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SkillsUSA®
CHAMPIONSHIPS

2018-19

Technical Standards

WWW.SKILLSUSA.ORG

ACKNOWLEDGMENTS

The SkillsUSA Championships Technical Standards 2019 sets forth the rules, protocols, competencies and criteria for official contests at the 2019 SkillsUSA Championships. Thousands of hours of volunteer and staff effort have been invested in this document. The business, industry, labor and education communities uniquely combined their time and talents to create and update the technical standards.

This document has a one-year shelf life, so advisors and students should be diligent in checking for updates from their competition's national technical committee, posted on SkillsUSA's website at: http://updates.skillsusa.org.

The organizations contributing to the technical standards want to improve the quality of career and technical education and better prepare our students for successful careers and engaged citizenship. The competency listings in this manual transmit the expectations of industry to our classrooms and labs.

SkillsUSA owes a great debt of gratitude for the selfless service of the members of our national technical committees and the organizations that support them. The SkillsUSA Championships represents a national hallmark in corporate citizenship. We would like to again thank our partners from business and industry for their sponsorship and dedication in helping shape our future skilled workforce. I would also especially thank my colleagues in the Office of Business Partnerships and Development and in the Office of Communications for their dedication and professionalism in preparing this edition.

David J. Worden
Program Director, SkillsUSA Championships Office of Business Partnerships and Development
SkillsUSA Inc.

In keeping with a tradition of respect for the individuality of our members and our role in workforce development, SkillsUSA strives to ensure inclusive participation in all of our programs, partnerships and employment opportunities.

INTRODUCTION

Many consider the SkillsUSA Championships to be the preeminent showcase of public technical education in the United States. The championships recognize career and technical students who excel in their occupational and occupationally related areas, as well as in the leadership development activities that are such an integral part of the SkillsUSA program in the classroom.

The involvement of industry in the SkillsUSA Championships program is essential. Experts in leadership, health occupations, and skilled and technical sciences donate their time to serve as contest judges and as technical committee members. They assume responsibility for selecting the skills that are to be judged, determining the format of the contests and establishing the standards by which contestants will be judged.

Besides showcasing students' skills, the SkillsUSA Championships, by the very nature of competition, urges students to take pride in their work. It also provides prospective employers with an opportunity to see dedicated, motivated potential employees at work.

To continue to meet the needs of both these potential employees and prospective employers, the lines of communication between technical education schools and industry must be kept open. Educators need to be able to identify industry's needs and, in turn, develop appropriate curricula.

SkillsUSA Career Essentials: Assessments

SkillsUSA's Career Essentials suite includes assessments for career and technical education that are supported by industry, education and policy leaders. Central to the assessments are the expertise and industry-defined competencies compiled in the SkillsUSA Championships Technical Standards. All of the system's assessments and certificates are based on the procedures, protocols, competencies and criteria established by subject -matter experts from industry and education.

Overview

Using a unique collaboration between employers and educators that simultaneously improves instructional programming, the SkillsUSA Career Essentials: Assessments system assesses and documents the entry-level technical proficiency of students. It helps teachers and advisors engage with the system to enhance instruction in classrooms and labs across the nation. The major components are:

1. **Skill Point Certificate**
   Individuals achieving an industry-defined cut score can earn a Skill Point Certificate through the online system. Skill Point Certificates, however, are awarded only to SkillsUSA member students who reach or exceed a threshold score in a national championships contest. Competitors achieving the cut score will be awarded the Skill Point Certificate, regardless of contest ranking or medal standing.

   All "official" national championships competitions will award Skill Point Certificates.

   Along with a national gold, silver or bronze medal, the Skill Point Certificate represents the pinnacle of achievement in demonstrating proficiency and workplace readiness in the student's occupational specialty. Each Skill Point Certificate may carry the logos and names of the organizations represented on that contest's national technical committee.

2. **Skill Connect Assessments**
   Both SkillsUSA and non-SkillsUSA students will have an opportunity to purchase and take an assessment (online, proctored paper and pencil, or hands-on testing) based on the competencies and criteria established in the championships technical standards. Those candidates achieving a cut score in the assessment test will be awarded a Skill Connect Certificate, very similar to the Skill Point Certificate.

   SkillsUSA has created fee-based Skill Connect assessment tests in more than 40 technical and employability contests.

   For more information on the SkillsUSA Career Essentials, visit: www.careeressentials.org.

SkillsUSA Championships Organization

The SkillsUSA Championships is governed by policies established by the board of directors of SkillsUSA Inc. These policies cover donations and awards as well as SkillsUSA Championships committees' composition and responsibilities.

The SkillsUSA Championships is organized as follows:

1. Board of directors of SkillsUSA Inc.
2. SkillsUSA Championships Executive Committee
3. SkillsUSA Championships director
4. Individual technical committees for each area of competition
5. National Education Teams

Introduction of New Contests

There are many requests for the establishment of new contests in the SkillsUSA Championships program. In determining the addition of new events to the SkillsUSA Championships, either for demonstrations or for final approval as an official contest, the staff of SkillsUSA will apply the following principles as a test of need:

Go to: www.skillsusa.org/competitions/skillsusa-championships/contest-descriptions/ to download the "Demonstration Contest Application" form. To be considered, the following time frame must be followed. If not followed, the contest will have to wait until the next open application period.

1. Applications submitted between Jan. 1 and July 1 of that year will be considered for the following year's NLSC. Example: Feb. 2, 2016, would be for 2017 NLSC; Sept. 13, 2016, would fall to the 2018 NLSC.
2. All applications submitted within the enrollment period will be reviewed and placed before the state association directors in their August meeting.
3. State association directors would then need to have their votes back to the SkillsUSA Championships director by Nov. 15 or sooner.
4. The SkillsUSA Championships director would then notify the state directors and the technical committees and post the results of which contests are going to be offered by Jan. 15 or sooner.

Some of the criteria to consider:

1. Are there a significant number of members in SkillsUSA who want to compete in the contest?
2. Are there jobs in the occupation and an industry that is nationally significant?
3. Special attention should be given to areas of new and changing technology as driven by industry.
4. Leadership contests will be added based upon solid proposals from the memberships that indicate value to students in relationship to future employment.

The following areas will be considered before a new contest can be approved:

1. A minimum of 10 state associations must commit to conducting the contest at the state level for a contest to be seriously considered.

2. A SkillsUSA Championships technical committee representing at least two different companies or professional organizations must be established to develop contest rules and establish the necessary support for personnel, contest equipment and prizes to introduce the contest. There also will be a need to establish a custodial account to help cover the cost of the contest. A financial commitment will be needed to cover costs in setting up the space and contest needs. The fees are as follows:
   a. Leadership, $1,750
   b. Occupationally Related, $3,000
   c. Skilled and Technical, $4,500

3. Preliminary contest rules will be printed and distributed to all state association directors with states invited to conduct the contest and participate in the national demonstration.

4. New contests introduced at the national championships are given "demonstration" status. The contest is then reviewed and should qualify for "official" contest status

by the third year. Demo status can be extended by the Executive Committee if warranted.

5. Contest operation and participation regulations will be reviewed by national staff to determine feasibility of official inclusion of the contest in the SkillsUSA Championships.

6. Official inclusion of new SkillsUSA Championships contests will be approved by the SkillsUSA board of directors. Industries may conduct technology demonstrations to solicit support from the states for a demonstration contest the following year.

Elimination of Contests

There must be at least 12 contestants/teams in each official contest for the contest to be held. (Exceptions are Chapter Display, Occupational Health and Safety, Outstanding Chapter, Promotional Bulletin Board and health occupations contests.) *In the event that fewer than 12 contestants participate for two years, the contest may be discontinued pending a decision by the SkillsUSA board of directors.*

Absorption of Contests

If an existing contest is facing elimination because of declining numbers, it is to be evaluated to determine if there is a new contest that may be similar. If so, the old contest guidelines would be reviewed by the championships director to determine if it could be absorbed within an existing contest. If so, the contest would receive temporary demonstration status so the state association directors have time to restructure and review the possibilities. This temporary demonstration status will cover a two-year period.

SkillsUSA Championships General Regulations

1. These *SkillsUSA Championships Technical Standards* are written as guidelines for the administration of national contests.
   a. They should serve as models for administration of local, regional and state contests but should not be considered binding upon state associations in conducting state-level SkillsUSA Championships.
   b. Because of the changes that can occur within a contest area or a specific station, the scorecards or scoring criteria for all contests can be found on the SkillsUSA website under: updates.skillsusa.org.
2. A careful analysis of the skills and knowledge required for successful employment will identify a core of technical and scientific principles that students should understand. Knowing these principles will increase their chances of succeeding and progressing in their fields and form a basis for understanding and applying new technology as it is introduced in their respective fields. Competitors are expected to understand such principles as they apply to their skill areas. They will be expected to know and demonstrate the following:
   a. Mathematics: addition, subtraction, division and multiplication of whole numbers, common fractions, decimal fractions, ratio, proportion, percentage, average, area, volume, metrics and written problems specific to areas of training
   b. Engineering drawing/print interpretation and schematics related to specific areas of training
   c. Reading comprehension/interpreting technical manuals
   d. Completion of a job application form
   e. Making an appointment for a job interview
   f. Proper interview techniques
   g. Responding clearly to oral questions
   h. Safety knowledge (Some contests require evidence of safety training. Contests that require a training safety card will be noted in the technical standards or posted on the SkillsUSA Updates page: updates.skillsusa.org.)

      Students are encouraged to complete the Occupational Safety and Health Administration's (OSHA) 10-hour, web- based CareerSafe course. For more, visit: www.careersafeonline.com. Participants completing the safety training course will receive a wallet card from OSHA

      Note: There will be a phase in of safety requirements to all contests Some contests may require the 10-hour OSHA safety card and/or other type of safety certification.

   i. Compliance with all copyright laws and software licensing requirements

3. Begin checking SkillsUSA's website in September for any changes to these guidelines. All changes to the current year's competitions can be found at: updates.skillsusa.org.

4. Tie-Breaker:
   a. No contest will end in a tie. If the competitors are tied at the end of the contest. The tie will then refer to the most heavily weighted station as determined by the technical committee.
   b. The test results will be used in the event of a tie to determine first-, second- and third-place winners only.

5. Technical Skills-Related Written Test:
   a. Written tests and problem-solving exercises covering skills and related information will be included as a part of each contest (with the exception of special needs contests). The number of points allowed will not exceed 15 percent of the total possible points and will be determined by the technical committee. The following procedures will apply:

- The test will cover the appropriate math, technology, schematic/ engineering drawing/print interpretation, safety, problem-solving and related information needed for employment.
- The test will be prepared or approved by the SkillsUSA Championships technical committee and may be given at the contest orientation meeting or on the day of the contest.

6. Professional Development Test:

There will be a written test based on the Career Essentials Program of work. Competitors will be required to take the exam and the scores will be added to their total overall score within their respective contests. This will take place in 2020.

7. Leadership and Occupationally Related Written Test:

   a. Written tests and problem-solving exercises covering skills and related information may be included as a part of some contests. *Those that do not require a written test are:* Action Skills, American Spirit, Chapter Display, Career Pathways Showcase, Community Action Project, Community Service, Employment Application Process, Entrepreneurship, Extemporaneous Speaking, Job Interview, Job Skills Demonstration, Occupational Health and Safety, Opening and Closing Ceremonies, Outstanding Chapter, Pin Design, Prepared Speech, Principals of Technology, Promotional Bulletin Board and T-Shirt Design.
   b. The only Skilled and Technical Sciences contest to not require a written test is Building Maintenance.

   Note: Check the contest Updates Page at: updates.skillsusa.org for any potential changes.

8. An oral professional assessment, such as a personal interview, explanation of skills to be performed, problem to be solved or other employability skills assessment, will be included as a part of each contest. The number of points allowed will not exceed 10 percent of the total score and will be determined by the technical committee.

9. All competitors must create a one-page résumé and submit a hard copy to the technical committee chair at orientation.

Failure to do so will result in a 10-point penalty. *Competitors may bring a résumé to the contest on the day of competition; however, the penalty will remain in effect.*

10. Competitors in contests that require verbal presentations must use the proper name of the national organization, "SkillsUSA." Contestants in American Spirit, Chapter Display, Community Service, Occupational Health and Safety, Outstanding Chapter, Promotional Bulletin Board and Career Pathways Showcase must exhibit the organization's proper name and logo. Failure to do so will result in penalty points being assessed by the national technical committee. Visit: www.skillsusabrandcenter.org for proper use of the logo.

11. SkillsUSA Championships awards may be presented to the top three contestants in each division. *Contestants are rated against a standard of performance* rather than automatically being awarded first, second or third-place medals base on the highest-rankings. **Medals will not be awarded if the standard of performance as determined by the technical committee does not justify such recognition.**
    a. No ties will be permitted.
    b. National finalists will be recognized with an appropriate designation on their SkillsUSA Championships participation certificates. The state association will determine designation as a finalist.
    c. Judges' decisions will be final. Interpretations of all contest rules will be made by the director of the SkillsUSA Championships.

12. The competencies listed in this publication under each occupational area are the basis for a quality technical instructional program from which our national contests are derived. The competencies have been listed to provide direction and assistance to state associations as they establish their district and state SkillsUSA Championships and to identify the scope of the national contest.

Who May Compete

13. Participants must be active SkillsUSA members in their respective divisions whose dues have been postmarked by midnight of March 1.
    a. Exceptions to the above policy may be made under certain conditions. For details, contact your state SkillsUSA office.
14. Each national contest provides for individual entries unless the rules of the contest state that it is a team competition. States may enter one high school, one middle school *(where contests are stated to accept a middle school)* and one college/postsecondary student/team in each competition, unless otherwise stated in the specific contest rules.
    a. High-school contestants are students enrolled in a coherent sequence of courses or a career major that prepares the student for further education and/or employment related to technology, the health industry, trades or industry. Further, a high-school contestant must be earning credit toward a high-school diploma/certificate or its equivalent during the school year immediately preceding the National Leadership and Skills Conference.
    b. College/postsecondary contestants are students enrolled in a coherent series of courses or a career major that prepares them for further education and/or employment related to technology, the health industry, trades or industry. College/postsecondary contestants must be earning credit toward a postsecondary degree/certificate during the school year immediately preceding the National Leadership and Skills Conference.
    c. Middle-school members must be or have been enrolled in a middle-school exploratory course that prepares for future study in a career and technical education pathway.

15. Individual contestants may enter only one national championships contest annually. The Championships will not adjust a contest schedule for students running for national office or any other reason with the exception of an unforeseen travel issues.

16. Participants in national contests must be first-place winners selected within their career pathway on a competitive basis at the state level. In the event the first-place winner is unable to participate, the alternate must be the next highest-placing contestant at the state level who is able to participate. All contestants must qualify through state SkillsUSA approved contests. States may be disqualified from participation in a specific contest if they approve contestants who have not competed in a state contest.

    In team events, substitutions may be made if a team member (or members) has to withdraw from the national competition. *A full team must be registered*. The ability of the contestants to meet the standards of national competition must be considered before the state association certifies the contestant.

    Teams that have fewer attend than the full number registered may be subject to penalties. The amount of the penalty will be determined by the number of no-shows as well as the reason for having less than the required number (e.g., team of three and one no-show, 1/3 of the total points).

    Note: Teams will be allowed to add a member if a member has a family emergency and must cancel. Such cases will be handled as needed, and the director of the SkillsUSA Championships will be notified.

17. Participants must meet the eligibility requirements set forth in each contest description.

Judging Criteria

18. The judging criteria listed on each contest rating sheet comprise the basic elements that will be considered in the evaluation of the contestants' performance.
    a. The exact number of items evaluated and points assigned to each criterion may change from year to year depending on the complexity of the project.

b. The rating sheets are intended to give contestants and advisors a basic understanding of the evaluation criteria and serve as a guide as they prepare for national competition.

Release of Contest Results

19. An analysis of contestant scoring and a ranking of the contestants will be available and accessible to every competitor on the SkillsUSA website within one week following the close of the national conference. The ranking of all competitors will be available and given to the state association directors (or their appropriate designees) at the Awards Ceremony.

20. The appropriate state official agrees not to use this information in any way that will violate any local, state or federal law and will protect each student's right of privacy as required by law.

How to Register

21. Only properly registered participants may enter SkillsUSA Championships contests. Registration requirements are:
    a. Contestants must have joined SkillsUSA by March 1. *Note:* For some states, it may be sooner.
    b. Official National Leadership and Skills Conference (NLSC) registration forms must be submitted by the deadline (May 1, or 10 days following the state SkillsUSA Championships).
    c. States may make changes and substitutes up to 4 p.m. two days prior to the contest during the week of that particular conference.
    d. After June 1, the addition of contestants/teams must first be approved by the specific national technical committee chair.
    e. In team *leadership contests*, should a team member drop following the state competitions, states may substitute another student. *Teams may compete with one fewer team member in the case of an unforeseen circumstance just prior to the national competition* (e.g., student becomes ill, is involved in an accident or simply does not show up) as long as a full team was registered originally and the specific contest guidelines do not state otherwise.

Tools and Materials

22. Participants who do not bring the required tools and materials as specified in the individual contest regulations *may be penalized two points for each item missing*. Such penalties will be assessed by the contest chair. The contest chair may, at his or her discretion, furnish the required item(s) but may assess the two-point penalty per item.

23. It is strongly recommended that toolboxes not exceed 9"x14"x22". Contestants may bring more than one box. Toolboxes that are bigger or cannot be carried by one person should have casters, wheels or a hand truck for movement to and from contest areas.

Observer Rules

24. During the contest, participants must work independently, without assistance from judges, teachers, fellow students or observers. Contestants will be disqualified for receiving such assistance.

25. It is in the spirit of competition and good sportsmanship to demonstrate professional courtesy to other competitors. Contestants shall in no way disrupt or interfere with the work or performance of fellow contestants or teams. Any contestant or team found to be in violation of this regulation may be at the risk of penalty or even disqualification in the case of a serious violation.

26. A roped or otherwise marked area will be designated for observers. No observers, including SkillsUSA advisors, will enter the designated contest areas without the approval of the SkillsUSA Championships technical committee.

27. No observers will talk or gesture to contestants. Doing so may result in penalties or disqualification.

28. Judges may request a penalty or disqualify contestants who accept assistance from observers.
29. No observers will be permitted in the contest holding room or at the contest orientation meeting unless specifically invited by the SkillsUSA Championships technical committee.
30. Additional limitations on observers, such as entering or leaving a contest area during a demonstration or sequence, may be posted to protect contestants from unnecessary distractions.
31. The technical committee chair may close the contest to observers if observers are seen to be communicating or aiding a contestant in any way or if safety demands such action.

32. **Neither cameras with flash attachments, cell phones, nor recording devices of any kind will be permitted in any contest area without the consent of the SkillsUSA Championships director**.

Contestants with Special Needs

33. The SkillsUSA Championships management team will make every effort to provide assistance/accommodations as appropriate to create equal opportunities and a level playing field for all contestants. No assistance will be provided that could be interpreted as giving the special needs contestant an unfair advantage. Advanced identification of the contestants and their special needs will be required. The following are examples of the types of assistance that are allowed:
    a. Special tables will be allowed for contestants who need to use wheelchairs.
    b. Signers will be allowed to translate oral instructions given by the technical committee to deaf or hearing-impaired contestants.
    c. Special tools and devices will be allowed for contestants with prosthetics or physical challenges such as a club foot, burn injury or amputation.
    d. Contestants with dyslexia or other learning disabilities will be allowed assistance as determined by the complexity of the contest assignment.
    e. Readers will not be allowed in contests where the use of technical manuals is required.
    f. Hearing-impaired contestants will be provided signers at contest orientations, at the startup of the competition (and throughout the day if required by the technical committee) and for the contest debriefing.
    g. Translators for language issues must be noted and provided by the state.

Models/Assistants

34. Nail Care and Esthetics models and assistants in Action Skills, Principles of Technology, and Job Skill Demonstrations A and Open must be active SkillsUSA student members. Models and assistants are not required to be from the same school as the competitor. They are not considered contestants and are not required to attend contestant orientation meetings. Since models and assistants are not involved in the written test and are not considered contestants, they are also not eligible to receive medals. They will, however, receive a participation certificate or other form of recognition.

Mandatory Contest Meetings

35. Contestants must report to the *mandatory contest orientation meeting,* as scheduled in the conference program, for instructions from the technical committee chairs. This is a critical meeting since technical committee chairs provide specific contest instructions and many times administer the written and oral tests at this meeting.

Personal Appearance of Piercing and Tattoos

The policy in regard to piercing and tattoos while participating in the NLSC is as follows:

36. Piercings: Wearing of any piercings should not in any way cause a safety issue. If so determined, the offending item must be removed for the duration of the SkillsUSA Championships contest. Failure to comply will result in a safety penalty.

37. Tattoos: Any tattoo that is considered vulgar, sexual or morbid should be covered to the best of the student's ability while competing in any SkillsUSA Championships contest. Failure to do so will results in a penalty

SkillsUSA Championships Clothing Requirements

1. Contestants in the SkillsUSA Championships must wear the approved SkillsUSA Championships clothing or work uniform specified for their particular contests during competition or be subject to a penalty of up to 5 percent of the total points available. The clothing items referred to in these regulations are pictured and described at: www.skillsusastore.org. For questions regarding clothing or other logo items, call 800-401-1560 or 703-956-3723.

2. Contestants must wear their official contest clothing to the mandatory contestant meeting prior to the competition.

3. Participants must meet clothing requirements for the individual contests. For specific requirements, refer to the individual contest regulations.
   a. Contestants who do not satisfy the clothing requirements may be penalized up to 5 percent of the total possible contest points.
   b. All contestants are required to wear their official contest uniforms or official SkillsUSA attire to the Awards Ceremony, where the winners are announced and the industry awards are presented. Inappropriately dressed contestants will be denied access to the awards platform.

   Note: Contestants with special needs regarding clothing requirements should contact the SkillsUSA Championships office.

   The original official blazer, jacket, sweater or any other uniform with the old "SkillsUSA–VICA" or "VICA" emblem patch may still be worn in contests requiring official attire as the required clothing.

4. The clothing requirements apply only to the national contests. State associations may have different dress requirements for their own SkillsUSA Championships program.

5. "SkillsUSA official attire" as indicated for specific contests refers to the following:
   For men: Official blazer or jacket, black trousers with white dress shirt, plain black tie with no pattern (or official SkillsUSA black tie from: www.skillsusastore.org), black socks and black shoes.

   For women: Official blazer or jacket, black slacks or knee-length skirt with businesslike white, collarless blouse or white blouse with small, plain collar that may not extend onto the lapels of the blazer, black sheer or skin-tone seamless hose and black dress shoes.

   Note: T-shirt-style tops are not approved.

   All personal jewelry should contribute to a businesslike appearance. Only official SkillsUSA jewelry is to be worn on a SkillsUSA blazer, jacket or sweater. Official jewelry is described as conference pin, SkillsUSA emblem, officer pin, President's Volunteer Service Award pin, statesman pin (one only) and professional development (one only) pin.

6. No canvas, vinyl, plastic or leather athletic-type shoes, open-toe shoes or open-heel shoes are permitted in any SkillsUSA Championships event without penalty. Contestants may be disqualified where improper footwear constitutes a health or safety hazard. When work boots/shoes are required, they can be steel-, or non-steel-toed, tied or pull-on (Roper-type, no cowboy boots), with rubber or skid-resistant soles, and they must meet the specifications of The Occupational Safety and Health Administration (OSHA) OSH Act of 1970; United States Code Title 29, Chapter 15, states:

   The OSH Act was established to ensure safe and healthful working conditions for every working man and woman. Among the many provisions, the act requires the use of personal protective equipment (PPE) to reduce employee exposure to hazards

when engineering and administrative controls are not feasible or effective in reducing these exposures to acceptable levels. OSHA's personal protective equipment standard, 1910.132 (d)(1), requires that employers "assess the workplace to determine if hazards are present or are likely to be present, which necessitate the use of personal protective equipment."

OSHA 29 CFR 1910.136 incorporates the following industry standards by reference: the American Society for Testing and Materials — ASTM F2412-05 Standard Test Methods for Foot Protection, F2413-05 Standard Specification for Performance Requirements for Protective Footwear and the American National Standards Institute (ANSI) American National Standard for Personal Protection — Protective Footwear (ANSI Z41-1999 and Z41-1991).

What to look for: Approved foot safety protection should be labeled as "Complies with (or Conforms to) ASTM F 2412-05 and F 2413-05" (which replaced the older label of the former ANSI Z41-1999 footwear standard in 2005). Work boots come in a wide range of styles. Some may look similar to athletic shoes but are regulation safety work boots/shoes and meet the ASTM standards. Checking work boots will require verifying compliance with the standards. One shoe of a pair must be clearly and legibly marked (stitched in, stamped on, pressure sensitive label, etc.) on either the surface of the tongue, gusset, shaft or quarter lining. Work boot identification marking must be enclosed in a rectangular border, and a four-line format is suggested.

7. Eye protection must meet ANSI Z87 requirements. Prescription and non-prescription safety glasses must include side shields designed for the safety glasses by the manufacturer of the eye protection. An imprint with the mark "Z87" will appear on the frame or lens to identify the safety glasses as meeting ANSI Z87 requirements. Approved safety goggles may also be worn to meet these eye protection requirements.
8. Contestants with long hair that poses a possible safety or sanitary hazard must wear hair containment devices (hair nets).
9. Contestants may be disqualified for lack of safety clothing or attire.
10. The wearing of accessory items (such as belts) is optional unless otherwise specified in the contest rules.
11. Only occupational or career patches, competitor patches and Professional Development Program (PDP) patches may be worn on the left shoulder or above the left pocket without penalty. However, they are not required.
12. No identification of the contestant, school or state is allowed on official clothing.
13. Check for specific clothing and safety requirements under the guidelines for each contest.
14. Clothing penalties in all skill contests will be assessed by the designated state director in cooperation with the contest chair. SkillsUSA Championships technical committees will assess clothing penalties for all leadership contests.

Clothing Classifications

Class A: SkillsUSA Official Attire

For men: Official SkillsUSA blazer or jacket, black dress slacks, white dress shirt, plain black tie with no pattern (or SkillsUSA black tie), black socks, black shoes.
For women: Official SkillsUSA blazer or jacket; black dress skirt (knee-length) or black slacks; plain businesslike white, collarless blouse (or white blouse with small, plain collar that may not extend onto the lapels of the blazer); black sheer or skin-tone hose; black shoes.

Class B: Healthcare Attire

For both men and women: Official blue scrubs; white socks or skin-tone seamless hose; health-professional's white leather work shoes. Shoes must be all-white leather (no canvas), completely enclosed (no open-toe or open-heel). Athletic-style shoes that meet the aforementioned criteria are acceptable.

Scrubs should fit appropriately for all health contests and should be properly hemmed and wrinkle free. Only plain, white, collarless t-shirts may be worn underneath the scrubs. Hair must be pinned up and off the collar.

Class C: Contest Specific — Manufacturing/Construction Khaki Attire

For both Men and Women: Official SkillsUSA khaki work shirt and pants; black, brown, or tan leather work shoes; safety glasses with side shields or goggles (prescription glasses may be used, only if they are equipped with side shields. If not, they must be covered with goggles).

Class D: Contest Specific — Automotive Blue Attire

For both men and women: Official SkillsUSA light blue work shirt; navy pants; black, brown, or tan leather work shoes safety shoes (with protective toe cap.) Safety glasses with side shields or goggles (prescription glasses may be used only if they are equipped with side shields. If not, they must be covered with goggles).

Class E: Contest specific — Business Casual

For men: Official SkillsUSA white polo shirt, black dress slacks, black socks, black leather shoes.
For women: Official SkillsUSA white polo shirt with black dress skirt (knee-length) or black slacks; black socks or black or skin-tone seamless hose; black leather dress shoes.

Class F: Contest Specific - Cosmetology

For men: Official SkillsUSA white dress shirt; black dress slacks; black socks; black leather work or dress shoes.
For women: Official white top; black dress slacks; black socks or black or skin-tone seamless hose; black leather work or dress shoes.
Note: A white cosmetology smock can be worn with the white dress shirt for men or white top for women.

Class G: Culinary/Commercial Baking Attire

For both men and women: White or black work pants or black-and-white checkered chef's pants*, white chef's jacket, white or black leather work shoes; white apron; white neckerchief; side-towels; hairnet. Chef's hats (toques) will be supplied by the National Technical Committee, as well as food-handlers' gloves.

Not available through SkillsUSA Store

Class H: Contest Specific — Restaurant Service

For men: Official SkillsUSA white long-sleeved dress shirt, or long-sleeved plain white collared shirt; black dress slacks with belt; plain black tie with no pattern or SkillsUSA black tie; black socks; shined black leather work shoes.

For women: Official SkillsUSA white long-sleeved dress shirt, or long-sleeved plain white collared shirt; black skirt (knee-length) or black dress slacks with belt; black socks or black or skin-colored seamless hose; shined black flat heels.

Note: Bistro aprons are the official apron for Restaurant Service and are required. Waiter's jackets, bow ties, vests, cummerbunds or half aprons are not permitted.

INSTRUCTIONS TO SKILLSUSA CHAMPIONSHIPS TECHNICAL COMMITTEE CHAIRS

General Responsibilities

1. Attend all meetings called by the SkillsUSA Championships director or officially designate a committee member to serve as your authorized representative at those meetings.

2. Make sure that all committee members are familiar with the SkillsUSA Championships Technical Standards.

3. Supervise the selection of the skills to be tested in the national contest, and identify necessary equipment and supplies. Make arrangements for borrowing and/or soliciting donations of all items.

4. Supervise the development of contest projects, drawings and instruction sheets for the contestants.

5. Locate individuals who are knowledgeable in your contest trade or skill area and invite them to serve as judges.

6. Plan the layout of the contest site. Identify needs and/or services such as water, electricity and compressed air.

7. Make arrangements for acquiring appropriate industry awards.

8. Plan and conduct the mandatory contest orientation and debriefing meetings.

Contest Orientation Meeting

The contest orientation meeting is mandatory for all SkillsUSA Championships participants. The purpose of this meeting is to review the following items with all contestants.

1. Contestants' Credentials: Verify each contestant's name and number as he or she appears on the nametag with the master list of contestants. Check the individual name to the actual name on the nametag.

2. Contest Rules: Check to be certain that all contestants are familiar with the contest rules and have been notified of any relevant information in the annual contest updates.

3. Contest Procedures: Explain the way in which the contest will be run, including schedule, procedure for time in/time out, rating criteria, procedure for breaking ties and method of dealing with problems.

4. Safety Regulations: Review general and specific safety requirements and procedures for the contest.

5. Tools and Materials: Go over the list of tools and materials that are to be supplied by the contestants. Include any additional items mentioned in the updates. If contestants do not have all the required items, be sure they understand that they must obtain them before the contest begins.

6. Work Stations/Order of Performance: If workstations are not identical, make sure contestants draw numbers for assignments. In contests where the order of performance is important, the procedure for determining the order should be explained.

7. Equipment: Take time to explain the operation of equipment with which contestants may not be familiar, including safety features. If possible, allow contestants time to become familiar with the equipment.

8. Special Announcements: Detail any special functions that the committee has planned, explain special transportation or time schedules, announce industry awards, and announce that contestants are not permitted to smoke during the contest.

   Note: The national organization requests that all SkillsUSA Championships committee and contest personnel refrain from smoking or consuming alcoholic beverages in the presence of SkillsUSA student members.

9. Contestants' Questions: Encourage contestants to ask any questions they may

have about the SkillsUSA Championships. Try to give satisfactory answers before the close of the contest orientation meeting.

10. Contestant Penalties: There may be special circumstances that prevent a competitor from attending the contest meeting (e.g., illness, accidents or transportation). Please do not disqualify a competitor without first consulting with the SkillsUSA Championships office.

Conducting the SkillsUSA Championships

1. Check all contest area facilities prior to the day of the contest to be certain that everything is in place and in order for a smooth-running competition.

2. Assemble all judges at the contest site prior to the start of the contest for a briefing. Be sure that all questions are answered and that the rating procedures are clear.

3. Check to be certain that all contestants have brought the tools and materials required for the competition. The technical committee may, at its option, furnish any required items that contestants have failed to bring; however, a two-point penalty may be assessed for each missing item.

4. Make sure that all contestants meet clothing requirements for the contest. (See the section on SkillsUSA Championships Clothing Requirements in the individual contest regulations.) The penalty for those who do not satisfy dress requirements will be 1 percent to 5 percent of the total possible contest points. *Clothing penalties in all skill contests will be assessed by the designated state director or designee in cooperation with the contest chair. SkillsUSA Championships technical committees will assess clothing penalties for all leadership contests.*

5. Make sure that all contestants receive copies of the project to be completed as well as any necessary drawings, instruction sheets or other materials. Be certain that contestants understand all instructions and have a chance to ask procedural questions. Take great care to see that all contestants have equal time and their questions are answered fairly.

6. Oversee the contest to ensure that safe work practices are followed.

7. Do not permit contestants to enter the contest site at any time unless they are displaying their contestant badges and numbers.

8. Do not permit contestants to smoke during the contest.

9. Conduct a critiquing session with the contestants after the contest to point out general strengths and weaknesses and the quality of work expected by the judges. (Do not discuss individual contestant performance.)

10. Verify all judges' rating sheets and submit them to the SkillsUSA Championships scoring management team.

11. Complete the chair's final report and return it along with required items to SkillsUSA Championships headquarters following the contest.

12. Keep the results of the contest confidential until the announcement of the winners at the Awards Ceremony.

13. Attend the Awards Ceremony to present medals to the place winners.

14. Organize and supervise the teardown of the contest area and be certain that equipment, tools and supplies are returned to the proper owners.

Instructions to Contest Judges

1. Judges must be completely familiar with the SkillsUSA Championships Technical Standards, particularly the General Regulations, Instructions to Technical Committee Chairs, and the specific rules of the contest they have been asked to judge.

2. Judges should receive copies of the contest project and judges' rating sheet(s), along with complete instructions from the

technical committee chair prior to the competition.

3. Members of the SkillsUSA Championships technical committee may not serve as judges unless approved by the SkillsUSA Championships director.

4. Judges must give careful attention to each rule, and each contestant or entry must be judged in exactly the same manner and under the same conditions as every other contestant or entry.

5. Judges will meet prior to the SkillsUSA Championships, at a time and place announced by the SkillsUSA Championships technical committee chair, to confer on:
   a. Rule meanings and interpretations
   b. Room arrangements
   c. Materials and equipment
   d. Last-minute details
   e. Rating sheets

6. Judges will evaluate the performance of each contestant according to the criteria listed in each contest.

7. Judges will identify contestants by number only. Judges will not use contestants' names, schools or states unless otherwise specified in individual contest rules.

8. Judges may attend the contest orientation meeting held prior to the opening of the SkillsUSA Championships. However, only members of the technical committee may instruct the contestants and verify attendance.

9. Judges are selected because of their recognized expertise in the trade or skill that they are being asked to judge and are asked to follow the official SkillsUSA rules without inserting personal opinions. Such things as length of hair, length of dress and style of shoe, unless specifically covered in the contest regulations, are not to be considered by the judges except where safety is considered.

10. *In no instance are judges or contest chairs authorized to change the contest rules.* If an interpretation is required, the chair should contact the SkillsUSA Championships director.

11. Judges are to evaluate all items related to safety. Contestants not meeting safety requirements in clothing and/or devices may be disqualified from competition if, in the judges' opinions, the safety of the contestants or those around them is endangered.
12. Judges should rate contestants on the basis of entry-level job skills.

13. Judges should rate each contestant independently and not compare rating sheets with those of other judges.

14. Judges should rate contestants against a standard of performance rather than automatically awarding first-, second- or third-place medals to the highest-ranking competitors. It is not necessary to award a medal if the standard of performance does not justify such recognition.

15. After the judging is completed, judges should total their own rating sheets and return them, along with any notes and other pertinent information, to the SkillsUSA Championships technical committee chair.

16. The judges and technical committee members will keep all results confidential until the general announcement of winners is made at the Awards Ceremony. Under no circumstances may the judges discuss contest results or contestants' performance with contestants, chapter advisors or any observers.

17. Judges should refer all contest inquiries or problems that arise to the SkillsUSA Championships technical committee chair.

WORLDSKILLS COMPETITION

Introduction

SkillsUSA is a member of WorldSkills International, headquartered in Amsterdam, Netherlands. This organization sponsors the biennial WorldSkills Competition (WSC).

Participation in the WSC has provided a vehicle for comparing our career and technical students and methods of training with that of our major free-market competitors. The training technologies displayed at the WSC exemplify the ultimate standard in skilled workforce preparation. As such, they offer important lessons for technical instructors and for SkillsUSA's corporate partners, whose productivity depends on employees with up-to-date skills. WSC results are one of the benchmarks by which a country's global economic competitiveness is judged.

Over its 60-year history, WorldSkills International has come to symbolize the pinnacle of excellence in career and technical training. Every two years, hundreds of young skilled people, accompanied by their teachers and trainers, gather from around the world to compete in the skills of their various trades and test themselves against demanding international standards and each other. They represent the best of their peers drawn from national skill competitions in 75 countries/regions.

WorldSkills was founded in 1950 and currently has members from 76 countries, with efforts constantly being made to expand the membership. In 1973, President Richard Nixon recognized SkillsUSA (then known as VICA) as the official organization representing the United States. Only one organization may represent a country in the official delegation and certify that country's international contestants.

SkillsUSA appoints one official delegate and one technical delegate to the governing body of the WorldSkills Organization, called the Member Assembly. A technical expert from the United States is appointed to each contest in which the United States competes and is responsible for working with technical experts from other countries to organize, conduct and judge that contest.

WorldTeam Selection Procedures and Criteria

1. SkillsUSA* will only compete in those WSC contests for which it has a well-qualified competitor, a well-qualified technical expert, adequate industry-funded support for conducting qualifying trials, advanced training and general operating costs of the SkillsUSA WorldTeam contestant prior to the WSC.
   Note: The SkillsUSA Foundation is responsible for obtaining financial support for the WorldTeam's general operating costs, financial and in-kind support for qualifying trials, and advanced training of the WorldTeam members. SkillsUSA must also have 100-percent funding for the competitor and the expert. The funding can be from a single company or a series of contributors. Competitors can be added as funding comes in; however, if there is a possibility that the training needed to send a qualified representative is not available, SkillsUSA may not select a representative.

2. WorldTeam contestants may not turn 23 years of age or older during the calendar year of the WSC. (Exceptions apply for the two-member Mechatronics team and Aviation Technology contestants, who may be 25 years old.)

3. The selection process for the WorldTeam will be a combination of trials where possible and the balance by eligibility, scores from either of the prior two years' SkillsUSA Championships along with an essay and a detailed interview process.
   Note: The selection process for those candidates not selected by trials will be as follows:
   a. Invitations will be sent to eligible SkillsUSA Championships competitors who are selected by the national organization.
   b. Potential candidates will then fill out an application that includes a more detailed overview of what they will be challenged with.

c. This will be followed by a telephone interview and then a more in-depth interview, either in person or via a web conference.

4. Only students continuing their education and/or currently working in the skill area of the international competition for which they are being considered will be eligible.

5. Advanced training may require contestants to travel to receive training. Contestants will not be expected to pay for their training or travel without adequate financial support.

6. WorldTeam members are required to attend all webinars, orientations and promotional meetings scheduled by the SkillsUSA national headquarters prior to departure for the WSC.

7. State SkillsUSA directors and advisors of those candidates who are being considered will be notified. If their student is chosen, they will be notified and the student paired with a technical expert.

8. Individual training programs and schedules will be developed and will begin as soon as possible.

Action Skills

Purpose
To evaluate each contestant's ability to demonstrate and explain an entry-level skill used in the occupational area for which he or she is training.

First, download and review the General Regulations at: http://updates.skillsusa.org.

Eligibility
Open to active SkillsUSA members enrolled in career and technical programs with entry-level job skills as the occupational objective. A letter from the appropriate school official on school letterhead stating that the contestant is classified under the provisions of Public Law 105-17, Individuals with Disabilities Education Act, 1997, is required for participation. State associations having restrictions on the release of this information may submit a letter on school letterhead of eligibility, which simply states: "I certify that (student name) meets the eligibility requirements for the SkillsUSA Championships Action Skills contest. Signed, (school official)." The eligibility letter is to be presented to the contest chair at the contestant orientation meeting.

Clothing Requirement
Contestants *must* wear appropriate attire for the occupational area of the demonstration.

SkillsUSA official attire will be acceptable only if the demonstration is considered a leadership skill.

For men: Official blazer, jacket or sweater; black dress slacks; white dress shirt; plain black tie with no pattern or SkillsUSA black tie; black socks and black shoes.

For women: Official blazer, jacket or sweater; black dress slacks or knee-length skirt with businesslike white, collarless blouse or white blouse with small, plain collar that may not extend onto the lapels of the blazer; black sheer or skin-tone seamless hose and black dress shoes.

These regulations refer to clothing items that are pictured and described at: www.skillsusastore.org. If you have questions about clothing or other logo items, call 800-401-1560 or 703-956-3723.

Note: Contestants must wear their official contest clothing to the contest orientation meeting.

Equipment and Materials
1. Supplied by the technical committee:
   a. Timekeeper
   b. All necessary information and furnishings for judges and technical committee
2. Supplied by the contestant:
   a. All materials and equipment needed for the demonstration to be completed two times, once for the preliminaries and again for the finals, if required
   b. All competitors must create a one-page résumé and submit a hard copy to the technical committee chair at orientation. Failure to do so will result in a 10-point penalty.

   ***Note*:** Your contest may also require a hard copy of your résumé as part of the actual contest. Check the Contest Guidelines and/or the updates page on the SkillsUSA website at http://updates.skillsusa.org.

Scope of the Contest

Knowledge Performance
There is no written knowledge test required in this contest.

Skill Performance
The demonstration is a presentation of an occupational skill accompanied by a clear explanation of the topic through the use of examples, experiments, displays or practical operations.

Contest Guidelines

1. Any skill may be demonstrated if it is related to the occupational program of the contestant.

2. The contestant will present a 3"x5" card with the following three items:
   a. The contestant's number
   b. The topic or purpose of the demonstration
   c. The contestant's training program

   This 3"x5" card will be presented to the chair upon entering the contest room and prior to the contestant's demonstration.

3. The demonstration shall be at least five minutes in length but shall not exceed seven minutes.

   Penalty: 50 points will be deducted for each 30 seconds (or fraction thereof) under the five minutes or for each 30 seconds (or fraction thereof) over the seven minutes.

4. Contestants will be allowed three minutes to set up the demonstration and three minutes to clear the demonstration area (8'x12') box.

   Penalty: 50 points will be deducted for each 30 seconds (or fraction thereof) over the three-minute allowance.

   Note: The demonstration area/box will be marked by an 8'x12' taped area on the floor.

5. Demonstration time (limit) will start when the demonstration begins. The timekeeper will signal the speaker at five minutes, six minutes and seven minutes.

6. One 110-volt (15 amp) electrical outlet with an extension cord, one 30"x 72" table, one chair and one easel will be provided.

   Note: The presenter and his or her demonstration material must remain within the 8'x12' demonstration area/box. Points will be deducted for any violation of demonstration materials, easel, presenter, model and/or model's chair that are outside the 8'x12' demonstration area/box.

7. Any visual aids (signs, charts, transparencies, slides or diagrams) are to be prepared by contestants. No sound devices of any kind may be used to transmit audible words, sound or music. No compressed air or gas will be permitted. No material or apparatus that in any way poses a threat of fire or explosion may be used. No pressurized aerosol cans of any kind are permitted.
8. The contestant will not mention or display his or her name, school, city or state.
9. The demonstration is an individual performance; however, an assistant may be used to set up and dismantle the demonstration, or may be used as a prop or model, but in no way can assist with the presentation. Any presentation assistance, coaching or signaling will disqualify the contestant. An advisor may not serve as an assistant. The presentation assistant/model/helper must be a SkillsUSA student member.
10. The contestant's advisor/instructor must attend the mandatory orientation meeting with the contestant.
11. Contestants will not take the skills-related written or Professional Development Test as outlined in the general regulations.
12. The presentation assistant/model/helper must attend the contestant orientation meeting.
13. The contestant will not have any interaction with the judges or timekeeper.
14. Tiebreaker — Highest score based on the following criteria:
    a. Explanation is complete
    b. Demonstration is interesting
    c. Demonstration is organized

Standards and Competencies

AS 1.0 — Design an effective presentation that demonstrates a job skill related to the field of training

1.1 Prepare a demonstration of a job skill that lasts five to seven minutes
1.2 Organize demonstration in a logical and coherent manner

AS 2.0 — Deliver the presentation in a professional manner that meets the standards outlined by the technical committee

2.1 Practice elements of informal conversation
2.2 Perform the actual skill in the presentation
2.3 Explain the topic through the use of experiments, displays or practical operations
2.4 Demonstrate an effective and pleasing delivery style
2.5 Use verbal illustrations and examples effectively
2.6 Make a formal and effective introduction to the presentation that clearly identifies the scope of the demonstration
2.7 Pronounce words in a clear and understandable manner if feasible
2.8 Use a variety of verbal techniques including: modulation of voice, changing volume, varied inflection, modifying tempo and verbal enthusiasm
2.9 Demonstrate poise and self-control while presenting
2.10 Use props and models to illustrate points
2.11 Demonstrate good platform development and personal confidence
2.12 Communicate the primary points of the speech in a compact and complete manner
2.13 Tie organizational elements together with an effective ending
2.14 Complete the demonstration within the time limits set by contest requirements
2.15 Deliver an interesting and informative demonstration

AS 3.0 — Wear appropriate national contest clothing for the occupational area of the demonstration.

3.1 Display clothing that meets national standards for competition
3.2 Demonstrate good grooming in dress and personal hygiene

AS 4.0 — SkillsUSA Framework

The SkillsUSA Framework is used to pinpoint the Essential Elements found in Personal Skills, Workplace Skills, and Technical Skills Grounded in Academics. Students will be expected to display or explain how they used some of these Essential Elements. Please reference the graphic above, as you may be scored on specific elements applied to your project. For more, visit: www.skillsusa.org/about/skillsusa-framework/.

Committee Identified Academic Skills

The technical committee has identified that the following academic skills are embedded in this contest.

Math Skills

None Identified

Science Skills

None Identified

Language Arts Skills

- Provide information in oral presentations
- Demonstrate use of verbal communication skills: choice, pitch, feeling, tone and voice
- Demonstrate use of nonverbal communication skills: eye contact, posture and gestures using interviewing techniques to gain information
- Identify words and phrases that signal an author's organizational pattern to aid comprehension
- Organize and synthesize information for use in written and oral presentations

- Demonstrate knowledge of appropriate reference materials
- Demonstrate understanding of skill

Connections to National Standards

State-level academic curriculum specialists identified the following connections to national academic standards.

Math Standards

None Identified

Source: NCTM Principles and Standards for School Mathematics. For more information, visit: www.nctm.org.

Science Standards

None Identified

Source: McREL compendium of national science standards. To view and search the compendium, visit: http://www2.mcrel.org/compendium/browse.asp.

Language Arts Standards

- Students adjust their use of spoken, written and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes
- Students employ a wide range of strategies as they write and use different writing process elements appropriately to communicate with different audiences for a variety of purposes
- Students use spoken, written and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion and the exchange of information)

Source: IRA/NCTE Standards for the English Language Arts. To view the standards, visi

American Spirit

Purpose
To evaluate local chapter activities for community service, citizenship projects and those with patriotic overtones that demonstrate a belief in the American way of life.

First, download and review the General Regulations at: http://updates.skillsusa.org.

Eligibility (Team of 3)
Open to all active SkillsUSA members. Each state may send one high-school and one college/postsecondary entry.

Clothing Requirement
Class A: SkillsUSA Official Attire
For men: Official SkillsUSA blazer or jacket, black dress slacks, white dress shirt, plain black tie with no pattern (or SkillsUSA black tie), black socks, black shoes.
For women: Official SkillsUSA blazer or jacket; black dress skirt (knee-length) or black slacks; plain businesslike white, collarless blouse (or white blouse with small, plain collar that may not extend onto the lapels of the blazer); black sheer or skin-tone hose; black shoes.

These regulations refer to clothing items that are pictured and described at: www.skillsusastore.org. If you have questions about clothing or other logo items, call 800-401-1560 or 703-956-3723

Note: Contestants must wear their official contest clothing to the contest orientation meeting.

Scope of the Contest
Knowledge Performance
There is no written exam for this contest.

Skill Performance
The contest evaluates local chapter activities for community service, citizenship projects and those projects with patriotic overtones that demonstrate a belief in the American way of life.

Contest Guidelines
How to Enter the Competition
1. Deadline: The entry will be brought to the National Leadership and Skills Conference and submitted to the national technical committee at the contest on the Tuesday immediately prior to the SkillsUSA Championships.
2. Interview: Interview time will be given at the time the entry is submitted.
3. Exhibition of Entries: Entries will be displayed in a secure area following the judging. Observers will be allowed to view them at designated times throughout the conference.
4. Pickup of Entries: Entries will be picked up on the afternoon of the last day of the National Leadership and Skills Conference by the state association director or by the chapter advisor. Entries will not be released to an unauthorized person. Chapters will be charged $10 for the return of their entries following the national conference.
5. Procedure: Chapters must conduct three separate projects that demonstrate community service, patriotism and citizenship, and promotion of career and technical education. Only one project per category may be entered. Students must plan, organize, prepare and execute all projects within the current competition school year.
6. All competitors must create a one-page résumé and submit a hard copy to the technical committee chair at orientation. Failure to do so will result in a 10-point penalty.

***Note*:** Your contest may also require a hard copy of your résumé as part of the actual contest. Check the Contest Guidelines and/or the updates page on the SkillsUSA website at http://updates.skillsusa.org.

Documentation Guidelines

1. Entries must be typed and submitted in an official three-ring SkillsUSA notebook or scrapbook. The notebook/scrapbook will contain no more than 75 sheets of paper the size of the official SkillsUSA notebook/scrapbook paper. Both surfaces of the 75 sheets may be filled, for a maximum of 150 surfaces.
   Penalty: Five points per surface (10 points per sheet of paper) will be deducted for exceeding these maximums.
   Note: A surface is only that material which can be pasted or glued to the basic notebook/scrapbook paper. Any pockets, foldout pages, multiple pages or similar features will count as additional surfaces and will be subject to penalty, except where specifically stated otherwise. Pages may be plasticized without affecting the scores. Original copies of newspaper articles must be submitted. Photocopies of articles, letters or digital communications are not acceptable. Dates of articles must be within the article, letter or digital communication or the date must be attached to the newspaper article, letter or digital communication (digital communication should contain the URL link as well).

   No complete names should be used anywhere in the book — first or last names only.

Documentation must include the following in this order:

a. Title Page
   Include name of chapter, name of chapter president, school name, school address and school telephone number, and a complete list of all credentials or certifications offered through the school's SkillsUSA pathway(s). Order should be as listed.

b. Table of Contents
(This should be Page 1.) The table of contents will follow the presented order list with page numbers. (It is better to itemize each section with page numbers for the item rather than a range of pages for the section.)

c. Section I: Community Service
   1. A single project description
   2. Indication of the applicable SkillsUSA Framework component (Personal Skills, Workplace Skills, Technical Skills Grounded in Academics) and Essential Elements for the project
   3. Objectives for the project
   4. Evidence of planning for the project
   5. Methods of implementation
   6. Number of members involved in the activity and the total membership (if the activity was done by a single pathway, use the pathway membership; however, if the entire chapter participated, use the total membership numbers)
   7. Letters (two or three) of recommendation or recognition
   8. Photographs (at least three and no more than six)

d. Section II: Patriotism and Citizenship
   1. A project description
   2. Indication of the applicable SkillsUSA Framework component (Personal Skills, Workplace Skills, Technical Skills Grounded in Academics) and Essential Elements for the project
   3. Objectives for the project
   4. Evidence of planning
   5. Methods of implementation

6. Number of members involved in the activity
7. Letters of recommendation or recognition
8. Photographs (at least three and no more than six)

e. Section III: Promotion of Career and Technical Education
   1. A project description
   2. Indication of the applicable SkillsUSA Framework component (Personal Skills, Workplace skills, Technical Skills Grounded in Academics) and Essential Elements for the project
   3. Objectives for the project
   4. Evidence of planning for the project
   5. Methods of implementation
   6. Number of members involved in the activity
   7. Letters of recommendation or recognition
   8. Photographs (at least three and no more than six)

2. Letters of Recommendation/Recognition (three for each project — one from each category below)
   a. Letter from a school administrator will be required for each project on school letterhead stationery with a signature
   b. Letter from a business, organization or industry representative will be required for each project, on official stationery with a signature
   c. Letter from local newspaper, radio station or TV station verifying that articles have been submitted and/or published to publicize the activity conducted by the SkillsUSA chapter. Original copies of the newspaper articles must be submitted. Date(s) of the project must be within the article or attached to the article. Photocopies of the articles are not acceptable.
3. Photographs
   a. At least three and not more than six good photographs (digitally reproduced copies are acceptable for photographs) of each project must be submitted to show events as they were conducted. (A collage-type picture is acceptable but must be printed as a single item.)
   b. Photos should be affixed in the scrapbook/notebook and identified.
   c. Photographs should be labeled with a description of the event taking place. Names (use only the person's first or last name) of people in the photograph should be included.
4. Interview
   a. An interview will be set up with one student designated by the advisor. Students will have an opportunity to explain how they approached various activities and how the project benefited their class. The interview will be used to help verify points awarded by the judges and to answer any questions they may have. No PowerPoint presentations or visual aids other than the notebook may be referenced during the interview.

Standards and Competencies

AM 1.0 — Conduct, plan and participate in three separate projects during the school year and provide evidence by creating a professional notebook/scrapbook with the title page, table of contents and three required sections

1.1 Describe the project using correct grammar, punctuation and spelling
1.2 List the objectives for the project
1.3 Write obtainable goals for the project
1.4 Provide evidence of planning for the project
1.5 Describe which skills and/or competencies from the framework were employed and how you used them to help make your project a success.
1.6 Describe how the project was planned
1.7 Describe who helped to plan the project
1.8 Describe the methods of implementation used
1.9 Provide a description of how the project was conducted in a sequential order
1.10 Explain how each member participated in the project
1.11 List the total membership number in the chapter and how many members were involved in the project

AM 2.0 — Complete a five- to 10-minute oral presentation/interview explaining the entry to the judges

2.1 Create an effective, clear and strong opening
2.2 Organize the presentation according to the sequence of projects in the scrapbook
2.3 Communicate information about each project in a compact and complete manner
2.4 Display various verbal techniques and exhibit poise in behavior
2.5 Close speech with an effective ending that ties all of the elements together
2.6 Complete the interview within the time limits set by the contest standards

Committee Identified Academic Skills

The technical committee has identified that the following academic skills are embedded in this contest.

Math Skills

None Identified

Science Skills

None Identified

Language Arts Skills

- Provide information in conversations and in group discussions
- Provide information in oral presentations
- Demonstrate use of verbal communication skills: word choice, pitch, feeling, tone and voice
- Demonstrate use of nonverbal communication skills: eye contact, posture and gestures using interviewing techniques to gain information
- Analyze mass media messages
- Demonstrate comprehension of a variety of informational texts
- Use text structures to aid comprehension
- Identify words and phrases that signal an author's organizational pattern to aid comprehension
- Understand source, viewpoint and purpose of texts
- Organize and synthesize information for use in written and oral presentations
- Demonstrate knowledge of appropriate reference materials
- Use print, electronic databases and online resources to access information in books and articles
- Demonstrate narrative writing
- Demonstrate expository writing
- Demonstrate persuasive writing
- Demonstrate informational writing
- Edit writing for correct grammar, capitalization, punctuation, spelling, sentence structure and paragraphing

Connections to National Standards

State-level academic curriculum specialists identified the following connections to national academic standards.

Math Standards

None Identified

Source: NCTM Principles and Standards for School Mathematics. For more information, visit: www.nctm.org.

Science Standards

- Understands the nature of scientific inquiry

Source: McREL compendium of national science standards. To view and search the compendium, visit: http://www2.mcrel.org/compendium/browse.asp.

Language Arts Standards

- Students adjust their use of spoken, written and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes
- Students employ a wide range of strategies as they write and use different writing process elements appropriately to communicate with different audiences for a variety of purposes
- Students apply knowledge of language structure, language conventions (e.g., spelling and punctuation), media techniques, figurative language and genre to create, critique and discuss print and nonprint texts
- Students conduct research on issues and interests by generating ideas and questions and by posing problems. They gather, evaluate and synthesize data from a variety of sources (e.g., print and nonprint texts, artifacts, people) to communicate their

discoveries in ways that suit their purpose and audience
- Students use a variety of technological and information resources (e.g., libraries, databases, computer networks, video) to gather and synthesize information and to create and communicate knowledge
- Students use spoken, written and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion and the exchange of information)

Source: IRA/NCTE Standards for the English Language Arts. To view the standards, visit: www.ncte.org/standards.

Chapter Business Procedure

Purpose
To evaluate a chapter's ability to conduct regular SkillsUSA business meetings according to the order of business published in these regulations and correct parliamentary procedure. The contest is based on the rules found in the latest edition of *Robert's Rules of Order, Newly Revised*.

First, download and review the General Regulations at: http://updates.skillsusa.org.

Eligibility (Team of 6)
Open to active SkillsUSA members. The team need not be comprised of officers, but team members must be organized under one local charter. All team members must be members in the same division. Each team will consist of six registered members. The team may perform with five members without penalty in the event that a member fails to show up or is forced to withdraw within five days of the competition. (See exception policy in General Regulations.)

Clothing Requirement
Class A: SkillsUSA Official Attire
For men: Official SkillsUSA blazer or jacket, black dress slacks, white dress shirt, plain black tie with no pattern (or SkillsUSA black tie), black socks, black shoes.
For women: Official SkillsUSA blazer or jacket; black dress skirt (knee-length) or black slacks; plain business-like white, collarless blouse (or white blouse with small, plain collar that may not extend onto the lapels of the blazer); black sheer or skin-tone hose; black shoes.

These regulations refer to clothing items that are pictured and described at: www.skillsusastore.org. If you have questions about clothing or other logo items, call 800-401-1560 or 703-956-3723.

Note: Contestants must wear their official contest clothing to the contest orientation meeting.

Observer Rule
Observers will be permitted in the college/postsecondary presentations on Wednesday of the competition. College/postsecondary teams must wait in a holding room. No observers will be permitted in the preliminary rounds of the high-school competition. Observers will be permitted in the final presentations on the Thursday of competition. Contestants must wait in a holding room. Observers will be instructed not to talk or gesture, or enter or exit the demonstration room, while a team is competing.

Equipment and Materials
1. Supplied by the technical committee:
   a. Speaker's stand (lectern)
   b. Gavel
   c. Pad and pencil for secretary
   d. One copy of the latest edition of *Robert's Rules of Order, Newly Revised* per demonstration room
   e. Packet for each team, which will include:
      1. List of business items
      2. Minutes of a previous meeting (these minutes cannot be modified)
      3. Treasurer's report
      4. Paper for any committee report
      5. One pencil
   f. Stopwatch
   g. Extra pencils as may be required
2. Supplied by the contestants:
   a. All competitors must create a one-page résumé and submit a hard copy to the technical committee chair at orientation. Failure to do so will result in a 10-point penalty.

Note: Your contest may also require a hard copy of your résumé as part of the actual contest. Check the Contest Guidelines and/or the updates page on the SkillsUSA website: http://updates.skillsusa.org.

SCOPE OF THE CONTEST

The contest consists of two parts that test knowledge of parliamentary procedure: a written exam and a chapter business procedure demonstration. During a simulated regular SkillsUSA business meeting, teams will demonstrate the procedures necessary to complete the meeting, from call to order to adjournment, using only those portions of the following order of business that are required by contest materials given to the team.

Knowledge Performance

The written exam consists of 40 multiple-choice questions related to material found in *Robert's Rules of Order in Brief*. Scores are averaged and included as part of the team's overall score. This written test score will comprise up to 150 of the possible 1,000 points of the total score for all rounds of the competition. Visit the website of the National Association of Parliamentarians (www.parliamentarians.org) to download a study guide for preparing for the NAP membership exam.

Skill Performance

The contest consists of a demonstration of a simulated chapter business meeting.

Contest Guidelines

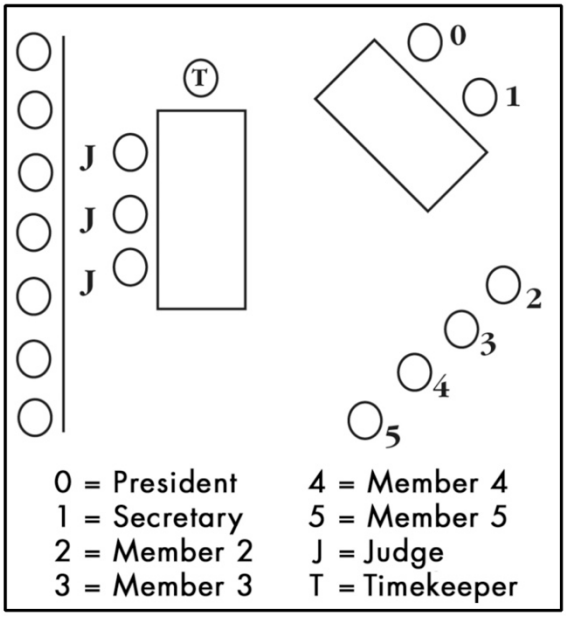
1. During the presentation, the team will demonstrate the running of a typical business meeting using a standard order of business.
2. The order of business to be followed will include:
   a. Call to order
   b. Reading and approval of the minutes
   c. Reports of officers, boards and standing committees
   d. Reports of special committees
   e. Special orders
   f. Unfinished business
   g. New business
   h. Adjourn
3. During the simulated demonstration, the team must properly handle items dictated by the above order of business and materials given to the teams by the technical committee. The demonstration must include no fewer than six motions, including at least one motion of each of the following types:
   a. Privileged
   b. Subsidiary
   c. Main
   d. Incidental
   e. Motions that bring a question before the assembly again

   Note: Additional points will not be given for demonstrating extra motions correctly. If extra motions are used incorrectly, points will be deducted accordingly.
4. During contest orientation, each team member will take a written test covering basic parliamentary procedures, based on the current membership exam for the National Associations of Parliamentarians. The order of appearance for teams in the preliminary round is determined by a seeded, ranking order based upon the teams' averaged written exam score. The order of appearance for teams in the final round is determined by random drawing, with the highest test scoring teams drawing first.
5. Sixty minutes prior to the team's demonstration in front of the judges, the team will be given a list of business items to insert into the order of business: the secretary's minutes of the previous meeting, the treasurer's report, and paper for preparing any committee report. Any written committee reports submitted will comply with the provisions set forth in the latest edition of *Robert's Rules of Order, Newly Revised*, and stipulated by the minutes of the previous meeting. Teams may bring their own copy of the latest edition of *Robert's Rules of Order, Newly Revised* to use in the preparation room, but it must be given to the time keeper during their demonstration.
6. During the simulated meeting presentation, the team may use only the secretary's minutes of the previous meeting, the treasurer's report, the list of business items, and committee reports. The presiding officer may make notes on the list of business items; however, a team will be disqualified if any member uses notes during the simulated presentation. The secretary will be provided with a pad and pencil for recording minutes of the simulated meeting. One copy of *Robert's Rules of Order, Newly Revised* will be in the demonstration room for team

reference. There will be a 30-point penalty for each item not covered.

7. The demonstration room will be furnished with a table and three chairs for judges and contest officials. A timekeeper will be seated beside the judges' table in clear view of the demonstrating team. The demonstration area will be set with four chairs for team members and a table from which the presiding officer will conduct the meeting and the secretary will take minutes. The presiding officer *will stand, not sit* while presiding.
8. The demonstration should be at least 10 minutes in length but should not exceed 15 minutes. There will be five points deducted for each 30 seconds or fraction thereof under 10 minutes or over 15 minutes. The time required to complete the recording and reading of the secretary's minutes at the end of the presentation will not count toward a team's time. However, the secretary will have a maximum of three minutes to complete the recording and reading of the secretary's minutes after the meeting is adjourned.
9. Following adjournment of the simulated business meeting, the secretary will read the minutes covering the demonstration to the judges. The minutes will be judged for completeness as read, neither for penmanship nor sentence structure.
10. All materials given to team members, along with the minutes of the demonstration, committee reports and contest badges, will be given to a contest official in the demonstration room after the completion of the demonstration.
11. Throughout the demonstration, team members will be referred to by first name only. No reference may be made to their school name, city or state. A five-point penalty will be assessed each time any of these are identified in the presentation.
12. Tiebreakers for teams will be determined by first looking at total presentation score and second by looking at the team's average written test score.
13. The chair and secretary shall be seated at the head table, with the other team members seated in four chairs staggered in front of the table.
14. The demonstration room will be furnished with seats for judges and observers with a demonstration area at the front. The demonstration area will be set up with four chairs for team members and a table, from which the president will conduct the meeting and the secretary will take minutes. A table and three chairs will be provided for the judges and contest officials. The timekeeper will be seated beside the judge's table so as to be in clear view of participants.

Note: The official SkillsUSA Opening and Closing ceremonies are not to be performed during this contest.



Standards and Competencies

CBP 1.0 — President demonstrates the ability to conduct a meeting

1.1 Demonstrates impartiality when conducting meeting
- 1.1.1 Does not call on the same member every time

CBP 2.0 — Read minutes of previous meeting

2.1 Read minutes from previous meeting
- 2.1.1 Secretary stands
- 2.1.2 Secretary reads clearly and loudly enough to be heard
- 2.1.3 Secretary is seated

CBP 3.0 — Chair obtains approval of minutes

3.1 Obtain approval of minutes
- 3.1.1 Chair asks for corrections
- 3.1.2 Chair announces results

CBP 4.0 — Present reports of officers, boards and committees

4.1 Deliver treasurer's report
- 4.1.1 Treasurer stands when called upon
- 4.1.2 Treasurer reads so as to be heard
- 4.1.3 Chair asks for questions

4.2 Deliver committee reports
- 4.2.1 Member stands when called upon
- 4.2.2 Member reads so as to be heard
- 4.2.3 Chair asks for questions
- 4.2.4 Chair processes motions or recommendations, if any

4.3 Present reports of special committees
- 4.3.1 Member stands to be recognized
- 4.3.2 Member reads so as to be heard
- 4.3.3 Chair asks for questions
- 4.3.4 Chair processes motions or recommendations, if any

CBP 5.0 — Effectiveness of business meeting

5.1 Participate in meeting
- 5.1.1 All team members other than presiding officer make at least one motion
- 5.1.2 All team members other than presiding officer debate at least one debatable motion
- 5.1.3 More than one member debates each debatable motion

5.2 Demonstrate effective organization of meeting
- 5.2.1 Meeting flows logically and systematically
- 5.2.2 Business occurs as it should according to the prescribed order of business

5.3 Follow the order of business
- 5.3.1 Use the necessary parts of the following order of business as prescribed by the materials given them by the technical committee:
  - a. Call to order
  - b. Reading and approval of the minutes
  - c. Reports of officers, boards and standing committees
  - d. Reports of special committees
  - e. Special orders
  - f. Unfinished business
  - g. New business
  - h. Adjourn

5.4 Provide quality discussion
- 5.4.1 The maker of the motion has first right of debate
- 5.4.2 Each member may debate only twice on a pending motion unless the motion to Limit or Extend Limits of Debate is made and adopted
- 5.4.3 Chair does not debate
- 5.4.4 Team members debate only debatable motions
- 5.4.5 Debate provides information and insight, as opposed to asking questions or saying "I agree"
- 5.4.6 Debate is germane to the pending motion
- 5.4.7 Conduct business meeting with ease
- 5.4.8 Motions are handled without hesitance or awkwardness
- 5.4.9 The business meeting runs smoothly and efficiently

CBP 6.0 — Demonstration of the use of the five types of parliamentary motions according to the latest edition of *Robert's Rules of Order, Newly Revised*

6.1 Obtain the floor
- 6.1.1 Member stands to be recognized
- 6.1.2 Member says "Mr./Madame President"
- 6.1.3 Chair recognizes member by first name only

6.2 Demonstrate proper use of privileged motions
- 6.2.1 Member makes the motion
- 6.2.2 Another member seconds the motion, if necessary
- 6.2.3 Chair states the motion or responds to the request or demand
- 6.2.4 Chair puts motion to a vote, if necessary
- 6.2.5 Chair announces the result of the vote, if necessary

6.3 Demonstrate proper use of Subsidiary motions
- 6.3.1 Member makes the motion
- 6.3.2 Another member seconds the motion
- 6.3.3 Chair states the motion and asks for debate, if permitted
- 6.3.4 Members debate motion, if debatable
- 6.3.5 Chair puts motion to a vote

6.3.6 Chair announces the result of the vote

6.4 Demonstrate proper use of Main motions
- 6.4.1 Member makes the motion
- 6.4.2 Another member seconds the motion
- 6.4.3 Chair states the motion
- 6.4.4 Chair asks, "Are you ready for the question?"
- 6.4.5 Members debate motion and make secondary motions
- 6.4.6 Chair puts motion to a vote
- 6.4.7 Chair announces the result of the vote

6.5 Demonstrate proper use of Incidental motions
- 6.5.1 Member makes the motion
- 6.5.2 Another member seconds the motion, if necessary
- 6.5.3 Chair states the motion or responds to the request
- 6.5.4 Members debate motion if debatable
- 6.5.5 Chair puts motion to a vote, if necessary
- 6.5.6 Chair announces the result of the vote, if necessary

6.6 Demonstrate proper use of motions that bring a question back before the assembly
- 6.6.1 Member makes the motion
- 6.6.2 Another member seconds the motion
- 6.6.3 Chair states the motion
- 6.6.4 Members debate motion if debatable
- 6.6.5 Chair puts motion to a vote
- 6.6.6 Chair announces the result of the vote

CBP 7.0 — Read minutes of demonstration

7.1 Record minutes accurately
- 7.1.1 All essential items are included
- 7.1.2 Minutes reflect what actually happened during the demonstration
- 7.1.3 Debate and nonessential items are excluded

7.2 Demonstrate effective reading and submission of minutes
- 7.2.1 Secretary stands
- 7.2.2 Secretary reads clearly and loudly enough to be heard

CBP 8.0 — Team appearance

8.1 Wear official attire
- 8.1.1 All members wear SkillsUSA official attire as prescribed by clothing requirements for the contest

8.2 Demonstrate positive overall appearance
- 8.2.1 Members wear same type of official attire (i.e., all blazers, all jackets, etc.)
- 8.2.2 Members are groomed neatly
- 8.2.3 Members demonstrate good posture and poise

CBP 9.0 — Written test

9.1 Demonstrate understanding of parliamentary procedure according to *Robert's Rules of Order, Newly Revised*
- 9.1.1 Each member will complete an examination of 100 questions
- 9.1.2 Tests are taken individually, and the scores are averaged for the team

CBP 10.0 — SkillsUSA Framework

The SkillsUSA Framework is used to pinpoint the essential elements found in Personal Skills, Workplace Skills, and Technical Skills Grounded in Academics. Students will be expected to display or explain how they used some of these Essential Elements. Please reference the graphic above, as you may be scored on specific elements applied to your project. For more, visit: www.skillsusa.org/about/skillsusa-framework/.

Committee Identified Academic Skills

The technical committee has identified that the following academic skills are embedded in this contest.

Math Skills

- Balance a treasurer's report sheet

Science Skills

None Identified

Language Arts Skills

- Provide information in conversations and in group discussions
- Provide information in oral presentations
- Demonstrate use of verbal communication skills: word choice, pitch, feeling, tone, and voice
- Demonstrate use of nonverbal communication skills: eye contact, posture and gestures using interviewing techniques to gain information
- Organize and synthesize information for use in written and oral presentations
- Demonstrate knowledge of appropriate reference materials
- Edit writing for correct grammar, capitalization, punctuation, spelling, sentence structure and paragraphing
- Write a proper set of minutes

Connections to National Standards

State-level academic curriculum specialists identified the following connections to national academic standards.

Math Standards

None Identified

Source: NCTM Principles and Standards for School Mathematics. For more information, visit: www.nctm.org.

Science Standards

None Identified

Source: McREL compendium of national science standards. To view and search the compendium, visit: http://www2.mcrel.org/compendium/browse.asp.

Language Arts Standards

- Students read a wide range of print and nonprint texts to build an understanding of texts, of themselves, and of the cultures of the United States and the world; to acquire new information; to respond to the needs and demands of society and the workplace; and for personal fulfillment. Among these texts are fiction and nonfiction, classic and contemporary works
- Students apply a wide range of strategies to comprehend, interpret, evaluate and appreciate texts. They draw on their prior experience, their interactions with other readers and writers, their knowledge of word meaning and of other texts, their word identification strategies, and their understanding of textual features (e.g., sound-letter correspondence, sentence structure, context, graphics)
- Students adjust their use of spoken, written and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes
- Students employ a wide range of strategies as they write and use different writing process elements appropriately to communicate with different audiences for a variety of purposes
- Students apply knowledge of language structure, language conventions (e.g., spelling and punctuation), media techniques, figurative language, and genre to create, critique and discuss print and nonprint texts
- Students conduct research on issues and interests by generating ideas and questions and by posing problems. They gather, evaluate and synthesize data from a variety of sources (e.g., print and nonprint texts, artifacts, people) to communicate their discoveries in ways that suit their purpose and audience
- Students use a variety of technological and information resources (e.g., libraries, databases, computer networks, video) to gather and synthesize information and to create and communicate knowledge
- Students participate as knowledgeable, reflective, creative and critical members of a variety of literacy communities

- Students use spoken, written and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion and the exchange of information)

Source: IRA/NCTE Standards for the English Language Arts. To view the standards, visit: www.ncte.org/standards.

CHAPTER DISPLAY

PURPOSE
The Chapter Display contest selects the outstanding promotional exhibit that SkillsUSA student members design and construct. The display is built around and articulates a common theme that SkillsUSA establishes annually.

First, download and review the General Regulations at: http://updates.skillsusa.org.

ELIGIBILITY (TEAM OF 3)
Open to active SkillsUSA members. Two displays from each state association may be entered in the contest: one in high-school and one in college/postsecondary competition.

CLOTHING REQUIREMENT
Class A: SkillsUSA Official Attire
For men: Official SkillsUSA blazer or jacket, black dress slacks, white dress shirt, plain black tie with no pattern (or SkillsUSA black tie), black socks, black shoes.
For women: Official SkillsUSA blazer or jacket; black dress skirt (knee-length) or black slacks; plain business-like white, collarless blouse (or white blouse with small, plain collar that may not extend onto the lapels of the blazer); black sheer or skin-tone hose; black shoes.

These regulations refer to clothing items that are pictured and described at: www.skillsusastore.org. If you have questions about clothing or other logo items, call 800-401-1560 or 703-956-3723.

***Note*:** Contestants must wear their official contest clothing to the contest orientation meeting.

OBSERVER RULE
Observers will not be present during the actual judging. Displays may be viewed on Thursday during the week of the conference.

SCOPE OF THE CONTEST
Knowledge Performance
There is no written knowledge test required in this contest.

Skill Performance
This contest is a team event that begins with goal setting in relation to a theme and involves the major competencies: developing a design, teamwork, organizing work, communications, marketing a product, and demonstrating workplace skills of workmanship. These competencies are comprised of a number of subcompetencies, which are listed below.

Contest Guidelines
1. The display must be designed and constructed by students who were enrolled during the school year immediately preceding the National Leadership and Skills Conference.
2. Maximum size of the display will be 48" wide by 48" deep by 84" high (measured from the floor and a parallel line running from the drapery posts in front of displays). All moving parts must remain inside these dimensions. All stationary and moving parts must remain inside these dimensions. The minimum size of a floor or table top display will be 32" wide by 42" deep by 42" high (measured from the floor or from a table top parallel to the front of the display layout line).
   Penalty: Five points will be deducted for each 1/8" over the prescribed size for any dimension or for each 1/8" under the prescribed size for any dimension. If foldout portions are used in the display, they must be arranged to comply with the maximum size of the display.
3. A team of three (3) contestants in offical SkillsUSA attire shall participate in a presentation/interview component in which contestants will describe the display and how it conforms to the theme. All contestants must submit a one-page, type-written résumé to the national technical committee at the orientation meeting for the display contest.
   The presenters/ interviewees should include information on:

a. how the layout and design was determined
b. how the central theme was carried out
c. the educational value of the display
d. the creativity and originality incorporated into the display
e. the quality of workmanship
f. how the display was constructed according to a plan
g. what different occupational/academic program team members participated in the construction
h. the time lines and number of hours spent constructing the display
i. what parts of the display (if any) were commercially made
j. construction costs
k. how the display was designed to allow easy transportation and setup/ teardown

The presentation/interview will be five to seven minutes in length. A timekeeper will announce when 30 seconds remain in the interview time allotment so contestants and judges can complete final comments. The presentation/interview will end at the seven-minute set time. No penalties will be involved for the presentation/interview.

The presentation/interview team must bring a 1" official SkillsUSA three-ring binder containing pictures, design sketches and drawings, a brief description of the purpose of the display in relation to the theme and its educational value, information about the development and construction of the display, what programs/students participated in construction the display, and what are the plans for using the display after competition.

Note: The notebook can be used as a visual aid in helping team members inform judges about the display.

A letter/signed by the local school administrator, certifying that the display was designed and constructed by students, must be included as the first page of the notebook. The notebook must be limited to 12 pages (24 surfaces). Unused plastic document holders will count as pages and surfaces. A five-point penalty will be assessed for each surface over 24.

The notebook should be brought by the display team, used to support the presentation of the display to judges, and left at the display at the conclusion of the presentation/interview for further review by judges and technical committee members. The technical committee chairman will inform the presentation team as to whether or not the display can be deactivated. If so, team members may want to remove electronic hardware for security concerns.

4. The display may use references to state, city or school without penalty.
5. If displays use electronic equipment, surge protectors should be installed. The SkillsUSA headquarters cannot be responsible for current surges. Consider using a power strip with a circuit breaker for 110-volt power. Displays that have electrical/electronic components should be designed so that they can be activated and deactivated with one switch. The activation time will be reduced by the interview participant, and the switch will be left at the display following the interview for further review by the judges.
6. Immediately following the interviews, technical committee and judges will conduct a debriefing to inform participants about the quality of the displays and the interviews.
7. When the public visits the displays, display teams should take turns presenting their displays to interested visitors while ensuring the security of their displays.
8. The displays must be set up by students. Advisors are not to enter the setup area with the exception of moving in the display. Since the setup area has limited space, only three contestants will be allowed to participate in setting up the display.
9. All competitors must create a one-page résumé and submit a hard copy to the technical committee chair at orientation. Failure to do so will result in a 10-point penalty.

***Note*:** Your contest may also require a hard copy of your résumé as part of the actual contest. Check the Contest Guidelines and/or the updates page on the SkillsUSA website: updates.skillsusa.org

Procedure for Shipment

1. Display contest entries may be shipped in advance to the national conference. Shipping instructions may be obtained from your state association director. Do not ship entries to the national association headquarters or to the convention center; such shipments will be refused. All costs incurred will be the responsibility of the local chapter or the state SkillsUSA association. All sides of the display shipment container should be clearly marked as a display and contain the name of the school and state from which it was sent. Displays should also be clearly marked with the shippers' information so it can be traced if lost at the conference. The students and their advisors should obtain specific information from the shipper and bring copies of this information with them to the setup area to be used to locate lost shipments.
2. The display must be set up and moved out according to the schedule outlined in the National Leadership and Skills Conference program.
3. SkillsUSA will not be responsible for displays that have not been removed from the exhibit area by noon on the day following the SkillsUSA Championships contests. Failure to remove displays by this deadline could result in their damage or destruction by the cleanup crew.
4. Only students will be allowed to set up the displays, and only three students will be issued passes into the contest setup area. One student should have technical knowledge on how to repair malfunctioning or damaged displays. Students must stay in the designated area. Failure to do so will result in the disqualification of the display.

Standards and Competencies

DIS 1.0 — Develop a design for the display

- 1.1 Define the purpose of chapter displays
- 1.2 Brainstorm design ideas (theme directed and educational value focused)
- 1.3 Rank ideas most likely to be accepted
- 1.4 Establish consensus decision making
- 1.5 Read and comprehend the rules and regulations for displays
- 1.6 Identify criteria for the design (originality, creativity, innovation and motivation)
- 1.7 Develop a sketch or rough drawing for the design
- 1.8 Apply design principles of
  - 1.8.1 Function
  - 1.8.2 Balance
  - 1.8.3 Color
  - 1.8.4 Shape
  - 1.8.5 Placement of components, illustrations and lettering
  - 1.8.6 Use of type fonts and sizes
- 1.9 Select appropriate materials for the display
- 1.10 Construct the display in modular form for ease of setup and tear-down
- 1.11 Install motors and motor controls to facilitate display movement — C&T Literacy
- 1.12 Program computer slide shows — C&T Literacy
- 1.13 Secure needed components from a business or industrial firm
- 1.14 Install audio equipment and controlled lighting — C&T Literacy
- 1.15 Plan, organize and manage steps of procedure for constructing the display
- 1.16 Evaluate the design using established criteria
- 1.17 Modify the design using evaluation data

DIS 2.0 — Work together as a team

- 2.1 Demonstrate five characteristics of effective teams
  - 2.1.1 Clear direction (understands theme and mission)
  - 2.1.2 Diversity of team members (assembles diverse team members)
    - a. Members from different CTE programs

b. Members from different cultures
c. Members of different gender
    1. Shared leadership (set team rules; establishes roles and responsibilities)
    2. Straightforward handling of controversy (disciplined approach)
    3. A safe, supportive climate

2.2 Identify style of leadership used in team work
2.3 Match team member skills and group activity
2.4 Schedule and organize team work
2.5 Work as a team to complete team task
2.6 Evaluate group process and progress toward completed display
2.7 Recognize and value team member contributions

DIS 3.0 — Organize work

3.1 Identify individuals with special skills
3.2 Review work rules
3.3 Set priorities to meet deadlines
3.4 Assign individuals to display construction tasks
3.5 Develop a time log to record worker time on task
3.6 Manage the work process
3.7 Clean up the work area and store tools, equipment and display components
3.8 Create a team to set up and dismantle the display efficiently

DIS 4.0 — Communicate with others (display construction and interview)

4.1 Formulate clear messages
4.2 Communicate verbally with others
4.3 Demonstrate nonverbal communication skills
4.4 Demonstrate the three-step method of communication (intro, body and summary)
4.5 Influence others by emphasizing key topics of information
4.6 Exhibit knowledge of the display with confidence
4.7 Develop a display presentation speech
4.8 Practice the presentation speech
4.9 Demonstrate appropriate handshakes
4.10 Greet people with a smile and introduce yourself by number
4.11 Speak with appropriate volume and use inflection and word emphasis
4.12 Listen to questions carefully
4.13 Respond to questions concisely
4.14 Manage presentation time
4.15 Thank the judges for their time

DIS 5.0 — Market the display

5.1 Take pictures of the construction of the display
5.2 Organize pictures with captions in the notebook
5.3 Develop written pages of information with appropriate type size
5.4 Develop creative page backgrounds
5.5 Organize the notebook content beginning with an official letter from an administrator
5.6 End the notebook with a concluding page

DIS 6.0 — Demonstrate workplace skills

6.1 Demonstrate the safe operation of tools and equipment
6.2 Follow established rules, regulations and policies
6.3 Read and interpret sketches and drawings
6.4 Follow written and oral directions
6.5 Accept constructive criticism
6.6 Develop a work plan
6.7 Ask questions about tasks when necessary
6.8 Evaluate the quality of work
6.9 Maintain a safe, organized work area
6.10 Display initiative
6.11 Practice time management
6.12 Demonstrate a willingness to learn
6.13 Display enthusiasm
6.14 Assume responsibility for decisions and actions
6.15 Complete team tasks
6.16 Develop a packaging system to transport the display without damage
6.17 Demonstrate high quality workmanship including fit, lettering and finish
6.18 Evaluate the finished display and make appropriate modifications

DIS 7.0 — SkillsUSA Framework

The SkillsUSA Framework is used to pinpoint the Essential Elements found in Personal Skills, Workplace Skills, and Technical Skills Grounded in Academics. Students will be expected to display or explain how they used some of these essential elements. Please reference the graphic above, as you may be scored on specific elements applied to your project. For more, visit: www.skillsusa.org/about/skillsusa-framework/.

Committee Identified Academic Skills

The technical committee has identified that the following academic skills are embedded in this contest.

Math Skills

- Use fractions to solve practical problems
- Use proportions and ratios to solve practical problems
- Simplify numerical expressions
- Solve practical problems involving percentages
- Solve single variable algebraic expressions
- Measure angles
- Find surface area and perimeter of two-dimensional objects
- Find volume and surface area of three-dimensional objects
- Apply transformations (rotate or turn, reflect or flip, translate or slide, and dilate or scale) to geometric figures
- Construct three-dimensional models
- Make predictions using knowledge of probability
- Make comparisons, predictions and inferences using graphs and charts
- Solve problems using proportions, formulas and functions
- Find the slope of a line
- Solve practical problems involving complementary, supplementary and congruent angles
- Solve problems involving symmetry and transformation
- Use measures of interior and exterior angles of polygons to solve problems

Science Skills

- Plan and conduct a scientific investigation
- Describe factors that influence how populations change over time
- Use knowledge of the particle theory of matter
- Describe and recognize solids, liquids and gases
- Describe characteristics of types of matter based on physical and chemical properties
- Use knowledge of physical properties (shape, density, solubility, odor, melting point, boiling point and color)
- Use knowledge of chemical properties (acidity, basicity, combustibility and reactivity)
- Use knowledge of classification of elements as metals, metalloids and nonmetals
- Describe and demonstrate simple compounds (formulas and the nature of bonding)
- Understand the Law of Conservation of Matter and Energy
- Describe phases of matter
- Describe and identify physical changes to matter
- Predict chemical changes to matter (types of reactions, reactants and products; and balanced equations)
- Use knowledge of potential and kinetic energy
- Use knowledge of mechanical, chemical and electrical energy
- Use knowledge of heat, light and sound energy
- Use knowledge of temperature scales, heat and heat transfer
- Use knowledge of sound and technological applications of sound waves

- Use knowledge of the nature and technological applications of light
- Use knowledge of speed, velocity and acceleration
- Use knowledge of Newton's laws of motion
- Use knowledge of work, force, mechanical advantage, efficiency and power
- Use knowledge of simple machines, compound machines, powered vehicles, rockets and restraining devices
- Use knowledge of principles of electricity and magnetism
- Use knowledge of static electricity, current electricity and circuits
- Use knowledge of magnetic fields and electromagnets
- Use knowledge of motors and generators

Language Arts Skills

- Provide information in conversations and in group discussions
- Provide information in oral presentations
- Demonstrate use of verbal communication skills: word choice, pitch, feeling, tone and voice
- Demonstrate use of nonverbal communication skills: eye contact, posture and gestures using interviewing techniques to gain information
- Analyze mass media messages
- Demonstrate comprehension of a variety of informational texts
- Use text structures to aid comprehension
- Identify words and phrases that signal an author's organizational pattern to aid comprehension
- Understand source, viewpoint and purpose of texts
- Organize and synthesize information for use in written and oral presentations
- Demonstrate knowledge of appropriate reference materials
- Use print, electronic databases and online resources to access information in books and articles
- Demonstrate narrative writing
- Demonstrate expository writing
- Demonstrate persuasive writing
- Demonstrate informational writing
- Edit writing for correct grammar, capitalization, punctuation, spelling, sentence structure and paragraphing

Connections to National Standards

State-level academic curriculum specialists identified the following connections to national academic standards.

Math Standards

- Geometry
- Measurement
- Data analysis and probability
- Problem solving
- Communication
- Connections
- Representation

Source: NCTM Principles and Standards for School Mathematics. For more information, visit: www.nctm.org.

Science Standards

- Understands the nature of scientific inquiry
- Understands the scientific enterprise

Source: McREL compendium of national science standards. To view and search the compendium, visit: http://www2.mcrel.org/compendium/browse.asp.

Language Arts Standards

- Students read a wide range of print and nonprint texts to build an understanding of texts, of themselves, and of the cultures of the United States and the world; to acquire new information; to respond to the needs and demands of society and the workplace; and for personal fulfillment. Among these texts are fiction and nonfiction, classic and contemporary works
- Students apply a wide range of strategies to comprehend, interpret, evaluate and appreciate texts. They draw on their prior experience, their interactions with other readers and writers, their knowledge of word meaning and of other texts, their word identification strategies, and their understanding of textual features (e.g., sound-letter correspondence, sentence structure, context and graphics)
- Students adjust their use of spoken, written and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes
- Students employ a wide range of strategies as they write and use different writing

process elements appropriately to communicate with different audiences for a variety of purposes
- Students apply knowledge of language structure, language conventions (e.g., spelling and punctuation), media techniques, figurative language, and genre to create, critique, and discuss print and nonprint texts
- Students conduct research on issues and interests by generating ideas and questions, and by posing problems. They gather, evaluate and synthesize data from a variety of sources (e.g., print and nonprint texts, artifacts, people) to communicate their discoveries in ways that suit their purpose and audience
- Students use a variety of technological and information resources (e.g., libraries, databases, computer networks, video) to gather and synthesize information and to create and communicate knowledge
- Students develop an understanding of and respect for diversity in language use, patterns and dialects across cultures, ethnic groups, geographic regions and social roles
- Students participate as knowledgeable, reflective, creative and critical members of a variety of literacy communities
- Students use spoken, written and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion and the exchange of information)

Source: IRA/NCTE Standards for the English Language Arts. To view the standards, visit: www.ncte.org/standards.

Community Action Project

Purpose
To evaluate a team of two contestants' ability to develop, execute, document and present a project that was completed in their community or school, which provides a benefit or learning experience to the community or school. This event also enables the community to become aware of the outstanding work being performed by career and technical education students.

First, download and review the General Regulations at: http://updates.skillsusa.org.

Eligibility (Team of 2)
Open to active SkillsUSA members enrolled in career and technical programs with entry-level job skills as the occupational objective. A letter from an appropriate school official on school letterhead stating that both contestants are classified under the provisions of Public Law 105-17, Individuals with Disabilities Education Act, 1997, is required for participation.

State associations having restrictions on release of this information may submit a letter of eligibility that simply states, "I certify that (student's name) meets the eligibility requirements for the SkillsUSA Community Action Project contest." The letter must be signed by the school official, who must also include his/her title.

The eligibility letter *must* be submitted to the technical committee at the orientation meeting.

Clothing Requirement
Class A: SkillsUSA Official Attire
For men: Official SkillsUSA blazer or jacket, black dress slacks, white dress shirt, plain black tie with no pattern (or SkillsUSA black tie), black socks, black shoes.
For women: Official SkillsUSA blazer or jacket; black dress skirt (knee-length) or black slacks; plain business-like white, collarless blouse (or white blouse with small, plain collar that may not extend onto the lapels of the blazer); black sheer or skin-tone hose; black shoes.

Note: Contestants must wear their official contest clothing to the contest orientation meeting.

Advisors
1. Advisors or instructor *must* attend the orientation meeting with the contestant.
2. The advisor is responsible for obtaining the eligibility letter from the school and submitting it to the technical committee at orientation.
3. Failure to follow these steps will result in a penalty against the contestant's score.

Orientation
The following are required at the orientation meeting, or a penalty may apply. Refer to Penalties section.
1. Advisor must attend with contestant.
2. Eligibility letter must be submitted.
3. Résumé for SkillsUSA requirement must be submitted.
4. SkillsUSA attire is required.

Observer Rule
Observers are permitted to view the contest. However, other contestants competing in Community Action Project may not observe presentations.

Time Limits
Contestants' presentation must be a minimum of 5 minutes and a maximum of 10 minutes. Penalties apply for presentations less than the 5 minutes or greater than the 10 minutes in increments of 30 seconds or fraction thereof.

Setup time for the presentation is not scored; however, this time should be kept to a minimum.

Penalties
Penalties apply for the following:
1. No advisor attending the orientation: -1 pt.
2. Missing eligibility letter at orientation: -1 pt.
3. Attire incorrect at orientation: -1 pt.

4. Attire incorrect at contest time, 0-5 percent of score
5. Résumé not submitted at orientation (requirement of SkillsUSA): -10 pts
6. Presentation time: -5 pts for every 30 seconds or fraction thereof, if less than 5 minutes or more than 10 minutes.

Equipment and Materials

1. Supplied by the technical committee:
   a. Judges, including a timekeeper
   b. All necessary information for the judges and technical committee
   c. A projector and screen will be provided if using electronic media; however, cabling *must* be provided by the contestant
2. Supplied by the contestant:
   a. SkillsUSA three-ring notebook documenting the project, which will be on display for one day after the presentations
   b. Presentation media, such as laptop computer, poster boards, etc.
   c. If using an electronic presentation media, bring a stick or thumb drive for backup
   d. Cable specific for the laptop and the projector, if using a laptop
   e. Backup presentation media should be available in case of technical difficulties

   ***Note*:** Your contest may also require a hard copy of your résumé as part of the actual contest. Check the Contest Guidelines and/or the updates page on the SkillsUSA website at: http://updates.skillsusa.org.

Arrangement of Rooms

1. An assembly area will be set up for the contestants to wait their turn.
2. Presentation room is provided and includes a table and chair, if needed by the contestant.
3. Projector for electronic presentations
4. Screen or appropriate area for projection, if needed
5. Table and chairs for judges
6. Chairs for observers

Scope of the Contest

The contest will require the contestants to develop and execute a project in their community or school community. Documentation or recording of the events will be maintained in a SkillsUSA notebook to be presented at the competition. The presentation shall last a minimum of 5 minutes and a maximum of 10 minutes, and will include an explanation of the purpose and scope of the project, how the project was developed, methods used, implementation and execution of the project and its results.

Knowledge Performance

No written employability skills knowledge test is required for this contest.

Skill Performance

The contest requires the contestants to develop and execute a project in the community or school community.

The contest will consist of two parts: a SkillsUSA notebook outlining the community service project and a live presentation by two eligible contestants explaining the project. Refer to contest guidelines for specific requirements.

Both the presentation and the notebook will be reviewed and judged at the time of the contest. The notebook will then be on display for a period of time. Responsibility to retrieve the notebook at the end of the display period is upon the contestants.

Contest Guidelines

1. Completed at home school
   Project will be completed prior to competition. Requirements are:
   a. Determine the need or desire for a project
   b. Outline the project
   c. Develop the timeline of the project
   d. Implement the project
   e. Anticipate results of the project or its impact to the community or school community

f. Include participation of others involved; school peers, school administration, community leaders, or other support people
g. Evaluate final results of the project

2. Notebook
The purpose of the notebook is to document and capture the chronological events in the completion of the project.
   a. The notebook must be an official SkillsUSA three-ring binder.
   b. Pictures (or copies of pictures) may be used throughout the notebook to assist judges in understanding the project
   c. Notebook Organization Requirements
      1. *Title Page*
      Name of the project, school name and address, names of the presenting team and any other members of the team who worked on the project at the home school.
      2. *Introduction*
      Provide a brief description of the project
      3. *Table of Contents*
      4. *Section 1 — Methodology*
      Describe the methodology for determining the project to be completed. How did you decide on the project? Who did you enlist at this stage? What was the anticipated goal of the project?
      5. *Section 2 — Organization*
      Describe how the project was organized. What was the timeline? Who was responsible for which steps, and how did you determine this?
      6. *Section 3 — Implementation Schedule*
      What were the specific steps to be followed?
      7. *Section 4 — Result of the Project*
      What was the impact of the project on the school or community? Who benefited from the project?
      8. *Section 5 — Recognition for the Project*
      Was this project recognized in any local papers, school papers, radio, TV or other news media? Did you receive letters of appreciation, congratulations or any other types of recognition? Do you have pictures or copies of pictures that may be included?
      9. *Section 5 — Evaluation*
      Do you feel the project was successful? Why or why not? What are your recommendations and/or thoughts for this project?

3. Presentation
The purpose of the presentation is to provide the judges with an understanding of the project, how the project was decided or determined, how it was completed, results achieved, and comments or recommendations for others to do a similar project.
   a. Presentation is a minimum of 5 minutes and a maximum of 10 minutes in length.
   b. Time penalty of 5 points is deducted for each 30-seconds (or fraction) under the five minutes or for each 30-seconds (or fraction) over the 10 minutes.
   c. Timing is started when the presentation begins. Timekeeper will signal the presenters at 5, 7, and 9 minutes.
   d. Presentation can use any type of media, such as PowerPoint, slides, posters or any other media that would be appropriate. Be creative in expressing your presentation to the judges.
   e. All presentation materials must be produced by the students involved in the project whether they are presenting or not.
   f. Both members of the team must participate in the presentation.
   g. Introduction: Brief description and scope of the project
   h. Project Scope: How was the project initiated, what triggered this project?
   i. Organization: Planning steps, objectives
   j. Steps and Timeline: What are the planning steps to implement this project, what was the timeline, and how did you align the steps and timeline?
   k. Results: Evaluate the impact of the project on the school or community or whoever was the recipient and received benefit of the project.

l. Closing: Indicate if the project was successful or not. If successful, why, and if not successful, why not?
m. Organization of Presentation: Follow the appropriate steps of a presentation: opening/introduction, scope of project, steps and timeline, results and closing.
n. Presence, Demeanor, Self-Confidence: Involve all members, demonstrate poise, self-control, good platform performance and personal confidence

Check the SkillsUSA website for updates: http://updates.skillsusa.org

Standards and Competencies

CAP 1.0 — Create a community project

1.1 Determine the need/desire for the project
1.2 Develop the project
1.3 Obtain assistance in completing the project
1.4 Execute the project

CAP 2.0 — Create a professional notebook that follows guidelines and effectively expresses project

2.1 Design a title page that lists the name of the project
2.2 Prepare an introduction
2.3 Construct a table of contents, organize subjects in order, and list with page numbers
2.4 Write clear and effective objectives and scope of project
2.5 Describe impact of the project on the school or community
2.6 Secure any publicity, including newspaper articles, letters of commendation from appropriate sources
2.7 Clearly evaluate and recommend (or not) the project

CAP 3.0 — Design and prepare an effective presentation that provides the judges with an overview of the project, including results achieved

3.1 Both contestants must participate in the presentation
3.2 Prepare a 5- to 10-minute demonstration of the project
3.3 Organize the demonstration in a logical and coherent manner
3.4 Explain the project through the use of displays and visuals, incorporating at least one of the following visual aids in the presentation: posters, flip chart, overhead transparencies, 35mm slide presentation and/or PowerPoint or other computer presentation

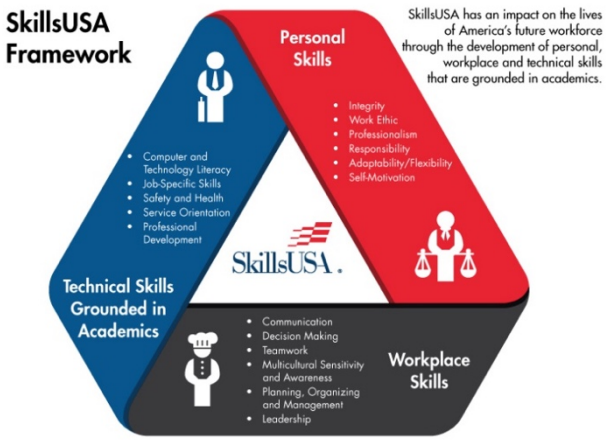
CAP 4.0 — Deliver the presentation in a professional manner meeting the standards outlined by the technical committee

4.1 Explain the project through the use of media you have chosen
4.2 Demonstrate an effective and pleasing delivery style
4.3 Effectively use verbal illustrations and examples
4.4 Make a formal and effective introduction to the presentation that clearly identifies the scope of the project
4.5 Use a variety of verbal techniques including: modulation of voice, changing volume, varied inflection, modifying tempo and verbal enthusiasm
4.6 Demonstrate poise and self-control while presenting
4.7 Demonstrate good platform development and personal confidence
4.8 Tie organizational elements together with an effective closing
4.9 Complete the presentation within the time limits set by contest requirements

CAP 5.0 — Wear appropriate clothing per SkillsUSA national requirements

5.1 Display clothing that meets national standards for competition
5.2 Demonstrate good grooming in dress and personal hygiene

CAP 6.0 — SkillsUSA Framework



The SkillsUSA Framework is used to pinpoint the Essential Elements found in Personal Skills, Workplace Skills, and Technical Skills Grounded in Academics. Students will be expected to display or explain how they used some of these Essential Elements. Please reference the graphic above, as you may be scored on specific elements applied to your project. For more, visit: www.skillsusa.org/about/skillsusa-framework/.

Committee Identified Academic Skills

The technical committee has identified that the following academic skills are embedded in this contest.

Math Skills

Potential calculations based on providing results or the project, cost analysis, etc.

Science Skills

Potential green project or other project related to the environment within the community.

Social Studies Skills

Community demographics, generational impact, historical impact based on the type of project.

Language Arts Skills

- Provide information in oral presentations
- Demonstrate use of verbal communication skills: word choice, pitch, feeling, tone and voice
- Demonstrate use of nonverbal communication skills: eye contact, posture and gestures using interviewing techniques to gain information
- Organize and synthesize information for use in written and oral presentations
- Use print, electronic databases and online resources to access information in books and articles
- Demonstrate narrative writing
- Demonstrate informational writing
- Edit writing for correct grammar, capitalization, punctuation, spelling, sentence structure and paragraphing

Connections to National Standards

State-level academic curriculum specialists identified the following connections to national academic standards.

Math Standards

None Identified

Source: NCTM Principles and Standards for School Mathematics. For more information, visit: www.nctm.org.

Science Standards

- Understands the nature of scientific inquiry
- Understands the scientific enterprise

Source: McREL compendium of national science standards. To view and search the compendium, visit: http://www2.mcrel.org/compendium/browse.asp.

Language Arts Standards

- Students adjust their use of spoken, written and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes
- Students employ a wide range of strategies as they write. They use different writing process elements appropriately to communicate with different audiences for a variety of purposes
- Students apply knowledge of language structure, language conventions (e.g., spelling and punctuation), media techniques, figurative language and genre to create, critique, and discuss print and nonprint texts

- Students conduct research on issues and interests by generating ideas and questions and by posing problems. They gather, evaluate and synthesize data from a variety of sources (e.g., print and nonprint texts, artifacts, people) to communicate their discoveries in ways that suit their purpose and audience
- Students use a variety of technological and information resources (e.g., libraries, databases, computer networks, video) to gather and synthesize information and to create and communicate knowledge
- Students participate as knowledgeable, reflective, creative and critical members of a variety of literacy communities
- Students use spoken, written and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion and the exchange of information)

Source: IRA/NCTE Standards for the English Language Arts. To view the standards, visit: www.ncte.org/standards.

COMMUNITY SERVICE

PURPOSE

To evaluate local chapter activities that benefit the community and to recognize excellence and professionalism in the area of community service. This event also enables the community to become aware of the outstanding work being performed by career and technical education students.

First, download and review the General Regulations at: http://updates.skillsusa.org.

ELIGIBILITY (TEAM OF 3)

Open to active SkillsUSA members. Only the first-place high-school and/or college/ postsecondary winning team(s) may be entered in national competition. The entire chapter is encouraged to participate in the community service project. A team of three members will represent the chapter in a live presentation. All team members must be from the same school.

CLOTHING REQUIREMENT

Class A: SkillsUSA Official Attire

For men: Official SkillsUSA blazer or jacket, black dress slacks, white dress shirt, plain black tie with no pattern (or SkillsUSA black tie), black socks, black shoes.
For women: Official SkillsUSA blazer or jacket; black dress skirt (knee-length) or black slacks; plain business-like white, collarless blouse (or white blouse with small, plain collar that may not extend onto the lapels of the blazer); black sheer or skin-tone hose; black shoes.

These regulations refer to clothing items that are pictured and described at: www.skillsusastore.org. If you have questions about clothing or other logo items, call 800-401-1560 or 703-956-3723.

Note: Contestants must wear their official contest clothing to the contest orientation meeting.

EQUIPMENT AND MATERIALS

1. Supplied by the technical committee:
   a. LCD projector and screen
   b. 110-volt outlet
   c. Timer
   d. Time cards
2. Supplied by the contestant:
   a. Laptop computer, LCD projector (optional) or other visual equipment as necessary for the presentation. *Backup must be ready and available if technical problems occur.*
   b. Clicker (for your specific equipment)
   c. Notecards, if desired

3. All competitors must create a one-page résumé and submit a hard copy to the technical committee chair at orientation. Failure to do so will result in a 10-point penalty.

   ***Note*:** Your contest may also require a hard copy of your résumé as part of the actual contest. Check the Contest Guidelines and/or the updates page on the SkillsUSA website at http://updates.skillsusa.org.

SCOPE OF THE CONTEST

The contest will consist of two parts: a notebook outlining the chapter community service project and a live presentation by the chapter team.

Knowledge Performance

There is no written knowledge test required in this contest.

Skill Performance

The contest will consist of two parts: a notebook outlining the chapter community service project and a live presentation by the chapter team. The chapter will organize the year's community service activities and present its best community service project to a panel of judges. Only one project may be presented. Notebooks containing information about more than one project will not be judged.
The notebook and presentation should represent a community service project that was conceived, planned and completed during the current school year.

Note: Although involvement of the entire school is encouraged, the project must clearly be organized and conducted by the active SkillsUSA chapter.

Contest Guidelines

1. Notebook
   a. A chapter notebook must be compiled that describes the chapter community service project. The notebook must be brought to the contestant orientation meeting.
   b. The notebook must be an official SkillsUSA three-ring binder.
   c. The notebook must not contain more than 30 pages (60 surfaces).
   Note: A surface is only that material which can be pasted or glued to a notebook page. Any pockets, foldout pages, individual materials contained in plastic sleeves, multiple pages or similar features will count as additional surfaces and will be subject to penalty, except where specifically stated otherwise. Pages may be plasticized without affecting the scores.
   d. The notebook should be organized in the following format:
      1. *Title Page*
      The title page must include the name of the project, chapter name, school address and a list of the names of the presenting team members.
      2. *Introduction*
      Provide a brief description of the project, not to exceed one page. This statement should provide a brief and concise description or overview of your community service project.
      3. *Table of Contents*
      The table of contents should indicate page numbers. All surfaces should be numbered, and the information should be organized according to appropriate sections as indicated below.
      4. *Section I — Objectives of the Project*
      Objectives should be specific, measurable, action-oriented, relevant to local needs and time-bound. Objectives should be revisited at the conclusion of the project to show level of success and to document impact.
      5. *Section II — Community Impact*
      Describe and document the full impact that the project had on individuals, organizations, businesses, industry or the community in general as appropriate to the project. Include statistical evidence such as surveys, pre/post test results or data/documentation to prove that your project made a significant difference and can be sustained in the future.
      6. *Section III — Impact on the School*
      Describe and document the full impact that participation in the project had on the school community. Include statistical evidence such as surveys, pre-/post-test results or data/documentation to show how your project made a difference in some aspect of the school environment or in the student population.
      7. *Section IV — Letters of Recognition*
      A maximum of five letters can be included. Include letters from business or industry representatives that recognize your community service contribution and demonstrate the community's awareness of SkillsUSA.
      8. *Section V — Publicity*
      Newspaper articles, photos or other items that show publicity received during the project. Do not include items you generated to promote participation. SkillsUSA must be mentioned in the publicity article to receive credit. Original copies of newspaper articles must be submitted. If you use information (or receive any publicity during the project) via the internet, social media or electronic articles, you must reference the source, including the dates.

      Dates of the article must be within the article, or a letter of verification from the editor must be submitted.

Photocopies of articles are not acceptable. You may also document your efforts to secure publicity by including letters from newspapers or TV/radio stations verifying that articles related to your project have been submitted for publication. This section should also include photos that document events as they were conducted. Photos should be affixed and captioned to explain content.

2. Live Team Presentation
   a. A team of three will represent the chapter in a live professional presentation. The purpose of the presentation is to provide the judges with an overview of the chapter's community service project and the positive results achieved. All team members must take an active part in the presentation.
      Note: Presentations should provide a clear sense about the project planning timetable and process — how the project was initiated, organized, implemented, evaluated and celebrated.
   b. The presentation shall be 7–10 minutes in length.
   c. Time penalty: Five points will be deducted for each 30 seconds or fraction thereof under seven minutes or over 10 minutes. Time will be started when the presentation begins. The timer will signal the team at seven minutes and at nine minutes.
   d. Teams are encouraged to be creative in their presentations. The use of computer-generated presentations or other visuals is strongly encouraged.
   e. All charts and graphs must be student produced. No commercially produced materials will be allowed. Each team may use at least one of the following visual formats in their presentation:
      1. Flip charts
      2. Overhead transparencies
      3. 35mm slide presentation
      4. PowerPoint or other computer presentation

Standards and Competencies

CS 1.0 — Create a professional notebook/scrapbook that follows guidelines and effectively expresses chapter community service activities

1.1 Design a title page that lists the name of the project and the chapter name
1.2 Construct a table of contents and organize subjects in order and list with page numbers
1.3 Write clear and effective objectives
1.4 Describe community impact
1.5 Describe school impact
1.6 Secure letters of recommendation from local officials
1.7 Explain publicity received by activities

CS 2.0 — Design and write an effective presentation that provides the judges with an overview of the chapter's community service project and positive results achieved

2.1 Prepare a seven- to 10-minute demonstration of a job skill
2.2 Organize the demonstration in a logical and coherent manner
2.3 Incorporate at least one of the following visual aids in the presentation: flip chart, overhead transparencies, 35mm slide presentation and/or PowerPoint or other computer presentation

CS 3.0 — Deliver the presentation in a professional manner meeting the standards outlined by the technical committee

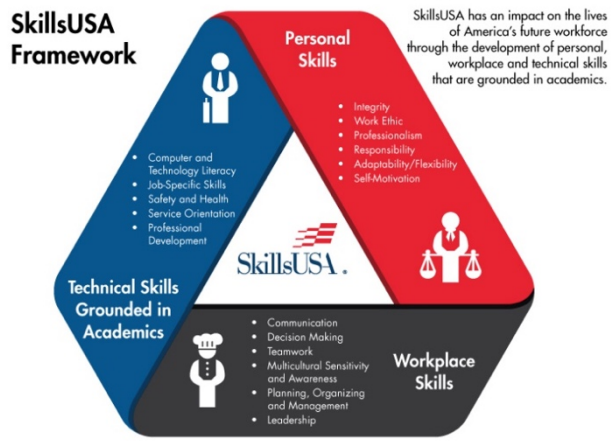
3.1 Engage all team members in the presentation
3.2 Explain the community service project through the use of displays and visuals
3.3 Demonstrate an effective and pleasing delivery style
3.4 Effectively use verbal illustrations and examples
3.5 Make a formal and effective introduction to the presentation that clearly identifies the scope of the demonstration
3.6 Pronounce words in a clear and understandable manner
3.7 Use a variety of verbal techniques including: modulation of voice, changing volume, varied inflection, modifying tempo and verbal enthusiasm
3.8 Demonstrate poise and self-control while presenting

3.9 Demonstrate good platform development and personal confidence from each team member
3.10 Communicate the primary points of the speech in a compact and complete manner
3.11 Tie organizational elements together with an effective ending
3.12 Complete the speech within the time limits set by contest requirements

CS 4.0 — Wear appropriate clothing for the SkillsUSA national contest

4.1 Display clothing that meets national standards for competition
4.2 Demonstrate good grooming in dress and personal hygiene

CS 5.0 — SkillsUSA Framework



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Committee Identified Academic Skills

The technical committee has identified that the following academic skills are embedded in this contest.

Math Skills

None Identified

Science Skills

None Identified

Language Arts Skills

- Provide information in oral presentations
- Demonstrate use of verbal communication skills: word choice, pitch, feeling, tone and voice
- Demonstrate use of nonverbal communication skills: eye contact, posture and gestures using interviewing techniques to gain information
- Organize and synthesize information for use in written and oral presentations
- Use print, electronic databases and online resources to access information in books and articles
- Demonstrate narrative writing
- Demonstrate informational writing
- Edit writing for correct grammar, capitalization, punctuation, spelling, sentence structure and paragraphing

Connections to National Standards

State-level academic curriculum specialists identified the following connections to national academic standards.

Math Standards

None Identified

Source: NCTM Principles and Standards for School Mathematics. For more information, visit: www.nctm.org.

Science Standards

- Understands the nature of scientific inquiry
- Understands the scientific enterprise

Source: McREL compendium of national science standards. To view and search the compendium, visit: http://www2.mcrel.org/compendium/browse.asp.

Language Arts Standards

- Students adjust their use of spoken, written and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes
- Students employ a wide range of strategies as they write. They use different writing process elements appropriately to communicate with different audiences for a variety of purposes
- Students apply knowledge of language structure, language conventions (e.g., spelling and punctuation), media techniques, figurative language and genre to create, critique, and discuss print and nonprint texts
- Students conduct research on issues and interests by generating ideas and questions and by posing problems. They gather, evaluate and synthesize data from a variety of sources (e.g., print and nonprint texts, artifacts, people) to communicate their discoveries in ways that suit their purpose and audience
- Students use a variety of technological and information resources (e.g., libraries, databases, computer networks, video) to gather and synthesize information and to create and communicate knowledge
- Students participate as knowledgeable, reflective, creative and critical members of a variety of literacy communities
- Students use spoken, written and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion and the exchange of information)

Source: IRA/NCTE Standards for the English Language Arts. To view the standards, visit: www.ncte.org/standards.

EMPLOYMENT APPLICATION PROCESS

PURPOSE
To evaluate contestants' readiness for applying for employment in their occupational areas and understanding the process and procedures required.

First, download and review the General Regulations at: http://updates.skillsusa.org.

ELIGIBILITY
Open to active SkillsUSA members enrolled in career and technical programs with entry-level job skills as the occupational objective. A letter from an appropriate school official on school letterhead stating that the contestant is classified under the provisions of Public Law 105-17, Individuals with Disabilities Education Act, 1997, is required for participation.

State associations having restrictions on release of this information may submit a letter of eligibility that simply states "I certify that (student's name) meets the eligibility requirements for the SkillsUSA Employment Application Process." The letter must be signed by the school official, who must also include his or her title.

The eligibility letter *must* be submitted to the technical committee at the orientation meeting.

CLOTHING REQUIREMENT
Class A: SkillsUSA Official Attire
For men: Official SkillsUSA blazer or jacket, black dress slacks, white dress shirt, plain black tie with no pattern (or SkillsUSA black tie), black socks, black shoes.
For women: Official SkillsUSA blazer or jacket; black dress skirt (knee-length) or black slacks; plain business-like white, collarless blouse (or white blouse with small, plain collar that may not extend onto the lapels of the blazer); black sheer or skin-tone hose; black shoes.

These regulations refer to clothing items that are pictured and described at: www.skillsusastore.org. If you have questions about clothing or other logo items, call 800-401-1560 or 703-956-3723.

Note: Contestants must wear their official contest clothing to the contest orientation meeting.

ADVISORS
1. Advisors or instructor *must* attend the orientation meeting with the contestant.
2. Advisor is responsible for obtaining the eligibility letter from the school and submission to the technical committee at orientation.
3. Failure to follow these steps will result in a penalty against the contestant's score.

KNOWLEDGE PERFORMANCE
No written employability skills knowledge test is required for this contest.

ORIENTATION
The following are required at the orientation meeting, or a penalty may apply. Refer to Penalties section.
1. Advisor must attend with contestant.
2. Eligibility letter must be submitted.
3. Résumé for SkillsUSA requirement must be submitted.
4. SkillsUSA attire is required.

OBSERVER RULE
Observers are not be permitted to review the contest.

TIME LIMITS
The contestant will be allowed 30 minutes to complete the application. The introduction (meet and greet) portion requesting the application is *not* included in the 30 minutes. A penalty will apply for more than 30 minutes spent completing the application.

The interview will last approximately 10 to 20 minutes. No penalties will be given for exceeding this time period, as this portion of the contest is under the judges' control.

Penalties

Penalties apply for the following:

1. No advisor attending the orientation, -1 pt
2. Missing eligibility letter at orientation, -1 pt
3. Attire incorrect at orientation, -1 pt
4. Attire incorrect at contest time, 0 to 5 percent of score
5. Résumé not submitted at orientation (requirement of SkillsUSA), -10 pts
6. Application time, -1 pt for every minute, or fraction thereof, over 30 minutes

Equipment and Materials

1. Supplied by the technical committee:
   a. Judges
   b. All necessary information for the judges and technical committee
   c. Employment application forms
   d. Table and chair for application completion
2. Supplied by the contestant:
   a. Three copies of his or her résumé, one to be turned in at orientation, one for preliminary and one for final, if needed
   b. Pen(s) for completing the employment application form
   c. The contestant's portfolio, which will be returned to the contestant after the interview

Arrangement of Rooms

1. An area will be set up for the contestants to assemble and wait their turns.
2. Application room will be set up with tables and chairs for the Personnel Manager (and assistant) for introductions and requesting application forms and for contestants to complete the application.
3. Interview room will be furnished with a table and chairs for the contestant and judges.

Scope of the Contest

The contest consists of:

1. Preparation and submission of a résumé, completed at home. Three copies will be required.
2. Preparation and submission of a portfolio, completed at home.
3. Completion of an application at contest time. Thirty minutes is allowed (penalty applies for exceeding the 30-minute limit; refer to the Penalities section). Introduction (meet and greet) with the personnel manager is *not* included in the 30-minute limit, but contestants are judged. Application will be completed in front of and timed by the personnel manager or assistant (judges).
   Note: A card (3"x5" or 4"x6") with necessary information may be used to assist in completing the application.
4. The personnel manager (and/or assistant) will evaluate the application and the portfolio.
5. Participate in an in-depth interview with the two interviewers (judges), approximately 15 minutes. There will be two judges for the interview process. Judges will be given a copy of the résumé and the portfolio for their review prior to the interview. After review of the résumé and portfolio, the judges will interview the contestant by asking a series of five questions. Judges are allowed to use their own techniques for the interview.
6. While the actual questions will be determined by the judges prior to the start of the contest, examples of types of questions that may be asked are:
   a. What's your objective?
   b. What can you tell us about your future?
   c. What are your strengths?
   d. What are your qualifications?

Résumé

Prepare three copies of a typewritten résumé for submission at the orientation, preliminary and finals, if needed. Included in the résumé must be:

1. Name, address, phone number
2. Career objective
3. Education/training
4. Work experience, listing present employment first, along with specific responsibilities or tasks involved. Volunteering also may be included in work experience.
5. Accomplishments, awards earned, certificates, involvement with school activities, civic organizations or clubs during school years
6. References are to be included

Portfolio

The portfolio is a hard-copy collection (notebook or other type of binding, not required to be a SkillsUSA notebook) of a contestant's abilities and accomplishments. The purpose of the portfolio is to provide another means for the interviewers to learn about the contestant (potential employee). The portfolio should be created as a final product to be used in applying for future employment.

Organization of Portfolio

1. Title page — name, address, school, vocational goals or type of job desired
2. Table of contents
3. Vocational skills
4. Work experience
5. Activities: school, community, civic, religious
6. Publicity: copies of awards, newspaper articles, school paper articles, pictures, etc.
7. Pictures or copies of pictures, clippings from other media
8. Other: Any other items that reflect the student's abilities and accomplishments.
   Note: Pictures may be included throughout the portfolio.

Preparation for Completing an Application

At home, contestants should practice completing various employment applications, using their reference cards if necessary. Practice printing legibly, using blue or black ink. Much of the information in an application is the same as in the résumé. Typical information requested includes:

1. Type of employment desired, what do you want to do, or what job are you seeking?
2. Education and training
3. Memberships, clubs, community activity, school organizations (include membership in SkillsUSA)
4. Certifications or other awards
5. Work experience (include voluntary jobs)
6. References are to be included

Preparation for the Interview

In preparation for the interview portion, the contestants should:

1. Understand the importance of first impressions.
2. Practice proper introductions, including handshaking, clearly providing your name and purpose of the interview.
3. Practice informal conversation including:
   a. Stating your objectives
   b. Providing information about yourself
   c. Making yourself understood to the interviewer
   d. Listening skills to be sure you understand the question
   e. Learning to ask for clarification if necessary
   f. Answering questions completely
4. Practice expressing your abilities confidently so that the employer wants to hire you.

Skills Performance

This contest evaluates the understanding of the employment process a student will face in applying for positions in the occupational area for which he or she is training. The contest consists of two parts. The first is meeting the Personnel Manager and completing the employment application, and the second is the interview. The portfolio is to be submitted at the time of requesting the application from the Personnel Manager.

Contest Guidelines

1. Contestants shall apply for positions in keeping with their occupational objectives. In completing the résumé, employment application and portfolio, contestants will use their own name, address, school, employment and occupational information, etc. All information must be as accurate as possible.
   Note: One 3"x5" or 4"x6" notecard with information to assist in completing the application may be used by the contestant.
2. When called from the assembly area, the contestant will approach the Personnel Manager as though applying for a job. Contestants will be given an employment application to complete within 30 minutes in the presence of the Personnel Manager.

3. Contestants will complete the application. The Personnel Manager will note the time the contestant is handed the application and the time the completed application is returned. The times are entered on the scoring sheet. One point will be deducted for each minute or fraction thereof over the 30-minute time limit (maximum deduction is 10 points).
4. The Personnel Manager will be handed the portfolio at the time of requesting the application. The Personnel Manager (or Assistant) will judge the application and the portfolio.
5. After completing the application and returning it to the Personnel Manager, the contestant will return to the assembly waiting area.
6. A technical committee member will present one copy of the résumé along with the portfolio to the interviewing judges for their perusal prior to the interview.
7. From the assembly area, a technical committee member will inform the contestant which room to enter for the interview.
8. The interview with the judges will be approximately 10 to 20 minutes. No penalty applies as the time required is under the control of the judges.
9. All contestants will be asked five questions. Three questions will be the same for each contestant and two will be about the contestant's portfolio.
10. Judges are encouraged to use their own interview techniques and should keep the focus of the interview on the selected questions.

Check the SkillsUSA website for updates: http://updates.skillsusa.org.

Standards and Competencies

EAP 1.0 — Prepare a one-page personal résumé

1.1 Design a personal layout and structure for the résumé
1.2 List name, address and phone numbers
1.3 State a specific career objective
1.4 List education and training information
  1.4.1 Provide GPA if currently enrolled in school
  1.4.2 Include areas of study
  1.4.3 List any employment-related certifications or licenses
  1.4.4 List any volunteer (nonpaid) employment
  1.4.5 Identify name and location of academic/training institutions
1.5 Discuss work experience beginning with present employment
1.6 Outline specific job responsibilities and transferable skills gained, in a bulleted format
1.7 List organizational memberships, major accomplishments, awards, other notable accomplishments
1.8 Edit résumé for spelling, grammar and effective design

EAP 2.0 — Complete an employment application that meets industry standards

2.1 Complete the employment application within the allotted time limit
2.2 Be prepared with all needed information to complete the application; a 3"x5" or 4"x6" card may be used as a word bank
2.3 Review employment application to ensure it is free of errors
2.4 Complete application form legibly

EAP 3.0 — Meet and greet Personnel Manager to meet industry standards

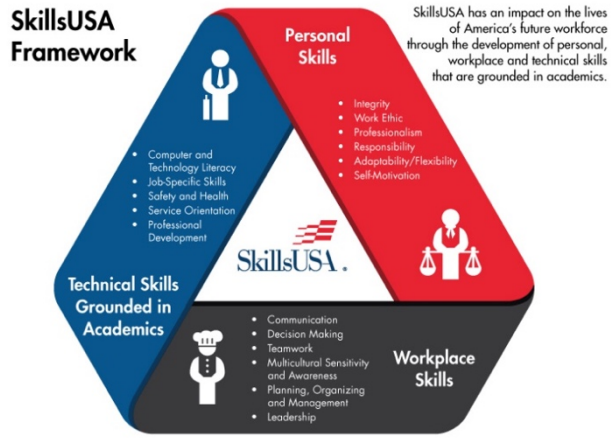
3.1 Greet Personnel Manager professionally
3.2 Introduce oneself appropriately

EAP 4.0 — Complete an approximately 15-minute interview that meets industry standards

4.1 Introduce self professionally
4.2 Display good posture and appropriate dress and grooming
4.3 Demonstrate knowledge of position applying for and personal history
4.4 Respond to questions from the interviewing judges
4.5 Explain work and leadership experiences concisely when applicable
4.6 Explain personal strengths and weaknesses if and when asked
4.7 Discuss personal and professional short- and long-term goals, if requested
4.8 Describe two accomplishments and personal satisfaction gained from each when applicable

4.9 Explain personal qualifications and characteristics that will lead to professional success
4.10 Describe the ideal job when applicable

EAP 5.0 — SkillsUSA Framework



The SkillsUSA Framework is used to pinpoint the Essential Elements found in Personal Skills, Workplace Skills, and Technical Skills Grounded in Academics. Students will be expected to display or explain how they used some of these Essential Elements. Please reference the graphic above, as you may be scored on specific elements applied to your project. For more, visit: www.skillsusa.org/about/skillsusa-framework/.

Committee Identified Academic Skills

The technical committee has identified that the following academic skills are embedded in this contest.

Math Skills

None Identified

Science Skills

None Identified

Language Arts Skills

- Provide information in conversations
- Provide information through oral presentation
- Demonstrate use of verbal communication skills: word choice, pitch, feeling, tone and voice
- Demonstrate use of nonverbal communication skills: eye contact, posture and gestures using interviewing techniques to gain information
- Organize and synthesize information for use in written and oral presentations
- Edit writing for correct grammar, capitalization, punctuation, spelling, sentence structure and paragraphing

Connections to National Standards

State-level academic curriculum specialists identified the following connections to national academic standards.

Math Standards

None Identified

Source: NCTM Principles and Standards for School Mathematics. For more information, visit: www.nctm.org.

Science Standards

- Understands the scientific enterprise

Source: McREL compendium of national science standards. To view and search the compendium, visit: http://www2.mcrel.org/compendium/browse.asp.

Language Arts Standards

- Students adjust their use of spoken, written and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes
- Students employ a wide range of strategies as they write and use different writing process elements appropriately to communicate with different audiences for a variety of purposes
- Students apply knowledge of language structure, language conventions (e.g., spelling and punctuation), media techniques, figurative language and genre to create, critique and discuss print and nonprint texts
- Students use a variety of technological and information resources (e.g., libraries, databases, computer networks, video) to

gather and synthesize information and to create and to communicate knowledge
- Students use spoken, written and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion and the exchange of information)

Source: IRA/NCTE Standards for the English Language Arts. To view the standards, visit: www.ncte.org/standards.

EXTEMPORANEOUS SPEAKING

PURPOSE
To evaluate each contestant's ability to give a speech on an assigned topic with a minimum of advance preparation.

First, download and review the General Regulations at: http://updates.skillsusa.org.

ELIGIBILITY
Open to active SkillsUSA members.

CLOTHING REQUIREMENT
Class A: SkillsUSA Official Attire
For men: Official SkillsUSA blazer or jacket, black dress slacks, white dress shirt, plain black tie with no pattern (or SkillsUSA black tie), black socks, black shoes.
For women: Official SkillsUSA blazer or jacket; black dress skirt (knee-length) or black slacks; plain business-like white, collarless blouse (or white blouse with small, plain collar that may not extend onto the lapels of the blazer); black sheer or skin-tone hose; black shoes.

These regulations refer to clothing items that are pictured and described at: www.skillsusastore.org. If you have questions about clothing or other logo items, call 800-401-1560 or 703-956-3723.

Note: Contestants must wear their official contest clothing to the contest orientation meeting.

OBSERVER RULE
No observers allowed.

EQUIPMENT AND MATERIALS
1. Supplied by the technical committee:
   a. Reference materials: *SkillsUSA Leadership Handbook, Webster's New Collegiate Dictionary, Bartlett's Familiar Quotations* and *Roget's Thesaurus*
   b. Blank 3"x5" cards
   c. Copies of selected speech topic in sealed envelopes
   d. Stopwatches as required
   e. Time cards
2. Supplied by the contestant:
   a. Pencil or pen
   b. All competitors must create a one-page résumé and submit a hard copy to the technical committee chair at orientation. Failure to do so will result in a 10-point penalty.

Note: An iPad or similar device may be used while in the preparation room as a reference tool, but it will not be provided by the technical committee.

***Note*:** Your contest may also require a hard copy of your résumé as part of the actual contest. Check the Contest Guidelines and/or the updates page on the SkillsUSA website at: http://updates.skillsusa.org.

ARRANGEMENT OF ROOMS
1. Assembly room: An area where contestants wait their turns to enter the preparation room will be provided.
2. Preparation room: A room furnished with a chair and a table or desk will be provided for the five-minute preparation time. All necessary reference materials and blank 3"x5" cards will be available in this room.
3. Speech presentation room: This room will be furnished with a speaker's stand (lectern) facing the audience and judges.

SCOPE OF THE CONTEST
Knowledge Performance
There is no written knowledge test required for this contest.

Skill Performance
This contest evaluates each contestant's ability to give a speech on an assigned topic with a minimum of advance preparation. A three- to five-minute speech will be delivered with a preparation time of five minutes.

Contest Guidelines

1. Contestants will draw numbers during the pre-contest orientation meeting to determine the order of competition.
2. The technical committee will select a speech topic based upon material in the *SkillsUSA Leadership Handbook*. All contestants will be assigned the same topic.
3. Contestants will enter the preparation room, where they will be given a speech topic. Contestants will have five minutes to determine the content and organize their speeches.
4. During preparation time, contestants may consult reference materials supplied in the preparation room and may make notes on 3"x5" cards for use during the speech. Contestants may not take any outlines, notes or reference materials into the preparation room.
5. The speech shall be at least three minutes in length but shall not exceed five minutes. Penalty: Five points will be deducted for each 30 seconds or fraction thereof under three minutes, or for each 30 seconds or fraction thereof over five minutes.
6. Time limit: Time will be started when the speech begins. The timekeeper will signal the speaker at three minutes, four minutes and five minutes. Contestants will be permitted to use a watch or clock.
7. Contestants will not mention their name, school, city or state at any time in the presentation room. A five-point penalty will be assessed for each occurrence.

Standards and Competencies

ES 1.0 — Design and organize a speech that meets the topical and time requirements as outlined by the technical committee

1.1 Prepare a speech on a leadership topic that lasts three to five minutes in length
1.2 Organize speech in a logical and coherent manner

ES 2.0 — Deliver the speech in a professional manner meeting the standards outlined by the technical committee

2.1 Make a formal and effective introduction to the presentation that clearly identifies the scope of the speech
2.2 Demonstrate an effective and pleasing delivery style
2.3 Effectively use verbal illustrations and examples
2.4 Pronounce words in a clear and understandable manner
2.5 Use a variety of verbal techniques, including: modulation of voice, changing volume, varied inflection, modifying tempo and verbal enthusiasm
2.6 Demonstrate poise and self-control while presenting
2.7 Demonstrate good platform deportment and personal confidence
2.8 Communicate the primary points of the speech in a compact and complete manner
2.9 Tie organizational elements together with an effective ending
2.10 Complete the speech within the time limits set by contest requirements

ES 3.0 — Wear appropriate clothing for the national contest

3.1 Display clothing that meets national standards for competition
3.2 Demonstrate good grooming in dress and personal hygiene

ES 4.0 — SkillsUSA Framework

The SkillsUSA Framework is used to pinpoint the Essential Elements found in Personal Skills, Workplace Skills, and Technical Skills Grounded in Academics. Students will be expected to display or explain how they used some of these Essential Elements. Please reference the graphic above, as you may be

scored on specific elements applied to your project. For more, visit: www.skillsusa.org/about/skillsusa-framework/.

Committee Identified Academic Skills

The technical committee has identified that the following academic skills are embedded in this contest.

Math Skills

None Identified

Science Skills

None Identified

Language Arts Skills

- Provide information in oral presentations
- Demonstrate use of verbal communication skills: word choice, pitch, feeling, tone and voice
- Demonstrate use of nonverbal communication skills: eye contact, posture and gestures using interviewing techniques to gain information
- Demonstrate comprehension of a variety of informational texts
- Use text structures to aid comprehension
- Identify words and phrases that signal an author's organizational pattern to aid comprehension
- Understand source, viewpoint and purpose of texts
- Organize and synthesize information for use in written and oral presentations
- Demonstrate knowledge of appropriate reference materials

Connections to National Standards

State-level academic curriculum specialists identified the following connections to national academic standards.

Math Standards

None Identified

Source: NCTM Principles and Standards for School Mathematics. For more information, visit: www.nctm.org.

Science Standards

None Identified

Source: McREL compendium of national science standards. To view and search the compendium, visit: http://www2.mcrel.org/compendium/browse.asp.

Language Arts Standards

- Students adjust their use of spoken, written and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes
- Students use a variety of technological and information resources (e.g., libraries, databases, computer networks, video) to gather and synthesize information and to create and communicate knowledge
- Students use spoken, written and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion and the exchange of information)

Source: IRA/NCTE Standards for the English Language Arts. To view the standards, visit: www.ncte.org/standards.

JOB INTERVIEW

PURPOSE
To evaluate contestants' understanding of employment procedures they will face in applying for positions in the occupational areas for which they are training.

First, download and review the General Regulations at: http://updates.skillsusa.org.

ELIGIBILITY
Open to active SkillsUSA members.

CLOTHING REQUIREMENT
Class A: SkillsUSA Official Attire
For men: Official SkillsUSA blazer or jacket, black dress slacks, white dress shirt, plain black tie with no pattern (or SkillsUSA black tie), black socks, black shoes.
For women: Official SkillsUSA blazer or jacket; black dress skirt (knee-length) or black slacks; plain business-like white, collarless blouse (or white blouse with small, plain collar that may not extend onto the lapels of the blazer); black sheer or skin-tone hose; black shoes.

These regulations refer to clothing items that are pictured and described at: www.skillsusastore.org. If you have questions about clothing or other logo items, call 800-401-1560 or 703-956-3723.

Note: Contestants must wear their official contest clothing to the contest orientation meeting.

OBSERVER RULE
No observers will be permitted to view the contest.

EQUIPMENT AND MATERIALS
1. Supplied by the technical committee:
   a. Employment application forms
   b. Timer
2. Supplied by the contestant:
   a. Six copies of a one-page, typewritten personal résumé (one set of three for the preliminary contest and the remaining set of three for the finals). No other material may be submitted by the contestant.
   b. Pen for completing application form

ARRANGEMENT OF ROOMS
1. Holding room: An area will be set up in which contestants will assemble to wait their turns.
2. Receptionist's area: An area will be furnished with receptionist's desk and necessary tables and chairs at which contestants will complete their employment applications.
3. Interview room: A room will be furnished with table and chairs for the contestant and interviewing committee of three judges.

SCOPE OF THE CONTEST
Knowledge Performance
There is no written knowledge test required in this contest.

Skills Performance
This contest evaluates the understanding of employment procedures that a student will face in applying for positions in the occupational area for which he or she is training. The contest consists of three parts. The first is the receptionist's preliminary evaluation. The second portion is the completion of an employment application, and the third portion is an in-depth interview.

Contest Guidelines
1. Contestants shall apply for positions in keeping with their occupational objectives. In completing the personal résumé and employment application, contestants will use their own name, address, school, employment and occupational information. All information must be as accurate as possible.
2. The receptionist will serve as a judge.
3. When called from the assembly area, the contestant will approach the receptionist as though applying for a job in the

occupational area consistent with the contestant's training program. Contestants will be given an employment application to complete within 30 minutes in the receptionist's presence.

4. Contestants will complete the application by printing in ink. The receptionist will note the time the contestant is handed the application and the time the completed application is returned. One point will be deducted for each minute or fraction thereof over the 30-minute time limit (maximum deduction of 10 points). Information such as the following may be asked on the application:
   a. Employment desired
   b. Education
   c. Membership in civic, community or school organizations
   d. Former employers and work experience
   e. References
5. The receptionist will receive the completed application along with three copies of a one-page, typewritten résumé prepared in advance and supplied by the contestants. The following information must be contained in the one-page résumé:
   a. Name, address and phone number
   b. Career objective
   c. Education and training
   d. Work experience beginning with present employment listing specific responsibilities
   e. Professional memberships, major accomplishments, awards earned
   f. References are to be on a separate page, not on the one-page résumé
6. After the receptionist evaluates the application, a technical committee member will present three copies of the personal résumé to the interviewing committee (judges).
7. After the judges review the personal résumé, a technical committee member will direct the contestant to the judges for the interview.
8. The interview with the judges will be approximately 10 minutes. This will allow adequate time for four to six questions.
9. All contestants in an interview group will be asked identical questions. Such questions might include the following but will be determined by the judges:
   a. What are your occupational objectives?
   b. What do you like most about this occupation?
   c. What are your hobbies?
   d. What would you like to be doing five years from now? Ten years?
   e. Why do you want to work for our company?
   f. What two accomplishments have given you the most satisfaction?
   g. What are your extracurricular activities?
   h. How would you describe your ideal job?
   i. What do you think determines a person's progress within a company?
   j. What do you consider to be your outstanding job-related personal characteristics or strengths?
   k. What qualifications and characteristics do you have that make you feel you'll succeed in your work?
10. Judges are encouraged to use their own interview techniques and should keep the focus of the interview on the selected questions.

Standards and Competencies

JI 1.0 — Prepare a one-page personal résumé

1.1 Design a personal layout and structure for the résumé
1.2 List name, address and phone number
1.3 State a specific career objective
1.4 List educational and training information
   1.4.1 Provide GPA if currently enrolled in school
   1.4.2 Include areas of study
   1.4.3 List any employment-related certifications or licenses
   1.4.4 Identify name and location of academic/training institutions
1.5 Discuss work experience beginning with present employment
1.6 Outline specific job responsibilities and transferable skills gained, in a bulleted format
1.7 List organizational memberships, major accomplishments and awards earned
1.8 Edit résumé for spelling, grammar and effective design

JI 2.0 — Complete an employment application that meets industry standards

2.1 Complete the employment application within allotted time limit
2.2 Be prepared with all needed information to complete the application
2.3 Review employment application to ensure it is free of errors
2.4 Complete application form legibly

JI 3.0 — Meet and greet receptionist to meet industry standards

3.1 Greet receptionist professionally
3.2 Introduce oneself to the receptionist

JI 4.0 — Complete a 10-minute job interview that meets industry standards

4.1 Professionally introduce yourself
4.2 Display good posture and appropriate dress and grooming
4.3 Demonstrate knowledge of position applying for and personal history
4.4 Respond to four to six questions from the judging panel
4.5 Explain work and leadership experiences concisely when applicable
4.6 Explain personal strengths and weaknesses to the committee when applicable
4.7 Discuss personal and professional short- and long-term goals
4.8 Describe two accomplishments and personal satisfaction gained from each when applicable
4.9 Explain personal qualifications and characteristics that will lead to professional success
4.10 Describe your ideal job when applicable

JI 5.0 — SkillsUSA Framework

The SkillsUSA Framework is used to pinpoint the Essential Elements found in Personal Skills, Workplace Skills, and Technical Skills Grounded in Academics. Students will be expected to display or explain how they used some of these Essential Elements. Please reference the graphic above, as you may be scored on specific elements applied to your project. For more, visit: www.skillsusa.org/about/skillsusa-framework/.

Committee Identified Academic Skills

The technical committee has identified that the following academic skills are embedded in this contest.

Math Skills

None Identified

Science Skills

None Identified

Language Arts Skills

- Provide information in conversations and in group discussions
- Provide information in oral presentations
- Demonstrate use of verbal communication skills: word choice, pitch, feeling, tone and voice
- Demonstrate use of nonverbal communication skills: eye contact, posture and gestures using interviewing techniques to gain information
- Organize and synthesize information for use in written and oral presentations

- Edit writing for correct grammar, capitalization, punctuation, spelling, sentence structure and paragraphing

Connections to National Standards

State-level academic curriculum specialists identified the following connections to national academic standards.

Math Standards

None Identified

Source: NCTM Principles and Standards for School Mathematics. For more information, visit: www.nctm.org.

Science Standards

- Understands the scientific enterprise

Source: McREL compendium of national science standards. To view and search the compendium, visit: http://www2.mcrel.org/compendium/browse.asp.

Language Arts Standards

- Students adjust their use of spoken, written and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes
- Students employ a wide range of strategies as they write and use different writing process elements appropriately to communicate with different audiences for a variety of purposes
- Students apply knowledge of language structure, language conventions (e.g., spelling and punctuation), media techniques, figurative language and genre to create, critique and discuss print and nonprint texts
- Students use a variety of technological and information resources (e.g., libraries, databases, computer networks, video) to gather and synthesize information and to create and communicate knowledge
- Students use spoken, written and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion and the exchange of information)

Source: IRA/NCTE Standards for the English Language Arts. To view the standards, visit: www.ncte.org/standards.

JOB SKILL DEMONSTRATION A

PURPOSE

To evaluate each contestant's ability to demonstrate and explain an entry-level technical skill used in the occupational area for which he or she is training.

First, download and review the General Regulations at: http://updates.skillsusa.org.

ELIGIBILITY

Open to active SkillsUSA members enrolled in career and technical programs with career objectives that are included in the SkillsUSA Championships official contests. The "A" classification is based on the program enrollment of the contestant. It is not based on the specific skill to be demonstrated.

CLOTHING REQUIREMENT

Contestants may wear SkillsUSA official attire *or* attire appropriate for the occupational area of the demonstration.

SkillsUSA official attire

For men: Official blazer, jacket or sweater; black dress slacks; white dress shirt; plain black tie with no pattern or SkillsUSA black tie; black socks and black shoes. Men may also wear official SkillsUSA white polo shirt with black dress slacks, black socks and black leather shoes.

For women: Official blazer, jacket or sweater; black dress slacks or knee-length skirt with businesslike white, collarless blouse or white blouse with small, plain collar that may not extend onto the lapels of the blazer; black sheer or skin-tone seamless hose and black dress shoes. Women may also wear official SkillsUSA white polo shirt with black dress slacks or skirt, black socks or black or clear seamless hose and black leather shoes.

These regulations refer to clothing items that are pictured and described at: www.skillsusastore.org. If you have questions about clothing or other logo items, call 800-401-1560 or 703-956-3723.

Note: Contestants must wear their official contest clothing to the contest orientation meeting.

EQUIPMENT AND MATERIALS

1. Supplied by the technical committee:
   a. Timekeeper
   b. A performance space of 8'x12' that contains a 30"x96" table and one duplex (two plug-ins) 110-volt (15 amp) electrical outlet
2. Supplied by the contestant:
   a. All materials and equipment needed for the demonstration to be completed two times, once for the preliminaries and again for the finals, if required
   b. All competitors must create a one-page résumé and submit a hard copy to the technical committee chair at orientation. Failure to do so will result in a 10-point penalty.

   ***Note*:** Your contest may also require a hard copy of your résumé as part of the actual contest. Check the Contest Guidelines and/or the updates page on the SkillsUSA website at http://updates.skillsusa.org.

OBSERVER RULE

1. No observers will be allowed to talk or gesture to contestants.
2. Judges may disqualify contestants who receive assistance from observer.
3. No videos, pictures or note-taking in the room. All electronics must be turned off, or contestant will be disqualified.
4. No observer may enter or exit while contestant is presenting.
5. No observing is allowed by any Job Skill Demonstration contestant in either the preliminary or final round.
6. Any judge, timekeeper or doorkeeper has the right to ask an observer to leave if they are being a distraction for any contestant.

Scope of the Contest

Knowledge Performance
There is no written exam for this contest.

Skill Performance
The contest requires the demonstration of a performance of an occupational skill within the chosen career pathway accompanied by a clear explanation of the topic through the use of experiments, displays or practical operations.

Contest Guidelines
1. An actual technical skill must be performed as opposed to an illustrated talk.
2. Notecards and other reference materials are not permitted.
3. *Any skill may be demonstrated, provided it is a skill related to the occupational program of the contestant.*
4. The demonstration shall be at least five minutes in length but shall not exceed seven minutes.
   Penalty: Five points will be deducted for each 30 seconds or fraction thereof under five minutes or for each 30 seconds or fraction thereof over seven minutes.
5. Time limit: Time will be started when the demonstration begins. The timekeeper will signal the speaker at five minutes, six minutes, and six minutes 30 seconds.
6. Contestants will be allowed three minutes to set up the demonstration and three minutes to clear the demonstration room.
   Penalty: Five points will be deducted for each 30 seconds or fraction thereof over the three-minute allowance.
7. A performance space of 8'x12' will be provided that contains a 30"x96" table and one duplex (two plug-ins) 110-volt (15 amp) electrical outlet.
8. Any visual or auditory aids (signs, charts, transparencies, slides, diagrams, tapes, CDs) are to be prepared by contestants. Professionally prepared visuals and audio materials may not be used. No open flames, no combustible or hazardous chemical compounds, no fluids containing pathogens or toxic chemicals, and no pressurized containers will be allowed.
9. The contestant will not mention his or her name, school, city or state.
10. The demonstration is an individual performance; however, assistants may be used to set up and dismantle the demonstration. Models or assistants may be used in the demonstration but will not say or do anything that assists the demonstration other than serve as a model as needed for a facial, clothing design demonstration, etc.
11. Basic safety practices related to the skill performed must be followed. Safety violations will be subject to penalties of one to 10 points. Judges may interrupt the demonstration for serious violations.

Standards and Competencies

JSDA 1.0 — Design and write an effective presentation that demonstrates a technical job skill related to the contestant's field of training

1.1 Prepare a demonstration of a technical job skill that lasts five to seven minutes
1.2 Organize the demonstration in a logical and coherent manner

JSDA 2.0 — Deliver the presentation in a professional manner meeting the standards outlined by the technical committee

2.1 Perform the actual technical skill in the presentation
2.2 Explain the topic through the use of experiments, displays or practical operations
2.3 Demonstrate an effective and pleasing delivery style
2.4 Effectively use verbal illustrations and examples
2.5 Make a formal and effective introduction to the presentation that clearly identifies the scope of the demonstration
2.6 Pronounce words in a clear and understandable manner
2.7 Use a variety of verbal techniques including: modulation of voice, changing volume, varied inflection, modifying tempo and verbal enthusiasm
2.8 Demonstrate poise and self-control while presenting
2.9 Demonstrate good platform development and personal confidence

2.10 Communicate the primary points of the speech in a compact and complete manner
2.11 Tie organizational elements together with an effective ending
2.12 Complete the speech within the time limits set by contest requirements

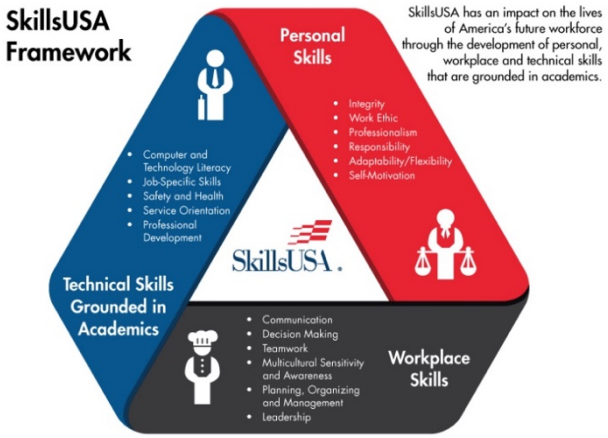
JSDA 3.0 — Wear appropriate clothing for the national contest

3.1 Display clothing that meets national standards for competition
3.2 Demonstrate good grooming in dress and personal hygiene

JSDA 4.0 — Safety and hazardous materials

4.1 Student cannot demonstrate with pressurized aerosol cans, compressed air, gases, flammable liquids or biohazardous materials
4.2 The demonstration may be interrupted or discontinued for severe safety violations

JSDA 5.0 — SkillsUSA Framework



The SkillsUSA Framework is used to pinpoint the Essential Elements found in Personal Skills, Workplace Skills, and Technical Skills Grounded in Academics. Students will be expected to display or explain how they used some of these Essential Elements. Please reference the graphic above, as you may be scored on specific elements applied to your project. For more, visit: www.skillsusa.org/about/skillsusa-framework/.

Committee Identified Academic Skills

The technical committee has identified that the following academic skills are embedded in this contest.

Math Skills

- Use fractions to solve practical problems
- Use proportions and ratios to solve practical problems
- Simplify numerical expressions
- Solve practical problems involving percentages
- Solve single variable algebraic expressions
- Measure angles
- Find surface area and perimeter of two-dimensional objects
- Find volume and surface area of three-dimensional objects
- Apply transformations (rotate or turn, reflect or flip, translate or slide, and dilate or scale) to geometric figures
- Construct three-dimensional models
- Apply Pythagorean Theorem
- Make predictions using knowledge of probability
- Make comparisons, predictions and inferences using graphs and charts
- Organize and describe data using matrices
- Solve problems using proportions, formulas and functions
- Find slope of a line
- Solve practical problems involving complementary, supplementary and congruent angles
- Solve problems involving symmetry and transformation
- Demonstrate measuring skills
- Convert from metric to English measurements or from English to metric measurements

Science Skills

- Use knowledge of speed, velocity and acceleration
- Use knowledge of work, force, mechanical advantage, efficiency and power
- Use knowledge of simple machines, compound machines, powered vehicles, rockets and restraining devices
- Use knowledge of principles of electricity and magnetism
- Use knowledge of static electricity, current electricity and circuits

- Use knowledge of magnetic fields and electromagnets
- Use knowledge of motors and generators

Language Arts Skills

- Provide information in conversations and in group discussions
- Provide information in oral presentations
- Demonstrate use of verbal communication skills, such as word choice, pitch, feeling, tone and voice
- Demonstrate use of nonverbal communication skills, such as eye contact, posture and gestures using interviewing techniques to gain information
- Demonstrate comprehension of a variety of informational texts
- Use text structures to aid comprehension
- Identify words and phrases that signal an author's organizational pattern to aid comprehension
- Understand source, viewpoint and purpose of texts
- Organize and synthesize information for use in written and oral presentations
- Demonstrate knowledge of appropriate reference materials
- Use print, electronic databases and online resources to access information in books and articles
- Demonstrate informational writing
- Edit writing for correct grammar, capitalization, punctuation, spelling, sentence structure and paragraphing

Connections to National Standards

State-level academic curriculum specialists identified the following connections to national academic standards.

Math Standards

None Identified

Source: NCTM Principles and Standards for School Mathematics. For more information, visit: www.nctm.org.

Science Standards

- Understands the nature of scientific inquiry

Source: McREL compendium of national science standards. To view and search the compendium, visit: http://www2.mcrel.org/compendium/browse.asp.

Language Arts Standards

- Students adjust their use of spoken, written and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes
- Students employ a wide range of strategies as they write and use different writing process elements appropriately to communicate with different audiences for a variety of purposes
- Students use a variety of technological and information resources (e.g., libraries, databases, computer networks, video) to gather and synthesize information and to create and communicate knowledge
- Students use spoken, written and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion and the exchange of information)

Source: IRA/NCTE Standards for the English Language Arts. To view the standards, visit: www.ncte.org/standards.

Job Skill Demonstration Open

Purpose
To evaluate each contestant's ability to demonstrate and explain an entry-level technical skill used either in the occupational area for which he or she is training or outside the training area.

First, download and review the General Regulations at: http://updates.skillsusa.org.

Eligibility
Open to active SkillsUSA members.

Clothing Requirement
Contestants may wear SkillsUSA official attire *or* attire appropriate for the occupational area of the demonstration.

SkillsUSA official attire
For men: Official blazer, jacket or sweater; black dress slacks; white dress shirt; plain black tie with no pattern or SkillsUSA black tie; black socks and black shoes. Men may also wear official SkillsUSA white polo shirt with black dress slacks, black socks and black leather shoes.
For women: Official blazer, jacket or sweater; black dress slacks or knee-length skirt with businesslike white, collarless blouse or white blouse with small, plain collar that may not extend onto the lapels of the blazer; black sheer or skin-tone seamless hose and black dress shoes. Women may also wear official SkillsUSA white polo shirt with black dress slacks or skirt, black socks or black or clear seamless hose and black leather shoes.

These regulations refer to clothing items that are pictured and described at: www.skillsusastore.org. If you have questions about clothing or other logo items, call 800-401-1560 or 703-956-3723.

Note: Contestants must wear their official contest clothing to the contest orientation meeting.

Equipment and Materials
1. Supplied by the technical committee:
   a. Timekeeper
   b. A performance space of 8'x12' that contains a 30"x96" table and one duplex (two plug-ins) 110-volt (15 amp) electrical outlet.
2. Supplied by the contestant:
   a. All materials and equipment needed for the demonstration to be completed two times, once for the preliminaries and again for the finals, if required.
   b. All competitors must create a one-page résumé and submit a hard copy to the technical committee chair at orientation. Failure to do so will result in a 10-point penalty.

   ***Note*:** Your contest may also require a hard copy of your résumé as part of the actual contest. Check the Contest Guidelines and/or the updates page on the SkillsUSA website at: http://updates.skillsusa.org.

Observer Rule
1. No observers will be allowed to talk or gesture to contestants.
2. Judges may disqualify contestants who receive assistance from observer.
3. No videos, pictures or note-taking in the room. All electronics must be turned off, or contestant will be disqualified.
4. No observer may enter or exit while contestant is presenting.
5. No observing is allowed by any Job Skill Demonstration contestant in either the preliminary or final round.
6. Any judge, timekeeper or doorkeeper has the right to ask an observer to leave if they are being a distraction for any contestant.

Scope of the Contest

Knowledge Performance
There is no written knowledge exam for this contest.

Skill Performance
The contest requires the demonstration of a performance of an occupational skill that is not within their chosen pathway accompanied by a

clear explanation of the topic through the use of experiments, displays or practical operations.

Contest Guidelines

1. An actual technical skill must be performed as opposed to an illustrated talk.
2. Notecards and other reference materials are not permitted.
3. *Any technical skill may be demonstrated. The skill does not have to relate to the occupational program of the contestant.*
4. The demonstration shall be at least five minutes in length but shall not exceed seven minutes.
   ***Penalty*:** Five points will be deducted for each 30 seconds or fraction thereof under five minutes or for each 30 seconds or fraction thereof over seven minutes.
5. Time limit: Time will be started when the demonstration begins. The timekeeper will signal the speaker at five minutes, six minutes, and six minutes 30 seconds.
6. Contestants will be allowed three minutes to set up the demonstration and three minutes to clear the demonstration room.
   ***Penalty*:** Five points will be deducted for each 30 seconds or fraction thereof over the three minute allowance.
7. A performance space of 8'x12' will be provided that contains a 30"x96" table and one duplex (two plug-ins) 110-volt (15 amp) electrical outlet.
8. Any visual or auditory aids (signs, charts, transparencies, slides, diagrams, tapes, CDs) are to be prepared by contestants. Professionally prepared visuals and audio materials may not be used. No open flames, no combustible or hazardous chemical compounds, no fluids containing pathogens or toxic chemicals, and no pressurized containers will be allowed.
9. The contestant will not mention his or her name, school, city or state.
10. The demonstration is an individual performance; however, assistants may be used to set up and dismantle the demonstration. Models or assistants may be used in the demonstration but will not say or do anything that assists the demonstration other than serve as a model as needed for a facial, clothing design demonstration, etc.
11. Basic safety practices related to the skill performed must be followed. Safety violations will be subject to penalties of one to 10 points. Judges may interrupt the demonstration for serious violations.

Standards and Competencies

JSDO 1.0 — Develop and write an effective presentation that demonstrates a technical job skill related to the contestant's field of training

1.1 Prepare a job skill demonstration that lasts five to seven minutes
1.2 Organize the demonstration in a logical and coherent manner

JSDO 2.0 — Deliver the presentation in a professional manner meeting the standards outlined by the technical committee

2.1 Perform the actual technical skill in the presentation
2.2 Explain the topic through the use of experiments, displays or practical operations
2.3 Demonstrate an effective and pleasing delivery style
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2.5 Make a formal and effective introduction to the presentation that clearly identifies the scope of the demonstration
2.6 Pronounce words in a clear and understandable manner
2.7 Use a variety of verbal techniques including: modulation of voice, changing volume, varied inflection, modifying tempo and verbal enthusiasm
2.8 Demonstrate self-control and poise while presenting
2.9 Demonstrate good platform development and personal confidence
2.10 Communicate the primary points of the demonstration in a compact and complete manner
2.11 Tie organizational elements together with an effective closing
2.12 Complete the demonstration within the time limits set by contest requirements

JSDO 3.0 — Wear appropriate clothing for the national contest

3.1 Display clothing that meets national standards for competition
3.2 Demonstrate good grooming in dress and personal hygiene

JSDO 4.0 — Safety and hazardous materials

4.1 Student cannot demonstrate with pressurized aerosol cans, compressed air, gases, flammable liquids or biohazardous materials
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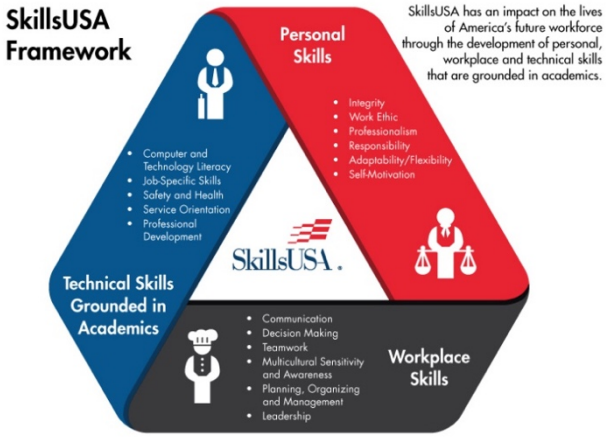
JSDO 5.0 — SkillsUSA Framework



The SkillsUSA Framework is used to pinpoint the Essential Elements found in Personal Skills, Workplace Skills, and Technical Skills Grounded in Academics. Students will be expected to display or explain how they used some of these Essential Elements. Please reference the graphic above, as you may be scored on specific elements applied to your project. For more, visit: www.skillsusa.org/about/skillsusa-framework/.

Committee Identified Academic Skills

The technical committee has identified that the following academic skills are embedded in this contest.

Math Skills

- Use fractions to solve practical problems
- Use proportions and ratios to solve practical problems
- Simplify numerical expressions
- Solve practical problems involving percentages
- Solve single variable algebraic expressions
- Measure angles
- Find surface area and perimeter of two-dimensional objects
- Find volume and surface area of three-dimensional objects
- Apply transformations (rotate or turn, reflect or flip, translate or slide and dilate or scale) to geometric figures
- Construct three-dimensional models
- Apply Pythagorean Theorem
- Make predictions using knowledge of probability
- Make comparisons, predictions, and inferences using graphs and charts
- Organize and describe data using matrices
- Solve problems using proportions, formulas and functions
- Find slope of a line
- Solve practical problems involving complementary, supplementary and congruent angles
- Solve problems involving symmetry and transformation
- Demonstrate measuring skills
- Convert from metric to English measurements and from English to metric measurements

Science Skills

- Use knowledge of speed, velocity and acceleration
- Use knowledge of work, force, mechanical advantage, efficiency and power
- Use knowledge of simple machines, compound machines, powered vehicles, rockets and restraining devices
- Use knowledge of principles of electricity and magnetism
- Use knowledge of static electricity, current electricity and circuits
- Use knowledge of magnetic fields and electromagnets
- Use knowledge of motors and generators

Language Arts Skills

- Provide information in conversations and in group discussions
- Provide information in oral presentations

- Demonstrate use of verbal communication skills, such as word choice, pitch, feeling, tone and voice
- Demonstrate use of nonverbal communication skills, such as eye contact, posture and gestures using interviewing techniques to gain information
- Demonstrate comprehension of a variety of informational texts
- Use text structures to aid comprehension
- Identify words and phrases that signal an author's organizational pattern to aid comprehension
- Understand source, viewpoint and purpose of texts
- Organize and synthesize information for use in written and oral presentations
- Demonstrate knowledge of appropriate reference materials
- Use print, electronic databases and online resources to access information in books and articles
- Demonstrate informational writing
- Edit writing for correct grammar, capitalization, punctuation, spelling, sentence structure and paragraphing

Connections to National Standards

State-level academic curriculum specialists identified the following connections to national academic standards.

Math Standards

None Identified

Source: NCTM Principles and Standards for School Mathematics. For more information, visit: www.nctm.org.

Science Standards

- Understands the nature of scientific inquiry

Source: McREL compendium of national science standards. To view and search the compendium, visit: http://www2.mcrel.org/compendium/browse.asp.

Language Arts Standards

- Students adjust their use of spoken, written, and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes
- Students employ a wide range of strategies as they write and use different writing process elements appropriately to communicate with different audiences for a variety of purposes
- Students use a variety of technological and information resources (e.g., libraries, databases, computer networks, video) to gather and synthesize information and to create and communicate knowledge
- Students use spoken, written and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion and the exchange of information)

Source: IRA/NCTE Standards for the English Language Arts. To view the standards, visit: www.ncte.org/standards.

Occupational Health and Safety

Purpose
To evaluate the chapter's activities in the promotion of good health and safety habits in the shop, laboratory and on the job.

First, download and review the General Regulations at: http://updates.skillsusa.org.

Eligibility (Team of 3 for both Single and Multiple Chapters)
All state first-place winners may be entered in national competition. Each state may enter one high-school single- and one multiple-section entry and one college/postsecondary single- and one multiple-section entry (see Contest Guidelines for more details). States may register up to three students per entry.

Clothing Requirement
Class A: SkillsUSA Official Attire
For men: Official SkillsUSA blazer or jacket, black dress slacks, white dress shirt, plain black tie with no pattern (or SkillsUSA black tie), black socks, black shoes.
For women: Official SkillsUSA blazer or jacket; black dress skirt (knee-length) or black slacks; plain business-like white, collarless blouse (or white blouse with small, plain collar that may not extend onto the lapels of the blazer); black sheer or skin-tone hose; black shoes.

These regulations refer to clothing items that are pictured and described at: www.skillsusastore.org. If you have questions about clothing or other logo items, call 800-401-1560 or 703-956-3723.

Note: Contestants must wear their official contest clothing to the contest orientation meeting.

Equipment and Materials
All competitors must create a one-page résumé and submit a hard copy to the technical committee chair at orientation. Failure to do so will result in a 10-point penalty.

***Note*:** Your contest may also require a hard copy of your résumé as part of the actual contest. Check the Contest Guidelines and/or the updates page on the SkillsUSA website at: http://updates.skillsusa.org.

Deadline
The safety entry will be brought to the National Leadership and Skills Conference (NLSC) and submitted to the national Occupational Health and Safety technical committee on the day immediately prior to the SkillsUSA Championships.

Exhibit of Entries
Safety entries will be displayed following the judging. Observers will be allowed to view them at designated times during the conference.

Pickup of Entries
Safety entries must be picked up by 4 p.m. or immediately after the debriefing meeting on Thursday by the student(s) or the advisor. They will not be released to an unauthorized person.

All winning chapters are encouraged to send their notebooks by Aug. 1 to the National Safety Council for consideration of its national award. Send with a letter requesting entry into the NSC Youth Safety Awards Program to:

Youth Safety Specialist
National Safety Council
1121 Spring Lake Drive
Itasca, IL 60143

SCOPE OF THE CONTEST

Knowledge Performance
There is no written knowledge exam for this contest.

Skill Performance
The contest will consist of an evaluation of a chapter's safety activities as presented in the official SkillsUSA scrapbook.

Contest Guidelines
1. Awards will be presented in two categories: single and multiple chapter.
   Note: A school may enter both categories of competition. All activities documented in the entry must reflect only the efforts of the students and advisor[s] of the section[s]. You may not take credit for school functions or projects conducted outside of SkillsUSA sponsorship.
   a. "Single chapter" refers to a SkillsUSA chapter that represents one occupational area regardless of the number of members. Multiple-teacher departments with the same vocational classification will be recognized as a single chapter. (For example, a three-teacher cosmetology department would be entered as a single chapter; an Auto Service Technology I and Auto Service Technology II program would be a single chapter.) All work-based learning or coop/cooperative programs in a school will be considered one chapter.
   b. "Multiple chapter" refers to an entry that represents more than one occupational program. (Example: a cosmetology program and a graphic arts program completing an entry together would be a multiple section.) There must be at least one member from each program on the Health and Safety Committee.
   c. A single- or multiple-chapter entry must complete all categories in the contest.
2. The entry will:
   a. Contain verification, proof or evidence of the activities represented. All articles and materials must be dated.
   b. Be in an official SkillsUSA scrapbook from the SkillsUSA Store catalog. A 20-point deduction will result from the use of any other type of scrapbook or notebook.
      Note: Different pages may be substituted for pages supplied in the official SkillsUSA scrapbook, or the pages may be covered; however, both front and back covers must be used without alteration. Ten points will be deducted for alteration.
   c. Contain no more than 75 sheets of paper the size of the official SkillsUSA scrapbook paper. Both surfaces of the 75 sheets may be filled for a maximum of 150 surfaces.
   d. ***Penalty***: Five points per surface (10 points per sheet of paper) will be deducted for exceeding this maximum.
      Note: A surface is only that material which can be pasted or glued to the basic scrapbook paper. Any pockets, foldout pages, multiple pages or similar features will count as additional surfaces and will be subject to penalty, except where specifically stated otherwise. Laminated/plasticized pages are not allowed, as they are difficult to judge and make the books too thick. Books with laminated/plasticized pages will receive a 100-point penalty.
      Note: For books over 2 inches thick, it is suggested that bolts be used. Binder post screws tend to break in thick books.
3. The contest will consist of four health and/or safety projects conducted by a special Health and Safety Committee.
   Note: The committee cannot be referred to as the OSHA Committee. "OSHA" can only refer to the Occupational Health and Safety Administration.
4. The Health and Safety Committee must have a minimun of three members. Once the Health and Safety Committee is appointed by the chapter president, the committee must document at least one regular meeting a month during the school year with Health and Safety Committee minutes that show the progress of the committee and its projects.
5. The entry will verify all activities from the time the Health and Safety Committee first meets, until all projects are completed. A single project may cover an entire school

year, or it may be a short-term project. All articles and materials must be dated. All projects must be conducted within SkillsUSA sponsorship.

6. All photographs, news articles, announcements, official letters and other evidence that substantiate a project must be dated. Points will be awarded only for committee activities that were accomplished during the year in which a chapter enters. Use of news articles, pictures or other materials dated or acquired prior to that year may result in a points deduction.
7. The entry will be organized in the following sequence:
    a. Title Page
        1. Name of school
        2. Name of state
        3. Names of the Health and Safety Committee members
        4. Names of all occupational programs involved in the Health and Safety Committee
        5. High school or postsecondary chapter
    b. Table of contents with page numbers: The project category (see Project Categories section) or each project must be clearly identified in the table of contents. All pages of the notebook must be numbered including blank pages.
    c. Calendar of events of all chapter activities including dates of Health and Safety Committee meetings
    d. Introduction
        1. A description of how and why your chapter(s) decided that health and/or safety was to be included in the SkillsUSA chapter's yearly program of work
        2. Documentation as to how the specific areas of health and/or safety were selected for emphasis
    e. Minutes of all official chapter business meetings that set the stage and gave direction or supported your projects *Note:* These are minutes of the SkillsUSA chapter that should include committee reports of the Health and Safety Committee. They are *not* Health and Safety Committee minutes.
    f. Four health and/or safety projects

Project Categories

There must be a total of four occupational health and/or safety projects, which must be selected from the five categories listed below. Two projects may be selected from one category with at least three different categories used. Failure to cover at least three categories will result in disqualification. Each project must begin with a cover page that clearly identifies the project category selected from the five project categories.

1. **Shop/Laboratory Health and Safety Survey**
   The survey form in the technical standards may be used, or a customized survey prepared to fit a chapter's specific needs may be used. If a customized survey is used, it must be of industry quality. The survey may be one used by a local industry.
    a. Describe all aspects of implementing the survey, including planning, conducting the survey, subsequent action and final reporting.
    b. Describe any action taken as a result of identifying possible hazards as shown on the survey. Corrective action should be part of any survey.
    c. A separate survey and description must be completed for each occupational area covered.
2. **Machine and Equipment Safety**
   Describe in detail the safety instruction provided in a selected shop/laboratory regarding the operation of all power machines and equipment as well as general safety instruction. Included in the description must be documentation of dates of all instructor classroom safety demonstrations, copies of classroom safety rules, listing of safety-related audiovisual materials shown in class and other pertinent information.
3. **Workplace Inspection**
    a. Visit a workplace to learn firsthand the degree of health and safety measures provided by an employer to the employees or customers.
    b. Compare the health and safety concepts taught in the classroom to those encountered in the workplace.
    c. Describe in detail the planning, site visit and general observations regarding

health and safety practiced at the workplace.

4. **Specialized Health and Safety Project**
   a. Develop a health and/or safety project chosen from the following categories. Document all activities involved in the project.
      1. 10-hour OSHA Industry Credentialing (CareerSafe)
      2. Safety in lifting and moving heavy objects
      3. Heat stress
      4. Occupational respiratory protection
      5. Indoor air pollution safety
      6. Personal protective equipment/Industrial protective clothing
      7. Occupational vehicle driving
      8. Plant/school building safety
5. **Other Industrial or Occupational Health and Safety Project**
   Other industrial or occupational health and safety concerns as identified by the chapter safety committee. The focus of any such project must be on industrial or occupational health and safety.

Project Criteria

Each project should be documented in such a way that it would tell a complete story if removed from the notebook. The documentation must cover the following items.

1. **Project Planning**
   Describe how interest was generated within your chapter for the specific safety project. Why was the project selected, or what was the need? Describe the steps the Health and Safety Committee followed to plan the project.
2. **Scope of Activities**
   Identify the committee members and all others who actually participated in the project. The amount of work and time that goes into a project will be considered when evaluating the project. All photographs, news articles, announcements, official letters and other evidence that substantiates the project should be included and dated.
3. **Committee Minutes**
   All Health and Safety Committee minutes related to the project should be included in each project. Minutes must follow the style set forth in the "Finalized Form of the Minutes" section in *Robert's Rules of Order*. Only include committee minutes if they document discussion and planning of the specific project in which they are included. Duplicate minutes that discuss more than one project should appear in each project. One meeting each month is required once the Health and Safety Committee is appointed. Each project does not have to be discussed at each committee meeting. Minutes must be dated and signed.
4. **Results Achieved**
   Describe and document the full impact that the project had on individuals, schools, businesses, industry and the community in general as appropriate to the project. Report positive and negative (if any) outcomes of the project. Include any data collected.
5. **Layout/Presentation**
   Neatness, clarity, organization and presentation of material will be evaluated. Errors in spelling, punctuation and grammar will result in a reduction of points.
6. **Interview**
   Up to three students on the Health and Safety Committee whose names appear on the title page of the notebook will be interviewed by a panel of judges. The contestant(s) will be asked questions pertaining to the projects. Each student must submit a one-page, typewritten résumé to the national technical committee when the notebook is submitted.

Standards and Competencies

OHSS 1.0 — Identify and conduct four health and/or safety projects planned by a special health and safety committee

1.1 Evaluate potential success of project prior to planning
1.2 Identify appropriate projects for your committee

OHSS 2.0 — Design a scrapbook that displays four heath and/or safety projects completed by the chapter

2.1 Document all safety committee activities in the safety committee reports
2.2 Date all material and articles

2.3 Describe how interest was generated within the chapter for the specific safety project
2.4 Explain why the specific safety project was selected
2.5 List the steps the Health and Safety Committee followed to plan the project
2.6 Document at least one regular meeting a month during the school year with minutes that show the progress of the projects (meeting of the Health and Safety Committee)

OHSS 3.0 — Organize a scrapbook according to contest guidelines

3.1 Create and use a title page
3.2 Design a table of contents with page numbers
3.3 Include a calendar of events of all chapter activities with dates of safety committee meetings and activities
3.4 Write an introduction
- 3.4.1 Describe how and why your chapter decided that health and/or safety was to be included in your yearly program of work
- 3.4.2 Document how the specific areas of health and/or safety were selected for emphasis

3.5 Include minutes of all official chapter business meetings (not safety committee minutes) that set the stage and provide direction or support for the safety projects
3.6 Identify and describe each completed project
- 3.6.1 Describe why each project was selected/what the need was
- 3.6.2 Describe in detail how interest was generated within your chapter/chapters for each safety project
- 3.6.3 Describe the steps the Health and Safety Committee followed to plan the project
- 3.6.4 Document the activities that took place to implement the safety project
- 3.6.5 Include news articles, announcements, photographs, official letters, and other evidence that substantiates the activities involved in the project
- 3.6.6 Identify all committee members and other individuals who participated in the safety project
- 3.6.7 Include related committee meeting minutes
- 3.6.8 Describe and document in detail the full impact that the project had on individuals, programs, schools or others
- 3.6.9 Report on the impact, if any, that the project had on improving safety attitudes or behavior
- 3.6.10 Present follow-up data, if possible, documenting the change in safety attitudes or behavior

3.7 Use principles of effective layout and presentation
- 3.7.1 Present information in a way that facilitates clarity, ease of understanding, organization, neatness and overall presentation of the materials
- 3.7.2 Use proper spelling, grammar and punctuation

OHSS 4.0 — Complete an interview that meets work force development guidelines

4.1 Introduce self professionally
4.2 Display good posture and appropriate dress and grooming
4.3 Demonstrate knowledge of the safety projects presented in the scrapbook.
4.4 Respond to four to six questions from the judging panel
4.5 Provide examples of health and safety activities not presented in the scrapbook
4.6 Discuss strengths and weaknesses of the chapter's health and safety initiatives

OHSS 5.0 — SkillsUSA Framework

The SkillsUSA Framework is used to pinpoint the Essential Elements found in Personal Skills, Workplace Skills, and Technical Skills Grounded in Academics. Students will be expected to display or explain how they used some of these Essential Elements. Please reference the graphic above, as you may be scored on specific elements applied to your project. For more, visit: www.skillsusa.org/about/skillsusa-framework/.

Committee Identified Academic Skills

The technical committee has identified that the following academic skills are embedded in this contest.

Math Skills

None Identified

Science Skills

None Identified

Language Arts Skills

- Provide information in conversations and in group discussions
- Provide information in oral presentations
- Demonstrate use of verbal communication skills: word choice, pitch, feeling, tone and voice
- Demonstrate use of nonverbal communication skills: eye contact, posture and gestures using interviewing techniques to gain information
- Demonstrate comprehension of a variety of informational texts
- Use text structures to aid comprehension
- Identify words and phrases that signal an author's organizational pattern to aid comprehension
- Understand source, viewpoint and purpose of texts
- Organize and synthesize information for use in written and oral presentations
- Demonstrate knowledge of appropriate reference materials
- Use print, electronic databases and online resources to access information in books and articles
- Demonstrate informational writing
- Edit writing for correct grammar, capitalization, punctuation, spelling, sentence structure and paragraphing

Connections to National Standards

State-level academic curriculum specialists identified the following connections to national academic standards.

Math Standards

None Identified

Source: NCTM Principles and Standards for School Mathematics. For more information, visit: www.nctm.org.

Science Standards

- Understands relationships among organisms and their physical environment
- Understands the structure and properties of matter
- Understands the sources and properties of energy
- Understands the nature of scientific knowledge
- Understands the nature of scientific inquiry

Source: McREL compendium of national science standards. To view and search the compendium, visit: http://www2.mcrel.org/compendium/browse.asp.

Language Arts Standards

- Students adjust their use of spoken, written and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes

- Students employ a wide range of strategies as they write and use different writing process elements appropriately to communicate with different audiences for a variety of purposes
- Students apply knowledge of language structure, language conventions (e.g., spelling and punctuation), media techniques, figurative language and genre to create, critique and discuss print and nonprint texts
- Students conduct research on issues and interests by generating ideas and questions, and by posing problems. They gather, evaluate and synthesize data from a variety of sources (e.g., print and nonprint texts, artifacts and people) to communicate their discoveries in ways that suit their purpose and audience
- Students use a variety of technological and information resources (e.g., libraries, databases, computer networks and video) to gather and synthesize information and to create and communicate knowledge
- Students participate as knowledgeable, reflective, creative and critical members of a variety of literacy communities
- Students use spoken, written and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion and the exchange of information)

Source: IRA/NCTE Standards for the English Language Arts. To view the standards, visit: www.ncte.org/standards.

SKILLSUSA VOCATIONAL SHOP HEALTH AND SAFETY SURVEY

School _____ City _____

County _____ Date _____

Address _____

Shop _____

Survey by _____ Title _____

	SATISFACTORY	NEEDS ATTENTION	REMARKS
A. GENERAL PHYSICAL CONDITION			
1. Machines, benches and other equipment are arranged so as to conform to good safety practices			
2. Condition of stairways			
3. Condition of aisles			
4. Condition of floors			
5. Condition of walls, windows and ceiling			
6. Illumination is safe, sufficient and well placed			
7. Ventilation			
8. Temperature			
9. Fire extinguishers are of proper type, adequately supplied, properly located and maintained			
10. Teacher and pupils know location of, and use of, proper type extinguishers for various fires			
11. The number and location of exits is adequate			
12. Proper procedures have been formulated for emptying the room of pupils and taking precautions in case of emergencies			
13. Lockers are inspected regularly for cleanliness and fire hazards			
14. Locker doors are kept closed			
B. HOUSEKEEPING			
1. General appearance and orderliness			
2. Adequate and proper storage space for tools and materials			
3. Benches are kept orderly			
4. Corners are clean and clear			
5. Special tool racks, kept in orderly condition are provided at benches and machines			
6. Tool, supply and/or material room is orderly			
7. Sufficient scrap boxes are provided			
8. Scrap stock is put in scrap boxes promptly			
9. Materials are stored in orderly fashion and in a safe condition			
10. A spring-lid, metal container is provided for oily rags and waste			
11. All waste materials and oily rags are placed in containers			
12. Containers for oily rags and waste materials are frequently and regularly emptied			
13. Dangerous (flammable, corrosive, reactive, etc.) materials are stored in separate metal cabinets			
C. EQUIPMENT			
1. Machines are arranged so that workers are protected from hazards of other machines and passing students			
2. Danger zones are properly identified			
3. All equipment control switches are easily available to the operator			
4. All machines are "locked off" when instructor is out of the room			
5. Brushes are used for cleaning equipment			
6. Non-skid areas are provided around machines			
7. Machines are in safe working condition			
8. Machines are guarded to comply with the State Industrial Code			

	SATISFACTORY	NEEDS ATTENTION	REMARKS
9. Adequate supervision is maintained where students are using machines and dangerous tools			
10. Tools are kept sharp, clean and in safe working order			
D. ELECTRICAL INSTALLATION			
1. All switches are enclosed			
2. There is a master control switch for all electrical installations			
3. An electrician changes fuses of over 30 amperes			
4. Electrical outlets and circuits are properly identified			
E. PERSONAL PROTECTION			
1. Goggles provided/required for all work where eye hazards exist...			
2. If individual goggles are not provided, hoods and goggles are properly disinfected before use			
3. Shields are provided for electric welding			
4. Aprons or shop coats are worn in the shop			
5. Rings, other jewelry removed by pupils when working in shop			
6. Proper wearing apparel is worn for the job being done			
7. Leggings, safety shoes and other items are worn in special classes such as foundry			
8. A respirator is used when spraying in the finishing room			
F. INSTRUCTION			
1. Shop safety is taught as an integral part of each teaching unit			
2. Health and Safety rules are posted			
3. Printed safety rules are given to each student			
4. The pupils take a safety pledge			
5. The shop makes use of a safety inspector			
6. There is a shop safety committee			
7. Safety contests are promoted			
8. Motion and/or slide films on safety are used in the instruction			
9. The shop has a safety suggestions box			
10. Safety tests are administered			
11. Safety posters are in evidence			
12. Talks on safety are given by industry representatives			
13. Tours taken of industrial plants as means of studying safety practices			
14. Periodic safety inspections of the shop made by a student committee			
15. Industrial representatives make safety inspections of the shop			
G. ACCIDENT RECORDS			
1. Adequate accident statistics are kept			
2. Accidents are reported to the proper administrative authority			
3. A copy of each accident report is filed with the State Department of Education or appropriate agency			
4. Accident reports are analyzed for instructional purposes and to furnish the basis for elimination of hazards			
H. FIRST AID			
1. An adequately stocked first-aid cabinet is provided			
2. The first aid is administered by a qualified individual			
3. The school has two or more individuals qualified to administer first aid ...			

Opening and Closing Ceremonies

Purpose
To evaluate the contestants' understanding of the symbolic representation of the colors and assembled parts of the SkillsUSA emblem and to evaluate teamwork and professional presentation skills.

First, download and review the General Regulations at: http://updates.skillsusa.org.

Eligibility (Team of 7)
Open to a team of seven active SkillsUSA members. The team need not be comprised of officers, and team members may be from more than one section, but team members must be organized under one local charter and active members in the same division.

Clothing Requirement
Class A: SkillsUSA Official Attire
For men: Official SkillsUSA blazer or jacket, black dress slacks, white dress shirt, plain black tie with no pattern (or SkillsUSA black tie), black socks, black shoes.
For women: Official SkillsUSA blazer or jacket; black dress skirt (knee-length) or black slacks; plain business-like white, collarless blouse (or white blouse with small, plain collar that may not extend onto the lapels of the blazer); black sheer or skin-tone hose; black shoes.

These regulations refer to clothing items that are pictured and described at: www.skillsusastore.org. If you have questions about clothing or other logo items, call 800-401-1560 or 703-956-3723.

Note: Contestants must wear their official contest clothing to the contest orientation meeting.

Observer Rule
Observers will be allowed to view the demonstration provided space is available. No talking or gesturing will be permitted. No member of the audience is to leave or enter the demonstration room while a team is competing.

Equipment and Materials
1. Supplied by the technical committee:
   a. Official SkillsUSA emblem
   b. Easel for emblem
   c. U.S. flag
   d. Gavel and sound block
   e. Speaker's stand (lectern)
   f. Two draped tables 8 feet long and 30 inches wide
   g. Six chairs
   h. Copy of *SkillsUSA Championships Technical Standards* for each judge
   i. All necessary information and furnishings for judges and technical committee
2. Supplied by the contestant:
   a. All competitors must create a one-page résumé and submit a hard copy to the technical committee chair at orientation. Failure to do so will result in a 10-point penalty per team member.

   ***Note*:** Your contest may also require a hard copy of your résumé as part of the actual contest. Check the Contest Guidelines and/or the updates page on the SkillsUSA website at: http://updates.skillsusa.org.

Arrangement of Demonstration Room
The room provided will be arranged to seat an audience and will have a demonstration area at the front of the room.

The room will be set up by the technical committee according to the diagram at the end of these standards, as closely as possible and based upon the confines of the facility. The tables will be placed 6 feet to 8 feet from the wall, depending on what the facility permits. The chairs may be placed anywhere behind the tables as long as they do not go past the ends of the tables. The emblem will be placed 4-8 feet from the front corner of the table depending on what the facility permits. The

flag will be placed 4-8 feet from the front corner of the table depending on what the facility permits. Both the emblem and the flag will be placed at the same distance. The room will contain a center aisle. If facilities permit, the room could have at least one side aisle added.

Scope of Contest

This is a teamwork and oral presentation contest that evaluates teams' understanding of the symbolic representation of the colors and assembled parts of the SkillsUSA emblem. Each team includes seven registered members in the roles of president, vice president, parliamentarian, reporter, treasurer, secretary and historian.

Knowledge Performance

There is no written knowledge test (other than the SkillsUSA knowledge test, which will be used as a tie breaker) required for this contest. Knowledge of ceremonies will be assessed during the performance demonstration.

Skill Performance

The contest is a demonstration of the SkillsUSA Opening and Closing Ceremonies conducted according to the script and description as printed in the SkillsUSA Championships Technical Standards.

Contest Guidelines

1. The official script and description for the contest shall be the one printed in the SkillsUSA Championships Technical Standards. No other method of performing the ceremony will be allowed for the purpose of the contest demonstration.
2. Teams will draw numbers during the pre-contest orientation meeting to determine the order of performance and demonstration times. Only the president, team captain or other representative of the team will attend the pre-contest meeting.
3. Each team must consist of seven registered members in the roles of president, vice president, parliamentarian, reporter, treasurer, secretary and historian.
   Note: The team may perform with six members (with a 14-point deduction) in the event that a member fails to show up or is forced to withdraw within five days of the competition. Another officer, not the president, will be assigned the missing part.
4. One member of the team, not the president, will deliver the thought for the day. It must be long enough to be scored for voice, stage presence and mechanics.
5. There is no time limit for the demonstration.
6. The team will be allowed three minutes to properly assemble the contest paraphernalia before the demonstration begins. Any number of team members may enter the room to set up. Members will be asked to leave the room when three minutes are up. No additional points are given for the manner in which the team comes into or leaves the room.
7. Only the official SkillsUSA emblem will be used.
8. If notification is given to the contest chairperson at the contestant orientation meeting that one or more team members will not say the Pledge of Allegiance for religious reasons, no points will be deducted. However, if no one on a team says the pledge, 42 points will be deducted.

Evaluation Criterion

Evaluations will be made by visual observation at the performance. A scoring rubric will be used.

Official SkillsUSA Championships Opening and Closing Ceremonies: Opening Ceremony

The officers will walk in from the outside entrance to their respective places and remain standing.

President: (Raps twice with gavel.) The meeting will come to order. The thought for the day will be given by the (designated officer).

Designated Officer: (Gives the thought for the day at the speaker's stand and returns to his or her seat.)

President: (Raps gavel once to seat the officers.) The emblem is symbolic of the SkillsUSA organization. You are about to witness the emblem ceremony, in which the meaning of each component of our emblem

will be given and the significance of the colors described. (Raps gavel once, calls for Mister or Madame Parliamentarian and steps directly back.)

Parliamentarian: (Picks up the shield and moves to speaker's stand and presents emblem piece, then pauses.) The shield represents patriotism. (Pauses.) The shield denotes our belief in democracy, liberty and the American way of life. (Moves to the emblem, presents piece to judges, pauses, and affixes the shield to the SkillsUSA emblem stand, calls for Mister or Madame Reporter and returns to seat.)

Reporter: (Picks up the gear and moves to the speaker's stand and presents emblem piece, then pauses.) The gear represents the industrial society. (Pauses.) The gear, symbolic of the industrial society, denotes the interdependence and cooperation of the individual working with labor and management for the betterment of mankind. (Moves to the emblem, presents piece to judges, pauses, and affixes the gear to the emblem, calls for Mister or Madame Treasurer and returns to seat.)

Treasurer: (Picks up the torch and moves to speaker's stand and presents emblem piece, then pauses.) The torch represents knowledge. (Pauses.) The flaming torch reflects the light of knowledge, which dispels the darkness of ignorance. In the light of the torch, progress will be made toward the vocational goals of the individual. (Moves to the emblem, presents piece to judges, pauses, and affixes the torch to the emblem, calls for Mister or Madame Secretary and returns to seat.)

Secretary: (Picks up the orbital circles and moves to speaker's stand and presents emblem piece, then pauses.) The orbital circles represent technology. (Pauses.) The circles represent the challenge of modern technology and the training needed to accept and master new technical frontiers and the need for continuous education. (Moves to the emblem, presents piece to judges, pauses, and affixes the circles to the emblem, calls for Mister or Madame Vice President and returns to seat.)

Vice President: (Picks up the hands and moves to speaker's stand and presents emblem piece, then pauses.) The hands represent the individual. (Pauses.) The hands portray a search for knowledge and our desire to acquire a skill. In the process of attaining knowledge and skill, we will develop a respect for the dignity of work and become productive and responsible citizens. (Moves to the emblem, presents piece to judges, pauses, and affixes the hands to emblem, calls for Mister or Madame Historian and returns to seat.)

Historian: (Moves to emblem and pauses.) With the affixing of the golden hands, we add the final official color of SkillsUSA. The colors of the emblem represent our organization. Red and white represent the individual states and the chapters; blue represents the common union of the states and the chapters; and gold represents the individual, the most important element of SkillsUSA. (Calls for Mister or Madame President and returns to seat.)

President: (Picks up the letters 'SkillsUSA" and moves to emblem. Presents piece to judges, then pauses, and affixes the letters to emblem; pauses.) All of the components constitute our emblem. Separately, they could be applied to many organizations, but as one unit, they represent the fundamental principles and purposes of our organization. The emblem represents SkillsUSA. (Returns to speaker's stand and pauses. Raps three times with gavel for all to stand.) We will respect the flag with the Pledge of Allegiance. (In unison, team members turn to flag and place their right hands over their hearts.)

In Unison: I pledge allegiance to the flag of the United States of America, and to the republic for which it stands, one nation under God, indivisible, with liberty and justice for all. (In unison, right hand is lowered to side and all turn to front.)

President: (Raps once with gavel for all to be seated.)

Official SkillsUSA Championship Opening and Closing Ceremonies: Closing Ceremony

President: Mister or Madame Secretary, have you a record of any further business to come before the meeting at this time?

Secretary: (Rises.) I have none, Mister or Madame President. (Is seated.)
President: Does any member know of any new or unfinished business that should come before this meeting? (Pauses for response.) Since there is no further business to come before the meeting at this time, we will prepare to adjourn. Since the rule is the basic instrument of our work, it is particularly fitting that we select the Golden Rule, "Do unto others as you would have them do unto you," to govern our lives. Let us speak our pledge. (Raps three times with the gavel for all to rise and leads in reciting the pledge.)

In Unison: Upon my honor, I pledge:

To prepare myself by diligent study and ardent practice to become a worker whose services will be recognized as honorable by my employer and fellow workers.

To base my expectations of reward upon the solid foundation of service.

To honor and respect my vocation in such a way as to bring repute to myself.

And further, to spare no effort in upholding the ideals of SkillsUSA.

President: I now declare this meeting adjourned until our next regular meeting or until a special meeting shall be called by your president. (Raps once with gavel.)

(All officers turn in unison and exit the room in a formal manner.)

Standards and Competencies

OCC 1.0 — Demonstrate proper room setup

1.1 Assemble the contest paraphernalia properly

OCC 2.0 — Demonstrate teamwork and coordinated activities

2.1 Enter/exit room in step
2.2 Sit, stand and turn in unison
- 2.2.1 Respond in unison to gavel raps immediately
- 2.2.2 Sit, stand and turn together
- 2.2.3 Synchronize movements
- 2.2.4 Perform natural movements
- 2.2.5 The sounding of the gavel will be the only sound made to signal movement

2.3 Handle emblem properly
- 2.3.1 Pick up the pieces in the same smooth manner
- 2.3.2 Keep emblem straight when being held
- 2.3.3 All except the president move with the emblem to the speaker's stand and present piece to the judges
- 2.3.4 Move with the emblem piece to the emblem stand
- 2.3.5 Present emblem piece to judges
- 2.3.6 Put emblem on the easel in the same manner

2.4 Conduct pledges
- 2.4.1 Place hand over the heart in unison in preparation for speaking the Pledge of Allegiance
- 2.4.2 Keep hands at sides during SkillsUSA pledge

OCC 3.0 — Demonstrate professional presentation skills as in voice, stage presence and mechanics

3.1 Vary pitch, tempo, volume and enthusiasm of voices
3.2 Exhibit stage presence including poise, eye contact, confident appearance, attitude and natural movements
3.3 Use good language mechanics such as diction, pronunciation and enunciation
3.4 Speak words with feeling and understanding

OCC 4.0 — Demonstrate accuracy of presentation

4.1 Repeat aloud from memory the script exactly as written
  - 4.1.1 Include exact wording with commas, pauses and periods used in the correct places
  - 4.1.2 Repeat from memory all of both pledges in unison

4.2 Conduct a chronological presentation

4.3 Strike sounding block with gavel in all instances

OCC 5.0 — Exhibit personal grooming, uniformity of dress and neatness

5.1 Wear clothing that fits well

5.2 Press clothing prior to performance

5.3 Wear the same style jacket as all members. Must have at least one or two buttons buttoned, but all team members must be the same. If a zipper jacket is worn, the jacket must be zipped halfway up or higher. All team members must be the same.

5.4 Wear same style shirt, dress slacks, black socks and black dress shoes for males

5.5 Wear same style shirt, slacks or skirt, dress shoes and same color hose for females (refer to clothing requirements)

5.6 Arrange hair back and out of eyes for all contestants. Does not have to be the same style.

OCC 6.0 — SkillsUSA Framework

The SkillsUSA Framework is used to pinpoint the Essential Elements found in Personal Skills, Workplace Skills, and Technical Skills Grounded in Academics. Students will be expected to display or explain how they used some of these Essential Elements. Please reference the graphic above, as you may be scored on specific elements applied to your project. For more, visit: www.skillsusa.org/about/skillsusa-framework/.

Committee Identified Academic Skills

The technical committee has identified that the following academic skills are embedded in this contest.

Math Skills

None Identified

Science Skills

None Identified

Language Arts Skills

- Provide information in oral presentations
- Demonstrate use of verbal communication skills, such as word choice, pitch, feeling, tone and voice
- Demonstrate use of nonverbal communication skills, such as eye contact, posture and gestures using interviewing techniques to gain information
- Identify words and phrases that signal an author's organizational pattern to aid comprehension

Connections to National Standards

State-level academic curriculum specialists identified the following connections to national academic standards.

Math Standards

None Identified

Source: NCTM Principles and Standards for School Mathematics. For more information, visit: www.nctm.org.

Science Standards

- Understands the scientific enterprise

Source: McREL compendium of national science standards. To view and search the compendium, visit: http://www2.mcrel.org/compendium/browse.asp.

Language Arts Standards

- Students adjust their use of spoken, written and visual language
- Students use spoken, written and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion and the exchange of information)

Source: IRA/NCTE Standards for the English Language Arts. To view the standards, visit: www.ncte.org/standards.

Opening and Closing Ceremonies Room Diagram

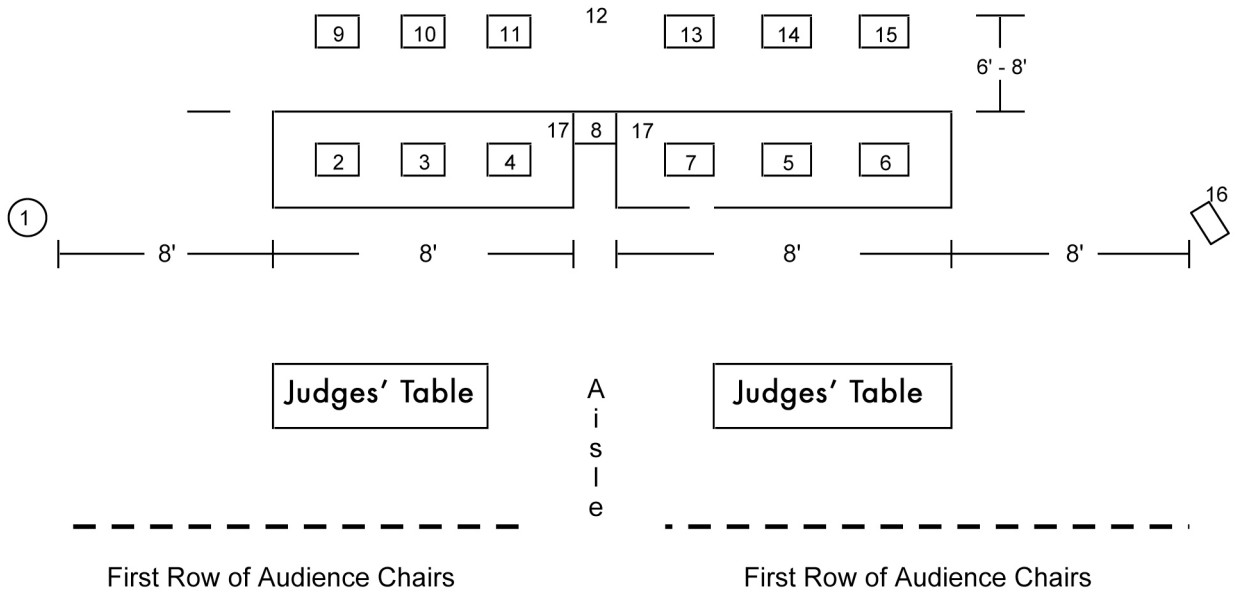


Diagram Key

1. American flag (8' from the front corner of the table)

Emblem Plastics (Nos. 2–7)

Note: Teams may decide the proximity of the plastics to each other. However, they must still be placed in the specified order from the podium and may not overlap.

2. Shield
3. Gear
4. Torch
5. Orbital circles
6. Hands
7. Letters
8. Podium (speaker's stand)

Chairs (Nos. 9–15)

Note: Teams may place the chairs any distance from the tables within the provided 6 feet to 8 feet space. For example, if the provided space is 7 feet, the chairs may be placed 1 foot, 2 feet, etc. from the table up to the point where the back of the chair is 7 feet from the table.

9. Parliamentarian
10. Reporter
11. Treasurer
12. President (no chair)
13. Secretary
14. Vice president
15. Historian
16. SkillsUSA emblem stand (easel — 8' from the front corner of the table)
17. Gavel and sound block (wooden block — either side is acceptable)

Outstanding Chapter

Purpose
To evaluate local chapter activities that benefit the student members, the school and the community. The outstanding chapters chosen each year serve as an example of the enthusiasm and careful planning necessary to keep chapters active and to involve as many members in activities as possible.

First, download and review the General Regulations at: http://updates.skillsusa.org.

Eligibility (Team of 3)
All state first-place winners may be entered in national competition.

Deadline
The Outstanding Chapter entry will be brought to the contestant orientation meeting. A card with the name of the state, school and interview student must be taped on the inside of the cover of the notebook.

Exhibit of Entries
Outstanding Chapter entries will be displayed following the judging. Observers will be allowed to view them at designated times during the conference.

Pickup of Entries
Outstanding Chapter entries will be picked up at the contest debriefing meeting by the student(s) or advisor. Entries will not be released to an unauthorized person.

Clothing Requirement
Class A: SkillsUSA Official Attire
For men: Official SkillsUSA blazer or jacket, black dress slacks, white dress shirt, plain black tie with no pattern (or SkillsUSA black tie), black socks, black shoes.
For women: Official SkillsUSA blazer or jacket; black dress skirt (knee-length) or black slacks; plain business-like white, collarless blouse (or white blouse with small, plain collar that may not extend onto the lapels of the blazer); black sheer or skin-tone hose; black shoes.

These regulations refer to clothing items that are pictured and described at: www.skillsusastore.org. If you have questions about clothing or other logo items, call 800-401-1560 or 703-956-3723.

Note: Contestants must wear their official contest clothing to the contest orientation meeting.

Equipment and Materials
All competitors must create a one-page résumé and submit a hard copy to the technical committee chair at orientation. Failure to do so will result in a 10-point penalty.

Note: Your contest may also require a hard copy of your résumé as part of the actual contest. Check the Contest Guidelines and/or the updates page on the SkillsUSA website at: http://updates.skillsusa.org.

Scope of the Contest
Knowledge Performance
There is no written knowledge test required for this contest.

Skill Performance
The contest assesses a chapter's ability to effectively plan, organize, implement and record activities related to its annual program of work.

Contest Guidelines
1. The chapter will organize the year's activities and record them in an official SkillsUSA book with a completed secretary's and treasurer's notebook available from the SkillsUSA Store.
2. Awards will be presented in two categories:
   a. High-school division will recognize a first-, second- and third-place winner.
   b. College/postsecondary division will recognize a first-, second- and third-place winner.

3. The Outstanding Chapter entry will:
   a. Contain verification, proof or evidence of the activities claimed and the date they were accomplished.
   b. Be in an official SkillsUSA book from the SkillsUSA Store.
      Note: Different pages may be substituted for pages supplied in the official SkillsUSA book or the pages may be covered; however, both front and back covers must be used without alteration.
      Penalty: Ten points will be deducted for alteration to either cover.
   c. Number of pages allowed: no more than 75 sheets of paper the size of the official SkillsUSA book paper. Both surfaces of the 75 sheets may be filled for a maximum of 150 surfaces.
      Penalty: Five points per surface (10 points per sheet of paper) will be deducted for exceeding these maximums.

      Note: A surface is only that material which can be pasted or glued to the basic book paper.) Any pockets, fold-out pages, multiple pages or similar features will count as additional surfaces and will be subject to penalty, except where specifically stated otherwise. Pages may be plasticized without affecting the scores.

      Note: Any entry omitting an item listed under Scope of the Contest, Parts 1–3, will be automatically disqualified.)
4. The book must be organized by activity in the same sequence as the rating sheet.
   Penalty: Ten points will be deducted for each activity that is out of sequence. Points may be claimed only for chapter activities that were accomplished during the year in which the entry is made, except as noted. Summer activities may be included, but a chapter may not claim points for activities that were a result of the previous year's chapter.
5. Points used in one section may not be claimed in another section. For example, social meetings may not be counted as both social and professional meetings. However, articles describing chapter activities may still receive publicity credit under Publicity.
6. Points will be awarded based on verification and/or documentation of activities described in the following order:
   a. The first surface of the book will be a title page.
   b. The table of contents may be on the back surface of the title page or the front of Page 2 (third surface) with page numbers included.
   c. All surfaces will be numbered.

Elements and Criteria for Judging

Part 1: School-Related Chapter Activities

A. Chapter Membership
   1. 25 points will be awarded for the chapter holding at least one-chapter recruitment activity.
   2. A written description must be presented to include the following:
      a. Evidence the event was planned by a committee
      b. A description of how the activity was conducted
      c. Number of members participating
      d. Date, time and place of activity
   3. A minimum of one photograph for the activity must be included.
   4. Verification: An official letter from the local school administrator verifying enrollment and actual SkillsUSA membership must be submitted in this section of the book. (***Note:*** Where schools participate in the Total Participation Plan or Campus Affiliation Plan, the school administrator must clearly state in the verification letter the actual number of CTE students enrolled and the actual number of active SkillsUSA members.)
   5. Copies of an official listing of members from the SkillsUSA Registration website must be placed in the secretary's notebook.
   6. If items 3 or 4 are not present, no points will be awarded for this section.

B. Official SkillsUSA Equipment
   1. Twenty points will be awarded for having the following official SkillsUSA equipment in the classroom:
      a. Banner
      b. SkillsUSA Secretary's notebook

c. Ceremonial emblem
d. Gavel
e. U.S. flag
f. Robert's Rules of Order, Newly Revised
g. Creed
h. Charter

Verification: One photo clearly showing these items must be submitted. The photo must be taken in such a way that all writing can be read on the items displayed.

C. SkillsUSA Program of Work (Secondary)
1. Describe the methods or procedure used to determine the local SkillsUSA program of activities for the year. A minimum of five committees must be established. The description must indicate a minimum of the following items:
   a. List each committee and the names of members
   b. Provide the date, time and a list of attendees for all committee meetings
   c. Copies of the minutes of all committee meetings must be placed in the secretary's book. In the book, reference the page in the secretary's book where each committee meeting is located
2. Consider the following committees:
   a. Professional Development
   b. Ways and Means (budget)
   c. Community Service
   d. Local SkillsUSA Championships
   e. Employment
   f. Public Relations
   g. Social
3. Points will be awarded based on a written description of the chapter's program activities, which must include the following for each activity:
   a. Provide written evidence the committee met for planning purposes
   b. Describe each committee's responsibilities
   c. Describe how the planning for each committee function was carried out

Note: The total description of the chapter's program of activities should be no more than three pages in length and will count as only one surface.

D. SkillsUSA Program of Work (Post-Secondary)
1. Describe the methods or procedure used to determine the local SkillsUSA program of activities for the year. A minimum of two committees must be established. The description must indicate a minimum of the following items:
   a. List each committee and the names of members
   b. Provide the date, time and a list of attendees for all committee meetings
   c. Copies of the minutes of all committee meetings must be placed in the secretary's book. In the book, reference the page in the secretary's book where each committee meeting is located
2. Consider the following committees:
   a. Leadership Development
   b. Community Service
   c. Local SkillsUSA Championships
   d. Employment
   e. Public Relations
3. Points will be awarded based on a written description of the chapter's program activities, which must include the following for each activity:
   a. Provide written evidence the committee met for planning purposes
   b. Describe each committee's responsibilities
   c. Describe how the planning for each committee function was carried out

Note: The total description of the chapter's program of activities should be no more than three pages in length and will count as only one surface.

E. Leadership Training for Officers and Members
1. Describe how chapter officers were prepared to conduct chapter meetings and provide leadership for the chapter.
2. Describe how chapter members were taught to effectively use parliamentary procedure in conducting their business

meetings. This description should include classroom type procedures taught by chapter advisors in addition to any workshops attended by members for learning parliamentary procedure.

3. Describe your installation of chapter officers. Points will be awarded for a written description of activities, which must include:
    a. Evidence of planning (Describe how the installation ceremony was planned.)
    b. Schedule of activities (Where did the installation ceremony take place? Who participated in the installation process? How many members were in attendance?)
    c. Method of implementation (Provide a description of how the ceremony was conducted. The description must include reference to the installation ceremony as found in the SkillsUSA Leadership Handbook.)

F. Chapter Meetings
    1. The chapter must hold a minimum of 6 meetings between the months of July 1 and June 1st of the current school year. No meetings relative to activities conducted the previous year may be counted.
    2. Credit will be given for one meeting per month (two or more meetings in the same month will count only as one monthly meeting).
    3. A minimum of three meetings must include one or more of the following: a guest speaker, field trip, leadership development or professional development activities. A written report of each meeting must be provided. The report shall include the planning for each meeting, how the planning was carried out, and number of members participating in each meeting. Reference should be made in this section to the page number of the minutes of each meeting in the secretary's notebook.

G. SkillsUSA Framework (Update score)
    1. The SkillsUSA Framework illustrates how students fulfill the mission of the organization "to empower members to become world-class workers, leaders and responsible American citizens."
    2. The chapter must conduct at least one activity within each of the three framework components: Personal Skills, Workplace Skills, Technical Skills Grounded in Academics
    3. A written description must be presented to include the following:
        a. Objective of the activity
        b. Evidence the event was planned by a committee
        c. A description of how the activity was conducted
        d. Number of members participating
        e. Date, time and place of activity
    4. A minimum of one photograph for each activity must be included.

H. SkillsUSA Publicity
    1. Zero to 20 points will be given for each public relations activity of the local chapter designed to promote SkillsUSA membership, class enrollment, career and technical education, or community awareness of SkillsUSA. SkillsUSA must be mentioned in the publicity article or credit will not be given.
    2. At least three activities must have been publicized. This can include newspaper or online media. Original copies of newspaper must be submitted — no photocopies. Newspaper articles must have the date within the article, or a letter of verification from the editor must be submitted. If online media, the article or screenshot must be printed with a link to the article and date printed on the header or footer of the page. TV and radio media are acceptable. A picture showing SkillsUSA members performing the activity along with a description of the activity must be included. A signed letter from the media station stating the name of the show, date and topics discussed must also be included.
        a. News articles from newspapers are accepted.

b. Online media will include official school, county and SkillsUSA chapter websites.
c. Online media will include official newspaper, radio station or TV websites.
d. Online media will include official school, county or SkillsUSA chapter Facebook accounts.
e. All articles must include a photo of the activity.
f. Online media such as blogs, Twitter, Instagram or other social media sites will not be accepted.

3. At least three or more members must be involved in each activity. Names must be listed in the description.
4. A description of each activity must be written. The description will include the following:
   a. Objective of the activity
   b. Evidence that the activity was planned by a committee
   c. Description of how the activity was conducted
   d. Number of members who participated in each activity
5. Photographs may be included.

I. Awards and Recognition Program
1. The awards and recognition program should be designed to recognize the contributions of program advisory committee members, chapter members, SkillsUSA chapter achievements, employer or advisory committee banquets, assembly programs for recognition or special occasions (must be related to accomplishments of the SkillsUSA chapter or members).
2. Credit will be given for only one program.
3. A written description of the activity must be presented. Points will be awarded as follows:
   a. Indicate the objective of the activity
   b. Provide evidence that a committee planned the activity
   c. Describe how the activity was conducted
   d. List in the description the number of members participating
4. A minimum of one photograph must be submitted.

J. Local SkillsUSA Championships
1. Points are based on 20 points for each of five SkillsUSA Championships contests conducted on the local level in which the chapter members participated. Credit will be given only for those contests of leadership or occupational preparation offered in the SkillsUSA Technical Standards. At least one of the five contests must involve occupational skills.
2. Points will be awarded for:
   a. Evidence that a committee planned the local event
   b. A written description of each contest to include date, time and location of contest; names of contest technical committees; names of judges for each event; and names of contestants in each contest

   Verification: The local school administrator must sign a statement verifying that the local SkillsUSA Championships events were held. Pictures of each contest must be submitted. (The photographs must show the contestant[s], judges and contest area.)

K. SkillsUSA Career Essentials
1. Two points will be awarded for each member that completes the Career Essentials: Foundations curriculum up to the maximum amount of points.
2. Names of SkillsUSA members, name of each member's training program and dates of all achievements must be included.
3. Students will receive two points for each additional Career Essentials curriculum completed, including those completed in prior years

Verification: Printout of official gradebook from SkillsUSA Career Essentials

Part 2: Community Activities

These activities should benefit the community. (Examples: project to help a needy family, cleanup or painting campaign, health promotion activity, safety program, blood drive, project to assist special populations, voter registration drive.) Pictures must show some SkillsUSA members in SkillsUSA official attire while participating in the event.

A. Credit will be given for three activities (70 points each).

B. Points will be awarded by writing a description of each activity to include the following:
   1. Objective of the activity
   2. Evidence the activity was planned by a committee
   3. Written description as to how the activity was conducted
   4. Names of all participants in the activity
   5. List of place, time and date for each activity
   6. Evidence of students dressed in SkillsUSA official attire

C. A list of community activities included in the previous year's Outstanding Chapter contest must be submitted. No credit will be given during the current year for any activity that occurred in the previous year. There must be a one-year absence before any activity is repeated.

D. A minimum of one photograph for each activity must be submitted. The photograph must show students involved in the activity as it took place.

Part 3: Business and Industry Relations

In this section, the chapter must include a written description of at least two business and industry related activities (100 points each). A list of suggested activities may include, but is not limited to, the following:

- Business and industry tour
- Business and industry shadowing program
- Business and industry work-based (co-op) program
- Service learning activity/community service activity
- Partners in progress
- Job fair

A detailed description of each activity must be included. The description should indicate how the chapter and the business community work together for the benefit of the students enrolled in the SkillsUSA chapter. The following information must be included in the description:

A. Name of the committee and committee members who planned the activity (reference to the page number in the secretary's minutes for the committee meeting minutes)

B. How the activity was carried out
   1. List the names of all participants in the activity
   2. List the date of the activity and a description of the day's events
   3. Describe the benefit received by participants
   4. Describe the benefit to the host business/industry

A minimum of one photo for each activity showing students involved must be presented. This activity should include an opportunity for all chapter members to be involved. Photos must show some SkillsUSA members in SkillsUSA official attire while participating in the event. The local business/industry must provide a letter of verification for the activity. Only one event per business/industry is allowed. The second event must be conducted with another business/industry.

Part 4: General Appearance and Overall Layout

Points will be awarded on the basis of the overall quality of the Outstanding Chapter entry. The uniformity of presentation, neatness, clarity of material, quality of pictures and printed material will be considered.

Part 5: Secretary/Treasurer Notebook

Thirty-Five points will be awarded for the Secretary's/Treasurer's notebook based on:

A. Membership and attendance rosters
B. Chapter yearly calendar of activities
C. Names of committee members and complete minutes of all committees

D. Minutes of all business and professional Meetings
E. Each meeting minutes should also include:
   1. Monthly income record
   2. Monthly expense record
F. Names of local and state officers and national presidents
G. Local, state and national constitutions.
H. Projected budget
I. Dues payment record for local, state and national dues
J. Year beginning and ending balance

Note: The secretary's/treasurer's notebook is one notebook that must contain the above requirements.

Part 6: Student Interview

Each team will be interviewed. All three team members must be present during the interview. Students will have an opportunity to explain how they approached various activities and how the Outstanding Chapter project benefited their class and/or school. The interview will be used to help verify points awarded by the judges and to answer any questions they may have.

Standards and Competencies

OUT 1.0 — Plan and conduct meaningful and effective activities related to SkillsUSA program of work

1.1 List components of SkillsUSA program of work
1.2 Identify chapter activities to meet expectations of program of work
1.3 Design and plan activities
1.4 Conduct activities
1.5 Record and publicize activities
1.6 Evaluate success of activities for future planning

OUT 2.0 — Communicate the activities of a SkillsUSA chapter effectively in a book in the sequence provided by the technical committee's rating sheet

2.1 Identify appropriate activities to meet each of the required items in contest guidelines
2.2 Design visual and written components to communicate identified activities
2.3 Show participation in chapter standards
2.4 Provide verification, proof or evidence of the activities claimed and the date they were accomplished
2.5 Design a book with no more than 75 pages or 150 surfaces following contest guidelines

OUT 3.0 — Describe activities and respond to inquiries about activities in an interview setting

3.1 Introduce self professionally
3.2 Display good posture and appropriate dress and grooming
3.3 Demonstrate knowledge of book and chapter activities
3.4 Respond to four to six questions from the judging panel
3.5 Explain personal involvement in chapter and book concisely, when applicable

OUT 4.0 — SkillsUSA Framework

The SkillsUSA Framework is used to pinpoint the Essential Elements found in Personal Skills, Workplace Skills, and Technical Skills Grounded in Academics. Students will be expected to display or explain how they used some of these Essential Elements. Please reference the graphic above, as you may be scored on specific elements applied to your project. For more, visit: www.skillsusa.org/about/skillsusa-framework/.

Committee Identified Academic Skills

The technical committee has identified that the following academic skills are embedded in this contest.

Math Skills

- Solve practical problems involving percentages

Science Skills

None Identified

Language Arts Skills

- Provide information in conversations and in group discussions
- Provide information in oral presentations
- Demonstrate use of verbal communication skills, such as word choice, pitch, feeling, tone and voice
- Demonstrate use of nonverbal communication skills, such as eye contact, posture and gestures using interviewing techniques to gain information
- Demonstrate comprehension of a variety of informational texts
- Organize and synthesize information for use in written and oral presentations
- Demonstrate knowledge of appropriate reference materials
- Use print, electronic databases and online resources to access information in books and articles
- Demonstrate narrative writing
- Demonstrate persuasive writing
- Demonstrate informational writing
- Edit writing for correct grammar, capitalization, punctuation, spelling, sentence structure and paragraphing

Connections to National Standards

State-level academic curriculum specialists identified the following connections to national academic standards.

Math Standards

None Identified

Source: NCTM Principles and Standards for School Mathematics. For more information, visit: www.nctm.org.

Science Standards

- Understands the nature of scientific inquiry

Source: McREL compendium of national science standards. To view and search the compendium, visit: http://www2.mcrel.org/compendium/browse.asp.

Language Arts Standards

- Students apply a wide range of strategies to comprehend, interpret, evaluate and appreciate texts. They draw on their prior experience, their interactions with other readers and writers, their knowledge of word meaning and of other texts, their word identification strategies, and their understanding of textual features (e.g., sound-letter correspondence, sentence structure, context, graphics)
- Students adjust their use of spoken, written and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes.
- Students employ a wide range of strategies as they write and use different writing process elements appropriately to communicate with different audiences for a variety of purposes
- Students apply knowledge of language structure, language conventions (e.g., spelling and punctuation), media techniques, figurative language and genre to create, critique and discuss print and nonprint texts
- Students conduct research on issues and interests by generating ideas and questions and by posing problems. They gather, evaluate and synthesize data from a variety of sources (e.g., print and nonprint texts, artifacts, people) to communicate their

discoveries in ways that suit their purpose and audience
- Students use a variety of technological and information resources (e.g., libraries, databases, computer networks, video) to gather and synthesize information and to create and communicate knowledge
- Students use spoken, written and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion and the exchange of information)

Source: IRA/NCTE Standards for the English Language Arts. To view the standards, visit: www.ncte.org/standards.

Pin Design

Purpose
To evaluate a contestant's creative, technical and oral presentation skills and to recognize outstanding students for excellence and professionalism.

First, download and review the General Regulations at: http://updates.skillsusa.org.

Eligibility
Open to active SkillsUSA members enrolled in career and technical programs.

Clothing Requirement
Class A: SkillsUSA Official Attire
For men: Official SkillsUSA blazer or jacket, black dress slacks, white dress shirt, plain black tie with no pattern (or SkillsUSA black tie), black socks, black shoes.
For women: Official SkillsUSA blazer or jacket; black dress skirt (knee-length) or black slacks; plain businesslike white, collarless blouse (or white blouse with small, plain collar that may not extend onto the lapels of the blazer); black sheer or skin-tone hose; black shoes.

These regulations refer to clothing items that are pictured and described at: www.skillsusastore.org. If you have questions about clothing or other logo items, call 800-401-1560 or 703-956-3723.

Note: Contestants must wear their official contest clothing to the contest orientation meeting.

Equipment and Materials
1. Supplied by the technical committee:
   a. Timekeeper and judges
   b. All necessary information for the judges and technical committee
2. Supplied by the contestant:
   a. Rendering of pin design
   b. Tabletop display to promote your pin design to the public
   c. All competitors must create a one-page résumé and submit it at the orientation meeting.
   d. Means of presentation: computer, tablet, notebook, poster or other media of your choice if desired to make your presentation to the judges. See http://skillsusapin.wordpress.com/ for further instructions.

***Note*:** Your contest may also require a hard copy of your résumé as part of the actual contest. Check the Contest Guidelines and/or the updates page on the SkillsUSA website at: http://updates.skillsusa.org.

Scope of the Contest
The contest consists of two parts:
1. Evaluation of the pin design
2. Oral presentation and question-and-answer session. All contestants will be asked the same questions, which judges will determine before the start of the contest.
3. Evaluation of the tabletop display

Knowledge Performance
There will be no skill-related written test.

Skill Performance
The contest is designed to assess the ability of the competitor to design and produce a drawing of that design, as well as give a presentation regarding all aspects of his or her creation of the design.

Contest Guidelines
1. All entries must be rendered in color (full color or two-color).
2. Preferably, entries will be created in a design software package such as Illustrator, Photoshop or other comparable software. Entries may also be hand-drawn, painted or rendered in colored pencils or markers.
3. All entries should be submitted with two versions of the art on a single 8.5"x11" page. A copy for judging will be turned in at the orientation meeting with your résumé. The larger 7" version is for showing greater detail. The smaller 1" version is to show what the actual pin will look like reproduction size. The larger version must be 7" wide or 7" tall on its

largest dimension for judging. The smaller version should be 1" wide or 1" tall on its largest dimension to show how the actual pin will look at reproduction size. Deductions will be taken for every ⅛" over or under 7" and every ⅛" over or under 1" on your artwork designs. Both designs should be identical. Wording on the pin must reference the name of the state. Your contestant number for the national conference must be placed on the back of your submitted artwork.

4. The SkillsUSA emblem or SkillsUSA logo (or elements of either) should not appear on the pin.
5. The design must be the original concept of the student. Use of the students' own original photos, drawings or digital art is highly recommended. Designs may be constructed of small amounts of Creative Commons licensed material, material in the public domain, or commercial stock images. These materials must be accompanied by proof of license and must credit the originator.
6. All copyright laws must be followed in the creation of the design.
7. Contestants will deliver a five- to seven-minute presentation regarding their design. Presenter substitutions are not permitted. However, a language translator may be allowed for students with this need. Requests for such must be made at the orientation meeting.
   Talking points should include:
   a. How he or she came up with the design of the pin
   b. The process in which he or she designed the pin
   c. Why the contestant feels it represents his or her state
   d. What its unique qualities are
   e. Why other students/advisors would want to wear it
8. After your presentation, the judges will ask questions related to Pin Design, SkillsUSA, production process, professional development, etc.
9. A space will be provided for you to make a tabletop display to promote your pin design/state to the public, for viewing at the national conference. You will have no more than 28" x 28" table space for this display. It should be no taller than 48" from the tabletop. Your entry submitted for judging will also be in this space. This display can be used in your presentation.

   This display must be put up within two hours after the orientation meeting and remain up until the debriefing. You will not have electricity or security for your display, so be careful not to leave valuable items on your display. The display will be judged separate from your interview. Displays may not include hazardous or flammable materials or generate noise. Displays will be judged on:
   - Neatness
   - Overall aesthetic appeal
   - Informative
   - Cohesiveness
   - Grammar/spelling
   - Size

Standards and Competencies

PD 1.0 — Understand general design industry terminology and concepts

1.1 Define, explain and describe various concepts related to typography, elements of design, digital images, artwork and the printing process

PD 2.0 — Demonstrate mechanical skills by creating a design on the computer within a specified amount of time

2.1 Recall understanding and skills necessary to prepare art electronically
   2.1.1 Implement correct size and orientation of design

2.2 Recall knowledge and appropriate use of industry standard hardware and software
   2.2.1 Implement correct size and placement of elements
   2.2.2 Implement correct use of typography
   2.2.3 Implement assignment of proper color to elements

PD 3.0 — Administer creative skills by solving a graphic design problem relevant to the skill set required for the design industry

3.1 Apply understanding and skills necessary to create a variety of thumbnails and ideas for a given design problem
- 3.1.1 Implement correct number, size, scaling and color requirements of thumbnails as defined by the technical committee
- 3.1.2 Implement media (markers, color pencils, etc.) in the creation of thumbnails
- 3.1.3 Demonstrate professional presentation and technical execution of thumbnails

3.2 Apply understanding and skills necessary to create roughs developed from thumbnails for the given design problem
- 3.2.1 Implement correct number, size, scaling and color requirements of thumbnails as defined by the technical committee
- 3.2.2 Exhibit the development of ideas from the thumbnail stage
- 3.2.3 Implement media (markers, color pencils, etc.) in the creation of roughs
- 3.2.4 Demonstrate professional presentation and technical execution of roughs

3.3 Administer industry standard hardware and software in the creation of the project
- 3.3.1 Implement correct size and format for the design of the comprehensive portion of the contest
- 3.3.2 Exhibit the development of ideas from the rough stage
- 3.3.3 Implement clip art, original art and designs in the creation of the comprehensive
- 3.4.4 Demonstrate professional presentation and technical execution of the comprehensive

PD 4.0 — Complete an oral professional assessment in a simulated customer situation

4.1 Perform customer-service-related activities when relating to a customer
- 4.1.1 Explain the function of the customer service representative

4.2 Communicate professionally with technical knowledge
- 4.2.1 Describe the workings of a production environment
- 4.2.2 Explain the nature of work performed and requirements of customers

4.3 Respond quickly, accurately and professionally in a customer situation

PD 5.0 — Demonstrate an understanding of the SkillsUSA Framework in the presentation.

5.1 Apply job specific skills to the project
- 5.1.1 Explaining the research done for the state the pin is representing.
- 5.1.2 Explain the design rationale; why this design was chosen based on research done.

5.2 Presenting personal skills
- 5.2.1 Explain the integrity of the design
- 5.2.2 Share some of the hardships that came with executing the pin, and how those were overcome.

5.3 Apply workplace skills.
- 5.3.1 Explain the process of communicating, organizing, and managing the process in which this pin was created.
- 5.3.2 Provide examples of the commitment to leadership to complete this project.

Committee Identified Academic Skills

The technical committee has identified that the following academic skills are embedded in this contest.

Math Skills

- Use fractions to solve practical problems
- Use proportions and ratios to solve practical problems
- Simplify numerical expressions
- Solve practical problems involving percentages
- Solve single variable algebraic expressions
- Solve multiple variable algebraic expressions
- Measure angles
- Find surface area and perimeter of two-dimensional objects
- Find volume and surface area of three-dimensional objects

- Apply transformations (rotate or turn, reflect or flip, translate or slide, and dilate or scale) to geometric figures
- Construct three-dimensional models
- Solve problems using proportions, formulas and functions
- Take measurements with a ruler

Science Skills

None Identified

Language Arts Skills

- Analyze mass media messages
- Demonstrate comprehension of a variety of informational texts
- Use print, electronic databases and online resources to access information in books and articles
- Demonstrate narrative writing
- Demonstrate expository writing
- Demonstrate persuasive writing
- Demonstrate informational writing
- Edit writing for correct grammar, capitalization, punctuation, spelling, sentence structure and paragraphing

Connections to National Standards

State-level academic curriculum specialists identified the following connections to national academic standards.

Math Standards

- Numbers and operations
- Algebra
- Geometry
- Measurement
- Data analysis and probability
- Problem solving
- Communication
- Connections
- Representation

Source: NCTM Principles and Standards for School Mathematics. For more information, visit: www.nctm.org.

Science Standards

None Identified

Language Arts Standards

- Students read a wide range of print and nonprint texts to build an understanding of texts, of themselves and of the cultures of the United States and the world; to acquire new information; to respond to the needs and demands of society and the workplace; and for personal fulfillment. Among these texts are fiction and nonfiction, classic and contemporary works
- Students apply a wide range of strategies to comprehend, interpret, evaluate and appreciate texts. They draw on their prior experience, their interactions with other readers and writers, their knowledge of word meaning and of other texts, their word identification strategies and their understanding of textual features (e.g., sound-letter correspondence, sentence structure, context, graphics)
- Students adjust their use of spoken, written and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes
- Students apply knowledge of language structure, language conventions (e.g., spelling and punctuation), media techniques, figurative language and genre to create, critique and discuss print and nonprint texts
- Students conduct research on issues and interests by generating ideas and questions and by posing problems. They gather, evaluate and synthesize data from a variety of sources (e.g., print and nonprint texts, artifacts, people) to communicate their discoveries in ways that suit their purpose and audience
- Students use a variety of technological and information resources (e.g., libraries, databases, computer networks and video) to gather and synthesize information and to create and communicate knowledge
- Students participate as knowledgeable, reflective, creative and critical members of a variety of literacy communities
- Students use spoken, written and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion and the exchange of information)

Source: IRA/NCTE Standards for the English Language Arts. To view the standards, visit: www.ncte.org/standards.

Prepared Speech

Purpose
To evaluate each contestant's ability to prepare and present clearly and effectively a series of thoughts relating to a central theme.

First, download and review the General Regulations at: http://updates.skillsusa.org.

Eligibility
Open to active SkillsUSA members.

Clothing Requirement
For men: Official blazer, jacket or sweater; black dress slacks; white dress shirt; plain black tie with no pattern or SkillsUSA black tie; black socks and black shoes.
For women: Official blazer, jacket or sweater; black dress slacks or knee-length skirt with businesslike white, collarless blouse or white blouse with small, plain collar that may not extend onto the lapels of the blazer; black sheer or skin-tone seamless hose and black dress shoes.

These regulations refer to clothing items that are pictured and described at: www.skillsusastore.org. If you have questions about clothing or other logo items, call 800-401-1560 or 703-956-3723.

Note: Contestants must wear their official contest clothing to the contest orientation meeting.

Observer Rule
Observers will be allowed to hear the speeches in the presentation room provided space is available. No talking or gesturing will be permitted. No observers will be allowed in the assembly area. No member of the audience will be permitted to enter or leave the demonstration room while a contestant is speaking. No cameras, video recorders or audio recorders will be allowed by members of the audience.

Equipment and Materials
1. Supplied by the technical committee:
   a. Stopwatch
   b. Time cards
   2. Supplied by the contestant:
   a. All competitors must create a one-page résumé and submit a hard copy to the technical committee chair at orientation. Failure to do so will result in a 10-point penalty.

   ***Note*:** Your contest may also require a hard copy of your résumé as part of the actual contest. Check the Contest Guidelines and/or the updates page on the SkillsUSA website at: http://updates.skillsusa.org.

Arrangement of Rooms
Speech presentation room: A room will be furnished with two tables, each with chairs for judges and a timekeeper/room monitor.

Scope of the Contest

Knowledge Performance
There is no written knowledge test required for this contest. Contestants' knowledge will be demonstrated through performance demonstration.

Skill Performance
This contest assesses public speaking skills through delivery of a five- to seven-minute speech.

Contest Guidelines
1. The topic for the prepared speech will be established by SkillsUSA and will be announced to the state associations by Sept. 1 for the following year.
2. The speech will be five to seven minutes in length. ***Penalty***: Five points will be deducted for each 30 seconds or fraction thereof under five minutes, or for each 30 seconds or fraction thereof over seven minutes.
3. Time limit: Time will be started when the speech begins. The timer will signal the speaker at five minutes and at seven minutes. The contestant will be permitted to use a watch or clock.

4. No visual aids, props, notes and/or notecards will be permitted.
5. Contestants will not mention their name, school, city or state. A five-point penalty will be assessed for each occurrence.
6. Contestants may submit one typewritten copy of the speech to the technical committee prior to the debriefing meeting. Include the name of the training program, institution name, contestant's name, address, phone number and the speech title. This speech may be used in part or in whole in SkillsUSA publications throughout the year. Credit will be given to the contestant, instructor and the school.
7. The following judging criteria will be used:
   a. Opening — Has a strong, clear opening
   b. Voice — Voice is well modulated and controlled, and carries the rhythm of the speech
   c. Platform deportment — Speaker is poised and demonstrates good control of movement
   d. Organization — Speech is well organized, and the organization can be easily followed
   e. Mechanics — Proper grammar is used and diction is clear
   f. Closing — Closing provides a clear and solid conclusion and summary of the speech
   g. Effectiveness — Assigned topic is covered, and the purpose of the speech is clear and achieved
   h. Timing — Speech falls within the five- to seven-minute contest requirement
   i. Clothing requirement — Clothing meets contest requirements

Standards and Competencies

PS 1.0 — Design and write an effective presentation based upon the designed theme

1.1 Prepare a presentation on a given topic for a specific time
1.2 Choose logical patterns of organization (e.g., chronological, topical, cause and effect) to inform and persuade

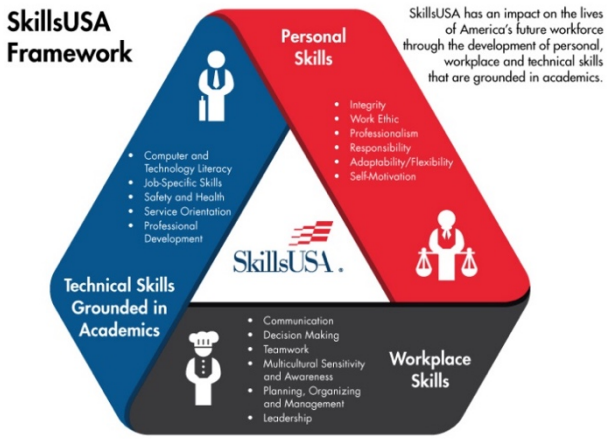
PS 2.0 — Deliver the presentation in a professional manner, employing the use of verbal and nonverbal delivery techniques

2.1 Demonstrate an effective and pleasing delivery style
2.2 Effectively use verbal illustrations and examples
2.3 Make a formal and effective introduction to the speech
2.4 Use a variety of verbal techniques including: modulation of voice, changing volume, varied inflection, modifying tempo and verbal enthusiasm
2.5 Demonstrate poise and self-control while presenting
2.6 Demonstrate good platform development and personal confidence
2.7 Communicate the primary points of the speech in a compact and complete manner
2.8 Tie organizational elements together with an effective ending
2.9 Complete the speech within the time limits set by contest requirements

PS 3.0 — Wear appropriate clothing for the national contest

3.1 Display clothing that meets national standards for competition
3.2 Demonstrate good grooming in dress and personal hygiene

PS 4.0 — SkillsUSA Framework



The SkillsUSA Framework is used to pinpoint the Essential Elements found in Personal Skills, Workplace Skills, and Technical Skills

Grounded in Academics. Students will be expected to display or explain how they used some of these Essential Elements. Please reference the graphic above, as you may be scored on specific elements applied to your project. For more, visit: www.skillsusa.org/about/skillsusa-framework/.

Committee Identified Academic Skills

The technical committee has identified that the following academic skills are embedded in this contest.

Math Skills

None Identified

Science Skills

None Identified

Language Arts Skills

- Provide information in oral presentations
- Demonstrate use of verbal communication skills, such as word choice, pitch, feeling, tone and voice
- Demonstrate use of nonverbal communication skills, such as eye contact, posture and gestures using interviewing techniques to gain information
- Organize and synthesize information for use in written and oral presentations
- Demonstrate narrative writing
- Demonstrate expository writing
- Demonstrate persuasive writing
- Demonstrate informational writing
- Edit writing for correct grammar, capitalization, punctuation, spelling, sentence structure and paragraphing

Connections to National Standards

State-level academic curriculum specialists identified the following connections to national academic standards.

Math Standards

None Identified

Source: NCTM Principles and Standards for School Mathematics. For more information, visit: www.nctm.org.

Science Standards

Dependent upon topic of speech

Source: McREL compendium of national science standards. To view and search the compendium, visit: http://www2.mcrel.org/compendium/browse.asp.

Language Arts Standards

- Students adjust their use of spoken, written, and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes
- Students use spoken, written, and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion, and the exchange of information)

Source: IRA/NCTE Standards for the English Language Arts. To view the standards, visit: www.ncte.org/standards.

PROMOTIONAL BULLETIN BOARD

PURPOSE
To encourage local SkillsUSA chapters to promote the organization, career and technical education, and related occupational information through a promotional bulletin board.

First, download and review the General Regulations at: http://updates.skillsusa.org.

ELIGIBILITY (TEAM OF 3)
Two bulletin boards from each state association may be entered in the contest — one in the high-school and one in the college/ postsecondary competition.

CLOTHING REQUIREMENT
Class A: SkillsUSA Official Attire
For men: Official SkillsUSA blazer or jacket, black dress slacks, white dress shirt, plain black tie with no pattern (or SkillsUSA black tie), black socks, black shoes.
For women: Official SkillsUSA blazer or jacket; black dress skirt (knee-length) or black slacks; plain business-like white, collarless blouse (or white blouse with small, plain collar that may not extend onto the lapels of the blazer); black sheer or skin-tone hose; black shoes.

These regulations refer to clothing items that are pictured and described at: www.skillsusastore.org. If you have questions about clothing or other logo items, call 800-401-1560 or 703-956-3723.

Note: Contestants must wear their official contest clothing to the contest orientation meeting.

OBSERVER RULE
Observers will not be present during the actual judging. Promotional bulletin boards may be viewed on Thursday during the week of the SkillsUSA Championships.

EQUIPMENT AND MATERIALS
All competitors must create a one-page résumé and submit a hard copy to the technical committee chair at orientation. Failure to do so will result in a 10-point penalty.

Note: Your contest may also require a hard copy of your résumé as part of the actual contest. Check the Contest Guidelines and/or the updates page on the SkillsUSA website at: http://updates.skillsusa.org.

SCOPE OF THE CONTEST
Knowledge Performance
There is no written knowledge test required for this contest.

Skill Performance
The contest requires the development of a promotional bulletin board *using the SkillsUSA national theme,* and it may also include promotion of local SkillsUSA chapter activities or technical, skilled and service occupations, including health occupations. Skill also will be evaluated through an interview.

Contest Guidelines
1. SkillsUSA headquarters establishes the theme for the Promotional Bulletin Board contest and announces it to the state associations by Sept. 1 for the following school year. To verify the correct national theme, go to: www.skillsusa.org/competitions/skillsusa-championships/theme/.
   a. The bulletin board must carry out the established theme.
   b. The bulletin board must be related to SkillsUSA.
   c. The bulletin board may include promotion of local SkillsUSA chapter activities.
   d. All career and technical education students who are SkillsUSA members are eligible to compete in the Promotional Bulletin Board contest.
2. Bulletin Board Design and Workmanship
   a. Display materials used must be student-prepared, including design and cutting of interchangeable pieces. A 50-point

penalty will be assessed for failure to comply.

b. Review and follow basic guidelines for use of the SkillsUSA logo. Use of the official logo is optional. However, the verbiage "SkillsUSA: Champions at Work, [Current Theme]" is required and may be text only.
Note: See website www.SkillsUSABrandCenter.org and honor the space requirements.

c. If the SkillsUSA logo is used, a penalty of 10 points will be assessed for failure to comply with all SkillsUSA logo. guidelines and regulations.

d. Follow U.S. copyright rules and regulations.

3. Intent of the Promotional Bulletin Board
   a. The bulletin board is a tool to convey ideas, ideals or activities related to SkillsUSA.
   b. Interchangeable parts are required. The bulletin board should be designed to easily accommodate changes by using interchangable parts to reflect activities and messages or draw attention to a function.
   Note: An interchangable part is one that is removed from the board and replaced with another element.
   c. The bulletin board is not intended to be a wall hanging or poster board.
4. Bulletin Board Size — The total size of the bulletin board may be smaller than, but may not exceed, the following dimensions:
   a. 4 feet wide by 4 feet high by 2 inches thick (including the thickness of the board)
   Note: If an element is attached to the board and opens or unfolds, the depth of the element will be included in the thickness measurement (2" max) and will incur penalty points appropriately.
   b. A penalty of five points per ⅛" over size will be assessed.
5. Mounting Board and Support
   a. The quality of the board on which the display is mounted will not be judged.
   b. A mounting board is required.
   c. All areas of the mounting board must be covered with a paper product front and back.
   d. A 10-point penalty will be assessed if any area of the mounting board is exposed.
   e. Entries must be self-supporting. A 10-point penalty will be assessed for failure to comply.
   f. The supporting device will not be included in the measurement and cost figures.
   g. The supporting device must be designed and constructed to be durable and allow for safe exhibit of the board and display materials. A 10-point penalty will be assessed for failure to comply.
   h. The bulletin board and mounting board must be fastened securely to the supporting device. A 10-point penalty will be assessed for failure to comply.
6. Bulletin Board Frame
   a. A frame is not required but may be used if desired.
   Note: Additional information placed on the frame, such as engraving the theme, makes the frame part of the board and will be measured as such.
   b. A frame cannot exceed 2½" in width. A 10-point penalty will be assessed for failure to comply.
   c. A frame can be made from any material.
7. Bulletin Board Materials
   a. Any material(s) used to attach parts to the board must not be visible on the face of the board. A 10-point penalty will be assessed for failure to comply.
   b. Approved materials on the bulletin board used as background and to convey the message will be limited to the following paper products:
      1. Construction paper
      2. Poster board
      3. Foam core/Gatorboard
      4. Cardboard
      5. Mat board
      6. High gloss photo paper printed on a large format printer/plotter. Note: Highly adhesive vinyl, car-wrap material, or any non-paper products that have been printed or cut on a large-format printer/plotter are not approved products for the board.

7. Media printed on a large format printer/plotter.
   Note: All photos may be laminated; other surfaces may be painted or colored

c. No other materials will be permitted. A 50-point penalty will be assessed for failure to comply.
   Note: Glitter or foil, whether incorporated in paper or paint, is *not* to be used on any part of the board. Remember, this is a bulletin board, not a poster. Further vinyl, car-wrap material or any nonpaper products that have been printed or cut on a large-format printer/plotter are not approved products for the board.
d. No audiovisual equipment, electrical, mechanical, automatic or manual moving parts are to be used. A 10-point penalty will be assessed for failure to comply.
e. If an interactive component (e.g., QR code, software link, etc.) is showcased or demonstrated during the presentation, it is acceptable to use an electronic device appropriately.
f. Student-taken photographs are allowed.
g. The chapter name, school, city or state may be used without penalty.

8. Cost of Materials
   a. A maximum of $300 (purchased, donated or borrowed) may be spent on the entire display and backing board (frame and support costs excluded). A 10-point penalty for each $5 over $300 will be assessed.
   b. A quote of the "fair market price" of the printing and/or other materials used on the board must be included in the notebook. All donated or borrowed materials must be included in the $300.
      Note: Fair market value is the cost of having work done or obtained *commercially — not* the cost of work done or obtained through a school.
9. Résumé (50 points possible/5 percent of overall score)
   a. Overall appearance and professionalism
   b. Accuracy in spelling, punctuation and capitalization (10 points)
   c. Complete contact information: name, address, phone, email (5 points)
   d. Career objective (5 points)
   e. Education (5 points)
   f. Technical skills (10 points)
      Note: Technical skills should include such things as trade-related skills, certifications, software training, etc.
   g. Employment (5 points)
   h. Honors/awards/memberships (5 points)
   i. References: available upon request (5 points)
      Note: Student should not supply the names and contact information for references. The words, "References: Available upon request" should be listed on the résumé.
   j. A 5-point penalty will be assessed if résumé exceeds one page.
10. Bulletin Board Evaluation (400 points/40 percent of overall score)
    a. Gains attention
       1. Focuses attention on important items (20 points)
       2. Pulls the eye to specific areas (20 points)
       3. Color and contrast command attention (20 points)
       4. Balance creates interest (20 points)
       5. Shapes, lines, spaces and colors create an interesting and readable bulletin board. All text should be legible for the viewing audience. (20 points)
    b. Development of theme
       1. Theme of bulletin board is the official theme established by the SkillsUSA headquarters (25 points)
          Note: The theme includes the SkillsUSA slogan, i.e., SkillsUSA: Champions at Work, followed by annual verbiage from national headquarters
       2. Meaning and message of the bulletin board are apparent immediately. All imagery and text support the theme and concept (60 points).
       3. Graphic elements, lettering and illustrations allow quick and clear comprehension of the bulletin board theme (25 points).
       4. Lettering is related in scale and character to the spirit of the theme (25 points).

5. A 5-point penalty will be assessed for error in grammar, spelling and punctuation.

c. Quality of work
   1. Artwork is of consistent style and proportion (15 points).
   2. Computer-generated type, art or photos are sharp/smooth (non-pixilated) and photos are properly exposed, well-cropped and suitably sized (30 points).
   3. Edges of cutout pieces are clean and smooth (15 points).
   4. Interchangeable parts are stiff and self-supporting with no paper curl (15 points).
   5. Tiled or layered pieces are properly aligned (10 points).

d. Imagination, creativity and originality
   1. Bulletin board shows originality (20 points).
   2. Bulletin board is creative, in good taste and attractive (20 points).
   3. Differences in color, line and shapes depict good design and imagination (20 points).
   4. Illustrations, lettering and background harmonize and show innovation (20 points).

11. Interview Component (40 percent of overall score)
    a. One student shall be prepared to participate in the interview component.
    b. The interview component will consist of two parts: a presentation and a question-and-answer session.
12. Presentation
    a. Notecards may *not* be used. A 50-point penalty will be assessed if contestant uses notecards.
    b. Students will demonstrate interchangeable parts and use the notebook along with the bulletin board to enhance the presentation (40 points).
    Note: If an interactive component (e.g., QR code, software link, etc.) is showcased or demonstrated during the presentation, it is acceptable to use an electronic device appropriately.
    c. Student will describe the bulletin board and how it conforms to the theme (35 points).
    d. Student will explain the process the chapter followed to determine the scope and design of the bulletin board (30 points).
    e. Student will state the purpose and educational value of the bulletin board (30 points).
    Note: What did the students learn while working on the board? What can viewers learn from the bulletin board?
    f. Student will discuss the chapter members' participation in the construction of the bulletin board (30 points).
    g. Student will tell where and how the bulletin board will be used after the competition (30 points).
    h. Student will discuss the benefits of the bulletin board to the chapter members (30 points).
    i. Student's speaking skills to include variances of pitch, tempo, volume and enthusiasm will be judged (30 points).
    j. Student's stage presence, including poise, eye contact, gestures, confident appearance and attitude will be judged (30 points).
    k. Student's mechanics as in diction, grammar, pronunciation and enunciation will be judged (25 points).
    l. Student's conclusion to presentation (30 points)
    m. Time frame for presentation is five to seven minutes.
    n. Time penalty: 5 points for each fraction of 30 seconds under five minutes or over seven minutes will be assessed.
13. Question/Answer Session (quality of student's response to questions from judges)
    a. Student will deliver answers that are appropriate, organized and reflect logic and clarity (30 points).
    b. Student's answers reflect knowledge and involvement in the promotional bulletin board project (30 points).
14. Notebook Requirements (15 percent of overall score)
    a. The notebook must be placed with the bulletin board prior to judging. Failure

to do so will result in the notebook not being judged and no points awarded.

b. Notebook must be a 1-inch SkillsUSA three-ring binder (10 points).
c. Notebook must contain pictures and supporting evidence (20 points).
   Note: Photos may be blended with other areas of the book but must have a caption describing the photo.
d. Notebook must include a brief description of the purpose (20 points).
e. Notebook must state educational value (20 points).
   Note: What did the students learn while working on the board? What can viewers learn from the bulletin board?
f. Notebook must describe the development and construction of the bulletin board (20 points).
g. Notebook must be limited to 10 pages (20 surfaces) or less (10 points).
h. Verification letter
   1. A letter certifying that the bulletin board was designed and constructed by students will be the first page of the notebook. The letter should be printed on school letterhead (10 points).
   2. The letter must identify the school, city and state (5 points).
   3. The letter must identify the local advisor (5 points).
   4. The letter must identify the student who will be interviewed (5 points).
   5. The letter must state the division (high school or college/ postsecondary – 5 points).
   6. The letter must be signed by a local administrator, with full name and title included (10 points).
   7. Failure to supply the required information will penalize the entry as outlined.
i. Notebook Outline: Follow this page order to organize the notebook
   1. Verification letter
   2. Purpose
   3. Educational value
   4. Development/Construction
   5. Fair market value/Itemized list of expenses
      Note: Expenses should reflect the fair market value of commercial work, such as large-format printing. For example: A background is printed in the classroom on a large-format printer. The cost for the school to print is $5 per square foot. However, the commercial cost is $12 per square foot. The list should reflect the FMV of $12 per square foot.
   6. Supporting evidence

Total points possible: 1,000

Procedure for Shipment

1. The Promotional Bulletin Board entries maybe shipped via UPS to your hotel.
2. Shipping instructions may be obtained from your state association director.
3. Do not ship entries to the SkillsUSA headquarters or to the convention center. Such shipments will be refused.
4. All costs incurred will be the responsibility of the local chapter or the state SkillsUSA association.
5. The bulletin board must be set up and moved according to the schedule outlined in the National Leadership and Skills Conference program.
6. The SkillsUSA headquarters will not be responsible for bulletin boards that have not been removed from the exhibit area by noon on the day following the SkillsUSA Championships. Failure to do so could result in their damage, destruction or disposal by the cleanup crew.

Procedure for Setup

1. Only contestants will be permitted into the contest setup area and allowed to set up the bulletin board.
2. Advisors will not be allowed into the contest setup area, thus advisors cannot help with the setup.
3. Once the board is set up, contestants must leave the contest area. Setup time is not a time to view other boards.

Standards and Competencies

BB 1.0 — Plan and develop an attractive and effective promotional bulletin board

1.1 Use elements such as color, balance and focal points to gain attention
1.2 Develop a coherent, meaningful and easily understood theme
1.3 Demonstrate quality artwork and design
1.4 Provide evidence of imagination, creativity and originality

BB 2.0 — Describe activities and respond to inquiries about activities in an interview setting

2.1 Introduce self professionally
2.2 Display good posture and appropriate dress and grooming
2.3 Demonstrate knowledge of promotional bulletin board development and design
2.4 Respond to four to six questions from the judging panel
2.5 Explain personal involvement in promotional bulletin board concisely, when applicable

BB 3.0 — Wear appropriate clothing for the national contest

3.1 Display clothing that meets national standards for competition
3.2 Demonstrate good grooming in dress and personal hygiene

BB 4.0 — SkillsUSA Framework

The SkillsUSA Framework is used to pinpoint the Essential Elements found in Personal Skills, Workplace Skills, and Technical Skills Grounded in Academics. Students will be expected to display or explain how they used some of these essential elements. Please reference the graphic below left, as you may be scored on specific elements applied to your project. For more, visit: www.skillsusa.org/about/skillsusa-framework/.

Committee Identified Academic Skills

The technical committee has identified that the following academic skills are embedded in this contest.

Math Skills

- Use fractions to solve practical problems
- Use proportions and ratios to solve practical problems
- Solve practical problems involving percents
- Measure angles
- Find surface area and perimeter of two dimensional objects
- Apply transformations (rotate or turn, reflect or flip, translate or slide and dilate or scale) to geometric figures
- Construct three-dimensional models
- Solve practical problems involving complementary, supplementary and congruent angles
- Use measures of interior and exterior angles of polygons to solve problems

Science Skills

None Identified

Language Arts Skills

- Provide information in conversations and in group discussions
- Provide information in oral presentations
- Demonstrate use of verbal communication skills, such as word choice, pitch, feeling, tone and voice
- Demonstrate use of nonverbal communication skills, such as eye contact, posture and gestures using interviewing techniques to gain information
- Analyze mass media messages
- Use text structures to aid comprehension
- Understand source, viewpoint and purpose of texts
- Organize and synthesize information for use in written and oral presentations

- Use print, electronic databases and online resources to access information in books and articles
- Demonstrate narrative writing
- Demonstrate persuasive writing
- Demonstrate informational writing
- Edit writing for correct grammar, capitalization, punctuation, spelling, sentence structure and paragraphing

Connections to National Standards

State-level academic curriculum specialists identified the following connections to national academic standards.

Math Standards

- Numbers and operations
- Geometry
- Measurement
- Problem solving
- Communication
- Connections
- Representation

Source: NCTM Principles and Standards for School Mathematics. For more information, visit: www.nctm.org.

Science Standards

None identified

Source: McREL compendium of national science standards. To view and search the compendium, visit: http://www2.mcrel.org/compendium/browse.asp.

Language Arts Standards

- Students adjust their use of spoken, written and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes
- Students employ a wide range of strategies as they write and use different writing process elements appropriately to communicate with different audiences for a variety of purposes
- Students apply knowledge of language structure, language conventions (e.g., spelling and punctuation), media techniques, figurative language and genre to create, critique and discuss print and nonprint texts
- Students use spoken, written and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion and the exchange of information)

Source: IRA/NCTE Standards for the English Language Arts. To view the standards, visit: www.ncte.org/standards.

QUIZ BOWL

PURPOSE
To test the knowledge of selected team members on various aspects of general academic knowledge, professional development and current events.

First, download and review the General Regulations at: http://updates.skillsusa.org.

ELIGIBILITY (TEAM OF 5)
Open to active SkillsUSA members currently enrolled in technical, skilled and service occupations, including health occupations.

CLOTHING REQUIREMENT
Class A: SkillsUSA Official Attire
For men: Official SkillsUSA blazer or jacket, black dress slacks, white dress shirt, plain black tie with no pattern (or SkillsUSA black tie), black socks, black shoes.
For women: Official SkillsUSA blazer or jacket; black dress skirt (knee-length) or black slacks; plain businesslike white, collarless blouse (or white blouse with small, plain collar that may not extend onto the lapels of the blazer); black sheer or skin-tone hose; black shoes.

Men may also wear official SkillsUSA white polo shirt with black dress slacks, black socks and black leather shoes. Women may also wear official SkillsUSA white polo shirt with black dress slacks or skirt, black socks or black or clear seamless hose and black leather shoes.

These regulations refer to clothing items that are pictured and described at: www.skillsusastore.org. If you have questions about clothing or other logo items, call 800-401-1560 or 703-956-3723.

Note: Contestants must wear their official contest clothing to the contest orientation meeting.

OBSERVER RULE
Observers will be allowed to watch the match providing space is available. No talking or gesturing will be permitted. The event chair or moderator may remove observers and/or close the event to observers for cause.

EQUIPMENT AND MATERIALS
1. Supplied by the technical committee:
   a. One table for each team plus a table for the apparatus and scorekeeper and sufficient tables for the judges
   b. Chairs for all participants, committee and judges
   c. Podium and, if necessary, a public-address system
   d. Quiz Bowl apparatus
   e. Audience chairs
   f. Sufficient score sheets and pencils for judges
   g. Paper for the team members
   h. Calculators for contest officials
2. Supplied by the contestants:
   a. All competitors must create a one-page résumé and submit a hard copy to the technical committee chair at orientation. Failure to do so will result in a 10-point penalty.

   ***Note*:** Your contest may also require a hard copy of your résumé as part of the actual contest. Check the Contest Guidelines and/or the updates page on the SkillsUSA website at: http://updates.skillsusa.org.
3. Personnel required:
   a. Moderator
   b. Operator for the Quiz Bowl apparatus/timekeeper
   c. Judges who will serve as scorekeepers

SCOPE OF THE CONTEST
Knowledge Performance
A written test will be administered to all team members, including alternates.

Skill Performance
Teams will demonstrate communication skills, teamwork, problem solving and time-management skills by determining and presenting the answer to each question clearly within the five-second time frame.

Contest Guidelines

1. A state may enter one high-school team and one college/postsecondary team comprised of five registered members each. The team may perform with four members without penalty in the event that a member fails to show up or is forced to withdraw within five days of the competition, as long as five members were originally registered and verified in the national headquarters. (See General Regulations.)
2. A team may register up to two alternates (in addition to the five team members). The alternates are required to attend orientation and take the written test. The alternate scores will be included in the team average. Registered alternates who take the test may then be allowed to participate in active rounds, as described in No. 7.
3. The moderator will ask questions, and teams will have five seconds to respond. Responding shall be accomplished by activating the buzzer.
4. Approximately 30 percent of the questions asked will be about professional development issues, 30 percent will be about current events, and 40 percent will consist of general academic knowledge. Points are determined on the basis of one point awarded for a correct response and one point deducted for an incorrect response.
5. A round shall be defined as 100 questions, with no time limit.
6. A match shall be defined as two rounds, which includes a preliminary round and the final round.
7. A break will be taken after every 25 questions. Contest officials will verify scores at every break. Substitutions of registered alternates may be made only at these breaks, after notifying the moderator.
8. During the pre-contest orientation session, the contest chair will administer a written test to all team members. All team members, including registered alternates, must take the written test to be eligible to participate with their team in the active rounds. Participants are responsible to bring a No. 2 pencil to use for the written test.
9. The written test questions shall follow the same question proportion formula as the active rounds and be based upon 100 points. Once scored, the individual scores of all team members, including alternates, will be averaged to create a team score. The written test team score will be used for seeding teams to competition rooms for the preliminary round.
10. Each team will be assigned a table location at the beginning of the event by the contest chair or moderator.
11. The moderator will read a question, and the team that presses the buzzer first will be recognized to answer the question. If a wrong response is given, the team cannot give a second answer and the opposing team(s) will be given an opportunity to buzz in and answer the question. One point will be awarded for a correct answer. One point will be deducted from any team that gives an incorrect answer.
12. A team may buzz in as soon as it feels it knows the answer. However, the moderator will stop reading the question, and the team must answer based upon what has been read to that point. Some questions may require multiple answers.
13. Once a team buzzes in, it must wait to be identified by the moderator. Any team that responds to the question before being recognized by the moderator will be scored with an incorrect answer.
14. Once recognized, the team members may confer among themselves but must respond within five seconds. In the event that a team misses an answer, unless another team buzzes before the moderator can begin or finish the question, the moderator will begin re-reading the question following the procedure outlined above for the other teams. A question will not be re-read during actual play except upon the request of a judge.
15. Only the first answer given will be considered. If it is a wrong response, the team cannot give another answer, and another team is to have an opportunity to respond to the question. If the moderator inadvertently gives the answer away, the question is voided.
16. Any team member may give the team's answer.
17. If the answer is incomplete, the moderator may ask the team member to be more specific. For example, if the correct answer

given is Roosevelt, the moderator may ask which one, or for more information.
18. The moderator will give the correct response in the event no team gives the correct answer.
19. Teams may not use notes, reference materials, calculators or any type of electronic communication. Blank paper will be provided by the officials and taken up at the end of each round. Participants will supply their own pens or pencils to use during the rounds.
20. The judges will make the final ruling on correct or incorrect responses.
21. The Quiz Bowl apparatus will maintain the official time, which is used only for responding to questions. The apparatus time-readout will face the operator and *will not* be visible to the teams.
22. There will be no true/false or multiple-choice questions in the active rounds.
23. In the event that a team believes that an incorrect answer was accepted or a correct answer was not accepted, it may offer a challenge. Only team members may make challenges, and only at the point at which they occur. Challenges may not be made once the next question is read.
24. Topics for general academic knowledge may include but shall not be limited to: science, math, history, geography, English (including literature), spelling, government, the arts and music.
25. Professional Development questions may be drawn from the following sources: *SkillsUSA Leadership Handbook*; SkillsUSA website; Professional Development Program; Career Skills Education Program (postsecondary); CareerSafe; Advisor's Success Kit; *SkillsUSA Champions* magazine; any resource published by SkillsUSA; *Robert's Rules of Order, Newly Revised*; OSHA's Teen Worker site (www.osha.gov/SLTC/teenworkers/index.html); and the Youth EEOC site (youth.eeoc.gov/). Items found in any conference publication, e.g., official program, *Awards and Recognition* book and any material from the Opening Ceremony may be included.
26. The sources for current-events questions will be CNN and Fox News. Items will be taken from these sources published no more than 90 days prior to the date of the contest. The sources can be media or online versions.
27. In the event that the audience gives away an answer, the moderator may void the question with no penalty for any team.
28. The written-test team score will be used as a tiebreaker during the active rounds. No tiebreaker rounds will be conducted.
29. For the preliminary round score, 80 percent of the team's active score plus 20 percent of the team's average written score will be used. The preliminary round will be used as an eliminator, if necessary. For the final round, 80 percent of the team's active score plus 20 percent of the team's average written score will serve as the final score. The final score will be used to determine the medallion winners.

Standards and Competencies

QUIZ 1.0 — Demonstrate knowledge of general academic knowledge, professional development and current events

1.1 Prepare to respond to a variety of questions
1.2 Read and retain key points from a variety of related sources

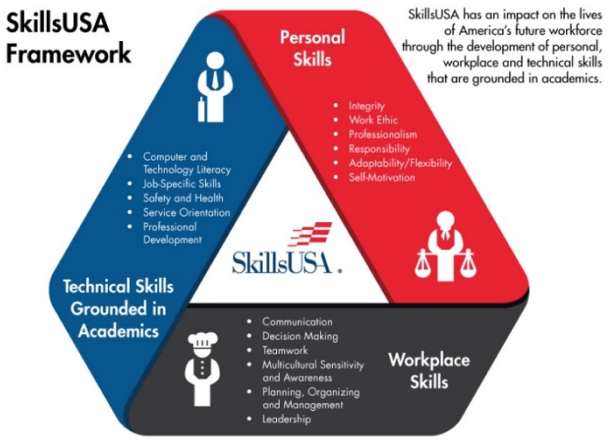
QUIZ 2.0 — Demonstrate communication skills, teamwork, problem solving and time-management skills

2.1 Speak clearly and listen effectively to team members in a time sensitive situation
2.2 Use conflict resolution techniques to bring the group to consensus about an answer
2.3 Maintain awareness of time remaining to answer a question

QUIZ 3.0 — Wear appropriate clothing for the national contest

3.1 Display clothing that meets national standards for competition
3.2 Demonstrate good grooming in dress and personal hygiene

QUIZ 4.0 — SkillsUSA Framework



The SkillsUSA Framework is used to pinpoint the Essential Elements found in Personal Skills, Workplace Skills, and Technical Skills Grounded in Academics. Students will be expected to display or explain how they used some of these essential elements. Please reference the graphic above, as you may be scored on specific elements applied to your project. For more, visit: www.skillsusa.org/about/skillsusa-framework/.

Committee Identified Academic Skills

The technical committee has identified that the following academic skills are embedded in this contest.

Math Skills

- Simplify numerical expressions
- Solve practical problems involving percents
- Solve single variable algebraic expressions
- Find surface area and perimeter of two-dimensional objects
- Find volume and surface area of three-dimensional objects
- Apply Pythagorean Theorem
- Make predictions using knowledge of probability
- Solve problems using proportions, formulas and functions
- Find slope of a line
- Use laws of exponents to perform operations
- Use measures of interior and exterior angles of polygons to solve problems
- Add, subtract, multiply and divide

Science Skills

- Use knowledge of cell theory
- Use knowledge of patterns of cellular organization (cells, tissues, organs, systems)
- Use knowledge of carbon, water and nitrogen cycles
- Use knowledge of reproduction and transmission of genetic information
- Use knowledge of the particle theory of matter
- Describe characteristics of types of matter based on physical and chemical properties
- Use knowledge of physical properties (shape, density, solubility, odor, melting point, boiling point, color)
- Use knowledge of chemical properties (acidity, basicity, combustibility, reactivity)
- Use knowledge of classification of elements as metals, metalloids, and nonmetals
- Use knowledge of potential and kinetic energy
- Use knowledge of mechanical, chemical and electrical energy
- Use knowledge of heat, light and sound energy
- Use knowledge of speed, velocity and acceleration
- Use knowledge of Newton's laws of motion
- Use knowledge of principles of electricity and magnetism
- Supply scientific terms, given definition

Language Arts Skills

- Demonstrate comprehension of a variety of informational texts
- Use text structures to aid comprehension
- Organize and synthesize information for use in written and oral presentations
- Demonstrate knowledge of appropriate reference materials
- Use print, electronic databases and online resources to access information in books and articles
- Select appropriate verbal responses to oral and written questions

Connections to National Standards

State-level academic curriculum specialists identified the following connections to national academic standards.

Math Standards

None Identified

Source: NCTM Principles and Standards for School Mathematics. For more information, visit: www.nctm.org.

Science Standards

- Understand atmospheric processes and the water cycle
- Understands Earth's composition and structure
- Understands the composition and structure of the universe and the Earth's place in it
- Understands the principles of heredity and related concepts
- Understands the structure and function of cells and organisms
- Understands relationships among organisms and their physical environment
- Understands biological evolution and the diversity of life
- Understands the structure and properties of matter
- Understands the sources and properties of energy
- Understands forces and motion
- Understands the nature of scientific knowledge
- Understands the nature of scientific inquiry
- Understands the scientific enterprise

Source: McREL compendium of national science standards. To view and search the compendium, visit: http://www2.mcrel.org/compendium/browse.asp.

Language Arts Standards

- Students read a wide range of print and nonprint texts to build an understanding of texts, of themselves, and of the cultures of the United States and the world; to acquire new information; to respond to the needs and demands of society and the workplace; and for personal fulfillment. Among these texts are fiction and nonfiction, classic and contemporary works
- Students apply a wide range of strategies to comprehend, interpret, evaluate and appreciate texts. They draw on their prior experience, their interactions with other readers and writers, their knowledge of word meaning and of other texts, their word identification strategies, and their understanding of textual features (e.g., sound-letter correspondence, sentence structure, context, graphics)
- Students adjust their use of spoken, written and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes
- Students conduct research on issues and interests by generating ideas and questions, and by posing problems. They gather, evaluate and synthesize data from a variety of sources (e.g., print and nonprint texts, artifacts, people) to communicate their discoveries in ways that suit their purpose and audience
- Students use a variety of technological and information resources (e.g., libraries, databases, computer networks, video) to gather and synthesize information and to create and communicate knowledge
- Students use spoken, written and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion, and the exchange of information)

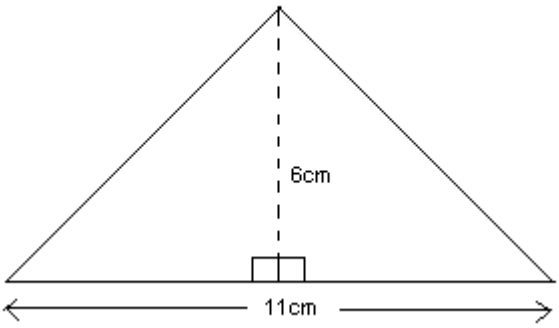
Source: IRA/NCTE Standards for the English Language Arts. To view the standards, visit: www.ncte.org/standards.

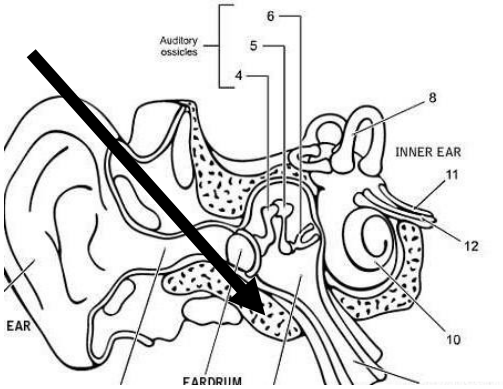
SkillsUSA Championships
Quiz Bowl: Written Test

National Level – 2017

Place your answer for each question on the Scantron answer sheet.

Number	Category	Question
1	AC	These are the result of a partnership, called a mutualistic symbiosis, between a fungus and an alga or cyanobacteria; they appear to be plants. Actually, they are fungi; what, specifically, are they called? a) mutants b) lichens c) bathyspheres d) bacteriomes
2	CE	Which country, currently experiencing violent protests, is ruled by Nicolas Maduro? a) Venezuela b) The Philippines c) Yemen d) Brazil
3	AC	An organism that contains chloroplasts is able to produce food by the process of a) reproduction. b) digestion. c) respiration. d) photosynthesis.
4	PD	Gail knows the meeting must end soon, so she makes a motion to speed up discussion by capping each speaker at one minute. What motion is used to reduce the time for discussion on a topic? a) Call the Question b) Adjournment c) Limit Debate d) Persona non gratis
5	AC	The idea that all people are born with the natural rights of life, liberty, and property is most directly associated with the writings of a) Thomas Hobbes b) John Locke c) Jacques-Bénigne Bossuet d) Baron de Montesquieu
6	CE	President Trump's first presidential trip outside the US included stops in Saudi Arabia, Israel, and which other country? a) Spain b) Germany c) the Vatican d) Syria
7	PD	How many modules compose the CareerSafe online program that leads to a certificate? a) 10 b) 20 c) 15 d) 6

8	AC	Which novel by John Green describes the life of Hazel, a teen with cancer? It was also a 2014 film. a) *Twilight* c) *Anna Karenina* b) *Green Gables* *d) The Fault in Our Stars*
9	CE	Which comedian came under investigation by the FCC in May for the content of his remarks about President Trump? a) Stephen Baldwin c) Jimmy Fallon b) Stephen Colbert d) Seth Meyers
10	PD	SkillsUSA competitions fall into three broad categories. Quiz Bowl is a leadership contest. Auto Technology is a technical contest. What is another general category of competitions? a) Occupationally Related c) Postsecondary b) Engage d) Entrepreneurship
11	AC	 What is the area of the triangle above? a) 66 cm c) 34 cm b) 33 cm d) 16.5 cm
12	CE	Which flower is associated with Louisville's Kentucky Derby? a) black-eyed susan c) daisy b) carnation d) rose
13	AC	Of the Great Lakes, which ones does NOT touch the state of Michigan? a) Erie c) Superior b) Huron d) Ontario
14	CE	In May, Boko Haram released 82 girls they kidnapped years ago in which country? a) Yemen c) Iraq b) Nigeria d) Somalia

15	AC	Select the proper spelling for the incomplete word: "They're crazy if they think **t____** insurance will still cover them when they move there." a) their c) there b) thier d) theyre
16	CE	Mt. Etna has been erupting recently. Name the island upon which Etna spews ash and dumps lava. a) Corsica c) Santorini b) Thera d) Sicily
17	PD	So they can complete their degrees, Holly and Edna have arranged to divide a job's responsibilities between them, giving them time to work but also go to class. What is the term for letting two people occupy one job? a) Job sharing c) Shadowing b) Mentoring d) Job co-operative
18	AC	Which US Supreme Court case affected prayer in US schools? a) Gideon v. Wainwright c) Engel v. Vitale b) Marbury v. Madison d) Miranda v. Arizona
19	PD	Which component of SkillsUSA has six parts, all beginning with the same two words? a) The pledge c) the theme b) The creed d) the emblem
20	PD	The Career Transitions Portal is sponsored and was developed with a SkillsUSA corporate partner named a) Caterpillar c) Snap-on b) Cengage d) Lowe's
21	AC	Name the part of the ear on the diagram below, indicated by the dark arrow; it is a common source of problems with ears.  a) middle ear c) Eustachian tube b) Pinna d) cochlea

22	CE	The winner of the May elections held in France was a) Emmanuel Macron c) Marine Le Pen b) Francois Hollande d) Sigmar Gabriel
23	AC	Who wrote the poem *Chicago* about the "City of the Big Shoulders"? a) Carl Sandburg c) Robert Frost b) Walt Whitman d) Edgar Allan Poe
24	PD	What is the street in the mailing address for SkillsUSA? a) 1600 Pennsylvania Avenue c) 111 Fifth Avenue b) 981 Headquarters Street d) 14001 SkillsUSA Way
25	CE	Adding insult to injury, residents of this town recently learned that they may lose their homes because they have not paid for the water that they cannot drink unfiltered. Which city is looking for a solution to this problem? a) Detroit c) St. Louis b) Flint d) Baltimore
26	AC	Which action did President Dwight D. Eisenhower take to enforce the *Brown v. Board of Education of Topeka* Supreme Court decision? a) the closing of Central High School in Little Rock, Arkansas b) transferring white students to a new public high school c) proposing legislation in support of school segregation d) sending United States Army troops to enforce school integration
27	PD	Which state was awarded the 2016-2017 Alumni Startup/Project Grants to expand and develop its Alumni Chapter? a) California c) Oregon b) Virginia d) Ohio
28	CE	Kim Hak-song, Tony Kim or Kim Sang Duk, Otto Warmbier, and Kim Dong Chul all have what in common, as of May 7? a) Detention in North Korea c) ICE arrests as illegals b) Invitations to the White House d) being the UN Secretary General
29	AC	The terms Teapot Dome, Watergate, and Iran Contra are most closely associated with a) domestic policies. c) failed reform movements. b) presidential scandals. d) federal court decisions.
30	PD	What kind of literacy is specified as one of the Technical Skills Grounded in Academics on the SkillsUSA Framework? a) Leadership c) Computer and Technology b) Professional d) Communication

31	AC	What literary term refers to a character or thing that suddenly enters the story in a novel, play or movie, and solves a problem that had previously seemed impossible to solve? It's almost a heavenly intervention. a) Divine intervention c) Tedium ventura b) Deus ex machina d) E pluribus unum
32	CE	Racist incidents in May involving a bag of peanuts and off-color remarks have resulted in fans being banned for life from which baseball stadium? a) Yankee Stadium c) Camden Yards b) Fenway Park d) Wrigley Field
33	AC	Which measurement can be used to determine if a specific place is located north or south of the equator? a) latitude in degrees c) elevation in kilometers b) longitude in degrees d) altitude in kilometers
34	PD	How many total associations belong to SkillsUSA, in state and territorial groups? a) 78 b) 53 c) 121 d) 51
35	AC	An orbital of an atom is defined as the most probable location of a) a neutron. c) a positron. b) a proton. d) an electron.
36	CE	Ismail Haniya was elected leader of which world group in early May? a) Hamas b) ISIS c) the PLO d) NATO
37	PD	In what month will the SkillsUSA's WorldTeam travel to Abu Dhabi for competition? a) September c) October b) November d) December
38	AC	In which state was the novel *Bridges of Madison County* set? a) Iowa c) Indiana b) Missouri d) Kentucky
39	PD	One of the SkillsUSA Middle School competitions involves problem-solving and group creativity. What is the contest called? a) Opening and Closing Ceremonies b) Team Engineering Challenge c) TeamWorks d) Robotics: Urban Search and Rescue

40	PD	What name does SkillsUSA apply to a teaching methodology, which allows faculty to integrate classroom instruction with student community service? a) Chapter Business c) Chapter Excellence b) Student2Student d) Service Learning
41	AC	What value of X makes the following proportion correct? $\frac{X}{9} \quad \frac{9}{27}$ a) X = 13 c) X = 3 b) X = 9 d) X = 1/3
42	CE	This movie includes characters like a green Zoe Saldana, a professional wrestler, a talking raccoon and a baby tree. What is this recent hit? a) *Captain America: Civil War* c) *Guardians of the Galaxy Vol. 2* b) *Thor: Ragnarok* d) *Avengers: Infinity War*
43	AC	Which modern country was formerly known as British Honduras? a) Panama c) Senegal b) Belize d) Ceylon
44	PD	Which symbol on the SkillsUSA emblem represents the individual working with labor and management for the betterment of mankind? a) Torch c) Hands b) Orbital circles d) Gear
45	AC	Sometimes called the "Panhandle State", identify the state with two panhandles, one with the city of Wheeling and the other with Martinsburg. a) Oklahoma c) Florida b) West Virginia d) Oregon
46	CE	Which school won the Ladies 2017 NCAA basketball tourney? a) South Carolina c) University of Connecticut b) Baylor d) Duke
47	PD	In SkillsUSA's Opening Ceremonies, what gesture or signal does the president give in his call to order? a) "I pledge allegiance" c) two raps of the gavel b) a rap of the gavel d) "Mr. Parliamentarian, call to order."
48	AC	Infants will often smile when they hear a parent's voice. In this situation, the parent's voice is considered a) a response. c) a stimulus. b) an adaptation. d) a resource.

49	CE	The Kentucky Derby was won by: a) Battle of Midway. c) Patch. b) Always Dreaming. d) Gunnevera.
50	PD	Which component of the national website is interactive and helps design custom logos and graphics? a) the Brand Center c) the Press Department b) the PDP online portal d) the SkillsUSA Foundation

Career Pathways Showcase

Purpose

To encourage career technical students to promote their schools' career preparation program to their community and industry. They will develop a learning-based project that will benefit their school, industry or community with a focus on their career preparation. They will then develop a display to use in their community to explain the project, their studies and its benefits.

First, download and review the General Regulations at: http://updates.skillsusa.org.

Eligibility (Team of 3)

A team consisting of three students enrolled in the same recognized Career Pathways course of a state-approved career and technical program. The Career Pathways program must be part of an organized chapter of SkillsUSA. Students must be current, active members of SkillsUSA. Only the first-place high-school and college/postsecondary winning teams are eligible to participate. Teams of fewer than three members will be penalized one-third or two thirds of the possible points, based on the number of team members missing.

Clothing Requirement

Class A: SkillsUSA Official Attire

For men: Official SkillsUSA Blazer or jacket; black dress slacks; white dress shirt; plain black tie with no pattern (or SkillsUSA black tie); black socks; black shoes
For women: Official SkillsUSA Blazer or jacket; black dress skirt (knee-length) or black slacks; plain business-like white, collarless blouse (or white blouse with small, plain collar that may not extend onto the lapels of the blazer); black sheer or skin-tone hose; black shoes

Note: Contestants must wear their official contest clothing to the contest orientation meeting. Teams will be judged in official attire at the contestant briefing.

These regulations refer to clothing items that are pictured and described at: www.skillsusastore.org. If you have questions about clothing or other logo items, call 800-401-1560 or 703-956-3723.

Equipment and Materials

1. Supplied by the technical committee:
   a. One 7'10"-wide x 7'10"-deep space supplied with a 6' table (2 chairs may be available)
2. Supplied by the contestants:
   a. Project for display
   b. If needed, one three-prong, 20' 110v electrical power strip
   c. All competitors must create a one-page résumé and submit a hard copy to the Technical Committee Chair at orientation. Failure to do so will result in a 10-point penalty.

   Note: Your contest may also require a hard copy of your résumé as part of the actual contest. Check the Contest Guidelines and/or the updates page on the SkillsUSA website at http://updates.skillsusa.org.

Display Requirements

1. The display must fit within the assigned space, leaving room in the booth for the contestants to perform their demonstration.
2. Displays may not entail hazardous or flammable materials.
3. The national headquarters of SkillsUSA must be notified in advance if the display may include large equipment. Displays that generate excessive noise are discouraged and may result in a penalty assessment.
4. Local schools/consortia are responsible for all equipment to be used, including delivery and installation in the booth area. Teams must bring their own extension cords, power strips, tablecloths and all other needed supplies.
5. All display components must fit through doors and up steps, as forklifts and carts are not usually available. It is the responsibility of the team, not the event organizers, to deliver all display components from the curb to the show floor.

6. After the official contestant briefing by the technical committee, contestants will have approximately three hours to completely install their display. No access to the contest site is allowed before that time. Advisors are encouraged to supervise their teams but are reminded that these are to be student displays. Students should expect to have no more than 30 minutes prior to judging the following day.
7. All displays must remain set up, attended by at least one student-team member and open to the public all day Thursday. Wednesday will be used for judging the contest, and on that day, the display will be closed to the public. Teardown will be announced by the technical committee. Early teardown or leaving the booth unattended at any time prior to teardown may result in a penalty assessment.

Scope of the Contest

The student teams will use their course of study as the basis of a project that will benefit their class, school, community or industry. The project must highlight an aspect of their career cluster training. Upon completion of the project, the students will develop a display and use it within their community to explain their training and their project. This contest will judge mastery of their training, its application, the project's benefit to their community, and display and presentation techniques.

Knowledge Performance

This contest does not require a skill-related written test.

Contest Guidelines

1. A team consisting of three students enrolled in the same recognized Career Pathways program must present the project; students may only be members of one team.
2. The project must be designed and constructed by students who were enrolled during the school year immediately preceding the National Leadership and Skills Conference.
3. Guidance by Career Cluster instructors, counselors, and career and academic teachers is encouraged.
4. Emphasis is placed on the project, the display and the presentations/ demonstrations.
5. The project must be related to the program of study of the team members and this program of study will determine the pathway of the project.
6. Panels of judges, selected from business, labor, education and government, will evaluate projects.
7. As stated above, "Guidance by career pathway instructors, counselors, and career and academic teachers is encouraged" but advisors may not assist in the setup or presentation.

Project Requirements

A. Time limit: The presentation/demonstration shall be at least four minutes in length but not exceed eight minutes. *Penalty:* five points will be deducted for each 30 seconds or fraction thereof under four minutes or over eight minutes. Judges may ask questions for a period not to exceed two minutes. Following judging, judges may return to debrief teams on their presentation.
B. Maximum size of the display area is 7'10"-wide x 7'10"-long. Display components may extend to 8' high. Projects exceeding these limits will be disqualified.
C. Project Mobility: All projects must be self-contained. There will be no on-site technical support, internet hookup or backup equipment. Each team must be able to maneuver the project into the contest area. For large projects, modular makeup is recommended.

Judging Criteria

Each project will be judged according to its own merits and compliance with the listed criteria, as well as competitively within each pathway. Participants should read the guidelines carefully and make sure the project presentation covers all the criteria.

A. **Knowledge Attained** (150 points): Students should, through written and oral presentations, demonstrate the achievement of core knowledge related to their pathway.
B. **Demonstration/Evidence of Technical Skill** (150 points): Through demonstrations, photographs, products and

other media, students should show evidence of technology skills appropriate for their career level and pathway.

C. **Presentation Skills** (200 points): Students should demonstrate appropriate mastery of skills in communication, answering questions and explaining processes related to their projects. Each student team member must take an active role in the presentation/demonstration. Use of technology for the presentation is encouraged.
D. **Integration of Business and Industry** (150 points): The project must demonstrate evidence of integration and/or cooperation with business and industry. This must include at least ***one*** of the following:
    1. Students' working in the industry
    2. Business and industry partners providing assistance and guidance at the school
    3. Application of the project to an industry setting
E. **Community Impact** (200 points): The project must reflect impact to the community, related business field or related field of study as determined by the pathway.
F. **Overall Effect** (150 points): Students project a businesslike and professional manner. Project and presentation are well-organized; students display knowledge of, and enthusiasm for, the project and its contribution to the community, business or related field of study. Booths **must** clearly convey the purpose (intent) of the project.
G. Three medals (one gold, one silver and one bronze) will be given for the top three teams in each of the pathways.

Career Pathways

The project must be entered in its appropriate pathway. The technical committee may reassign a team to another pathway at its sole discretion.

Arts and Communication

Arts, Audiovisual Technology and Communications: Designing, producing, exhibiting, performing, writing and publishing multimedia content, including visual and performing arts and design, journalism and entertainment services

Business, Management and Technology

Business Management and Administration: Planning, managing and providing administrative support, information processing, accounting, human resource management services and related management support services

Finance Services: Planning, managing and providing banking, investment, financial planning and insurance services

Information Technology: Designing, developing, managing and supporting hardware, software, multimedia and systems integration services

Marketing, Sales and Services: Planning, managing and performing wholesaling and retailing services and related marketing and distribution support services including merchandise/product management and promotion

Human Services

Government and Public Administration: Planning, managing and providing government legislative and administrative and regulatory services and related general-purpose government services at the federal, state and local levels

Law, Public Safety and Security: Planning, managing and providing judicial, legal and protective services, including professional and technical support services in the fire protection and criminal justice systems

Education and Training Services: Planning, managing and providing education and training services and related learning support services including assessment and library and information services

Human Services: Planning, managing and providing human services including social and related community services

Hospitality and Tourism: Planning, managing and providing lodging, food, recreation, convention and tourism and related planning and support services such as travel-related services

Health Services

Health Science: Planning, managing and providing diagnostic, therapeutic and information and environmental services in health care

Industrial and Engineering Technology

Architecture and Construction: Designing, planning, managing, building and maintaining physical structures, including roadways and bridges and industrial, commercial and residential facilities and buildings

Manufacturing: Planning, managing and performing the processing of materials into intermediate or final products and related professional and technical and support activities such as production planning and control, maintenance and manufacturing/process engineering

Science, Technology and Math: Planning, managing and providing scientific research and professional and technical services (e.g., physical science, social service, engineering) including laboratory and testing services and research and development services

Transportation Distribution and Logistics: Planning, management and movement of people, materials and goods by road, pipeline, air, rail and water and related professional and technical support services such as transportation infrastructure planning and management, logistics services, mobile equipment and facility maintenance

Natural Resources/Agriculture/Food

Agricultural, Food and Natural Resources: Planning and managing agriculture, food, fiber and natural resource systems. This includes production of agricultural commodities, including food, fiber, wood products, horticultural crops and other plant and animal products. Also includes financing, marketing and distribution of agricultural products; farm production and supply and service industries; horticulture and landscaping services and the use and conservation of land and water resources; development and maintenance of recreational resources; mining and extraction operations and related environmental management services

Standards and Competencies

CPS 1.0 — Relate core knowledge gained through instructional program related to an identified career cluster

1.1 Provide written evidence of knowledge gained
1.2 Orally share knowledge gained in presentation and when questioned

CPS 2.0 — Relate technical skills gained through instructional program related to an identified pathway

2.1 Use media to provide evidence of skills attained
2.2 Use verbal illustrations and examples

CPS 3.0 — Show effective presentation skills when conveying knowledge and technical skills attained

3.1 Answer questions about the project and technical skill
3.2 Communicate ideas central to the project and technical skill
3.3 Explain processes related to the project and technical skill
3.4 Involve all team members in presentation
3.5 Use multimedia in presentation to support key points and examples

CPS 4.0 — Display evidence of integration and/or cooperation with business and industry

4.1 Document students' work experience in the industry
4.2 List business/industry partners providing assistance and guidance at the school
4.3 Explain the application of the project to an industry setting

CPS 5.0 — Relate the value of the project to the community

5.1 Identify and state the value of the project to the community, related business field or field of study

5.2 Use verbal and written presentation elements to convey the project's value

CPS 6.0 —Use professional skills required in a presentation situation

6.1 Use appropriate business and professional language

6.2 Show professionalism and enthusiasm

6.3 Show organization in project display and presentation

CPS 7.0 — SkillsUSA Framework

The SkillsUSA Framework is used to pinpoint the Essential Elements found in Personal Skills, Workplace Skills, and Technical Skills Grounded in Academics. Students will be expected to display or explain how they used some of these Essential Elements. Please reference the graphic above, as you may be scored on specific elements applied to your project. For more, visit: www.skillsusa.org/about/skillsusa-framework/.

Committee Identified Academic Skills

Math Skills

Dependent upon the presentation topic

Science Skills

Dependent upon the presentation topic

Language Arts Skills

- Provide information in conversations and in group discussions
- Provide information in oral presentations
- Demonstrate use of such verbal communication skills as word choice, pitch, feeling, tone and voice
- Demonstrate use of such nonverbal communication skills as eye contact, posture and gestures using interviewing techniques to gain information
- Analyze mass media messages
- Demonstrate comprehension of a variety of informational texts
- Use text structures to aid comprehension
- Organize and synthesize information for use in written and oral presentations
- Demonstrate knowledge of appropriate reference materials
- Use print, electronic databases and online resources to access information in books and articles

Connections to National Standards

State-level academic curriculum specialists identified the following connections to national academic standards.

Math Standards

- Measurement

Source: NCTM Principles and Standards for School Mathematics. For more information, visit: http://www.nctm.org.

Science Standards

- Understands the nature of scientific inquiry
- Understands the scientific enterprise

Source: McREL compendium of national science standards. To view and search the compendium, visit: http://www2.mcrel.org/compendium/browse.asp.

Language Arts Standards

- Students apply a wide range of strategies to comprehend, interpret, evaluate and appreciate texts. They draw on their prior experience, their interactions with other readers and writers, their knowledge of word meaning and of other texts, their word identification strategies and their understanding of textual features (e.g.,

sound-letter correspondence, sentence structure, context, graphics)
- Students adjust their use of spoken, written and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes
- Students conduct research on issues and interests by generating ideas and questions and by posing problems. They gather, evaluate and synthesize data from a variety of sources (e.g., print and nonprint texts, artifacts, people) to communicate their discoveries in ways that suit their purpose and audience
- Students use a variety of technological and information resources (e.g., libraries, databases, computer networks, video) to gather and synthesize information and to create and communicate knowledge
- Students use spoken, written and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion and the exchange of information)

Source: IRA/NCTE Standards for the English Language Arts. To view the standards, visit: www.ncte.org/standards.

CUSTOMER SERVICE

PURPOSE
To evaluate each contestant's preparation for employment and to recognize outstanding students for excellence and professionalism in the field of customer service.

First, download and review the General Regulations at: http://updates.skillsusa.org.

ELIGIBILITY
Open to all active SkillsUSA members.

CLOTHING REQUIREMENT
Class A: SkillsUSA Official Attire
For men: Official SkillsUSA blazer or jacket, black dress slacks, white dress shirt, plain black tie with no pattern (or SkillsUSA black tie), black socks, black shoes
For women: Official SkillsUSA blazer or jacket; black dress skirt (knee-length) or black slacks; plain business-like white, collarless blouse (or white blouse with small, plain collar that may not extend onto the lapels of the blazer); black sheer or skin-tone hose; black shoes

These regulations refer to clothing items that are pictured and described at: www.skillsusastore.org. If you have questions about clothing or other logo items, call 800-401-1560 or 703-956-3723.

Note: Contestants must wear their official contest clothing to the contest orientation meeting.

EQUIPMENT AND MATERIALS
1. Supplied by the technical committee:
   a. Workspace with table, chair, computer, telephone and customer reception area
   b. Flip chart and markers
   c. Telephone log, telephone directory
2. Supplied by the contestant:
   a. Pencil and ballpoint pen
   b. Paper (legal pad or spiral notebook)
   c. Calculator (nonprogrammable)
   d. All competitors must create a one-page résumé and submit a hard copy to the technical committee chair at orientation. Failure to do so will result in a 10-point penalty.

   Note: Your contest may also require a hard copy of your résumé as part of the actual contest. Check the Contest Guidelines and/or the updates page on the SkillsUSA website at http://updates.skillsusa.org.

SCOPE OF THE CONTEST
Knowledge Performance
The contest involves a written knowledge test. Knowledge of the competencies outlined below will be assessed during the written knowledge test. Written assessments may also be given during the skill performance portion of the contest.

Skill Performance
The contest involves live, role-playing situations that demonstrate the ability to perform customer service skills selected from the following list of competencies as determined by the SkillsUSA Championships technical committee.

CONTEST GUIDELINES
1. Each contestant will be given the same scenario(s) and the same amount of time. Total time will be 15 to 20 minutes.
2. Contestants will be required to attend an orientation meeting where a written test will be given. At this meeting, contestants will draw for reporting times.
3. Contestants must report to the contest area 30 minutes prior to their scheduled reporting time to check in with contest officials and receive final instructions.
4. Contestants should expect to use all aspects of the skills listed in Standards and Competencies. A scenario will likely involve multiple situations occurring simultaneously (e.g., one customer may be engaged in a telephone conversation with the contestant while another customer is walking through the door for face-to-face interaction).

5. Judges will serve in the role of the customer(s).

Standards and Competencies

CUS 1.0 — Demonstrate ability to communicate effectively

1.1 Display effective written communication
1.2 Demonstrate effective verbal communication
1.3 Employ basic computer keyboarding and computer skills in Microsoft Word
1.4 Exhibit good listening skills and show sincere interest
1.5 Speak in a clear, understandable manner

CUS 2.0 — Exhibit professional demeanor and business etiquette in customer service scenarios

2.1 Display a confident handshake, proper greeting, and personal introductions
2.2 Show confidence and a positive personal image
2.3 Show good grooming in dress and personal hygiene
2.4 Make a formal introduction
2.5 Use proper diction, grammar and pronunciation
2.6 Maintain politeness at all times
2.7 Exhibit poise, eye contact and professional mannerisms
2.8 Show enthusiasm in meeting customer needs
2.9 Display self-confidence and persuasiveness
2.10 Answer questions maturely

CUS 3.0 — Solve problems common in customer service work

3.1 Demonstrate brainstorming techniques
3.2 Discuss implementation of solutions and costs involved with choosing a solution
3.3 Explain the need for follow-up and modification
3.4 Apply conflict resolution skills

CUS 4.0 — Act out proper telephone operating techniques in roleplay scenarios

4.1 Demonstrate ability to receive incoming calls
4.2 Handle basic customer service functions
4.3 Use basic phone functions
- 4.3.1 Answer telephone properly
- 4.3.2 Transfer calls successfully
- 4.3.3 Participate in a conference call
- 4.3.4 Place callers on hold
- 4.3.5 Terminate calls professionally
- 4.3.6 Complete login and logout procedures accurately

4.4 Apply skills to role-play service applications
- 4.4.1 Respond to a request for information
- 4.4.2 Manage a customer complaint
- 4.4.3 Schedule appointments
- 4.4.4 Respond to account inquires and problems
- 4.4.5 Respond to product/service information requests
- 4.4.6 Address any customer issues or concerns

CUS 5.0 — SkillsUSA Framework

The SkillsUSA Framework is used to pinpoint the Essential Elements found in Personal Skills, Workplace Skills, and Technical Skills Grounded in Academics. Students will be expected to display or explain how they used some of these Essential Elements. Please reference the graphic above, as you may be scored on specific elements applied to your project. For more, visit: www.skillsusa.org/about/skillsusa-framework/

Committee Identified Academic Skills

The technical committee has identified that the following academic skills are embedded in this contest.

Math Skills

None Identified

Science Skills

None Identified

Language Arts Skills

- Provide information in conversations and in group discussions
- Demonstrate use of such verbal communication skills as word choice, pitch, feeling, tone and voice
- Demonstrate use of such nonverbal communication skills as eye contact, posture and gestures using interviewing techniques to gain information
- Understand source, viewpoint and purpose of texts
- Organize and synthesize information for use in written and oral presentations
- Use print, electronic databases and online resources to access information in books and articles
- Demonstrate informational writing
- Edit writing for correct grammar, capitalization, punctuation, spelling, sentence structure and paragraphing

Connections to National Standards

State-level academic curriculum specialists identified the following connections to national academic standards.

Math Standards

None Identified

Source: NCTM Principles and Standards for School Mathematics. For more information, visit: http://www.nctm.org.

Science Standards

- Understands the nature of scientific inquiry

Source: McREL compendium of national science standards. To view and search the compendium, visit: http://www2.mcrel.org/compendium/browse.asp.

Language Arts Standards

- Students adjust their use of spoken, written and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes
- Students employ a wide range of strategies as they write and use different writing process elements appropriately to communicate with different audiences for a variety of purposes
- Students apply knowledge of language structure, language conventions (e.g., spelling and punctuation), media techniques, figurative language and genre to create, critique and discuss print and nonprint texts
- Students participate as knowledgeable, reflective, creative and critical members of a variety of literacy communities
- Students use spoken, written, and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion and the exchange of information)

Source: IRA/NCTE Standards for the English Language Arts. To view the standards, visit: www.ncte.org/standards.

ENGINEERING TECHNOLOGY/DESIGN

PURPOSE

To recognize an outstanding engineering design project that has been developed by a three-member team of engineering or technology students. The student team will present its innovative idea along with a design board, a design prototype and engineering notebook.

First, download and review the General Regulations at: http://updates.skillsusa.org.

ELIGIBILITY (TEAM OF 3)

Open to active SkillsUSA members enrolled in a career and technical education engineering program or a curriculum that integrates engineering/pre-engineering concepts and techniques as an integral component of the instructional strategies.

CLOTHING REQUIREMENT

Class A: SkillsUSA Official Attire

For men: Official SkillsUSA blazer or jacket, black dress slacks, white dress shirt, plain black tie with no pattern (or SkillsUSA black tie), black socks, black shoes
For women: Official SkillsUSA blazer or jacket; black dress skirt (knee-length) or black slacks; plain business-like white, collarless blouse (or white blouse with small, plain collar that may not extend onto the lapels of the blazer); black sheer or skin-tone hose; black shoes

These regulations refer to clothing items that are pictured and described at: www.skillsusastore.org. If you have questions about clothing or other logo items, call 800-401-1560 or 703-956-3723.

Note: Contestants must wear their official contest clothing to the contest orientation meeting

OBSERVER RULE

No observers will be permitted to enter the contest area during the first day of competition. Judging will continue on the second day of competition; however, teams are invited to repeat their presentation to the public when they are not being judged. Observers should avoid teams who are actively being judged and will be asked to leave if they are disruptive during the judging process.

EQUIPMENT AND MATERIALS

1. Supplied by the technical committee:
   a. A space for the design prototype and design board that is no bigger than 10'x10'
   b. One standard 120-volt electrical outlet
   c. One standard 8' conference table
2. Supplied by the contestant team:
   a. Design prototype: The design prototype cannot be hazardous in any way. If the prototype is not conducive to being presented in an indoor facility, please notify the SkillsUSA headquarters in advance so other arrangements can be made. Design prototypes must be transported and set up in the contest area by the contestant team on the move in and set up day. No help will be provided by SkillsUSA.
   b. Design board
   c. Engineering notebook
   d. Industrial review of engineering design
   e. Laptop, computer, projector and small screen, if necessary; documentation and presentation software such as Microsoft Office or Open Office
   f. All competitors must create a one-page résumé and submit a hard copy to the technical committee chair at orientation. Failure to submit a résumé for any one team member will result in a 10-point penalty.

   Note: Your contest may also require a hard copy of your résumé as part of the actual contest. Check the Contest Guidelines and/or the updates page on the SkillsUSA website at http://updates.skillsusa.org.

Scope of the Contest

The team consists of three students, all enrolled in the same educational institution during the current school year. Students may be members of only one team per contest year and may not compete in more than one contest at the national level. High school and college/postsecondary educational institutions are eligible to participate.

The project must be designed and constructed by students who are enrolled (or were enrolled immediately preceding the National Leadership and Skills Conference) in an engineering program or career and technical education program (see definition in the Eligibility section).

Each team will have one design board explaining the new innovation it collaboratively developed. This should represent the engineering process, detailing brainstorming efforts, schedule, prototypes, modeling, relevant industry regulations, restrictions and laws, safety considerations, manufacturability, and more – as is relevant to design. The design board may not be any larger than a 36"x56" tri-fold display. Digital media, such as digital picture frames, can be attached to the design board. The board should be a comprehensive representation of the team's design process.

The design prototype must be an accurate reflection of what is being claimed in the oral explanation and presentation.

Importance is placed on the oral presentation, which lasts no longer than 10 minutes. Following the oral presentation, there may be a question and answer session by the judging panel — not to exceed 5 minutes — to clarify any questions that arise during the presentation.

Each team is required to have an industrial review of its proposed engineering design completed by a technical person in that area of study. This review should be conducted by engineers, technicians or other technical professions within the design's respective industry. The reviewer is to give written feedback to the team, which will be submitted to the judges at the NLSC.

Mentorship from the team's career and technical instructor, academic teachers, and representatives from the business and industry world, including engineers and industrial designers, is highly encouraged.

The panel of judges will consist of engineers, engineering educators and members from business and industry.

Judging Criteria

Each engineering presentation will be judged according to its own merits and compliance with the listed criteria. Participants should read the guidelines carefully and make sure the project presentation covers all the criteria.

1. Design Prototype
   The design prototype is a working model that demonstrates the results of the team's research and how the team has put its research into action (e.g., a newly designed air-intake system for a high-mileage vehicle). The design prototype must accurately reflect the engineering design accomplishment referred to in the presentation. These criteria include CAD, virtual modeling, materials selection ergonomics, manufacturing analysis, construction and asthetics. Design prototypes will be judged independently of the oral explanation and presentation.

2. Engineering Notebook
   Teams are required to keep an engineering notebook documenting the engineering process they used to design and prototype their innovation. Every page should be numbered. Every entry should be dated and should follow a general engineering notebook format. The entire engineering process should be documented with such things as sketches, notes, calculations, evidence of research, photographs, etc. The notebook will be submitted to the judges after they have reviewed the team's design prototype.

   Engineering notebooks in an electronic format will be accepted for review and are expected to meet in full the criteria described above. Teams should bring a copy of the electronic engineering

notebook on a USB drive, to be delivered to the judges.

3. Oral Explanation and Presentation
   Students should demonstrate appropriate mastery of the engineering project. Each student should take an equal role during the allotted time. The presentation given by the entire group should reflect excellent presentation skills, as well as clear communication and explanation of the technical process related to the engineering design project. This presentation should include analysis on the design feasibility. The use of technology presentation equipment is highly encouraged to convey a clear presentation.

4. Industrial Review
   The project must demonstrate evidence of the integration and involvement of business and industry related to the engineering field. Each team must present its design project to a technical person in that area of study. *A written review of the presentation from the technical person must be submitted to the judges at the NLSC.* This important process allows teams to interact with technical professionals and engineers, practice presenting their innovation, and get feedback on their design.

5. Design Board
   The design board will chronicle the history of the innovation from idea to reality. The storyboard will be judged on the explanation of the team's engineering process, quality, imagination, impacts, appearance and overall effectiveness of the project. A Gantt chart is required to document the progress of the engineering design throughout the project history.

6. On-Site Problem-Solving Activity
   Teams will be given an on-site problem-solving activity during the competition. All required materials will be provided by the technical committee.

7. Overall Effect
   The synergy of the overall presentation of the team's engineering design project and supplied materials (e.g., storyboard, design prototype) must be projected in a businesslike and professional manner. The design prototype and presentation materials must be well organized. The judges will look for the students' display of knowledge and overall professionalism.

Items judges will be evaluating at NLSC:

- **Design Prototype —** CADD and virtual modeling, material selection, ergonomics, manufacturing analysis, construction and aesthetics, Q&A Prototype—Process

- **Design Board —** A comprehensive engineering design process summary. Brainstorming, Gantt Chart (schedule), cost of materials, consideration of industry regulations, laws and limitations, product testing, applicable redesign, overall appearance.

- **Engineering Notebook —** Format, depth of documentation, professionalism, storyboard-Gantt Chart, engineering process, appearance

- **Industrial Review —** Written technical review, market data and information, overall effect/synergy between content, accuracy, and professionalism

- **On-site Problem Solving**

- **Oral Explanation and Presentation—** Clear communication, design feasibility and analysis, team participation, presentation of the design, Q&A general knowledge

Standards and Competencies

ENG 1.0 — Integrate knowledge of basic engineering principles into technical writing and presentations following the guidelines the contest technical committee has established

1.1 Apply engineering knowledge in the areas of force, work, rate, resistance, energy, power, force transformers, momentum, waves and vibrations, energy converters, transducers, radiation, optical systems

ENG 2.0 — Transform existing systems into conceptual models

2.1 Transform conceptual models into determinable models
2.2 Use determinable models to obtain system specifications
2.3 Select optimum specifications and create physical models
2.4. Apply the results from physical models to create real target systems
2.5 Critically review real target systems and personal performance
2.6 Design effective and usable IT-based solutions and integrate them into the user environment
2.7 Assist in the creation of an effective project plan
2.8 Identify and evaluate current and emerging technologies and assess their applicability to address the users' needs

ENG 3.0 — Showcase knowledge of project planning

3.1 Apply brainstorming techniques
3.2 Implement benchmarking
3.3 Discuss continuous improvement
3.4 Explain cause and effect relationships
3.5 Apply knowledge of customer satisfaction
3.6 Demonstrate how to collect data
3.7 Apply decision-making skills
3.8 Define and describe a process
3.9 Empower team members
3.10 Recognize methods of idea generation
3.11 Prioritize tasks
3.12 Reach consensus amongst the team
3.13 Display teamwork during the contest
  3.13.1 Have equal team participation
  3.13.2 Show positive group dynamics
  3.13.3 Define team roles

ENG 4.0 — Developing/identifying opportunities

4.1 Identify and define the opportunity
  4.1.1 Identify the customer
  4.1.2 Identify the customer's needs
  4.1.3 State the problem or areas of improvement within the identified opportunity clearly and concisely
  4.1.4 Quantify the opportunity with data
4.2 Show data gathered from research
  4.2.1 Identify opportunity for improvement
4.3 Make decisions based on facts, not opinions
4.4 Show how the team determined the cause(s) of the problem and gained an understanding of the variation that occurs in the process
  4.4.1 Diagram and perform a thorough assessment of the possible causes
4.5 Develop various solutions
  4.5.1 Show alternative approaches or changes that would improve the situation
  4.5.2 Show the analysis used to select the most beneficial solution to implement
  4.5.3 Define milestones
4.6 Recommend a plan to implement the solution(s)
4.7 Use analytical decision making by making full use of flow charts, bar graphs, cause and effect diagrams, Pareto diagrams, etc.
4.8 Describe a method to standardize or institutionalize the process

ENG 5.0 — Write a problem statement

5.1 Define the problem
5.2 Define the customer
5.3 Explain the customer expectations
5.4 Describe the product or service
5.5 Discuss how the product or service fulfills the customer's expectations
5.6 List the needed data
5.7 Reflect on how the process can be improved
5.8 Describe how the improved process will meet or exceed the customer's expectations

ENG 6.0 — Design and deliver a presentation that discusses the problems and processes of the local institution

6.1 Make the presentation clear and concise
6.2 Use graphics effectively to clarify presentation topics
6.3 Use time wisely while presenting

ENG 7.0 — Design and develop a presentation that is the result of findings from the on-site problem and process

7.1 Make the presentation clear and concise
7.2 Use graphics effectively to clarify presentation topics
7.3 Use time wisely while presenting

ENG 8.0 — Deliver the presentation in a professional manner, meeting the standards outlined by the technical committee

8.1 Explain the topic through the use of displays or practical operations
8.2 Demonstrate an effective and pleasing delivery style
8.3 Use verbal illustrations and examples effectively
8.4 Make a formal and effective introduction to the presentation that clearly identifies the scope of the presentation
8.5 Pronounce words in a clear and understandable manner
8.6 Use a variety of verbal techniques including: modulation of voice, changing volume, varied inflection, modifying tempo and verbal enthusiasm
8.7 Demonstrate poise and self-control while presenting
8.8 Demonstrate good platform development and personal confidence
8.9 Communicate the primary points of the speech in a compact and complete manner
8.10 Tie organizational elements together with an effective ending
8.11 Complete the speech within the time limits set by contest requirements
8.12 Develop storyboards for the presentation outlining the process

ENG 9.0 — SkillsUSA Framework

The SkillsUSA Framework is used to pinpoint the Essential Elements found in Personal Skills, Workplace Skills, and Technical Skills Grounded in Academics. Students will be expected to display or explain how they used some of these Essential Elements. Please reference the graphic in the previous column, as you may be scored on specific elements applied to your project. For more, visit: www.skillsusa.org/about/skillsusa-framework/.

Committee Identified Academic Skills

The technical committee has identified that the following academic skills are embedded in this contest.

Math Skills

- Use fractions to solve practical problems
- Use proportions and ratios to solve practical problems
- Simplify numerical expressions
- Use scientific notation
- Solve practical problems involving percentages
- Solve single variable algebraic expressions
- Solve multiple variable algebraic expressions
- Measure angles
- Find surface area and perimeter of two-dimensional objects
- Find volume and surface area of three-dimensional objects
- Apply transformations (rotate or turn, reflect or flip, translate or slide, and dilate or scale) to geometric figures
- Construct three-dimensional models

- Apply Pythagorean Theorem
- Make predictions using knowledge of probability
- Make comparisons, predictions and inferences using graphs and charts
- Organize and describe data using matrixes
- Graph linear equations
- Solve problems using proportions, formulas and functions
- Find slope of a line
- Use laws of exponents to perform operations
- Solve quadratic equations
- Solve practical problems involving complementary, supplementary and congruent angles
- Solve problems involving symmetry and transformation
- Use measures of interior and exterior angles of polygons to solve problems
- Find arc length and the area of a sector

Science Skills

- Plan and conduct a scientific investigation
- Use knowledge of the particle theory of matter
- Describe and recognize elements, compounds, mixtures, acids, bases and salts
- Describe and recognize solids, liquids and gases
- Describe characteristics of types of matter based on physical and chemical properties
- Use knowledge of physical properties (shape, density, solubility, odor, melting point, boiling point, color)
- Describe and use the Periodic Table — symbols, atomic number, atomic mass, chemical families (groups), and periods
- Use knowledge of classification of elements as metals, metalloids and nonmetals
- Use knowledge of potential and kinetic energy
- Use knowledge of mechanical, chemical and electrical energy
- Use knowledge of heat, light and sound energy
- Use knowledge of temperature scales, heat and heat transfer
- Use knowledge of sound and technological applications of sound waves
- Use knowledge of the nature and technological applications of light
- Use knowledge of speed, velocity and acceleration
- Use knowledge of Newton's laws of motion
- Use knowledge of work, force, mechanical advantage, efficiency and power
- Use knowledge of simple machines, compound machines, powered vehicles, rockets and restraining devices
- Use knowledge of principles of electricity and magnetism
- Use knowledge of static electricity, current electricity and circuits
- Use knowledge of magnetic fields and electromagnets
- Use knowledge of motors and generators

Language Arts Skills

- Provide information in conversations and in group discussions
- Provide information in oral presentations
- Demonstrate use of verbal communication skills: word choice, pitch, feeling, tone and voice
- Demonstrate use of nonverbal communication skills: eye contact, posture and gestures using interviewing techniques to gain information
- Organize and synthesize information for use in written and oral presentations
- Demonstrate knowledge of appropriate reference materials
- Demonstrate narrative writing
- Demonstrate informational writing

Connections to National Standards

State-level academic curriculum specialists identified the following connections to national academic standards.

Math Standards

- Numbers and operations
- Algebra
- Geometry
- Measurement
- Data analysis and probability
- Problem solving
- Reasoning and proof
- Communication
- Connections
- Representation

Source: NCTM Principles and Standards for School Mathematics. For more information, visit: http://www.nctm.org.

Science Standards

- Understands the structure and properties of matter
- Understands the sources and properties of energy
- Understands forces and motion
- Understands the nature of scientific knowledge
- Understands the nature of scientific inquiry
- Understands the scientific enterprise

Source: McREL compendium of national science standards. To view and search the compendium, visit: http://www2.mcrel.org/compendium/browse.asp.

Language Arts Standards

- Students read a wide range of print and nonprint texts to build an understanding of texts, of themselves and of the cultures of the United States and the world; to acquire new information; to respond to the needs and demands of society and the workplace; and for personal fulfillment. Among these texts are fiction, nonfiction, classic and contemporary works
- Students apply a wide range of strategies to comprehend, interpret, evaluate and appreciate texts. They draw on their prior experience, their interactions with other readers and writers, their knowledge of word meaning and of other texts, their word identification strategies and their understanding of textual features (e.g., sound-letter correspondence, sentence structure, context, and graphics)
- Students adjust their use of spoken, written and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes
- Students employ a wide range of strategies as they write and use different writing process elements appropriately to communicate with different audiences for a variety of purposes
- Students apply knowledge of language structure, language conventions (e.g., spelling and punctuation), media techniques, figurative language and genre to create, critique, and discuss print and nonprint texts
- Students conduct research on issues and interests by generating ideas and questions and by posing problems. They gather, evaluate and synthesize data from a variety of sources (e.g., print and nonprint texts, artifacts, people) to communicate their discoveries in ways that suit their purpose and audience
- Students use a variety of technological and information resources (e.g., libraries, databases, computer networks, video) to gather and synthesize information and to create and communicate knowledge
- Students use spoken, written and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion, and the exchange of information)

Source: IRA/NCTE Standards for the English Language Arts. To view the standards, visit: www.ncte.org/standards.

ENTREPRENEURSHIP

PURPOSE

To evaluate the team's success to formulate a business plan, present business presentations and respond to changes that may occur during operation.

First, download and review the General Regulations at: http://updates.skillsusa.org.

ELIGIBILITY (TEAM OF 4)

Open to a team of four active SkillsUSA members. A state may enter one high school team and one college/postsecondary team comprised of four registered members each. The team may perform with three members without penalty in the event that a member fails to show up or is forced to withdraw within five days of the competition, as long as four members were originally registered and verified in the national headquarters.

CLOTHING REQUIREMENT

Class A: SkillsUSA Official Attire

For men: Official SkillsUSA blazer or jacket, black dress slacks, white dress shirt, plain black tie with no pattern (or SkillsUSA black tie), black socks, black shoes
For women: Official SkillsUSA blazer or jacket; black dress skirt (knee-length) or black slacks; plain business-like white, collarless blouse (or white blouse with small, plain collar that may not extend onto the lapels of the blazer); black sheer or skin-tone hose; black shoes

These regulations refer to clothing items that are pictured and described at: www.skillsusastore.org. If you have questions about clothing or other logo items, call 800-401-1560 or 703-956-3723.

Note: Contestants must wear their official contest clothing to the contest orientation meeting.

EQUIPMENT AND MATERIALS

1. Supplied by the technical committee:
   a. Timekeeper
   b. One 30"x72" table
   c. Projection screen
   d. One electrical 120 volt (15 amp) outlet
2. Supplied by the contestants:
   a. All materials and supplies needed for their presentations, including all presentation equipment such as visual aids, a computer, projector, extension cords, etc.
   b. One hard copy of the team's business case to be presented at the competition must be in a hard three-ring binder, along with an electronic copy submitted prior to the competition. The electronic copy must be submitted by June 1, or penalties will be applied. See electronic submission details in the "Knowledge Performance" section below.
   c. All competitors must create a one-page résumé and submit a hard copy to the technical committee chair at orientation. Failure to do so will result in a 10-point penalty.
   3. Resources provided to contestants:
   a. HP LIFE eLearning (*www.life-global.org/go/skillsusa*) free, open educational resource providing self-paced and interactive modules teaching business and IT skills of the 21st century. HP LIFE eLearning course mapping to standards and competencies provided.
   b. Contest recommendations/best practices

   Note: Your contest may also require a hard copy of your résumé as part of the actual contest. Check the Contest Guidelines and/or the updates page on the SkillsUSA website at http://updates.skillsusa.org.

SCOPE OF THE CONTEST

The Entrepreneurship contest area consists of two separate competitions, one for high-school students and another for college/postsecondary students.

Knowledge Performance

One hard copy of each participating team's business plan must be brought to the orientation and to the contest site. The team also must send an electronic copy to kyoungs@skillsusa.org and bleisy@comcast.net. The electronic copy must be received by June 1. Electronic submissions missing the deadline are subject to penalties.

The electronically submitted business plans will be judged prior to the two-day competition and will comprise 50 percent of the team's total score.

Skill Performance

The contest includes a business plan presentation and a challenge presentation to demonstrate performance skills.

A. **Schedule of Skill Performance**

1. *Day One, Orientation Session:* A brief overview of the contest will be delivered. Teams schedules will be randomly assigned by the Technical Director. Copies of the team members résumés will be collected during this session. Teams will be reminded of the Challenge questions at this session as well. All work must be completed by the registered team members only. The competition will be spread over Day Two and Day Three via three teams.
2. *Day Two, 12-minute Business Plan Presentations:* Teams will have five minutes to set up the room for their presentations and will have a maximum of 12 minutes for their presentations. All team members must participate and must also demonstrate an in-depth understanding and knowledge of their business plan that may include a demonstration of their product. Teams should cover all eight criteria in the Standards and Competencies section.
3. *Day Three, 12-minute Business Plan Presentation:* Teams will have five minutes to set up the room for their presentations and will have a maximum of 12 minutes for their presentations. All team members must participate and must also demonstrate an in-depth understanding and knowledge of their business plan that may include a demonstration of their product.

   Teams should cover all eight criteria in the Standards and Competencies section.

   During the question and answer period students must present the answers to the challenge questions. No observers will be permitted to talk or gesture to contestants during presentations. No observers may enter or leave the room during presentations. The presentations will be open to the public. Teams may observe the presentations only after they have completed their presentation on each day.

   Challenge questions to be answered during the oral presentation:
   - Anyone can start a business, but should you (from a needs, social and economical point of view)?
   - Why you (rather than your competition)?
4. *Day Four, Mandatory Closing and Mentoring Workshop:* Two-hour workshop, 30-minute closing feedback session

B. **Method of Presentation**

1. Computer projection may be used to deliver the presentations.
2. Each presentation will be limited to the timeframes as stated previously. Points will be deducted for teams that exceed the time limits. Judges will be allowed up to an additional 10 minutes for clarification and questions after each presentation is complete.
3. A professional presentation is expected from each team. This includes, but is not limited to, posture, eye contact, clarity, volume, teamwork, effective use of visuals, use of time and group dynamics. Each team member must verbally participate in the presentation.

C. **Format of Written Plans**

1. All pages in the business plan will be 8.5"x11" and, with the exception of the title page, will be numbered. The business plan may not be more than 30 pages long, including the title page, sample forms, marketing materials and supporting documents. Everything submitted is part of the business plan. The front and back of the pages may be used.
2. The text of the business plan will be typed (12 pt. Times New Roman or equivalent). Handmade or computer-generated graphs and charts are acceptable. Professionally made graphs and charts are unacceptable.
3. The title page will include the name of the business, the name of the class or classes, name of the team (if one exists), names of the team members and date of submission.
4. The second page will be the Table of Contents.
5. The third page will be a team "Bio Sheet" that provides a brief overview of the business the group selected as well as a description of the experience and skills each team member brought to the effort.
6. The fourth page will consist of verification from a senior educational institution official that the project is the original work of the registered team members.
7. The business plan that follows these above mentioned pages must be organized according to the competencies listed below. Points will be deducted for each criterion out of sequence, not completed or omitted.

Standards and Competencies

ENTR 1.0 — EXECUTIVE SUMMARY

1.1 **Company Mission**

This is a short description of the company that would be written on the back of a business card. It communicates the value proposition of the company, also known as the elevator pitch.

1.2 **Management Team**

a. Focus on the capabilities and relevant past accomplishments of the team.
b. Include service providers who add significant value to your team, e.g., attorneys, accountants, and industry experts.

1.3 **Market**

a. Quickly define the market in regard to what problems are being addressed, size of potential market(s) and major segments of the overall market.
b. Address any important market trends and industry assumptions.

1.4 **Products and Service**

a. Provide a short description focusing on the unique nature of your idea and whether you will have "first mover" advantage.
b. Mention what technology you are using to implement the strategy, whether your ideas are proprietary or not, or if you have potential trade secretes (do not disclose them).
c. If construction or manufacturing is involved, give target dates and time windows of completion.

1.5 **Implementation Strategy**

a. Quickly define the key aspects of the sales plan for achieving market penetration.
b. Describe any strategic alliances and partnerships that are important to your success.
c. State other key factors that are critical to the success of the marketing efforts.

1.6 **Risk Analysis**

a. Explain how your competition is likely to respond to your entry into the market and how you will react.
b. Address a few key competitors and what competitive advantage you will leverage against them to take market share.

1.7 **Projected Financial Highlights**

	FY1	*FY2*	*FY3*
Total Annual Sales/Revenues	$	$	$
Net Income (End of Year Amounts)	$	$	$
Cash Flow (End of Year Amounts)	$	$	$

1.8 **Capital Requirements**

a. State clearly and concisely the total amount required for the project and the intended use of those funds.

b. Mention the scalability of your plan and how you would work with a larger or smaller investment.

ENTR 2.0 — SUMMARY OF BUSINESS

2.1 **Statement of Purpose**

State your objectives as *simply* as possible. If the plan is for your internal use, the statement should be a brief description of how you intend to use the business plan. If the plan is to be used as a financing proposal, the statement of purpose should respond to the following questions:

a. Who is asking for money?
b. What is the business structure (LLC, sole proprietorship, etc.)?
c. How much money is needed?
d. What is the money needed for?
e. How will the funds be repaid?

2.2 **Mission Statement**

Include your mission statement here. This should be no more than 30 words and should describe your day-to-day business activities.

2.3 **Description of Business**

The objective of this section of the plan is three-fold. After reading this section, the reader should be able to answer the following points:

a. What business are you in? Many times the description or summary of business will answer the seven basic questions:
   - What kind of business are you going into?
   - What is the status of the business? (Start-up? Expansion? Acquisition?)
   - What is the business operating form?
   - Why will the business be profitable?
   - When will the business open, expand, etc.?
   - What hours of the day and days of the week will your business be open?
   - Is your business seasonal?

b. How are you going to operate it?

c. Why do you think it will succeed?

Remember to be precise, but do not go into too much detail. For a new business, experience in the industry is paramount. If you do not have significant experience running and managing a business in this industry, make sure there are people on your team that do. Speak with others in the industry and define key areas where your proposed business will differ from the entrenched competitors.

2.4 **Background of Business**

a. Include pertinent details of the background of the business. How long has the idea for the project been in place? Who are the key players? What dates are important?

b. Include any other background information necessary to understand where and why the business will be successful.

2.5 **Location**

a. Include details of the location or proposed location. Is parking important?

b. Obtain traffic counts if needed. Is foot traffic important?

c. Include details on any construction or remodeling, timing, contractors,

and proposed dates of start and completion

2.6 **Operating Agreement**
Include any pertinent details of the operating agreement: ownership of firm, partnerships, desired equity breakdown etc.

2.7 **Products and Services Offered**
If your products or services are unique, state-of-the-art, or otherwise noteworthy, explain how you will take advantage of those opportunities. Differentiating your products and services is a must in competitive environment. The first step is to communicate a thorough product or service knowledge.

Be careful, however. While you want to communicate the important attributes that will make your business successful, many entrepreneurs go into too much detail about their products and services. Bankers and investors know business and finance and are not interested in the details of your project. They typically expect you to be the expert, so do not try to make them the expert with an overly technical business plan.

2.8 **Strategic Alliances**
Make sure to address any businesses or organizations that will be crucial to your success. This group may include suppliers and trade associations. Many times, what may seem as a potential competitor may actually turn out to be a key strategic partner that will help guide you into the marketplace and perhaps become a valuable referral source.

2.9 **Operational and Regulatory Items**
In this section you want to discuss the status of any licenses, permits or other regulatory requirements to operating your business. If licenses have not been acquired, include likely dates for application or approval. Typically, the amount of money invested in an experienced small business attorney and accountant will save you time and money in the long run. Be wary of bargain basement or pre-paid legal and professional advice.

ENTR 3.0 — MARKETING PLAN

3.1 **Industry Background**
- a. Illustrate a detailed analysis of the current market size, both nationally and locally
- b. Identify areas of growth and market niches, etc. In most cases, charts or figures can illustrate market trends more efficiently and clearly than long narratives

3.2 **Target Market**
- a. Clearly identify who you have identified as your target market and why you have selected this target market. Try to avoid sweeping generalizations, so be as specific as possible.
- b. Include key demographics on your target market, testimonials, results of surveys (formal or informal), etc.
- c. Clearly identify why people will buy what you are selling — a common sense idea, but one that is critical and often overlooked.
- d. Be sure to include industry statistics and demographic information. Also identify why the customer will buy from you (the benefit to the customers).

3.3 **Trends and Industry Assumptions**
- a. Describe any key drivers that will influence the future of your business.
- b. Articulate where you think the marketplace is going and why it is heading in that direction.

3.4 **Competitive Analysis**
Every business has competition. List no less than three and no more than five of your biggest competitors. What are your internal strengths and weaknesses? What are their external opportunities and threats? How will this environment affect your market and marketing strategy?

3.5 **S.W.O.T. Analysis**
How will you address these and gain market share? List your strengths and weaknesses (internal) and competitors' opportunities and threats (external competition).

Internal	External
Strengths	Opportunities
Weaknesses	Threats

Show that you have done your homework on your competitors. Include details like sales analysis, number of years entrenched in the market, reputation in the marketplace, key employees, officers, etc.

3.6 **Products and Services**
Discuss how your product or service line will relate to your target market while addressing the current external competitive environment. Again, readers often briefly skim through your business plan, so critical information such as this should be described several times.

3.7 **Pricing Strategy**
Discuss details of the pricing of your products or services and how they will relate to your target market and your competitors.

3.8 **Promotional and Advertising Plan**
Explain in detail how your business will capture market share. Include details on promotional and advertising activities and costs of those marketing activities. Do not just rely on "word of mouth advertising"; describe what steps you are taking to ensure that this positive "buzz" is created by your proposed business.

Remember, most effective marketing plans are the product of a well thought out, consistent, long-term strategy. Rarely do "one-shot" advertising or promotions effectively increase market share. If you are working with a professional firm or experienced marketer (recommended if mass media and/or social media marketing will be utilized), list and briefly describe that business relationship here.

ENTR 4.0 — MANAGEMENT PLAN

This section is *extremely* important for new businesses and for those seeking capital from banks or investors.

4.1 **Management Team**
a. Describe who will manage the business. Include résumés in supporting documents in your appendix of key team members.
b. Describe in detail your team's experience, strengths, job functions, and plans to fill gaps in the management team.
c. Include job descriptions/duties for key personnel.

4.1 **Related Work Experience**
a. Make sure to illustrate that you and your team have worked in this industry in the past.
b. Include dates and descriptions of previous experience and how you will use these experiences and expertise to ensure that your project is successful.

4.2 **Personnel Needed**
a. Address any additional team members you will need and how you plan to attract and retain those team members. This is consistently one of the biggest problems facing all small businesses year after year, as most entrepreneurs do not address how they will "scale" the

business by adding talented personnel who can assume more duties as the business grows.

b. Ensure that you address how you will deal with the challenges of recruiting, developing and retaining employees.

4.3 **Salaries**

a. Address how your team and you will be paid. This seems obvious, but your financial projections and your marketing plan will drive revenues, and profits from those revenues will enable your team to be paid.

b. If you will be working full time, show that you intend to take an owner's withdrawal out of the business, even if it is a minimal amount, to ensure the business remains profitable and cash flow positive.

4.4 **Advisory Board**

Critical to the project's success is the recruitment of a well-balanced advisory board that will help you achieve your goals.

a. Recruit local professionals who will be essential to the operations of your business and include those names or identified professionals in your business plan. These people are not on your payroll, but they should be accessible to answer any questions or problems that may arise.

b. Mention your relationships with these professionals and their area of expertise, years in the business, etc.

c. Gauge these professionals' interest in serving on your advisory board, and get their permission to list their name and business in your business plan.

d. Prepare to set up at least quarterly meetings with the entire advisory board for the first year, but also plan to talk with members of the advisory board on a more frequent basis between meetings.

e. Ask your coach/consultant for additional advice regarding this section of your business plan.

Legal
Firm name
Address line 1
Address line 2
Phone/Email

Accounting
Firm name
Address line 1
Address line 2
Phone/Email

Industry Consultant/Expert
Firm name
Address line 1
Address line 2
Phone/Email

Insurance
Firm name
Address line 1
Address line 2
Phone/Email

Banking
Firm name
Address line 1
Address line 2
Phone/Email

ENTR 5.0 — FINANCIAL PLAN SOURCES AND USES OF FUNDS STATEMENT

A financial template accompanies this business plan template and may be used to complete this section. Each worksheet may be copied to a word document and used as an appendix.

This sheet will describe exactly how much money is needed, how you will access those funds and how those funds will be used. (Land/building purchase, renovations, equipment, furniture/fixtures, inventory, working capital needs, etc.) Typically, funds on this sheet will be spent before the first day of operation.

If you opt to use another tool you may do so but should include information indicated below.

5.1 **Monthly Income Statement — Year One**
This spreadsheet will track your month-to-month sales, variable costs and fixed cost. Often, sales projections are the most difficult and least understood aspect of business planning. Develop *reasonable* estimates of sales projections, cost of goods and fixed cost. Use industry benchmarks and talk to your KSBDC consultant on how to get that information. Develop projections that are neither overly inflated nor overly conservative.

5.2 **Monthly Statement of Cash Flows — Year One**
Think of this spreadsheet as a checkbook for your business. This will account for the cash sales expenses, not the accounting or "book" expenses. It will also include principle payments to debts and any cash withdrawals that the owner may take. Most importantly, the cash flow statement will show the timing of when cash is going out and coming into the business and help you plan to remain cash positive.

5.3 **Monthly Balance Sheets — Year One**
Balance sheets track the assets, liabilities and equity of a business. The information on this spreadsheet is commonly used by bankers and investors to calculate financial ratios (benchmarks) that will be used to evaluate your business.

5.4 **Break-Even Analysis**
Often called a sensitivity analysis, or "what if" analysis, this spreadsheet will show exactly where the "break-even" point is regarding sales and expenses. This is a very useful tool to determine the amount of risk in a project and the margin of error built into your projections.

5.5 **List of Critical Assumptions**
It is important to explain exactly what assumptions you have made while building your financial model. Clearly identify *everything* that you have assumed. Do not expect the reviewer of your business plan to know how you arrived at each number in the preceding financial statements.

5.6 **Monthly or Quarterly Income Statements — Years Two and Three**
Unless your business is seasonal, many bankers and investors may prefer to see quarterly estimates for years two and three simply due to the fact that projections become less reliable in future years. Be sure to include any key elements that may affect your sales or expenses, such as additional employees, new locations, etc.

5.7 **Monthly or Quarterly Statements of Cash Flows — Years Two and Three**

5.8 **Monthly or Quarterly Balance Sheets – Years — Years Two and Three**

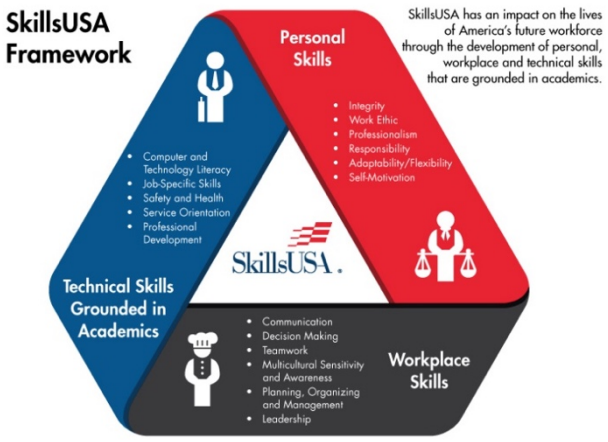
5.9 **Ratio Analysis**
Include a sheet of common financial ratios (profitability, inventory management, efficiency, etc.) for your business and compare those financial ratios to similar businesses or industry standards from Robert Morris Associates (RMA), Standard & Poor's or other resources.

ENTR 6.0 — SUPPORTING DOCUMENTS (Appendix)

6.1 Include applicable documentation, including:

a. Résumés of key team members
b. Letters of intent
c. Copies of contracts/leases
d. Articles of organization/ incorporation/partnership agreements
e. Details of your market research data, including industry trends, research on key competitors, demographic data, etc.
f. Key details of your marketing plan
g. Summarized tables of research/ marketing surveys
h. Assumptions for your financial projections, industry benchmarks, information about your competitors, etc.
i. Other appropriate documentation

ENTR 7.0 — SkillsUSA Framework



The SkillsUSA Framework is used to pinpoint the Essential Elements found in Personal Skills, Workplace Skills, and Technical Skills Grounded in Academics. Students will be expected to display or explain how they used some of these Essential Elements. Please reference the graphic above, as you may be scored on specific elements applied to your project. For more, visit: www.skillsusa.org/about/skillsusa-framework/.

Committee Identified Academic Skills

The technical committee has identified that the following academic skills are embedded in this contest.

Math Skills

- Use fractions to solve practical problems
- Use proportions and ratios to solve practical problems
- Simplify numerical expressions
- Solve practical problems involving percentages
- Solve single variable algebraic expressions
- Construct three-dimensional models Make predictions using knowledge of probability
- Make comparisons, predictions and inferences using graphs and charts
- Organize and describe data using matrices
- Analyze and provide sample order forms and bid forms that use multiple formulas
- Estimate the startup cost of a business
- Estimate operating expenses
- Calculate operation expenses
- Calculate sales projections
- Establish and use a record-keeping system
- Examine costs to produce marketable goods and services
- Calculate and provide pricing of good and services
- Calculate pricing options that better market good and services

Science Skills

- Describe factors that influence how populations change over time
- Describe and recognize solids, liquids and gases
- Describe characteristics of types of matter based on physical and chemical properties
- Use knowledge of physical properties (shape, density, solubility, odor, melting point, boiling point, color)
- Use knowledge of chemical properties (acidity, basicity, combustibility, reactivity)

Language Arts Skills

- Provide information in conversations and in group discussions
- Provide information in oral presentations
- Demonstrate use of such verbal communication skills as word choice, pitch, feeling, tone and voice
- Demonstrate use of such nonverbal communication skills as eye contact, posture and gestures using interviewing techniques to gain information
- Analyze mass media messages
- Demonstrate comprehension of a variety of informational texts
- Use text structures to aid comprehension
- Identify words and phrases that signal an author's organizational pattern to aid comprehension
- Understand source, viewpoint and purpose of texts
- Organize and synthesize information for use in written and oral presentations
- Demonstrate knowledge of appropriate reference materials
- Use print, electronic databases and online resources to access information in books and articles
- Demonstrate narrative writing
- Demonstrate expository writing

- Demonstrate persuasive writing
- Demonstrate informational writing
- Edit writing for correct grammar, capitalization, punctuation, spelling, sentence structure and paragraphing
- Use organizational flow charts

Connections to National Standards

State-level academic curriculum specialists identified the following connections to national academic standards.

Math Standards

- Numbers and operations
- Algebra
- Measurement
- Data analysis and probability
- Problem solving
- Communication
- Connections
- Representation

Source: NCTM Principles and Standards for School Mathematics. For more information, visit: http://www.nctm.org.

Science Standards

- Understands the nature of scientific inquiry
- Understands the scientific enterprise

Source: McREL compendium of national science standards. To view and search the compendium, visit: http://www2.mcrel.org/compendium/browse.asp.

Language Arts Standards

- Students adjust their use of spoken, written and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes
- Students employ a wide range of strategies as they write and use different writing process elements appropriately to communicate with different audiences for a variety of purposes
- Students apply knowledge of language structure, language conventions (e.g., spelling and punctuation), media techniques, figurative language and genre to create, critique and discuss print and non-print texts
- Students use spoken, written and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion and the exchange of information)

Source: IRA/NCTE Standards for the English Language Arts. To view the standards, visit: www.ncte.org/standards.

First Aid/CPR

Purpose
To evaluate each contestant's ability to react positively in simulated situations demanding First Aid and CPR intervention and to recognize excellence and professionalism in the career and technical student's first aid skills.

First, download and review the General Regulations at: http://updates.skillsusa.org.

Eligibility
Open to all active SkillsUSA members enrolled in a health care related program.

Clothing Requirement
Class B: Healthcare Attire
For both men and women: Official blue scrubs; white socks or skin-tone seamless hose; health-professional's white leather work shoes. Shoes must be all-white leather (no canvas), completely enclosed (no open-toe or open-heel). Athletic-style shoes that meet the aforementioned criteria are acceptable. Scrubs should fit appropriately for all health contests and should be properly hemmed and wrinkle free. Only plain, white, collarless t-shirts may be worn underneath the scrubs. Hair must be pinned up and off the collar.

Jewelry: Only one stud or small hoop in each ear is allowed. Postsecondary contestants may wear a wedding band as long as it doesn't contain a stone. If it does, the band must be taped. No facial or tongue rings are permitted.

All visible tattoos (including those on hands, arms and necks) must be covered.

Note: Contestants must wear their official contest clothing to the contest orientation meeting.

Equipment and Materials
1. Supplied by the technical committee:
   a. All information needed to react to scenarios
   b. Supplies commonly found in the situation(s) described
2. Supplied by the contestant:
   a. A copy of current certifications at orientation in CPR/AED two-man system and First Aid from any of the following organizations: the American Red Cross, American Heart Association, American Health and Safety Institute or the National Safety Council
   b. Competitors should bring their own face mask.
   c. All competitors must create a one-page résumé and submit a hard copy to the technical committee chair at orientation. Failure to do so will result in a 10-point penalty. Check the website for further instructions.

   Note: Your contest may also require a hard copy of your résumé as part of the actual contest. Check the Contest Guidelines and/or the updates page on the SkillsUSA website at http://updates.skillsusa.org.

   Note: No textbooks are allowed in the testing area.

Observer Rule
Observers will be allowed to view the scenarios as the contestants participate, provided there is space available. Talking or gesturing by the observers may result in disqualification of the contestant. Observers will not be permitted to communicate with contestants in the holding/assembly area.

Scope of the Contest
Knowledge Performance
There will be one written knowledge test. Maximum points for the written knowledge test will be 12 percent of the total score.

Skill Performance

All skills demonstrated will be based on nationally accepted standards as identified by the American Red Cross, American Heart Association, National Safety Council and American Safety and Health Institute.

Contest Guidelines

Contestants will demonstrate their ability to perform procedures or take appropriate action based on scenarios presented related to those listed in the Standards and Competencies.

Standards and Competencies

CPR 1.0 — Contestants will demonstrate competency to proficiently perform procedures or take appropriate action based on scenarios presented related to the following topic areas:

CPR 2.0 — CPR with AED for Adult

2.1 Demonstrate skills in performing CPR with AED including two-man system

CPR 3.0 — CPR for Child

3.1 Demonstrate skills in performing CPR for child

CPR 4.0 — CPR for Infant

4.1 Demonstrate skills in performing CPR for infant

CPR 5.0 — Choking Victim: Conscious/Unconscious Adult

5.1 Demonstrate skills in performing choking emergencies for conscious/unconscious adult

CPR 6.0 — Choking Victim: Conscious/Unconscious Child

6.1 Demonstrate skills in performing choking emergencies for conscious/unconscious child

CPR 7.0 — Choking Victim: Conscious/Unconscious Infant

7.1 Demonstrate skills in performing choking emergencies for conscious/unconscious infant

CPR 8.0 — Sudden Illness: Seizures/Diabetics

8.1 Demonstrate skills in performing interventions and care for seizures/diabetic emergencies

CPR 9.0 — Injuries to Muscles, Bones and Joints (e.g., dislocations; fractures; sprains and strains; head, neck and back injuries)

9.1 Demonstrate care dealing with muscle, bone and joint injuries

CPR 10.0 — Bleeding/Wound Care

10.1 Demonstrate care/control dealing with bleeding/wound care

CPR 11.0 — Burn Care

11.1 Demonstrate care for first-, second- and third-degree burns

CPR 12.0 — SkillsUSA Framework

The SkillsUSA Framework is used to pinpoint the Essential Elements found in Personal Skills, Workplace Skills, and Technical Skills Grounded in Academics. Students will be expected to display or explain how they used some of these Essential Elements. Please reference the graphic above, as you may be scored on specific elements applied to your project. For more, visit: www.skillsusa.org/about/skillsusa-framework/.

Resources

- American Heart Association — for Healthcare Providers and ACLS Courses
- American Red Cross — First Aid/CPR/AED BLS (Basic Life Support)

- American Safety and Health Institute — Basic First Aid
- American Safety and Health Institute — CPR/AED two-man system
- National Safety Council — Basic First Aid and CPR/AED
- OSHA National Health and Safety Guidelines

Committee Identified Academic Skills

The technical committee has identified that the following academic skills are embedded in this contest.

Math Skills

None Identified

Science Skills

- Use knowledge of cell theory
- Use knowledge of patterns of cellular organization (cells, tissues, organs, systems)
- Describe basic needs of organisms
- Describe behaviors in animal populations
- Use knowledge of reproduction and transmission of genetic information
- Describe characteristics of types of matter based on physical and chemical properties
- Use knowledge of physical properties (shape, density, solubility, odor, melting point, boiling point, color)
- Use knowledge of chemical properties (acidity, basicity, combustibility, reactivity)
- Understand Law of Conservation of Matter and Energy
- Describe and identify physical changes to matter
- Describe and identify nuclear reactions (products of fusion and fission and the effect of these products on humans and the environment)
- Predict chemical changes to matter (types of reactions, reactants and products; and balanced equations)
- Use knowledge of potential and kinetic energy
- Use knowledge of mechanical, chemical and electrical energy
- Use knowledge of heat, light and sound energy
- Use knowledge of speed, velocity and acceleration
- Use knowledge of Newton's laws of motion
- Use knowledge of work, force, mechanical advantage, efficiency and power

Language Arts Skills

- Provide information in conversations and in group discussions
- Demonstrate use of such verbal communication skills as word choice, pitch, feeling, tone and voice
- Demonstrate use of such nonverbal communication skills as eye contact, posture and gestures using interviewing techniques to gain information
- Demonstrate comprehension of a variety of informational texts
- Use text structures to aid comprehension
- Demonstrate knowledge of appropriate reference materials
- Use print, electronic databases and online resources to access information in books and articles

Connections to National Standards

State-level academic curriculum specialists identified the following connections to national academic standards.

Math Standards

- Geometry
- Measurement
- Problem solving

Source: NCTM Principles and Standards for School Mathematics. For more information, visit: http://www.nctm.org.

Science Standards

- Understands the principles of heredity and related concepts
- Understands the structure and function of cells and organisms
- Understands relationships among organisms and their physical environment
- Understands the sources and properties of energy
- Understands forces and motion
- Understands the nature of scientific inquiry

Source: McREL compendium of national science standards. To view and search the compendium, visit: http://www2.mcrel.org/compendium/browse.asp.

Language Arts Standards

- Students apply a wide range of strategies to comprehend, interpret, evaluate and appreciate texts. They draw on their prior experience, their interactions with other readers and writers, their knowledge of word meaning and of other texts, their word identification strategies and their understanding of textual features (e.g., sound-letter correspondence, sentence structure, context, graphics)
- Students adjust their use of spoken, written and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes
- Students employ a wide range of strategies as they write and use different writing process elements appropriately to communicate with different audiences for a variety of purposes
- Students use a variety of technological and information resources (e.g., libraries, databases, computer networks, video) to gather and synthesize information and to create and communicate knowledge
- Students use spoken, written and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion and the exchange of information)

Source: IRA/NCTE Standards for the English Language Arts. To view the standards, visit: www.ncte.org/standards.

Health Knowledge Bowl

Purpose
To test the knowledge of a team of contestants preparing for employment in the health occupations field and to recognize outstanding students for excellence and professionalism.

First, download and review the General Regulations at: http://updates.skillsusa.org.

Eligibility (Team of 4)
Open to a team of four SkillsUSA members enrolled in a program with a health career as the occupational objective.

Clothing Requirement
Class A: SkillsUSA Official Dress
For men: Official SkillsUSA blazer or jacket, black dress slacks, white dress shirt, plain black tie with no pattern (or SkillsUSA black tie), black socks, black shoes
For women: Official SkillsUSA blazer or jacket; black dress skirt (knee-length) or black slacks; plain business-like white, collarless blouse (or white blouse with small, plain collar that may not extend onto the lapels of the blazer); black sheer or skin-tone hose; black shoes

These regulations refer to clothing items that are pictured and described at: www.skillsusastore.org. If you have questions about clothing or other logo items, call 800-401-1560 or 703-956-3723.

Note: Contestants must wear their official contest clothing to the contest orientation meeting.

Equipment and Materials
1. Supplied by the technical committee:
   a. A number of sample questions are available for download from the same site from which these guidelines were obtained. These questions and answers are designed to give you examples of the types of questions that will be developed for the actual contest, not as a study guide.
2. Supplied by the team:
   a. 60 sheets of 8½"x11" white blank paper
   b. 8½"x11" blank colored paper for use as scrap paper
   c. Pens, pencils and black marking pens (four to six of each)
   d. All competitors must create a one-page résumé and submit a hard copy to the technical committee chair at orientation. Failure to do so will result in a 10-point penalty.

   Note: Your contest may also require a hard copy of your résumé as part of the actual contest. Check the Contest Guidelines and/or the updates page on the SkillsUSA website at http://updates.skillsusa.org.

   ***Note*:** No notes or reference materials of any kind will be permitted in the contest room.

Observer Rule
There will be no spectators allowed in the contest room.

Scope of the Contest
Core standards from the National Health Care Core Skill Standards Project make up the categories from which questions are developed for the Health Knowledge Bowl contest.

Knowledge Performance
A written knowledge test will be administered during the contestant briefing. This test will be completed as a team. The score from the written test will not be announced but will be added to the final total score. Content for the written exam is based upon the standards identified by the National Health Care Core Skill Standards Project.

Skill Performance
Teams will demonstrate communication skills, teamwork, problem-solving and time-management skills by determining and presenting the answer to each question presented during the quiz bowl portion of the contest.

Contest Guidelines

1. General

a. A state may enter one high school team and one college/postsecondary team comprised of four registered members each. The team may perform with three members without penalty in the event a member fails to show up or is forced to withdraw within five days of the competition.
b. The contest will be four quarters consisting of 12 questions per quarter.
c. A break will be announced at the end of the second quarter. At no time will a contestant be allowed to talk with an advisor or spectator during the contest.
d. Contestants will discard all paper before leaving the contest area.
e. Mobile devices, cell phones, recording devices, and smart watches or other items deemed hazardous to the integrity of the contest are grounds for disqualification.

2. Scoring

a. Each team will begin each quarter with 0 points.
b. A team may choose to answer the question or not answer the question.
c. If the team does not answer the question (signified by remaining seated) it will will neither gain nor lose points.
d. If a team chooses to answer and is correct, it will be awarded 10 points. If a team chooses to answer and is incorrect, 10 points will be deducted.
e. The judges will make the scores visible to all teams before the start of each quarter.
f. Score discrepancies must be addressed by the team captain prior to the next question.
g. A written test will be administered during the contestant briefing. This test will be completed as a team. The score from the written test will not be announced but will be added to the final total score.
h. The winning team is that team which has accumulated the highest total points (total score plus written test score, less clothing penalties).
i. In the event of a tie, the tie will be broken as follows:
    1. First tie-breaker: The team with the highest written test score.
    2. Second tie-breaker: The compiled score of team members on the Professional Development Program (PDP) test.

3. Marking Answers

a. The answer will be written on a sheet of paper. It must be written legibly and large enough to be seen by the floor judge.
b. Any team member may write the answer. He/she must complete writing the answer and then stand before time is called. No team member may stand before the writer has completed the answer.
c. If a team member is not standing prior to the end of the allotted time, the team will forfeit its chance to answer the question.
d. The question will be read once and visually displayed. The team will have 30 seconds after the question has been read to determine and write the answer. A five-second warning will be given before time is up. A team member must be standing with the answer before time is called.
e. Teams may discuss answers among themselves. Contestants are cautioned to whisper to each other so as to not be overheard by other teams.
f. Answers must be spelled correctly; spelling errors will be counted as an incorrect response.
g. The team member will display the answer when directed to do so by the judge. The reader will announce the correct answer. The floor judge will check the team answer. If correct, the scorer will add 10 points to the team's total quarter score. If incorrect, the scorer will subtract 10 points from the team's total quarter score.

4. **Judging**
   a. The judging team will make all decisions regarding score, correct answers and rule violations. The decision of the judging team will be final and will be announced by the contest chair. Disqualification may result upon repeated rule violations.
   b. A team that wishes to challenge a score or an answer must address the issue with the floor judge before the next question begins. This is signified by the captain standing and raising his or her hand prior to the next question's category being announced.
   c. It is the responsibility of all team members and advisors to know the rules of the contest.
   d. Resource books used to develop the contest questions will be provided for the judges' reference if needed.

Standards and Competencies

Core standards from the National Health Care Core Skill Standards comprise the categories from which the questions will be developed for the Health Knowledge Bowl contest.

BOWL 1.0 — Answer questions from the academic foundations outlined by the National Health Care Core Skill Standards (NHCCSS) Project

1.1 Apply knowledge of human structure and function, diseases and disorders, growth and development, vital signs, nutrition and therapeutic diets, medical terminology and abbreviations, mathematical computations and English language arts to answer questions

BOWL 2.0 — Recall the knowledge of oral and written communication skills to answer questions

2.1 Identify the elements of communication skills to answer questions
2.2 Demonstrate effective written communication skills
2.3 Identify concepts of active listening
2.4 Identify concepts of verbal and nonverbal communication
2.5 Demonstrate knowledge of interviewing skills
2.6 Identify barriers to communication

BOWL 3.0 — Use knowledge gained from reading the "Health" section of *USA Today* concerning current events affecting health care to answer questions regarding systems theory and health care delivery systems

3.1 Describe systems theory and its components
3.2 Predict where and how factors such as cost, managed care, technology, an aging population, patient access to care, alternative therapies and lifestyle/behavior changes may affect various health care delivery system models
3.3 Compare and contrast elements of the different health care delivery systems
3.4 Explain the results of the health care delivery system
3.5 Discuss the evolution of the health care delivery system

BOWL 4.0 — Employ knowledge of key employability skills as they relate to the health care industry

4.1 List and explain key employability skills using examples such as dynamics of change, personal qualities, problem-solving and critical-thinking skills.
4.2 Identify elements of successful interpersonal communications such as communication strategies, listening behaviors, written communication and nomenclature.
4.3 Recall stages and elements of personal growth and development.
4.4 Explain the career decision-making process as it applies to health care

BOWL 5.0 — Know the legal responsibilities, limitations and the implications of employee actions within the health care delivery setting

5.1 Compare and contrast behaviors and practices that could result in malpractice, liability and negligence
5.2 Identify concepts of legal practice such as Patient's Bill of Rights, informed consent, scope of practice and standards of workplace safety (Occupational Safety and Health Administration/OSHA and Centers for Disease Control/CDC)
5.3 Explain the importance of maintaining client confidentiality
5.4 Describe legal requirements for documentation

BOWL 6.0 — Understand accepted ethical practices

6.1 Describe morality and ethics and the relationship of each to health care outcomes
6.2 Explain the difference between ethical and legal issues impacting health care
6.3 Demonstrate the knowledge of ethical practice such as professionalism, interdisciplinary roles, incident reporting, abuse and Patient's Bill of Rights
6.4 Demonstrate knowledge of providing care to patients from diverse religious and ethnic backgrounds
6.5 Analyze legal and ethical aspects of confidentiality

BOWL 7.0 — Describe how to implement safety practices to prevent injury or illness

7.1 Explain standard precautions as described in the rules and regulations set forth by OSHA to control the spread of infection
7.2 Discuss the principles of body mechanics and ergonomics and how they relate to personal safety in the health care industry
7.3 Describe methods of environmental safety as they apply to the health care industry
7.4 Explain common safety hazards and methods of managing them
7.5 Explain common emergency procedures and protocols

BOWL 8.0 — Understand the roles and responsibilities of health care teams and how teamwork affects the ability to provide quality health care

8.1 Characterize the elements of effective teams
8.2 Contrast the elements of effective health care teams to those of ineffective teams
8.3 Explain the value of team member participation such as inclusiveness, collaboration, conflict resolution, commitment and team identity

BOWL 9.0 — Know the fundamentals of wellness and prevention of disease processes

9.1 Describe alternative and complimentary health practices
9.2 Describe the practices that promote the prevention of injury and diseases

BOWL 10.0 — SkillsUSA Framework

The SkillsUSA Framework is used to pinpoint the Essential Elements found in Personal Skills, Workplace Skills, and Technical Skills Grounded in Academics. Students will be expected to display or explain how they used some of these Essential Elements. Please reference the graphic above, as you may be scored on specific elements applied to your project. For more, visit: www.skillsusa.org/about/skillsusa-framework/.

Committee Identified Academic Skills

The technical committee has identified that the following academic skills are embedded in this contest.

Math Skills

- Use fractions to solve practical problems
- Use proportions and ratios to solve practical problems
- Solve practical problems involving percents
- Solve problems using proportions, formulas and functions

Science Skills

- Use knowledge of patterns of cellular organization (cells, tissues, organs, systems)
- Describe the basic needs of organisms
- Use knowledge of chemical properties (acidity, basicity, combustibility, reactivity)
- Describe and use the Periodic Table—symbols, atomic number, atomic mass, chemical families (groups) and periods
- Human anatomy
- Human physiology

- Human path psychology (disease)
- Human growth and development
- Nutritional concepts
- Vital signs concepts

Language Arts Skills

- Provide information in conversations and in group discussions
- Provide information in oral presentations
- Demonstrate the use of verbal communication skills: word choice, pitch, feeling, tone and voice
- Edit writing for correct grammar, capitalization, punctuation, spelling, sentence structure and paragraphing

Connections to National Standards

State-level academic curriculum specialists identified the following connections to national academic standards.

Math Standards

- Numbers and operations
- Measurement
- Communication
- Connections
- Representation

Source: NCTM Principles and Standards for School Mathematics. For more information, visit: http://www.nctm.org.

Science Standards

- Understands the principles of heredity and related concepts
- Understands the structure and function of cells and organisms
- Understands relationships among organisms and their physical environment
- Understands biological evolution and the diversity of life
- Understands the structure and properties of matter
- Understands the sources and properties of energy
- Understands the nature of scientific knowledge

Source: McREL compendium of national science standards. To view and search the compendium, visit: http://www2.mcrel.org/compendium/browse.asp.

Language Arts Standards

- Students read a wide range of print and nonprint texts to build an understanding of texts, of themselves and of the cultures of the United States and the world; to acquire new information; to respond to the needs and demands of society and the workplace; and for personal fulfillment. Among these texts are fiction and nonfiction, classic and contemporary works
- Students apply a wide range of strategies to comprehend, interpret, evaluate and appreciate texts. They draw on their prior experience, their interactions with other readers and writers, their knowledge of word meaning and of other texts, their word identification strategies, and their understanding of textual features (e.g., sound-letter correspondence, sentence structure, context, graphics)
- Students adjust their use of spoken, written and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes
- Students employ a wide range of strategies as they write and use different writing process elements appropriately to communicate with different audiences for a variety of purposes
- Students apply knowledge of language structure, language conventions (e.g., spelling and punctuation), media techniques, figurative language and genre to create, critique and discuss print and nonprint texts
- Students conduct research on issues and interests by generating ideas and questions, and by posing problems. They gather, evaluate and synthesize data from a variety of sources (e.g., print and nonprint texts, artifacts, people) to communicate their discoveries in ways that suit their purpose and audience
- Students use a variety of technological and information resources (e.g., libraries, databases, computer networks, video) to gather and synthesize information and to create and communicate knowledge
- Students participate as knowledgeable, reflective, creative and critical members of a variety of literacy communities

- Students use spoken, written and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion and the exchange of information)

Source: IRA/NCTE Standards for the English Language Arts. To view the standards, visit: www.ncte.org/standards.

Health Occupations Professional Portfolio

Purpose
To recognize students for their successful development of a professional portfolio and to evaluate the ability of an individual to present himself or herself to an employer using effective communication skills.

First, download and review the General Regulations at: http://updates.skillsusa.org.

Clothing Requirement
Class A: SkillsUSA Official Dress
For men: Official SkillsUSA blazer or jacket, black dress slacks, white dress shirt, plain black tie with no pattern (or SkillsUSA black tie), black socks, black shoes
For women: Official SkillsUSA blazer or jacket; black dress skirt (knee-length) or black slacks; plain business-like white, collarless blouse (or white blouse with small, plain collar that may not extend onto the lapels of the blazer); black sheer or skin-tone hose; black shoes

These regulations refer to clothing items that are pictured and described at: www.skillsusastore.org. If you have questions about clothing or other logo items, call 800-401-1560 or 703-956-3723.

Note: Contestants must wear their official contest clothing to the contest orientation meeting.

Eligibility
Open to active SkillsUSA members enrolled in a health occupations program.

Scope of the Contest
Knowledge Performance
The knowledge performance portion of this contest is the creation of a professional portfolio with title page, table of contents and six required sections in specific order.

Skill Performance
The contest includes a live presentation by the contestant designed to evaluate the ability of an individual to present himself or herself to an employer using effective communication skills.

Contest Guidelines
1. **Notebook**
   Each contestant is required to submit an official SkillsUSA three-ring, 1-inch loose-leaf binder (available from www.skillsusastore.org or 800-401-1560). Photographs, news articles, illustrations and other informative material may be included to support and enhance written evidence of the contestant's participation in activities as described in the notebook. Pages must be limited to 25 (50 surfaces). Divider pages **do not** count toward maximum number of pages allowed.

   Notebook must include the following, presented in the order given:
   a. Title Page — include name of contestant, name of school, grade, training program and a picture of contestant
   b. Table of Contents with page numbers
   c. Components of an Employment Portfolio
      1. **Résumé and Career Objectives**
         Prepare a current résumé. The student should include a written statement, describing his or her career objective and plans to achieve that objective and competencies that have been mastered. All competitors must also submit a hard copy of the résumé to the technical committee chair at orientation. Failure to do so will result in a 10-point penalty.

2. **References**
   Letters of reference from teachers, mentors, supervisors, employers or others who can verify the student's skill ability (limit of three references).
3. **Awards and Recognition**
   Include copies of certificates, documentation of leadership activities, news articles and supporting material to serve as proof of the student's achievements. Reflect the highest level of achievement.
4. **Work Sample Documentation**
   Summary of work site experiences pertaining to health occupations. Students should distinguish project documentation that is a result of school-based learning versus work-based learning. Work experience can be supported with photographs as appropriate.
5. **Community Service**
   List of activities conducted that provided a benefit to the community. This section should demonstrate excellence and professionalism in the area of community service.
6. **Membership and Affiliations**
   List of organizations and community groups in which the student is actively involved.

2. **Presentation**
   Students should be prepared to make a five- to seven-minute oral presentation on their portfolio to the judges. Contestants should anticipate answering questions from the judges. Students are strongly encouraged to use current multimedia technology. This could include (but is not limited to) video, audio or computer-generated presentations in software such as PowerPoint. A computer, projector and screen will be provided. If you plan to use this equipment, make sure to have the presentation on a flash or jump drive.
3. **Judging**
   Notebooks will be submitted on Tuesday of the National Leadership and Skills Conference during orientation. The notebooks will be returned to the contestant at the end of the live presentation. The judges will be permitted to have the notebooks during the presentation. Contestants must report to the contest area at the designated time with all equipment necessary for their presentation. Students will be required to stay until they are dismissed by the judges.

Standards and Competencies

HOPP 1.0 — Create a portfolio notebook that effectively describes health occupation skills attained and meets the structural guidelines established by the contest technical committee

1.1 Write a title page that includes the contestant's name, school, grade, training program and picture
1.2 List each section and corresponding page numbers in a table of contents
1.3 Include all components as identified by the technical committee

HOPP 2.0 — Create and deliver a five- to seven-minute oral presentation on the submitted portfolio that meets the presentation guidelines established by the contest technical committee

2.1 Make a formal and effective introduction to the speech
2.2 Demonstrate an effective and pleasing delivery style
2.3 Communicate the primary points of the presentation in a compact and complete manner
2.4 Effectively use verbal illustrations and examples to explain technical information
2.5 Use a variety of verbal techniques including: modulation of voice, changing volume, varied inflection, modifying tempo and verbal enthusiasm
2.6 Demonstrate poise and self-control while presenting
2.7 Demonstrate good platform development and personal confidence
2.8 Tie organizational elements together with an effective ending
2.9 Complete the speech within the time limits set by contest requirements
2.10 Respond to questions from judges following the presentation

2.11 Use current multimedia technology when applicable
   2.11.1 Provide any necessary audiovisual presentation equipment needed for the presentation
2.12 Present in attire that meets national requirements for competition

HOPP 3.0 — SkillsUSA Framework

The SkillsUSA Framework is used to pinpoint the Essential Elements found in Personal Skills, Workplace Skills, and Technical Skills Grounded in Academics. Students will be expected to display or explain how they used some of these Essential Elements. Please reference the graphic above, as you may be scored on specific elements applied to your project. For more, visit: www.skillsusa.org/about/skillsusa-framework/.

Committee Identified Academic Skills

The technical committee has identified that the following academic skills are embedded in this contest.

Math Skills

None Identified

Science Skills

None Identified

Language Arts Skills

- Provide information in conversations and in group discussions
- Provide information in oral presentations
- Demonstrate use of verbal communication skills: word choice, pitch, feeling, tone and voice
- Demonstrate use of nonverbal communication skills: eye contact, posture and gestures using interviewing techniques to gain information
- Organize and synthesize information for use in written and oral presentations
- Use print, electronic databases and online resources to access information in books and articles

Connections to National Standards

State-level academic curriculum specialists identified the following connections to national academic standards.

Math Standards

- Problem solving
- Communication
- Connections
- Representation

Source: NCTM Principles and Standards for School Mathematics. For more information, visit: http://www.nctm.org.

Science Standards

- Understands the nature of scientific inquiry
- Understands the scientific enterprise

Source: McREL compendium of national science standards. To view and search the compendium, visit: http://www2.mcrel.org/compendium/browse.asp.

Language Arts Standards

- Students adjust their use of spoken, written and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes
- Students employ a wide range of strategies as they write and use different writing process elements appropriately to communicate with different audiences for a variety of purposes
- Students apply knowledge of language structure, language conventions (e.g., spelling and punctuation), media techniques, figurative language and genre

to create, critique and discuss print and nonprint texts
- Students conduct research on issues and interests by generating ideas and questions and by posing problems. They gather, evaluate and synthesize data from a variety of sources (e.g., print and nonprint texts, artifacts, people) to communicate their discoveries in ways that suit their purpose and audience
- Students use a variety of technological and information resources (e.g., libraries, databases, computer networks, video) to gather and synthesize information and to create and communicate knowledge
- Students use spoken, written and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion and the exchange of information)

Source: IRA/NCTE Standards for the English Language Arts. To view the standards, visit: www.ncte.org/standards.

MEDICAL MATH

PURPOSE
To evaluate the students' ability to understand and solve mathematical problems commonly used in the various health care settings.

First, download and review the General Regulations at: http://updates.skillsusa.org.

ELIGIBILITY
Open to active SkillsUSA members enrolled in a health care science technology program.

CLOTHING REQUIREMENT
Class A: SkillsUSA Official Dress
For men: Official SkillsUSA blazer or jacket, black dress slacks, white dress shirt, plain black tie with no pattern (or SkillsUSA black tie), black socks, black shoes
For women: Official SkillsUSA blazer or jacket; black dress skirt (knee-length) or black slacks; plain business-like white, collarless blouse (or white blouse with small, plain collar that may not extend onto the lapels of the blazer); black sheer or skin-tone hose; black shoes

For both men and women: Official blue scrubs; white socks or skin-tone seamless hose; health-professional's white leather work shoes. Shoes must be all-white leather (no canvas), completely enclosed (no open-toe or open-heel). Athletic-style shoes that meet the aforementioned criteria are acceptable.

These regulations refer to clothing items that are pictured and described at: www.skillsusastore.org. If you have questions about clothing or other logo items, call 800-401-1560 or 703-956-3723.

Note: Contestants must wear their official contest clothing to the contest orientation meeting.

EQUIPMENT AND MATERIALS
1. Supplied by the technical committee:
   a. Test problems and instructions
   b. Scratch paper and pencils
2. Supplied by the contestant:
   a. Basic hand-held calculator (no graphing or scientific calculators [with fraction keys] will be permitted)
   b. All competitors must create a one-page résumé and submit a hard copy to the technical committee chair at orientation. Failure to do so will result in a 10-point penalty.

   Note: Your contest may also require a hard copy of your résumé as part of the actual contest. Check the Contest Guidelines and/or the updates page on the SkillsUSA website at http://updates.skillsusa.org.

   ***Note*:** No reference materials may be brought into the contest area.

SCOPE OF CONTEST
1. The test questions will be taken from problems encountered in the medical field and are selected from the area that might be used in real world applications. Contestants will demonstrate their ability to solve math problems that deal with the following areas:
   a. Measurements including vital signs, temperature conversions, and height and weight
   b. Metric and household measurements
   c. Conversions
   d. Ratio and proportion
   e. Percentage
   f. Intake and output
   g. Roman numerals
   h. Dosage calculations
2. The test will comprise 100 or more problems that will allow contestants the opportunity to use their problem-solving skills as well as their mathematical ability.
3. The contestants will have two hours to complete the test. No bonus points will be given for early completion of the test, and no contestant will be allowed to go in or out of the testing site during the testing.

Suggested references: "Standardized Medical Abbreviations"

Medical Abbreviations

The following list is to be used as a reference ***prior*** to the competition, but it is ***not*** allowed in the contest area.

This list of terms and abbreviations is a sample of abbreviations taken from *Diversified Health Occupations* (Simmers, Louise). Please use that reference for other abbreviations related to medical math that could be used in the contest.

Term	Abbreviation
millimeter	mm
centimeter	cm
meter	m
foot/feet	ft
inch	in
gram	G
milligram	mg
microgram	mcg
kilogram	kg
pound	lb
ounce	oz
degrees Fahrenheit	°F
degrees Celsius (Centigrade)	°C
cubic centimeter	cc
milliliter	ml or mL
liter	L
unit	U
pint	pt
quart	qt
gallon	gal
tablespoon	tbsp
teaspoon	tsp
drop or drops	gtt or gtts
minim	minim
dram	dr
milliequivalent	mEq
grain	gr
intravenous	IV
tablet	tab
capsule	cap
suspension	susp
intake and output	I & O

Conversion Chart

(To be used as reference prior to the competition but not allowed in the contest area.)

Length

1 meter = 100 centimeters = 1,000 millimeters
10 millimeters = 1 centimeter

Weight

1 gram = 1,000 milligrams
1 milligram = 1,000 micrograms
1 kilogram = 1,000 grams
1 grain = 60 milligrams

Volume for Solids

1,000 cubic millimeters = 1 cubic centimeter
1,000 cubic centimeters = 1 cubic decimeter
1,000 cubic decimeters = 1 cubic meter

Volume for Fluids

1 liter = 1,000 milliliters
1 milliliter = 1 cubic centimeter
10 centiliters = 1 deciliter
10 deciliters = 1 liter

Weight Conversion

1 kilogram = 2.2 pounds
1 pound = 16 ounces
1 ounce = 0.028 kilograms

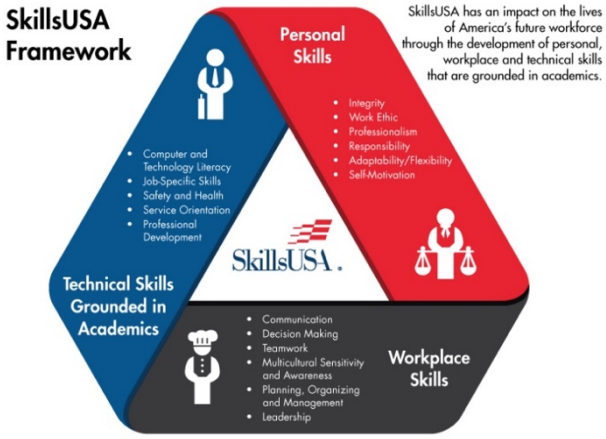
Temperature Conversion

°C = (°F-32) 5/9 or 0.5556
°F = (°C) 9/5 or 1.8 + 32

Metric/Household Equivalents (Note: 1 cc = 1 mL)

1 cc or 1 mL	15 gtts (drops)
5 mL or cc	1 tsp (teaspoon)
15 mL or cc	1 tbsp (tablespoon)
30 mL or cc	1 oz. (ounce)
240 mL or cc	1 cup (8 oz.)
500 mL or cc	1 pt (pint) (16 ounces)
1,000 mL or cc	1 qt (quart) (32 ounces)
1 meter	39.37 inches (3.281 feet)
0.914 meters	3 feet (1 yard)
0.3048 meters	12 inches (1 foot)
2.54 centimeters	1 inch

Standards and Competencies
MM 1.0 — SkillsUSA Framework



The SkillsUSA Framework is used to pinpoint the Essential Elements found in Personal Skills, Workplace Skills, and Technical Skills Grounded in Academics. Students will be expected to display or explain how they used some of these Essential Elements. Please reference the graphic above, as you may be scored on specific elements applied to your project. For more, visit: www.skillsusa.org/about/skillsusa-framework/.

MEDICAL TERMINOLOGY

PURPOSE
To evaluate the knowledge of medical terminology and abbreviations of an individual preparing for employment in the health occupation field and to recognize outstanding students for excellence and professionalism.

First, download and review the General Regulations at: http://updates.skillsusa.org.

ELIGIBILITY
Open to active SkillsUSA members enrolled in programs that include medical terminology as a component.

CLOTHING REQUIREMENT
Class A: SkillsUSA Official Dress
For men: Official SkillsUSA blazer or jacket, black dress slacks, white dress shirt, plain black tie with no pattern (or SkillsUSA black tie), black socks, black shoes
For women: Official SkillsUSA blazer or jacket; black dress skirt (knee-length) or black slacks; plain business-like white, collarless blouse (or white blouse with small, plain collar that may not extend onto the lapels of the blazer); black sheer or skin-tone hose; black shoes

These regulations refer to clothing items that are pictured and described at: www.skillsusastore.org. If you have questions about clothing or other logo items, call 800-401-1560 or 703-956-3723.

Note: Contestants must wear official contest clothing to the contest orientation meeting. Scrubs are not acceptable attire for this contest.

EQUIPMENT AND MATERIALS
1. Supplied by the technical committee:
   a. All necessary information and furnishings for judges and technical committee
2. Supplied by the contestant:
   a. No. 2 pencil
   b. All competitors must create a one-page résumé and submit a hard copy to the technical committee chair at orientation. Failure to do so will result in a 10-point penalty.

   Note: Your contest may also require a hard copy of your résumé as part of the actual contest. Check the Contest Guidelines and/or the updates page on the SkillsUSA website at http://updates.skillsusa.org.

SCOPE OF THE CONTEST
Core standards from the medical terminology portion of the National Health Care Core Skills Standards Project make up the category from which questions are developed for the Medical Terminology contest.

Knowledge Performance
This contest involves successful completion of a written medical terminology knowledge test. Content for the test is based on the Core Standards from the National Health Care Core Skills Standards Project.

Skills Performance
Contestants will demonstrate knowledge of medical word roots, prefixes, suffixes, medical word building and medical abbreviations by successfully answering the questions.

Standards and Competencies

MT 1.0 — Exhibit knowledge of accepted medical word roots used in the health care industry
1.1 Demonstrate knowledge of the fundamental word roots used to build medical terms
1.2 Identify common word roots used for each body system

1.3 Demonstrate the use of common word roots used in disease pathology
1.4 Identify word roots used for diagnostic procedures

MC 2.0 — Exhibit knowledge of accepted medical prefixes used in the health care industry

2.1 Identify and give the meaning of selected prefixes that pertain to position or placement, numbers and amounts, and those that are descriptive and used in general
2.2 Demonstrate the use of common prefixes used in disease pathology
2.3 Identify prefixes used for diagnostic procedures

MT 3.0 — Exhibit knowledge of accepted medical suffixes used in the health care industry

3.1 Identify and give the meaning of selected suffixes that pertain to pathologic conditions
3.2 Identify suffixes used in diagnostic procedures
3.3 Identify suffixes used in surgical procedures and those that are used in general

MT 4.0 — Exhibit knowledge of accepted medical abbreviations used in the health care industry

4.1 Identify and give the meaning of selected prefixes that pertain to position or placement, numbers and amounts, and those that are descriptive and used in general
4.2 Identify and give the meaning of selected suffixes that pertain to pathologic conditions, those used in diagnostic and surgical procedures, and those that are used in general

MT 5.0 — SkillsUSA Framework

The SkillsUSA Framework is used to pinpoint the Essential Elements found in Personal Skills, Workplace Skills, and Technical Skills Grounded in Academics. Students will be expected to display or explain how they used some of these Essential Elements. Please reference the graphic above, as you may be scored on specific elements applied to your project. For more, visit: www.skillsusa.org/about/skillsusa-framework/.

Committee Identified Academic Skills

The technical committee has identified that the following academic skills are embedded in this contest.

Math Skills

None Identified

Science Skills

- Understands the principles of heredity and related concepts
- Identify the organ systems of the human body and the major components of each system
- Understand the basic function of the human body systems
- Understand the processes of pathology of the human body systems

Language Arts Skills

- Demonstrate comprehension of a variety of formal and informal texts
- Demonstrate knowledge of appropriate reference material
- Understand source, viewpoint and purpose of texts
- Organize and synthesize information for use in written presentations
- Demonstrate knowledge of appropriate reference material

Connection to National Standards

State-level academic curriculum specialists identified the following connections to national academic standards.

Math Standards

None Identified

Science Standards

- Understands the principles of heredity and related concepts
- Understands the structure and function of cells and organisms
- Understands biological evolution and the diversity of life
- Understands the structure and properties of matter
- Understands the nature of scientific knowledge

Source: McREL compendium of national science standards. To view and search the compendium, visit: http://www2.mcrel.org/compendium/browse.asp.

Language Arts Skills

- Students apply a wide range of strategies to comprehend, interpret, evaluate, and appreciate texts. They draw on their prior experience, their interactions with other readers and writers, their knowledge of word meaning and of other texts, their word identification and strategies and their understanding of textual features (e.g., sound letter correspondence, sentence structure, context, graphics)
- Students use a variety of technological and information resources (e.g., libraries, databases, computer networks, video) to gather and synthesize information and to create and communicate knowledge
- Students use spoken, written and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion and the exchange of information)

Source: IRA/NCTE Standards for the English Language Arts. To view the standards, visit: www.ncte.org/standards.

PRINCIPLES OF ENGINEERING

PURPOSE
To evaluate each contestant's understanding of basic technical concepts/principles of the applied sciences and their ability to demonstrate and explain the concept/principle in action and application.

First, download and review the General Regulations at: http://updates.skillsusa.org.

ELIGIBILITY
The contest is open to all active SkillsUSA members either presently enrolled in or having completed the Project Lead the Way principles of engineering course, the principles of technology physics course or an equivalent applied physics course in career and technical education. Contestants may enter from any course of study skill area.

CLOTHING REQUIREMENT
Class A: SkillsUSA Official Dress
For men: Official SkillsUSA blazer or jacket, black dress slacks, white dress shirt, plain black tie with no pattern (or SkillsUSA black tie), black socks, black shoes.
For women: Official SkillsUSA blazer or jacket; black dress skirt (knee-length) or black slacks; plain business-like white, collarless blouse (or white blouse with small, plain collar that may not extend onto the lapels of the blazer); black sheer or skin-tone hose; black shoes.

These regulations refer to clothing items that are pictured and described at: www.skillsusastore.org. If you have questions about clothing or other logo items, call 800-401-1560 or 703-956-3723.

Note: Contestants must wear their official contest clothing to the contest orientation meeting.

EQUIPMENT AND MATERIALS
1. Supplied by the technical committee:
   a. Timekeeper
   b. 8'x12' space, a 30"x72" table and one 110-volt (15 amp) electrical outlet
2. Supplied by the contestant:
   a. Contestants are required to bring five copies of the discussion paper to the contestant orientation meeting
   b. All materials and equipment required for the demonstration
   c. If electricity is required, contestant must have a 20-foot heavy-duty extension cord
   d. All competitors must create a one-page résumé and submit a hard copy to the technical committee chair at orientation. Failure to do so will result in a 10-point penalty.

   Note: Your contest may also require a hard copy of your résumé as part of the actual contest. Check the Contest Guidelines and/or the updates page on the SkillsUSA website at http://updates.skillsusa.org.

SCOPE OF THE CONTEST
Knowledge Performance
There is no written knowledge test for this contest. Instead, a paper will be prepared and presented in this contest.

Skill Performance
The second portion of the contest is a technical demonstration where the knowledge, underlying theories, and applications of the chosen principle(s) in action and application will be demonstrated.

Contest Guidelines
1. Present a technical demonstration of (a) chosen principle(s) of technology. Demonstrate the principle(s) in theory and/or application and leave the judges with a clear comprehension of the subject unit or sub-unit from principles of technology.
2. Answer questions and discuss the application of the principle(s) with the judges.

3. Any technical concept may be demonstrated, provided it is related to physics, can be referenced to the course curriculum, and incorporates basic principles of applied physics. If any hazardous or caustic materials are used, contestants must bring the associated Material Safety Data Sheet(s) (MSDS) to the contestant meeting and present five copies along with the five copies of the discussion paper for committee review.
4. The recitation of curriculum experiments is not, in and unto itself, sufficient to meet the requirements of the contest. Thorough research and in-depth treatment of the subject matter will be required to comply with the requirements of the contest and to be competitive. Imagination and innovation will be expected by the judges.
5. Any visual aids (signs, charts, transparencies, slides, diagrams) are to be prepared by the contestants. Professionally prepared visual materials are not permitted. No sound device of any kind may be used to transmit or amplify audible words unless they are integral to the technical demonstration itself. No compressed air, gas or flammable liquid may be used.
6. The contestant will use his or her contestant number only and will not mention his or her school, city or state.
7. The Principles of Engineering contest is an individual performance event. However, others can assist to set up and/or tear down the demonstration. Only students can be used as models or props in the demonstration.
8. Discussion paper — The contestant will prepare and present to the contest chair five copies of a discussion paper in accordance with the following requirements.
    a. The discussion paper shall include subjects (such as background, history, development, explanation of the theory, applications, examples, methods of demonstration or benefits) to be addressed to the extent appropriate to present a clear explanation and demonstrate the contestant's understanding of the subject.
    b. The discussion paper must be typed, one-and-a-half- or double-spaced in 10- or 12-point type, must have 1-inch margins on all sides and must be four to eight pages long. Each page (except the cover) is to have a one-up page number at the bottom of the page. *The cover page will not be counted in the page count; however, all tables, graphs, pictures and illustrations will be counted.*

       A cover page is required and must include the following: "(current year) Principles of Engineering Contest," and title of the technical demonstration and blanks for date, time and contestant number in the upper right-hand corner. The contestant number shall be placed in the upper right-hand corner of each page before handing in the paper.
    c. The discussion paper shall conform to the following format:
        1. Title — short, descriptive title for the technical demonstration, centered near the top of the page.
        2. Introduction — a descriptive introduction to the technical demonstration principle(s) involved, objectives of the demonstration and reason(s) for the choice.
        3. Discussion — as a minimum, include a detailed discussion of the following subject areas:
            a. The history and background of the principle(s) involved
            b. A description of the principle(s) involved and an explanation of the scientific theories embodied in the principle(s)
            c. The technical demonstration to be given: how it will be conducted, what will be shown and how it relates to the subject matter
            d. Practical applications of the principle (or principles) involved, including past, present and/or future
            e. Provide examples of demonstrations of the principle(s) that are possible or in existence, but are not practical for the contest

f. Cite the particular unit and/or sub-unit in Principles of Technology curriculum that is the basis for this technical demonstration

4. Summary — present a concluding discussion of the principle(s) to be demonstrated, what the demonstration will have achieved, relevance to the practical world and any concluding remarks or conclusions.

d. A bibliography shall be included with the discussion paper to properly credit reference sources. Footnotes are required in the text to credit specific references. All bibliography and footnote information shall be included at the end of the paper. Formatting is at the discretion of the contestant; however, complete credit and reference data is mandatory. Page numbers such as "B1" will be used for the bibliography and footnote section but will not be included in the page count.

9. Technical demonstration — The contestant shall prepare and present a technical demonstration to a panel of judges in accordance with the following requirements. The purpose of the technical demonstration is for the contestants to demonstrate thorough knowledge and awareness of the history, underlying theories, descriptive knowledge and applications of the chosen principle(s) in action and application. The contestants shall be prepared to present their demonstrations three times. Exhibition of the contestants' demonstrations to the general public will be required, but not scored.
10. Contestants will be allowed five minutes to set up the demonstration and five minutes to clear the demonstration room. Penalty: Five points will be deducted for each 30 seconds or fraction thereof over the five-minute setup or clearing times.

    Each presentation of the technical demonstration to the judges shall be at least 10 minutes in length and shall not exceed 15 minutes in length. Penalty: Five points will be deducted for each 30 seconds or fraction thereof under 10 minutes or over 15 minutes in length. The timekeeper will indicate elapsed time of the demonstration at the 10-, 13- and 15-minute points.

    Setup time will begin when the contestant indicates readiness to set up by handing to the lead judge a 3"x5" card containing the title of the technical demonstration and the contestant number. The demonstration time will begin when the contestant indicates readiness and will stop when the contestant indicates that the technical demonstration has ended. The tear-down time will be timed from the end of the question and answer period until the contestant indicates completion to the lead judge.
11. A question and answer period will be allowed at the conclusion of each demonstration to permit the contest judges to query the contestants and further evaluate the contestants' understanding of the demonstrated principle. Questions by the judges may cover any aspect of a contestant's chosen principle(s) as presented in the discussion paper or technical demonstration. **This question and answer period is not to exceed 10 minutes in length.**

Standards and Competencies

PT 1.0 — Integrate knowledge of basic physics principles into technical writing and presentations following the guidelines the contest technical committee has established

1.1 Apply physics knowledge in the areas of force, work, rate, resistance, energy, power, force transformers, momentum, waves and vibrations, energy converters, transducers, radiation, optical systems and time constraints

PT 2.0 — Construct a discussion paper focusing on the technical principle(s) selected for the contest that meets both the contest guidelines of the technical committee and the formatting guidelines established by the Modern Language Association (MLA)

2.1 Write the discussion paper to follow the formatting and grammar standards established by the MLA

2.2 Construct the content of the discussion paper to match the contest guidelines

established by the contest's technical committee

- 2.2.1 Write a short, descriptive title for the technical paper and center near the top of the page
- 2.2.2 Write a descriptive introduction to the technical demonstration that includes the principle(s) involved, the objectives of the demonstration and the reason(s) for the choice
- 2.2.3 Describe in detail the history and background of the principle(s)
- 2.2.4 Describe in detail the principle(s) involved and an explanation of the scientific theories embodied in the principle(s)
- 2.2.5 Explain thoroughly how the technical presentation will be given, how it will be conducted, what will be demonstrated and how it relates to the subject matter
- 2.2.6 Relate the practical application of the principle(s) involved, including past, present, and/or future applications of the principle(s)
- 2.2.7 Provide examples of the principle(s) that are possible or in existence, but are not practical for the contest
- 2.2.8 Cite the particular unit and/or sub-unit in Principles of Technology curriculum that is the basis for the discussion paper and presentation

2.3 Create a concluding discussion of the principle(s) to be demonstrated

- 2.3.1 Explain what the demonstration will have achieved
- 2.3.2 Identify what the relevance of the demonstration is to the practical world
- 2.3.3 Articulate any concluding remarks or conclusions

2.4 Include technical data in the discussion paper

2.5 Use equations and mathematical analysis to support findings

PT 3.0 — Effectively create and deliver a technical presentation that exhibits the knowledge and skills developed through the Principles of Technology learning curriculum that focuses on the principle(s)

3.1 Make a formal and effective introduction to the speech

3.2 Demonstrate an effective and pleasing delivery style

3.3 Communicate the primary points of the presentation in a compact and complete manner

3.4 Effectively use verbal illustrations and examples to explain technical information

3.5 Use a variety of verbal techniques including modulation of voice, changing volume, varied inflection, modifying tempo and verbal enthusiasm

3.6 Demonstrate poise and self-control while presenting

3.7 Demonstrate good platform development and personal confidence

3.8 Tie organizational elements together with an effective ending

3.9 Complete the speech within the time limits set by contest requirements

3.10 Respond to questions from judges following the presentation

PT 4.0 — SkillsUSA Framework

The SkillsUSA Framework is used to pinpoint the Essential Elements found in Personal Skills, Workplace Skills, and Technical Skills Grounded in Academics. Students will be expected to display or explain how they used some of these Essential Elements. Please reference the graphic above, as you may be

scored on specific elements applied to your project. For more, visit: www.skillsusa.org/about/skillsusa-framework/.

Committee Identified Academic Skills

The technical committee has identified that the following academic skills are embedded in this contest.

Math Skills

- Use fractions to solve practical problems
- Use proportions and ratios to solve practical problems
- Simplify numerical expressions
- Use scientific notation
- Solve practical problems involving percentages
- Solve single variable algebraic expressions
- Solve multiple variable algebraic expressions
- Measure angles
- Find surface area and perimeter of two-dimensional objects
- Find volume and surface area of three-dimensional objects
- Apply transformations (rotate or turn, reflect or flip, translate or slide, and dilate or scale) to geometric figures
- Construct three-dimensional models
- Apply Pythagorean Theorem
- Make predictions using knowledge of probability
- Make comparisons, predictions and inferences using graphs and charts
- Organize and describe data using matrices
- Graph linear equations
- Solve problems using proportions, formulas and functions
- Find slope of a line
- Use laws of exponents to perform operations
- Solve quadratic equations
- Solve practical problems involving complementary, supplementary and congruent angles
- Solve problems involving symmetry and transformation
- Use measures of interior and exterior angles of polygons to solve problems
- Find arc length and the area of a sector

Science Skills

- Plan and conduct a scientific investigation
- Use knowledge of the particle theory of matter
- Describe and recognize elements, compounds, mixtures, acids, bases and salts
- Describe and recognize solids, liquids and gases
- Describe characteristics of types of matter based on physical and chemical properties
- Use knowledge of physical properties (shape, density, solubility, odor, melting point, boiling point, color)
- Describe and use the Periodic Table — symbols, atomic number, atomic mass, chemical families (groups), and periods
- Use knowledge of classification of elements as metals, metalloids and nonmetals
- Use knowledge of potential and kinetic energy
- Use knowledge of mechanical, chemical and electrical energy
- Use knowledge of heat, light and sound energy
- Use knowledge of temperature scales, heat and heat transfer
- Use knowledge of sound and technological applications of sound waves
- Use knowledge of the nature and technological applications of light
- Use knowledge of speed, velocity and acceleration
- Use knowledge of Newton's laws of motion
- Use knowledge of work, force, mechanical advantage, efficiency and power
- Use knowledge of simple machines, compound machines, powered vehicles, rockets and restraining devices
- Use knowledge of principles of electricity and magnetism
- Use knowledge of static electricity, current electricity and circuits
- Use knowledge of magnetic fields and electromagnets
- Use knowledge of motors and generators

Language Arts Skills

- Provide information in conversations and in group discussions
- Provide information in oral presentations
- Demonstrate use of verbal communication skills: word choice, pitch, feeling, tone and voice
- Demonstrate use of nonverbal communication skills: eye contact, posture and gestures using interviewing techniques to gain information
- Organize and synthesize information for use in written and oral presentations
- Demonstrate knowledge of appropriate reference materials
- Demonstrate narrative writing
- Demonstrate informational writing

Connections to National Standards

State-level academic curriculum specialists identified the following connections to national academic standards.

Math Standards

- Numbers and operations
- Algebra
- Geometry
- Measurement
- Data analysis and probability
- Problem solving
- Reasoning and proof
- Communication
- Connections
- Representation

Source: NCTM Principles and Standards for School Mathematics. For more information, visit: http://www.nctm.org.

Science Standards

- Understands the structure and properties of matter
- Understands the sources and properties of energy
- Understands forces and motion
- Understands the nature of scientific knowledge
- Understands the nature of scientific inquiry
- Understands the scientific enterprise

Source: McREL compendium of national science standards. To view and search the compendium, visit: http://www2.mcrel.org/compendium/browse.asp.

Language Arts Standards

- Students read a wide range of print and nonprint texts to build an understanding of texts, of themselves and of the cultures of the United States and the world; to acquire new information; to respond to the needs and demands of society and the workplace; and for personal fulfillment. Among these texts are fiction, nonfiction, classic and contemporary works
- Students apply a wide range of strategies to comprehend, interpret, evaluate and appreciate texts. They draw on their prior experience, their interactions with other readers and writers, their knowledge of word meaning and of other texts, their word identification strategies and their understanding of textual features (e.g., sound-letter correspondence, sentence structure, context, and graphics)
- Students adjust their use of spoken, written and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes
- Students employ a wide range of strategies as they write and use different writing process elements appropriately to communicate with different audiences for a variety of purposes
- Students apply knowledge of language structure, language conventions (e.g., spelling and punctuation), media techniques, figurative language and genre to create, critique, and discuss print and nonprint texts
- Students conduct research on issues and interests by generating ideas and questions and by posing problems. They gather, evaluate and synthesize data from a variety of sources (e.g., print and nonprint texts, artifacts, people) to communicate their discoveries in ways that suit their purpose and audience
- Students use a variety of technological and information resources (e.g., libraries, databases, computer networks, video) to gather and synthesize information and to create and communicate knowledge

- Students use spoken, written and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion, and the exchange of information)

Source: IRA/NCTE Standards for the English Language Arts. To view the standards, visit: www.ncte.org/standards.

Related Technical Math

Purpose
To evaluate the contestant's understanding and ability to solve mathematical problems commonly found in the skilled trades, professional and technical occupations.

First, download and review the General Regulations at: http://updates.skillsusa.org.

Eligibility
Open to active SkillsUSA members.

Clothing Requirement
Class E: Contest specific — Business Casual
For men: Official SkillsUSA white polo shirt, black dress slacks, black socks, black leather shoes.
For women: Official SkillsUSA white polo shirt with black dress skirt (knee-length) or black slacks; black socks or black or skin-tone seamless hose; black leather dress shoes.

These regulations refer to clothing items that are pictured and described at: www.skillsusastore.org. If you have questions about clothing or other logo items, call 800-401-1560 or 703-956-3723.

Note: Contestants must wear their official contest clothing to the contest orientation meeting.

Observer Rule
Observers will be allowed to view the test. No talking or gesturing with contestants or any disruptive noise will be permitted.

Equipment and Materials
1. Supplied by technical committee:
   a. Tables and chairs
   b. Test problems and instructions
   c. Scratch paper and pencils
   d. Formula sheets and conversion tables/charts
2. Supplied by the contestant:
   a. Hand-held calculator
   b. All competitors must create a one-page résumé and submit a hard copy to the technical committee chair at orientation. Failure to do so will result in a 10-point penalty.

   ***Note*:** Your contest may also require a hard copy of your résumé as part of the actual contest. Check the Contest Guidelines and/or the updates page on the SkillsUSA website at http://updates.skillsusa.org.

   Note: No reference materials may be used other than those provided by the technical committee.

Scope of the Contest
Knowledge Performance
A written knowledge test will be required. A sound knowledge of geometry, algebra, trigonometry and basic statistics will prepare the students to exhibit their problem-solving skills for this part of the contest.

Skill Performance
There is no skill performance component of this contest.

Contest Guidelines
1. The written knowledge test comprises 50 problems applicable to any career and technical field. It covers applications of the fundamental operations of whole numbers, fractions and decimals, including applications of percentages, ratio and proportion, averages, areas and volumes.
2. The written knowledge test will provide the student the opportunity to demonstrate his or her problem-solving skills, not just mathematical ability.
3. Students have two hours to complete the problems and check their answers.
4. Hand-held calculators may be used. Competitors need nothing more than a simple scientific calculator that can be purchased for about $10–$15. A graphing calculator is not necessary. The test is based on real-world mathematical

applications and reasoning — not theoretical mathematics.

5. No bonus will be given for early completion of the written knowledge test.

Standards and Competencies

RTM 1.0 — SkillsUSA Framework

The SkillsUSA Framework is used to pinpoint the Essential Elements found in Personal Skills, Workplace Skills, and Technical Skills Grounded in Academics. Students will be expected to display or explain how they used some of these Essential Elements. Please reference the graphic above, as you may be scored on specific elements applied to your project. For more, visit: www.skillsusa.org/about/skillsusa-framework/.

The remaining standards and competencies for this contest will be completed by the national technical committee in the next edition of the Technical Standards. In the meantime, visit: updates.skillsusa.org for updates.

Committee Identified Academic Skills

The technical committee has identified that the following academic skills are embedded in this contest.

Math Skills

- Use fractions to solve practical problems
- Use proportions and ratios to solve practical problems
- Simplify numerical expressions
- Use scientific notation
- Solve practical problems involving percentages
- Solve single variable algebraic expressions
- Solve multiple variable algebraic expressions
- Measure angles
- Apply Pythagorean Theorem
- Graph linear equations
- Solve problems using proportions, formulas and functions
- Find slope of a line
- Use laws of exponents to perform operations
- Solve quadratic equations
- Solve practical problems involving complementary, supplementary and congruent angles
- Solve problems involving symmetry and transformation
- Use measures of interior and exterior angles of polygons to solve problems
- Find arc length and the area of a sector

Science Skills

None Identified

Language Arts Skills

None Identified

Connections to National Standards

State-level academic curriculum specialists identified the following connections to national academic standards.

- Math Standards
- Numbers and operations
- Algebra
- Geometry
- Measurement
- Data analysis and probability
- Problem solving
- Communication
- Connections
- Representation

Source: NCTM Principles and Standards for School Mathematics. For more information, visit: http://www.nctm.org.

Science Standards

- Understands the nature of scientific inquiry

Source: McREL compendium of national science standards. To view and search the compendium, visit: http://www2.mcrel.org/compendium/browse.asp.

Language Arts Standards

None Identified

Source: IRA/NCTE Standards for the English Language Arts. To view the standards, visit: www.ncte.org/standards.

T-SHIRT DESIGN

PURPOSE
To evaluate a contestant's creative, technical and oral presentation skills and recognize outstanding students for excellence and professionalism.

First, download and review the General Regulations at: http://updates.skillsusa.org.

ELIGIBILITY
Open to active SkillsUSA members enrolled in career and technical programs.

CLOTHING REQUIREMENT
Class A: SkillsUSA Official Attire
For men: Official SkillsUSA blazer or jacket, black dress slacks, white dress shirt, plain black tie with no pattern (or SkillsUSA black tie), black socks, black shoes
For women: Official SkillsUSA blazer or jacket; black dress skirt (knee-length) or black slacks; plain businesslike white, collarless blouse (or white blouse with small, plain collar that may not extend onto the lapels of the blazer); black sheer or skin-tone hose; black shoes

These regulations refer to clothing items that are pictured and described at: www.skillsusastore.org. If you have questions about clothing or other logo items, call 800-401-1560 or 703-956-3723.

Note: Contestants must wear their official contest clothing to the contest orientation meeting.

EQUIPMENT AND MATERIALS
1. Supplied by the technical committee:
   a. Time keeper and judges
   b. All necessary information for the judges and technical committee
   c. Data projector
2. Supplied by the contestant:
   a. Rendering of the T-shirt design
   b. Supporting materials for the interview portion of the contest
   c. All competitors must create a one-page résumé and submit a hard copy to the technical committee chair at orientation. Failure to do so will result in a 10-point penalty.

   ***Note*:** Your contest may also require a hard copy of your résumé as part of the actual contest. Check the Contest Guidelines and/or the updates page on the SkillsUSA website at: http://updates.skillsusa.org.

SCOPE OF THE CONTEST
The contest consists of two parts:
1. Evaluation of the T-shirt design
2. Oral presentation and question-and-answer session. All contestants will be asked the same questions determined by the judges before the start of the contest.

Knowledge Performance
There will be no skill-related written test.

Skill Performance
The contest is designed to assess the ability of the competitor to design and produce a drawing of that design, as well as give a presentation regarding all aspects of his or her creation of the design.

Contest Guidelines
1. All entries must be rendered in color (full color or up to four color).
2. Preferably, entries will be created in a design software package such as Illustrator, Photoshop or Freehand. Entries may also be hand-drawn, painted or rendered in colored pencils or markers.
3. Artwork submission is 8"x11". The artwork should be a comprehensive design that is essentially "camera ready." There is no opportunity to "tweak" the design after it has been submitted at the contest orientation meeting.
4. The SkillsUSA emblem or SkillsUSA logo (or elements of either) should not appear on the design.
5. All copyright laws must be followed in the creation of the design.

6. T-shirt design submissions must be turned in at the contest orientation meeting.
7. Advisors need to check all designs prior to submission to ensure strict compliance with all rules.
8. The T-shirt designer must specify the color of the shirt that the artwork will be screened onto and where artwork will be placed.
9. In addition to the T-shirt background color, the designer may use up to four colors in his or her artwork. These colors are "spot colors" and may not be blended or shaded.
10. The following text must appear on the T-shirt design: "SkillsUSA (STATE NAME)" followed by the appropriate year.
11. Students will participate in an interview during the competition. They should be prepared to discuss the overall process and how they came up with their design and color scheme. They should bring all of their preliminary work (sketches, layouts, etc.) with them to the interview.
12. Contestants will present a five- to seven-minute presentation regarding their design. Talking points should include:
    a. How he or she came up with the design
    b. The process used in developing their design
    d. The design's unique qualities
    e. Why other students/advisors would want to wear it

Standards and Competencies

TD 1.0 — SkillsUSA Framework

The SkillsUSA Framework is used to pinpoint the Essential Elements found in Personal Skills, Workplace Skills, and Technical Skills Grounded in Academics. Students will be expected to display or explain how they used some of these Essential Elements. Please reference the graphic above, as you may be scored on specific elements applied to your project. For more, visit: www.skillsusa.org/about/skillsusa-framework/.

3-D Visualization and Animation

Purpose

To evaluate each contestant's preparation for employment and to recognize outstanding students for excellence and professionalism in the field of 3-D visualization and animation.

First, download and review the General Regulations at: http://updates.skillsusa.org.

Eligibility

Open to a team of two active SkillsUSA members enrolled in programs using 3-D imaging and animation as an occupational objective.

Clothing Requirement

Class E: Contest specific — Business Casual

For men: Official SkillsUSA white polo shirt, black dress slacks, black socks, black leather shoes.
For women: Official SkillsUSA white polo shirt with black dress skirt (knee-length) or black slacks; black socks or black or skin-tone seamless hose; black leather dress shoes.

These regulations refer to clothing items that are pictured and described at: www.skillsusastore.org. If you have questions about clothing or other logo items, call 800-401-1560 or 703-956-3723.

Note: Contestants must wear their official contest clothing to the contest orientation meeting.

Equipment and Materials

1. Supplied by the technical committee:
   a. Space for practical development including table space for two personal computers and two chairs
   b. 110-volt power outlet
   c. Three 24"x36" sheets for concept art and storyboard layout
   d. 64 GB USB3 drives to be available for contest practical submissions.

2. Supplied by the contestants:
   a. Two complete graphics work stations including personal computers, monitors and input devices. Contestants may use any brand or type of personal computer from any source (a hometown computer dealer may be willing to serve as a team sponsor). Software must be preloaded and configured. Contestants should test the system carefully prior to the competition. Limited technical assistance will be available at setup and on contest day. The computer hardware must meet or exceed the minimum recommended system requirements from the manufacturer of the software of choice. We strongly recommend that the minimum requirements are exceeded and recommended configurations are used whenever possible. For example, Autodesk's 3ds Max requirements can be found at this link: http://tinyurl.com/3ds-MAX-requirements-SkillsUSA
   b. Contestants may bring the software of their choice. Software package(s) must be capable of producing both 2-D and 3-D renderings and animations. ***Note:*** Proof of licensing for software programs installed on the contestants' computers must be provided to the technical committee at the pre-contest meeting.
   c. Two 6' multiple-outlet surge protectors
   d. Paper and art supplies for storyboard development to include colored pencils, two 11"x17" tablets, chalk, glue stick, charcoal and regular pencils. These supplies are subject to approval of the technical committee.
   e. Contestants may bring published reference books and software manuals. Reference materials may not take up more than $^1/_2$ cubic foot of space per team member (total of 1 cubic foot).
   f. All competitors must create a one-page résumé and submit a hard copy to the technical committee chair at orientation. Failure to do so will result in a 10-point penalty.

Note: Your contest may also require a hard copy of your résumé as part of the actual contest. Check the Contest Guidelines and/or the updates page on the SkillsUSA website at updates.skillsusa.org.

Scope of the Contest

The contest is defined by industry standards as set by the current technical standards within the industry. The contest is a two-person team event and tests technical knowledge, production skills, creative/artistic abilities and storyboarding.

Knowledge Performance

The contest will include a written exam assessing technical knowledge, production skills and creative/artistic abilities.

Skill Performance

The contest is a two-person event assessing the ability of the team to produce high-quality images and an animated short subject using 3-D computerized images. A practical visual design problem will be given, the scope of which should be viable within the seven-hour practical competition period. The problem will consist of a topic to communicate, its context and target audience, a rough script to follow, and an emotion or graphical effect that should be illuminated in the still and animated output.

Contest Guidelines

1. Preparation of the animation must include the development of a storyboard. However, in the real world the final output is of paramount importance and the storyboard only a means to that end. So, the storyboarding process will be used to judge contestants on:
    a. Teamwork skills
    b. Ability to creatively reach consensus on a design solution
    c. Ability to organize their efforts
    d. Ability to verbally and visually express ideas between team members and to the client (in this case, the judges)
2. Three to five still images from varied scenes and perspectives must be rendered with and without wireframe in 1080p resolution (1920x1080 pixels) and true color (24, 32 or 64 bits per pixel) and submitted to the judges' station on the supplied USB drive at the completion of the practical competition. Still images must be output to either: TIF(F), TGA, PNG or JPG. These images should clearly show superiority in modeling, texturing, lighting and composition.
3. Render animation at 720p resolution (1280x720 pixels) and medium color depth (16 bit) for playback (with a minimum length of 15-second/450 frames, or as specified in the practical instructions). Animation must be output to either Microsoft Movie (AVI), Macintosh Quicktime (MOV) files or MPEG-4 (MP4, M4A) and submitted to the judges' station on the supplied USB drive at the completion of the practical competition. The animation should clearly show superiority in composition, staging and the use of motion and object manipulation over time. Anticipation and scene transitions, object stretching and squashing and/or other techniques should be employed to create a sense of realism or graphic impact as defined by the visual design practical problem.
4. During the contest, the contestants will work as a team. No assistance will be given by other teams, instructors or observers. Limited technical assistance for computer or software malfunction may be given by appropriate manufacturers' representatives.
5. Teams will each be given the same amount of time to accomplish the problem. Everyone will begin at the same time and take a required lunch break, and no one will be allowed to work past the contest conclusion.
6. The technical committee reserves the right to videotape the animation.
7. The technical committee will be responsible not only for developing the practical for the competition, but also for developing the evaluation tool by which to objectively measure competitors' performance. Judging criteria will be general in nature and will be done from the completed storyboard, still images and animation. Specific criteria will be based on the demonstration of competency in those elements of design, animation and clearly depicting the theme. Emphasis in judging

will be placed on the graphical impact and effectiveness in addressing the design problem. Some areas for consideration include:

a. Planning — The storyboarding process, the degree to which the output images/animation clearly and creatively communicates the solution to the problem without the benefit of support materials
b. Modeling — Creation of 3-D objects. The degree to which the animation realistically and accurately portrays something about the problem
c. Animating — Defined motion of objects
d. Rendering — Final rendered output. A quality measured in terms of how well directions are followed in telling the story, the visual impact of the problem solution and the judges assessment of the design, revision, final editing and presentation of the design problem's solution
e. Originality — Creative techniques
f. Illustration of the theme — An overall measurement of the distinctiveness of submitted output, including the degree to which the use of technology, aesthetics, lighting and composition demonstrate development of a superior product

8. The setup, configuration and tear-down of all contestant-provided equipment will be the responsibility of the team.

Standards and Competencies

VA 1.0—Solve a problem or tell a story in a two-dimensional format

1.1 Identify previsualization and/or storyboard design techniques
- 1.1.1 Define how a problem will be solved or how a story will be told without the benefit of support materials
- 1.1.2 Describe the concept with enough artistic depth visually and verbally to allow the viewer to accurately visualize the final 3-D output

VA 2.0—Model a computer-generated object

2.1 Create three-dimensional objects using the appropriate technology
- 2.1.1 Apply geometry-deforming methods to create computer-generated models that possess shape, color, materials and surface maps
- 2.1.2 Create models that are photo-realistic, artistic and/or graphically pleasing

VA 3.0—Create a three-dimensional scene

3.1 Light, animate and render a scene, including created model(s)
- 3.1.1 Apply appropriate light and shadow to models and surfaces in a scene to convey the proper level of realism
- 3.1.2 Assign motion to objects and/or cameras in a scene
- 3.1.3 Use bones, links and other forward and inverse kinematics to create complex animation of created objects
- 3.1.4 Create cameras, with or without motion attached, to properly view a scene
- 3.1.5 Create the final rendered output of a high-quality scene to a still image or animation using appropriate rendering technology

VA 4.0—Demonstrate originality and creativity in telling the story

4.1 Create a final product that has an emotional impact on the viewer
- 4.1.1 Select aesthetically pleasing elements
- 4.1.2 Select elements that will evoke an appropriate emotional response from the viewer

VA 5.0—Demonstrate the ability to work in a team environment

5.1 Cooperate with others to achieve the solution to a problem or convey a story
- 5.1.1 Demonstrate consensus-building skills
- 5.1.2 Apply verbal and visual communication skills to convey ideas between team members and to a client

Committee Identified Academic Skills

The technical committee has identified that the following academic skills are embedded in this contest.

Math Skills

- Use fractions to solve practical problems
- Use proportions and ratios to solve practical problems
- Solve practical problems involving percentages
- Measure angles
- Apply transformations (rotate or turn, reflect or flip, translate or slide and dilate or scale) to geometric figures
- Construct three-dimensional models
- Solve problems involving symmetry and transformation

Science Skills

- Use knowledge of physical properties (shape, density, solubility, odor, melting point, boiling point, color)
- Use knowledge of the nature and technological applications of light
- Use knowledge of speed, velocity and acceleration

Language Arts Skills

- Provide information in conversations and in group discussions
- Provide information in oral presentations
- Demonstrate use of verbal communication skills: word choice, pitch, feeling, tone and voice
- Demonstrate comprehension of a variety of informational texts
- Organize and synthesize information for use in written and oral presentations
- Demonstrate knowledge of appropriate reference materials
- Demonstrate narrative writing

Connections to National Standards

State-level academic curriculum specialists identified the following connections to national academic standards.

Math Standards

- Geometry
- Measurement
- Problem solving
- Communication
- Connections
- Representation

Source: NCTM Principles and Standards for School Mathematics. NCTM Principles and Standards for School Mathematics. For more information, visit: http://www.nctm.org.

Science Standards

- Understands forces and motion
- Understands the nature of scientific inquiry

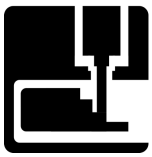
Source: McREL compendium of national science standards. To view and search the compendium, visit: http://www2.mcrel.org/compendium/browse.asp

Language Arts Standards

- Students adjust their use of spoken, written and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes
- Students use a variety of technological and information resources (e.g., libraries, databases, computer networks, video) to gather and synthesize information and to create and communicate knowledge
- Students participate as knowledgeable, reflective, creative and critical members of a variety of literacy communities
- Students use spoken, written and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion and the exchange of information)

Source: IRA/NCTE Standards for the English Language Arts. To view the standards, visit: www.ncte.org/standards.

ADDITIVE MANUFACTURING



PURPOSE

To evaluate each team's preparation for employment and to recognize outstanding students for excellence and professionalism in the field of Digital and Additive Manufacturing (AM).

Additive manufacturing embraces a wide range of materials and derivative processes building parts suitable for end-use service. The virtually unlimited design freedom enabled by additive manufacturing allows the creation of shapes and the integration of feature and function that previously required subassemblies.

Employment opportunities for creative individuals are growing while industry adopts AM methods. Ready access to workstations and service providers makes the Internet a growing marketplace for public additive manufacturing.

3D printing plays a role in nearly every industry. From teaching creativity in education to designing surgical guides in difficult medical procedures to cost savings in manufacturing, 3D printing demands of its practitioners' literacy in many areas. Contestants should expect to demonstrate their ability to use 3D CAD, design for the advantages of additive manufacturing, account for limitations of major 3D printing technologies, advocate for design choices, and use creativity to solve physical problems with real constraints.

First, download and review the General Regulations at: http://updates.skillsusa.org.

ELIGIBILITY

Open to active SkillsUSA members enrolled in Computer Aided Design classes, design classes, manufacturing, etc.

CLOTHING REQUIREMENT

Class E: Contest specific — Business Casual

For men: Official SkillsUSA white polo shirt, black dress slacks, black socks, black leather shoes.
For women: Official SkillsUSA white polo shirt with black dress skirt (knee-length) or black slacks; black socks or black or skin-tone seamless hose; black leather dress shoes.

These regulations refer to clothing items that are pictured and described at: www.skillsusastore.org. If you have questions about clothing or other logo items, call 800-401-1560 or 703-956-3723.

Note: Contestants must wear their official contest clothing to the contest orientation meeting.

EQUIPMENT AND MATERIALS

1. Supplied by the technical committee:
   a. 3D printers and post processing equipment
   b. Gloves for wash tank
   c. Post processing tools
   d. Blank engineering notebooks for teams to use during contest
2. Supplied by the contestant:
   a. Personal computer system (laptop or desktop) with a computer design system capable of rendering files in STL format. Make sure software licensing will work without an internet connection in the contest space outside of your school's location and outside of your school's normal calendar year. You may bring up to one computer per contestant or two computers per team. Only one computer is necessary to complete the contest. Stratasys, SME, and SkillsUSA are not responsible for computers or any property left overnight in the competition space.
   b. GrabCAD Print software downloaded to computer for contestant to use at contest. Software available for download at this link: https://grabcad.com/print. This software will be used during the contest. Contestants should download

and familiarize themselves with this software before contest.

c. New and empty USB Drive for transferring competition files (including .print, .txt, STL files). The USB Drive must be clearly labeled with team identification (number and letter). ID must be on the outside of USB drive, must not be able to fall off, and clearly visible to the naked eye.
d. Calipers
e. Needle nose pliers
f. Pencil or pen in engineering notebook
g. Sandpaper
h. All competitors must create a one-page résumé and submit a hard copy to the technical committee chair at orientation. Failure to do so will result in a 10-point penalty.

***Note*:** Your contest may also require a hard copy of your résumé as part of the actual contest. Check the Contest Guidelines and/or the updates page on the SkillsUSA website at updates.skillsusa.org.

SCOPE OF THE CONTEST

Knowledge Performance

The exam taken during the SkillsUSA National Additive Manufacturing Contest will be the Additive Manufacturing Fundamentals Certification Exam at this link: http://www.sme.org/certified-additive-manufacturing-fundamentals/.

This exam is being given at no additional cost to the students because they have earned a spot competing at the national level. The certification in Additive Manufacturing Fundamentals is the first and only certification validating an individual's knowledge of industry-standard concepts in additive manufacturing, based on revisions to the Additive Manufacturing Body of Knowledge by the Additive Manufacturing Leadership Initiative (AMLI) in 2016.

This certification was developed by Tooling U-SME and is co-sponsored by America Makes. If a passing score of 70 percent or higher is achieved, the contestant will earn the Additive Manufacturing Fundamentals Certification. This certification does not expire.

Please review our exam preparation tips at: http://www.sme.org/examtips/ to increase chances of certification. This is an open-book and open-notes exam. Sharing of books, notes and other materials during the exam is not permitted. Use of the Internet to search for answers is strictly prohibited during the exam and will result in your exam being terminated.

If you are using an eBook version of the recommended reading, it is required that you use a second device to avoid any interruptions during your online exam. A second device can be an additional laptop, iPad, tablet, kindle or smartphone. Please note that internet usage is not allowed during your exam

Please see the Additive Manufacturing Fundamentals Certification Recommended Review Books (www.sme.org/amreading) and Additive Manufacturing Fundamentals Certification Body of Knowledge PDF (www.sme.org/uploadedFiles/Certified_Additive_Manufacturing/additive-BOK.pdf) for additional information to aid in preparation.

Skill Performance

1. This contest will be a team-oriented event. Teams will be comprised of two contestants from the same school in the same division. The contest will consist of:
   a. 3D design that demonstrates thoughtful design for additive manufacturing and solves a given problem under given constraints to be printed onsite.
   b. 3D printing "mini challenge" designed to quickly test the contestants' knowledge of 3-D printing
   c. Engineering notebook documenting design process for challenges during contest
   d. Evaluation from judges.

2. The contest will focus on real-world challenges of an individual and build on each team's understanding of:
   a. Physical, functional, and performance characteristics or specifications that uniquely identify a component or

device and determine its interchangeability in a system
   b. Material properties (material specifications will be provided

3. Final designs will demonstrate an ability to:
   a. Design for integration into an existing process
   b. Adapt to an existing design/interface

Contest Guidelines

1. The first design challenge will focus on use of moving parts, model and support material usage, build size, print time and functionality. Software to virtually estimate print time and material usage can be accessed using GrabCAD Print.

   Moving parts that rotate freely must be part of the design. The design will show the benefits of additive manufacturing by incorporating complex geometric features. The geometry of the design must be defined within a three-dimensional (3D), computer design system capable of rendering files in STL and .print format. Stratasys will print designs from the first design challenge during the contest.

   The competition will use Stratasys FDM 3-D Printers. Stratasys FDM 3-D Printers build parts by extruding a model material along with a dissolvable support material. The support material is used to fill in negative spaces in the part that is being built. This allows for complex geometries and moving parts. At the end of the build, the support material is dissolved away.

   Notes about the use of support material: If you would like support material to fill in a space to achieve moving parts or a negative space in your design, you must leave an opening of at least 0.023".

   Process considerations:
   - Self-supporting angles are 45 degrees.
   - More support means longer build time because the machine takes time to switch from model to support on each layer.
   - Air gap for freedom of movement in parts ≥ 0.023".
   - How the file is oriented to be built will affect the amount of support material being used and the overall time of the build.
   - See http://www.stratasys.com/3d-printers/technologies/fdm-technology/faqs for additional information about the printers being used during the contest.

2. The mini challenge given during the contest will emphasize other additive manufacturing principles and benefits, such as rapid prototyping and design modification to an existing part.

3. Teams will present and turn in to the judges their engineering notebooks. Notebooks should include all areas of the scoring rubric provided on the day of the competition, such as: concept description, specifications, dimensional drawings, design tree (flow chart), considerations of design for 3-D, finishing aspects that impact design, and mistakes/lessons learned.

4. Engineering notebook and designs from the contest, in printed form as well as in 3-D design software, will be presented to the judges. Teams can use a simple PowerPoint to show screen shots of the design process to complement their engineering notebook. The PowerPoint (PowerPoint not a requirement) and engineering notebook will guide the conversation with judges. Be prepared to answer questions about designs and process.

5. Items on which contestants will be evaluated:
   - Design Challenge
   - Mini Challenge
   - Engineering Notebook
   - Presentation
   - Knowledge Exam

Standards and Competencies

ADMFG 1.0 — Design sketch and plan machine work to U.S. National CAD Standards

1.1 Create CAD file for manufacturing using standard CAD terminology and standard practice
1.2 Initiate manufacturing documentation process
1.3 Export a CAD file to .stl format
1.4 Process engineering change orders

ADMFG 2.0 — Preform and inspect part(s) using a Total Quality Management process

2.1 Verify part(s) to provided standards
2.2 Verify part(s) to ECO standards
2.3 Document process of verification and inspection

ADMFG 3.0 — Demonstrate safety practices in a working situation to the related duty tasks of the National Institute for Metalworking Skills (NIMS) Duties and Standards

3.1 Carry out assigned responsibilities while adhering to safe practices in accordance with OSHA requirements and guidelines
3.2 Document safety activities as required

ADMFG 4.0 — Provide an accurate quotation given an automated manufacturing technology simulated scenario

4.1 Solve various solutions to the process that is involved in quoting a job in a rapid prototyping environment

Committee Identified Academic Skills

The technical committee has identified that the following academic skills are embedded in this contest.

Math Skills

- Numbers and operations
- Algebra
- Geometry
- Measurement
- Problem Solving
- Reasoning and proof
- Communication
- Connections
- Representation
- Use fractions to solve practical problems
- Use proportions and ratios to solve practical problems
- Simplify numerical expressions
- Solve single variable algebraic expressions
- Solve multiple variable algebraic expressions
- Measure angles
- Use scientific notation
- Find surface area and perimeter of two-dimensional objects
- Construct three-dimensional models
- Apply Pythagorean Theorem
- Make predictions using knowledge of probability
- Solve problems using proportions, formulas and functions
- Find slope of a line
- Solve practical problems involving complementary, supplementary and congruent angles
- Solve problems involving symmetry and transformation

Science Skills

- Use knowledge of the particle theory of matter
- Describe characteristics of types of matter based on physical and chemical properties
- Use knowledge of physical properties (shape, density, solubility, odor, melting point, boiling point, color)
- Use knowledge of classification of elements as metals, metalloids and nonmetals
- Describe and identify physical changes to matter
- Predict changes to matter (types of reactions, reactants, and products; and balanced equations)
- Use knowledge of potential and kinetic energy
- Use knowledge of Newton's laws of motion
- Use knowledge of work, force, mechanical advantage, efficiency and power
- Use knowledge of simple machines, compound machines, powered vehicles, rockets and restraining devices

Language Arts Skills

- Provide information in conversations and in group discussions
- Demonstrate comprehension of a variety of informational texts
- Use text structures to aid comprehension
- Organize and synthesize information for use in written and oral presentations
- Demonstrate knowledge of appropriate reference materials
- Demonstrate use of such verbal communication skills as word choice, pitch, feeling, tone and voice
- Demonstrate use of such nonverbal communication skills as eye contact, posture and gestures using interviewing techniques to gain information
- Demonstrate informational writing
- Edit writing for correct grammar, capitalization, punctuation, spelling, sentence structure and paragraphing

Connections to National Standards

State-level academic curriculum specialists identified the following connections to national academic standards.

Math Standards

- Numbers and operations
- Algebra
- Geometry
- Measurement
- Data analysis and probability
- Problem solving
- Reasoning and proof
- Communication
- Connections
- Representation

Source: NCTM Principles and Standards for School Mathematics. NCTM Principles and Standards for School Mathematics. For more information, visit: http://www.nctm.org.

Science Standards

- Understands the structure and properties of matter
- Understands the sources and properties of energy
- Understands forces and motion
- Understands the nature of scientific inquiry

Source: McREL Compendium of National Science Standards. To view and search the compendium, visit: http://www2.mcrel.org/compendium/browse.asp.

Language Arts Standards

- Students apply a wide range of strategies to comprehend, interpret, evaluate and appreciate texts. They draw on their prior experience, their interactions with other readers and writers, their knowledge of word meaning and of other texts, their word identification strategies, and their understanding of textual features (e.g., sound-letter correspondence, sentence structure, context, graphics)
- Students adjust their use of spoken, written and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes
- Students apply knowledge of language structure, language conventions (e.g., spelling and punctuation), media techniques, figurative language and genre to create, critique and discuss print and nonprint texts
- Students use a variety of technological and information resources (e.g., libraries, databases, computer networks, video) to gather and synthesize information and to create and communicate knowledge
- Students participate as knowledgeable, reflective, creative and critical members of a variety of literacy communities
- Students use spoken, written and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion, and the exchange of information)

Source: IRA/NCTE Standards for the English Language Arts. To view the standards, visit: www.ncte.org/standards.

ADVERTISING DESIGN

PURPOSE
To evaluate each contestant's preparation for employment and to recognize outstanding students for excellence and professionalism in the field of advertising design.

First, download and review the General Regulations at: http://updates.skillsusa.org.

ELIGIBILITY
Open to active SkillsUSA members enrolled in programs with advertising design or commercial art as the occupational objective.

CLOTHING REQUIREMENT
Class E: Contest specific — Business Casual
For men: Official SkillsUSA white polo shirt, black dress slacks, black socks, black leather shoes.
For women: Official SkillsUSA white polo shirt with black dress skirt (knee-length) or black slacks; black socks or black or skin-tone seamless hose; black leather dress shoes.

These regulations refer to clothing items that are pictured and described at: www.skillsusastore.org. If you have questions about clothing or other logo items, call 800-401-1560 or 703-956-3723.

Note: Contestants must wear their official contest clothing to the contest orientation meeting.

These regulations refer to clothing items that are pictured and described at: www.skillsusastore.org. If you have questions about clothing or other logo items, call 800-401-1560 or 703-956-3723.

Note: Contestants must wear their official contest clothing to the contest orientation meeting.

EQUIPMENT AND MATERIALS
1. Supplied by the technical committee:
   a. Drawing tables and stools
   b. Illustration board and repro material
   c. Clip art and reference artwork (no outside clip art will be allowed)
2. Supplied by the contestant:
   a. Computers of choice with RAM to run industry standard software; compatible monitor, keyboard and mouse; and external storage device and CD and/or jump drive/disk
   b. Software (Check Championships update annually at for announcement of software choice. Industry standard software packages include QuarkXpress, PageMaker, InDesign, PhotoShop, Illustrator and FreeHand. CorelDraw may be used if the aforementioned programs are not available)
   c. Competitors may bring a scanner to scan in their own illustrations, as well as draw and scan in hand-drawn work. A scanner is not required but may be used for this purpose alone. Use of a scanner will be strictly prohibited during the computer mechanical portion of the competition
   d. Assortment of graphite pencils
   e. Colored pencils and/or markers
   f. Fine-point black markers (e.g., Sharpie)
   g. Paper that is appropriate to the medium in which the student will be working (e.g., marker paper or visualizer pad)
   h. Triangle, compass or French curve as needed by student for drawing purposes
   i. A ruler at least 12" long
   j. Small T square for drawing appropriately sized thumbnail or rough boxes
   k. Pencil sharpener
   l. Tape for securing paper to table if the student will be using a T square
   m. Erasers
   n. Students may bring with them whatever items they feel they need to visually express their creative ideas
   o. All competitors must create a one-page résumé and submit a hard copy to the technical committee chair at

orientation. Failure to do so will result in a 10-point penalty.

Note: Your contest may also require a hard copy of your résumé as part of the actual contest. Check the Contest Guidelines and/or the updates page on the SkillsUSA website at updates.skillsusa.org.

Scope of the Contest

The contest is defined by industry standards as set by the current industry technical committee. The contest will be divided into three parts: general knowledge test, re-creation of a developed advertisement and a creative design challenge. The theme, size, product and number of colors for each of the skilled components will be standardized.

Knowledge Performance

The contest will include a written exam assessing general knowledge of advertising design. Definitions, file types, processes and procedures relevant to advertising design will be assessed. Written portions may also exist during the skills portion of the contest.

Skill Performance

The skill performance portion of the contest will be divided into two parts: design an existing advertisement and a design challenge.

Contest Guidelines

1. The first part of the contest requires a redesign of an existing advertisement using contest-supplied software.
2. The second part of the contest is a creative section presenting contestants with a design challenge to complete in the time allotted. All three stages of the creative process must be followed: thumbnails, roughs and the comprehensive stage. Contestants will create their design solutions both by hand and on the computer.
3. The theme, size, product and number of colors will be standardized. Indication of headlines, body copy and logo art for the comprehensive may be lifted from the repro sheets supplied by the technical committee.
4. Contestants will not be allowed to use any reference materials that are not supplied by the technical committee.

Standards and Competencies

ADV 1.0 — Understand general advertising design industry terminology and concepts

1.1 Define, explain and describe various concepts related to typography, elements of design, digital images, artwork and the printing process

ADV 2.0 — Demonstrate mechanical skills by re-creating a given advertisement/design on the computer within a specified amount of time

2.1 Recall understanding and skills necessary to prepare art and copy for reproduction electronically
- 2.1.1 Implement correct size and orientation of advertisement or design

2.2 Recall knowledge and appropriate use of industry standard hardware and software
- 2.2.1 Implement correct size and placement of elements
- 2.2.2 Implement correct use of typography
- 2.2.3 Implement assignment of proper color to elements

ADV 3.0 — Administer creative skills by solving a graphic design problem relevant to the skill set required for the advertisement/design industry

3.1 Apply understanding and skills necessary to create a variety of thumbnails and ideas for a given design problem
- 3.1.1 Implement correct number, size, scaling and color requirements of thumbnails as defined by the technical committee
- 3.1.2 Implement media (markers, color pencils, etc.) in the creation of thumbnails
- 3.1.3 Demonstrate professional presentation and technical execution of thumbnails

3.2 Apply understanding and skills necessary to create roughs developed from thumbnails for the given design problem
- 3.2.1 Implement correct number, size, scaling and color requirements of

thumbnails as defined by the technical committee

3.2.2 Exhibit the development of ideas from the thumbnail stage

3.2.3 Implement media (markers, color pencils, etc.) in the creation of roughs

3.2.4 Demonstrate professional presentation and technical execution of roughs

3.3 Administer industry standard hardware and software in the creation of the comprehensive portion of the contest

3.3.1 Implement correct size and format for the design of the comprehensive portion of the contest

3.3.2 Exhibit the development of ideas from the rough stage

3.3.3 Implement clip art, original art and designs in the creation of the comprehensive

3.4.4 Demonstrate professional presentation and technical execution of the comprehensive

ADV 4.0 — Create an Adobe Acrobat PDF file of the creative and mechanical designs developed

4.1 Create an Adobe Acrobat PDF file of the creative design developed

4.2 Create an Adobe Acrobat PDF file of the mechanical design developed

Committee Identified Academic Skills

The technical committee has identified that the following academic skills are embedded in this contest.

Math Skills

- Use fractions to solve practical problems
- Use proportions and ratios to solve practical problems
- Simplify numerical expressions
- Solve practical problems involving percentages
- Solve single variable algebraic expressions
- Solve multiple variable algebraic expressions
- Measure angles
- Find surface area and perimeter of two-dimensional objects
- Find volume and surface area of three-dimensional objects
- Apply transformations (rotate or turn, reflect or flip, translate or slide, and dilate or scale) to geometric figures
- Construct three-dimensional models
- Solve problems using proportions, formulas and functions
- Take measurements with a ruler

Science Skills

None Identified

Language Arts Skills

- Analyze mass media messages
- Demonstrate comprehension of a variety of informational texts
- Use print, electronic databases and online resources to access information in books and articles
- Demonstrate narrative writing
- Demonstrate expository writing
- Demonstrate persuasive writing
- Demonstrate informational writing
- Edit writing for correct grammar, capitalization, punctuation, spelling, sentence structure and paragraphing

Connections to National Standards

State-level academic curriculum specialists identified the following connections to national academic standards.

Math Standards

- Numbers and operations
- Algebra
- Geometry
- Measurement
- Data analysis and probability
- Problem solving
- Communication
- Connections
- Representation

Source: NCTM Principles and Standards for School Mathematics. For more information, visit: http://www.nctm.org.

Science Standards

None Identified

Source: McREL compendium of national science standards. To view and search the compendium, visit: http://www2.mcrel.org/compendium/browse.asp.

Language Arts Standards

- Students read a wide range of print and nonprint texts to build an understanding of texts, of themselves and of the cultures of the United States and the world; to acquire new information; to respond to the needs and demands of society and the workplace; and for personal fulfillment. Among these texts are fiction and nonfiction, classic and contemporary works
- Students apply a wide range of strategies to comprehend, interpret, evaluate and appreciate texts. They draw on their prior experience, their interactions with other readers and writers, their knowledge of word meaning and of other texts, their word identification strategies and their understanding of textual features (e.g., sound-letter correspondence, sentence structure, context, graphics)
- Students adjust their use of spoken, written and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes
- Students apply knowledge of language structure, language conventions (e.g., spelling and punctuation), media techniques, figurative language and genre to create, critique and discuss print and nonprint texts
- Students conduct research on issues and interests by generating ideas and questions and by posing problems. They gather, evaluate and synthesize data from a variety of sources (e.g., print and nonprint texts, artifacts, people) to communicate their discoveries in ways that suit their purpose and audience
- Students use a variety of technological and information resources (e.g., libraries, databases, computer networks and video) to gather and synthesize information and to create and communicate knowledge
- Students participate as knowledgeable, reflective, creative and critical members of a variety of literacy communities
- Students use spoken, written and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion and the exchange of information)

Source: IRA/NCTE Standards for the English Language Arts. To view the standards, visit: www.ncte.org/standards.

ARCHITECTURAL DRAFTING

PURPOSE

To evaluate each contestant's preparation for employment and to recognize outstanding students for excellence and professionalism in the field of architectural drafting.

First, download and review the General Regulations at: http://updates.skillsusa.org.

ELIGIBILITY

Open to active SkillsUSA members enrolled in programs with architectural drafting as the occupational objective.

CLOTHING REQUIREMENT

Class E: Contest specific — Business Casual

For men: Official SkillsUSA white polo shirt, black dress slacks, black socks, black leather shoes.
For women: Official SkillsUSA white polo shirt with black dress skirt (knee-length) or black slacks; black socks or black or skin-tone seamless hose; black leather dress shoes.

These regulations refer to clothing items that are pictured and described at: www.skillsusastore.org. If you have questions about clothing or other logo items, call 800-401-1560 or 703-956-3723.

Note: Contestants must wear their official contest clothing to the contest orientation meeting.

EQUIPMENT AND MATERIALS

1. Supplied by the technical committee:
   a. The architectural drafting work station will consist of a table with a work area, space for reference material and a personal computer and a chair.
   b. 110-volt electrical outlet
   c. Output hardware: plotter or printer
   d. Drafting paper/vellum
   e. All necessary information and furnishings for judges and technical committees
2. Supplied by the contestant:
   a. PC-type computer, monitor and input devices. Computers may be obtained from any source. To have access to the most current technology, contestants and their schools are encouraged to develop a relationship with a hometown computer/software dealer who can serve as a contestant sponsor. It is advisable to have active virus-protection software on the contestant's computer.
   b. Removable data storage device (flash drive) or recordable CD
   c. Architectural software of choice. Proof of licensing for every software program installed on the contestant's computer must be provided to the technical committee at the contestant orientation meeting. School-owned computers must be set up to operate the software of choice independent of the school's network.
   d. Students may bring published reference books, tables and software manuals. Reference materials must not take up more than one cubic foot of space and may not be shared between contestants. Legal PDF copies of textbooks may be allowed if resident to the student's computer hard drive and approved by the technical committee.
   e. Typical personal drafting supplies desired for board drafting and freehand sketching subject to the approval of the technical committee
   f. Battery-operated calculator
   g. Multi-receptacle power strip
   h. Students choosing to use board drafting equipment must bring their own drawing board, equipment and drafting supplies.
   i. All competitors must create a one-page résumé and submit a hard copy to the technical committee chair at orientation. Failure to do so will result in a 10-point penalty.

Note: Your contest may also require a hard copy of your résumé as part of the actual contest. Check the Contest Guidelines

and/or the updates page on the SkillsUSA website at http://updates.skillsusa.org.

Note: The setup configuration and the tear-down of all contestant-provided equipment will be the responsibility of the contestant.

Scope of the Contest

Knowledge Performance

The contest will include a written knowledge test assessing general knowledge of architecture and drafting. Written portions may also exist during the skills portion of the contest. Knowledge of terms and principles used in the architecture profession will be required for the skill demonstration portion of the contest.

Skill Performance

The contest will assess skill performance by providing a hand sketch and computer-generated problem that may be solved using either board drafting or CAD.

Contest Guidelines

1. Preparation of drawings will include proper dimensions and line type selection according to current drafting standards.
2. During the contest, the contestants will work independently; no assistance from other contestants, instructors or observers is allowed.
3. Limited technical assistance for computer or software malfunction may be given by appropriate manufacturers' representatives or members of the technical committee.
4. Contestants will each be given the same amount of time to accomplish the problem. Everyone will begin at the same time and take the required lunch break, and no one will be allowed to work past the contest conclusion. (Additional time may be granted for equipment malfunction.)
5. Each contestant will be responsible for establishing plotting procedures at the computer and for plotting his or her work to a plot file on a USB flash drive. Students must have a program on their computer to allow them to plot to a PDF if the program of choice does not allow this plotting option.
6. Criteria to evaluate skill performance are general in nature and will be done from plotted drawings, manual drawings and sketches. Specific criteria will be based on the demonstration of competency in those elements of accuracy and productivity included in the contest problem.
7. Competencies to be demonstrated may be selected from the Standards and Competencies below.

Standards and Competencies

AD 1.0 — Demonstrate understanding of terms and principles used in the architectural profession

1.1 Define and use terms commonly used in the architectural profession

1.2 Explain the application of geometric objects to building materials

- 1.2.1 Define the characteristics of an equilateral triangle and its application to architecture
- 1.2.2 Define the characteristics of an isosceles triangle and its application to architecture
- 1.2.3 Define the characteristics of a square and its application to architecture
- 1.2.4 Define the characteristics of a parallelogram and its application to architecture
- 1.2.5 Define the characteristics of an equilateral triangle and its application to architecture
- 1.2.6 Define the characteristics of a hexagon and its application to architecture
- 1.2.7 Define the characteristics of an octagon and its application to architecture
- 1.2.8 Define the characteristics of a circle and its application to architecture

AD 2.0 — Interpret and apply conventional General Drafting Standards to architectural drafting situations

2.1 Define function of each line in the Alphabet of Lines

2.2 Explain the graphical characteristics of each line

- 2.2.1 Visible/Object Lines: Thick solid lines that represent visible edges

or contours of the part. Visible lines of floor plans are medium thickness (0.6mm)

2.2.2 Hidden Lines: Hidden lines should always touch where the visible feature starts or ends (0.3mm). Hidden lines may be omitted from drawings for clarity purposes

2.2.3 Section Lines: Section lines represent the area of the part that would be cut in a section view (0.3mm)

2.3 Explain orthographic elevation projection

2.3.1 Architecturally, views are referred to as elevations

2.3.2 Roof plan is the top view and front elevation is the front view, etc.

2.3.3 Elevations are oriented on site with reference to true north or building north

2.4 Explain the terms and definitions used in detail drawings, working drawings and drafting

2.5 Define and describe the components that comprise architectural drawings

2.5.1 Necessary multiviews

2.5.2 Dimensional information

2.5.3 Specified materials

2.5.4 Revision block, title block and sheet size

2.5.5 Drafter/reviewer names

2.5.6 Enlarged views and sections showing detail

2.5.7 General notes with construction information

2.5.8 Schedules: doors, windows and room finishes

2.6 Define and describe the components that comprise architectural construction (working) drawings

AD 3.0 — Develop a set of working drawings from a provided scenario with provided materials using competencies identified for drafting certification by the American Design Drafting Association

3.1 Produce multiview drawings with lines, curves, surfaces, holes, fillets, rounds, chamfers, run outs and ellipses

3.2 Use standard drafting techniques to create section views to improve the visualization of new designs

3.3 Clarify multiview drawings and facilitate the dimensioning of drawings

3.4 Summarize and apply the principles and procedures for adding size information to a drawing according to standard dimensioning practices

3.5 Draw and label site plans, floor plans, foundation plans, plumbing plans, mechanical plans, electrical plans and landscaping plans with elevations, sections, details, schedules and necessary multiviews

Committee Identified Academic Skills

The technical committee has identified that the following academic skills are embedded in this contest.

Math Skills

- Use fractions to solve practical problems
- Use proportions and ratios to solve practical problems
- Simplify numerical expressions
- Solve practical problems involving percents
- Solve single variable algebraic expressions
- Solve multiple variable algebraic expressions
- Measure angles
- Find surface area and perimeter of two-dimensional objects
- Find volume and surface area of three-dimensional objects
- Construct three-dimensional models
- Apply Pythagorean Theorem
- Make predictions using knowledge of probability
- Make comparisons, predictions and inferences using graphs and charts
- Organize and describe data using matrixes
- Graph linear equations
- Solve problems using proportions, formulas and functions
- Find slope of a line
- Solve practical problems involving complementary, supplementary and congruent angles
- Solve problems involving symmetry and transformation
- Use measures of interior and exterior angles of polygons to solve problems

Science Skills

- Describe and recognize solids, liquids and gases
- Describe characteristics of types of matter based on physical and chemical properties
- Use knowledge of physical properties (shape, density, solubility, odor, melting point, boiling point, color)
- Use knowledge of classification of elements as metals, metalloids and nonmetals
- Use knowledge of mechanical, chemical and electrical energy
- Use knowledge of heat, light and sound energy
- Use knowledge of temperature scales, heat and heat transfer
- Use knowledge of sound and technological applications of sound waves
- Use knowledge of simple machines, compound machines, powered vehicles, rockets and restraining devices
- Use knowledge of principles of electricity and magnetism
- Use knowledge of static electricity, current electricity and circuits
- Use knowledge of motors and generators

Language Arts Skills

- Provide information in conversations and in group discussions
- Demonstrate use of such verbal communication skills as word choice, pitch, feeling, tone and voice
- Demonstrate use of such nonverbal communication skills as eye contact, posture and gestures using interviewing techniques to gain information
- Analyze mass media messages
- Demonstrate comprehension of a variety of informational texts
- Use text structures to aid comprehension
- Identify words and phrases that signal an author's organizational pattern to aid comprehension
- Understand source, viewpoint and purpose of texts
- Organize and synthesize information for use in written and oral presentations
- Demonstrate knowledge of appropriate reference materials
- Use print, electronic databases and online resources to access information in books and articles
- Demonstrate narrative writing
- Demonstrate expository writing
- Demonstrate persuasive writing
- Demonstrate informational writing
- Edit writing for correct grammar, capitalization, punctuation, spelling, sentence structure and paragraphing

Connections to National Standards

State-level academic curriculum specialists identified the following connections to national academic standards.

Math Standards

- Numbers and operations
- Algebra
- Geometry
- Measurement
- Problem solving
- Communication
- Connections
- Representation

Source: NCTM Principles and Standards for School Mathematics. For more information, visit: http://www.nctm.org.

Science Standards

- Understands forces and motion
- Understands the nature of scientific inquiry

Source: McREL Compendium of National Science Standards. To view and search the compendium, visit: http://www2.mcrel.org/compendium/browse.asp.

Language Arts Standards

- Students adjust their use of spoken, written and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes
- Students employ a wide range of strategies as they write and use different writing process elements appropriately to communicate with different audiences for a variety of purposes
- Students apply knowledge of language structure, language conventions (e.g., spelling and punctuation), media techniques, figurative language and genre to create, critique and discuss print and nonprint texts

- Students conduct research on issues and interests by generating ideas and questions and by posing problems. They gather, evaluate and synthesize data from a variety of sources (e.g., print and nonprint texts, artifacts, people) to communicate their discoveries in ways that suit their purpose and audience
- Students use a variety of technological and information resources (e.g., libraries, databases, computer networks, video) to gather and synthesize information and to create and communicate knowledge
- Students use spoken, written and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion, and the exchange of information)

Source: IRA/NCTE Standards for the English Language Arts. To view the standards, visit: www.ncte.org/standards.

AUDIO/RADIO PRODUCTION

PURPOSE

To evaluate each contestant's preparation for employment and to recognize outstanding students for excellence and professionalism in the field of audio/radio production.

First, download and review the General Regulations at: http://updates.skillsusa.org.

ELIGIBILITY

Open to a team of two active SkillsUSA members enrolled in career and technology programs with audio/radio production as an occupational objective.

CLOTHING REQUIREMENT

Class E: Contest specific — Business Casual

For men: Official SkillsUSA white polo shirt, black dress slacks, black socks, black leather shoes.
For women: Official SkillsUSA white polo shirt with black dress skirt (knee-length) or black slacks; black socks or black or skin-tone seamless hose; black leather dress shoes.

These regulations refer to clothing items that are pictured and described at: www.skillsusastore.org. If you have questions about clothing or other logo items, call 800-401-1560 or 703-956-3723.

Note: Contestants must wear their official contest clothing to the contest orientation meeting.

EQUIPMENT AND MATERIALS

1. Supplied by the technical committee:
   a. Theme and objective for production
   b. Transportation to and from "on scene" location, if necessary
   c. Facilities and power to edit final product
   d. Audio equipment, cables and connectors outside of required "contestant supplied" equipment
   d. Additional/updated information to assist students in preparing for the contest may be posted online annually at: updates.skillsusa.org.
2. Supplied by the contestants:
   a. Portable digital audio recorder with removable recording media
   b. Microphone with audio cable
   c. Method of importing digital audio from field recorder to editing system
   d. Audio editing software/system (use of laptops is strongly encouraged)
   e. Writing implement (pen, pencil, marker, etc.)
   f. USB flash drive
   g. Scratch paper for notes
   h. Headphones *(not ear buds)*
   i. One-page typewritten résumé
   j. Production music CD (see note)
   k. Surge-protected power strip
   l. All competitors must create a one-page résumé and submit a hard copy to the technical committee chair at orientation. Failure to do so will result in a 10-point penalty.

   ***Note*:** Your contest may also require a hard copy of your résumé as part of the actual contest. Check the Contest Guidelines and/or the updates page on the SkillsUSA website at http://updates.skillsusa.org.

   Note: Production music is *not* commercial music purchased in stores. It is music created for use in audio and video productions. Some production music companies are: Music Bakery, Production Garden, TM Studios and Omnimusic. Production music may also be created using programs such as GarageBand, Soundtrack or ACID.

SCOPE OF CONTEST

Each team will be comprised of two student members from the same school and same division, one specializing in Radio and the other in Audio Production.

Knowledge Performance

A written knowledge exam of as many as 50 questions will be given covering the standards and competencies of listed on the following pages, including basic digital audio recording

and editing, equipment, cables and connectors, and terminology.

Skill Performance

The contest includes an assignment to produce a final project on site as determined by the national technical committee.

Contest Guidelines

Written Exam

1. Contestants will take the exam individually.
2. Both teammates' scores will be averaged together on the score sheet.
3. Contestants competing as "Radio Talent" will be responsible for knowledge including radio production, mass communications and radio history.
4. Contestants competing as the "Audio Technician" will be responsible for aspects of producing quality audio.
5. Contestants may use any textbook or other materials to prepare for the exam. The technical committee and NET recommend using one or more of the following textbooks:
    a. *The Sound Effects Bible: How to Create and Record Hollywood Style Sound Effects* (written by Ric Viers, published by Michael Wiese Productions, ©2008, ISBN 1932907483)
    b. *Modern Radio Production: Production, Programming, and Performance* (Seventh Edition, Hausman/Benoit/Messere, published by Thomson Wadsworth, ©2007, ISBN 0495050318)
    c. *Fundamentals of Audio Production* (First Edition, McDaniel/Shriver/ Collins, published by Allyn and Bacon, ©2008, ISBN 0205462332)
    d. *Audio in Media* (Eighth Edition, Alten, Published by Thomson Wadsworth, ©2008, ISBN 0495095680)
    e. Cyber College, (www.cybercollege.com). Use both the "TV Production" (TVP) and "Elements of Mass Communication" (EMC) online texts (TVP: the "Scriptwriting Guidelines" module and all of the modules in the "Audio" section; EMC: the modules in the "History and Development of Radio" section).
6. Both teammates' scores will be averaged together on the score sheet

While specific chapters generally aren't mentioned in these textbooks, competitors are encouraged to use the following standards and competencies to guide their studying.

Contest Assignment

1. Audio and information will be gathered on location as needed to convey the assigned theme or objective.
2. Students are to fully produce (plan, write, voice, record, edit, render, etc.) a five-minute radio production such as a PSA, NPR-style soundscape, sound-rich/NPR-style news story, sound and interview only news story, etc. A 30-second ad spot will be produced and inserted into the production. The complete production requires students to demonstrate their ability to plan a project that meets a specific prompt and run time; gather, edit and mix a variety of audio sources; and render the completed project to a specified audio file.
3. The completed production must meet the assigned run time and convey an adequate representation of the subject or theme.
4. Designated time periods over two days will be provided for script research and development, rehearsal of the script, generation of written copy, field recording, booth voiceover recording, and editing the final project.
5. Emphasis will be placed on:
    a. Professional production of the audio/radio production by industry standards
    b. Quality of the audio
    c. Conveyance of the subject, theme and information to the listener
6. Location of contest will be determined by the national technical committee.
7. All teams will submit their projects including final production and script on a USB flash drive with a file name and format chosen by the technical committee.

8. Contestants will demonstrate their ability to perform jobs or skills selected from the following list of competencies as determined by the technical committee:
   Audio Technician:
   a. Demonstrate knowledge of audio production technology, including proficiency in digital audio recording, editing and mixing.
   b. Demonstrate knowledge of terminology for mic level, line level, dynamic range, microphone preamp, compressor/limiter, XLR cable, XLR connector, EQ, time-based processing, send, return, input, output, balanced, and unbalanced.
   c. Demonstrate working knowledge of microphones, microphone preamps, compressor/limiters, EQ, send, return, level control, and digital audio editing on a DAW (Digital Audio Workstation).

   Radio Talent:
   a. Demonstrate proficiency in planning a radio production, including the proper commercial script form.
   b. Demonstrate knowledge of terminology for script, script form, copy, target demographic, live tag, intro, outro, format, 60-second spot, 30-second spot, PSA, broadcast, network, run time, voice over, FCC, and mic technique.
   c. Demonstrate practical knowledge of scriptwriting, pre-production story development, radio advertising development, proper microphone tecnique.
10. Teams that do not turn in their produced audio/radio production and script within the time limit will have 20 points deducted from their final score, plus 1 point for each additional minute past the deadline.
11. Contestants should not arrive at the contest area any earlier than 15 minutes prior to the assigned session.
12. Teams that are late to their assigned editing station will have that time deducted from their allotted time.
13. The finished production must meet the run time determined by the contest committee (plus or minus one second) Points will be deducted if the spot is outside the one-second tolerance.
14. If a team experiences a problem with its equipment, it is the *team's* responsibility to fix the problem. *No extra time will be given for equipment problems.* Teams may choose to bring in a second editing system in case of equipment problems, but no extra space will be given for the second system. *The contest committee strongly encourages the use of laptops.*
15. Teams may edit by using whatever software or method they choose, but they must supply their own equipment.
16. State and regional contests should mirror these requirements as closely as possible but may be adjusted to be completed in one day. Adjustments could include simply giving less time to complete the production and/or assigning a shorter run time for the assigned project. At the regional and state levels, this contest could also be run in partnership with the Television (Video) Production contest.

Standards and Competencies

AP 1.0 — Plan an audio/radio production, including the proper commercial script form demonstrating digital audio recording, editing and mixing

1.1 Demonstrate processes in digital audio recording
   1.1.1 Record natural sound on location characterizing the unique sound of that location
   1.1.2 Perform interview on location with an understanding of the purpose and goals of the audio/radio production
   1.1.3 Demonstrate proper techniques in writing the script inclusive of the target audience
   1.1.4 Demonstrate proper techniques in performing voice over on location

1.2 Demonstrate processes in digital audio editing and mixing
   1.2.1 Perform digital audio editing and mixing using a standard application to change and enhance the audio for the target audience
   1.2.2 With full consideration of the script, choose and integrate the appropriate audio/radio elements

to enhance the presentation for the target audience

1.3 Define and give appropriate examples of the following audio/radio trade vocabulary: send, return, line level, mic level, analog, scrubbing, digital, mixer, target group, demographics, live tag, format, run time, PSA, ASCAP, BMI, SESAC, SoundExchange, commercial, FCC, voice over

AP 2.0 — Demonstrate knowledge and use of cables and connectors used in audio/radio production

2.1 Show use of the following audio connectors (male and female for each): XLR, ¼" balanced, ¼" unbalanced, and RCA/phono plug
2.2 Describe pin configuration of balanced cables
2.3 Describe pin configuration of unbalanced cables

AP 3.0 — Implement the skills and knowledge needed to describe and demonstrate audio/radio production

3.1 Differentiate major microphone designs
3.2 Describe directional characteristics
3.3 Identify and describe handheld and personal microphones
3.4 Position microphones
3.5 Describe types and uses of various microphones
3.6 Describe phase cancellation
3.7 Describe methods of creating the stereo effect
3.8 Describe digital audio
3.9 Describe analog audio
3.10 Identify and describe communications systems

Committee Identified Academic Skills

The technical committee has identified that the following academic skills are embedded in this contest.

Math Skills

- Demonstrate the ability to do basic calculations involving time
- Demonstrate the ability to read and use a variety of clocks and stopwatches

Science Skills

- Use knowledge of sound and technological applications of sound waves

Language Arts Skills

- Demonstrate use of such verbal communication skills as word choice, pitch, feeling, tone and voice
- Analyze mass media messages
- Demonstrate comprehension of a variety of informational texts
- Demonstrate persuasive writing
- Demonstrate informational writing
- Edit writing for correct grammar, capitalization, punctuation, spelling, sentence structure and paragraphing

Connections to National Standards

State-level academic curriculum specialists identified the following connections to national academic standards.

Math Standards

- Numbers and Operations
- Problem Solving
- Communication
- Connections
- Representation

Source: NCTM Principles and Standards for School Mathematics. For more information, visit: http://www.nctm.org.

Science Standards

- Understands the sources and properties of energy
- Understands the nature of scientific inquiry

Source: McREL compendium of national science standards. To view and search the compendium, visit: http://www2.mcrel.org/compendium/browse.asp.

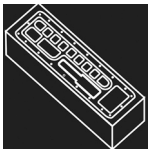
Language Arts Standards

- Students adjust their use of spoken, written and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes
- Students conduct research on issues and interests by generating ideas and questions, and by posing problems. They gather,

evaluate and synthesize data from a variety of sources (e.g., print and non-print texts, artifacts, people) to communicate their discoveries in ways that suit their purpose and audience
- Students use a variety of technological and information resources (e.g., libraries, databases, computer networks, video) to gather and synthesize information and to create and communicate knowledge
- Students use spoken, written and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion, and the exchange of information).

Source: IRA/NCTE Standards for the English Language Arts. To view the standards, visit: www.readwritethink.org/standards/index.html.

AUTOMATED MANUFACTURING TECHNOLOGY



PURPOSE

To evaluate each contestant's preparation for employment in automated manufacturing and the team approach to problem-solving work environment. To recognize outstanding students for excellence and professionalism in the field of automated manufacturing technology.

First, download and review the General Regulations at: http://updates.skillsusa.org.

CLOTHING REQUIREMENT

Class C: Contest Specific — Manufacturing/Construction Khaki Attire

For both Men and Women: Official SkillsUSA khaki work shirt and pants; black, brown, or tan leather work shoes; safety glasses with side shields or goggles (prescription glasses may be used, only if they are equipped with side shields. If not, they must be covered with goggles).

These regulations refer to clothing items that are pictured and described at: www.skillsusastore.org. If you have questions about clothing or other logo items, call 800-401-1560 or 703-956-3723.

Note: Contestants must wear their official contest clothing to the contest orientation meeting.

ELIGIBILITY

Open to a team of three active SkillsUSA members enrolled in programs with precision machining, automated manufacturing, or CAD/CAM or CNC as the occupational objective.

EQUIPMENT AND MATERIALS

1. Supplied by the technical committee:
   a. CNC machining center with:
      1. Machinist vise
      2. Hold-downs and clamps
      3. Tool holders
      4. End mills
   b. Part(s) design
   c. Competition packet
   d. Pencils
   e. Material for machining
2. Supplied by the contestants:
   a. All competitors must create a one-page résumé and submit a hard copy to the technical committee chair at orientation. Failure to do so will result in a 10-point penalty.

      Note: Your contest may also require a hard copy of your résumé as part of the actual contest. Check the Contest Guidelines and/or the updates page on the SkillsUSA website at http://updates.skillsusa.org.

   b. Two computers:
      1. One computer loaded with CAD software for CAD program
      2. One computer loaded with software for CAM program. This computer *must* have an open LAN Port (Ethernet connection) and Windows XP SP3/Vista/7-32 or 64bit 8/10. (Must have administrator privilege to the computer to configure the address of the LAN Port.)
   c. One 6" dial or digital vernier caliper
   d. One dial indicator. Dial indicator must have $\frac{3}{8}$" holding shank to fit into tool holder supplied by the technical committee.
   e. One calculator
   f. One pair of $\frac{3}{4}$" and/or 1" parallels (complete set soft-jaw parallel pliers)
   g. One soft-face hammer
   h. One 6" or 12" steel rule
   i. Safety glasses with clear lenses
   j. Each team must provide a USB memory device
   k. Each team must provide a machinist handbook
   l. Each team can provide appropriate sized end mills

Note: Only the above listed items will be allowed in the contest area during the competition.

SCOPE OF THE CONTEST

The contest will test the ability to perform, exhibit and compile skills and knowledge from the following list of competencies determined by the SkillsUSA Automated Manufacturing Technology technical committee. Committee membership includes intelitek Inc., MasterCam/CNC Software, CG Tech, Verisurf, Learning Labs Inc.

Knowledge Performance

The contest includes a written math test assessing general knowledge related to automated manufacturing technology. Written portions may also exist during the skills portion of the contest. The exam is an evaluation that measures ability to solve various solutions to the process that is involved in quoting a job in a rapid prototyping environment.

Skill Performance

The contest includes a team skill performance for three students and evaluates teams for employment in integrated manufacturing technology fields of computer-aided drafting/design (CAD), computer-aided manufacturing (CAM) and computer numerical controlled machining (CNC).

Contest Guidelines

1. All equipment provided by the technical committee will be in place and set up on the Monday before the competition begins. On Tuesday, all teams assemble for a random placement drawing to decide competition day. Competition runs on Tuesday, Wednesday and Thursday. The team will compete on their scheduled day. Teams must bring their computers and above-listed equipment on Tuesday. Tampering with or removing *any* of the equipment provided during the days of the competition is grounds for disqualification.
2. Advisors are recommended to stay period but must leave during the competition.
3. All team members and advisors are required to attend a debriefing session on Friday morning.
4. Teams must be comprised of three members.
5. The teams will be presented with dimensioned drawing(s) of a part(s) to prototype during the contest.
6. The CAD operators construct the part geometry; the CAM operator generates the tool paths; and the CNC operator sets up and machines the part. When a team member has spare time, he or she will help others in the group.
7. One person should not dominate a team by doing the CAD drawing and the CAM toolpath and running the CNC machine while using the other members simply as support. The contest is designed to promote creativity in organization of production responsibility.
8. All group members are responsible for double-checking each other's work and quality control.
9. When the teams finish machining the prototype part(s), they will present it to the client (judges). At this time, they will be presented with a second drawing(s) as either a change order or as an additional part(s).
10. Each team will be issued a contest guideline packet. Included in the packet will be all the necessary information and forms to complete the project. These forms will not be highly specific but will coach the teams.
11. All packets, forms and drawings must be turned in to the judges at the end of the competition.

Standards and Competencies

MFG 1.0 — Perform mathematical and measurement calculations used in automated manufacturing situations

1.1 Measure work pieces to the nearest .001 inch
1.2 Calculate CNC speed and feeds
1.3 Calculate stock utilization and setup
1.4 Calculate tolerances
1.5 Calculate various variables to estimate costs and material usage written evaluation

MFG 2.0 — Design, sketch and plan machine work to U.S. National CAD Standards

2.1 Transfer information from provided drawing to CAD drawing
2.2 Create CAD file for manufacturing using standard CAD terminology and standard practice
2.3 Initiate manufacturing documentation process
2.4 Generate a process plan
2.5 Plot a CAD file
2.6 Export a CAD file
2.7 Process Engineering Change Orders (ECO)
2.8 Repeat steps as necessary to accommodate ECO

MFG 3.0 — Create a toolpath (CAM file) and the CNC code to related duty tasks of the National Institute for Metalworking Skills (NIMS) Duties and Standards for Machining Skills, Level I

3.1 Create process plan (job plan)
3.2 Read-in CAD export file
3.3 Create toolpath
3.4 Verify toolpath
3.5 Create CNC code
3.6 Send CNC code to machine tool
3.7 Process Engineering Change Orders (ECO)
3.8 Repeat steps as necessary to accommodate ECO

MFG 4.0 — Perform CNC machining functions given a scenario to the related duty tasks of the National Institute for Metalworking Skills (NIMS) Duties and Standards for Machining Skills, Level I

4.1 Verify CNC file existence
4.2 Verify toolpath
4.3 Set up fixture(s) and tooling on machine
4.4 Set up part(s) on mill
4.5 Set all offsets and tooling
4.6 Adjust machine speeds and feeds as needed
4.7 Complete an in-process quality assurance process
4.8 Perform tool changes
4.9 Perform multiple machining operations in one setup
4.10 Demonstrate proficiency in using a CNC machine tool and produce part(s)
4.11 Use Total Quality Management practices to verify process and part
4.12 Process Engineering Change Orders (ECO)
4.13 Repeat steps as necessary to accommodate ECO

MFG 5.0 — Perform and inspect part(s) using a Total Quality Management process

5.1 Verify part(s) to provided standards
5.2 Verify part(s) to ECO standards
5.3 Document process of verification and inspection

MFG 6.0 — Demonstrate safety practices in a working situation to the related duty tasks of the National Institute for Metalworking Skills (NIMS) Duties and Standards for Machining Skills-Level I

6.1 Carry out assigned responsibilities while adhering to safe practices in accordance with OSHA requirements and guidelines
6.2 Document safety activities as required
6.3 Demonstrate safety procedures in running and programming a CNC machine tool

MFG 7.0 — Provide an accurate quotation given an automated manufacturing technology simulated scenario

7.1 Solve various solutions to the process that are involved in quoting a job in a rapid prototyping environment

Committee Identified Academic Skills

The technical committee has identified that the following academic skills are embedded in this contest.

Math Skills

- Use fractions to solve practical problems
- Use proportions and ratios to solve practical problems
- Use scientific notation
- Solve single variable algebraic expressions
- Solve multiple variable algebraic expressions
- Measure angles
- Find surface area and perimeter of two-dimensional objects
- Find volume and surface area of three-dimensional objects
- Construct three-dimensional models
- Apply Pythagorean Theorem
- Solve problems using proportions, formulas and functions

- Find slope of a line
- Solve practical problems involving complementary, supplementary and congruent angles
- Solve problems involving symmetry and transformation

Science Skills

- Use knowledge of physical properties (shape, density, solubility, odor, melting point, boiling point, color)

Language Arts Skills

- Provide information in conversations and in group discussions
- Demonstrate comprehension of a variety of informational texts
- Organize and synthesize information for use in written and oral presentations
- Demonstrate knowledge of appropriate reference materials

Connections to National Standards

State-level academic curriculum specialists identified the following connections to national academic standards.

Math Standards

- Numbers and operations
- Geometry
- Measurement
- Data Analysis and probability
- Problem solving
- Communication
- Connections
- Representation

Source: NCTM Principles and Standards for School Mathematics. For more information, visit: http://www.nctm.org.

Science Standards

- Understands the structure and properties of matter
- Understands the sources and properties of energy
- Understands the nature of scientific inquiry

Source: McREL compendium of national science standards. To view and search the compendium, visit: http://www2.mcrel.org/compendium/browse.asp.

Language Arts Standards

- Students apply a wide range of strategies to comprehend, interpret, evaluate and appreciate texts. They draw on their prior experience, their interactions with other readers and writers, their knowledge of word meaning and of other texts, their word identification strategies, and their understanding of textual features (e.g., sound-letter correspondence, sentence structure, context, graphics)
- Students adjust their use of spoken, written, and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes
- Students apply knowledge of language structure, language conventions (e.g., spelling and punctuation), media techniques, figurative language and genre to create, critique, and discuss print and nonprint texts
- Students use a variety of technological and information resources (e.g., libraries, databases, computer networks, video) to gather and synthesize information and to create and communicate knowledge
- Students participate as knowledgeable, reflective, creative and critical members of a variety of literacy communities
- Students use spoken, written and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion, and the exchange of information)

Source: IRA/NCTE Standards for the English Language Arts. To view the standards, visit: www.ncte.org/standards.

AUTOMOTIVE REFINISHING TECHNOLOGY

PURPOSE

To evaluate each contestant's preparation for employment and to recognize outstanding students for excellence and professionalism in the field of automotive refinishing technology.

First, download and review the General Regulations at: http://updates.skillsusa.org.

ELIGIBILITY

Open to active SkillsUSA members enrolled in programs with automotive refinishing technology as the occupational objective.

CLOTHING REQUIREMENT

Class D: Contest Specific — Automotive Blue Attire

For both men and women: Official SkillsUSA light blue work shirt; navy pants; black, brown, or tan leather work shoes safety shoes (with protective toe cap.) Safety glasses with side shields or goggles (prescription glasses may be used only if they are equipped with side shields. If not, they must be covered with goggles).

These regulations refer to clothing items that are pictured and described at: www.skillsusastore.org. If you have questions about clothing or other logo items, call 800-401-1560 or 703-956-3723.

Note: Contestants must wear their official contest clothing to the contest orientation meeting.

EQUIPMENT AND MATERIALS

1. Supplied by the technical committee: basic equipment of an automotive refinishing laboratory
   a. Various grits and styles of sandpaper
   b. Clean-up thinner
   c. Waterborne basecoats
   d. Strainers
   e. Reducer
   f. Paint
   g. Primer surfacer
   h. Clear coats
   i. DA sanders
   j. Abrasive sanding pads
   k. Sanding blocks
   l. Paint panels
   m. Necessary masking materials
   n. Razor blades
   o. Cleaning towels
   p. Tack cloths
   q. Painter's gloves
   r. Solvent cleaner
   s. Waterborne cleaner
   t. Sanding masks
   u. Fresh air respirators
   v. Safety glasses
   w. Paint suits
   x. Spray guns

2. Supplied by the contestant:
   a. All competitors must create a one-page résumé and submit the résumé at the orientation.

   ***Note*:** Your contest may also require a hard copy of your résumé as part of the actual contest. Check the Contest Guidelines and/or the updates page on the SkillsUSA website at http://updates.skillsusa.org.

SCOPE OF THE CONTEST

The contest will be consistent with the Collision Repair/Refinishing Technician Task list outlined in the guidelines published by the National Institute for Automotive Service Excellence (ASE) and the National Technicians Education Foundation (NATEF), www.natef.org. Contestants will demonstrate their ability to perform jobs of skills selected from the standards mentioned above as determined by the SkillsUSA Championships technical committee. Committee membership includes (but is not limited to): Am Automotive Aftermarket Division, ABC Autobody Color, Akzo Nobel Coatings Inc., All Star Marketing, Axalta Performance Coatings, Complete Sales and Marketing, LKQ Corp., Martin-Senour Paints, National Institute for Automotive Service Excellence (ASE), PPG Industries, Safety Kleen Corporation, SATA Spray Equipment, Sherwin-Williams, State Farm Insurance Companies and Toyota Motor Sales USA Inc.

Knowledge Performance

The contest includes a written knowledge test given by ASE, which will consist of 50 questions covering the automotive refinishing areas that are identified in the NATEF Collision Repair/Refinishing Program Standards and the ASE Official Study Guide: Collision Repair/Refinish. The tests for the high school and college contestants will be comprised of surface preparation; spray gun operation and related equipment; paint mixing, matching, and applying; solving paint application problems; and finish defects, causes and cures and safety precautions.

Skill Performance

The contest includes a series of workstations, a manually written estimate and an interview process designed to assess skills in the following areas: spot repair, color tinting, featheredge, prime and block, paint id and masking. The overall appearance of the finished product, speed and proper safety practices will be judged.

***Note*:** "*" Denotes this material is covered on a separate written test prior to the official contest day.

Standards and Competencies

Spot Repair

ART 1.0 — Prepare a panel surface for a basecoat blend in relationship to the tasks in the National Automotive Technicians Education Foundation (NATEF) Collision Repair and Refinishing Technical Standards for Painting and Refinishing (B2 ASE test)

1.1 Demonstrate proper safety procedures
1.2 Clean the entire area of panel being repaired; use appropriate cleaner to remove contaminants
1.3 Dry sand areas to be refinished.
1.4 Featheredge damaged areas to be refinished
1.5 Clean area to be refinished using a final cleaning solution
1.6 Remove dust from the area to be refinished, including cracks or moldings of adjacent areas
1.7 Remove, with a tack rag, any dust or lint particles from the area to be refinished

ART 2.0 — Prepare a panel surface for clearcoat application (full panel) in relationship to the tasks in the National Automotive Technicians Education Foundation (NATEF) Collision Repair and Refinishing Technical Standards for Painting and Refinishing (B2 ASE test)

2.1 Demonstrate proper safety procedures
2.2 Dry sand the areas to be refinished
2.3 Clean the area to be refinished using a final cleaning solution
2.4 Remove dust from area to be refinished, including cracks or moldings of adjacent areas
2.5 Remove, with a tack rag, any dust or lint particles from the area to be refinished

ART 3.0 — Prepare a panel surface for basecoat spot repair application in relationship to the tasks in the National Automotive Technicians Education Foundation (NATEF) Collision Repair and Refinishing Technical Standards for Painting and Refinishing (B2 ASE Test)

3.1 Demonstrate proper safety procedures
3.2 Remove, with a tack rag, any dust or lint particles from the area to be refinished
3.3 Apply clear blender if applicable to prevent metallic halo
3.4 Check and adjust spray gun operation
3.5 Apply finish using appropriate spray techniques (gun arc, gun angle, gun distance, gun speed and spray pattern overlap) for the finish being applied
3.6 Apply basecoat for panel blending or partial refinishing

ART 4.0 — Prepare a panel surface for full panel clearcoat application in relationship to the tasks in the National Automotive Technicians Education Foundation (NATEF) Collision Repair and Refinishing Technical Standards for Painting and Refinishing (B2 ASE Test)

4.1 Demonstrate proper safety procedures
4.2 Remove, with a tack rag, any dust or lint particles from the area to be refinished
4.3 Check and adjust spray gun operation
4.4 Apply clearcoat finish using appropriate spray techniques (gun arc, gun angle, gun distance, gun speed and spray pattern overlap) for the finish being applied

Color Tinting

ART 5.0 — Complete color assessment in relationship to the tasks in the National Automotive Technicians Education Foundation (NATEF) Collision Repair and Refinishing Technical Standards for Painting and Refinishing (B2 ASE Test)

5.1 Determine the type of mismatch problem encountered while evaluating the color sample
5.2 Determine adjustment that must be made to correct the hue/color, value/lightness or darkness, chroma/saturation/purity and flop

ART 6.0 — Select the correct toner for color adjustment (toner within the formula) application in relationship to tasks in the National Automotive Technicians Education Foundation (NATEF) Collision Repair and Refinishing Technical Standards for Painting and Refinishing (B2 ASE Test)

6.1 Demonstrate the ability to select the correct toner to correct predetermined mismatch problems while selecting the correct toner
6.2 Demonstrate the ability to select the correct toner to correct the hue/color, value/lightness or darkness, chroma/saturation/purity and flop

ART 7.0 — Spray out completed (includes clearcoat application) application in relationship to tasks in the National Automotive Technicians Education Foundation (NATEF) Collision Repair and Refinishing Technical Standards for Painting and Refinishing (B2 ASE Test)

7.1 Apply finish using appropriate spray techniques (gun arc, gun angle, gun distance, gun speed and spray pattern overlap) for the finish being applied

ART 8.0 — Make proper adjustments/hits producing a blendable color match (evidenced of a sprayout card) application in relationship to tasks in the National Automotive Technicians Education Foundation (NATEF) Collision Repair and Refinishing Technical Standards for Painting and Refinishing (B2 ASE Test)

8.1 Apply tinted product to produce evidence of a blendable color match
8.2 Finish being applied

Featheredge, Priming and Blocking (Scratched Substrate)

ART 9.0 — Surface cleaning application in relationship to tasks in the National Automotive Technicians Education Foundation (NATEF) Collision Repair and Refinishing Technical Standards for Painting and Refinishing. (B2 ASE Test)

9.1 Clean entire panel; use appropriate cleaner to remove contaminants
9.2 Apply surface cleaner to remove contaminants

ART 10.0 — Repair damaged area in preparation for primers in relationship to tasks in the National Automotive Technicians Education Foundation (NATEF) Collision Repair and Refinishing Technical Standards for Painting and Refinishing (B2 ASE Test)

10.1 Sand area using dual action sander
10.2 Sand areas to show appropriate removal of material for good featheredge technique
10.3 Sand beyond the repair area for adhesion of primer

ART 11.0 — Apply 2-K primers application in relationship to tasks in the National Automotive Technicians Education Foundation (NATEF) Collision Repair and Refinishing Technical Standards for Painting and Refinishing (B2 ASE Test)

11.1 Apply primer surfacer onto surface of repaired area
11.2 Check and adjust spray gun operation
11.3 Apply finish using appropriate spray techniques (gun arc, gun angle, gun distance, gun speed and spray pattern overlap) for the finish being applied

ART 12.0 — Perform proper block sanding techniques and final sand for basecoat application in relationship to tasks in the National Automotive Technicians Education Foundation (NATEF) Collision Repair and Refinishing Technical Standards for Painting and Refinishing (B2 ASE Test)

12.1 Dry sand the area to which two-component finishing filler has been applied
12.2 Dry sand the area to which primer-surfacer has been applied
12.3 Block the sand area to achieve levelness of repaired area

Paint Code ID and Masking

ART 13.0 — Locate and document vehicle manufacturers' paint code application in relationship to tasks in the National Automotive Technicians Education Foundation (NATEF) Collision Repair and Refinishing Technical Standards for Painting and Refinishing (B2 ASE Test)

13.1 Determine the type and color of paint already on the vehicle by manufacturer's vehicle information label
13.2 Identify the code using paint manufacture manuals and or computer to determine paint code location

ART 14.0 — Select the correct variant application if applicable in relationship to tasks in the National Automotive Technicians Education Foundation (NATEF) Collision Repair and Refinishing Technical Standards for Painting and Refinishing (B2 ASE Test)

14.1 Identify variant swatches/chips
14.2 Match variant to vehicle using color-corrected lighting
14.3 Identify variant that will produce the best possible blend

ART 15.0 — Appropriate masking techniques for refinishing fender and blending into adjacent panel (front door) application in relationship to tasks in the National Automotive Technicians Education Foundation (NATEF) Collision Repair and Refinishing Technical Standards for Painting and Refinishing (B2 ASE Test)

15.1 Mask and protect adjacent panels that will not be refinished
15.2 Mask door jambs and other aperture panels

Note: * Denotes this material is covered on a separate written test prior to the official contest day

ART 16.0 — Complete an estimate to related tasks in ASE Catalog of Collision Repair/Refinishing Tests B6 (Damage Analysis and Estimating)*

16.1 Report heading/legibility*
- 16.1.1 List entrant number on estimating test*
- 16.1.2 Locate provided "Vehicle Description and Labor Rate Page" and complete owner and vehicle information segment on estimate (e.g., owner name, address, phone numbers, license plate, vehicle year, series, mileage, vehicle identification number)
- 16.1.3 Write legibly*

ART 17.0 — Identify parts replacement*

17.1 Locate and select vehicle to be estimated in the provided collision estimating guide*
17.2 Locate and list the correct part prices and replacement labor times and refinish labor times for the pre-determined parts being replaced*
17.3 Estimate labor adjustments for vehicle options when appropriate*
17.4 Recognize and apply body labor overlap and refinish labor overlap where appropriate*
17.5 Consider and apply "included" and "not included" operations where appropriate*
17.6 Consider and apply labor footnotes (# signs) when necessary*

ART 18.0 — Prepare calculations*

18.1 Calculate and list the correct paint and materials allowance*
18.2 Calculate and list parts, body labor, refinish labor, paint and material column totals*
18.3 Calculate and list total labor hours (body labor plus refinish labor)*
18.4 Multiply total labor hours by provided labor rate and list labor dollar amount*
18.5 Calculate and list **total** estimate amount*

ART 19.0 — Oral Assessment/Interview*

19.1 Exhibit personal skills such as attendance, time management and individual responsibility*
19.2 Demonstrate promptness when required to meet interviewer at specific time and location*

ART 20.0 — Maintain professional conduct*

20.1 Demonstrate courteous behavior while waiting for the interviewer*

ART 21.0 — Maintain professional appearance*

21.1 Demonstrate proper attire (SkillsUSA uniform — light blue shirt, dark blue pants)*

ART 22.0 — Complete job application and résumé *

22.1 Properly and legibly complete a job application and résumé*

ART 23.0 — Demonstrate interview skills*

ASE Written Test

ART 24.0 — Contestants will be required to take a 50-question multiple-choice test prior to the official contest. A 100-point scale is used for this segment. Participants will be expected to successfully complete this segment. Participants should have some basic knowledge in math and science

24.1 Contestants will take a 50-question multiple-choice test in the area of Painting and Refinishing

24.1.1 Contestants will answer 50 questions in the area of painting and refinishing in the content areas of: surface preparation, spray gun operation and related equipment, paint mixing, matching and applying, solving paint application problems, finish defects, causes and cures and safety precautions and miscellaneous

This information is obtained through the National Institute for Automotive Service Excellence Painting and Refinishing (B2) Certification Test.

Committee Identified Academic Skills

The technical committee has identified that the following academic skills are embedded in this contest.

Math Skills

- Use fractions to solve practical problems
- Use proportions and ratios to solve practical problems
- Solve practical problems involving percentages
- Make predictions using knowledge of probability
- Make comparisons, predictions and inferences using graphs and charts
- Solve problems using proportions, formulas and functions
- Solve practical problems involving complementary, supplementary and congruent angles
- Calculate percentages

Science Skills

- Plan and conduct a scientific investigation
- Describe and recognize elements, compounds, mixtures, acids, bases and salts
- Describe and recognize solids, liquids and gases
- Describe characteristics of types of matter based on physical and chemical properties
- Use knowledge of physical properties (shape, density, solubility, odor, melting point, boiling point, color)
- Use knowledge of chemical properties (acidity, basicity, combustibility, reactivity)
- Use knowledge of classification of elements as metals, metalloids and nonmetals
- Describe and demonstrate simple compounds (formulas and the nature of bonding)
- Use knowledge of temperature scales, heat and heat transfer
- Use knowledge of the nature and technological applications of light
- Use knowledge of work, force, mechanical advantage, efficiency and power
- Use knowledge of simple machines, compound machines, powered vehicles, rockets and restraining devices

Language Arts Skills

- Provide information in conversations and in group discussions
- Provide information in oral presentations
- Demonstrate use of such verbal communication skills as word choice, pitch, feeling, tone and voice
- Demonstrate use of such nonverbal communication skills as eye contact, posture and gestures using interviewing techniques to gain information
- Demonstrate comprehension of a variety of informational texts
- Use text structures to aid comprehension

- Organize and synthesize information for use in written and oral presentations
- Demonstrate knowledge of appropriate reference materials
- Use print, electronic databases and online resources to access information in books and articles
- Edit writing for correct grammar, capitalization, punctuation, spelling, sentence structure and paragraphing

Connections to National Standards

State-level academic curriculum specialists identified the following connections to national academic standards.

Math Standards

- Problem solving
- Numbers and operations
- Measurement
- Geometry
- Representation
- Communication
- Connections

Source: NCTM Principles and Standards for School Mathematics. For more information, visit: http://www.nctm.org.

Science Standards

- Understands the structure and properties of matter
- Understands the sources and properties of energy
- Understands forces and motion
- Understands the nature of scientific inquiry

Source: McREL compendium of national science standards. To view and search the compendium, visit: http://www2.mcrel.org/compendium/browse.asp.

Language Arts Standards

- Students apply a wide range of strategies to comprehend, interpret, evaluate and appreciate texts. They draw on their prior experience, their interactions with other readers and writers, their knowledge of word meaning and of other texts, their word identification strategies and their understanding of textual features (e.g., sound-letter correspondence, sentence structure, context and graphics)
- Students adjust their use of spoken, written and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes
- Students use spoken, written and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion and the exchange of information)

Source: IRA/NCTE Standards for the English Language Arts. To view the standards, visit: www.ncte.org/standards.

AUTOMOTIVE SERVICE TECHNOLOGY

PURPOSE

To evaluate each contestant's preparation for employment and to recognize outstanding students for excellence and professionalism in the field of automotive service technology.

First, download and review the General Regulations at: http://updates.skillsusa.org.

ELIGIBILITY

Open to active SkillsUSA members enrolled in career and technical programs with automotive technician or automotive service technology as the occupational objective.

CLOTHING REQUIREMENT

Class D: Contest Specific - Automotive Blue Attire

For Both Men and Women: Official SkillsUSA light blue work shirt; navy pants; black, brown, or tan leather work shoes safety shoes (with protective toe cap.) Safety glasses with side shields or goggles (prescription glasses may be used only if they are equipped with side shields. If not, they must be covered with goggles).

These regulations refer to clothing items that are pictured and described at: www.skillsusastore.org. If you have questions about clothing or other logo items, call 800-401-1560 or 703-956-3723.

Note: Contestants must wear their official contest clothing to the contest orientation meeting.

EQUIPMENT AND MATERIALS

1. Supplied by the technical committee:
   a. All necessary tools and equipment for the contest
   b. All necessary service publications for the contestants
2. Supplied by the contestant:
   a. All competitors must create a one-page résumé and submit a hard copy to the technical committee chair at orientation. Failure to do so will result in a 10-point penalty.

***Note*:** Your contest may also require a hard copy of your résumé as part of the actual contest. Check the Contest Guidelines and/or the updates page on the SkillsUSA website at http://updates.skillsusa.org.

SCOPE OF THE CONTEST

The contest will be consistent with the automobile technician task list outlined in guidelines published by the National Institute for Automotive Service Excellence (ASE) and the ASE Education Foundation at: www.aseeducationfoundation.org. Contestants will demonstrate their ability to perform jobs or skills selected from the standards mentioned above as determined by the SkillsUSA Championships technical committee. Committee membership includes American Honda Motor Co. Inc., Cengage Learning, Ford Motor Co., Gates Corp., General Motors, Hunter Engineering Co., Megatech Corp., National Institute for Automotive Service Excellence, Pittsburgh State University, Snap-on Inc., S/P2, Toyota Motor North America, Inc., CCAR, ATech, ConsuLab, FIAT Chrysler Automobiles, Nissan North America, and Lucas-Nuelle.

Knowledge Performance

The contest will include a written knowledge test given by ASE, and will consist of 100 questions covering all eight automobile areas identified in the ASE Education Foundation Automobile Program Standards and the Official ASE Study Guide — Automobile Tests. The test for these high school and college/postsecondary contests will be comprised of diagnostic and repair content from these skill areas: engine repair, automatic transmission/transaxle, manual drive train and axles, suspension and steering, brakes, electrical/electronic steering, heating and air conditioning and engine performance.

Skill Performance

The contest will include a series of workstations. Workstations consist of a vehicle and/or simulators, components, service

publications and interpersonal skills stations such as Customer Service and Job Interview.

Contest Guidelines

1. A variety of vehicles sold in the United States will be used in the contest. This will include both domestic and imported vehicles.
2. Some or all of the high-school work stations may be different than the college/postsecondary work stations.
3. Safety, quality, ability to follow instructions and procedures, accuracy (in comparison with factory specifications), workmanship, and other skills representative of the trades identified by industry leaders will be judged.
4. A total of eight to 15 stations will be assigned. Each station must be broken down into specific task criteria and separate steps based on the task. For example:

   Station No. 1 Wire test and repair segments
   Identify faulty circuit = x points
   Repair condition = x points
   Assemble/retest = x points
   Resistor board tests = x points
   Compare values to specs = x points
   Workmanship = x points
   Safety practices = x points

5. The points allowed for each station will be assigned by the national technical committee and will be based on the difficulty of each assigned task.
6. Time limits will be assigned for each task, but no bonus points will be awarded for early completion.
7. Stations and equipment to be used in the national competition will be published annually by April 15 in the SkillsUSA Championships contest updates.

Standards and Competencies: High School

AST 1.0 — Perform vehicle HVAC system diagnosis and testing to related tasks in the ASE Education Foundation Automobile Program Standards — Automobile Heating and Air Conditioning Task List (ASE Test A7)

- 1.1 Diagnose and repair an inoperative HVAC system on a current model vehicle
- 1.2 Use a provided factory scan tool for current model vehicle
  - 1.2.1 Read DTC with scan tool
  - 1.2.2 Read data with scan tool
  - 1.2.3 Perform actuator test with scan tool
- 1.3 Use factory service information provided
  - 1.3.1 Identify correct test procedures
  - 1.3.2 Follow the correct test procedure
  - 1.3.3 Identify connector pin-outs
  - 1.3.4 Identify component locations
  - 1.3.5 Read and interpret wiring schematics
- 1.4 Use provided test equipment
  - 1.4.1 Use a DVOM or DMM
  - 1.4.2 Use a test light
  - 1.4.3 Use A/C service gauges
- 1.5 Use a repair order
  - 1.5.1 Verify complaint
  - 1.5.2 Repair vehicle
  - 1.5.3 Verify repair was successful
  - 1.5.4 Identify components in the system

AST 2.0 — Perform vehicle engine performance diagnosis and testing to related tasks in the ASE Education Foundation Automobile Program Standards — Automobile Engine Performance Task List (ASE Test A8)

- 2.1 Diagnose and repair an engine performance issue on a current model vehicle
- 2.2 Use a provided factory scan tool for the current model vehicle
  - 2.2.1 Read DTC with scan tool
  - 2.2.2 Read data with scan tool
  - 2.2.3 Perform actuator test with scan tool
- 2.3 Use factory service information provided
  - 2.3.1 Identify correct test procedures
  - 2.3.2 Follow the correct test procedure
  - 2.3.3 Identify connector pin-outs
  - 2.3.4 Identify component locations
  - 2.3.5 Use wiring schematics
- 2.4 Use provided test equipment

2.4.1 Use a DVOM or DMM
2.4.2 Use a test light
2.4.3 Use a fuel pressure gauge

2.5 Use a repair order
2.5.1 Verify complaint
2.5.2 Repair vehicle
2.5.3 Verify repair was successful
2.5.4 Identify components in the system

AST 3.0 — Perform vehicle body electrical diagnosis and testing to related tasks identified in the ASE Education Foundation Automobile Program Standards — Automobile Electrical/Electronic Systems Task List (ASE Test A6)

3.1 Diagnose and repair a body electrical issue on a current model vehicle

3.2 Use a provided factory scan tool for the current model vehicle
3.2.1 Read DTC with scan tool
3.2.2 Read data with scan tool
3.2.3 Perform actuator test with scan tool

3.3 Use factory service information provided
3.3.1 Identify correct test procedures
3.3.2 Follow the correct test procedure
3.3.3 Identify connector pin-outs
3.3.4 Identify component locations
3.3.5 Use wiring schematics

3.4 Use provided test equipment
3.4.1 Use a DVOM or DMM
3.4.2 Use a test light
3.4.3 Use a battery or charging system tester

3.5 Use a repair order
3.5.1 Verify complaint
3.5.2 Repair vehicle
3.5.3 Verify repair was successful
3.5.4 Identify components in the system

AST 4.0 — Demonstrate application of environment, health and safety knowledge in auto service situations to related OSHA section 1910 standards and EPA standards

4.1 Identify personal protective equipment

4.2 Explain the use of personal protective equipment

4.3 Recall information about related EPA and OSHA requirements

4.4 Identify blood borne pathogens kits

4.5 Explain the use of blood borne pathogens kits

4.6 Answer questions from a provided material SDS sheet

4.7 Describe proper use of a fire extinguisher

AST 5.0 — Complete a mock job interview for an automotive service technology related position

5.1 Conduct a mock job interview with appropriate professional behavior

5.2 Communicate clearly and effectively

5.3 Clearly and completely fill out a job application

5.4 Provide a printed copy of résumé

AST 6.0 — Perform electronic circuit diagnosis, testing and wire repair to related tasks identified in the ASE Education Foundation Automobile Program Standards — Automobile Electrical/Electronic Systems Task List (ASE Test A6)

6.1 Construct an electrical circuit from supplied material and a wiring diagram
6.1.1 Check electrical circuit operation
6.1.2 Take electrical readings on the circuit with a DVOM. ***Note:*** A shunt may be used when measuring current.
6.1.3 Diagnose and repair the circuit
6.1.4 Confirm the repair of the circuit

6.2 Diagnose electrical/electronic integrity of series, parallel and series-parallel circuits
6.2.1 Check electrical circuits with a test light and determine necessary action

6.3 Repair connectors and terminal ends
6.3.1 Repair wiring harness
6.3.2 Perform solder repair of electrical wiring

AST 7.0 — Perform steering, suspension and wheel alignment to related tasks identified in the ASE Education Foundation Automobile Program Standards — Automobile Suspension and Steering Task List (ASE Test A4)

7.1 Identify wheel alignment tools

7.2 Explain practical application of tools

7.3 Identify OEM alignment products
7.3.1 Explain practical application or use of OEM products
7.3.2 Identify aftermarket alignment products
7.3.3 Explain practical application or use of aftermarket products

7.4 Identify steering suspension components

7.5 Explain alignment theory

7.6 Explain diagnosis of alignment conditions
7.7 Use reference materials provided

AST 8.0 — Perform manual drive train service, testing and diagnosis to related tasks identified in the ASE Education Foundation Automobile Program Standards — Automobile Manual Drive Train and Axles Task List (ASE Test A3)

8.1 Identify components manual drive trains, axles, drivelines and transfer cases
8.2 Inspect clutch operating components for wear/damage and determine necessary action
- 8.2.1 Measure flywheel run-out and crankshaft endplay and determine necessary action
- 8.2.2 Inspect transmission/transaxle components for wear/damage and determine necessary action
- 8.2.3 Measure endplay/preloads on transmission/transaxle shafts and determine necessary action
- 8.2.4 Inspect, measure, reassemble and/or reinstall synchronizer assemblies
- 8.2.5 Inspect, measure, adjust and/or reassemble transaxle final drive assemblies
- 8.2.6 Check driveshaft phasing, measure driveshaft run-out and measure driveshaft operating angles
- 8.2.7 Measure companion flange run-out and determine necessary action
- 8.2.8 Inspect ring gear and measure run-out and determine necessary action
- 8.2.9 Measure and adjust drive pinion depth and drive pinion bearing preload
- 8.2.10 Measure and adjust side bearing preload, ring and pinion gear backlash and backlash variation
- 8.2.11 Check ring and pinion gear contact patterns and determine necessary action
- 8.2.12 Measure rotating torque on a limited slip differential and determine necessary action
- 8.2.13 Inspect and reinstall limited slip clutch components

8.3 Use factory service information provided to complete tasks
8.4 Use tools provided to complete task
8.5 Determine which components need replaced or repaired in a given situation

AST 9.0 — Perform brake service, testing and diagnosis to related tasks identified in the ASE Education Foundation Automobile Program Standards–Automobile Brakes Task List (ASE Test A5)

9.1 Identify different brake components
9.2 Diagnose pressure concerns in the brake system using hydraulic principles
- 9.2.1 Fabricate brake lines (double flare and ISO types)
- 9.2.2 Inspect and measure brake drums and determine necessary action
- 9.2.3 Remove, inspect and install brake shoes, springs, pins, clips, levers, adjusters and other brake hardware
- 9.2.4 Remove, inspect and install wheel cylinders
- 9.2.5 Pre-adjust brake shoes and parking brake before installing brake drums
- 9.2.6 Remove, inspect and install caliper, pads and related hardware and determine necessary action
- 9.2.7 Clean, inspect and measure rotor with a dial indicator and a micrometer and determine necessary action
- 9.2.8 Check parking brake components; clean, lubricate, adjust or replace as necessary
- 9.2.9 Inspect brake booster and determine necessary action
- 9.2.10 Remove, clean, inspect, repack and install wheel bearings; install hub and adjust wheel bearings

9.3 Identify and inspect ABS components and determine necessary action
- 9.3.1 Diagnose ABS electronic controls and components
- 9.3.2 Test, diagnose and service ABS speed sensors, toothed ring and circuits using an oscilloscope

9.4 Use factory service information provided to complete the above task

9.5 Use tools provided to complete the above task

AST 10.0 — Perform automatic transmission service, testing and diagnosis to related tasks identified in the ASE Education Foundation Automobile Program Standards — Automobile Automatic Transmission/Transaxle Task List (ASE Test A2)

10.1 Identify components on a transmission
10.2 Diagnose and inspect a transmission
- 10.2.1 Check input or output shaft endplay
- 10.2.2 Check clutch clearances
- 10.2.3 Perform air checks on the clutches
- 10.2.4 Measure pump clearances
- 10.2.5 Diagnose electrical components on a transmission

10.3 Perform adjustments on a transmission
- 10.3.1 Perform valve body adjustments
- 10.3.2 Perform input or output shaft adjustments
- 10.3.3 Perform clutch pack adjustments
- 10.3.4 Perform range sensor adjustments

10.4 Disassemble and assemble components of a transmission
- 10.4.1 Disassemble and assemble the planetary gear train
- 10.4.2 Disassemble and assemble the front pump
- 10.4.3 Disassemble and assemble the valve body
- 10.4.4 Disassemble and assemble clutch packs

10.5 Use factory service information provided to complete tasks
10.6 Use tools provided to complete tasks

AST 11.0 — Perform engine measuring, inspecting, service and diagnosis on the head or block of an engine to related tasks identified in the ASE Education Foundation Automobile Program Standards — Automobile Engine Repair Task List (ASE Test A1)

11.1 Measure and inspect the pistons and connecting rods
11.2 Measure and inspect cylinder diameter
11.3 Measure and inspect cylinder taper and bore with a dial bore gauge
11.4 Measure and inspect the cylinder head
11.5 Measure and inspect valve guides
11.6 Measure and inspect the valves
11.7 Measure and inspect valve stem to guide clearance
11.8 Measure and inspect the camshaft or crankshaft
11.9 Measure and inspect the valve springs
11.10 Measure and inspect valve timing
11.11 Measure and inspect the timing chain or belt
11.12 Identify the clearance specifications for any item requiring measuring and inspecting
11.13 Use the factory service information provided
11.14 Determine which components need to be replaced or repaired on a given engine head or block
11.15 Use the precision engine measurement tools required for measuring or inspecting

AST 12.0 — Use electrical service information resources

12.1 Locate specifications and other service information using electronic service information resources

Standards and Competencies: College/Postsecondary Standards

AST 1.0 — Perform vehicle HVAC system diagnosis and testing to related tasks in the ASE Education Foundation Automobile Program Standards — Automobile Heating and Air Conditioning Task List (ASE Test A7)

1.1 Diagnose and repair an inoperative HVAC system on a current model vehicle
1.2 Use a provided factory scan tool for current model vehicle
- 1.2.1 Read DTC with scan tool
- 1.2.2 Read data with scan tool
- 1.2.3 Perform an actuator test with scan tool

1.3 Use factory service information provided
- 1.3.1 Identify correct test procedures
- 1.3.2 Follow the correct test procedure
- 1.3.3 Identify connector pin-outs
- 1.3.4 Identify component locations
- 1.3.5 Use wiring schematics

1.4 Use provided test equipment correctly
- 1.4.1 Use a DVOM or DMM
- 1.4.2 Use a test light
- 1.4.3 Use A/C service gauges

1.5 Use a repair order
- 1.5.1 Verify complaint

1.5.2 Repair vehicle
1.5.3 Verify repair was successful

1.6 Identify hybrid vehicle A/C system electrical circuits and service/safety precautions

AST 2.0 — Perform vehicle engine performance diagnosis and testing on a current model vehicle to related tasks in the ASE Education Foundation Automobile Program Standards — Automobile Engine Performance Task List (ASE Test A8)

2.1 Diagnose and repair an engine performance issue on a current model vehicle.
2.1.1 Read data with scan tool
2.1.2 Perform an actuator test with scan tool
2.2 Use factory service information provided
2.2.1 Identify correct test procedures
2.2.2 Follow the correct test procedure
2.2.3 Identify connector pin-outs
2.2.4 Identify component locations
2.2.5 Use wiring schematics
2.6 Use provided test equipment correctly
2.6.1 Use a DVOM or DMM
2.6.2 Use a test light
2.6.3 Use a fuel pressure gauge
2.7 Use a repair order
2.7.1 Verify complaint
2.7.2 Repair vehicle
2.7.3 Verify repair was successful

AST 3.0 — Perform steering, suspension and wheel alignment to related tasks identified in the ASE Education Foundation Automobile Program Standards — Automobile Suspension and Steering Task List (ASE Test A4)

3.1 Prepare to complete a wheel alignment
3.1.1 Read and interpret a repair order
3.1.2 Perform complete pre-alignment inspection
3.1.3 Evaluate vehicle condition and readiness for alignment
3.2 Identify vehicle suspensions system and components
3.3 Identify vehicle steering system and components
3.4 Identify alignment procedure required
3.5 Take alignment measurements using alignment system provided
3.6 Record alignment measurements
3.7 Recall and record vehicle alignment specifications
3.8 Evaluate vehicle alignment condition
3.9 Explain vehicle alignment adjustment procedures
3.10 Explain advanced alignment diagnostic procedures
3.11 Explain use of aftermarket alignment products
3.12 Identify hybrid vehicle power steering system electrical circuits and safety precautions

AST 4.0 — Demonstrate application of environment, health and safety knowledge in auto service situations to related OSHA section 1910 standards and EPA standards

4.1 Identify personal protective equipment
4.2 Explain the use of personal protective equipment
4.3 Recall information about related EPA and OSHA requirements
4.4 Identify blood-borne pathogens kits
4.5 Explain the use of blood-borne pathogens kits
4.6 Answer questions from a provided material SDS sheet
4.7 Describe proper use of a fire extinguisher

AST 5.0 — Demonstrate customer service skills to commonly accepted standards of performance

5.1 Answer questions posed by a customer
5.2 Use appropriate and professional manner in customer meeting
5.3 Clearly and effectively communicate with the customer information on the diagnosis and repair of the vehicle

AST 6.0 — Perform electronic circuit diagnosis, testing and wire repair to related tasks identified in ASE Catalog of Automobile Tests – Automobile Test A6 (Electrical/Electronic Systems)

6.1 Construct an electrical circuit from supplied material and a wiring diagram
6.2 Check electrical circuit operation
6.3 Take electrical readings on the circuit with a DVOM. ***Note:*** A shunt may be used when measuring current.
6.4 Diagnose and repair the circuit
6.5 Confirm the repair of the circuit

AST 7.0 — Perform electronic circuit diagnosis, testing and wire repair to related tasks identified in the ASE Education Foundation Automobile Program Standards — Automobile Electrical/Electronic Systems Task List (ASE Test A6)

7.1 Electrical circuit diagnosis through oscilloscope pattern interpretation
- 7.1.1 Use a provided oscilloscope
- 7.1.2 Answer questions based on oscilloscope readings
- 7.1.3 Explain basic oscilloscope operation

7.2 Identify high-voltage circuits of an electric or hybrid electric vehicle and related safety precautions.

7.3 Identify hybrid vehicle auxiliary (12 v) battery service, repair, and test procedures.

AST 8.0 — Perform service, testing and diagnosis of manual drive trains, axles, drive trains and transfer cases to related tasks identified in the ASE Education Foundation Automobile Program Standards — Automobile Manual Drive Train and Axles Task List (ASE Test A3)

8.1 Identify components of manual drive trains, axles, drive trains and transfer cases

8.2 Inspect clutch operating components for wear/damage and determine necessary action
- 8.2.1 Measure flywheel run-out and crankshaft endplay and determine necessary action
- 8.2.2 Inspect transmission/transaxle components for wear/damage and determine necessary action
- 8.2.3 Measure endplay/preloads on transmission/transaxle shafts and determine necessary action
- 8.2.4 Inspect, measure, reassemble and/or reinstall synchronizer assemblies
- 8.2.5 Inspect, measure, adjust and/or reassemble transaxle final drive assemblies
- 8.2.6 Check driveshaft phasing, measure driveshaft run out and measure driveshaft operating angles
- 8.2.7 Measure companion flange run-out and determine necessary action
- 8.2.8 Inspect ring gear and measure run-out and determine necessary action
- 8.2.9 Measure and adjust drive pinion depth and drive pinion bearing preload
- 8.2.10 Measure and adjust side bearing preload, ring and pinion gear backlash and backlash variation
- 8.2.11 Check ring and pinion gear contact patterns and determine necessary action
- 8.2.12 Measure rotating torque on a limited slip differential and determine necessary action
- 8.2.13 Inspect and reinstall limited slip clutch components

8.3 Use factory service information provided to complete tasks

8.4 Use tools provided to complete tasks

8.5 Determine which components need to be replaced or repaired in a given situation

AST 9.0 — Perform brake service, testing and diagnosis on a brake system on a bench to related tasks identified in the ASE Education Foundation Automobile Program Standards — Automobile Brakes Task List (ASE Test A5)

9.1 Identify brake components

9.2 Diagnose pressure concerns in the brake system using hydraulic principles
- 9.2.1 Fabricate brake lines (double flare and ISO types)
- 9.2.2 Inspect and measure brake drums and determine necessary action
- 9.2.3 Remove, inspect and install brake shoes, springs, pins, clips, levers, adjusters and other brake hardware
- 9.2.4 Remove, inspect and install wheel cylinders
- 9.2.5 Re-adjust brake shoes and parking brake before install brake drums
- 9.2.6 Remove, inspect, install caliper, pads and related hardware and determine necessary action
- 9.2.7 Clean, inspect and measure rotor with a dial indicator and a micrometer and determine necessary action

9.2.8 Check parking brake components; clean, lubricate, adjust or replace as necessary
9.2.9 Inspect brake booster and determine necessary action
9.2.10 Remove, clean, inspect, repack and install wheel bearings; install hub and adjust wheel bearings

9.3 Identify and inspect ABS components and determine necessary action
9.3.1 Diagnose ABS electronic controls and components
9.3.2 Test, diagnose and service ABS speed sensors, toothed rings and circuits using an oscilloscope or DVOM

9.4 Use factory service information provided to complete the above task

9.5 Use tools provided to complete the above task

AST 10.0 — Perform automatic transmission service, testing and diagnosis to related tasks identified in the ASE Education Foundation Automobile Program Standards— Automobile Automatic Transmission/Transaxle Task List (ASE Test A2)

10.1 Identify different components on the transmission

10.2 Diagnose and inspect a transmission on a bench
10.2.1 Check input or output shaft endplay and determine necessary action
10.2.2 Check clutch clearances and determine necessary action
10.2.3 Perform air checks on the clutches and determine necessary action
10.2.4 Measure pump clearances and determine necessary action

10.3 Diagnose electrical components on the transmission and determine necessary action

10.4 Adjust components of an automatic transmission
10.4.1 Perform valve body adjustments
10.4.2 Perform input or output shaft adjustments
10.4.3 Perform clutch pack adjustments
10.4.4 Perform range sensor adjustments

10.5 Disassemble and assemble components of an automatic transmission
10.5.1 Disassemble, assemble and inspect the planetary gear train and determine necessary action
10.5.2 Disassemble, assemble and inspect the front pump and determine necessary action
10.5.3 Disassemble, assemble and inspect the valve body and determine necessary action
10.5.4 Disassemble, assemble and inspect clutch packs and determine necessary action

10.6 Use factory service information provided to complete tasks

10.7 Use tools provided to complete tasks

10.8 Describe the operational characteristics of a hybrid vehicle drive train.

AST 11.0 — Perform engine measuring, inspecting, service and diagnosis on the head or block of an engine to related tasks in the ASE Education Foundation Automobile Program Standards — Automobile Engine Repair Task List (ASE Test A1)

11.1 Measure and inspect the pistons and connecting rods and determine necessary action

11.2 Measure and inspect cylinder diameter and determine necessary action

11.3 Measure and inspect cylinder taper and bore with a dial bore gauge and determine necessary action

11.4 Measure and inspect the cylinder head and determine necessary action

11.5 Measure and inspect valve guides and determine necessary action

11.6 Measure and inspect the valves and determine necessary action

11.7 Measure and inspect valve stem to guide clearance and determine necessary action

11.8 Measure and inspect the camshaft of crankshaft and determine necessary action

11.9 Measure and inspect the valve springs and determine necessary action

11.10 Measure and inspect valve timing and determine necessary action

11.11 Measure and inspect the timing chain or belt and determine necessary action

11.12 Identify the clearance specifications for any item requiring measuring and inspecting

11.13 Use the factory service information provided

11.14 Determine which components need to be replaced or repaired in a given situation
11.15 Use the precision engine measurement tools required for measuring or inspecting
11.16 Identify hybrid vehicle internal combustion engine service precautions

AST 12.0 — Use electrical service information resources

12.1 Locate specifications and other service information using electronic service information resources

Committee Identified Academic Skills

The technical committee has identified that the following academic skills are embedded in this contest.

Math Skills

- Use fractions to solve practical problems
- Use proportions and ratios to solve practical problems
- Use scientific notation
- Solve practical problems involving percentages
- Measure angles
- Find surface area and perimeter of two-dimensional objects
- Find volume and surface area of three-dimensional objects
- Apply transformations (rotate or turn, reflect or flip, translate or slide and dilate or scale) to geometric figures
- Solve problems using proportions, formulas and functions
- Use laws of exponents to perform operations

Science Skills

- Use the knowledge of potential and kinetic energy
- Use the knowledge of mechanical, chemical and electrical energy
- Use the knowledge of temperature scales, heat and heat transfer
- Use the knowledge of principles of electricity and magnetism
- Use the knowledge of static electricity, current electricity and circuits
- Use the knowledge of magnetic fields and electromagnets
- Use the knowledge of motors and generators

Connections to National Standards

State-level academic curriculum specialists identified the following connections to national academic standards.

Math Standards

- Numbers and operations
- Algebra
- Geometry
- Measurement
- Data analysis and probability
- Problem solving
- Communication
- Connections
- Representation

Source: NCTM Principles and Standards for School Mathematics. For more information, visit: http://www.nctm.org.

Science Standards

- Understands the structure and properties of matter
- Understands the sources and properties of energy
- Understands forces and motion
- Understands the nature of scientific inquiry
- Understands the scientific enterprise

Source: McREL compendium of national science standards. To view and search the compendium, visit: http://www2.mcrel.org/compendium/browse.asp.

Language Arts Standards

- Students read a wide range of print and nonprint texts to build an understanding of texts, of themselves and of the cultures of the United States and the world; to acquire new information; to respond to the needs and demands of society and the workplace; and for personal fulfillment. Among these texts are fiction and nonfiction, classic and contemporary works
- Students apply a wide range of strategies to comprehend, interpret, evaluate and appreciate texts. They draw on their prior experience, their interactions with other readers and writers, their knowledge of word meaning and of other texts, their word identification strategies, and their

understanding of textual features (e.g., sound-letter correspondence, sentence structure, context, graphics)
- Students adjust their use of spoken, written and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes
- Students employ a wide range of strategies as they write and use different writing process elements appropriately to communicate with different audiences for a variety of purposes
- Students apply knowledge of language structure, language conventions (e.g., spelling and punctuation), media techniques, figurative language and genre to create, critique and discuss print and nonprint texts
- Students conduct research on issues and interests by generating ideas and questions and by posing problems. They gather, evaluate and synthesize data from a variety of sources (e.g., print and nonprint texts, artifacts and people) to communicate their discoveries in ways that suit their purpose and audience
- Students use a variety of technological and information resources (e.g., libraries, databases, computer networks, video) to gather and synthesize information and to create and communicate knowledge
- Students use spoken, written and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion, and the exchange of information)

Source: IRA/NCTE Standards for the English Language Arts. To view the standards, visit: www.ncte.org/standards.

AVIATION MAINTENANCE TECHNOLOGY

PURPOSE

To evaluate each contestant's preparation for employment and to recognize outstanding students for excellence and professionalism in the field of aviation maintenance technology.

First, download and review the General Regulations at: http://updates.skillsusa.org.

ELIGIBILITY

Open to active SkillsUSA members enrolled in programs with aviation maintenance technology as the occupational objective.

CLOTHING REQUIREMENT

Class D: Contest Specific — Blue Attire

For both men and women: Official SkillsUSA light blue work shirt; navy pants; black, brown, or tan leather work shoes safety shoes (with protective toe cap.) Safety glasses with side shields or goggles (prescription glasses may be used only if they are equipped with side shields. If not, they must be covered with goggles).

These regulations refer to clothing items that are pictured and described at: www.skillsusastore.org. If you have questions about clothing or other logo items, call 800-401-1560 or 703-956-3723.

Note: Contestants must wear their official contest clothing to the contest orientation meeting.

EQUIPMENT AND MATERIALS

1. Supplied by the technical committee:
   a. All necessary tools and equipment for the contest
   b. All necessary information and furnishings for judges and technical committees
2. Supplied by the contestant:
   a. Calculator (nonprogrammable)
   b. All competitors must create a one-page résumé and submit a hard copy to the technical committee chair at orientation. Failure to do so will result in a 10-point penalty.

      Note: Your contest may also require a hard copy of your résumé as part of the actual contest. Check the Contest Guidelines and/or the updates page on the SkillsUSA website at http://updates.skillsusa.org.

   c. Ear plugs
   d. Safety glasses

SCOPE OF THE CONTEST

The contest will be consistent with the airframe and powerplant mechanics certification guide published by the Department of Transportation Federal Aviation Administration Advisory Circular EA-AC 65-2D [Amdt. 147–2, 35 FR 5535, April 3, 1970, as amended by Amdt. 147–5, 57 FR 28960, June 29, 1992] and Sec. 6(c), Dept. of Transportation Act; 49 U.S.C. 1655(c) [Amdt. 147–2, 35 FR 5535, April 3, 1970, as amended by Amdt. 147–5, 57 FR 28961, June 29, 1992].

The high school contest will cover the competencies classified as general aviation by the FAA.

The college/postsecondary contest will cover those competencies classified as power plant and airframe by the FAA.

Knowledge Performance

The contest will include a written knowledge test assessing general knowledge of aviation maintenance technology. Definitions, knowledge, processes and procedures relevant to aviation maintenance technology will be assessed.

Skill Performance

The contest will include a series of operations. A total of eight to 15 operations will be assigned; each operation must be broken down

into specific criteria and points assigned based on the difficulty of the task.

Contest Guidelines

1. Tasks assigned to a contestant will not have a set time limit or sequence.
2. The following shop safety rules will be followed:
   a. Safety glasses must be used
   b. No loose clothing is permitted
   c. Long hair must be tied behind the head and netted or worn under a cap
   d. No jewelry will be allowed

Standards and Competencies (High School Contest)

AMT 1.0 — Apply knowledge of basic aviation electricity to FAA general aviation competencies

1.1 Calculate and measure capacitance and inductance
1.2 Calculate and measure electrical power
1.3 Measure voltage, current, resistance and continuity
1.4 Determine the relationship of voltage, current and resistance in electrical circuits
1.5 Read and interpret aircraft electrical circuit diagrams including solid state devices and logic functions
1.6 Inspect and service batteries

AMT 2.0 — Interpret aircraft drawings to FAA general aviation competencies

2.1 Use aircraft drawings, symbols and system schematics
2.2 Draw sketches of repairs and alterations
2.3 Use blueprint information
2.4 Use graphs and charts

AMT 3.0 — Use weight and balance knowledge to FAA general aviation competencies

3.1 Weigh aircraft
3.2 Perform complete weight-and-balance check and record data

AMT 4.0 — Demonstrate the ability to install fluid lines/fittings to FAA general aviation competencies

4.1 Fabricate and install rigid and flexible fluid lines and fittings

AMT 5.0 — Demonstrate a knowledge of materials and processes to FAA general aviation competencies

5.1 Identify and select appropriate nondestructive testing methods
5.2 Perform dye penetrant, eddy current, ultrasonic and magnetic particle inspections
5.3 Perform basic heat-treating processes
5.4 Identify and select aircraft hardware and materials
5.5 Inspect and check welds
5.6 Perform precision measurements

AMT 6.0 — Demonstrate knowledge of ground operation and servicing to FAA general aviation competencies

6.1 Start, ground operate, move, service and secure aircraft and identify typical ground operation hazards
6.2 Identify and select fuels

AMT 7.0 — Demonstrate knowledge of cleaning and corrosion control to FAA general aviation competencies

7.1 Identify and select cleaning materials
7.2 Inspect, identify, remove and treat aircraft corrosion and perform aircraft cleaning

AMT 8.0 — Demonstrate knowledge of mathematics to FAA general aviation competencies

8.1 Extract roots and raise numbers to a given power
8.2 Determine areas and volumes of various geometrical shapes
8.3 Solve ratio, proportion and percentage problem
8.4 Perform algebraic operations involving addition, subtraction, multiplication and division of positive and negative numbers

AMT 9.0 — Use maintenance forms and records to FAA general aviation competencies

9.1 Write descriptions of work performed including aircraft discrepancies and corrective actions using typical aircraft maintenance records
9.2 Complete required maintenance forms, records and inspection reports

AMT 10.0 — Recall knowledge of basic physics to FAA general aviation competencies

10.1 Use and understand the principles of simple machines; sound, fluid and heat dynamics; basic aerodynamics; aircraft structures; and theory of flight

AMT 11.0 — Use maintenance publications to FAA general aviation competencies

11.1 Demonstrate ability to read, comprehend and apply information contained in FAA and manufacturers' aircraft maintenance specifications, data sheets, manuals, publications and related federal guidelines
11.2 Use aviation regulations, airworthiness directives, and advisory material
11.3 Read technical data

AMT 12.0 — Explain mechanic privileges and limitations to FAA general aviation competencies

12.1 Exercise mechanic privileges within the limitations prescribed by Part 65 of this chapter

AMT 13.0 — Demonstrate knowledge of job-related safety requirements to FAA general aviation competencies

13.1 Demonstrate proper application of job site and shop rules and regulations (OSHA)
13.2 Demonstrate correct selection and use of electrical and hand tools
13.3 Demonstrate proper techniques and practices for working on and around live equipment

Standards and Competencies: Airframe Structures, Systems and Components (College/Postsecondary Contest)

AMT 1.0 — Maintain wood structures to FAA power plant and airframe competencies

1.1 Service and repair wood structures
1.2 Identify wood defects
1.3 Inspect wood structures

AMT 2.0 — Maintain aircraft covering to FAA power plant and airframe competencies

2.1 Select and apply fabric and fiberglass covering materials
2.2 Inspect, test and repair fabric and fiberglass

AMT 3.0 — Maintain aircraft finishes to FAA power plant and airframe competencies

3.1 Apply trim, letters and touchup paint
3.2 Identify and select aircraft finishing materials
3.3 Apply finishing materials
3.4 Inspect finishes and identify defects

AMT 4.0 — Maintain sheet metal and nonmetallic structures to FAA power plant and airframe competencies

4.1 Select, install and remove special fasteners for metallic, bonded and composite structures
4.2 Inspect bonded structures
4.3 Inspect, test and repair fiberglass, plastics, honeycomb, composite and laminated primary and secondary structures
4.4 Inspect, check, service and repair windows, doors and interior furnishings
4.5 Inspect and repair sheet-metal structures
4.6 Install conventional rivets
4.7 Form, lay out and bend sheet metal

AMT 5.0 — Demonstrate ability in aviation welding to FAA power plant and airframe competencies

5.1 Weld magnesium and titanium
5.2 Solder stainless steel
5.3 Fabricate tubular structures
5.4 Solder, braze, gas-weld and arc-weld steel
5.5 Weld aluminum and stainless steel

AMT 6.0 — Demonstrate knowledge of assembly and rigging to FAA power plant and airframe competencies

6.1 Rig rotary-wing aircraft
6.2 Rig fixed-wing aircraft
6.3 Check alignment of structures
6.4 Assemble aircraft components, including flight control surfaces
6.5 Balance, rig and inspect movable primary and secondary flight control surfaces
6.6 Jack aircraft

AMT 7.0 — Apply knowledge of airframe inspection to FAA power plant and airframe competencies

7.1 Perform airframe conformity and airworthiness inspections

AMT 8.0 — Apply knowledge of aircraft landing gear systems to FAA power plant and airframe competencies

8.1 Inspect, check, service and repair landing gear, retraction systems, shock struts, brakes, wheels, tires and steering systems

AMT 9.0 — Apply knowledge of hydraulic and pneumatic power systems to FAA power plant and airframe competencies

9.1 Repair hydraulic and pneumatic power systems components
9.2 Identify and select hydraulic fluids
9.3 Inspect, check, service, troubleshoot and repair hydraulic and pneumatic power systems

AMT 10.0 — Ability to apply knowledge of cabin atmosphere control systems to FAA power plant and airframe competencies

10.1 Inspect, check, troubleshoot, service and repair heating, cooling, air conditioning and pressurization systems and air cycle machines
10.2 Inspect, check, troubleshoot, service and repair heating, cooling, air conditioning and pressurization systems
10.3 Inspect, check, troubleshoot, service and repair oxygen systems

AMT 11.0 — Apply knowledge of aircraft instrument systems to FAA power plant and airframe competencies

11.1 Inspect, check, service, troubleshoot and repair electronic flight instrument systems and both mechanical and electrical heading, speed, altitude, temperature, pressure and position indicating systems to include the use of built-in test equipment
11.2 Install instruments and perform a static pressure system leak test

AMT 12.0 — Apply knowledge of communication and navigation systems to FAA power plant and airframe competencies

12.1 Inspect, check and troubleshoot autopilot, service and approach coupling systems
12.2 Inspect, check and service aircraft electronic communication and navigation systems, including VHF passenger address interphones and static discharge devices, aircraft VOR, ILS, LORAN, radar beacon transponders, flight management computers, and GPWS
12.3 Inspect and repair antenna and electronic equipment installations

AMT 13.0 — Apply knowledge of aircraft fuel systems to FAA power plant and airframe competencies

13.1 Check and service fuel dump systems
13.2 Perform fuel management transfer and defueling
13.3 Inspect, check and repair pressure fueling systems
13.4 Repair aircraft fuel system components
13.5 Inspect and repair fluid quantity indicating systems
13.6 Troubleshoot, service and repair fluid pressure and temperature warning systems
13.7 Inspect, check, service, troubleshoot and repair aircraft fuel systems

AMT 14.0 — Apply knowledge of aircraft electrical systems to FAA power plant and airframe competencies

14.1 Repair and inspect aircraft electrical system components; crimp and splice wiring to manufacturers' specifications; and repair pins and sockets of aircraft connectors
14.2 Install, check and service airframe electrical wiring, controls, switches, indicators and protective devices
14.3 Inspect, check, troubleshoot, service and repair alternating and direct current electrical systems
14.4 Inspect, check and troubleshoot constant speed and integrated speed drive generators

AMT 15.0 — Apply knowledge of position and warning systems to FAA power plant and airframe competencies

15.1 Inspect, check and service speed and configuration warning systems, electrical brake controls and anti-skid systems
15.2 Inspect, check, troubleshoot and service landing gear position indicating and warning systems

AMT 16.0 — Apply knowledge of ice and rain control systems to FAA power plant and airframe competencies

16.1 Inspect, check, troubleshoot, service and repair airframe ice and rain control systems

AMT 17.0 — Apply knowledge of fire protection systems to FAA power plant and airframe competencies

17.1 Inspect, check and service smoke and carbon monoxide detection systems
17.2 Inspect, check, service, troubleshoot and repair aircraft fire detection and extinguishing systems

AMT 18.0 — Demonstrate knowledge of job-related safety requirements to FAA power plant and airframe competencies

18.1 Demonstrate proper application of job site and shop rules and regulations (OSHA)
18.2 Demonstrate correct selection and use of electrical and hand tools
18.3 Demonstrate proper techniques and practices for working on and around live equipment

Standards and Competencies: Power Plant Theory, Maintenance, Systems and Components (College/Postsecondary Contest)

AMT 1.0 — Apply knowledge of reciprocating engines to FAA power plant and airframe competencies

1.1 Inspect and repair a radial engine
1.2 Overhaul reciprocating engine
1.3 Inspect, check, service and repair reciprocating engines and engine installations
1.4 Install, troubleshoot and remove reciprocating engines

AMT 2.0 — Apply knowledge of turbine engines to FAA power plant and airframe competencies

2.1 Overhaul turbine engine
2.2 Inspect, check, service and repair turbine engines and turbine engine installations
2.3 Install, troubleshoot and remove turbine engines

AMT 3.0 — Apply knowledge of engine inspection to FAA power plant and airframe competencies

3.1 Perform power plant conformity and air worthiness inspections

AMT 4.0 — Demonstrate knowledge of engine instrument systems to FAA power plant and airframe competencies

4.1 Troubleshoot, service and repair electrical and mechanical fluid rate-of-flow indicating systems
4.2 Inspect, check, service, troubleshoot and repair electrical and mechanical engine temperature, pressure and rpm indicating systems

AMT 5.0 — Demonstrate knowledge of engine fire protection systems to FAA power plant and airframe competencies

5.1 Inspect, check, service, troubleshoot and repair engine fire detection and extinguishing systems

AMT 6.0 — Demonstrate knowledge of engine electrical systems to FAA powerplant and airframe competencies

6.1 Repair engine electrical system components
6.2 Install, check and service engine electrical wiring, controls, switches, indicators and protective devices

AMT 7.0 — Demonstrate knowledge of lubrication systems to FAA powerplant and airframe competencies

7.1 Identify and select lubricants
7.2 Repair engine lubrication system components
7.3 Inspect, check, service, troubleshoot and repair engine lubrication systems

AMT 8.0 — Demonstrate knowledge of ignition and starting systems to FAA power plant and airframe competencies

8.1 Overhaul magneto and ignition harness
8.2 Inspect, service, troubleshoot and repair reciprocating and turbine engine ignition systems and components
8.3 Inspect, service, troubleshoot and repair turbine engine electrical starting systems
8.4 Inspect, service, and troubleshoot turbine engine pneumatic starting systems

AMT 9.0 — Demonstrate knowledge of fuel metering systems to FAA power plant and airframe competencies

9.1 Troubleshoot and adjust turbine engine fuel metering systems and electronic engine fuel controls
9.2 Overhaul carburetor
9.3 Repair engine fuel metering system components
9.4 Inspect, check, service, troubleshoot and repair reciprocating and turbine engine fuel metering systems

AMT 10.0 — Demonstrate knowledge of engine fuel systems to FAA power plant and airframe competencies

10.1 Repair engine fuel system components
10.2 Inspect, check, service, troubleshoot and repair engine fuel systems

AMT 11.0 — Demonstrate knowledge of induction and engine airflow systems to FAA power plant and airframe competencies

11.1 Inspect, check, troubleshoot, service and repair engine ice and rain control systems
11.2 Inspect, check, service, troubleshoot and repair heat exchangers, superchargers, and turbine engine airflow and temperature control systems
11.3 Inspect, check, service and repair carburetor air intake and induction manifolds

AMT 12.0 — Demonstrate knowledge of engine cooling systems to FAA power plant and airframe competencies

12.1 Repair engine cooling system components
12.2 Inspect, check, troubleshoot, service and repair engine cooling systems

AMT 13.0 — Demonstrate knowledge of engine exhaust and reverser systems to FAA power plant and airframe competencies

13.1 Repair engine exhaust system components
13.2 Inspect, check, troubleshoot, service and repair engine exhaust systems
13.3 Troubleshoot and repair engine thrust reverser systems and related components

AMT 14.0 — Demonstrate knowledge of propellers to FAA power plant and airframe competencies

14.1 Inspect, check, service and repair propeller synchronizing and ice control systems
14.2 Identify and select propeller lubricants
14.3 Balance propellers
14.4 Repair propeller control system components
14.5 Inspect, check, service and repair fixed-pitch, constant-speed and feathering propellers, and propeller governing systems
14.6 Install, troubleshoot and remove propellers
14.7 Repair aluminum alloy propeller blades

AMT 15.0 — Demonstrate knowledge of unducted fans to FAA power plant and airframe competencies

15.1 Inspect and troubleshoot unducted fan systems and components

AMT 16.0 — Demonstrate knowledge of auxiliary power units to FAA power plant and airframe competencies

16.1 Inspect, check, service and troubleshoot turbine-driven auxiliary power units

AMT 17.0 — Demonstrate knowledge of job-related safety requirements to FAA power plant and airframe competencies

17.1 Demonstrate proper application of job site and shop rules and regulations to OSHA standards
17.2 Demonstrate correct selection and use of electrical and hand tools
17.3 Demonstrate proper techniques and practices for working on and around live equipment

Committee Identified Academic Skills

The technical committee has identified that the following academic skills are embedded in this contest.

Math Skills

- Use fractions to solve practical problems
- Solve practical problems involving percents
- Measure angles
- Find surface area and perimeter of two-dimensional objects
- Find volume and surface area of three-dimensional objects

Science Skills

- Describe and recognize solids, liquids and gases
- Describe characteristics of types of matter based on physical and chemical properties
- Use knowledge of physical properties (shape, density, solubility, odor, melting point, boiling point, color)
- Use knowledge of chemical properties (acidity, basicity, combustibility, reactivity)
- Use knowledge of classification of elements as metals, metalloids and nonmetals
- Use knowledge of potential and kinetic energy
- Use knowledge of mechanical, chemical and electrical energy
- Use knowledge of heat, light and sound energy
- Use knowledge of temperature scales, heat and heat transfer
- Use knowledge of speed, velocity and acceleration
- Use knowledge of Newton's laws of motion
- Use knowledge of work, force, mechanical advantage, efficiency and power
- Use knowledge of simple machines, compound machines, powered vehicles, rockets and restraining devices
- Use knowledge of principles of electricity and magnetism
- Use knowledge of static electricity, current electricity and circuits
- Use knowledge of magnetic fields and electromagnets
- Use knowledge of motors and generators

Language Arts Skills

- Provide information in conversations and in group discussions
- Demonstrate knowledge of appropriate reference materials
- Use print, electronic databases and online resources to access information in books and articles
- Demonstrate informational writing

Connections to National Standards

State-level academic curriculum specialists identified the following connections to national academic standards.

Math Standards

- Numbers and operations
- Algebra
- Geometry
- Measurement
- Data analysis and probability
- Problem solving
- Reasoning and proof
- Communication
- Connections
- Representation

Source: NCTM Principles and Standards for School Mathematics. For more information, visit: http://www.nctm.org.

Science Standards

- Understands atmospheric processes and the water cycle
- Understands the structure and properties of matter
- Understands the sources and properties of energy
- Understands forces and motion
- Understands the nature of scientific inquiry

Source: McREL compendium of national science standards. To view and search the compendium, visit: http://www2.mcrel.org/compendium/browse.asp.

Language Arts Standards

None Identified

Source: IRA/NCTE Standards for the English Language Arts. To view the standards, visit: www.ncte.org/standards.

Basic Health Care Skills

Purpose
To evaluate each contestant's beginning level of health occupations knowledge and to recognize outstanding students for excellence and professionalism.

First, download and review the General Regulations at: http://updates.skillsusa.org.

Eligibility
Open to students enrolled in any high school health program.

Clothing Requirement
Class B: Healthcare Attire
For both men and women: Official blue scrubs; white socks or skin-tone seamless hose; health-professional's white leather work shoes. Shoes must be all-white leather (no canvas), completely enclosed (no open-toe or open-heel). Athletic-style shoes that meet the aforementioned criteria are acceptable.

Scrubs should fit appropriately for all health contests and should be properly hemmed and wrinkle free. Only plain, white, collarless t-shirts may be worn underneath the scrubs. Hair must be pinned up and off the collar.

These regulations refer to clothing items that are pictured and described at: www.skillsusastore.org. If you have questions about clothing or other logo items, call 800-401-1560 or 703-956-3723.

***Note*:** Contestants must wear their official contest clothing to the contest orientation meeting.

a. Blue scrub uniform
b. Clinical shoes — clean, white and minimal commercial markings

Contestants must meet workplace expectations. No artificial nails, visible tattoos, or more visible piercings than one studded earring in each earlobe will be allowed.

Equipment and Materials
1. Supplied by the technical committee:
   a. All instruments, equipment and materials required for the contest
   b. All necessary information and furnishings for judges and technical committee
   c. Laptop computer, projector and screen (computer will have Windows XP Microsoft Office software and USB ports)
2. Supplied by the contestant:
   a. Watch
   b. Pen (black ink)
   c. Safety glasses/shield (only if needed for the prepared presentation)
   d. All competitors must create a one-page résumé and submit a hard copy to the technical committee chair at orientation. Failure to do so will result in a 10-point penalty.
   e. Bring one copy of your current résumé in your "career" area of interest to the orientation meeting.

      ***Note*:** Five points will be deducted for not providing the résumé.

Scope of the Contest
The scope of the contest is defined by industry standards as set by the SkillsUSA technical committee.

Knowledge Performance
The contest will include a written knowledge test assessing general knowledge of basic health care skills. Topics assessed may include but are not limited to: life sciences related to health care, communication skills, employability, law and ethics, and work safety practices.

Skill Performance
The second portion of the contest will be a series of workstations in which contestants will demonstrate their knowledge of basic health care skills. Topics that will be assessed may include but are not limited to: core therapeutic and clinical skills, emergency care for infants

through adults, communication skills, key medical terms and abbreviations, law and ethics, and work safety. Prior to the event, the contestant will prepare a five- to seven-minute demonstration of a basic health care skill. Guidelines for this presentation are listed below.

Presentation Guidelines

1. The purpose of the presentation is to present a topic related to basic health care through demonstration, display and/or explanation.
2. A presentation will be compact, no larger than 30"x30"x30" and presented in five to seven minutes. A 4'x6' table space will be available. Any visual aids (signs, charts, transparencies, slides, diagrams) are to be prepared by contestants. Three-sided poster display boards and PowerPoint presentations stored on jump drives are permitted **(no note cards)**. No full-size adult mannequins are allowed. No pressurized aerosol cans of any kind will be permitted, and no compressed air, gas or flammable liquid may be used.
3. All employers' names and manufacturers' trade names must be covered or removed.
4. The demonstration will neither promote nor advertise any commercial organization or product.
5. The title should designate the exact nature of the presentation. Catchy titles are not appropriate to the scientific and educational purpose of the presentation.
6. The prepared presentation does not include another person acting as a patient.
7. Time limit: 5–7 minutes
8. Complete a job application and résumé.
9. Be prepared to present an oral interview.

Standards and Competencies

CARE 1.0 — Apply academic knowledge of life sciences as related to the health care professions

- 1.1 Demonstrate knowledge of human anatomy structure and function
  - 1.1.1 Identify major body systems and their functions
  - 1.1.2 Compare interrelationships of the body systems
  - 1.1.3 Describe basic diseases affecting each major body system
  - 1.1.4 Define, pronounce and spell key terms
- 1.2 Integrate concepts of Maslow's Hierarchy of Needs, and human growth and development
  - 1.2.1 List the five levels of Maslow's Hierarchy of Needs
  - 1.2.2 Discuss how clients meet or satisfy each level of Maslow's Hierarchy of Needs
  - 1.2.3 Summarize each of Erickson's eight stages of psychosocial development
- 1.3 Apply knowledge of nutrition
  - 1.3.1 Recall groups of essential nutrients and vitamins, and their functions and sources
  - 1.3.2 Distinguish between digestion, absorption, metabolism and excretion
  - 1.3.3 Describe purposes of key therapeutic diets
  - 1.3.4 Define, pronounce and spell key terms
- 1.4 Perform core therapeutic and clinical skills that relate to most basic health care skill careers
  - 1.4.1 Position, turn and move a client using correct body alignment
  - 1.4.2 Perform the following transfer techniques: dangling, wheelchair, chair and stretcher
  - 1.4.3 Make closed, open and occupied beds
  - 1.4.4 Administer personal hygiene care
  - 1.4.5 Assist client with eating
  - 1.4.6 Feed a patient
  - 1.4.7 Collect specimens to be sent to the laboratory
  - 1.4.8 Perform range of motion exercises
  - 1.4.9 Ambulate a client using a transfer (gait) belt
  - 1.4.10 Ambulate a client using assist devices
  - 1.4.11 Apply cold or warm packs
  - 1.4.12 Use a reagent strip to test a urine specimen
  - 1.4.13 Provide dignified postmortem care
- 1.5 Execute emergency care for the infant to adult age spectrum

1.5.1 Perform basic cardiopulmonary resuscitation
1.5.2 Demonstrate emergency measures for choking
1.5.3 Apply standard first aid bandages and splints
1.5.4 Identify first aid for the following common medical emergencies: bleeding, burns, diabetic reactions, heart attack, hypo/hyperthermia, poisonings, seizures, shock, stroke and trauma

CARE 2.0 — Express verbal and nonverbal communication skills

2.1 Deliver a prepared presentation
2.1.1 Present a basic health care skills entry-level topic
2.1.2 Conduct presentation between five and seven minutes
2.1.3 Follow presentation guidelines as identified by the technical committee

2.2 Demonstrate oral, written and/or telephone communication skills with clients, visitors and staff
2.2.1 Modify communication to meet client needs
2.2.2 Observe, report and document pertinent client data
2.2.3 Exhibit effective interpersonal relationships
2.2.4 Overcome physical and psychological barriers to communication
2.2.5 Express sensitivity to multicultural and multilingual needs
2.2.6 Provide for emotional support of client during procedure/treatment
2.2.7 Assess client's ability to understand
2.2.8 Adapt communication to individual needs including paraphrasing or translating
2.2.9 Ask for clarification when needed

2.3 Define, pronounce, spell and use key medical terms and abbreviations
2.3.1 Define prefixes, suffixes and word roots
2.3.2 Define, pronounce and spell key medical terms
2.3.3 Recognize basic medical abbreviations

CARE 3.0 — Perceive major career opportunities and systems available in health care

3.1 Describe different careers such as, but not limited to, dentistry, diagnostic, emergency medical services, health information, hearing, medicine, mental health, laboratory, mortuary, nursing, nutrition, radiology, social, therapeutic, veterinary and vision services
3.1.1 Compare various career levels between professional, technologist, technician and aide/assistant
3.1.2 Compare educational requirements from diploma, associate's, baccalaureate, master's and doctorate degrees for certification, registration and/or licensure
3.1.3 Differentiate realm of health care settings
3.1.4 Describe range of services offered
3.1.5 List a governmental or professional organization with oversight in health care
3.1.6 Identify the role and responsibilities of the various levels of individuals within the health care profession

3.2 Discuss current trends and events in health care
3.2.1 Discuss increasing costs of health care and reimbursement issues
3.2.2 Discuss alternative/ complementary methods of health care
3.2.3 Discuss wellness/prevention programs
3.2.4 Discuss health care reform
3.2.5 Discuss pediatric/geriatric abuse
3.2.6 Discuss technology and science
3.2.7 Discuss governmental bodies and regulatory agencies
3.2.8 Discuss client populations and needs
3.2.9 Discuss allocation of resources

3.2.10 Discuss accessibility to health care and insurance
3.2.11 Discuss worker shortage and closure of facilities
3.2.12 Discuss malpractice costs

3.3 Submit a résumé at the pre-contest briefing on Tuesday
3.3.1 Type the document using an easy to read, appropriate font
3.3.2 Provide personal contact information of name, address, phone number and/or email address
3.3.3 State professional goal(s)
3.3.4 Highlight educational background
3.3.5 List career history
3.3.6 Limit to one page

3.4 Complete a job application
3.4.1 Write neatly and legibly
3.4.2 Use English and grammar correctly
3.4.3 Follow application form directions for completion
3.4.4 Use black ink
3.4.5 Prepare correspondence related to the employment process

3.5 Demonstrate interview skills
3.5.1 Present a neat and clean appearance
3.5.2 Introduce self
3.5.3 Listen closely to questions
3.5.4 Speak clearly
3.5.5 Provide appropriate response to questions
3.5.6 Demonstrate good posture, eye contact and mannerisms
3.5.7 Shake hands and thank the interviewers

CARE 4.0 — Epitomize quality employment and teamwork skills

4.1 Exemplify professional conduct and appearance
4.1.1 Exhibit personal skills, such as attendance, time management, individual responsibility and teamwork
4.1.2 Use analytical skills to solve problems and make decisions
4.1.3 Adapt to changing situations

4.2 Apply basic mathematical concepts to include addition, subtraction, division, and multiplication of whole numbers, common fractions, decimals fractions, ratio, proportion percentage, average, area, volume, metrics and written problems specific to area of training
4.2.1 Measure and record vital signs, height, weight, intake and output
4.2.2 Graph TPR and B/P
4.2.3 Convert between the metric and household volume, length and weight measurements and calculations
4.2.4 Relate standard time with the 24-hour clock

4.3 Possess cultural diversity skills
4.3.1 Differentiate between culture, ethnicity and race
4.3.2 Identify some of the major ethnic groups in the United States
4.3.3 Cite how bias, prejudice or stereotyping can cause a barrier to effective relationships with others
4.3.4 Recognize how language, personal space, touching, eye contact and gestures are affected by cultural diversity
4.3.5 Compare and contrast the diverse health beliefs of different ethnic/cultural groups
4.3.6 Identify methods health care workers can use to show respect for individual religious beliefs and different cultural backgrounds

4.4 Incite teamwork
4.4.1 Practice team membership skills such as cooperation, leadership and anticipation of the needs of coworkers
4.4.2 Respect cultural and religious differences of team members
4.4.3 Interact with others in a manner consistent with the health care team structure and lines of authority
4.4.4 Manage conflict within the workplace through consideration of others' points of view
4.4.5 Respect interdisciplinary differences among team members

CARE 5.0 — Differentiate between law and ethics

5.1 Explain legal responsibilities, limitations and the implications of their action within the health care delivery system
- 5.1.1 Operate within the legal framework of liabilities in your scope of work or practice
- 5.1.2 Explain client rights
- 5.1.3 Recognize and report signs of neglect and abuse
- 5.1.4 Explain situations that have the potential for legal problems
- 5.1.5 Define key terminology related to law
- 5.1.6 Perform in accordance to regulations, policies, laws, and legislated rights of clients
- 5.1.7 Be aware of malpractice and liability issues
- 5.1.8 Maintain client confidentiality
- 5.1.9 Obtain informed consent
- 5.1.10 Comply with legal requirements of documentation

5.2 Describe accepted ethical practices with respect to cultural, social and ethnic differences within the health care environment
- 5.2.1 Perform duties within established ethical guidelines, supporting sensitive and quality health care delivery
- 5.2.2 Respect client rights and self-determination
- 5.2.3 Promote justice and equal treatment to all persons
- 5.2.4 Recognize the importance of client need over other considerations
- 5.2.5 Define key terminology related to ethics

CARE 6.0 — Create a safe working environment

6.1 Apply principles of body mechanics
- 6.1.1 Use correct body mechanics in the health care environment
- 6.1.2 Observe safety standards established by Occupational Safety and Health Administration (OSHA)

6.2 Be vigilant for fire safety
- 6.2.1 Implement correct plan of action during fire emergencies
- 6.2.2 Differentiate between the four main classes of fire extinguishers
- 6.2.3 Simulate the operation of a fire extinguisher
- 6.2.4 Describe the PASS acronym for fire extinguisher usage

6.3 Practice infection control
- 6.3.1 Perform correct hand-washing technique
- 6.3.2 Identify at-risk behaviors and modes of transmission of pathogens
- 6.3.3 Apply principles of disinfection
- 6.3.4 State the chain of infection's six components
- 6.3.5 Differentiate between antisepsis, disinfection and sterilization

6.4 Employ standard precautions/body substance isolation techniques
- 6.4.1 Use standard precautions outlined by the Centers for Disease Control and Prevention (CDC)
- 6.4.2 Observe blood-borne pathogen standards established by OSHA
- 6.4.3 Maintain transmission-based isolation techniques by donning the appropriate personal protective equipment (PPE) when indicated
- 6.4.4 Manage hazardous materials

6.5 Demonstrate aseptic technique
- 6.5.1 Create and maintain a sterile field
- 6.5.2 Don and remove sterile gloves/gown
- 6.5.3 Assist with minor surgical procedures
- 6.5.4 Apply principles of sterilization
- 6.5.5 Clean, disinfect and sterilize surfaces, instruments, supplies, and equipment using appropriate methods
- 6.5.6 Prepare and/or package equipment for sterilization

6.6. Manage a safe environment
- 6.6.1 Report and/or correct safety hazards
- 6.6.2 Maintain equipment in proper working order
- 6.6.3 Maintain a safe client environment
- 6.6.4 Verify identity of client

6.6.5 Observe safety precautions during oxygen administration
6.6.6 Use precautions in the presence of ionizing radiation
6.6.7 Handle materials, supplies and equipment safely
6.6.8 Comply with pertinent regulatory guidelines, including OSHA standards

6.7 Complete NOCTI skills-related written test of 25 to 50 multiple choice questions

6.8 Create a safe work environment

Committee Identified Academic Skills

The technical committee has identified that the following academic skills are embedded in this contest.

Math Skills

- Use fractions to solve practical problems
- Use proportions and ratios to solve practical problems
- Simplify numerical expressions
- Solve practical problems involving percents
- Solve problems using proportions, formulas and functions
- Convert metric to English volume, length, weight measurements and calculations
- Relate standard time with the 24-hour clock (military time)

Science Skills

- Use knowledge of cell theory
- Use knowledge of patterns of cellular organization (cells, tissues, organs, systems)
- Describe basic needs of organisms
- Describe factors that influence how populations change over time
- Use knowledge of reproduction and transmission of genetic information
- Describe and recognize elements, compounds, mixtures, acids, bases and salts
- Describe and recognize solids, liquids and gases
- Describe characteristics of types of matter based on physical and chemical properties
- Use knowledge of physical properties (shape, density, solubility, odor, melting point, boiling point, color)
- Use knowledge of chemical properties (acidity, basicity, combustibility, reactivity)
- Describe phases of matter
- Use knowledge of potential and kinetic energy
- Use knowledge of mechanical, chemical and electrical energy
- Use knowledge of heat, light, and sound energy
- Use knowledge of temperature scales, heat and heat transfer
- Use knowledge of sound and technological applications of sound waves
- Use knowledge of the nature and technological applications of light
- Use knowledge of work, force, mechanical advantage, efficiency and power

Language Arts Skills

- Provide information in conversations and in group discussions
- Provide information in oral presentations
- Demonstrate use of such verbal communication skills as word choice, pitch, feeling, tone and voice
- Demonstrate use of such nonverbal communication skills as eye contact, posture and gestures using interviewing techniques to gain information
- Demonstrate comprehension of a variety of informational texts
- Use text structures to aid comprehension
- Identify words and phrases that signal an author's organizational pattern to aid comprehension
- Understand source, viewpoint and purpose of texts
- Organize and synthesize information for use in written and oral presentations
- Demonstrate knowledge of appropriate reference materials
- Use print, electronic databases and online resources to access information in books and articles
- Demonstrate narrative writing
- Demonstrate informational writing
- Edit writing for correct grammar, capitalization, punctuation, spelling, sentence structure and paragraphing

Connections to National Standards

State-level academic curriculum specialists identified the following connections to national academic standards.

Math Standards

- Numbers and operations
- Geometry
- Measurement
- Data analysis and probability
- Problem solving
- Communication
- Connections
- Representation

Source: NCTM Principles and Standards for School Mathematics. For more information, visit: http://www.nctm.org.

Science Standards

- Understands the principle of heredity and related concepts
- Understands the structure and function of cells and organisms
- Understands the structure and properties of matter
- Understands the nature of scientific inquiry
- Understands the scientific enterprise

Source: McREL compendium of national science standards. To view and search the compendium, visit: http://www2.mcrel.org/compendium/browse.asp.

Language Arts Standards

- Students read a wide range of print and nonprint texts to build an understanding of texts, of themselves, and of the cultures of the United States and the world; to acquire new information; to respond to the needs and demands of society and the workplace; and for personal fulfillment. Among these texts are fiction and nonfiction, classic and contemporary works
- Students apply a wide range of strategies to comprehend, interpret, evaluate and appreciate texts. They draw on their prior experience, their interactions with other readers and writers, their knowledge of word meaning and of other texts, their word identification strategies and their understanding of textual features (e.g., sound-letter correspondence, sentence structure, context, graphics)
- Students adjust their use of spoken, written and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes
- Students employ a wide range of strategies as they write and use different writing process elements appropriately to communicate with different audiences for a variety of purposes
- Students apply knowledge of language structure, language conventions (e.g., spelling and punctuation), media techniques, figurative language and genre to create, critique and discuss print and nonprint texts
- Students conduct research on issues and interests by generating ideas and questions, and by posing problems. They gather, evaluate and synthesize data from a variety of sources (e.g., print and nonprint texts, artifacts, people) to communicate their discoveries in ways that suit their purpose and audience
- Students use a variety of technological and information resources (e.g., libraries, databases, computer networks, video) to gather and synthesize information and to create and communicate knowledge
- Students use spoken, written and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion and the exchange of information)

Source: IRA/NCTE Standards for the English Language Arts. To view the standards, visit: www.ncte.org/standards.

Broadcast News Production

Purpose

To evaluate each contestant's preparation for employment and to recognize outstanding teams for excellence and professionalism in the fields of broadcast news production, news anchoring, directing, technical directing and floor directing.

First, download and review the General Regulations at: http://updates.skillsusa.org.

Clothing Requirement

For the anchorperson:

For men: Official blazer, jacket or sweater; black dress slacks; white dress shirt; plain black tie with no pattern or SkillsUSA black tie; black socks and black shoes.
For women: Official blazer or jacket; black dress skirt (knee-length) or slacks with businesslike white, collarless blouse or white blouse with small, plain collar that may not extend onto the lapels of the blazer; black sheer or skin-tone seamless hose and black dress shoes.

For other team members:

For men: Official white polo shirt with black dress slacks, black socks and black shoes.
For women: Official white polo shirt with black dress slacks or skirt, black sheer or skin-tone hose and black shoes.

These regulations refer to clothing items that are pictured and described at: www.skillsusastore.org. If you have questions about clothing or other logo items, call 800-401-1560 or 703-956-3723.

Note: Contestants must wear their official contest clothing to the contest orientation meeting.

Eligibility

Open to a team of four active SkillsUSA members enrolled in career and technology programs with media technology and or news broadcasting as part of the curriculum.

Equipment and Materials

1. Supplied by the technical committee:
   a. News set (physical or virtual):
      1. Three cameras with preset shots (one wide shot and one close-up on each anchor). Each camera must be equipped with a teleprompter monitor.
      2. News desk
      3. Studio lighting (preset)
      4. Two lavaliere microphones
   b. Control room:
      1. A production switcher with media stores and a character generator/graphics system (Ross Carbonite Solo Switcher and Ross XPression Graphics recommended)
      2. Headset communication system between control room technical director and studio floor director
      3. Computer with teleprompter software and video cabling to reach each teleprompter head. Teleprompter software is recommended to be MOS compliant so it can communicate directly with the Newsroom Computer System (NRCS) software. (CueScript CueIT recommended as it is included/integrated with Ross Inception News Academic NRCS systems)
   c. Preparation room:
      1. Newsroom Computer System (NRCS) software for rundown and scriptwriting (Ross Inception News Academic version recommended)
      2. Laser printer with ink and paper
      3. Two Apple iPads for anchors
      4. Laptop or desktop computers networked with the computer hosting the NCRS, the laser printer and the computer hosting the teleprompter software
2. Supplied by the contestants:
   a. USB flash drive

b. All competitors must create a one-page résumé and submit a hard copy to the technical committee chair at orientation. Failure to do so will result in a 10-point penalty.

***Note*:** Your contest may also require a hard copy of your résumé as part of the actual contest. Check the Contest Guidelines and/or the updates page on the SkillsUSA website: http://updates.skillsusa.org.

Scope of the Contest

Knowledge Performance

The contest includes a written knowledge exam assessing news terminology, direction terminology, technical direction terminology, floor direction terminology, news ethics, newsroom personnel, scripting and on-air etiquette.

Skill Performance

The contest assesses skills through the development, design and delivery of a newscast production in a simulated environment.

Contest Guidelines

1. Each team shall be comprised of four student members. Two students will serve as the news anchors, one student will serve as the team's director/technical director in the control room, and one student will serve as the studio floor director.
2. Each team will write, produce and complete a three-minute newscast as if it were live.
3. All teams must attend the contest orientation prior to the competition or the team will be disqualified.
4. The assignment will consist of the following:
   a. Each team will receive an identical set of newswire stories (printed or electronic) and an identical set of corresponding muted B-roll video files for use with voice overs. Contestants will work as a team during their assigned contest preparation time to develop their own newscast rundown and production script based on available newswire story facts and context. Each team will return any newswire materials received and any printed rundowns/scripts.
   b. Contestants will review wire service content and videos, then as a team determine the content for the newscast, which must include a balance of international news, national news, regional/local news and sports news stories.
5. Contestants will demonstrate their ability to perform jobs or skills as listed in the standards and competencies section and on the contest score sheet.
6. An appropriate number of rundowns and scripts must be printed during preparation time, including at least one clean copy for the judge(s). Exact number will be determined at contest orientation.
7. Immediately following each team's assigned prep time, each team will be allocated a total 20-minute session in the control room/studio contest space for practice run throughs to declare their readiness to record and complete the recording of their one take (as live) three-minute newscast.
8. Each team member also will take a written knowledge test/quiz as part of the contest.

Standards and Competencies

BNP 1.0 — Organize news scripts per standards as set forth by the technical committee

1.1 Review pre-selected pools of newswire stories (printed or electronic) available for the newscast
1.2 Ask appropriate questions when in need of clarification
1.3 Author clear and concise rundown and scripts for newcast production based on newswire stories selected from available pool
1.4 Proofread scripts for clarity and understanding

BNP 2.0 — Deliver news scripts per standards as set forth by the technical committee

2.1 Maintain a good balance of international, national, local and sports news coverage
2.2 Present a well-developed newscast
2.3 Prepare self appropriately for camera

2.3.1 Maintain and present a professional image
2.3.2 Select appropriate colors and style in clothing

2.4 Use of proper diction, pronunciation and inflection

BNP 3.0 — Demonstrate knowledge of the following vocabulary terms

3.1 Voice over (VO)
3.2 Sound on tape (SOT)
3.3 Voice over/sound on tape (VOSOT)
3.4 Natural sound (Nat Sound)
3.5 Package (PKG)
3.6 Reader (RDR)
3.7 Lower third graphics
3.8 Take
3.9 Safe area
3.10 Lead in
3.11 Out cue
3.12 Sound bite
3.13 Insert

BNP 4.0 — Demonstrate knowledge of floor director hand signals:

4.1 Two minutes
4.2 One minute
4.3 Thirty seconds
4.4 Fifteen seconds
4.5 Ten-second countdown
4.6 Cut
4.7 Stretch
4.8 Speed up
4.9 Cue talent
4.10 Wrap
4.11 Break

BNP 5.0 — Demonstrate knowledge of director cues:

5.1 Standby
5.2 Cue
5.3 Take camera
5.4 Out cues
5.5 Audio cues
5.6 Camera direction
5.6.1 Pan
5.6.2 Tilt
5.6.3 Zoom
5.6.4 Focus
5.6.5 Dolly
5.6.6 Truck

BNP 6.0 — Demonstrate knowledge of technical director actions:

6.1 Cut
6.2 Countdown
6.3 Dissolve
6.4 Fade to black
6.5 Cross fade
6.6 Insert graphics
6.7 Slate

Committee Identified Academic Skills

The technical committee has identified that the following academic skills are embedded in this contest.

Math Skills

- Numbers and operations
- Problem solving
- Communication
- Connections
- Representation
- Addition/subtraction of time

Science Skills

- Use knowledge of sound technology applications

Language Arts Skills

- Provide information in conversations and in group discussions
- Provide information in oral presentations
- Demonstrate use of such verbal communication skills as word choice, pitch, feeling, tone and voice
- Demonstrate use of such nonverbal communication skills as eye contact, posture and gestures using interviewing techniques to gain information
- Analyze mass media messages
- Organize and synthesize information for use in written and oral presentations
- Demonstrate knowledge of appropriate reference materials
- Demonstrate narrative writing
- Demonstrate informational writing
- Edit writing for correct grammar, capitalization, punctuation, spelling, sentence structure and paragraphing

Connections to National Standards

State-level academic curriculum specialists identified the following connections to national academic standards.

Math Standards

None Identified

Source: NCTM Principles and Standards for School Mathematics. For more information, visit: http://www.nctm.org.

Science Standards

- Understands the nature of scientific knowledge
- Understands the nature of scientific inquiry

Source: McREL compendium of national science standards. To view and search the compendium, visit: www2.mcrel.org/compendium/browse.asp.

Language Arts Standards

- Students read a wide range of print and nonprint texts to build an understanding of texts, of themselves, and of the cultures of the United States and the world; to acquire new information; to respond to the needs and demands of society and the workplace; and for personal fulfillment. Among these texts are fiction and nonfiction, classic and contemporary works
- Students apply a wide range of strategies to comprehend, interpret, evaluate and appreciate texts. They draw on their prior experience, their interactions with other readers and writers, their knowledge of word meaning and of other texts, their word identification strategies and their understanding of textual features (e.g., sound-letter correspondence, sentence structure, context, graphics)
- Students adjust their use of spoken, written and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes
- Students employ a wide range of strategies as they write and use different writing process elements appropriately to communicate with different audiences for a variety of purposes
- Students apply knowledge of language structure, language conventions (e.g., spelling and punctuation), media techniques, figurative language and genre to create, critique and discuss print and nonprint texts
- Students conduct research on issues and interests by generating ideas and questions and by posing problems. They gather, evaluate and synthesize data from a variety of sources (e.g., print and nonprint texts, artifacts, people) to communicate their discoveries in ways that suit their purpose and audience
- Students use a variety of technological and information resources (e.g., libraries, databases, computer networks, video) to gather and synthesize information and to create and communicate knowledge
- Students participate as knowledgeable, reflective, creative and critical members of a variety of literacy communities
- Students use spoken, written, and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion and the exchange of information)

Source: IRA/NCTE Standards for the English Language Arts. To view the standards, visit: www.ncte.org/standards.

BUILDING MAINTENANCE

PURPOSE
To evaluate each contestant's preparation for employment and to recognize outstanding students in the field of building maintenance.

First, download and review the General Regulations at: http://updates.skillsusa.org.

ELIGIBILITY
Open to active SkillsUSA members enrolled in career and technical programs with entry-level job skills as the occupational objective. A letter from the appropriate school official on school letterhead stating that the contestant is classified under the provisions of Public Law 105-17, Individuals with Disabilities Education Act, 1997, is required for participation. State associations having restrictions on the release of this information may submit a letter of eligibility on school letterhead that simply states: "I certify that (student name) meets the eligibility requirements for the SkillsUSA Championships Building Maintenance contest. Signed (school official)." The eligibility letter is to be presented to the contest chair at the contestant orientation meeting.

CLOTHING REQUIREMENT
Class C: Contest Specific — Manufacturing/Construction Khaki Attire
For both men and women: Official SkillsUSA khaki work shirt and pants; black, brown, or tan leather work shoes; safety glasses with side shields or goggles (prescription glasses may be used, only if they are equipped with side shields. If not, they must be covered with goggles).

These regulations refer to clothing items that are pictured and described at: www.skillsusastore.org. If you have questions about clothing or other logo items, call 800-401-1560 or 703-956-3723.

Note: Contestants must wear their official contest clothing to the contest orientation meeting.

EQUIPMENT AND MATERIALS
1. Supplied by the technical committee: materials, supplies and equipment
2. Supplied by the contestant:
   a. One pair of plastic or rubber gloves with three-quarter sleeves
   b. Hearing protection devices
   c. All competitors must create a one-page résumé and submit a hard copy to the technical committee chair at orientation. Failure to do so will result in a 10-point penalty.

   ***Note*:** Your contest may also require a hard copy of your résumé as part of the actual contest. Check the Contest Guidelines and/or the updates page on the SkillsUSA website: http://updates.skillsusa.org.

SCOPE OF THE CONTEST
Contestants may be asked to provide an oral explanation of a procedure or to answer a question, but there will be no written test.

Knowledge Performance
The contest does not require a written knowledge test. Contestants will need basic knowledge of cleaning and maintenance, safety and customer service for the skill performance activities.

Skill Performance
The contest will ask participants to demonstrate their ability to perform tasks selected from the following list of competencies as determined by the SkillsUSA Championships technical committee.

The contest areas may include, but are not limited to: carpet care, office cleaning, floor care and liquid measurement.

Contest Guidelines
1. Contestants may be asked to provide an oral explanation of a procedure or to answer a question.
2. Careful instruction and explanation of all tasks to be completed will be given to each

contestant in both oral and written form to ensure that each contestant fully understands the assigned task.
3. Time limits will be assigned for each task, but no bonus points will be awarded for early completion.
4. The judging criteria and points assigned will be determined by the difficulty of the tasks assigned.

Standards and Competencies

BLMT 1.0 — Apply knowledge of proper floor maintenance and floor maintenance machinery to care for a variety of surfaces including carpeted, hardwood, vinyl and tile

1.1 Vacuum, scrub, dust mop and wet mop various surfaces
1.2 Vacuum carpeted surfaces
1.3 Strip wax and clean hardwood, vinyl and tile surfaces
1.4 Operate a floor buffer
1.5 Identify types of surfaces and care needed for proper maintenance
1.6 Demonstrate ability to read and comprehend instructions

BLMT 2.0 — Perform proper carpet vacuuming, shampooing, water extraction and stain removal

2.1 Vacuum carpeted area
2.2 Bonnet clean carpeted area
2.3 Shampoo carpeted area by rotary floor machine or dry foam
2.4 Perform hot water extraction on carpeted area
2.5 Remove stains or spots from carpeted area
2.6 Define carpet terms

BLMT 3.0 — Implement knowledge of custodial chemical measuring, mixing and safety

3.1 Implement steps and procedures to measure and mix chemicals
3.2 Demonstrate knowledge of custodial chemical terminology
3.3 Indicate knowledge and use of Material Safety Data Sheets (MSDS)

BLMT 4.0 — Demonstrate knowledge and use of safety practices in custodial applications

4.1 Demonstrate knowledge of safe work practices in custodial services
4.2 Demonstrate knowledge and practice of safety in use and handling of electrical equipment
4.3 Demonstrate knowledge and use of safety practices when using ladders
4.4 Demonstrate knowledge and use of safety practices in the measuring and mixing of chemicals
4.5 Indicate knowledge of color codes used in custodial cleaning equipment

BLMT 5.0 — Clean offices and classrooms to make the rooms hygienic and attractive

5.1 Apply knowledge and procedures in cleaning office spaces and classrooms
5.2 Apply knowledge and use of tools, methods, supplies and equipment to make the rooms clean, hygienic and attractive

BLMT 6.0 — Employ proper window maintenance techniques to wash and clean windows

6.1 Wash windows using correct tools, supplies and equipment
6.2 Clean blinds, shades and shutters of various types

BLMT 7.0 — Clean and maintain walls with a variety of surfaces including painted, tiled, papered and plastered

7.1 Clean various wall surfaces including painted, tiled, papered and plastered walls

BLMT 8.0 — Maintain restrooms using proper cleansing and disinfection techniques

8.1 Demonstrate steps and procedures to clean restrooms and showers
8.2 Clean toilet bowls, urinals and wash basins
8.3 Clean and disinfect restroom and shower ceilings, walls and floors

BLMT 9.0 — Monitor general building maintenance, and provide additional cleaning and supply replenishment sources when needed

9.1 Dust and clean furnace filters
9.2 Dust and clean furniture and fixtures
9.3 Fill dispensers such as soap, towels or paper
9.4 Clean chalk boards

9.5 Identify tools and materials used in custodial services
9.6 Clean and disinfect kitchens, bath, toilet and other public facilities
9.7 Properly collect and dispose of various forms of trash

Committee Identified Academic Skills

The technical committee has identified that the following academic skills are embedded in this contest.

Math Skills

- Use fractions to solve practical problems
- Use proportions and ratios to solve practical problems
- Solve practical problems involving percents
- Solve single variable algebraic expressions
- Solve multiple variable algebraic expressions
- Solve problems using proportions, formulas and functions

Science Skills

- Describe and recognize elements, compounds, mixtures, acids, bases and salts
- Describe and recognize solids, liquids and gases
- Describe characteristics of types of matter based on physical and chemical properties
- Use knowledge of physical properties (shape, density, solubility, odor, melting point, boiling point, color)
- Use knowledge of chemical properties (acidity, basicity, combustibility, reactivity)
- Describe and demonstrate simple compounds (formulas and the nature of bonding)
- Predict chemical changes to matter (types of reactions, reactants and products; and balanced equations)

Language Arts Skills

- Demonstrate comprehension of a variety of informational texts
- Use text structures to aid comprehension
- Demonstrate knowledge of appropriate reference materials
- Use print, electronic databases and online resources to access information in books and articles

Connections to National Standards

State-level academic curriculum specialists identified the following connections to national academic standards.

Math Standards

- Numbers and operations
- Geometry
- Measurement
- Data analysis and probability
- Problem solving
- Communication
- Connections
- Representation

Source: NCTM Principles and Standards for School Mathematics. For more information, visit: http://www.nctm.org.

Science Standards

- Understands the structure and properties of matter
- Understands the sources and properties of energy
- Understands forces and motion

Source: McREL compendium of national science standards. To view and search the compendium, visit: www2.mcrel.org/compendium/browse.asp.

Language Arts Standards

- Students apply a wide range of strategies to comprehend, interpret, evaluate and appreciate texts. They draw on their prior experience, their interactions with other readers and writers, their knowledge of word meaning and of other texts, their word identification strategies and their understanding of textual features (e.g., sound-letter correspondence, sentence structure, context, graphics)
- Students adjust their use of spoken, written and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes
- Students use a variety of technological and information resources (e.g., libraries, databases, computer networks, video) to gather and synthesize information and to create and communicate knowledge

- Students use spoken, written and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion, and the exchange of information)

Source: IRA/NCTE Standards for the English Language Arts. To view the standards, visit: www.ncte.org/standards.

CABINETMAKING

PURPOSE
To evaluate each contestant's preparation for employment and to recognize outstanding students for excellence and professionalism in the field of cabinetmaking and millwork.

First, download and review the General Regulations at: http://updates.skillsusa.org.

ELIGIBILITY
Open to active SkillsUSA members enrolled in career and technical programs with cabinetmaking and millwork as the occupational objective.

CLOTHING REQUIREMENT
Class C: Contest Specific — Manufacturing/Construction Khaki Attire
For both men and women: Official SkillsUSA khaki work shirt and pants; black, brown, or tan leather work shoes; safety glasses with side shields or goggles (prescription glasses may be used, only if they are equipped with side shields. If not, they must be covered with goggles).

These regulations refer to clothing items that are pictured and described at: www.skillsusastore.org. If you have questions about clothing or other logo items, call 800-401-1560 or 703-956-3723.

Note: Contestants must wear their official contest clothing to the contest orientation meeting.

SAFETY REQUIREMENT
Both the instructors and the contestants certify by agreeing to enter this contest that the contestant has received instruction and has satisfactorily passed examination on the safe use of the following power equipment that may be used in the contest:

1. Router
2. Table saw
3. Jointer
4. Band saw
5. Drill press
6. Hand drill
7. Scroll saw
8. Miter/Cutoff saw
9. Disc and belt sander
10. Boring machine

They also certify that SkillsUSA Inc., the SkillsUSA Championships technical committee and national judges are released from all responsibility relating to personal injury resulting from the use of the above-listed power equipment. Contestants will be removed from competition if proper training has not been provided and/or they are using the equipment in an unsafe manner.

EQUIPMENT AND MATERIALS
1. Supplied by the technical committee:
   a. All necessary power tools, equipment and workstations for contestants
2. Supplied by the contestant:
   a. Nail apron
   b. Claw hammer
   c. Measuring tape
   d. Combination square
   e. Two pencils
   f. 1/32", 1/16", 3/32" nail sets
   g. Block plane
   h. Utility knife
   i. Backsaw
   j. Two hand-screw clamps or two "C" clamps with a maximum opening of 8"
   k. One set 1/4"–1" wood chisels
   l. 10" or 12" mill bastard flat file
   m. One set of flat-blade and Phillips-head screwdrivers and/or handle with interchangeable bits
   n. Sanding block
   o. Hand scraper/cabinet scraper
   p. Calculator
   q. Three 8 1/2"x11" pieces of sandpaper (80–220 grit)
   r. All competitors must create a one-page résumé and submit a hard copy to the technical committee chair at orientation. Failure to do so will result in a 10-point penalty.

***Note*:** Your contest may also require a hard copy of your résumé as part of the actual contest. Check the Contest Guidelines and/or

the updates page on the SkillsUSA website: http://updates.skillsusa.org.

***Note*:** No additional tools will be permitted.

Scope of the Contest

Knowledge Performance
The contest will include a written test.

Skill Performance
The contest consists of workstations that require the building of a small cabinet from the materials and drawings supplied. Contestants will demonstrate their ability to perform jobs or skills selected from the following list of competencies as determined by the SkillsUSA Championships technical committee.

Contest Guidelines
1. Read drawings, lay out and cut parts using a table saw, laminating trimmer, hand drilling, utilizing the boring machine and various hand tools are skills that will be assessed. In addition, the parts must be accurately assembled, sanded and adjusted to tolerances specified.
2. Contestant will be given all necessary information by job sheets or prints of articles to be constructed. Contestants will use joinery techniques as specified.

Standards and Competencies

CM 1.0 — Apply wood veneers and plastic laminates
1.1 Apply adhesives, edge banding and wood edges
1.2 Apply laminate to core
1.3 Cut plastic to size
1.4 Fit plastic laminate joints
1.5 Trim edges

CM 2.0 — Assemble, fasten and install components
2.1 Apply clamping devices
2.2 Assemble drawers, panel door and joint
2.3 Assemble ends, back, bracing and face frame
2.4 Attach molding/trim
2.5 Fasten parts with nails, screws and staples
2.6 Fasten top to casework
2.7 Glue boards edge to edge
2.8 Install catches, doors, drawer rail and guides, hinges, pulls and knobs, shelves and track and slide for sliding doors
2.9 Reinforce joints with block/dowel

CM 3.0 — Cut and shape components
3.1 Cut butt joint, counter top, dado/rabbet joint, doors, doweled joint, and drawer guides and runners (rails)
3.2 Cut drawer front, sides, back and bottom
3.3 Cut ends, back and interior bracing
3.4 Cut face frame, miter joints, molding trim, mortise and tenon joints, frames and panels, shelving, spline joints and tongue and groove joints
3.5 Cut out for sink
3.6 Edge (shape) counter top
3.7 Plane stock
3.8 Square solid stock

CM 4.0 — Design and lay out
4.1 Determine materials from a blueprint
4.2 Draw detailed plans
4.3 Estimate labor and material cost
4.4 Sketch shop plans

CM 5.0 — Finish surfaces
5.1 Apply lacquers, paints, stains, varnishes/polyurethanes and wood filler to nail or screw holes
5.2 Clean surfaces
5.3 Remove excess glue
5.4 Sand surfaces
5.5 Swell dents

CM 6.0 — Transport and install cabinets
6.1 Fasten cabinet to wall
6.2 Trim cabinets
6.3 Prepare cabinets for transporting

Committee Identified Academic Skills
The technical committee has identified that the following academic skills are embedded in this contest.

Math Skills
- Use fractions to solve practical problems
- Use proportions and ratios to solve practical problems
- Simplify numerical expressions
- Solve practical problems involving percentages

- Measure angles
- Find surface area and perimeter of two-dimensional objects
- Apply transformations (rotate or turn, reflect or flip, translate or slide, and dilate or scale) to geometric figures
- Construct three-dimensional models
- Apply Pythagorean Theorem
- Solve practical problems involving complementary, supplementary and congruent angles
- Use measures of interior and exterior angles of polygons to solve problems
- Find arc length and the area of a sector

Science Skills

None Identified

Language Arts Skills

- Provide information in conversations and in group discussions
- Provide information in oral presentations
- Demonstrate use of such nonverbal communication skills as eye contact, posture and gestures using interviewing techniques to gain information

Connections to National Standards

State-level academic curriculum specialists identified the following connections to national academic standards.

Math Standards

- Numbers and operations
- Algebra
- Geometry
- Measurement
- Data analysis and probability
- Problem solving
- Communication
- Connections
- Representation

Source: NCTM Principles and Standards for School Mathematics. For more information, visit: http://www.nctm.org.

Science Standards

None Identified

Source: McREL compendium of national science standards. To view and search the compendium, visit: www2.mcrel.org/compendium/browse.asp.

Language Arts Standards

- Students adjust their use of spoken, written and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes
- Students employ a wide range of strategies as they write and use different writing process elements appropriately to communicate with different audiences for a variety of purposes
- Students apply knowledge of language structure, language conventions (e.g., spelling and punctuation), media techniques, figurative language and genre to create, critique and discuss print and nonprint texts
- Students use a variety of technological and information resources (e.g., libraries, databases, computer networks, video) to gather and synthesize information and to create and communicate knowledge
- Students use spoken, written and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion and the exchange of information)

Source: IRA/NCTE Standards for the English Language Arts. To view the standards, visit: www.ncte.org/standards.

CARPENTRY

PURPOSE
To evaluate each contestant's preparation for employment and to recognize outstanding students for excellence and professionalism in the field of residential and commercial carpentry.

First, download and review the General Regulations at: http://updates.skillsusa.org.

ELIGIBILITY
Open to active SkillsUSA members enrolled in programs with carpentry as the occupational objective.

CLOTHING REQUIREMENT
Class C: Contest Specific — Manufacturing/Construction Khaki Attire
For both men and women: Official SkillsUSA khaki work shirt and pants; black, brown, or tan leather work shoes; safety glasses with side shields or goggles (prescription glasses may be used, only if they are equipped with side shields. If not, they must be covered with goggles).

These regulations refer to clothing items that are pictured and described at: www.skillsusastore.org. If you have questions about clothing or other logo items, call 800-401-1560 or 703-956-3723.

Note: Contestants must wear their official contest clothing to the contest orientation meeting.

SAFETY REQUIREMENT
Both the instructor and the contestant certify by agreeing to enter this contest that the contestant has received instructions and has satisfactorily passed an examination on the safe use of a portable power saw. They also certify that the contestant's saw has been thoroughly inspected and is in safe working condition. Further they agree that SkillsUSA Inc., the SkillsUSA Championships technical committee and national judges are released from all responsibility relating to personal injuries resulting from its use. Contestants will be removed from competition if proper training has not been provided and/or they are using the equipment in an unsafe manner.

EQUIPMENT AND MATERIALS
1. Supplied by the technical committee:
   a. Prefabricated saw horses
   b. All lumber and materials, as specified on the job sheet
   c. Job sheets and blueprints for each contestant and judge
   d. All necessary information and furnishings for judges and technical committee
   e. Hard hat
   f. Safety glasses
2. Supplied by the contestant:
   a. Cut-resistant Level 3 gloves
   b. One 8 pt. crosscut saw (10 pt. or 12 pt. optional)
   c. Claw hammer
   d. One set chisels (¼" to 1")
   e. Framing square
   f. 16' or longer steel tape measure
   g. Utility knife with standard blades
   h. Two pencils
   i. One each — 1 and 2 pt. Phillips and 4" and 8" standard screwdrivers or one multi-tip with equivalent tip
   j. Wrecking bar or gooseneck pinch bar
   k. Coping saw and extra blade
   l. Cat's paw (nail puller)
   m. Chalk box and line
   n. One nail set
   o. Straight aviation snip or any metal-cutting snips
   p. 24" or 30" spirit level
   q. Combination wood rasp and file (8")
   r. Carpenter's tool and nail pouch with belt and/or suspenders
   s. Stair gauges
   t. Combination square and/or speed square
   u. 25' power cord (UL approved grounded)
   v. Calculator
   w. Power circular saw with new carbide-tipped blade
   x. Drywall saw

3. All competitors must create a one-page résumé and submit a hard copy to the technical committee chair at orientation. Failure to do so will result in a 10-point penalty.

   ***Note*:** Your contest may also require a hard copy of your résumé as part of the actual contest. Check the Contest Guidelines and/or the updates page on the SkillsUSA website: http://updates.skillsusa.org.

SCOPE OF THE CONTEST

Knowledge Performance

The contest will include a written knowledge test that assesses knowledge of carpentry including, but not limited to, building materials, foundations and forms, rough framing, roof framing, exterior finish, interior finish, stairs, lumber and tools.

Skill Performance

The contest will assess accuracy, workmanship, the ability to read and interpret blueprints, and the proper use of tools and equipment. Contestants may be required to frame walls using wood and/or steel studs; cut and install common, hip and jack rafters; and install drywall, siding, sheathing, baseboard moldings and window trim.

Contest Guidelines

1. Time limit: Contestants will be stopped when time limits, as specified on the contest job sheet, are up; however, contestants may stop whenever they have completed a particular phase of the contest.
2. The dismantling of the project will be considered the final sequence or task of this contest.

Note: If desired, a contestant may choose to use a standard hand saw without penalties.

Standards and Competencies

C 1.0 — Read blueprints and specifications by interpreting dimensions and specifications, as well as door, window and finish schedules while understanding common blueprint abbreviations and symbols

1.1 Interpret and determine dimensions from multiple view drawings and build the project from plans, elevations, sections and details
1.2 Interpret specifications and drawing notes by verbally demonstrating how specifications are used
1.3 Identify plot plan information such as reference points and bench marks by locating the reference point; using Pythagorean theorem, a level and square, the participant can lay out building as drawn on the plot plan
1.4 Interpret oral and written changes, and incorporate modifications into existing plans
1.5 Understand common abbreviations and symbols, and verbally describe all common blueprint abbreviations and symbols on competition blueprints
1.6 Interpret door, window and finish schedules by describing location, quantity and type of materials

C 2.0 — Organize building site/materials in a safe and sequential manner while using builder's level and transit properly

2.1 Use builder's level and transit properly for layout and elevation
2.2 Identify, receive and inspect materials and ensure all required materials are in place prior to start of competition by using material lists supplied
2.3 Store lumber and other materials properly by type and use in a safe and sequential manner

C 3.0 — Build foundations and forms including the construction and alignment of footing forms, wall and wall forms, and column and pier forms

3.1 Construct and align various footing forms to include keyways, bulkheads, dowels and anchorages, as per plans
3.2 Construct and align foundation wall and wall forms to include pilasters and beam pockets

3.3 Construct and align column and pier forms
3.4 Maintain form materials properly

C 4.0 — Construct rough framing by identifying and selecting framing members, and installing frame components while meeting OHSA standards

4.1 Identify framing members and select materials for project
4.2 Frame and install sill plate, girders, floor joists and bridging
4.3 Frame floor
4.4 Install sub-floor
4.5 Build or erect safe scaffolding to meet OHSA standards
4.6 Frame and brace walls to include corners, openings, trimmers, cripples, partitions, plumbing partitions, fixture backing and sheathing
4.7 Frame stair stringer and other components

C 5.0 — Construct roof framing by determining rafter lengths, making calculations, laying out a plan, framing and installing roof sheathing

5.1 Identify types and components of roof construction and verbally describe all typical components of roof construction identified on the competition project blueprint
5.2 Determine rafter lengths from a rafter scale
5.3 Calculate and use the rise and run of a common roof
5.4 Lay out a common roof plan
5.5 Lay out, cut and install common rafters, ridge board, collar ties, gambrel rafters, valley rafters, valley jack rafters, tail rafters, hip rafters, hip jack rafters and cripple jack rafters
5.6 Frame roof openings, dormers and saddles
5.7 Lay out, cut and install roof trusses (purling)
5.8 Install roof sheathing

C 6.0 — Construct exterior finish by installing frames, corner boards, moldings, cornices, siding and shingles as per industry standards

6.1 Install window and doorframes as per competition project blueprint and manufacturer's standards
6.2 Measure, cut and install trim for window and door frames
6.3 Install corner boards, moldings or metal/vinyl corners within $\frac{1}{8}$"
6.4 Install wood, bevel, sheet and lap siding and aluminum or vinyl siding as per competition project blueprint and manufacturer's recommendations
6.5 Install wood shingles and miter corners as per industry standards
6.6 Install exterior finish rake, open cornice and box cornice as per competition project blueprint

C 7.0 — Construct interior finish while measuring and cutting materials, fitting and hanging doors and trim, constructing closets and installing crown moldings

7.1 Measure, cut and install gypsum board to meet blueprint specs and industry standards
7.2 Cut and install paneling while trimming to fit in prescribed locations
7.3 Fit and hang doors and trim to include swinging, sliding, folding and pocket doors to industry and manufacturers' standards
7.4 Construct closets and built-in units and install accessories as per competition blueprint specs and manufacturers' recommendations
7.5 Cut and install crown molding or other moldings within $\frac{1}{16}$"

C 8.0 — Build stairs by laying out stringer and stringer sets, calculating rise, run and tread cutting and installing stair treads and stair skirts

8.1 Lay out a straight run stringer and a two-flight stringer set with landing using a carpenter square
8.2 Calculate rise, run and tread width within $\frac{1}{16}$"
8.3 Cut and install stair treads and stair skirt within a $\frac{1}{8}$" variable

C 9.0 — Identify lumber by writing a requisition for ordering lumber

9.1 Match letters designating uses in plywood or composition board to their current application
9.2 Match at least two examples each of common hardwoods and softwoods to their uses

9.3 Identify types of trim and moldings, and describe use
9.4 Identify common defects in lumber
9.5 Write a requisition for ordering lumber based on a given material list
9.6 Calculate board feet using the standard formula (No. of pieces x thickness in inches x width in inches x length in feet ÷12 = board feet)

C 10.0 — Using and maintaining tools safely per manufacturers' recommendations

10.1 Inspect and properly use hand tools as per manufacturers' recommendations. Hand tools from the following list: sliding T-bevel, tape measure, combination square/speed square coping saw, keyhole saw, folding rule, hammer, punch, hand saw, nail set, wood chisel, carpenter's level, and framing square
10.2 Inspect and properly operate power tools as per manufacturers' recommendations. Power tools from the following list: reciprocating (jig saw), miter saw, hand drill, belt sander, circular saw, sabre saw, table saw, finish sander, and hand router

Committee Identified Academic Skills

The technical committee has identified that the following academic skills are embedded in this contest.

Math Skills

- Use fractions to solve practical problems
- Use proportions and ratios to solve practical problems
- Measure angles
- Find surface area and perimeter of two-dimensional objects
- Apply transformations (rotate or turn, reflect or flip, translate or slide, and dilate or scale) to geometric figures
- Construct three-dimensional models
- Apply Pythagorean Theorem
- Make comparisons, predictions and inferences using graphs and charts
- Find slope of a line
- Solve practical problems involving complementary, supplementary and congruent angles
- Solve problems involving symmetry and transformation

Science Skills

- Use knowledge of work, force, mechanical advantage, efficiency and power
- Use knowledge of simple machines, compound machines, powered vehicles, rockets and restraining devices

Language Arts Skills

- Provide information in conversations and in group discussions
- Provide information in oral presentations
- Demonstrate use of such nonverbal communication skills as eye contact, posture and gestures using interviewing techniques to gain information
- Demonstrate comprehension of a variety of informational texts
- Use text structures to aid comprehension
- Identify words and phrases that signal an author's organizational pattern to aid comprehension
- Understand source, viewpoint, and purpose of texts

Connections to National Standards

State-level academic curriculum specialists identified the following connections to national academic standards.

Math Standards

- Numbers and operations
- Geometry
- Measurement
- Data analysis and probability
- Problem Solving
- Communication
- Connections
- Representation

Source: NCTM Principles and Standards for School Mathematics. For more information, visit: http://www.nctm.org.

Science Standards

- Understands the structure and function of cells and organisms
- Understands relationships among organisms and their physical environment
- Understands the sources and properties of energy
- Understands forces and motion
- Understands the nature of scientific inquiry

Source: McREL compendium of national science standards. To view and search the compendium, visit: www2.mcrel.org/compendium/browse.asp.

Language Arts Standards

- Students adjust their use of spoken, written, and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes
- Students use a variety of technological and information resources (e.g., libraries, databases, computer networks, video) to gather and synthesize information and to create and communicate knowledge

Source: IRA/NCTE Standards for the English Language Arts. To view the standards, visit: www.ncte.org/standards.

CNC Milling Specialist

Purpose
The purpose of this contest is to evaluate each contestant's preparation for employment in Computer Numeric Control Milling. In addition, to recognize outstanding students for excellence and professionalism.

First, download and review the General Regulations at: http://updates.skillsusa.org.

Eligibility
Open to active SkillsUSA members enrolled in programs with precision machining, automated manufacturing or CNC as the occupational objective.

Clothing Requirement
Class C: Contest Specific — Manufacturing/Construction Khaki Attire
For both men and women: Official SkillsUSA khaki work shirt and pants; black, brown, or tan leather work shoes; safety glasses with side shields or goggles (prescription glasses may be used, only if they are equipped with side shields. If not, they must be covered with goggles).

These regulations refer to clothing items that are pictured and described at: www.skillsusastore.org. If you have questions about clothing or other logo items, call 800-401-1560 or 703-956-3723.

Note: Contestants must wear their official contest clothing to the contest orientation meeting.

Equipment and Materials
1. Supplied by the technical committee:
   a. Haas programmable controller
   b. Scientific calculator
   c. Pencils and paper
2. Supplied by the contestant:
   a. Machinery's Handbook (optional)
   b. All competitors must create a one-page résumé and submit a hard copy to the technical committee chair at orientation. Failure to do so will result in a 10-point penalty.

   ***Note*:** Your contest may also require a hard copy of your résumé as part of the actual contest. Check the Contest Guidelines and/or the updates page on the SkillsUSA website: http://updates.skillsusa.org.

Scope of the Contest
Knowledge Performance
The contest will include a written test to evaluate a contestant's knowledge of Computer Numeric Control milling in such areas as: basic milling skills, knowledge of CNC programming, performing mathematical calculations related to CNC, communication and inspection.

Skill Performance
This contest will assess the ability to write CNC milling programs, interpret prints (including GDT), and measure/gauge parts. Participants also will demonstrate theoretical knowledge of CNC machine configuration, setup and operations.

Contest Guidelines
1. Each contestant will be given dimensional drawings to program a part on a Haas CNC Controller.
2. Programming
   a. Write and verify CNC programs without the use of CAM software
   b. Display complete knowledge of programming (G and M codes)
   c. Apply the correct use of cutter compensation (G41/G42)
3. Perform mathematical calculations
   a. Calculate CNC speeds and feeds
   b. Calculate programming coordinates from the drawing
   c. Calculate radius tangent points
4. Measuring
   a. Measure sample parts within 0.005"
5. Communication
   a. Read and interpret technical prints
   b. Understand all symbols on technical prints, such as geometric controls,

surface-finish symbols, corner-break symbols, etc.

6. Dimensions
   This is a contest of programming skills. Contestant parts will only run on machine if programs run without violating safety standards or damaging machines.
7. An overview of a Haas CNC controller will be available for orientation before the competition with technicians on hand to help competitors familiarize themselves with the interface.

Standards and Competencies

CNCM 1.0 — Apply basic machining skills per industry standards as set forth by the technical committee

1.1 Demonstrate the basic math skills essential for CNC milling
1.2 Identify and use measuring tools that are basic to CNC milling
1.3 Interpret and apply information from prints and drawings
1.4 Measure part to nearest +/- .001"
1.5 Demonstrate safe working practices on machines
1.6 Use various precision measuring tools (i.e., micrometers, calipers, radius gages)
1.7 Define and calculate speed and feed rates (SFPM, CCS, IPM, IPR)
1.8 Demonstrate knowledge of cutting tools, clamping devices and materials
1.9 Perform mathematical calculations that enable solving complex trigonometric, geometric and algebraic problems applicable to CNC machining processes

CNCM 2.0 — Demonstrate knowledge of CNC programming per industry standards as set forth by the technical committee

2.1 Manually write and verify CNC programs without the use of CAM software according to print specifications, dimensions and tolerances (competitor has the opportunity to edit any program errors on the machine)
2.2 Display complete knowledge of programming (G and M codes)
2.3 Apply the correct use of cutter compensation (G41/G42)
2.4 Demonstrate knowledge of incremental and absolute positioning
2.5 Demonstrate knowledge of coordinate system
2.6 Determine proper machining sequences from workpiece drawing

CNCM 3.0 — Perform mathematical calculations as needed for calculating speeds, feeds, program coordinates, angles, radii and tangent points

3.1 Calculate CNC speeds and feeds
3.2 Calculate programming coordinates from the drawing
3.3 Calculate angles, radii and tangent points

CNCM 4.0 — Communicate and demonstrate an understanding of all symbols on a print

4.1 Read and interpret technical prints
4.2 Understand all symbols on technical prints, such as geometric tolerances, surface-finish symbols, corner-break symbols, etc.

CNCM 5.0 — Inspect work per industry standards as set forth by the technical committee

5.1 Inspect for conformity to print (shape and features of part to drawing)
5.2 Inspect for broken edges
5.3 Inspect for damage to part (clamp marks, scratches)

Committee Identified Academic Skills

The technical committee has identified that the following academic skills are embedded in this contest.

Math Skills

- Use fractions to solve practical problems
- Simplify numerical expressions
- Measure angles
- Apply transformations (rotate or turn, reflect or flip, translate or slide and dilate or scale) to geometric figures
- Apply Pythagorean Theorem
- Solve problems using proportions, formulas, and functions
- Solve problems using trigonometry
- Solve problems using Cartesian coordinate system

Science Skills

None Identified

Language Arts Skills

None Identified

Connections to National Standards

State-level academic curriculum specialists identified the following connections to national academic standards.

Math Standards

- Numbers and operations
- Algebra
- Geometry
- Measurement
- Problem solving
- Reasoning and proof
- Communication
- Connections
- Representation

Source: NCTM Principles and Standards for School Mathematics. For more information, visit: http://www.nctm.org.

Science Standards

- Understands the sources and properties of energy
- Understands forces and motion
- Understands the nature of scientific inquiry

Source: McREL compendium of national science standards. To view and search the compendium, visit: www2.mcrel.org/compendium/browse.asp.

Language Arts Standards

- Students adjust their use of spoken, written and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes
- Students use a variety of technological and information resources (e.g., libraries, databases, computer networks, video) to gather and synthesize information and to create and communicate knowledge
- Students use spoken, written and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion and the exchange of information)

Source: IRA/NCTE Standards for the English Language Arts. To view the standards, visit: www.ncte.org/standards.

CNC Turning Specialist

Purpose
The purpose of this contest is to evaluate each contestant's preparation for employment in Computer Numeric Control Turning. In addition, to recognizing outstanding students for excellence and professionalism.

First, download and review the General Regulations at: http://updates.skillsusa.org.

Eligibility
Open to active SkillsUSA members enrolled in programs with precision machining, automated manufacturing or CNC as the occupational objective.

Clothing Requirement
Class C: Contest Specific — Manufacturing/Construction Khaki Attire
For both men and women: Official SkillsUSA khaki work shirt and pants; black, brown, or tan leather work shoes; safety glasses with side shields or goggles (prescription glasses may be used, only if they are equipped with side shields. If not, they must be covered with goggles).

These regulations refer to clothing items that are pictured and described at: www.skillsusastore.org. If you have questions about clothing or other logo items, call 800-401-1560 or 703-956-3723.

Note: Contestants must wear their official contest clothing to the contest orientation meeting.

Equipment and Materials:
1. Supplied by the technical committee:
   a. Haas programmable controller
   b. Scientific calculator
   c. Pencils and paper
2. Supplied by the contestant:
   a. Machinery's Handbook (optional)
   d. All competitors must create a one-page résumé and submit a hard copy to the technical committee chair at orientation. Failure to do so will result in a 10-point penalty.

   ***Note*:** Your contest may also require a hard copy of your résumé as part of the actual contest. Check the Contest Guidelines and/or the updates page on the SkillsUSA website: http://updates.skillsusa.org.

Scope of the Contest
Knowledge Performance
The contest will include a written test to evaluate a contestant's knowledge of Computer Numeric Control turning in such areas as: basic turning skills, knowledge of CNC programming, performing mathematical calculations related to CNC, communication and inspection.

Skill Performance
The contest will assess the ability to write CNC turning programs, interpret prints (including GDT), and measure/gauge parts. Participants also will demonstrate theoretical knowledge of CNC machine configuration, setup and operations.

Contest Guidelines
1. Each contestant will be given dimensional drawings to program a part on a Haas CNC Controller.
2. Programming
   a. Write and verify CNC programs without the use of CAM software
   b. Display complete knowledge of programming (G and M codes)
   c. Apply the correct use of cutter compensation (G41/G42)
3. Perform mathematical calculations
   a. Calculate CNC speeds and feeds
   b. Calculate programming coordinates from the drawing
   c. Calculate radius tangent points
4. Measuring
   a. Measure test part to the nearest 0.0005"
5. Communication
   a. Read and interpret technical prints
   b. Understand all symbols on technical prints, such as geometric controls,

surface-finish symbols, corner-break symbols, etc.

6. Dimensions
   This is a contest of programming skills. Contestant parts will only run on machine if programs run without violating safety standards or damaging machines.
7. An overview of a Haas CNC controller will be available at orientation with technicians on hand to help competitors familiarize themselves with the interface.

Standards and Competencies

CNCT 1.0 — Apply basic machining skills per industry standards as set forth by the technical committee

1.1 Demonstrate the basic math skills essential for CNC turning
1.2 Identify and use measuring tools that are basic to CNC turning
1.3 Interpret and apply information from prints and drawings
1.4 Measure part to nearest +/- .001"
1.5 Demonstrate safe working practices on machines
1.6 Use various precision measuring tools (i.e., micrometers, calipers, radius gages)
1.7 Define and calculate speed and feed rates (SFPM, CCS, IPM, IPR)
1.8 Demonstrate knowledge of cutting tools, clamping devices and materials
1.9 Perform mathematical calculations that enable solving complex trigonometric, geometric and algebraic problems applicable to CNC machining processes

CNCT 2.0 — Demonstrate knowledge of CNC programming per industry standards as set forth by the technical committee

2.1 Manually write and verify CNC programs without the use of CAM software according to print specifications, dimensions and tolerances
2.2 Display complete knowledge of programming (G and M codes)
2.3 Apply the correct use of cutter compensation (G41/G42)
2.4 Demonstrate knowledge of incremental and absolute positioning
2.5 Demonstrate knowledge of coordinate system
2.6 Determine proper machining sequences from workpiece drawing
2.7 Adjust speeds and feed as needed

CNCT 3.0 — Perform mathematical calculations as needed for calculating speeds, feeds, program coordinates, angles, radii and tangent points

3.1 Calculate CNC speeds and feeds
3.2 Calculate programming coordinates from the drawing
3.3 Calculate angles, radii and tangent points

CNCT 4.0 — Communicate and demonstrate an understanding of all symbols on a print

4.1 Read and interpret technical prints
4.2 Understand all symbols on technical prints, such as geometric tolerances, surface-finish symbols, corner-break symbols, etc.

CNCT 5.0 — Inspect work per industry standards as set forth by the technical committee

5.1 Inspect for conformity to print (shape and features of part to drawing)
5.2 Inspect for broken edges
5.3 Inspect for damage to part (clamp marks, scratches)

Committee Identified Academic Skills

The technical committee has identified that the following academic skills are embedded in this contest.

Math Skills

- Use fractions to solve practical problems
- Simplify numerical expressions
- Measure angles
- Apply transformations (rotate or turn, reflect or flip, translate or slide and dilate or scale) to geometric figures
- Apply Pythagorean Theorem
- Solve problems using proportions, formulas and functions
- Solve problems using trigonometry
- Solve problems using Cartesian coordinate system

Science Skills

None Identified

Language Arts Skills

None Identified

Connections to National Standards

State-level academic curriculum specialists identified the following connections to national academic standards.

Math Standards

- Numbers and operations
- Algebra
- Geometry
- Measurement
- Problem solving
- Reasoning and proof
- Communication
- Connections
- Representation

Source: NCTM Principles and Standards for School Mathematics. For more information, visit: http://www.nctm.org.

Science Standards

- Understands the sources and properties of energy
- Understands forces and motion
- Understands the nature of scientific inquiry

Source: McREL compendium of national science standards. To view and search the compendium, visit: www2.mcrel.org/compendium/browse.asp.

Language Arts Standards

- Students adjust their use of spoken, written and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes
- Students use a variety of technological and information resources (e.g., libraries, databases, computer networks, video) to gather and synthesize information and to create and communicate knowledge
- Students use spoken, written and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion and the exchange of information)

Source: IRA/NCTE Standards for the English Language Arts. To view the standards, visit: www.ncte.org/standards.

CNC Technician (Turning and Milling)

Purpose
The purpose of this contest is to evaluate each contestant's preparation for employment in Computer Numeric Control Turning and Milling. In addition, to recognize outstanding students for excellence and professionalism.

First, download and review the General Regulations at: http://updates.skillsusa.org.

Eligibility
Open to active SkillsUSA members enrolled in programs with precision machining automated manufacturing or CNC as the occupational objective.

Clothing Requirement
Class C: Contest Specific — Manufacturing/Construction Khaki Attire
For both men and women: Official SkillsUSA khaki work shirt and pants; black, brown, or tan leather work shoes; safety glasses with side shields or goggles (prescription glasses may be used, only if they are equipped with side shields. If not, they must be covered with goggles).

These regulations refer to clothing items that are pictured and described at: www.skillsusastore.org. If you have questions about clothing or other logo items, call 800-401-1560 or 703-956-3723.

Note: Contestants must wear their official contest clothing to the contest orientation meeting.

Equipment and Materials
1. Supplied by the technical committee:
   a. Haas Programable Controller
   b. Scientific calculator
   c. Pencils and paper
2. Supplied by the contestant:
   a. Machinery's Handbook (optional)
   b. All competitors must create a one-page résumé and submit a hard copy to the technical committee chair at orientation. Failure to do so will result in a 10-point penalty.

   ***Note*:** Your contest may also require a hard copy of your résumé as part of the actual contest. Check the Contest Guidelines and/or the updates page on the SkillsUSA website: http://updates.skillsusa.org.

Scope of the Contest
The contest will be based on and consistent with the National Institute for Metalworking Skills (NIMS), Duties and Standards for Machining Skills, Levels I and II. Information on how to obtain these skill standards may be obtained directly from NIMS by calling 703-352-4971, or on the web at: www.nims-skills.org. Competencies to be tested are determined by the SkillsUSA Championships technical committee.

Knowledge Performance
The contest will include a written test to evaluate a contestant's knowledge of Computer Numeric Control turning and milling in such areas as: basic machining skills, knowledge of CNC programming, performing mathematical calculations related to CNC, communication and inspection.

Skill Performance
The contest will assess the ability to write CNC programs, interpret prints (including GDT), and measure/gauge parts. Participants also will demonstrate theoretical knowledge of CNC machine configuration, setup and operations.

Contest Guidelines
1. Each contestant will be given dimensional drawings to program a part on a Haas CNC Controller.
2. Programming
   a. Write and verify CNC programs without the use of CAM software
   b. Display complete knowledge of programming (G and M modes)
   c. Apply the correct use of cutter compensation (G41/G42)
3. Perform mathematical calculations

a. Calculate CNC speeds and feeds
b. Calculate programming coordinates from the drawing
c. Calculate radius tangent points

4. Measuring
   a. Measure sample parts within 0.005"
5. Communication
   a. Read and interpret technical prints
   b. Understand all symbols on technical prints, such as geometric controls, surface-finish symbols, corner-break symbols, etc.
6. Dimensions
   This is a contest of programming skills. Contestant parts will only run on machine if programs run without violating safety standards or damaging machines.
7. An overview of a Haas CNC controller will be available for orientation before the competition with technicians on hand to help competitors familiarize themselves with the interface.

Standards and Competencies

CNCTECH1.0 — Apply basic machining skills per industry standards as set forth by the SkillsUSA technical committee

1.1 Demonstrate the basic math skills essential for CNC turning and milling
1.2 Identify and use measuring tools that are basic to CNC turning and machining
1.3 Interpret and apply information from prints and drawings
1.4 Measure part to nearest +/- .001"
1.5 Demonstrate safe working practices on machines
1.6 Use various precision measuring tools (i.e., micrometers, calipers, radius gages)
1.7 Define and calculate speed and feed rates (SFPM, CCS, IPM, IPR)
1.8 Demonstrate knowledge of cutting tools, clamping devices and materials
1.9 Perform mathematical calculations that enable solving complex trigonometric, geometric and algebraic problems applicable to CNC machining processes

CNCTECH2.0 — Demonstrate knowledge of CNC programming per industry standards as set forth by the SkillsUSA technical committee

2.1 Manually write and verify CNC programs without the use of CAM software according to print specifications, dimensions and tolerances
2.2 Display complete knowledge of programming (G and M codes)
2.3 Apply the correct use of cutter compensation (G41/G42)
2.4 Demonstrate knowledge of incremental and absolute positioning
2.5 Demonstrate knowledge of coordinate system
2.6 Determine proper machining sequences from workpiece drawing

CNCTECH3.0 — Perform mathematical calculations as needed for calculating speeds, feeds, program coordinates, angles, radii and tangent points

3.1 Calculate CNC speeds and feeds
3.2 Calculate programming coordinates from the drawing
3.3 Calculate angles, radii and tangent points

CNCTECH4.0 — Communicate and demonstrate an understanding of all symbols on a print

4.1 Read and interpret technical prints
4.2 Understand all symbols on technical prints, such as geometric tolerances, surface-finish symbols, corner-break symbols, etc.

CNCTECH5.0 — Inspect work per industry standards as set forth by the SkillsUSA technical committee

5.1 Inspect for conformity to print (shape and features of part to drawing)
5.2 Inspect for broken edges
5.3 Inspect for damage to part (clamp marks, scratches)

Committee Identified Academic Skills

The technical committee has identified that the following academic skills are embedded in this contest.

Math Skills

- Use fractions to solve practical problems
- Simplify numerical expressions
- Measure angles

- Apply transformations (rotate or turn, reflect or flip, translate or slide and dilate or scale) to geometric figures
- Apply Pythagorean Theorem
- Solve problems using proportions, formulas and functions
- Solve problems using trigonometry
- Solve problems using Cartesian coordinate system

Science Skills

None Identified

Language Arts Skills

None Identified

Connections to National Standards

State-level academic curriculum specialists identified the following connections to national academic standards.

Math Standards

- Numbers and operations
- Algebra
- Geometry
- Measurement
- Data Analysis and Probability
- Problem solving
- Reasoning and proof
- Communication
- Connections
- Representation

Source: NCTM Principles and Standards for School Mathematics. For more information, visit: http://www.nctm.org.

Science Standards

- Understands the sources and properties of energy
- Understands forces and motion
- Understands the nature of scientific inquiry

Source: McREL compendium of national science standards. To view and search the compendium, visit: www2.mcrel.org/compendium/browse.asp.

Language Arts Standards

- Students adjust their use of spoken, written, and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes
- Students use a variety of technological and information resources (e.g., libraries, databases, computer networks, video) to gather and synthesize information and to create and communicate knowledge
- Students use spoken, written and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion and the exchange of information)

Source: IRA/NCTE Standards for the English Language Arts. To view the standards, visit: www.ncte.org/standards.

COLLISION REPAIR TECHNOLOGY

PURPOSE

To evaluate each contestant's preparation for employment and to recognize outstanding students for excellence and professionalism in the field of collision repair technology.

First, download and review the General Regulations at: http://updates.skillsusa.org.

ELIGIBILITY

Open to active SkillsUSA members enrolled in programs with collision repair technology as the occupational objective.

CLOTHING REQUIREMENT

Class D: Contest Specific - Automotive Blue Attire

For Both Men and Women: Official SkillsUSA light blue work shirt; navy pants; black, brown, or tan leather work shoes safety shoes (with protective toe cap.) Safety glasses with side shields or goggles (prescription glasses may be used only if they are equipped with side shields. If not, they must be covered with goggles).

These regulations refer to clothing items that are pictured and described at: www.skillsusastore.org. If you have questions about clothing or other logo items, call 800-401-1560 or 703-956-3723.

Note: Contestants must wear their official contest clothing to the contest orientation meeting.

EQUIPMENT AND MATERIALS

1. Supplied by the technical committee: Basic equipment of a collision repair and refinishing laboratory
   a. Materials for metalworking phase:
      1. Identical fenders to be repaired
      2. Plastic filler
      3. Various grits of sandpaper/DA sanders, hand sanding blocks, Roloc disc.
      4. Plastic filler mixing boards and spreaders
      5. Dust respirators
      6. Cartridge-type respirators
      7. Vixen file
      8 Safety glasses
   b. Materials for plastic repair phase:
      1. Cleaning solvent
      2. Plastic repair material
      3. Mixing boards and spreaders
      4. Abrasive discs and sheets
      5. Plastic car parts
      6. Clamps
      7. Cartridge-type respirators
      8. Dust respirators
      9. Safety glasses
      10. Nitrogen welders
      11. Plastic welding rods
      12. Plastic welding tools
   c. Materials for estimating phase:
      1. Vehicle owner's name and address
      2. Scratch pads
      3. Estimate sheets
      4. Estimate books
      5. Calculator
      6. Parts price list for car involved
   d. Materials supplied for attachment methods phase:
      1. Welding helmets
      2. Welding respirators
      3. Skull caps
2. Supplied by the contestant:
   a. Specialty hand tools (i.e. bullseye pick, etc.). No power hand tools required
   b. Welding goggles
   c. Welding gloves
   d. Welding jacket
   e. $^{9}/_{16}$" and $^{5}/_{8}$" wrenches
   f. Tape measure
   g. Two hard copies of résumé

   ***Note*:** Check the Contest Guidelines and/or the updates page on the SkillsUSA website: http://updates.skillsusa.org.

SCOPE OF THE CONTEST

The contest will be consistent with the Collision Repair/Refinishing Technician Task List outlined in the guidelines published by the National Institute for Automotive Service Excellence (ASE) and the ASE Education Foundation, found online at: www.aseeducation.org/. Contestants will

demonstrate their ability to perform jobs of skills selected from the standards mentioned above as determined by the SkillsUSA Championships technical committee. Committee membership includes: 3M Co., Anne Arundel County Public Schools, Assured Performance Car-O-Liner Co., Car-Part Pro, Carolina Collision Equipment LLC., Center of Applied Technology North, Chief Automotive Systems Inc., Fox Valley Technical College, General Motors Corp., I-CAR Tech Centre, Miller Electric Mfg. Co. Inc., National Institute for Automotive Service Excellence (ASE),) ASE Education Foundation, Nationwide Insurance Company, Polyvance, Saint-Gobain, Snap-on Inc., State Farm Insurance Companies, Toyota Motor Sales USA Inc. and Verifacts Automotive LLC, and the Women's Industry Network.

Knowledge Performance

The contest includes a written knowledge test given by ASE, which will consist of 50 questions covering three areas of the Collision Repair areas that are identified in the NATEF ASE Education Foundation Collision Repair/Refinishing Program Standards and the ASE Official Study Guide: Collision Repair/Refinish, an estimating test and a structural test. The tests for the high school and college contests will be comprised of diagnosis and repair content from these skill areas: Non-structural Analysis and Damage Repair, Structural Analysis and Damage Repair, Mechanical and Electrical Components, and Estimating.

1. Nonstructural Analysis — 22 questions in Nonstructural Analysis and Damage Repair (B3) ASE Certification Test in the content areas of: preparation, outer body panel repairs, replacements and adjustments, metal finishing and body filling, glass and hardware, welding, cutting and removal and plastic repair*
2. Structural Analysis — 14 questions in Structural Analysis and Damage Repair (B4) ASE Certification Test in the content areas of: frame inspection and repair, unibody inspection, measurement and repair, stationary glass and metal welding and cutting*
3. Mechanical and Electrical Components — 14 questions in Mechanical and Electrical Components (B5) ASE Certification Test in the content areas of: suspension and steering, electrical, brakes, heating and air conditioning, engine cooling systems, drive train, fuel intake and exhaust systems and restraint systems*

Skill Performance

Contestants will demonstrate their ability to perform jobs and skills based on the task list outlined by the National Institute for Automotive Service Excellence (ASE) and the National Automotive Technicians Education Foundation (NATEF). The competition includes a series of workstations to assess skills in the following areas: metal straightening, welding, plastic repair and structural analysis. There will be a written test on estimating structural analysis, and an ASE exam. The competitors will also participate in an interview. The overall appearance of the finished product, speed and proper safety practices will be judged.

Note: "*" Denotes this material is covered on a separate written test prior to the official contest day.

Standards and Competencies

CRT 1.0 — Repair depressed area(s) on a steel panel with plastic body filler to related tasks in the ASE Education Foundation Collision Repair/Refinishing Non-Structural Analysis and Damage Repair Technical Standards (ASE B3 Test)

- 1.1 Model proper safety procedures
- 1.2 Clean contaminants from a damaged panel
- 1.3 Locate surface irregularities on a damaged panel
- 1.4 Remove finish from the damaged area(s) as necessary
- 1.5 Apply hammer and dolly techniques to repair damage
  - 1.5.1 Differentiate between pressure in relation to the concept of force to realign a component
  - 1.5.2 Straighten and rough out contours of damaged panels to a suitable condition for body filling using hand tools, and weld-on pull attachments

1.6 Mix and apply plastic body filler on a steel panel
  1.6.1 Determine the relative proportion of the desired versus the undesired ingredients or elements of a mixture, and determine if that proportion is within the manufacturer's specifications
  1.6.2 Describe chemical reactions that occur in various compounds and substances
  1.6.3 Identify the role an additive or catalyst plays in the mixing of plastic fillers
  1.6.4 Define the criticality of metals with different hardness depending upon the function and location of the metal as well as how plastic fillers adhere to metal
1.7 Rough sand cured body filler to contour
1.8 Finish sand

CRT 2.0 — Repair depressed area of an aluminum panel using heating techniques and related tasks in ASE Education Foundation. Collision Repair/Refinishing Non-structural Analysis and Damage Repair Technical Standards (ASE B3 Test)

2.1 Model proper safety procedures
2.2 Clean contaminants from a damaged panel
2.3 Locate surface irregularities on a damaged panel
2.4 Remove finish from the damaged area(s) as necessary
2.5 Identify techniques to repair damage
  2.5.1 Demonstrate understanding of pressure in relation to the concept of force to realign a component
2.6 Describe the cold shrinking process as necessary
2.7 Describe the heat shrinking process as necessary
  2.7.1 Straighten and rough out contours of damaged panels to a suitable condition for metal finishing using hand tools
2.8 Demonstrate the cold shrinking process as necessary
2.9 Demonstrate the straigthening process with heat application as necessary
  2.9.1 Demonstrate an understanding of the effect that adding heat will cause in a state of matter, such as changing a solid to a liquid

CRT 3.0 — Repair depressed areas using metal finishing techniques on a steel panel to related tasks in ASE Education Foundation Collision Repair/Refinishing Non-Structural Analysis and Damage Repair Technical Standards (ASE B3 Test)

3.1 Model proper safety procedures
3.2 Clean contaminants from a damaged panel
3.3 Locate surface irregularities on a damaged panel
3.4 Remove finish from the damaged area(s) as necessary
3.5 Demonstrate various uses of the metal finishing tools

CRT 4.0 — Prepare steel panel for primer application to related tasks in ASE Education Foundation Collision Repair/Refinishing Painting and Refinishing Technical Standards (ASE B2 Test)

4.1 Model proper safety procedures
4.2 Clean contaminants from a damaged panel
4.3 Featheredge paint/E-coat as necessary
4.4 Sand/Scuff bare metal as necessary
  4.4.1 Demonstrate an understanding of the criticality of metals with different hardness depending on the function and location of the metal as well as how plastic fillers adhere to metal

CRT 5.0 — Demonstrate attachment methods needed for collision repair of steel and aluminum panels to related tasks in ASE Education Foundation Collision Repair/Refinishing Non-structural Analysis and Damage Repair Technical Standards, ASE Education Foundation Collision Repair/Refinishing Structural Analysis and Damage Repair Technical Standards, (ASE B3 and B4 Tests), and the I-CAR Welding and Training and Certification Tests

5.1 Model proper safety procedures
5.2 Make a plug weld using steel coupons in the vertical position using a GMA (MIG) welder
  5.2.1 Set up and adjust the welder for proper stickout, voltage, polarity, flow rate and wire speed

required for the metal being welded

5.2.2 Determine work clamp (ground) location and attach

5.2.3 Use the proper angle of the gun to the joint and the direction of gun travel for the type of weld being made in a vertical position

5.2.4 Clean and prepare the metal to be welded, assure good fit-up, apply weld through primer if necessary, and clamp as required

5.2.5 Conduct a visual test on the vertical weld

5.3 Make a butt joint with backing weld using steel coupons in the vertical position using a GMA (MIG) welder

5.3.1 Set up and adjust the welder for proper stickout, voltage, polarity, flow rate and wire speed required for the metal being welded

5.3.2 Determine work clamp (ground) location and attach

5.3.3 Use the proper angle of the gun to the joint and the direction of gun travel for the type of weld being made in a vertical position

5.3.4 Clean and prepare the metal to be welded, assure good fit-up, apply weld through primer if necessary, and clamp as required

5.3.5 Perform a visual test on the vertical weld

5.4 Make a fillet weld on lap using steel coupons in the vertical position using a GMA (MIG) welder.

5.4.1 Set up and adjust the welder for proper stickout, voltage, polarity, flow rate and wire speed required for the metal being welded

5.4.2 Determine work clamp (ground) location and attach

5.4.3 Use the proper angle of the gun to the joint and the direction of gun travel for the type of weld being made in a vertical position

5.4.4 Clean and prepare the metal to be welded, assure good fit-up, apply weld through primer if necessary, and clamp as required

5.4.5 Perform a visual test on the vertical weld

5.5 Make a plug weld using steel coupons in the overhead position using a GMA (MIG) welder.

5.5.1 Set up and adjust the welder for proper stickout, voltage, polarity, flow rate and wire speed required for the metal being welded

5.5.2 Determine work clamp (ground) location and attach

5.5.3 Use the proper angle of the gun to the joint and the direction of gun travel for the type of weld being made in an overhead position

5.5.4 Clean and prepare the metal to be welded, assure good fit-up, apply weld through primer if necessary, and clamp as required

5.5.5 Perform a visual inspection on the overhead weld

5.6 Make a butt joint with backing weld using steel coupons in the overhead position using a GMA (MIG) welder.

5.6.1 Set up and adjust the welder for proper stickout, voltage, polarity, flow rate and wire speed required for the metal being welded

5.6.2 Determine work clamp (ground) location and attach

5.6.3 Use the proper angle of the gun to the joint and the direction of gun travel for the type of weld being made in an overhead position

5.6.4 Clean and prepare the metal to be welded, assure good fit-up, apply weld through primer if necessary, and clamp as required

5.6.5 Perform a visual inspection on the overhead weld

5.7 Make a fillet weld on lap using steel coupons in the overhead position using a GMA (MIG) welder.

5.7.1 Set up and adjust the welder for proper stickout, voltage, polarity, flow rate and wire speed required for the metal being welded

5.7.2 Determine work clamp (ground) location and attach

5.7.3 Use the proper angle of the gun to the joint and the direction of

gun travel for the type of weld being made in an overhead position

5.7.4 Clean and prepare the metal to be welded, assure good fit-up, apply weld through primer if necessary, and clamp as required

5.7.5 Perform a visual inspection on the overhead weld

5.8 Make an open butt joint using steel coupons in the overhead position using a GMA (MIG) welder.

5.8.1 Set up and adjust the welder for proper stickout, voltage, polarity, flow rate and wire speed required for the metal being welded.

5.8.2 Determine work clamp (ground) location and attach.

5.8.3 Use proper angle of the gun to the joint and the direction of the gun travel for the type of weld being made in the overhead position.

5.8.4 Clean and prepare the metal to be welded, assure good fit-up, and apply weld through primer if necessary, and clamp as required.

5.8.5 Perform a visual inspection on the overhead weld.

5.9 Make a plug weld using aluminum coupons in the vertical position using a GMA (MIG) welder

5.9.1 Set up and adjust the welder for proper stickout, voltage, polarity, flow rate and wire speed required for the metal being welded

5.9.2 Determine work clamp (ground) location and attach

5.9.3 Use the proper angle of the gun to the joint and the direction of gun travel for the type of weld being made in a vertical position

5.9.4 Clean and prepare the metal to be welded, assure good fit-up, apply weld through primer if necessary, and clamp as required

5.9.5 Perform a visual test of the vertical weld

5.10 Make a butt joint with backing weld using aluminum coupons in the vertical position using a GMA (MIG) welder

5.10.1 Set up and adjust the welder for proper stickout, voltage, polarity, flow rate and wire speed required for the metal being welded

5.10.2 Determine work clamp (ground) location and attach

5.10.3 Use the proper angle of the gun to the joint and the direction of gun travel for the type of weld being made in a vertical position

5.10.4 Clean and prepare the metal to be welded, assure good fit-up, apply weld through primer if necessary, and clamp as required

5.10.5 Perform a visual test of the vertical weld

5.11 Make a fillet weld on lap using aluminum coupons in the vertical position using a GMA (MIG) welder.

5.11.1 Set up and adjust the welder for proper stickout, voltage, polarity, flow rate and wire speed required for the metal being welded

5.11.2 Determine work clamp (ground) location and attach

5.11.3 Use the proper angle of the gun to the joint and the direction of gun travel for the type of weld being made in a vertical position

5.11.4 Clean and prepare the metal to be welded, assure good fit-up, apply weld through primer if necessary, and clamp as required

5.11.5 Perform a visual test of the vertical weld

5.12 Make a plug weld using aluminum coupons in the overhead position using a GMA (MIG) welder.

5.12.1 Set up and adjust the welder for proper stickout, voltage, polarity, flow rate and wire speed required for the metal being welded

5.12.2 Determine work clamp (ground) location and attach

5.12.3 Use the proper angle of the gun to the joint and the direction of gun travel for the type of weld being made in an overhead position

5.12.4 Clean and prepare the metal to be welded, assure good fit-up,

apply weld through primer if necessary, and clamp as required
5.12.5 Perform a visual inspection on the overhead weld

5.13 Make a butt joint with backing weld using aluminum coupons in the overhead position using a GMA (MIG) welder
5.13.1 Set up and adjust the welder for proper stickout, voltage, polarity, flow rate and wire speed required for the metal being welded
5.13.2 Determine work clamp (ground) location and attach
5.13.3 Use the proper angle of the gun to the joint and the direction of gun travel for the type of weld being made in an overhead position
5.13.4 Clean and prepare the metal to be welded, assure good fit-up, apply weld through primer if necessary, and clamp as required
5.13.5 Perform a visual inspection on the overhead weld

5.14 Make a fillet weld on lap using aluminum coupons in the overhead position using a GMA (MIG) welder.
5.14.1 Set up and adjust the welder for proper stickout, voltage, polarity, flow rate and wire speed required for the metal being welded
5.14.2 Determine work clamp (ground) location and attach
5.14.3 Use the proper angle of the gun to the joint and the direction of gun travel for the type of weld being made in an overhead position
5.14.4 Clean and prepare the metal to be welded, assure good fit-up, apply weld through primer if necessary, and clamp as required
5.14.5 Perform a visual inspection on the overhead weld

5.15 Make an open butt joint using aluminum coupons in the overhead position using a GMA (MIG) welder
5.15.1 Set up and adjust the welder for proper stickout, voltage, polarity, flow rate and wire speed required for the metal being welded
5.15.2 Determine work clamp (ground) location and attach
5.15.3 Use the proper angle of the gun to the joint and the direction of gun travel for the type of weld being made in an overhead position
5.15.4 Clean and prepare the metal to be welded, assure good fit-up, apply weld through primer if necessary, and clamp as required
5.15.5 Perform a visual inspection on the overhead weld

5.16 Make a squeeze-type resistance spot weld (STRSW) using steel coupons
5.16.1 Set up and adjust the welder for the metal being welded
5.16.2 Clean and prepare the metal to be welded, assure good fit-up and apply weld through primer if necessary, and clamp as required
5.16.3 Inspect spot welds for visual defects and adjust the welder accordingly
5.16.4 Maintain and adjust spot welding electrode tips to ensure a quality weld.

5.17 Make a MIG brazing slot weld using steel coupons
5.17.1 Set up and adjust the welder for the metal being welded
5.17.2 Clean and prepare the metal to be welded, assure good fit-up and clamp as required
5.17.3 Inspect welds for visual defects and adjust the welder accordingly.

5.18 Make a MIG brazing open butt joint weld using steel coupons
5.18.1 Set up and adjust the welder for the metal being welded
5.18.2 Clean and prepare the metal to be welded, assure good fit-up and clamp as required
5.18.3 Inspect welds for visual defects and adjust the welder accordingly.

5.19 Remove and install self-piercing rivet (SPR)
5.19.1 Remove SPR
5.19.2 Identify correct rivet size
5.19.3 Identify correct rivet gun dies for rivet size

5.19.5 Install and inspect SPR for visual defects and determine corrective actions, if applicable
5.19.5 Maintain SPR gun.

5.20 Remove and install blind rivet.
- 5.20.1 Identify correct rivet size
- 5.20.2 Remove blind rivet
- 5.20.3 Install and inspect blind rivet for visual defects and determine corrective actions, if applicable.
- 5.20.4 Maintain and adjust blind rivet gun.

5.21 Install solid rivet.
- 5.21.1 Identify correct rivet size
- 5.21.2 Install and inspect solid rivet for visual defects and determine corrective actions, if applicable.

5.22 Install rivet bonded panel.
- 5.22.1 Identify correct type(s) and size of rivet
- 5.22.2 Identify proper adhesive for the application
- 5.22.3 Prepare panel(s) for adhesive and rivet installation
- 5.22.4 Apply adhesive and install rivet(s)
- 5.22.5 Inspect adhesive and rivet(s) for visual defects and determine corrective actions, if applicable.

5.23 Install weld bonded panel.
- 5.22.1 Identify proper adhesive for the application
- 5.22.2 Prepare panel(s) for adhesive and spot weld installation
- 5.22.3 Apply adhesive
- 5.22.4 Make spot weld(s)
- 5.23.5 Inspect weld bond for visual defects and determine corrective actions, if applicable.

CRT 6.0 — Complete backside reinforced cosmetic surface repair on a plastic vehicle part. Mix and apply appropriate material corresponding with the related tasks in the ASE Education Foundation Repair/Refinishing Non-Structural Analysis and Damage Analysis (ASE B3 Test). A 20-point scale is used for each segment. Participants will be expected to successfully complete each segment. Participants should have some basic knowledge in chemistry.

6.1 Demonstrate proper safety procedures
6.2 Demonstrate an understanding of the importance to clean before making any repair
6.3 Damage preparation before adhesive work
6.4 Demonstrate an understanding of appropriate abrasive grade sequence for reinforcing plastic repair. (Typically 50 and 80)
6.5 Apply a light coating of adhesion promoter and allow to dry adequately
6.6 Demonstrate the ability to open, load, and equalize the cartridge, attach the mixing nozzle, and discard the first pump of material
6.7 Demonstrate proper spreading techniques: Apply a thin, tight coat of material, then build a thin layer of adhesive followed by reinforcing mesh and an additional layer of adhesive

CRT 7.0 — Complete a front-side cosmetic surface repair on a plastic vehicle part. Mix and apply appropriate material corresponding with the related tasks in the ASE Education Foundation and the ASE Collision Repair/Refinishing Non-structural Analysis and Damage (B3) Certification Test. A 20-point scale is used for each segment. Participants will be expected to successfully complete each segment. Participants should have some basic knowledge in chemistry.

7.1 Demonstrate proper safety procedures
7.2 Demonstrate an understanding of the importance of cleaning before making any repair
7.3 Damage preparation before adhesive work
7.4 Demonstrate an understanding of appropriate abrasive grade sequence for plastic repair (Typically 50, 80, adhesive application, 80, 180, 320)
7.5 Demonstrate an understanding of the need to keep very coarse grade scratches (80 grit) inside valley of repair and not on surrounding plastic, to avoid creating "fuzzies" that will be difficult to conceal in the finished paint work
7.6 Demonstrate understanding of the difference between "Veeing Out" a repair (incorrect) and "Dishing Out" a repair (correct), and how that relates to the finished product (no ghost lines)
7.7 Apply a light coating of adhesion promoter and allow to dry adequately
7.8 Demonstrate the ability to load, open, and equalize the cartridge, attach the

mixing nozzle, and discard the first pump of material

7.9 Demonstrate proper spreading techniques: Apply a thin, tight coat of material, build in thin layers, and avoid air entrapment as they build slightly higher than the surrounding areas

7.10 Demonstrate test to determine readiness to sand (check with fingernail, see if it leaves a white mark in the adhesive)

CRT 8.0 — Complete a tab repair on plastic vehicle part. Mix and apply appropriate material corresponding with the related tasks in the ASE Education Foundation and The ASE Collision Repair/Refinishing Non-Structural Analysis and Damage (B3) Certification Test. A 20-point scale is used for each segment. Participants will be expected to successfully complete each segment. Participants should have some basic knowledge in chemistry.

8.1 Demonstrate proper safety procedures

8.2 Demonstrate an understanding of the importance of cleaning before making any repair

8.3 Demonstrate an understanding of appropriate abrasive grade sequence for tab repair (typically 50 and 80)

8.4 Apply a light coating of adhesion promoter and allow to dry adequately

8.5 Demonstrate the ability to load, open and equalize the cartridge, attach the mixing nozzle, and discard the first pump of material

8.6 Demonstrate proper "molding" techniques, using contour sheeting, and form a new tab

8.7 Demonstrate test to determine readiness to sand (check with fingernail, see if it leaves a white mark in the adhesive)

CRT 9.0 — Complete surface preparation and related tasks in the ASE Education Foundation and the ASE Collision Repair/Refinishing Non-structural Analysis and Damage (B3) Certification Test. A 20-point scale is used for each segment. Participants will be expected to successfully complete each segment. Participants should have some basic knowledge in chemistry.

9.1 Demonstrate proper safety

9.2 Demonstrate the ability to use 50-grit abrasive on a high-speed grinder to rough shape the formed tab, followed by 180-grit on a DA to finely shape the tab, and lastly, a 320-grit abrasive to prepare the featheredge for the painting process

9.3 Demonstrate the ability to use an 80-grit abrasive to "knock down" the bulk of the excess cosmetic repair material without abrading the surrounding plastic, which would leave "fuzzies"

9.4 Demonstrate the ability to use 180-grit abrasive to successfully level the repair material and feather into the surrounding area

9.5 Finish sand the repair and surrounding area with 320-grit abrasive to prepare for painting process

9.6 Demonstrate the best practice of reapplying adhesion promoter after the final sanding step, to assure paint adhesion

CRT 10.0 — Complete a tear repair on a plastic vehicle part using a plastic nitrogen welder. Apply appropriate material corresponding with the related tasks in The ASE Education Foundation Repair/Refinishing Non-Structural Analysis and Damage Analysis (ASE B3 Test). Participants will be expected to successfully complete each segment. Participants should have some basic knowledge in chemistry

10.1 Demonstrate proper safety procedures during the preparation and welding process.

10.2 Demonstrate an understanding of the importance of cleaning the plastic vehicle part before making any repairs.

10.3 Demonstrate proper backside surface preparation of the plastic vehicle part prior to a repair (roughing-up the surface with an abrasive).

10.4 Demonstrate proper alignment of the cosmetic side of the repair.

10.5 Demonstrate proper welding rod, ribbon selection, and proper nitrogen welding technique on the backside of the plastic vehicle part. Reinforce if necessary to ensure the integrity of the repair.

10.6 Demonstrate attention to the cooling of the cosmetic side of the repair before continuing the repair process.

10.7 Demonstrate the v-grooving of the tear on the cosmetic side of the repair to the proper depth and width.

10.8 Demonstrate proper nitrogen plastic welding technique to the cosmetic side of the plastic vehicle part.
10.9 Demonstrate proper attention to cooling the welded area before finish sanding the plastic vehicle part.

CRT 11.0 — Describe basic steering and suspension components of the vehicle to related tasks in ASE Education Foundation Collision Repair/Refinishing Mechanical and Electrical Components Technical Standards* (ASE B5 Test)

11.1 Identify the illustrated steering and suspension components

CRT 12.0 — Describe steering and suspension geometry to related tasks in ASE Education Foundation Collision Repair/Refinishing Mechanical and Electrical Components Technical Standards* (ASE B5 Test)

12.1 Apply the number of angle to the definition that describes it
12.2 Identify the problem or problems that result when the vehicle's tie rods and lower control arms pivot points do not remain parallel to each other as the vehicle's body moves down (jounce) and up (rebound) as it travels along the road
12.2.1 Analyze and identify misaligned or damaged steering, suspension, and powertrain components that can cause vibration, steering, and wheel alignment problems

CRT 13.0 — Perform structural damage analysis and related information to related tasks in ASE Education Foundation Collision Repair and Refinishing Structural Analysis and Damage Repair Technical Standards* (ASE B4 Test)

13.1 Describe the structural damage analysis questions or complete the statement using the choices given

CRT 14.0 —Perform structural realignment to related tasks in ASE Education Foundation Collision Repair and Refinishing Structural Analysis and Damage Repair Technical Standards* (ASE B4 Test)

14.1 Illustrate the different types of structural realignments along with choices for supporting (blocking), securing (holding) and pulling the structure to realign it
14.2 Select the setup that is the most efficient for a high-quality repair
14.2.1 Determine the extent of damage and the direction of the impact; document the methods and sequence of repair

CRT 15.0 — Determine the location of the vehicle's major control points using the damage simulator to related tasks in ASE Education Foundation Collision Repair and Refinishing Structural Analysis and Damage Repair Technical Standards* (ASE B4 Test)

15.1 Locate the major control points of the vehicle's lower structure
15.1.1 Determine the locations of all steering, suspension and powertrain component attaching points

CRT 16.0 — Gauge and measure the vehicle's lower structure using the damage simulator to related tasks in ASE Education Foundation Collision Repair and Refinishing Structural Analysis and Damage Repair Technical Standards (ASE B4 Test)

16.1 Demonstrate proper safety procedures
16.2 Set the correct height (datum) dimensions on the gauges by using the data chart
16.3 Install the gauges at the major control points

CRT 17.0 — Read the gauges and measure using the damage simulator to related tasks in ASE Education Foundation Collision Repair and Refinishing Structural Analysis and Damage Repair Technical Standards (ASE B4 Test)

17.1 Measure critical diagonal, length and width measurements of the structure
17.2 Sight the gauges and determine if there is a centerline (sideways) or height misalignment of the structure

CRT 18.0 — Diagram (document) the vehicle's structural misalignments using the damage simulator to related tasks in ASE Education Foundation Collision Repair and Refinishing Structural Analysis and Damage Repair Technical Standards (ASE B4 Test)

18.1 Determine the types of structural misalignment present and record on the damage analysis diagram

CRT 19.0 — Measure and analyze structural, steering and suspension misalignment of a body on frame vehicle using the gauge measuring system or mechanical measuring system to related tasks in ASE Education Foundation Collision Repair and Refinishing Structural Analysis and Damage Repair Technical Standards (ASE B4 Test)

19.1 Using a tram gauge and tape measure, measure the damaged vehicle's upper body, and steering and suspension control points.
19.2 Using a mechanical measuring system determine the different types of misalignments that the vehicle's lower structure has sustained.
19.3 Record the misalignments identified and analyze the types and amount of damage the vehicle has sustained

CRT 20.0 — Measure and analyze structural, steering and suspension misalignment of a unitized body vehicle using a computerized measuring system to related tasks in ASE Education Foundation Collision Repair and Refinishing Structural Analysis and Damage Repair Technical Standards* (ASE B4 Test)

20.1 Determine the different types of misalignment the vehicle's structure, steering and suspension have sustained*
20.2 Record the misalignments identified and analyze the type and amount of damage the vehicle has sustained*
20.3 Determine the material type and the sectioning or replacement procedures.

CRT 21.0 — Complete an estimate to related tasks in ASE Education Foundation Collision Repair and Refinishing Standards and ASE Catalog of Collision Repair/Refinishing Tests B6 (Damage Analysis and Estimating)*

21.1 Report heading/legibility*
- 21.1.1 List entrant number on estimating test*
- 21.1.2 Locate provided "Vehicle Description and Labor Rate Page" and complete owner and vehicle information segment on estimate (e.g., owner name, address, phone numbers, license plate, vehicle year, series, mileage, vehicle identification number)
- 21.1.3 Identify and record customer/vehicle information
- 21.1.4 Identify and record vehicle identification (VIN) information
- 21.1.5 Write legibly*

21.2 Identify parts replacement*
- 21.2.1 Locate and select vehicle to be estimated in the provided collision estimating guide*
- 21.2.2 Locate and list the correct part prices and replacement labor times and refinish labor times for the predetermined parts being replaced*
- 21.2.3 Estimate labor adjustments for vehicle options when appropriate*
- 21.2.4 Recognize and apply body labor overlap and refinish labor overlap where appropriate*
- 21.2.5 Consider and apply "included" and "not included" operations where appropriate*
- 21.2.6 Consider and apply labor footnotes (# signs) when necessary*

21.3 Prepare calculations*
- 21.3.1 Calculate and list the correct paint and materials allowance*
- 21.3.2 Calculate and list parts, body labor, refinish labor, paint and material column totals*
- 21.3.3 Calculate and list total labor hours (body labor plus refinish labor)*
- 21.3.4 Multiply total labor hours by providing labor rate and list labor dollar amount*
- 21.3.5 Calculate and list the total estimated amount*

CRT 22.0 —* Complete an oral assessment/interview to related tasks in ASE Education Foundation Collision Repair and Refinishing Standards

22.1 Exhibit personal skills such as attendance, time management and individual responsibility
- 22.1.1 Demonstrate promptness when required to meet interviewer at specific time and location*

CRT 23.0 — Maintain professional conduct to related tasks in ASE Education Foundation Collision Repair and Refinishing Standards

23.1 Demonstrate courteous behavior while waiting for the interviewer*

CRT 24.0 — Maintain professional appearance to related tasks in ASE Education Foundation Collision Repair and Refinishing Standards

24.1 Demonstrate proper attire (SkillsUSA uniform light blue shirt, dark blue pants)*

CRT 25.0 — Complete job application and résumé to related tasks in ASE Education Foundation Collision Repair and Refinishing Standards

25.1 Properly and legibly complete a job application and résumé*

CRT 26.0 — Demonstrate interview skills to related tasks in ASE Education Foundation Collision Repair and Refinishing Standards

Committee Identified Academic Skills

The technical committee has identified that the following academic skills are embedded in this contest.

Math Skills

- Understand the measurement angles on a three-dimensional object
- Understand the surface area and perimeter of three-dimensional objects
- Apply transformations (rotator turn, reflector flip, translator slide and dilator scale) to geometric figures
- Solve problems involving complementary, supplementary and congruent angles
- Solve problems involving symmetry and transformation
- Use measures of interior and exterior angles of polygons to solve problems
- Measure angles
- Make predictions using knowledge of probability
- Organize and describe data using matrixes
- Find surface area and perimeter of two-dimensional objects
- Use fractions to solve practical problems
- Solve practical problems using percentages
- Calculate percentages
- Make comparisons, predictions and inferences using graphs and charts

Science Skills

- Use knowledge of mechanical, chemical and electrical energy
- Use knowledge of principles of electricity and magnetism (practical example: current and amperage settings on the GMA [MIG] welder in relationship to weld penetration)
- Use knowledge of static electricity
- Use knowledge of pressure in relation to the concept of force
- Use knowledge of simple machines and compound machines
- Use knowledge of potential and kinetic energy
- Use of knowledge of simple machines, compound machines, powered vehicles, rockets and restraining devices
- Describe characteristics of types of matter based on physical and chemical properties
- Use knowledge of physical properties (shape, density, solubility, odor, melting point, boiling point and color)
- Use knowledge of chemical properties
- Describe and identify physical changes to matter
- Use knowledge of heat, light and sound energy
- Use knowledge of temperature scales, heat and heat transfer
- Plan and conduct a scientific investigation
- Use knowledge of work, force, mechanical advantage, efficiency and power

Language Arts Skills

- Demonstrate comprehension of a variety of informational text
- Demonstrate knowledge of appropriate reference materials
- Use print, electronic databases, online resources to access information in books and articles
- Provide information in conversations and in group discussions
- Provide information in oral presentations
- Demonstrate use of verbal communication skills: word choice, pitch, feeling, tone and voice
- Demonstrate use of nonverbal communication skills: eye contact, posture

and gestures using interviewing techniques to gain information
- Organize and synthesize information for use in written and oral presentations
- Edit writing for grammar, capitalization, punctuation, spelling, sentence structure and paragraphing

Connections to National Standards

State-level academic curriculum specialists identified the following connections to national academic standards.

Math Standards

- Problem solving
- Numbers and operations
- Measurement
- Geometry
- Representation
- Communication
- Connections

Source: NCTM Principles and Standards for School Mathematics. For more information, visit: http://www.nctm.org.

Science Standards

- Understands the structure and properties of matter
- Understands the sources and properties of energy
- Understands forces and motion
- Understands the nature of scientific inquiry

Source: McREL compendium of national science standards. To view and search the compendium, visit: www2.mcrel.org/compendium/browse.asp.

Language Arts Standards

- Students apply a wide range of strategies to comprehend, interpret, evaluate and appreciate texts. They draw on their prior experience, their interactions with other readers and writers, their knowledge of word meaning and of other texts, their word identification strategies and their understanding of textual features (e.g., sound-letter correspondence, sentence structure, context, and graphics)
- Students adjust their use of spoken, written and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes

- Students use spoken, written and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion and the exchange of information)

Source: IRA/NCTE Standards for the English Language Arts. To view the standards, visit: www.ncte.org/standards.

COMMERCIAL BAKING

PURPOSE

To evaluate each contestant's preparation for employment and to recognize outstanding students for excellence and professionalism in the commercial baking field.

First, download and review the General Regulations at: http://updates.skillsusa.org.

ELIGIBILITY

Open to active SkillsUSA members enrolled in programs with commercial baking/pastry arts as the occupational objective.

CLOTHING REQUIREMENT

Class G: Culinary/Commercial Baking Attire

For both men and women: White or black work pants or black-and-white checkered chef's pants*, white chef's jacket, white or black leather work shoes; white apron; white neckerchief; side-towels; hairnet. Chef's hats (toques) will be supplied by the National Technical Committee, as well as food-handlers' gloves.

Not available through SkillsUSA Store

These regulations refer to clothing items that are pictured and described at: www.skillsusastore.org. If you have questions about clothing or other logo items, call 800-401-1560 or 703-956-3723.

* Black-and-white checkered chef's pants not available through the SkillsUSA Store.

Note: Contestants must wear their official contest clothing to the contest orientation meeting. (No identification of the school or state should be on the clothing.)

EQUIPMENT AND MATERIALS

1. Supplied by the technical committee:
   a. All necessary equipment and food items
2. Supplied by the contestant (at least one of each, but more per item than specified is acceptable):
   a. One palette knife
   b. One hand whip
   c. One large kitchen spoon
   d. Three pastry bags, tips and scissors
   e. One bowl scraper
   f. One dough knife
   g. One serrated knife
   h. One pastry wheel
   i. One bench brush
   j. One grease brush
   k. One pastry brush
   l. One rolling pin
   m. Three side towels
   n. One cleaning towel
   o. One set of nested mixing bowls (1-, 2- and 3-qt.)
   p. Thermometer
   q. Timer
   r. Oven mitt or pan handlers
   s. Disposable gloves to handle ready to eat foods
   t. Pencil or marker to mark baked items
   u. No other food items allowed (e.g., sprinkles, decorettes, etc.)
   v. A small (battery-powered or spring) scale (2 lb. to 4 lb. capacity)
   w. Basic calculator is allowed for baking and written test
   x. A 1-2 qt. sauce pan
   Note: This is the minimum of tools needed. Contestants may bring additional materials but they must be stored in your workspace. Judging will also include neat and clean workspace.
   y. All state winners must create a one-page résumé and submit a hard copy to the technical committee chair at orientation. Failure to do so will result in a 10-point penalty.

***Note*:** Your contest also may require a hard copy of your résumé as part of the actual contest. Check the Contest Guidelines and/or the updates page on the SkillsUSA website: http://updates.skillsusa.org.

SCOPE OF THE CONTEST

The contest will be geared toward the commercial (retail) baking business rather than commercial restaurant business.

Knowledge Performance

The contest will include a written knowledge test assessing baking fundamentals. The exam consists of 100 multiple-choice questions. Topics of the exam include: weights, measures and general baking math; proper temperatures of dough, dough handling and baking; classifications and properties of ingredients; handling and storage of ingredients; safety and handling; yeast raised dough products; doughnut — cake and yeast raised; cake decorating; cakes; production, scheduling, planning; laminated doughs; cookies, pies and pastries; and customer service and merchandising of products.

The written test will be scheduled during a contestant meeting and held before the performance portion of the contest.

Skill Performance

The skill performance of the contest will be the actual preparation of goods and presentation of finished products ready for sale to customers.

Contest Guidelines

1. During the contest, all food items needed for baking will be provided; no outside food will be allowed.
2. The product formulas and other instructions needed for product preparation will be posted on the SkillsUSA website at: updates.skillsusa.org.
3. A total of six products will be prepared during the performance portion of the contest. The products will be selected by the national technical committee.
4. The finished products identified in Competency 2.9 will be judged using the following criteria. All products will be visually evaluated on a scale of one to five. Each product will be scored on these elements:
    a. External appearance — Volume, form or shape, size, uniformity, structure, color, crust, thickness, character or feel and even bake. For certain products, the weight, size, flakiness, over spring, structure, toppings, fillings and glazes will be evaluated
    b. Internal appearance — Slice, structure, color, grain or density, tunneling or holes, texture or feel and even bake
    c. Taste — Aroma, flavor, mouth feel, aftertaste, character, palatability, texture, freshness, moisture and dryness
    d. Salability — Product quality, consistency and presentation as a desirable consumer good
5. The finished products identified in Competency 2.9 will be judged using the following criteria. All products will be visually evaluated on a scale of one to 10. Each product will be scored on these elements:
    a. Icing
        1. Symmetry — cake centered on board, final shape of cake, sides perpendicular to top, square and level cake
        2. Opacity (no window or crumbs)
        3. Proper amount of icing
    b. Design
        1. Borders — even and symmetrical
        2. Use of color
        3. Does the design fit the cake (room for lettering, flower too big or small)
        4. Balance
        5. Use of flowers
    c. Technique
        1. Borders — even and symmetrical
        2. Natural flow of stems and leaves
        3. Roses — made to resemble nature
        4. Execution of design
    d. Following directions — cake order followed exactly

Standards and Competencies

CB 1.0 — Demonstrate knowledge of basic baking fundamentals

1.1 Pass the Retail Baking Association standard certification exam. The exam consists of 100 multiple-choice questions. Topics of the exam include: weights, measures and general baking math; classifications and properties of ingredients; handling and storage of

ingredients; safety and handling; yeast-raised dough products; doughnut — cake and yeast-raised; cake decorating; cakes; production/scheduling/planning; laminated doughs; cookies, pies, and pastries; and customer service and merchandising of products

CB 2.0 — Prepare six baked goods made from scratch and/or from a fresh or frozen dough, and one iced and decorated cake in a bakery setting to RBA industry standards using a five-point scale (see criteria below). The contestant will:

2.1 Read and understand standard bakery formulas
2.2 Select correct ingredients given the provided formula
2.3 Weigh and measure ingredients accurately given the provided formula
2.4 Assemble ingredients in the correct sequence given the provided formula
2.5 Apply appropriate preparation procedure given the provided formula
2.6 Apply (i.e., blend, fold, mix) the appropriate mixing procedure given the provided formula according to RBA industry standard
2.7 Correctly leaven and bake product to RBA industry standard
2.8 Correctly finish baked product (i.e., glaze, ice or fill) to RBA industry standard
2.9 Prepare one product from each of the following categories to RBA industry standards
- 2.9.1 Category 1: Yeast bread and rolls — straight dough formula
  - a. French or Italian dough hard rolls, French bread, Vienna bread, Kaiser rolls, club rolls, baguettes and breadsticks
  - b. Pan breads
- 2.9.2 Category 2: Quick breads (no yeast) — baked
  - a. Loaf types — such as cranberry, date nut, lemon, poppy seed and cinnamon apple
  - b. Muffins
- 2.9.3 Category 3: Cookies
  - a. Cut and roll out — such as sugar cookies
  - b. Bagged out — such as spritz, butter and tea cookie
- 2.9.4 Category 4: Puff pastry (laminated dough)
  - a. Turnovers
  - b. Cream horns
- 2.9.5 Category 5: Paste a Choux product
  - a. Éclairs and cream puffs
- 2.9.6 Category 6: Pie and pastry crust pastry
  - a. Regular two-crust, fruit-filled pies
  - b. Rim crust for one crust of soft pies — such as squash and custard, pecan
- 2.9.7 Category 7: Prepare one iced and decorated cake to the customer's specifications as per written order

CB 3.0 — Demonstrate knowledge of commonly accepted OSHA safety standards in a bakery, including lifting techniques and safety management

3.1 Use appropriate lifting techniques
3.2 Keep work area well organized and free of hazards
3.3 Follow safety requirements for operating equipment
3.4 Work with a regard for safety of self and others

CB 4.0 — Demonstrate appropriate, commonly accepted OSHA sanitation practices in a bakery

4.1 Wash hands sufficiently and at appropriate times during baking process
4.2 Inspect tools and equipment before using and correctly clean items
4.3 Use a clean side towel and replace as needed during the day
4.4 Avoid actions that can potentially contaminate food
4.5 Wear gloves when working with ready-to-eat foods

CB 5.0 — Demonstrate production efficiency practices in a bakery

5.1 Use procedures to accurately measure ingredients
5.2 Bake and finish product to produce the maximum salable product
5.3 Model time-management

CB 6.0 — Use commonly used equipment in a bakery according to manufacturer's specifications

6.1 Use equipment according to manufacturer's specifications
6.2 Select appropriate tools and equipment for baking function or product
6.3 Use mixer according to manufacturer's specifications
6.4 Use small wares and tools (thermometer, spoons, measures, etc.) appropriately

CB 7.0 — Demonstrate appropriate, commonly accepted OSHA personal hygiene and grooming practices in a bakery

7.1 Dress in a commonly accepted professional manner
7.2 Maintain a clean uniform (shirt, pants, skirts, shoes, hat, towel, etc.)
7.3 Wear head gear or other covering at all times
7.4 Maintain clean hands at all times

Committee Identified Academic Skills

The technical committee has identified that the following academic skills are embedded in this contest.

Math Skills

- Use fractions to solve practical problems
- Use proportions and ratios to solve practical problems
- Simplify numerical expressions
- Solve practical problems involving percents
- Use of weights and measures

Science Skills

- Describe and recognize solids, liquids and gases
- Use knowledge of physical properties (shape, density, solubility, odor, melting point, boiling point, color)
- Describe and identify physical changes to matter
- Use knowledge of mechanical, chemical and electrical energy
- Use knowledge of heat, light and sound energy
- Use knowledge of temperature scales, heat and heat transfer

Language Arts Skills

- Provide information in conversations and in group discussions
- Provide information in oral presentations
- Demonstrate use of such verbal communication skills as word choice, pitch, feeling, tone and voice
- Understand source, viewpoint and purpose of texts
- Organize and synthesize information for use in written and oral presentations
- Demonstrate knowledge of appropriate reference materials
- Use print, electronic databases and online resources to access information in books and articles
- Edit writing for correct grammar, capitalization, punctuation, spelling, sentence structure and paragraphing

Connections to National Standards

State-level academic curriculum specialists identified the following connections to national academic standards.

Math Standards

- Numbers and operation
- Measurement
- Geometry
- Data
- Problem solving
- Communication
- Connections
- Representation

Source: NCTM Principles and Standards for School Mathematics. For more information, visit: http://www.nctm.org.

Science Standards

- Understands the structure and properties of matter
- Understands the sources and properties of energy
- Understands forces and motion
- Understands the nature of scientific inquiry

Source: McREL compendium of national science standards. To view and search the compendium, visit: www2.mcrel.org/compendium/browse.asp.

Language Arts Standards

- Students use spoken, written and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion and the exchange of information)

Source: IRA/NCTE Standards for the English Language Arts. To view the standards, visit: www.ncte.org/standards.

COMPUTER PROGRAMMING

PURPOSE
To evaluate each contestant's preparation for employment and to recognize outstanding students for excellence and professionalism in the field of computer programming.

First, download and review the General Regulations at: http://updates.skillsusa.org.

ELIGIBILITY
Open to active SkillsUSA members enrolled in programs with computer programming as the occupational objective.

CLOTHING REQUIREMENTS
Class E: Contest specific — Business Casual
For men: Official SkillsUSA white polo shirt, black dress slacks, black socks, black leather shoes.
For women: Official SkillsUSA white polo shirt with black dress skirt (knee-length) or black slacks; black socks or black or skin-tone seamless hose; black leather dress shoes.

These regulations refer to clothing items that are pictured and described at: www.skillsusastore.org. If you have questions about clothing or other logo items, call 800-401-1560 or 703-956-3723.

Note: Contestants must wear their official contest clothing to the contest orientation meeting.

EQUIPMENT AND MATERIALS
1. Supplied by the technical committee:
   a. Printer
   b. Programming instructions
   c. Timing and judges procedures
2. Supplied by the contestant:
   a. Desktop computer/monitor or laptop
   b. Visual Basic, Java, C++ or RPG software
   c. One copy only of the coding reference manual of the language in which they will code the program
   d. Ballpoint pens or sharpened pencils
   e. Blank notebook paper
   f. All competitors must create a one-page résumé and submit a hard copy to the technical committee chair at orientation. Failure to do so will result in a 10-point penalty.

   ***Note*:** Your contest may also require a hard copy of your résumé as part of the actual contest. Check the Contest Guidelines and/or the updates page on the SkillsUSA website: http://updates.skillsusa.org.

SCOPE OF THE CONTEST
The contest uses competencies identified by the Computing Technology Industry Association. The specific projects chosen for national competition will be determined by the Computer Programming technical committee.

Knowledge Performance
The contest includes a written knowledge test assessing knowledge of Visual Basic, Java, C++ or RPG or "other approved language." Check the Contest Guidelines and/or the updates page on the SkillsUSA website: updates.skillsusa.org.

Skill Performance
The contest includes a computer programming problem consisting of background information and program specifications with accompanying reference materials and description of program output requirements. An appropriate (successfully executable) computer program from design notes and instructions will be developed.

Contest Guidelines
1. The contestants will receive a packet that includes three or four projects.
2. Each project's specifications are written for either Visual Basic, Java, C++ or RPG.
3. Projects will be scored on the following six criteria: completeness, correctness of output, validation of input, internal documentation, efficiency of code, and quality of work.
4. The contest will also include an interview to assess contestants' ability to answer questions typical of an entry-level position for a computer programmer.

Standards and Competencies

CP 1.0 — Demonstrate knowledge of computer programming

1.1 Describe how programs and programming languages work
1.2 Describe the purposes and practices of structured programming

CP 2.0 — Perform competencies related to Java programming

2.1 Explain the structured programming paradigm
2.2 Identify the primary components of a Java program
2.3 Explain the basic syntax of a Java program
2.4 Demonstrate procedures for compiling and running a Java application
2.5 Demonstrate use of Java's online hypertext technology documentation
2.6 Demonstrate use of Java's identifiers to name variables, constants, and methods
2.7 Demonstrate use of Java's operators to write expressions
2.8 Explain the rules governing operand evaluation order and operator precedence
2.9 Summarize Java's variable naming conventions
2.10 Distinguish syntax errors, runtime errors and logic errors
2.11 Understand program flow control in selection and loop statements
2.12 Demonstrate use of methods in Java
2.13 Demonstrate use of declaring, initializing and accessing elements in arrays
2.14 Demonstrate use of the string class to process fixed strings

CP 3.0 — Perform competencies related to C++ programming

3.1 Write C++ programs using input/output statements
3.2 Write C++ programs using selection and iteration
3.3 Create C++ programs using functions
3.4 Write C++ programs using one-dimensional arrays
3.5 Properly document and debug C++ programs
3.6 Create object concepts and terminology
3.7 Implement those algorithms in the C++ programming language using classes
3.8 Debug C++ programs written by others
3.9 Use pointers in C++ programs
3.10 Use sequential files in C++ programs

CP 4.0 — Perform competencies related to Visual Basic programming

4.1 Demonstrate knowledge of the fundamentals of Visual Basic (VB) programming using Visual Basic.NET
4.2 Use sequential and random access files in VB programs
4.3 Use advanced controls and multiple controls in a business application
4.4 Use a database and database controls in a business application
4.5 Demonstrate knowledge of structured and object-oriented programming techniques through the process of subprograms, selection, and repetition in projects
4.6 Use GUI design principles in all projects

Committee Identified Academic Skills

The technical committee has identified that the following academic skills are embedded in this contest.

Math Skills

- Use fractions to solve practical problems
- Use proportions and ratios to solve practical problems
- Simplify numerical expressions
- Use scientific notation
- Solve practical problems involving percents
- Solve single variable algebraic expressions
- Solve multiple variable algebraic expressions
- Apply transformations (rotate or turn, reflect or flip, translate or slide, and dilate or scale) to geometric figures
- Construct three-dimensional models
- Apply Pythagorean Theorem
- Make predictions using knowledge of probability
- Make comparisons, predictions, and inferences using graphs and charts
- Organize and describe data using matrixes
- Graph linear equations
- Solve problems using proportions, formulas, and functions
- Find slope of a line

- Use laws of exponents to perform operations
- Solve quadratic equations
- Solve problems involving symmetry and transformation

Language Arts Skills

- Provide information in conversations and in group discussions
- Provide information in oral presentations
- Demonstrate comprehension of a variety of informational texts
- Organize and synthesize information for use in written and oral presentations
- Demonstrate knowledge of appropriate reference materials
- Use print, electronic databases and online resources to access information in books and articles

Connections to National Standards

State-level academic curriculum specialists identified the following connections to national academic standards.

Math standards

- Numbers and operations
- Algebra
- Reasoning and proof
- Communication
- Connections
- Representation

Source: NCTM Principles and Standards for School Mathematics. For more information, visit: http://www.nctm.org.

Science Standards

- Understands the sources and properties of energy
- Understands forces and motion
- Understands the nature of scientific inquiry

Source: McREL compendium of national science standards. To view and search the compendium, visit: www2.mcrel.org/compendium/browse.asp.

Language Arts Standards

- Students apply a wide range of strategies to comprehend, interpret, evaluate and appreciate texts. They draw on their prior experience, their interactions with other readers and writers, their knowledge of word meaning and of other texts, their word identification strategies, and their understanding of textual features (e.g., sound-letter correspondence, sentence structure, context, graphics)
- Students adjust their use of spoken, written and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes
- Students employ a wide range of strategies as they write and use different writing process elements appropriately to communicate with different audiences for a variety of purposes
- Students conduct research on issues and interests by generating ideas and questions, and by posing problems. They gather, evaluate and synthesize data from a variety of sources (e.g., print and nonprint texts, artifacts, people) to communicate their discoveries in ways that suit their purpose and audience
- Students use a variety of technological and information resources (e.g., libraries, databases, computer networks, video) to gather and synthesize information and to create and communicate knowledge
- Students use spoken, written and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion and the exchange of information)

Source: IRA/NCTE Standards for the English Language Arts. To view the standards, visit: www.ncte.org/standards.

COSMETOLOGY

PURPOSE
To evaluate each contestant's preparation for employment and to recognize outstanding students for excellence and professionalism in the field of cosmetology.

First, download and review the General Regulations at: http://updates.skillsusa.org/.

ELIGIBILITY
Open to active SkillsUSA members enrolled in programs with cosmetology as the occupational objective.

CLOTHING REQUIREMENT
Class F: Contest Specific - Cosmetology
For men: Official SkillsUSA white dress shirt; black dress slacks; black socks; black leather work or dress shoes.
For women: Official white top; black dress slacks; black socks or black or skin-tone seamless hose; black leather work or dress shoes.

***Note*:** A white cosmetology smock can be worn with the white dress shirt for men or white top for women.

These regulations refer to clothing items that are pictured and described at: www.skillsusastore.org. If you have questions about clothing or other logo items, call 800-401-1560 or 703-956-3723.

Note: Contestants must wear their official contest clothing to the contest orientation meeting.

EQUIPMENT AND MATERIALS
1. Supplied by the technical committee:
   a. Vanities, mirrors, tables and styling chairs
   b. Hair dryers, towels
   c. Any and all pictures or literature of styles, haircuts and technicals
   d. First aid kit
   e. Blood spill kit
2. Supplied by the contestant:
   a. Cutting shears
   b. Thinning shears
   c. Razor and spare blade
   d. Clipper
   e. Thermal tools (flat iron and/or curling iron
   f. Blow dryer
   g. Styling products of choice
   h. Finishing spray
   i. Combs
   j. Brushes
   k. Spray bottle (filled with water)
   l. Towel
   m. Rollers
   n. Clippies or hair clips
   o. All competitors must create a one-page résumé and submit a hard copy to the technical committee chair at orientation. Failure to do so will result in a 10-point penalty.

   ***Note*:** Your contest may also require a hard copy of your résumé as part of the actual contest. Check the Contest Guidelines and/or the updates page on the SkillsUSA website: http://updates.skillsusa.org/.

SCOPE OF THE CONTEST
The contest is defined by industry standards as identified by SkillsUSA technical committee, which includes Burmax Co. Inc., CMW Inc., Fantastic Sam's, Marianna, Milady, Regis Corp./Supercuts, SportsClips and Pivot Point International.

The contest is divided into four separate skill performance tests and one written examination and an oral communications competition.

Knowledge Performance
The contest will include a written knowledge test of 50 multiple-choice questions assessing knowledge of cosmetology. Contestants will have 45 minutes to complete the exam.

Skill Performance
An oral communication test will assess contestant verbal presentation skills. The four separate skill performance tests assess skills in haircutting, hair styling and long-hair design at

multiple performance stations. Creativity is assessed in the long-hair design test, while haircutting is tested in the re-creation of two women's and one men's haircut from a photograph.

Contest Guidelines

1. The contest rules will be reviewed the day before the contest. After the review session, contestants, in their required dress code, will take the oral communications and written test. Contestants will then be escorted to the contest site to receive final instructions. After they receive gifts from the sponsors, they may leave the area.
2. The long hair mannequin will be colored on site, after your orientation.
3. All contestants must keep their working area clean and organized.
4. All contestants must follow sanitation and safety procedures throughout the contest.
5. Professional attitude and communication is expected throughout the contest.
6. Once time is called, contestant must stop working. Touching the hair of the mannequin or model after time is called will result in three penalty points.
7. Cell phones must be turned off during the contest.
8. For the parade finale, a 3"x5" card will be given to a technical committee member listing the contestant's name, school, city and state. Contestants will present their completed mannequins to the audience and judges.
9. The technical committee will supply mannequins and holders for all areas of this contest. If this changes in any given year, contestants will be responsible for supplying their own mannequins and holders.
10. For the long-hair design station, no ornaments or hairpieces are allowed. No eyelashes will be allowed.

Standards and Competencies

CO 1.0 — Long Hair Design: Create a long-hair design of your choice within a one-hour time period

1.1 Style hair to produce a range of special effects in an upswept position
1.2 Incorporate applicable techniques such as braiding, twisting, rolls, loops, etc.
1.3 Secure hair with hair pins, bobbie pins and bands as applicable
1.4 Create a design that is clean, smooth, showing no back combing, and back brushing under the finished style
1.5 Check that hair pins, bobbie pins and bands are not exposed
1.6 Demonstrate balance, proportion and form in the finished design
1.7 Show control of texture and control of hair direction in the finished design
1.8 Incorporate current trends

CO 2.0 — Men's or Women's Long Hair Cut and Design: Duplicate a haircut and style that has been preselected by the national technical committee within a 45-minute time period

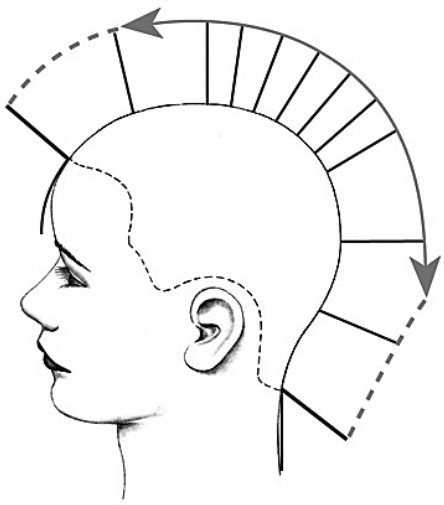
2.1 Duplicate the haircut using shears, thinning shears, texturizing shears, razor and/or clippers as needed.
2.2 Duplicate the length, design line and textured look of the selected cut
2.3 Duplicate the finished design using blow dryer or thermal tools such as curling iron, flat iron, etc., as needed.
2.4 Use appropriate styling products to duplicate the selected haircut
2.5 Duplicate the balance of form, control of texture and the control of the hair direction

CO 3.0 — Men's or Women's Short Cut and Design: Duplicate a predetermined haircut and design that has been selected by the national technical committee within a 45-minute time period

3.1 Duplicate the haircut using shears, thinning shears, texturizing shears, razor and/or clipper, as needed
3.2 Duplicate the length and design line of the selected cut
3.3 Duplicate the finished design using blow dryer, or thermal tools such as curling iron, flat iron, etc., as needed
3.4 Use appropriate styling products to duplicate the selected haircut
3.5 Duplicate the balance of form, control of texture and the control of hair direction

CO 4.0 — Uniform Layer Haircut (90 Degree) and the Uniform 247* (see drawing at end) Haircut Procedure: Duplicate a uniform layer (90 degree) haircut and design selected by the national technical committee within a 45-minute time period, styling the hair with hair dryer and fingers only

4.1 Assemble tools (shears, comb and blow dryer) and prepare station
4.2 Create a four-section parting drop hairline guide
4.3 Establish the design length around the back perimeter
4.4 Establish the design length around the front perimeter
4.5 Establish the interior guide at the top of head (apex, crown)
4.6 Continue cutting guideline to front hairline from an established interior guide at the top of the head
4.7 Continue cutting guideline from crown to nape from an established interior guide at the top of the head
4.8 Use vertical partings to blend top guide to design line
4.9 Maintain a constant 90-degree elevation throughout the procedure
4.10 Follow a traveling guide to maintain uniformly layered lengths
4.11 Perform a cross check of procedure for accuracy
4.12 Check perimeter guideline and finish as necessary
4.13 Finished cut is uniformly blended
4.14 Blow hair dry to frame face
4.15 Clean and organize station



CO 5.0 — Hair Color and Highlighting: Demonstrate application procedures for hair coloring and highlighting

5.1 Create a color design of your choice on the long-hair mannequin
5.2 Identify the color pattern used by drawing on a sketch sheet
5.3 Explain level and tone and their role in formulating hair color
5.4 List the four basic categories of hair color, explain their chemical effect on the hair, and give examples of their use
5.5 Demonstrate the application techniques for: temporary colors, semipermanent colors, permanent colors and lighteners
5.6 Demonstrate special effects hair coloring techniques

CO 6.0 — Curling and Relaxing Hair: Demonstrate the application procedures to perm and relax hair

6.1 List and describe the various types of permanent waving solutions
6.2 Demonstrate basic wrapping procedure: straight set, curvature wrap, bricklay wrap, weave wrap, double tool wrap and spiral wrap
6.3 Demonstrate the procedure for chemical hair relaxing
6.4 Demonstrate the basic procedure for a soft curl permanent

CO 7.0 — Communication Skills: Follow oral and written instructions, respond to oral questions, and demonstrate customer service skills by phone in a two- to three-minute simulated work scenario

7.1 Use a pleasant voice
7.2 Introduce yourself to client
7.3 Use client's name
7.4 Verify client information
7.5 Offer salon services
7.6 Ask client if he or she has any questions
7.7 Rebook client
7.8 Be friendly, helpful and sincere

Committee Identified Academic Skills

The technical committee has identified that the following academic skills are embedded in this contest.

Math Skills

- Use fractions to solve practical problems
- Use proportions and ratios to solve practical problems

- Solve practical problems involving percents
- Measure angles
- Find volume and surface area of three-dimensional objects
- Apply transformations (rotate or turn, reflect or flip, translate or slide, and dilate or scale) to geometric figures
- Construct three-dimensional models
- Make predictions using knowledge of probability
- Solve problems using proportions, formulas and functions
- Use basic math skills for purpose of marketing and bookkeeping; addition, subtraction, multiplication, division and percentages

Science Skills

- Describe and recognize elements, compounds, mixtures, acids, bases and salts
- Describe and recognize solids, liquids and gases
- Describe characteristics of types of matter based on physical and chemical properties
- Use knowledge of physical properties (shape, density, solubility, odor, melting point, boiling point, color)
- Use knowledge of chemical properties (acidity, basicity, combustibility, reactivity)
- Describe and demonstrate simple compounds (formulas and the nature of bonding)
- Predict chemical changes to matter (types of reactions, reactants and products; and balanced equations)
- Use knowledge of potential and kinetic energy
- Use knowledge of mechanical, chemical and electrical energy
- Use knowledge of heat, light and sound energy
- Use knowledge of temperature scales, heat and heat transfer
- Use knowledge of the nature and technological applications of light
- Use knowledge of simple machines, compound machines, powered vehicles, rockets and restraining devices
- Use knowledge of principles of electricity and magnetism
- Use knowledge of static electricity, current electricity and circuits

Language Arts Skills

- Demonstrate use of such verbal communication skills as word choice, pitch, feeling, tone and voice
- Demonstrate use of such nonverbal communication skills as eye contact, posture, and gestures using interviewing techniques to gain information
- Demonstrate comprehension of a variety of informational texts
- Use text structures to aid comprehension
- Understand source, viewpoint and purpose of texts
- Demonstrate knowledge of appropriate reference materials
- Use print, electronic databases and online resources to access information in books and articles

Connections to National Standards

State-level academic curriculum specialists identified the following connections to national academic standards.

Math Standards

- Geometry
- Measurement
- Problem solving
- Communication
- Connections
- Representation

Source: NCTM Principles and Standards for School Mathematics. For more information, visit: http://www.nctm.org.

Science Standards

- Understands the principles of heredity and related concepts
- Understands relationships among organisms and their physical environment
- Understands the nature of scientific inquiry

Source: McREL compendium of national science standards. To view and search the compendium, visit: www2.mcrel.org/compendium/browse.asp.

Language Arts Standards

- Students apply a wide range of strategies to comprehend, interpret, evaluate and appreciate texts. They draw on their prior experience, their interactions with other readers and writers, their knowledge of word meaning and of other texts, their word identification strategies, and their understanding of textual features (e.g., sound-letter correspondence, sentence structure, context, graphics)
- Students adjust their use of spoken, written and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes
- Students use spoken, written and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion and the exchange of information)

Source: IRA/NCTE Standards for the English Language Arts. To view the standards, visit: www.ncte.org/standards.

Crime Scene Investigation

Purpose
To evaluate a team's ability to conduct a crime scene investigation.

First, download and review the General Regulations at: http://updates.skillsusa.org.

Eligibility
Open to a team of three active SkillsUSA members enrolled in programs with law enforcement as the occupational objective. All team members must be from the same SkillsUSA chapter.

Clothing Requirement
Class D: Contest Specific — Blue Attire
For both men and women: Official SkillsUSA light blue work shirt; navy pants; black, brown, or tan leather work shoes safety shoes (with protective toe cap.) Safety glasses with side shields or goggles (prescription glasses may be used only if they are equipped with side shields. If not, they must be covered with goggles).

These regulations refer to clothing items that are pictured and described at: www.skillsusastore.org. If you have questions about clothing or other logo items, call 800-401-1560 or 703-956-3723.

Note: Contestants must wear their official contest clothing to the contest orientation meeting.

Equipment and Materials
1. Supplied by the technical committee:
   a. Crime scene
2. Supplied by the contestants:
   a. Crime scene kit containing materials necessary to conduct a crime scene investigation, e.g., fingerprint cards, brushes, powder, crime scene tape, etc.
   b. Small pocket notebook for field notes
   c. Pens and pencils
   d. Handcuffs and handcuff case
   e. Flashlight
   f. Digital camera (any style — quality of photography will not be judged)
   g. All competitors must create a one-page résumé and submit a hard copy to the technical committee chair at orientation. Failure to do so will result in a 10-point penalty.

***Note*:** Your contest may also require a hard copy of your résumé as part of the actual contest. Check the Contest Guidelines and/or the updates page on the SkillsUSA website: http://updates.skillsusa.org.

Scope of the Contest
The contest assesses the ability to perform skills related to the crime scene procedures as outlined in *Criminal Investigations* by Bennett and Hess, Seventh Edition, and guidelines as set forth by the SkillsUSA technical committee.

Knowledge Performance
The contest will include a skill-related written knowledge test assessing knowledge of crime scene photography, physical evidence, crime scene sketches, fingerprinting and releasing a crime scene.

Skills Performance
The contest will include activities that simulate situations encountered by criminal investigation professionals.

Contest Guidelines
1. Teams will draw numbers during the pre-contest orientation meeting to determine the order of performance and demonstration times.
2. Contestants must work together as a team without assistance from instructors, other contestants or observers.

Standards and Competencies

CSI 1.0 — Demonstrate or explain activities prior to conducting a crime scene search

1.1 Obtain information from the responding officer and secure the scene

1.2 Explain and demonstrate knowledge and use of constitutional law governing search and seizure
1.3 Demonstrate proper procedures for checking vital signs of a victim and certifying death of a victim

CSI 2.0 — Explain and demonstrate the use of crime scene photography

2.1 Demonstrate proper crime scene photography
2.2 Document photographs taken at the crime scene

CSI 3.0 — Properly search for, collect and remove physical evidence from a crime screen

3.1 Explain and demonstrate appropriate search method to use
3.2 Properly flag all evidence
3.3 Explain methods for collecting DNA evidence
3.4 Explain and demonstrate proper bagging and marking of all evidence

CSI 4.0 — Draw a crime scene sketch using proper measurements, symbols and labels

4.1 Demonstrate proper use of measurements
4.2 Demonstrate the proper use of symbols and labels

CSI 5.0 — Apply proper procedures for dusting a crime scene for collecting latent fingerprints

5.1 Demonstrate the ability to properly lift and mount a latent fingerprint from a designated item of evidence
5.2 Demonstrate the proper procedure for marking a latent fingerprint card

CSI 6.0 — Release a crime screen properly and legally

6.1 Demonstrate the ability to prepare an evidence inventory
6.2 Demonstrate the ability to remove all evidence and equipment from crime scene

CSI 7.0 — Work together as a professional team to conduct a crime scene investigation

7.1 Demonstrate professional bearing and demeanor
7.2 Demonstrate the ability to assign team members' tasks equal to their aptitude

Committee Identified Academic Skills

The technical committee has identified that the following academic skills are embedded in this contest.

Math Skills

- Measure angles
- Use the rectangular coordinate method to locate evidence (uses two fixed reference points and right angles to indicate the exact location of evidence in the crime scene)

Science Skills

- Plan and conduct a scientific investigation
- Use the proper method for developing latent fingerprints
- Identify and demonstrate necessary safety precautions for handling and processing DNA evidence

Language Arts Skills

- Provide information in conversations and in group discussions
- Provide information in oral presentations
- Demonstrate use of such verbal communication skills as word choice, pitch, feeling, tone and voice
- Demonstrate use of such nonverbal communication skills as eye contact, posture and gestures using interviewing techniques to gain information
- Organize and synthesize information for use in written and oral presentations
- Demonstrate informational writing
- Edit writing for correct grammar, capitalization, punctuation, spelling, sentence structure and paragraphing

Connections to National Standards

State-level academic curriculum specialists identified the following connections to national academic standards.

Math Standards

- Algebra
- Geometry
- Measurement
- Data analysis and probability
- Problem solving

- Reasoning and proof
- Communication
- Connections
- Representation

Source: NCTM Principles and Standards for School Mathematics. For more information, visit: http://www.nctm.org.

Science Standards

- Understands the principles of heredity and related concepts
- Understands the structure and function of cells and organisms
- Understands the structure and properties of matter
- Understands the nature of scientific knowledge
- Understands the nature of scientific inquiry

Source: McREL compendium of national science standards. To view and search the compendium, visit: www2.mcrel.org/compendium/browse.asp.

Language Arts Standards

- Students adjust their use of spoken, written and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes
- Students conduct research on issues and interests by generating ideas and questions and by posing problems. They gather, evaluate and synthesize data from a variety of sources (e.g., print and nonprint texts, artifacts, people) to communicate their discoveries in ways that suit their purpose and audience
- Students use spoken, written and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion and the exchange of information)

Source: IRA/NCTE Standards for the English Language Arts. To view the standards, visit: www.ncte.org/standards.

CRIMINAL JUSTICE

PURPOSE
To evaluate each contestant's preparation for employment and to recognize outstanding students for excellence and professionalism in the field of law enforcement and/or public security.

First, download and review the General Regulations at: http://updates.skillsusa.org/.

ELIGIBILITY
Open to active SkillsUSA members enrolled in programs with law enforcement and/or public security as the occupational objective.

CLOTHING REQUIREMENT
Class D: Contest Specific — Automotive Blue Attire
For both men and women: Official SkillsUSA light blue work shirt; navy pants; black, brown, or tan leather work shoes safety shoes (with protective toe cap.) Safety glasses with side shields or goggles (prescription glasses may be used only if they are equipped with side shields. If not, they must be covered with goggles).

These regulations refer to clothing items that are pictured and described at: www.skillsusastore.org. If you have questions about clothing or other logo items, call 800-401-1560 or 703-956-3723.

Note: Contestants must wear their official contest clothing to the contest orientation meeting.

EQUIPMENT AND MATERIALS
1. Supplied by the technical committee:
   All necessary materials for the contest
2. Supplied by the contestant:
   a. Small pocket notebook for field notes
   b. 25' tape measure
   c. Pens and pencils (two each)
   d. Handcuffs
   e. Handcuff case
   f. Flashlight
   g. Fingerprint kit
   h. Belt and training holster with weapon
   i. Camera (can be on phone)
   j. Clipboard or Posse box for paperwork
   k. Accident template
   l. One-page, typewritten resume (hand in at orientation, three copies)
   m. All competitors must create a one-page résumé and submit a hard copy to the technical committee chair at orientation. Failure to do so will result in a 10-point penalty.

   ***Note*:** Your contest may also require a hard copy of your résumé as part of the actual contest. Check the Contest Guidelines and/or the updates page on the SkillsUSA website: http://updates.skillsusa.org/.

SCOPE OF THE CONTEST
The contest is defined by industry standards as identified by the SkillsUSA technical committee, which includes: Boone County Sheriff's Department (Missouri), Olathe Police Department (Kansas) and the Platte County Sheriff's Office (Missouri).

Knowledge Performance
The contest includes a written knowledge exam assessing knowledge of laws and processes related to criminal justice.

Skills Performance
The contest will include activities that simulate situations encountered by criminal justice professionals.

Contest Guidelines
1. Each contestant must work independently without assistance from instructors, other contestants or observers.
2. The judging criteria and points assigned will be determined by the difficulty of the tasks assigned.

Standards and Competencies

CJ 1.0 — Explain concepts and applications of the major principles of federal laws related to criminal justice

1.1 Identify major themes of constitutional law and criminal law
1.2 Describe applicable laws of arrest
1.3 Describe rules of evidence
1.4 Explain federal laws related to search and seizure
1.5 Describe principles of juvenile law
1.6 Explain surcharges and civil and criminal liabilities

CJ 2.0 — Demonstrate standard patrol procedures in a simulated situation

2.1 Describe commonly accepted procedures used for patrol
2.2 Plan patrol routes and practices
2.3 Use protocols in communicating with dispatcher
2.4 Describe safe operation of a police vehicle
2.5 Direct and control traffic as needed

CJ 3.0 — Investigate a traffic report and traffic accidents using standard procedures in a given situation

3.1 Write a clear and concise report
- 3.1.1 Use proper grammar, punctuation and spelling
- 3.1.2 Identify persons involved
- 3.1.3 Provide a full description of the person(s) and vehicle(s) involved
- 3.1.4 Obtain a statement from the victim

3.2 Accurately describe an incident
3.3 Conduct a records check of suspicious subjects
3.4 Exhibit defensive techniques when encountering a suspicious subject

CJ 4.0 — Demonstrate the proper use of firearms and chemical agents used in law enforcement situations

4.1 Describe standard protocols that govern the use of firearms and chemical agents
4.2 Identify components of common firearms and chemical agents
4.3 Explain the use and effect of common firearms and chemical agents
4.4 Show the use of a firearm in a simulated situation
4.5 Show the use of a chemical agent in simulated situation

CJ 5.0 — Demonstrate the knowledge and skills needed for emergency and crisis situations encountered by law enforcement officers

5.1 Use crisis intervention techniques
5.2 Apply basic elements of emergency response
5.3 Demonstrate first aid procedures
5.4 Demonstrate water safety and rescue procedures
5.5 Explain first responder techniques

CJ 6.0 — Explain trial procedures and provide testimony for a given situation

6.1 Explain typical trial procedures
6.2 Describe roles of those involved in trials and hearings
6.3 Prepare for trial as a witness
6.4 Provide testimony in a given situation

CJ 7.0 — Demonstrate communication and interpersonal skills used in criminal justice situations

7.1 Show courtesy and professionalism
7.2 Listen intently to others
7.3 Use eye contact to establish rapport
7.4 Shake hands and introduce self to others
7.5 Speak clearly and effectively
7.6 Use proper grammar
7.7 Answer questions precisely
7.8 Follow protocol in communicating to a dispatcher

CJ 8.0 — Describe the operations of home and commercial security systems

8.1 Identify types of security systems
8.2 Explain the operation of various types of security systems

CJ 9.0 — Demonstrate standard procedures for handling and evaluating physical evidence in a given situation

9.1 Explain procedures for searching for evidence
9.2 Identify evidence at a crime scene
9.3 Document location where evidence was collected
9.4 Bag and label evidence
9.5 Follow chain of custody protocols

CJ 10.0 — Demonstrate procedures to arrest and search a subject in a simulated situation

10.1 Approach a subject safely and professionally
10.2 Use procedures that ensure safety at all times
10.3 Obtain identification from a subject
10.4 Identify and describe probable cause prior to arrest
10.5 Check for active warrants through dispatcher
10.6 Place subject under arrest
10.7 Notify subject of reason for arrest
10.8 Use a safe handcuffing procedure to secure subject
10.9 Pat down or search subject using safe procedure
10.10 Find and remove weapons from subject
10.11 Secure removed weapons

CJ 11.0 — Collect clear and legible latent fingerprints from a crime scene

11.1 Explain the proper technique for collecting fingerprints
11.2 Use the technique to collect fingerprints
11.3 Place collected fingerprints to card
11.4 Check for legibility of collected prints

Committee Identified Academic Skills

The technical committee has identified that the following academic skills are embedded in this contest.

Math Skills

- Measure angles
- Apply transformations (rotate or turn, reflect or flip, translate or slide, and dilate or scale) to geometric figures
- Construct three-dimensional models
- Organize and describe data using matrixes
- Find arc length and the area of a sector

Science Skills

- Plan and conduct a scientific investigation
- Use knowledge of the particle theory of matter
- Describe and recognize elements, compounds, mixtures, acids, bases and salts
- Describe and recognize solids, liquids and gases
- Describe characteristics of types of matter based on physical and chemical properties
- Use knowledge of physical properties (shape, density, solubility, odor, melting point, boiling point, color)
- Use knowledge of chemical properties (acidity, basicity, combustibility, reactivity)
- Describe phases of matter
- Describe and identify physical changes to matter
- Predict chemical changes to matter (types of reactions, reactants and products, and balanced equations)
- Use knowledge of speed, velocity and acceleration
- Use knowledge of Newton's laws of motion
- Use knowledge of simple machines, compound machines, powered vehicles, rockets and restraining devices

Language Arts Skills

- Provide information in conversations and in group discussions
- Provide information in oral presentations
- Demonstrate use of such verbal communication skills as word choice, pitch, feeling, tone and voice
- Demonstrate use of such nonverbal communication skills as eye contact, posture and gestures using interviewing techniques to gain information
- Demonstrate comprehension of a variety of informational texts
- Use text structures to aid comprehension
- Organize and synthesize information for use in written and oral presentations
- Demonstrate knowledge of appropriate reference materials
- Use print, electronic databases and online resources to access information in books and articles
- Demonstrate narrative writing
- Demonstrate informational writing
- Edit writing for correct grammar, capitalization, punctuation, spelling, sentence structure and paragraphing

Connections to National Standards

State-level academic curriculum specialists identified the following connections to national academic standards.

Math Standards

- Geometry
- Measurement
- Data analysis and probability
- Problem solving
- Communication
- Connections
- Representation

Source: NCTM Principles and Standards for School Mathematics. For more information, visit: http://www.nctm.org.

Science Standards

- Understands biological evolution and the diversity of life
- Understands the nature of scientific knowledge
- Understands the nature of scientific inquiry

Source: McREL compendium of national science standards. To view and search the compendium, visit: www2.mcrel.org/compendium/browse.asp.

Language Arts Standards

- Students adjust their use of spoken, written and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes
- Students employ a wide range of strategies as they write and use different writing process elements appropriately to communicate with different audiences for a variety of purposes
- Students apply knowledge of language structure, language conventions (e.g., spelling and punctuation), media techniques, figurative language and genre to create, critique and discuss print and nonprint texts
- Students conduct research on issues and interests by generating ideas and questions, and by posing problems. They gather, evaluate and synthesize data from a variety of sources (e.g., print and nonprint texts, artifacts, people) to communicate their discoveries in ways that suit their purpose and audience
- Students use a variety of technological and information resources (e.g., libraries, databases, computer networks, video) to gather and synthesize information and to create and communicate knowledge
- Students use spoken, written and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion and the exchange of information)

Source: IRA/NCTE Standards for the English Language Arts. To view the standards, visit: www.ncte.org/standards.

Culinary Arts

Purpose
To evaluate each contestant's preparation for employment in the food service industry and to recognize outstanding students for excellence and professionalism in culinary arts.

First, download and review the General Regulations at: http://updates.skillsusa.org.

Clothing Requirement
Class G: Culinary/Commercial Baking Attire
For both men and women: White or black work pants or black-and-white checkered chef's pants*, white chef's jacket, white or black leather work shoes; white apron; white neckerchief; side-towels; hairnet. Chef's hats (toques) will be supplied by the National Technical Committee, as well as food-handlers' gloves.
Not available through SkillsUSA Store

No facial jewelry is allowed. Earrings are not permitted even if covered by a bandage. A single watch or wedding ring is the only jewelry that will be allowed to be worn during the orientation and contest periods. All hair must be restrained by either a hat or hairnet. Beards must be covered by a snood during all periods of food handling.

These regulations refer to clothing items that are pictured and described at: www.skillsusastore.org. If you have questions about clothing or other logo items, call 800-401-1560 or 703-956-3723.
* Black-and-white checkered chef's pants not available through the SkillsUSA Store.

Cellphones are not permitted on the contest floor and cannot be used in place of a kitchen timer.

Note: Contestants must wear their official contest clothing to the contest orientation meeting.

Eligibility
Open to active SkillsUSA members enrolled in programs with culinary arts or commercial food trades as the occupational objective.

Equipment and Materials
1. Supplied by the technical committee:
   a. Contest problem (menus, recipes, instructions)
   b. All necessary food items, seasonings, etc.
   c. Contest site organized (workstations, ranges, refrigeration, access to product and additional equipment) in as fair a manner possible for each contestant
   d. All cookware and small wares necessary for food preparation
   e. All necessary platters, dishes, and china necessary for food presentations

2. Supplied by the contestant:
   a. No. 2 pencil (two each, small note pad if desired)
   b. Knife kit and cook's tools as desired from the following:
      1. French cook's knife
      2. Paring knife
      3. Vegetable peeler
      4. Knife steel
      5. Boning knife
      6. Cook's fork
      7. Slicing knife (meat)
      8. Serrated slicing knife
      9. Fillet knife
      10. Utility knife
      11. Offset spatula
      12. Cook's tongs (8–12 in.)
      13. Pocket thermometer
      14. Micro plane
      15. Piping bags and tips
      16. Molds or timbals
      17. Sil pats
      18. Battery-powered timer or clock
      19. Small mesh strainer
      20. Oven thermometer
      21. Food handler gloves
      22. Hair net(s)
      23. Cheesecloth
      24. Whisk
      25. Kitchen spoons
      26. Stainless steel mixing bowls
      27. Food mill or ricer
      28. Salad spinner

29. Measuring cups/spoons
30. Mise en place containers
31. Plastic squeeze bottles
32. Under counter equipment rack
33. Bench scrapers
34. Cutting boards
35. Garnish kit:
    a. Citrus zester
    b. Channel knife
    c. Parisienne scoop
    d. Apple corer
    e. Tourner knife
    f. Canapé or biscuit cutters

    No additional equipment will be allowed.

c. All competitors must create a one-page résumé and submit a hard copy to the technical committee chair at orientation. Failure to do so will result in a 10-point penalty.

***Note*:** Your contest may also require a hard copy of your résumé as part of the actual contest. Check the Contest Guidelines and/or the updates page on the SkillsUSA website: http://updates.skillsusa.org.

Note: No electrical devices, pasta machines, pots, pans, baking trays or large equipment will be allowed.

Scope of the Contest

Knowledge Performance

The contest will include a written knowledge test that will require the use of culinary math. The test will include topics such as knowledge of standard weights and measures; the ability to convert recipes, yields, portion sizes, a.p.s. accurately; science; nutrition basics; environment health standards and practices; bacteria, viruses and food-borne illnesses; food science and technology; information technology; language and communications; English (SOL) reading; manuals/SOP; recipes; menus; résumé writing; speaking efficiently and listening carefully; and elementary culinary language-menu terminology.

Skill Performance

The contest will include a series of testing stations for the actual preparation of food and arrangement of food on plates or platters and in dishes to serve to the customer.

Contest Guidelines

The skill performance portion of the contest will ask contestants to:

1. Demonstrate and apply food safety principles, procedures, HACCP and key practices for ensuring food safety
2. Coordinate *mise en place* and apply organizational skills
3. Demonstrate and apply knowledge of proper cooking methods and techniques as required
4. Demonstrate knife skills and proper cutting techniques
5. Demonstrate and apply the proper use of equipment
6. Demonstrate and apply creative preparation, portioning and presentation of food items

Standards and Competencies

CA 1.0 — Follow Hazard Analysis Critical Control Points (HACCP) in a food preparation setting

1.1 Document information on time and temperature in log
1.2 Store and rotate food according to policies (FIFO)
1.3 Use proper receiving procedures for the delivery of food
1.4 Wash hands according to proper procedures
1.5 Use properly calibrated thermometers
1.6 Use labels properly

CA 2.0 — Maintain knowledge of safety, sanitation and HAZMAT policies, procedures and codes in a food preparation setting

2.1 Validate that in-service training records and reports are up-to-date
2.2 Ensure that personal certifications are maintained
2.3 Ensure that proper containers are used for storage of food, chemicals and other supplies
2.4 Check that personal attire meets safety standards (e.g., covered hair)

2.5 Ensure that proper cleaning solutions are maintained and used
2.6 Ensure that spills and other safety problems are addressed immediately
2.7 Ensure that material safety data sheets are reviewed

CA 3.0 — Maintain personal hygiene and compliance with dress code in a food preparation setting

3.1 Demonstrate that uniforms are clean and fit properly
3.2 Demonstrate that hair restraints are used
3.3 Ensure that perfume and cologne use is minimal
3.4 Demonstrate that hands and nails are clean and groomed
3.5 Ensure that use of jewelry meets standards (e.g., only wedding rings)

CA 4.0 — Maintain safe and sanitary work area(s)

4.1 Show that location of first aid kit is clearly marked
4.2 Show that MSDS sheets are used properly
4.3 Show that sanitizers are located at every station
4.4 Show that work area, tools and equipment are cleaned and sanitized after each activity
4.5 Ensure that chemicals are stored properly
4.6 Ensure that sharp objects are stored properly
4.7 Demonstrate that fire codes are followed

CA 5.0 — Hold and store food at proper temperature

5.1 Show that food products are labeled and dated
5.2 Ensure that food is rotated in a timely manner
5.3 Ensure that temperature of food and storage containers is within guidelines
5.4 Show that the thermometer is calibrated
5.5 Demonstrate that temperatures are checked and logged regularly
5.6 Ensure that storage guidelines are followed
5.7 Prepare food according to specifications

CA 6.0 — Review menu, recipes and instructions

6.1 Demonstrate that clarification is sought when questions arise
6.2 Ensure that recipe reviewed is up-to-date
6.3 Ensure that quantity of food is verified
6.4 Ensure that menu items are consistent with recipes
6.5 Demonstrate that recipes are available and referenced when needed

CA 7.0 — Identify and select the necessary ingredients

7.1 Identify and use appropriate substitutions if necessary
7.2 Verify ingredient list
7.3 Verify that preparation ingredients are consistent with recipe
7.4 Ensure that requisition forms are used when appropriate for special items
7.5 Verify that stock levels are checked
7.6 Verify that freshness and proper rotation are checked

CA 8.0 — Follow recipes and customer requests

8.1 Demonstrate that proper weights and measurements are used
8.2 Ensure that substitutions are made upon customer requests
8.3 Verify that recipe is followed consistently
8.4 Identify that cooking and serving times are consistent with recipes
8.5 Identify that food is consistent with customer request and recipe
8.6 Ensure that order is checked for special instructions
8.7 Verify that the customer reports satisfaction

CA 9.0 — Prepare food to proper temperature and taste

9.1 Verify proper temperature requirements
9.2 Use thermometer correctly
9.3 Set food warmers to proper temperature
9.4 Calibrate thermometers correctly
9.5 Verify that potentially hazardous foods have reached safe temperatures

CA 10.0 — Communicate necessary information to co-workers in a food preparation setting

10.1 Follow chain of command
10.2 Communicate requests for special orders to chef prior to preparation
10.3 Verify customer requests with food server
10.4 Share customer feedback
10.5 Monitor and communicate quantity of returned items

10.6 Use shift logs
10.7 Use warning tags
10.8 Ensure that products are labeled

CA 11.0 — Review standards and customer requests for finished product

11.1 Identify special requests
11.2 Identify necessary garnishes
11.3 Identify appropriate portions
11.4 Identify appropriate container (e.g., plate, banquet container)

CA 12.0 — Assemble product for delivery

12.1 Use appropriate serving containers
12.2 Ensure that serving containers (e.g., plates, flatware) are clean
12.3 Use proper hygiene when assembling the final product (e.g., hair covering)
12.4 Verify that all menu items are present
12.5 Use proper serving tools
12.6 Verify that product is visually inspected
12.7 Notify food servers of the availability of order

CA 13.0 — Monitor holding time and temperature

13.1 Verify that heat lamps are in working order
13.2 Calibrate thermometers properly
13.3 Rotate finished food at appropriate time intervals
13.4 Verify that holding time and temperatures comply with standard policies
13.5 Check maintenance logs on equipment
13.6 Use thermometers consistently
13.7 Use Hazard Analysis Critical Control Point (HAACP) logs
13.8 Use serving and holding tools correctly

CA 14.0 — Assess final product for quality assurance

14.1 Verify that the ticket is compared to the finished dish
14.2 Match the final product to customer request
14.3 Verify that the presentation of product is consistent
14.4 Ensure that the final product is prepared at the correct temperature
14.5 Ensure that the final product is seasoned at correct level
14.6 Ask service staff about the customer reaction

CA 15.0 — Gather the necessary equipment in the food preparation setting

15.1 Use the right tool or piece of equipment for task
15.2 Ensure that tools and equipment are transported to work area safely
15.3 Use checklists to verify equipment

CA 16.0 — Verify that equipment and tools are in working order

16.1 Inspect equipment and tools visually
16.2 Identify equipment and tools with missing parts
16.3 Ensure that equipment is tested before use (e.g., oven temperature)
16.4 Ensure that defective tools and equipment are reported to supervisors
16.5 Verify that maintenance logs are maintained
16.6 Ensure that tools and equipment that create safety hazards are removed

CA 17.0 — Communicate deficiencies and other necessary information to the supervisor

17.1 Identify unsafe tools and equipment clearly
17.2 Describe deficiencies in detail
17.3 Report deficiencies to appropriate personnel
17.4 Log deficiencies
17.5 Ensure that maintenance logs reflect deficiencies
17.6 Verify that documentation procedures are followed

CA 18.0 — Use tools and equipment in a safe and sanitary manner

18.1 Verify that tools and equipment are cleaned and sanitized before and after use
18.2 Use proper colored cutting board (e.g., blue/fish; red/raw meat; green/vegetables)
18.3 Use proper food handler gloves
18.4 Verify that knives are sharpened on a regular basis
18.5 Use equipment safety devices (e.g., guards on electronic cutters)
18.6 Follow manufacturer's operating instructions for equipment

CA 19.0 — Clean and sanitize equipment and tools after every use

19.1 Use proper chemical mixture to clean and sanitize equipment and tools
19.2 Ensure that cutting boards are properly bleached
19.3 When cleaning tools and equipment, use hot water
19.4 Ensure that policies and procedures for using chemicals and sanitizers are followed

CA 20.0 — Store tools and equipment in proper area after use

20.1 Verify that equipment and tools are cleaned, sanitized and covered before storage
20.2 Ensure that cleaning supplies are stored in the proper area
20.3 Return tools and equipment to proper storage place
20.4 Ensure that equipment sanitization storage rules are followed

CA 21.0 — Maintain awareness of surroundings in the food preparation setting

21.1 Report security or safety problems promptly to appropriate personnel
21.2 Ensure that hazardous situations are dealt with promptly
21.3 Verify that work area is visually scanned on a regular basis for safety and security problems
21.4 Identify emergency exits and procedures
21.5 Check emergency equipment regularly
21.6 Monitor location of co-workers

CA 22.0 — Advise management of safety and security concerns

22.1 Notify supervisory personnel promptly about safety and security concerns
22.2 Document safety concerns in a timely manner
22.3 Forward concerns to appropriate personnel
22.4 Document concerns containing all relevant information
22.5 Ensure that follow-up activities occur after concerns have been forwarded

CA 23.0 — Take appropriate action to protect guest and employee safety

23.1 Correct hazardous conditions promptly and safely
23.2 Notify management and/or outside agencies (e.g., fire department, ambulance) promptly of problems
23.3 Use proper safety equipment
23.4 Follow written policies and procedures
23.5 Document outstanding hazards
23.6 Monitor customer behavior for potential harm to others
23.7 Verify that visible signage is posted around hazardous areas (e.g., wet floor)

CA 24.0 — Follow security policies and procedures

24.1 Review safety and security policies frequently
24.2 Verify that security documentation is complete and accurate
24.3 Verify that company reports (e.g., shrinkage reports) indicate security policies are being followed
24.4 Ensure that unauthorized individuals are identified and removed from premises
24.5 Verify that the work environment is checked frequently for potential security problems

CA 25.0 — Follow safety and emergency procedures, including appropriate workplace behavior

25.1 Follow emergency procedures according to company policy
25.2 Notify proper authorities of emergency situations
25.3 Use emergency equipment properly
25.4 Verify that safety-related training and certifications (e.g., CPR) are up-to-date
25.5 Report suspicious activity to appropriate personnel
25.6 Document incident reports properly and in a timely manner

CA 26.0 — Identify problems with customer satisfaction

26.1 Ensure that customers are asked about their source of dissatisfaction
26.2 Repeat problem description to customer to verify understanding
26.3 Assess customer body language for signs of dissatisfaction
26.4 Document problems in a timely manner
26.5 Review customer feedback

26.6 After a problem has been identified, ensure that follow up activity occurs

CA 27.0 — Resolve problem or offer alternative solutions according to company procedures and guidelines

27.1 Identify that the solution is consistent with company policies and procedures
27.2 Document the resolution to the problem as company policy requires
27.3 Ensure that proper attitude is maintained at all times
27.4 Verify that problems are referred to proper personnel when appropriate
27.5 Perform the resolution of a problem in a timely manner
27.6 After a problem has been identified, verify that follow-up activities occur

CA 28.0 — Follow up on guest satisfaction and employee actions

28.1 Verify that customer satisfaction is checked after solution is offered
28.2 Identify that customer comment cards indicate customer satisfaction
28.3 Contact customers about the resolution of outstanding problems
28.4 Ensure that follow-through activities with guest are performed
28.5 Document customer satisfaction level

CA 29.0 — Document incident and outcome

29.1 Verify that documents and forms are complete and accurate
29.2 Ensure that documentation is provided to appropriate personnel
29.3 Identify that documentation is completed in a timely manner
29.4 Notify co-workers of the outcome and any changes in policy
29.5 Verify that documentation is reviewed to ensure that the problem does not recur

Committee Identified Academic Skills

The technical committee has identified that the following academic skills are embedded in this contest.

Math Skills

- Use fractions to solve practical problems
- Use proportions and ratios to solve practical problems
- Simplify numerical expressions
- Use scientific notation
- Solve practical problems involving percents
- Solve single variable algebraic expressions
- Solve problems using proportions, formulas and functions

Science Skills

- Use knowledge of cell theory
- Use knowledge of patterns of cellular organization (cells, tissues, organs, systems)
- Describe basic needs of organisms
- Classify living organisms
- Use knowledge of carbon, water and nitrogen cycles
- Describe and recognize elements, compounds, mixtures, acids, bases and salts
- Describe and recognize solids, liquids and gases
- Describe characteristics of types of matter based on physical and chemical properties
- Use knowledge of physical properties (shape, density, solubility, odor, melting point, boiling point and color)
- Use knowledge of chemical properties (acidity, basicity, combustibility and reactivity)

Language Arts Skills

- Provide information in conversations and in group discussions
- Provide information in oral presentations
- Demonstrate use of such verbal communication skills as word choice, pitch, feeling, tone and voice
- Demonstrate use of such nonverbal communication skills as eye contact, posture and gestures using interviewing techniques to gain information
- Demonstrate comprehension of a variety of informational texts
- Use test structures to aid comprehension
- Understand source, viewpoint and purpose of texts
- Organize and synthesize information of ruse in written and oral presentations
- Demonstrate knowledge of appropriate reference materials
- Use print, electronic databases and online resources to access information in books and articles
- Demonstrate narrative writing
- Demonstrate expository writing

- Demonstrate information writing
- Edit writing for correct grammar, capitalization, punctuation, spelling, sentence structure and paragraphing

Connections to National Standards

State-level academic curriculum specialists identified the following connections to national academic standards.

Math Standards

- Numbers and operations
- Algebra
- Geometry
- Measurement
- Problem solving
- Communication
- Connections
- Representation

Source: NCTM Principles and Standards for School Mathematics. For more information, visit: http://www.nctm.org.

Science Standards

- Understands the structure and function of cells and organisms
- Understands relationships among organisms and their physical environment
- Understands biological evolution and the diversity of life
- Understands the structure and properties of matter
- Understands the sources and properties of energy
- Understands the nature of scientific inquiry

Source: McREL compendium of national science standards. To view and search the compendium, visit: www2.mcrel.org/compendium/browse.asp.

Language Arts Standards

- Students apply a wide range of strategies to comprehend, interpret, evaluate and appreciate texts. They draw on their prior experience, their interactions with other readers and writers, their knowledge of word meaning and of other texts, their word identification strategies, and their understanding of textual features (e.g., sound-letter correspondence, sentence structure, context, graphics)
- Students adjust their use of spoken, written and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes
- Students employ a wide range of strategies as they write and use different writing process elements appropriately to communicate with different audiences for a variety of purposes
- Students use a variety of technological and information resources (e.g., libraries, databases, computer networks, video) to gather and synthesize information and to create and communicate knowledge
- Students use spoken, written and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion and the exchange of information)

Source: IRA/NCTE Standards for the English Language Arts. To view the standards, visit: www.ncte.org/standards.

DENTAL ASSISTING

PURPOSE
To evaluate each contestant's preparation for employment and to recognize outstanding students for excellence and professionalism in the field of dental assisting.

First, download and review the General Regulations at: http://updates.skillsusa.org.

CLOTHING REQUIREMENT
Class B: Healthcare Attire
For both men and women: Official blue scrubs; white socks or skin-tone seamless hose; health-professional's white leather work shoes. Shoes must be all-white leather (no canvas), completely enclosed (no open-toe or open-heel). Athletic-style shoes that meet the aforementioned criteria are acceptable.

Scrubs should fit appropriately for all health contests and should be properly hemmed and wrinkle free. Only plain, white, collarless t-shirts may be worn underneath the scrubs. Hair must be pinned up and off the collar.

These regulations refer to clothing items that are pictured and described at: www.skillsusastore.org. If you have questions about clothing or other logo items, call 800-401-1560 or 703-956-3723.

***Note*:** Contestants must wear their official contest clothing and bring all supplies to the contest orientation meeting and contest.

Appearance Requirement
A white T-shirt with crew neck may be worn under the scrub top as long as the shirt is not visible from either the sleeve or the hem areas. Conservative hairstyle — long hair should be styled up and away from the face and neck. Nails should be cleaned, short and without nail polish. No artificial nails (which can harbor bacteria), no heavy makeup, no heavy body scents, and no jewelry other than a watch and a wedding ring may be worn. Tattoos and piercings should not be visible. Competitors should exhibit professional appearance and conduct during the contest.

ELIGIBILITY
Open to active SkillsUSA members enrolled in programs with dental assisting as the occupational objective.

EQUIPMENT AND MATERIALS
1. Supplied by the technical committee:
   a. All instruments, equipment and materials required for the contest
2. Supplied by the contestant:
   a. Watch with second hand
   b. Pencil
   c. Red and blue pencil
   d. Pen with black ink
   e. Masks, 10 pair gloves, safety glasses with side shield, goggles or face shield
   f. Disposable gown (no lab coats)
   g. All competitors must create a one-page résumé and submit a hard copy to the technical committee chair at orientation. Failure to do so will result in a 10-point penalty.

   ***Note*:** Your contest may also require a hard copy of your résumé as part of the actual contest. Check the Contest Guidelines and/or the updates page on the SkillsUSA website: http://updates.skillsusa.org.

SCOPE OF THE CONTEST
The contest is defined by the ability to perform the procedures specified in the ninth edition of the Task Analysis for Dental Assisting National Board Inc. (DANB) Examinations and as determined by the SkillsUSA Health Occupations technical committee. A copy of the standards may be purchased from:

DANB
676 N. St. Clair, Suite 1880
Chicago, IL 60611
Phone: 800-FOR-DANB
Web: www.danb.org

Knowledge Performance
The contest will include a written knowledge exam assessing knowledge of dental

foundations, communication skills, safety, infection control and asepsis (core and advanced), ethics/law and employment skills.

Skill Performance

The contest will consist of simulated dental office situations and demonstrations.

Contest Guidelines

1. Contestants will be rated on personal appearance, the degree of work skills and speed used in the performance of the assigned task. The use of safety measures and the degree of effective personal interaction with the patient will also be rated, when appropriate.
2. All procedures for the simulations will be selected from the latest edition of *Modern Dental Assisting* (Torres and Ehrlich), Elsevier Publishing. Contact your area representative for a desk copy of the textbook, student workbook and online resources by calling 800-222-9570.
3. The skills included in the contest will be selected from the Standards and Competencies listed below and may involve total procedures or tasks that are a part of the procedures.

Standards and Competencies

DA 1.0 — Monitor and manage safety and infection control using procedures specified in the ninth edition of the Task Analysis for Dental Assisting National Board Inc. (DANB) for examinations and as determined by the SkillsUSA health occupations technical committee

1.1 Report and/or record safety hazards in the workplace
1.2 Apply principles of body mechanics
1.3 Perform maintenance on equipment to keep in proper working order
1.4 Demonstrate and maintain a safe client environment
1.5 Interpret and respond to medical emergency protocol
1.6 Verify identity of client
1.7 Use precautions in the presence of ionizing radiation
1.8 Manage hazardous materials and use standard precautions of the workplace following EPA, OSHA, CDC and ADA guidelines.
1.9 Perform correct handwashing techniques
1.10 Use appropriate personal protective equipment
1.11 Identify modes of pathogen transmission
1.12 Apply principles of sterilization, disinfection and ultrasonic preparation for equipment, instruments and supplies in the workplace

DA 2.0 — Assess the client's condition following good practices based on guidelines as specified in the ninth edition of the Task Analysis for Dental Assisting National Board Inc. (DANB) for examinations and as determined by the SkillsUSA health occupations technical committee

2.1 Measure and record blood pressure, respirations, oral temperature and pulse
2.2 Perform CPR for adult, child and infant
2.3 Demonstrate knowledge of basic dental emergencies
2.4 Demonstrate knowledge of pre- and post-operative instructions

DA 3.0 — Apply preventive procedures using guidelines specified in the ninth edition of the Task Analysis for Dental Assisting National Board Inc. (DANB) for examinations and as determined by the SkillsUSA health occupations technical committee

3.1 Instruct client in use of dental floss and Bass tooth-brushing method
3.2 Identify food groups and their importance in relation to proper oral health
3.3 Assist with oral prophylaxis
3.4 Demonstrate proper oral appliance use and care
3.5 Demonstrate application of topical fluoride

DA 4.0 — Apply chair side assisting procedures using guidelines specified in the ninth edition of the Task Analysis for Dental Assisting National Board Inc. (DANB) for examinations and as determined by the SkillsUSA health occupations technical committee

4.1 Demonstrate seating, dismissing, positioning client in treatment chair and placing of patient napkin
4.2 Demonstrate knowledge of operator and assistant working positions inside the treatment area
4.3 Demonstrate transfer of instruments to operator during various procedures such as sealants, operative or specialty

4.4 Demonstrate the use of various restorative materials and their applications during the chair side procedure
4.5 Demonstrate use of high volume evacuation
4.6 Identify and use instruments properly
4.7 Demonstrate and assist with area isolation and moisture control
4.8 Demonstrate knowledge of local anesthesia application and armentarium
4.9 Demonstrate the use of various specialty materials and their applications during chair side procedures
4.10 Demonstrate field of operation during dental procedures using retraction, suction, irrigation, placing and removing cotton rolls, etc.
4.11 Identify features of rotary instruments
4.12 Demonstrate cleaning and polishing of removable appliances and prostheses

DA 5.0 — Apply dental laboratory procedures using various dental materials using the guidelines specified in the ninth edition of the Task Analysis for Dental Assisting National Board Inc. (DANB) for examinations and as determined by the SkillsUSA health occupations technical committee

5.1 Demonstrate mixing various gypsum products and construct study models
5.2 Demonstrate mixing various cements and demonstrate their applications
5.3 Demonstrate mixing various restorative materials along with their applications
5.4 Demonstrate and prepare various impression materials and their applications
5.5 Demonstrate and assist with oral sealants
5.6 Construct temporaries/provisionals using various methods
5.7 Construct mouth guard/bleaching tray/whitening tray using various methods

DA 6.0 — Apply radiology procedures using the guidelines specified in the ninth edition of the Task Analysis for Dental Assisting National Board Inc. (DANB) Examinations and as determined by the SkillsUSA health occupations technical committee

6.1 Demonstrate knowledge of radiation safety
6.2 Demonstrate knowledge of intraoral and extraoral radiography films
6.3 Identify radiographic processing errors
6.4 Demonstrate mounting and labeling of intraoral radiographic films
6.5 Demonstrate knowledge of processing radiographic films either manually or automatically
6.6 Demonstrate knowledge of intraoral radiographic equipment such as "XCP"
6.7 Demonstrate knowledge of methods of exposing radiographs

DA 7.0 — Manage the office using guidelines specified in the ninth edition of the Task Analysis for Dental Assisting National Board Inc. (DANB) Examinations and as determined by the SkillsUSA health occupations technical committee

7.1 Complete written client materials such as registration, charts and documents
7.2 Complete written office materials such as insurance forms, inventory, ordering supplies and recordkeeping procedures
7.3 Complete client oral charting (universal) from oral or written communication.
7.4 Complete various computer assignments including word processing, financial and/or office management software
7.5 Demonstrate oral and written communication skills with clients, families and staff using HIPPA regulations
7.6 Demonstrate various types of filing used to preserve client records
7.7 Demonstrate professional telephone etiquette
7.8 Record messages both written and verbally

DA 8.0 — Demonstrate employability skills using guidelines specified in the ninth edition of the Task Analysis for Dental Assisting National Board Inc. (DANB) Examinations and as determined by the SkillsUSA health occupations technical committee

8.1 Apply ethical and legal standards using a state dental practice act
8.2 Prepare résumé and job application
8.3 Participate in an interview for a job
8.4 Demonstrate ability to create a positive teamwork environment in the workplace
8.5 Demonstrate and exhibit professional appearance and conduct

Committee Identified Academic Skills

The technical committee has identified that the following academic skills are embedded in this contest.

Math Skills

- Simplify numerical expressions
- Solve practical problems involving percents

Science Skills

- Use knowledge of physical properties (shape, density, solubility, odor, melting point, boiling point, color)
- Use knowledge of chemical properties (acidity, basicity, combustibility, reactivity)
- Use knowledge of temperature scales, heat and heat transfer

Language Arts Skills

- Provide information in conversations and in group discussions
- Provide information in oral presentations
- Demonstrate use of verbal communication skills: word choice, pitch, feeling, tone and voice
- Demonstrate use of nonverbal communication skills: eye contact, posture and gestures using interviewing techniques to gain information
- Edit writing for correct grammar, capitalization, punctuation, spelling, sentence structure and paragraphing

Connections to National Standards

State-level academic curriculum specialists identified the following connections to national academic standards.

Math Standards

- Numbers and operations
- Measurement
- Problem solving
- Communication
- Connections
- Representation

Source: NCTM Principles and Standards for School Mathematics. For more information, visit: http://www.nctm.org.

Science Standards

- Understands the principles of heredity and related concepts
- Understands the structure and function of cells and organisms
- Understands relationships among organisms and their physical environment
- Understands the structure and properties of matter
- Understands the sources and properties of energy
- Understands forces and motion
- Understands the nature of scientific inquiry

Source: McREL compendium of national science standards. To view and search the compendium, visit: www2.mcrel.org/compendium/browse.asp.

Language Arts Standards

- Students adjust their use of spoken, written and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes
- Students employ a wide range of strategies as they write and use different writing process elements appropriately to communicate with different audiences for a variety of purposes
- Students use spoken, written and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion, and the exchange of information)

Source: IRA/NCTE Standards for the English Language Arts. To view the standards, visit: www.ncte.org/standards.

Diesel Equipment Technology

Purpose
To evaluate each contestant's preparation for employment and to recognize outstanding students for excellence and professionalism in the field of diesel equipment technology.

First, download and review the General Regulations at: http://updates.skillsusa.org.

Eligibility
Open to active SkillsUSA members enrolled in programs with diesel equipment technology as the occupational objective.

Clothing Requirement
Class D: Contest Specific — Blue Attire
For both men and women: Official SkillsUSA light blue work shirt; navy pants; black, brown, or tan leather work shoes safety shoes (with protective toe cap.) Safety glasses with side shields or goggles (prescription glasses may be used only if they are equipped with side shields. If not, they must be covered with goggles).

These regulations refer to clothing items that are pictured and described at: www.skillsusastore.org. If you have questions about clothing or other logo items, call 800-401-1560 or 703-956-3723.

Note: Contestants must wear their official contest clothing to the contest orientation meeting.

Safety Instruction and Verification of Training
Important: Both the instructor and the contestant certify by agreeing to enter this contest that the contestant has received instruction in diesel technology and has demonstrated knowledge of the operation and safe use of the following tools, equipment and machines:

1. Oxyacetylene welding and cutting
2. Drill press
3. Hand tools
4. Hydraulic systems
5. Electric welding
6. Metal grinders

They also certify that SkillsUSA Inc., the national technical committee and national judges are released from all responsibilities relating to personal injury resulting from their use.

Contestants will be removed from competition if proper training has not been provided and/or they are using the equipment in an unsafe manner.

Equipment and Materials
1. Supplied by the technical committee: All materials, tools and equipment needed for the contest
2. Supplied by the contestant: All competitors must create a one-page résumé and submit a hard copy to the technical committee chair at orientation. Failure to do so will result in a 10-point penalty.

   ***Note*:** Your contest may also require a hard copy of your résumé as part of the actual contest. Check the Contest Guidelines and/or the updates page on the SkillsUSA website: http://updates.skillsusa.org.

Scope of the Contest
The contest is defined by industry standards as identified by SkillsUSA technical committee, which includes: Air Products, ArvinMeritor Automotive Inc., Caterpillar Inc., Cummins Inc., Detroit Diesel Corp., Eaton Corp., FedEx Freight, International Truck and Engine Corp., J. Jeb Mfg. Co., John Deere Construction and Forestry, Kenworth Truck Co., Meritor WABCO, MTU-Detroit Diesel Inc., National Institute for Automotive Service Excellence, Ohio Technical College, Ryder Systems Inc., United Parcel Service and Volvo Trucks of North America Inc.

Knowledge Performance
The contest will include a written knowledge exam to assess knowledge of principles,

theories and procedures used in diesel equipment technology.

Skills Performance

The contest will include a series of stations where students will service and repair large diesel engines, transmissions, drive trains, electrical systems, brakes, hydraulic systems and cab components used in farm equipment, trucks and construction equipment.

Contest Guidelines

1. Contestants may be assigned problems or projects requiring as little as 20 minutes to perform or as long as four hours.
2. The following general shop safety rules will be followed:
    a. Safety glasses must be worn at all times when in the work area. If the contestant is taking a written test or is in a job interview, safety glasses can be removed.
    b. No loose clothing is permitted.
    c. Long hair must be tied behind the head or netted.
    d. Gloves must not be worn during operation of machinery, except while doing electric welding and oxyacetylene welding and cutting operations.
    e. Any liquid or grease spilled must be cleaned up immediately and reported to the judge.
    f. All injuries, no matter how slight, must be reported immediately to the judge.
3. In addition, contestants will be judged on general shop skills, problem-solving skills, shop safety and a written test. Points allowed will be assigned by the technical committee based on the difficulty of the assigned task.

Standards and Competencies

DET 1.0 — Demonstrate competencies related to using precision measurements in diesel equipment technology

1.1 Interpret and follow verbal instructions
1.2 Interpret and follow written instructions
1.3 Read and explain basic prints
1.4 Use dial indicator
1.5 Calibrate dial indicator
1.6 Use valve spring compressor to remove valve from head
1.7 Use valve spring compressor to install valve in head
1.8 Use metric micrometers
1.9 Use U.S. standard micrometers
1.10 Record metric measurements correctly
1.11 Record U.S. standards correctly
1.12 Use bore gauge correctly
1.13 Compare readings taken with standards to determine if part is within manufacturer's tolerances
1.14 Use dial calipers
1.15 Calibrate dial calipers
1.16 Use an inside telescoping gauge
1.17 Use a depth micrometer

DET 2.0 — Demonstrate competencies needed to complete live engine troubleshooting

2.1 Inspect fuel, oil and coolant levels, condition and consumption; determine needed action
2.2 Diagnose causes of engine fuel, oil, coolant, air and other leaks; determine needed action
2.3 Interpret engine noises; determine needed action
2.4 Observe engine exhaust smoke color and quantity; determine needed action
2.5 Perform air intake system restriction and leakage tests; determine needed action
2.6 Perform intake manifold pressure (boost) test; determine needed action
2.7 Perform exhaust back pressure test; determine needed action
2.8 Perform crankcase pressure test; determine needed action
2.9 Diagnose no cranking, cranks but fails to start, hard starting and starts but does not continue to run problems; determine needed action
2.10 Diagnose surging, rough operation, misfiring, low power, slow deceleration, slow acceleration and shutdown problems; determine needed action
2.11 Diagnose engine vibration problems; determine needed action
2.12 Check, record and clear electronic diagnostic (fault) codes; monitor electronic data; determine needed action
2.13 Perform cylinder compression test; determine needed action

2.14 Test engine oil pressure and check operation of pressure sensor, gauge and/or sending unit; determine needed action
2.15 Check engine coolant type, level, condition and consumption; determine needed action
2.16 Test coolant temperature and check operation of temperature sensor, gauge and/or sending unit; determine needed action
2.17 Inspect thermostatic cooling fan system (hydraulic, pneumatic and electronic) and fan shroud; replace as needed
2.18 Inspect turbocharger(s), wastegate and piping systems; determine needed action
2.19 Check air induction system: piping, hoses, clamps and mounting; check for air restrictions and leaks; service or replace air filter as needed
2.20 Remove and reinstall turbocharger/wastegate assembly
2.21 Inspect intake manifold, gaskets and connections; replace as needed
2.22 Inspect, clean and test charge air cooler assemblies; replace as needed
2.23 Inspect exhaust manifold, piping, mufflers, exhaust after-treatment device(s) and mounting hardware; repair or replace as needed
2.24 Inspect and test pre-heater/inlet air heater, or glow plug system and controls; perform needed action
2.25 Inspect and test exhaust gas recirculation (EGR) system; determine needed action
2.26 Check fuel level, quality and consumption; determine needed action
2.27 Inspect fuel tanks, vents, caps, mounts, valves, screens, crossover system and supply and return lines and fittings; determine needed action
2.28 Inspect, clean and test fuel transfer (lift) pump, pump drives, screens, fuel/water separators/indicators, filters, heaters, coolers, ECM cooling plates and mounting hardware; determine needed action
2.29 Inspect and test low pressure regulator systems (check valves, pressure regulator valves and restrictive fittings); determine needed action
2.30 Check fuel system for air; determine needed action; prime and bleed fuel system; check primer pump
2.31 Inspect, test and adjust engine fuel shut-down devices and controls; determine needed action
2.32 Inspect high pressure injection lines, hold downs, fittings and seals; replace as needed
2.33 Inspect and diagnose electronic fuel management system
2.34 Inspect and test power and ground circuits and connections; measure and interpret voltage, voltage drop, amperage and resistance readings using a digital multi-meter (DMM); determine needed action
2.35 Interface with vehicle's on-board computer; perform diagnostic procedures using recommended electronic diagnostic equipment and tools (to include PC based software and/or data scan tools); determine needed action
2.36 Locate and use relevant service information (to include diagnostic procedures, flow charts and wiring diagrams)
2.37 Inspect and replace electrical connector terminals, seals and locks
2.38 Inspect and test switches, sensors, controls, actuator components and circuits; adjust or replace as needed
2.39 Using recommended electronic diagnostic tools (to include PC based software and/or data scan tools), access and change customer parameters
2.40 Inspect, test and adjust electronic unit injectors (EUI); determine needed action
2.41 Remove and install electronic unit injectors (EUI) and related components; recalibrate ECM (if applicable)
2.42 Perform cylinder contribution test using recommended electronic diagnostic tool
2.43 Perform engine timing sensor calibration (if applicable)
2.44 Perform on-engine inspections and tests on hydraulic electronic unit injectors and system electronic controls; determine needed action
2.45 Inspect and adjust engine compression/exhaust brakes; determine needed action
2.46 Inspect, test and adjust engine compression/exhaust brake control circuits, switches and solenoids; repair or replace as needed

2.47 Inspect engine compression/exhaust brake housing, valves, seals, screens, lines and fittings; repair or replace as needed
2.48 Read and follow written directions
2.49 Comprehend and follow verbal directions
2.50 Diagnose engine-related problems
2.51 Comprehend and follow diagnostic procedures
2.52 Use basic diagnostic tools
2.53 Comprehend and follow general safety requirements
2.54 Demonstrate knowledge of safety requirements when working around running engines
2.55 Demonstrate knowledge of pre-trip inspection before starting engine (fuel, coolant, oil, belts, etc)
2.56 Explain the basic operations of a diesel engine (key, throttle control, gauge cluster)
2.57 Explain the principles of the four-cycle (stroke) engine (intake, compression, power, exhaust)
2.58 Describe related environmental concerns (fuel/oil/filter disposal)
2.59 Use basic computer operating skills and diagnostic programs

DET 3.0 (Standard 7) — Demonstrate competencies related to drive line component and system diagnosis and repair

3.1 Distinguish lubricant leaks and lubricant seeps per specifications
3.2 Remove and replace drive axle housing cover plates, gaskets, sealants, vents, magnetic plugs and seals
3.3 Remove and replace drive axle carrier assembly from drive axle housing
3.4 Remove and replace axle shafts
3.5 Check drive axle fluid level and condition
  3.5.1 Determine needed service
  3.5.2 Add proper type of lubricant
3.6 Remove and replace driveline yokes
3.7 Disassemble carrier assembly internal/external components
3.8 Inspect carrier assembly components to determine reuse, to include but not limited to: spider gears, cross, side gears, thrust washers, case halves, bearings, ring gear, pinion, inter-axle differential case assembly components, driver-controlled differential lock components, inter-axle differential lock components, drive axle lubrication system pump, troughs, collectors, slingers, tubes, filters, driveline yoke, spigot bearing, adjusting rings, carrier case, and planetary gear-type two-speed axle assembly including: case, idler pinion, pins, thrust washers, sliding clutch gear, shift fork, pivot, seals, cover and springs
3.9 Inspect, repair, or replace two-speed axle shift control system, speedometer adapters, motors, axle shift units, wires, air lines and connectors
3.10 Inspect, adjust, repair, or replace air operated power divider (inter-axle differential) lockout assembly including diaphragms, seals, springs, yokes, pins, lines, hoses, fittings and controls
3.11 Assemble carrier assembly internal/external components
3.12 Inspect, adjust or replace ring gear thrust block/bolt
3.13 Assemble drive pinion assembly in carrier housing and adjust bearing preload to specification
3.14 Assemble drive pinion assembly in carrier housing and adjust pinion depth to specification
3.15 Check, and if possible, set ring gear run-out to specification
3.16 Assemble main differential, check rotating resistance and adjust to specification
3.17 Install main differential case and ring gear and set bearing preload to specification
3.18 Remove and replace the ring gear from the flange case half of the main differential case
3.19 Check and interpret ring gear and pinion tooth contact pattern; determine needed action; if necessary, adjust to specification
3.20 Set ring and pinion gear backlash to specification
3.21 Assemble main differential lock components
3.22 Assemble inter-axle differential components
3.23 Check input shaft end play, adjust as necessary per specifications
3.24 Adjust ring gear thrust screw clearance per specifications

3.25 Clean, inspect, lubricate and replace wheel bearings; replace seals and wear rings; adjust drive axle wheel bearings to specifications
3.26 Diagnose drive axle for wheel bearing noise and damage; perform needed action
3.27 Inspect and test drive axle temperature gauge and sending unit/sensor; determine needed action
3.28 Diagnose drive axle(s)/drive unit noise, vibration and overheating problems; determine needed action

DET 4.0 (Standard 9) — Demonstrate knowledge of basic hydraulic theory and demonstrate competencies needed to inspect, diagnose and service hydraulic systems

4.1 Demonstrate knowledge of fluids (e.g., fluids have no shape of their own, are practically incompressible, apply equal pressure in all directions and provide great increases in work force)
4.2 Explain the function of a reservoir, pump, filters, relief valve, control valve and a cylinder in relation to each other both descriptively and schematically
4.3 Describe a basic, but complete, open center hydraulic system, explaining the operation of the system, the route of fluid during the use of a function and the route of the fluid while the machine is running when no hydraulic function is being used
4.4 Describe a basic, but complete, closed center hydraulic system, explaining the operation of the system, the route of fluid during the use of a function and the route of the fluid while the machine is running when no hydraulic function is being used
4.5 Identify open and closed center systems and the benefits of those applications on vocational equipment
4.6 Describe the purpose of a charge circuit
4.7 Explain the differences between hydraulic and hydrostatic systems
4.8 Identify hydraulic and hydrostatic applications and the benefits of those applications on vocational equipment
4.9 Exhibit the ability to select the proper hose for a given function, taking into consideration the flow needed, pressures to be used, routing, clamping, fittings required and pulsating of lines
4.10 Identify and select various fittings and thread styles (O-ring boss, NPT, NPTF, British, Metric, O-ring flange, ORFS, etc.)
4.11 Describe the use of various filters in hydraulic and hydrostatic systems
4.12 Understand oils and show familiarity with various fluids and their effects on hydraulic systems
4.13 Describe the applications and reactions of various types of sealants with different types of hydraulic systems
4.14 Practice good hydraulic maintenance and safety practices
4.15 Describe proper contamination control procedures dealing with hydraulics
4.16 Follow the proper manufacturer's cleaning/flushing procedures

DET 5.0 (Standard 11) — Perform basic shop skills

5.1 Demonstrate reading comprehension skills
5.2 Comprehend and follow verbal directions
5.3 Identify root cause of engine component failures
5.4 Identify root cause of transmission component failures
5.5 Identify root cause of carrier component failures
5.6 Interpret oil analysis readings
5.7 Identify root cause of elevated oil analysis readings
5.8 Identify mechanical type failures
5.9 Identify operator error type failures
5.10 Identify environmental type failures

DET 6.0 (Standard 13) — Demonstrate the competencies to diagnose, service and repair HVAC systems in a given situation at the operator environment station

6.1 Verify the need for service or repair of HVAC systems based on unusual operating noises; determine needed action
6.2 Verify the need for service or repair of HVAC systems based on unusual visual, smell and touch conditions; determine needed action
6.3 Identify system type and components (cycling clutch orifice tube — CCOT, expansion valve) and conduct performance test(s) on HVAC systems; determine needed action

6.4 Diagnose the cause of temperature control problems in the A/C system; determine needed action
6.5 Identify refrigerant type and check for contamination; determine needed action
6.6 Diagnose A/C system problems indicated by pressure gauge and temperature readings; determine needed action
6.7 Diagnose A/C system problems indicated by visual, aural, smell and touch procedures; determine needed action
6.8 Perform A/C system leak test; determine needed action
6.9 Evacuate A/C system using appropriate equipment
6.10 Internally clean contaminated A/C system components and hoses
6.11 Charge A/C system with refrigerant
6.12 Identify lubricant type needed for system application
6.13 Diagnose, service and repair compressor and clutch components in a HVAC system
- 6.13.1 Diagnose A/C system problems that cause protection devices (pressure, thermal and electronic) to interrupt system operation; determine needed action
- 6.13.2 Inspect, test and replace A/C system pressure and thermal and electronic protection devices
- 6.13.3 Inspect and replace A/C compressor drive belts, pulleys and tensioners; adjust belt tension and check alignment
- 6.13.4 Inspect, test, service and replace A/C compressor clutch components or assembly
- 6.13.5 Inspect and correct A/C compressor lubricant level (if applicable)
- 6.13.6 Inspect, test and replace A/C compressor
- 6.13.7 Inspect, repair, or replace A/C compressor mountings and hardware

6.14 Diagnose, service and repair evaporator, condenser and related components in a HVAC system
- 6.14.1 Correct system lubricant level when replacing the evaporator, condenser, receiver/drier or accumulator/drier and hoses
- 6.14.2 Inspect A/C system hoses, lines, filters, fittings and seals; determine needed action
- 6.14.3 Inspect A/C condenser for proper air flow
- 6.14.4 Inspect and test A/C system condenser and mountings; determine needed action
- 6.14.5 Inspect and replace receiver/drier or accumulator/drier
- 6.14.6 Inspect and test cab/sleeper refrigerant solenoid, expansion valve(s); check placement of thermal bulb (capillary tube); determine needed action
- 6.14.7 Inspect and replace orifice tube
- 6.14.8 Inspect and test cab/sleeper evaporator core; determine needed action
- 6.14.9 Inspect, clean and repair evaporator housing and water drain; inspect and service or replace evaporator air filter
- 6.14.10 Identify and inspect A/C system service ports (gauge connections); determine needed action
- 6.14.11 Diagnose system failures resulting in refrigerant loss from the A/C system high pressure relief device; determine needed action

6.15 Diagnose, service and repair heating and engine cooling components in a HVAC system
- 6.15.1 Diagnose the cause of outlet air temperature control problems in the HVAC system; determine needed action
- 6.15.2 Diagnose window fogging problems; determine needed action
- 6.15.3 Perform engine cooling system tests for leaks, protection level, contamination, coolant level, coolant type, temperature and conditioner concentration; determine needed action
- 6.15.4 Inspect engine cooling and heating system hoses, lines and clamps; determine needed action

6.15.5 Inspect and test radiator, pressure cap and coolant recovery system (surge tank); determine needed action
6.15.6 Inspect water pump for leaks and bearing play; determine needed action
6.15.7 Inspect and test thermostats, by-passes, housings and seals; determine needed repairs
6.15.8 Recover, flush and refill with recommended coolant/additive package; bleed cooling system
6.15.9 Inspect thermostatic cooling fan system (hydraulic, pneumatic and electronic) and fan shroud; replace as needed
6.15.10 Inspect and test heating system coolant control valve(s) and manual shut-off valves; determine needed action
6.15.11 Inspect and flush heater core; determine needed action

6.16 Diagnose, service and repair electrical operating systems and related control components in a HVAC system
6.16.1 Diagnose the cause of failures in HVAC electrical control systems; determine needed action
6.16.2 Inspect and test A/C heater blower motors, resistors, switches, relays, modules, wiring and protection devices; determine needed action
6.16.3 Inspect and test A/C compressor clutch relays, modules, wiring, sensors, switches, diodes and protection devices; determine needed action
6.16.4 Inspect and test A/C-related electronic engine control systems; determine needed action.
6.16.5 Inspect and test engine cooling/condenser fan motors, relays, modules, switches, sensors, wiring and protection devices; determine needed action
6.16.6 Inspect and test electric actuator motors, relays/modules, switches, sensors, wiring and protection devices; determine needed action
6.16.7 Inspect and test HVAC system electrical control panel assemblies; determine needed action

6.17 Diagnose, service and repair air, vacuum and mechanical operating systems and related control components in a HVAC system
6.17.1 Diagnose the cause of failures in HVAC air, vacuum and mechanical switches and controls; determine needed action
6.17.2 Inspect and test HVAC system air/vacuum/mechanical control panel assemblies; determine needed action
6.17.3 Inspect, test and adjust HVAC system air/vacuum/mechanical control cables and linkages; determine needed action
6.17.4 Inspect and test HVAC system vacuum actuators (diaphragms/motors) and hoses; determine needed action
6.17.5 Inspect and test HVAC system vacuum reservoir(s), check valve(s) and restrictors; determine needed action
6.17.6 Inspect, test and adjust HVAC system ducts, doors and outlets; determine needed action

6.18 Demonstrate knowledge of refrigerant recovery, recycling and handling procedures in accordance with published EPA and appropriate SAE "J" standards for R-12, R-134a and EPA approved refrigerant blends
6.18.1 Maintain and verify correct operation of certified equipment
6.18.2 Identify (by label application or use of a refrigerant identifier) and recover A/C system refrigerant
6.18.3 Recycle refrigerant
6.18.4 Handle, label and store refrigerant
6.18.5 Test recycled refrigerant for non-condensable gases

6.19 Perform various tasks by navigating vehicle dash controls, including onboard diagnostics, users settings, display settings, etc.
6.20 Perform various tasks by navigating vehicle sound system controls

Committee Identified Academic Skills

The technical committee has identified that the following academic skills are embedded in this contest.

Math Skills

- Use fractions to solve practical problems
- Use proportions and ratios to solve practical problems
- Simplify numerical expressions
- Solve practical problems involving percents
- Solve single variable algebraic expressions
- Measure angles
- Find surface area and perimeter of two-dimensional objects
- Find volume and surface area of three-dimensional objects
- Apply transformations (rotate or turn, reflect or flip, translate or slide and dilate or scale) to geometric figures
- Make predictions using knowledge of probability
- Make comparisons, predictions and inferences using graphs and charts
- Organize and describe data using matrixes
- Solve problems using proportions, formulas and functions
- Find slope of a line
- Use laws of exponents to perform operations
- Solve practical problems involving complementary, supplementary and congruent angles
- Solve problems involving symmetry and transformation
- Find arc length and the area of a sector

Science Skills

- Describe and recognize elements, compounds, mixtures, acids, bases and salts
- Describe and recognize solids, liquids and gases
- Describe characteristics of types of matter based on physical and chemical properties
- Use knowledge of physical properties (shape, density, solubility, odor, melting point, boiling point, color)
- Use knowledge of chemical properties (acidity, basicity, combustibility, reactivity)
- Use knowledge of classification of elements as metals, metalloids and nonmetals
- Describe and demonstrate simple compounds (formulas and the nature of bonding)
- Understand Law of Conservation of Matter and Energy
- Describe phases of matter
- Describe and identify physical changes to matter
- Predict chemical changes to matter (types of reactions, reactants and products; and balanced equations)
- Use knowledge of potential and kinetic energy
- Use knowledge of mechanical, chemical and electrical energy
- Use knowledge of heat, light and sound energy
- Use knowledge of temperature scales, heat and heat transfer
- Use knowledge of sound and technological applications of sound waves
- Use knowledge of the nature and technological applications of light
- Use knowledge of speed, velocity and acceleration
- Use knowledge of Newton's laws of motion
- Use knowledge of work, force, mechanical advantage, efficiency and power
- Use knowledge of simple machines, compound machines, powered vehicles, rockets and restraining devices
- Use knowledge of principles of electricity and magnetism
- Use knowledge of static electricity, current electricity and circuits
- Use knowledge of magnetic fields and electromagnets
- Use knowledge of motors and generators

Language Arts Skills

- Provide information in conversations and in group discussions
- Provide information in oral presentations
- Demonstrate use of such verbal communication skills as word choice, pitch, feeling, tone and voice

- Demonstrate use of such nonverbal communication skills as eye contact, posture and gestures using interviewing techniques to gain information
- Analyze mass media messages
- Demonstrate comprehension of a variety of informational texts
- Use text structures to aid comprehension
- Understand source, viewpoint and purpose of texts
- Organize and synthesize information for use in written and oral presentations
- Demonstrate knowledge of appropriate reference materials
- Use print, electronic databases and online resources to access information in books and articles
- Demonstrate narrative writing
- Demonstrate expository writing
- Demonstrate persuasive writing
- Demonstrate informational writing
- Edit writing for correct grammar, capitalization, punctuation, spelling, sentence structure and paragraphing

Connections to National Standards

State-level academic curriculum specialists identified the following connections to national academic standards.

Math Standards

- Numbers and operations
- Algebra
- Geometry
- Measurement
- Data analysis and probability
- Problem solving
- Reasoning and proof
- Communication
- Connections
- Representation

Source: NCTM Principles and Standards for School Mathematics. For more information, visit: http://www.nctm.org.

Science Standards

- Understands the structure and properties of matter
- Understands the sources and properties of energy
- Understands forces and motion
- Understands the nature of scientific inquiry
- Understands the scientific enterprise

Source: McREL compendium of national science standards. To view and search the compendium, visit: www2.mcrel.org/compendium/browse.asp.

Language Arts Standards

- Students read a wide range of print and nonprint texts to build an understanding of texts, of themselves and of the cultures of the United States and the world; to acquire new information; to respond to the needs and demands of society and the workplace; and for personal fulfillment. Among these texts are fiction and nonfiction, classic and contemporary works
- Students apply a wide range of strategies to comprehend, interpret, evaluate and appreciate texts. They draw on their prior experience, their interactions with other readers and writers, their knowledge of word meaning and of other texts, their word identification strategies and their understanding of textual features (e.g., sound-letter correspondence, sentence structure, context, graphics)
- Students adjust their use of spoken, written and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes
- Students employ a wide range of strategies as they write and use different writing process elements appropriately to communicate with different audiences for a variety of purposes
- Students use a variety of technological and information resources (e.g., libraries, databases, computer networks, video) to gather and synthesize information and to create and communicate knowledge
- Students use spoken, written and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion and the exchange of information)

Source: IRA/NCTE Standards for the English Language Arts. To view the standards, visit: www.ncte.org/standards.

DIGITAL CINEMA PRODUCTION

PURPOSE

To evaluate each contestant's preparation for employment and to recognize outstanding students for excellence and professionalism in cinematography/short film production.

First, download and review the General Regulations at: http://updates.skillsusa.org.

ELIGIBILITY

Open to all active SkillsUSA members enrolled in a program with filmmaking/video production as the occupational objective.

CLOTHING REQUIREMENT

Class E: Contest specific — Business Casual

For men: Official SkillsUSA white polo shirt, black dress slacks, black socks, black leather shoes.
For women: Official SkillsUSA white polo shirt with black dress skirt (knee-length) or black slacks; black socks or black or skin-tone seamless hose; black leather dress shoes.

These regulations refer to clothing items that are pictured and described at: www.skillsusastore.org. If you have questions about clothing or other logo items, call 800-401-1560 or 703-956-3723.

Note: Contestants must wear their official contest clothing to the contest orientation meeting.

EQUIPMENT AND MATERIALS

1. Supplied by contestant:
   a. USB thumb drive with self-addressed envelope if you want it returned
   b. DSLR or video cameras
   c. Up to two computers to be used for editing and music composition
   d. Copyright-free music or licensed music (must bring proof of license for each song or sound effect used)
   e. Optional equipment that may be used:
      1. Audio
         - Boom pole for microphones
         - Wireless microphones
         - Lavalier microphones
         - Multiple microphones
         - Shotgun microphone
         - Portable mixer
      2. Lighting
         - Reflectors
         - Camera-mounted lighting
         - Handheld lighting units
         - Hot lights (on stands)
         - LED lights (on stands)
      3. Camera
         - DSLR that shoots video
         - Video camera
         - Cellphone camera
         - 16x9 format
      4. Production equipment
         - Mono or tripods
         - Steadycam-type system
         - Sliders
         - Body mount straps
         - Dolly
         - Jib or crane
   f. All competitors must create a one-page résumé and submit a hard copy to the technical committee chair at orientation. Failure to do so will result in a 10-point penalty.

Note: Your contest may also require a hard copy of your résumé as part of the actual contest. Check the Contest Guidelines and/or the updates page on the SkillsUSA website: http://updates.skillsusa.org.

SCOPE OF THE CONTEST

The contest is defined by the current industry technical standards.

The contest will be divided into four portions: a written exam that will assess knowledge in industry standards, a storyboard assignment to be completed in teams of two people, an interview with one or more judges and a short video (four-and-one-half to five minutes) that will be filmed and edited *on site* (meaning all work must be done between contest briefing and designated turn-in time).

All footage must be acquired after the contest has begun and must be filmed within the area specified by the field assignment.

Knowledge Performance

The contest will include a written exam covering basic cinema knowledge. The team will complete the test together. The exam will be given on Thursday.

Competition Schedule/Locations

1. **Preproduction, filming, editing**: 35 hours
2. **Interview**: 15 minutes
3. **Filming locations**: To be announced at the orientation

Skill Performance

1. The contestants will submit a four-and-one-half to five minute video, which will be created and completed in its entirety at the national conference by a team of two students.
2. No preproduced video, photos, or stock footage is allowed.
3. The video will use a theme, single word or a simple phrase that will be given out at the contest orientation. Orientation attendance is mandatory.
4. Participants must turn in the finished video on their thumb drive in the required format to be announced during the orientation. The thumb drive must be submitted to the judges at the time and location specified during the orientation. If students want the thumb drive returned they must provide a postage-paid envelope.
5. The submission is to be a creative video piece. It is not in the form of a PSA, news story or promotional video.
7. The scoring rubric will include (but is not limited to) the following criteria:
   a. Written exam
   b. Overall creativity
   c. Shot log/shot list
   d. Script/storyboard
   e. Camera techniques
   f. Lighting
   g. Audio elements
   h. Titles
   i. Editing (pacing and structure)
   j. Interview and pitch of film

Standards and Competencies

DCP 1.0 — Apply the knowledge and skills necessary to describe the production overview

1.1 Describe cinema production careers
1.2 Explain production overview
1.3 Complete program proposal and treatment for a production
1.4 Explain the three production steps
  1.4.1 Preproduction
  1.4.2 Production stage
  1.4.3 Postproduction
1.5 Complete storyboards for a production
1.6 Define scriptwriting guidelines
1.7 Explain costing out a production
1.8 Define world video standards
1.9 Define HDTV standards

DCP 2.0 — Implement the knowledge needed to describe the task of location scouting

DCP 3.0 — Apply the knowledge needed to describe and demonstrate lens operation and control

3.1 Describe the type of lenses
3.2 Define angle of view
3.3 Describe zoom lenses
3.4 Demonstrate f-stops iris
3.5 Demonstrate control of depth of field
3.6 Illustrate focusing/follow focus/rack focus/macro focus
3.7 Explain the application of filters
3.8 Explain image stabilization

DCP 4.0 — Apply the knowledge and skills necessary to describe and demonstrate camera operation and control

4.1 Define video resolution
4.2 Describe and demonstrate camera mounts and tripod use
4.3 Operate camera pan heads
4.4 Demonstrate basic camera moves (e.g, pan, tilt, dolly, truck, pedestal)
4.5 Illustrate black balancing and white balancing
4.6 Describe shutter speed
4.7 Demonstrate exposure using f-stops
4.8 Explain frame rates
4.9 Demonstrate use of camera view finder

DCP 5.0 — Implement the skills and knowledge needed for describing and demonstrating composition

5.1 Describe form vs. content
5.2 Demonstrate insert and cutaway shots
5.3 Describe static composition
5.4 Describe dynamic composition
5.5 Define single center of interest
5.6 Describe shifting the center of interest
5.7 Demonstrate leading the subject
5.8 Describe the Rule of Thirds
5.9 Define maintaining tonal balance
5.10 Define balance of mass
5.11 Demonstrate frame central subject matter
5.12 Define controlling the number of prime objects

DCP 6.0 — Apply the knowledge and skills needed to describe and demonstrate cinema lighting

6.1 Describe hard and soft lighting
6.2 Define color temperature
6.3 Demonstrate intensity control through varying distance
6.4 Identify lighting instruments
6.5 Identify lighting modifiers
6.6 Demonstrate three-point lighting (i.e., main, fill, back light)
6.7 Describe lighting ratios
6.8 Describe back light intensity
6.9 Describe subject-to-background distance
6.10 Describe area lighting
6.11 Apply the uses of existing (natural) light
6.12 Demonstrate drawing of a light plot
6.13 Identify lighting controls
6.14 Calculate on-location power needs

DCP 7.0 — Implement the skills and knowledge needed to describe and demonstrate audio

7.1 Describe the frequency/loudness relationship
7.2 Define room tone
7.3 Differentiate major microphone designs
7.4 Describe directional characteristics
7.5 Define handheld and personal microphones
7.6 Position microphones
7.7 Identify audio connectors
7.8 Demonstrate positioning of microphone cables
7.9 Describe types and uses of wireless microphones
7.10 Describe phase cancellation
7.11 Describe methods of creating the stereo effect
7.12 Describe digital audio
7.13 Describe analog audio
7.14 Demonstrate operation of audio mixer controls
7.15 Describe issues of using audio from a PA system
7.16 Describe production communication systems

DCP 8.0 — Apply the knowledge and skills needed to describe and demonstrate video recording media

8.1 Describe the videotape recording process
8.2 Describe hard drive-based recording
8.3 Describe disk-based camcorders
8.4 Define solid state memory storage
8.5 Describe video servers
8.6 Define digital compression
  8.7.1 Describe MPEG-2
  8.7.2 Describe MPEG-4
  8.7.3 Describe JPEG
8.7 List professional video formats

DCP 9.0 — Apply the knowledge and skills needed to describe and demonstrate video editing

9.1 Describe continuity editing
9.2 Demonstrate continuity techniques
9.3 Demonstrate cutaways
9.4 Define relational and thematic editing
9.5 Demonstrate bridging jumps in action
9.6 Demonstrate bridging interview edits
9.7 Illustrate shooting angles
9.8 Describe or demonstrate audio continuity
9.9 Demonstrate maintaining consistency in action and detail
9.10 Demonstrate operation of software-based editors
9.11 Use linear and non-linear editing systems
9.12 Explain time-code
9.13 Define online and offline editing

DCP 10.0 — Apply the knowledge and skills needed to describe and demonstrate graphics

10.1 Describe titling
10.2 Describe character generator

DCP 11.0 — Apply the knowledge and skills needed to describe and demonstrate location production

11.1 Complete a location survey
11.2 Define camera placement
11.3 Illustrate microphone placement for on-location audio
11.4 Demonstrate on-location lighting techniques
11.5 Illustrate on-location production communication
11.6 Define multiple-camera production
11.7 Define single-camera production
11.8 Define film-style dramatic production

Screening of Submissions

A number of the submissions may be screened following the debriefing on Friday. These will be the best videos submitted but will not be presented in a way as to reveal scores. Competition winners will be announced at the final awards ceremony.

Committee Identified Academic Skills

The technical committee has identified that the following academic skills are embedded in this contest.

Math Skills

- Measure angles
- Apply transformations (rotate or turn, reflect or flip, translate or slide, and dilate or scale) to geometric figures
- Find slope of a line

Science Skills

- Use knowledge of mechanical, chemical and electrical energy
- Use knowledge of heat, light and sound energy
- Use knowledge of temperature scales, heat and heat transfer
- Use knowledge of sound and technological applications of sound waves
- Use knowledge of the nature and technological applications of light
- Use knowledge of static electricity, current electricity and circuits

Language Arts Skills

- Demonstrate use of such verbal communication skills as word choice, pitch, feeling, tone and voice
- Analyze mass media messages

Connections to National Standards

State-level academic curriculum specialists identified the following connections to national academic standards.

Math Standards

- Numbers and operations
- Geometry
- Measurement
- Data analysis and probability
- Problem solving
- Communication
- Connections
- Representation

Source: NCTM Principles and Standards for School Mathematics. For more information, visit: http://www.nctm.org.

Science Standards

- Understands the structure and properties of matter
- Understands the sources and properties of energy
- Understands forces and motion
- Understands the nature of scientific inquiry
- Understands the scientific enterprise

Source: McREL compendium of national science standards. To view and search the compendium, visit: www2.mcrel.org/compendium/browse.asp.

Language Arts Standards

- Students adjust their use of spoken, written and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes
- Students employ a wide range of strategies as they write and use different writing process elements appropriately to communicate with different audiences for a variety of purposes
- Students conduct research on issues and interests by generating ideas and questions

and by posing problems. They gather, evaluate and synthesize data from a variety of sources (e.g., print and nonprint texts, artifacts, people) to communicate their discoveries in ways that suit their purpose and audience

- Students use spoken, written and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion and the exchange of information)

Source: IRA/NCTE Standards for the English Language Arts. To view the standards, visit: www.ncte.org/standards.

EARLY CHILDHOOD EDUCATION

PURPOSE

To evaluate a contestant's knowledge of early childhood education based on developmentally appropriate practice for children ages 3–5 years. This is demonstrated through a written test, interview, literary reading and the ability to create and implement a lesson in a designated content area as determined by the committee.

First, download and review the General Regulations at: http://updates.skillsusa.org.

ELIGIBILITY

Open to active SkillsUSA members enrolled in technical education programs with early childhood/childcare as the occupational objective.

CLOTHING REQUIREMENT

Class E: Contest specific — Business Casual

For men: Official SkillsUSA white polo shirt, black dress slacks, black socks, black leather shoes.
For women: Official SkillsUSA white polo shirt with black dress skirt (knee-length) or black slacks; black socks or black or skin-tone seamless hose; black leather dress shoes.

These regulations refer to clothing items that are pictured and described at: www.skillsusastore.org. If you have questions about clothing or other logo items, call 800-401-1560 or 703-956-3723.

Note: Contestants must wear their official contest clothing to the contest orientation meeting.

OBSERVER RULE

Observers, who are not participants, will be allowed to be present during the competition. No talking or gesturing shall be permitted. No observers will be allowed in the interview area or be permitted to enter or exit the demonstration area while a contestant is speaking. *No video/tape recorders will be allowed by observers.*

EQUIPMENT AND MATERIALS

1. Supplied by the technical committee:
   a. An assortment of consumable and non-consumable materials to assist in the execution of the lesson plan and demonstration
2. Supplied by the contestant:
   a. Tools of the profession:
      1. 12" ruler
      2. Scissors
      3. Scotch tape — 1 roll
      4. Stapler
      5. Staples — 1 strip
      6. Paper clips — 10
      7. Ink pens — 2 black or blue
      8. Sharpened pencils with erasers — 3
      9. Markers — 10-count
      10. Crayons — 8-count
      11. White school glue — 4 oz. bottle
      12. Glue sticks — 2
      13. Construction paper, white — 10 sheets
      14. Construction paper, assorted — 10 sheets
   b. All competitors must create a one-page résumé and submit a hard copy to the technical committee chair at orientation. Failure to do so will result in a 10-point penalty.

   Note: Your contest may also require a hard copy of your résumé as part of the actual contest. Check the Contest Guidelines and/or the updates page on the SkillsUSA website: http://updates.skillsusa.org.

SCOPE OF THE CONTEST

This contest is established by industry standards as set by the current industry technical committee. Contest standards have been cross-checked for applicability to the National Association for the Education of Young Children (NAEYC), the National Association of Early Childhood Specialists in State Department of Education (NAECS/SDE), National Head Start Association (NHSA), and National Child Development Credential (CDA).

Knowledge Performance

The contest includes a multiple-choice, fill in the blank, written exam assessing knowledge of early childhood education and quality childcare.

Skill Performance

The skill performance of this contest consists of three parts:

1. Ability to interview and answer questions pertaining to working in a childcare facility
2. Ability to create and implement a developmentally appropriate lesson in an assigned curricular area
3. Ability to demonstrate a developmentally appropriate literary reading

Contest Guidelines

Interview

1. Contestant will respond to interview questions regarding knowledge of early childhood, collaboration and working with children and families
2. Contestant shall exhibit professionalism:
    a. Poise/body position
    b. Attitude
    c. Eye contact
    d. Appropriate grammar/language

Lesson Planning

1. An assortment of materials commonly found in a childcare facility shall be available for use in lesson planning
2. The assortment of materials will be unknown to contestants prior to the contest
3. Contestant shall address developmentally appropriate concepts from one of the following curriculum areas: food and nutrition, literacy, math, music and movement, science or social sciences.
4. Contestant shall complete a handwritten lesson plan and prepare materials during the allotted plan time. The plan must be:
    a. Neatly printed in ink
    b. Developmentally appropriate for children 3-5 years according to the *Developmentally Appropriate Practice in Early Childhood Programs Serving Children Birth Through Age 8 (2009, third edition)*
    c. Follow the specified outline:
        1. Curriculum Area
        2. Materials Needed
        3. Goals/Areas of Development
        4. Written Procedure/Sequence
        5. Scaffolding
        6. Mechanics (spelling, grammar, punctuation, etc.)
5. Contestants will have three hours to plan their lesson and prepare materials needed for their presentation. Warnings will be given with one hour remaining and again at thirty minutes.
6. Contestant may leave presentation area upon completion but will no longer have access to their plan or materials
7. **Penalty:** two-point deduction shall be indicated for each missing or excess item supplied by contestant

Lesson Demonstration

1. Contestants should arrive to demonstration area early
2. Contestants will be given lesson plan and materials 15 minutes prior to their assigned presentation time
3. Contestants will be given five to seven minutes to present their lesson
4. Contestant shall present as if children are present. Do not present to judges.
5. At end of presentation, judges will ask one question of contestant pertaining to inclusion/adaptations
6. Follow specified criteria:
    - Verbal/non-verbal communication
    - Presentation technique
    - Appropriate introduction/closure
    - Foster critical thinking
    - Creativity
7. Judges will be unknown to contestant
8. **Penalties:** Five-point deduction for every 30 seconds greater than **two** minutes allotted for setup and for every 30 seconds under or over the five- to seven-minute demonstration time
8. Contestant will return all materials to designated committee member upon completion of presentation. Materials made by contestant are the property of the contestant.

Book Reading Demonstration

1. Contestant will have access to and choose from designated books.
2. Contestant should arrive to demonstration area early and will have 15 minutes to practice their book prior to presentation.
3. Contestants will be given three to five minutes to present their lesson.
4. Contestant shall exhibit dynamic book reading skills:
   a. Literacy awareness
   b. Developmentally appropriate practice
   c. Verbal and non-verbal communication
   d. Interactive
   e. Foster critical thinking
5. Contestant is not required to read the entire book.
6. Contestant shall present as if children are present. Do not present to judges.
7. Judges will be unknown to contestant.
8. **Penalties:** Five-point deduction for every 30 seconds under or over the three- to five-minute demonstration time.
9. Contestant will return all materials to designated committee member upon completion of presentation.

Standards and Competencies

ECE 1.0 — Develop a hands-on lesson plan for a small group of children ages 3–5 years in the assigned curricular area

1 .1 Create a written lesson plan that addresses developmentally appropriate concepts from one of the following curriculum areas: food and nutrition, literacy, math, music and movement, science or social sciences
1.2 From provided materials, choose items to incorporate into the lesson
1.3 Write a legible plan on the provided lesson plan sheet
1.4 Include essential components in the lesson plan
   1.4.1 Curriculum area
   1.4.2 Materials needed
   1.4.3 Goals/Areas of development
   1.4.4 Written procedure/sequence
   1.4.5 Scaffolding
   1.4.6 Mechanics (spelling, grammar, punctuation, etc.)
1.5 Prepare developmentally appropriate lesson and materials for children ages 3–5 years
1.8 Submit written lesson and all materials to technical committee member

ECE 2.0 — Using applicable teacher skills and developmentally appropriate methodologies, demonstrate the written lesson. (Demonstration 5–7 minutes)

2.1 Demonstrate developmentally appropriate teaching techniques
2.2 Exhibit attention-gaining techniques in the introduction
2.3 Support lesson goals with appropriate procedure and use of materials
2.4 Use voice as a teaching tool — expression, grammar, volume, inflection
2.5 Promote critical thinking in children
2.6 Allow children to interact with materials
2.7 Present on child's level
2.8 Conclude the lesson appropriately
2.9 Display originality and creativity
2.10 Respond to judge's question following the presentation

ECE 3.0 — Using applicable teacher skills and developmentally appropriate methodologies, demonstrate a literacy experience (Demonstration 3–5 minutes)

3.1 Choose a book for demonstration
3.2 Read the book using developmentally appropriate teaching techniques
3.3 Exhibit attention-gaining technique for introduction
3.4 Introduce book using title, author and illustrator
3.5 Use voice as a teaching tool — expression, grammar, volume, inflection
3.6 Promote critical thinking in children
3.7 Provide opportunities for children to interact
3.8 Present on child's level

ECE 4.0 — Apply knowledge of early childhood education and employment skills through an interview process

4.1 Exhibit professionalism during interview
4.2 Use appropriate verbal and nonverbal communication
4.4 Display self-awareness
4.5 Demonstrate knowledge of high quality early childhood programs

ECE 5.0 — Apply knowledge of child development and early childhood education

5.1 Display an understanding of theorists and their contribution to the foundation of early childhood education
5.2 Describe child growth and development
5.3 Explain how to provide a safe and healthy learning environment
5.4 Discuss how to encourage development in all areas: physical, social, emotional, cognitive and linguistic
5.5 Provide safe and effective classroom management

ECE 6.0 — Demonstrate professional and ethical standards

6.1 Maintain a commitment to professionalism
6.2 Describe positive techniques for collaborative work with peers
6.3 Demonstrate understanding for positive and collaborative relationships with children, family and community

ECE 7.0 — Evaluate developmentally appropriate practices to enhance various learning levels of child growth and development

7.1 Assess strategies that promote physical, cognitive, social, emotional and linguistic development in children
7.2 Analyze components of an inclusive curriculum that incorporates learning styles, language, home experiences and values
7.3 Respect diversity with sensitivity to anti-bias, gender equality, age, culture and ethnicity related to children and parenting
7.4 Demonstrate positive guidance techniques
7.5 Devise strategies to encourage self-discipline
7.6 Educate self in current and emerging research in early childhood practice

ECE 8.0 — Evaluate factors affecting children and families with a variety of disadvantaging conditions

8.1 Examine characteristics, needs and interventions related to children with special needs, such as those with physical, emotional, social or developmental delays or socioeconomic disadvantages
8.2 Describe the impact of heredity and environment on conditions that affect children

Committee Identified Academic Skills

The technical committee has identified that the following academic skills are embedded in this contest.

Linguistic Skills

- Validate social skills through conversations and oral presentations
- Demonstrate use of verbal communication skills: vocabulary, tone, pitch, fluency, expression
- Usage of nonverbal communication skills: eye contact, posture and movement to gain information
- Display written communication: narrative and informational writing
- Ability to edit written communication: grammar, sentence structure, spelling, proper usage of upper/lowercase and punctuation
- Exhibit reading/literacy skills

Math Skills

- Make predictions using knowledge of probability
- Use standard and nonstandard measurements
- Understand basic geometry
- Practice spatial relationships
- Ability to sort and classify sets
- Aptitude to construct patterns
- Identify numbers and basic addition/subtraction
- Create charts and graphs
- Exposure to time, volume and temperature

Science Skills

- Hands-on scientific experimentation through exploration
- Ability to ask questions and hypothesize
- Use of observations
- Conduct reasoning and make predictions
- Formulate questions using critical thinking
- Describe of living and nonliving things
- Define weather and climate
- Understanding nutrition and body awareness
- Concept of child growth and development

- Recording investigations
- Communicating and sharing ideas

Connections to National Standards

State-level academic curriculum specialists identified the following connections to national academic standards.

Linguistic

- Application of strategies to comprehend, interpret, evaluate and appreciate texts. Use prior experience, knowledge of word meaning and identification strategies for understanding contextual features (e.g., sound-letter correspondence, sentence structure)
- Adjustment and usage of verbal, written and visual language (e.g., convections, vocabulary) to communicate effectively with diverse audiences for a variety of purposes
- Exhibit verbal, written and visual language to accomplish personal success (e.g., learning, enjoyment)
- Recognition, understanding and respect for diversity in language use and dialects across cultures, ethnic groups, geographic regions and social roles
- English Language Learners use native language to develop competency in the English language and develop understanding of content across the curriculum.
- Participation as knowledgeable, reflective, creative and crucial members of a variety of literacy communities

Source: Common Core English Language Arts Standards. To view high school standards, visit: www.corestandards.org/wp-content/uploads/ELA_Standards1.pdf.

National Council of Teachers for English (NCTE). To view high school standards, visit: www.ncte.org/standards.

Math Standards

- Problem solving
- Communication
- Connections
- Representation

Source: Common Core Math Standards. To view high school standards, visit: www.corestandards.org/assets/CCSSI_Mathematics_Appendix_A.pdf

Science Standards

- Understands the principles of heredity and related concepts
- Knowledge of biological evolution and diversity in life
- Recognizes scientific initiative

***Source*:** National Science Teachers Association (NSTA). To view high school standards visit: http://ngss.nsta.org/AccessStandardsByTopic.aspx.

Next Generation Science Standards (NGSS) Science and Engineering Practices in NGSS. To view high school standards, visit: http://tinyurl.com/ngss-standards-doc.

Electrical Construction Wiring

Purpose

The Electrical Construction Wiring event will allow each contestant the opportunity to perform in a practical work environment. Each contestant will have the opportunity to the use their acquired electrical wiring skills to construct an electrical wiring design, using electrical blue prints, written specifications and verbal instructions based on the National Electrical Construction Wiring standards in accordance with the National Electrical Code.

First, download and review the General Regulations at: http://updates.skillsusa.org.

Clothing Requirement

Class C: Contest Specific — Manufacturing/Construction Khaki Attire

For both men and women: Official SkillsUSA khaki work shirt and pants; black, brown, or tan leather work shoes; safety glasses with side shields or goggles (prescription glasses may be used, only if they are equipped with side shields. If not, they must be covered with goggles).

These regulations refer to clothing items that are pictured and described at: www.skillsusastore.org. If you have questions about clothing or other logo items, call 800-401-1560 or 703-956-3723.

Note: Contestants must wear their official contest clothing to the contest orientation meeting.

Eligibility

Open to active SkillsUSA members enrolled in programs with electrical wiring or electrical trades as the occupational objective.

Equipment and Materials

1. Supplied by the technical committee:
   a. All wiring panels, electrical supplies and materials as required by the project assigned
   b. All necessary hand tools will be provided
   c. Calculator (nonprogrammable)
2. Supplied by the contestant:
   a. Latest edition of the National Electrical Code as of the January prior to the SkillsUSA Championships. ***Note:*** The NEC handbook is not approved for use in the written test.
   b. All competitors must create a one-page résumé and submit a hard copy to the technical committee chair at orientation. Failure to do so will result in a 10-point penalty.

   ***Note*:** Your contest may also require a hard copy of your résumé as part of the actual contest. Check the Contest Guidelines and/or the updates page on the SkillsUSA website: http://updates.skillsusa.org.

Scope of the Contest

The contest will assess the ability to perform jobs or skills selected from the following list of competencies as determined by the SkillsUSA Championships technical committee.

Knowledge Performance

The contest will include a written knowledge exam assessing general knowledge of electrical construction wiring. Written portions may also exist during the skills portion of the contest. Knowledge of terms and principles used in residential wiring will be required for the skill demonstration portion of the contest.

Skill Performance

The skills portion of the contest will include a series of workstations that have information and instruction sheets for wiring a residence or completing a commercial installation.

All work must conform to the specifications of the latest edition of the National Electrical Code as of the January prior to the SkillsUSA Championships.

Standards and Competencies

ECW 1.0 — Define and apply safety rules and practices in residential wiring according to NEC standards

1.1 Apply shop rules and regulations to work stations
1.2 List the techniques and practices used to prevent fires
1.3 Use electrical and hand tools correctly
1.4 Discuss the appropriate methods for lifting and climbing ladders
1.5 Explain appropriate clothing for electrical wiring construction
1.6 Outline the safety requirements for installing temporary electrical services

ECW 2.0 — Apply knowledge of basic wiring theory according to NEC standards

2.1 Use wiring diagrams, schematic diagrams and prints successfully in a scenario
2.2 Apply math calculations to circuits and measurements
2.3 Discuss theory concepts for troubleshooting

ECW 3.0 — Discuss important trade information and standards according to the NEC

3.1 Explain the purpose and use of the National Electric Code
3.2 Sketch and diagram effectively
3.3 Plan the layout of an electrical installation
3.4 Use trade catalogs and publications to solve electrical construction wiring problems
3.5 Correlate specifications, prints and job sites

ECW 4.0 — Use basic equipment and procedures defined by industry standards

4.1 Discuss techniques of residential and commercial wiring
4.2 Demonstrate wire-pulling techniques

ECW 5.0 — Apply knowledge of service loads and electrical safety to electrical construction wiring situations

5.1 Compute service loads
5.2 Calculate individual service loads
5.3 Determine the number of outlets permitted in a circuit
5.4 Compute the size of service entrance conductors
5.5 Use any wire types listed in NEC 310.16

ECW 6.0 — Install a service entrance to meet NEC standards

6.1 Install a main service panel and sub-panel
6.2 Install circuit breakers in a panel
6.3 Install a service entrance cable to service drop
6.4 Install temporary electrical service
6.5 Install equipment disconnect
6.6 Install meter bases

ECW 7.0 — Install switch boxes and outlet boxes to meet NEC standards

7.1 Install box hangers
7.2 Install recess boxes for outlets
7.3 Install hangable boxes
7.4 Install octagon boxes
7.5 Install surface mount boxes
7.6 Install recessed fixture housing in a ceiling
7.7 Install outlet boxes in dry wall, lath plaster or paneled walls
7.8 Install telephone boxes in dry wall, lath plaster or paneled walls

ECW 8.0 — Maintain already existing wiring to meet NEC standards

8.1 Diagnose and repair incandescent lights
8.2 Replace existing receptacles and switches
8.3 Troubleshoot a branch circuit
8.4 Test wiring for correct voltages

ECW 9.0 — Rough in, connect and install electrical devices to meet NEC standards

9.1 Rough in, connect and install a single pole switch
9.2 Rough in, connect and install a three-way switch
9.3 Rough in, connect and install a four-way switch
9.4 Rough in, connect and install a duplex grounded receptacle
9.5 Rough in, connect and install a 120–240 volt distribution panel
9.6 Rough in, connect and install a door chime system
9.7 Rough in, connect and install a ground fault interrupting device

9.8 Rough in, connect and install an emergency warning system
9.9 Rough in, connect and install a photoelectric cell control
9.10 Rough in, connect and install a surface raceway
9.11 Rough in, connect and install an exterior lighting fixture
9.12 Rough in, connect and install lighting dimmers
9.13 Rough in, connect and install TV outlets
9.14 Rough in, connect and install telephone outlets
9.15 Rough in, connect and install emergency lighting systems
9.16 Rough in, connect and install appliance circuits
9.17 Rough in, connect and install occupancy sensor
9.18 Rough in, connect and install motion sensor

ECW 10.0 — Install PVC and EMT conduit to meet NEC standards

10.1 Make 90-degree bends from measurements
10.2 Make offset bends from measurements
10.3 Make back-to-back bends from measurements
10.4 Make saddle bends from measurements
10.5 Determine correct conduit measurements

ECW 11.0 — Install telecommunications infrastructure to meet current TIA/EIA 570 standards

11.1 Install a coaxial cable with "F" type connectors and terminating hardware
11.2 Install unshielded twisted-pair cable, connectors and terminating hardware
11.3 Install 110-type terminating hardware

ECW 12.0 — Apply knowledge of NEC Chapter 5 Special Occupancies

ECW 13.0 — Apply knowledge of the International Energy Conservation Code

Committee Identified Academic Skills

The technical committee has identified that the following academic skills are embedded in this contest.

Math Skills

- Use fractions to solve practical problems
- Measure angles
- Find surface area and perimeter of two-dimensional objects
- Apply Pythagorean Theorem
- Solve problems using proportions, formulas and functions

Science Skills

- Use knowledge of mechanical, chemical and electrical energy
- Use knowledge of principles of electricity and magnetism
- Use knowledge of static electricity, current electricity and circuits

Language Arts Skills

- Demonstrate knowledge of appropriate reference materials

Connections to National Standards

State-level academic curriculum specialists identified the following connections to national academic standards.

Math Standards

- Numbers and operations
- Algebra
- Geometry
- Measurement
- Problem solving
- Communication
- Connections
- Representation

Source: NCTM Principles and Standards for School Mathematics. For more information, visit: http://www.nctm.org.

Science Standards

- Understands the structure and properties of matter
- Understands the sources and properties of energy
- Understands forces and motion
- Understands the nature of scientific inquiry

Source: McREL compendium of national science standards. To view and search the compendium, visit: www2.mcrel.org/compendium/browse.asp.

Language Arts Standards

- Students adjust their use of spoken, written, and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes
- Students use a variety of technological and information resources (e.g., libraries, databases, computer networks, video) to gather and synthesize information and to create and communicate knowledge
- Students use spoken, written, and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion, and the exchange of information)

Source: IRA/NCTE Standards for the English Language Arts. To view the standards, visit: www.ncte.org/standards.

ELECTRONICS TECHNOLOGY

PURPOSE

To evaluate each contestant's preparation for employment and to recognize outstanding students for excellence and professionalism in the field of electronics technology.

First, download and review the General Regulations at: http://updates.skillsusa.org.

ELIGIBILITY

Open to active SkillsUSA members enrolled in programs with industrial electronics or electronics technology as the occupational objective.

CLOTHING REQUIREMENT

Class E: Contest specific — Business Casual

For men: Official SkillsUSA white polo shirt, black dress slacks, black socks, black leather shoes.
For women: Official SkillsUSA white polo shirt with black dress skirt (knee-length) or black slacks; black socks or black or skin-tone seamless hose; black leather dress shoes.

These regulations refer to clothing items that are pictured and described at: www.skillsusastore.org. If you have questions about clothing or other logo items, call 800-401-1560 or 703-956-3723.

Note: Contestants must wear their official contest clothing to the contest orientation meeting.

EQUIPMENT AND MATERIALS

1. Supplied by the technical committee:
   a. All materials, supplies and job information needed to construct and test the designed circuit
   b. The technical committee will not supply tools, test equipment or calculators
2. Supplied by the contestant:
   a. Small pliers
   b. Wire cutter
   c. Wire stripper for No. 28 and No. 30 gauge wire
   d. Small assorted screwdriver set (Phillips and slotted)
   e. 25-watt soldering iron and associated soldering supplies (***Note***: No soldering guns allowed)
   f. Other hand tools as desired, subject to the approval of the technical committee
   g. Digital multimeter capable of measuring ohms, volts and current
   h. 20 or more MHz dual trace oscilloscope
   i. Two 10x probes
   j. Calculators (can have scientific notation but cannot be programmable)
   k. All competitors must create a one-page résumé and submit a hard copy to the technical committee chair at orientation. Failure to do so will result in a 10-point penalty.

***Note*:** Your contest may also require a hard copy of your résumé as part of the actual contest. Check the Contest Guidelines and/or the updates page on the SkillsUSA website: http://updates.skillsusa.org.

SCOPE OF THE CONTEST

The contest will assess the ability to apply theoretical and practical knowledge of "state of the art" electronic industry standards as determined by the International Society of Certified Electronics Technicians. Additionally, the contest also requires contestant proficiency of competencies listed by the National Coalition for Electronics Education — Basic Electronics. Contestants will demonstrate their ability to perform jobs or skills from the following list of competencies as determined by the SkillsUSA Championships technical committee, which includes: Electronics Supply Co. Inc., NIDA Corp. and United States Postal Service. Changes may occur as needs or standards are updated. Any modifications and or changes will be posted to the SkillsUSA website.

Knowledge Performance

The contest includes two written knowledge tests: a certified electronics technician exam and a customer service test. The exam is an industry-standard written test. The customer service test is the Electronics Technician Association-International, Customer Service

Specialist (CSS) exam. This may change as needs or standards are updated. If there is a need to change or revise the exam, the change will be posted on the SkillsUSA website.

Skill Performance

The skill performance portion of the contest will include circuit construction, soldering and circuit/system troubleshooting. Contestants will read and follow instructions, interpret circuit design drawings, analyze and identify circuit faults, solder various electronic components and properly use electronic components in accordance with their design specifications.

Contest Guidelines

1. Contestants will be provided with the characteristics, parameters and information to accomplish the assigned tasks.
2. Time limit:
   a. Contestants will begin upon a signal from the timekeeper.
   b. As soon as contestants have completed the assignment and are fully satisfied with the operation and quality of their work, they will signal the judge and stop their work. This signal will determine elapsed time and speed.
3. The completed projects will be tested by the judges for quality of work and operating specifications.

Standards and Competencies

ET 1.0 — Interpret, record and report technical data from provided materials to related ISCET standards

1.1 Draw and interpret electronic schematics
1.2 Record data and design curves and graphs
1.3 Write reports
1.4 Maintain test logs
1.5 Make equipment failure reports
1.6 Specify and requisition simple electronic components
1.7 Compose technical letters
1.8 Write formal reports of laboratory experiences

ET 2.0 — Apply knowledge of DC circuits to a given scenario using related competencies of NCEE-Basic Electronics and ISCET-CET

2.1 Solve basic algebraic problems as applicable to electronics
2.2 Relate electricity to nature of matter
2.3 Identify sources of electricity
2.4 Define voltage, current, resistance, power and energy
2.5 Apply and relate Ohms Law
2.6 Read and interpret color codes to identify resistors
2.7 Measure properties of a circuit using VOM and DVM meters
2.8 Compute and measure conductance and resistance of conductors and insulators
2.9 Analyze, construct and troubleshoot series circuits, parallel circuits, series-parallel circuits and voltage dividers
2.10 Solve network theorem problems using Kirchhoff, Thevenin, Norton, Superposition and Delta-Wye
2.11 Analyze, construct and troubleshoot maximum power transfer theory
2.12 Define magnetic properties of circuits and devices
2.13 Determine physical and electrical characteristics of capacitors and inductors
2.14 Analyze and measure RL and RC time constants
2.15 Set up and operate a VOM, DVM, power supplies and oscilloscopes for DC circuits

ET 3.0 — Apply knowledge of AC circuits to a given scenario using related competencies of NCEE-Basic Electronics and ISCET-CET

3.1 Solve basic trigonometric problems as applicable to electronics (prerequisite to AC)
3.2 Identify properties of an AC signal
3.3 Identify AC sources
3.4 Analyze and measure AC signals using oscilloscope, frequency meters and generators
3.5 Analyze, construct and troubleshoot AC capacitive circuits, AC inductive circuits, RLC circuits (Series, Parallel, Complex) series and parallel resonant circuits, filter circuits and polyphase circuits
3.6 Analyze basic motor theory and operation

3.7 Analyze basic generator theory and operation
3.8 Set up and operate VOM, DVM and power supplies for AC circuits
3.9 Set up and operate oscilloscopes, frequency counters, signal generators, capacitor-inductor analyzers and impedance bridges for AC circuits
3.10 Analyze and apply principles of transformers to AC circuits

ET 4.0 — Apply knowledge of solid-state devices to a given scenario using related competencies of NCEE-Basic Electronics and ISCET-CET

4.1 Identify properties of semiconductor materials
4.2 Analyze and measure characteristics of P-N junction diodes
4.3 Analyze and measure characteristics of special diodes
4.4 Analyze, construct and troubleshoot diode circuits
4.5 Identify, define and measure characteristics of bipolar transistors, thyristors and integrated circuits
4.6 Set up and operate VOM, DVM and power supplies for solid state devices
4.7 Set up and operate oscilloscopes, frequency counters, signal generators, capacitor-inductor analyzers and impedance bridges for solid state devices
4.8 Set up and operate curve tracers and transistor testers

ET 5.0 — Apply knowledge of analog circuits to a given scenario using related competencies of NCEE-Basic Electronics and ISCET-CET

5.1 Analyze, construct and troubleshoot single-stage amplifiers, multi-state amplifiers, basic power supplies and filters, power supply regulators, active filters, and oscillators
5.2 Analyze motor or phase control circuits
5.3 Set up and operate VOM, DVM and power supplies for analog circuits
5.4 Set up and operate oscilloscopes, frequency counters, signal generators, and capacitor-inductor analyzers for analog circuits
5.5 Set up and operate impedance bridges for analog circuits
5.6 Set up and operate recorders for analog circuits

ET 6.0 — Apply knowledge of digital devices to a given scenario using related competencies of NCEE-Basic Electronics and ISCET-CET

6.1 Define and apply number systems to codes and arithmetic
6.2 Analyze, construct and troubleshoot logic gates, logic arithmetic circuits, flip-flops, and encoders and decoders
6.3 Identify, define and measure characteristics of IC logic families
6.4 Analyze, construct and troubleshoot registers and counters, clock and timing circuits, multiplexers and demultiplexers, digital to analog, and analog to digital
6.5 Analyze, construct and troubleshoot displays and representative digital systems
6.6 Set up and operate VOM, DVM and logic probes for digital devices
6.7 Set up and operate power supplies, pulsers, oscilloscopes, logic analyzers, signature analyzers, pulse generators, and counters for digital devices

ET 7.0 — Apply knowledge of microprocessors to a given scenario using related competencies of NCEE-Basic Electronics and ISCET-CET

7.1 Analyze, construct and troubleshoot CPUs, BUS systems, memory systems and input/output ports, microprocessor applications and systems
7.2 Execute computer instruction sets
7.3 Analyze and troubleshoot microprocessor systems
7.4 Set up and operate VOM, DVM, power supplies, pulsers, oscilloscopes, logic/data analyzers, signature analyzers, pulse generators, and counters for microprocessing

ET 8.0 — Use laboratory practices common to industry situation

8.1 Demonstrate proper OSHA-related safety standards
8.2 Make electrical connections
8.3 Identify and use hand and power tools used in electronics technology
8.4 Utilize standard troubleshooting procedures for defective circuits

Committee Identified Academic Skills

Math Skills

- Solve practical problems involving percents
- Solve single variable algebraic expressions
- Solve multiple variable algebraic expressions
- Make comparisons, predictions and inferences using graphs and charts

Science Skills

- Plan and conduct a scientific investigation
- Use knowledge of the particle theory of matter
- Describe characteristics of types of matter based on physical and chemical properties
- Use knowledge of physical properties (shape, density, solubility, odor, melting point, boiling point, color)
- Use knowledge of classification of elements as metals, metalloids and nonmetals
- Understand Law of Conservation of Matter and Energy
- Describe phases of matter
- Describe and identify physical changes to matter
- Use knowledge of potential and kinetic energy
- Use knowledge of mechanical, chemical, and electrical energy
- Use knowledge of heat, light and sound energy
- Use knowledge of temperature scales, heat and heat transfer
- Use knowledge of work, force, mechanical advantage, efficiency and power
- Use knowledge of simple machines, compound machines, powered vehicles, rockets and restraining devices
- Use knowledge of principles of electricity and magnetism
- Use knowledge of static electricity, current electricity and circuits
- Use knowledge of magnetic fields and electromagnets
- Use knowledge of motors and generators

Language Arts Skills

- Demonstrate comprehension of a variety of informational texts
- Use text structures to aid comprehension
- Demonstrate knowledge of appropriate reference materials
- Use print, electronic databases and online resources to access information in books and articles

Connections to National Standards

State-level academic curriculum specialists identified the following connections to national academic standards.

Math Standards

- Numbers and operations
- Algebra
- Geometry
- Measurement
- Data analysis and probability
- Problem solving
- Reasoning and proof

Source: NCTM Principles and Standards for School Mathematics. For more information, visit: http://www.nctm.org.

Science Standards

- Understands the structure and properties of matter
- Understands the sources and properties of energy
- Understands forces and motion
- Understands the nature of scientific knowledge
- Understands the nature of scientific inquiry

Source: McREL compendium of national science standards. To view and search the compendium, visit: www2.mcrel.org/compendium/browse.asp.

Language Arts Standards

- Students read a wide range of print and nonprint texts to build an understanding of texts, of themselves and of the cultures of the United States and the world; to acquire new information; to respond to the needs and demands of society and the workplace; and for personal fulfillment. Among these texts are fiction and nonfiction, classic and contemporary works
- Students apply a wide range of strategies to comprehend, interpret, evaluate and appreciate texts. They draw on their prior experience, their interactions with other

readers and writers, their knowledge of word meaning and of other texts, their word identification strategies and their understanding of textual features (e.g., sound-letter correspondence, sentence structure, context, graphics)

- Students adjust their use of spoken, written and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes
- Students employ a wide range of strategies as they write and use different writing process elements appropriately to communicate with different audiences for a variety of purposes
- Students apply knowledge of language structure, language conventions (e.g., spelling and punctuation), media techniques, figurative language and genre to create, critique and discuss print and nonprint texts
- Students conduct research on issues and interests by generating ideas and questions, and by posing problems. They gather, evaluate and synthesize data from a variety of sources (e.g., print and nonprint texts, artifacts, people) to communicate their discoveries in ways that suit their purpose and audience
- Students use a variety of technological and information resources (e.g., libraries, databases, computer networks, video) to gather and synthesize information and to create and communicate knowledge
- Students use spoken, written and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion, and the exchange of information)

Source: IRA/NCTE Standards for the English Language Arts. To view the standards, visit: www.ncte.org/standards.

ESTHETICS

PURPOSE
To evaluate each contestant's preparation for employment and to recognize outstanding students for excellence and professionalism in the field of esthetics.

First, download and review the General Regulations at: http://updates.skillsusa.org.

ELIGIBILITY
Open to active SkillsUSA members enrolled in programs with cosmetology/esthetics as the occupational objective.

CLOTHING REQUIREMENT
Class E: Contest specific — Business Casual
For men: Official SkillsUSA white polo shirt, black dress slacks, black socks, black leather shoes.
For women: Official SkillsUSA white polo shirt with black dress skirt (knee-length) or black slacks; black socks or black or skin-tone seamless hose; black leather dress shoes.

Class F: Contest Specific — Cosmetology
For men: Official SkillsUSA white dress shirt; black dress slacks; black socks; black leather work or dress shoes.
For women: Official white top; black dress slacks; black socks or black or skin-tone seamless hose; black leather work or dress shoes.
Note: A white cosmetology smock can be worn with the white dress shirt for men or white top for women. No jewelry.
For models: Plain black t-shirt, black dress slacks, black or skin-tone seamless hose and black leather shoes, no jewelry. Contestants must have hair pulled away from the face; models must have a clean, cosmetic-free face. Jewelry may be included on the model only during the prop application time in the fantasy portion of the contest.

These regulations refer to clothing items that are pictured and described at: www.skillsusastore.org. If you have questions about clothing or other logo items, call 800-401-1560 or 703-956-3723.

Note: Contestants and models must wear their official contest clothing to the contest orientation meeting. (Official SkillsUSA blazer not required.)

EQUIPMENT AND MATERIALS
1. Supplied by the technical committee:
   a. Tables (for use in performance of facials)
   b. Chairs (for models)
   c. Small table for products
   d. Towel steamers
   e. Water
   f. Bowls
   g. All items necessary for basic facial and massage skills will be provided by the technical committee and will include:
      1. Cleanser
      2. Toner
      3. Moisturizer
      4. Exfoliator
      5. Mask
      6. Massage cream
   h. Demonstration portion: items necessary for spa manicure skin treatments that will be provided by the technical committee will include:
      1. hand exfoliation product
      2. hand massage cream
      3. hand treatment paraffin
      4. paraffin heater
      5. plastic liners

2. Supplied by contestant:
   a. Models: must be student members dressed appropriately as described in the required clothing statement; must maintain hair pulled away from the face; must have a clean, cosmetic-free face; and must not wear earrings, facial piercings or necklaces. (Jewelry may be worn in the fantasy portion of the contest.) *Models are not required to take a skill-related written test or submit a résumé.*
   b. All competitors must create a one-page résumé and submit a hard copy to the

technical committee chair at orientation. Failure to do so will result in a 10-point penalty.
***Note*:** Your contest may also require a hard copy of your résumé as part of the actual contest. Check the Contest Guidelines and/or the updates page on the SkillsUSA website: http://updates.skillsusa.org.

c. A written description of the theme for the fantasy makeup portion of the contestant's theme interpretation is limited to one page typewritten in a legible font and contained within a plastic sleeve. The description must be submitted at the contestant orientation. No exceptions; late descriptions will result in a 10-point deduction.
d. One 8"x10" photograph of the completed fantasy makeup contained within a plastic sleeve.
e. Demo: One 8"x10" photograph of the completed two-hand freehand nail art contained within a plastic sleeve
f. Portable kit organizer (to transport and store items needed during the contest)
g. All items necessary for daytime makeup application
h. All items necessary for fantasy makeup application. (All items should be safe for use on the skin.)
i. All items necessary for basic facial and massage skills including:
   - Cleanser
   - Exfoliator
   - Mask
   - Toner or freshener
   - Moisturizer

   (Sponsors of these items will be posted on the SkillsUSA Updates page at: updates.skillsusa.org)
j. All necessary product applicators such as:
   - Spatulas
   - Cotton swabs
   - Fan and mask brushes
   - Cotton 4x4 pads or sponges
   - Tissues
   - Mascara wand
   - Makeup brushes

   All applicators must be disposable or sanitized.
k. False eyelash kit
   - Lashes (both strip and tab forms)
   - Adhesives
   - Lash application tools
   - Alcohol wipes and sanitizers
l. Minimum of six clean, white terry cloth towels in standard salon size (no holes or stains). For beauty portion, contestants can use set-up sheets/paper towels. Contestants will donate two towels to the contest to put in hot towel steamer.
m. Headband
n. Proper draping supplies (cape for makeup application and one fitted and one flat white, clean, twin-size sheet for massage and facial skills)
o. Sealable plastic bags for sanitation and soiled linens (large zip-lock bags are recommended that fit linens and towels)
p. Latex-free gloves (at least two pair)
q. Paper towels or tissues (can be mini travel size)
r. Decontamination supplies for equipment and implements (must be EPA approved, e.g., (but not limited to) Barbicide, Utronics, Clorox wipes
s. Decontamination supplies for hands
t. Stainless steel bowl for water (1½ quart minimum size)
u. Blood spill kit must have a properly labeled biohazard bag. First aid kit by itself is not acceptable.
v. Demonstration Task: All items needed to complete spa manicure:
   - finger bowl
   - cuticle pusher
   - cuticle softener, oil, and/or cream
   - nail file
   - base and top coats
   - red crème polish
   - setup and cleanup supplies
w. Demonstration Task: Items needed to complete 10 nails of fantasy hand nail art:
   - polishes or paints
   - brushes, application tools
   - clear top coat
   - set-up and cleanup supplies

***Note*:** All products to be in contact with the skin must be in original manufacturer's packaging. All decontamination chemicals must be in original manufacturer's packaging.

Scope of the Contest

The contest will include a written esthetic knowledge examination, an oral communications assessment and four skill performance tasks. Additionally, the tasks of Spa Manicure and Fantasy Nail Art will be performed as demonstration tasks at the 2019 SkillsUSA competition.

Knowledge Performance

The contest will include a skill-related written knowledge test of 50 multiple-choice questions assessing knowledge of esthetics. Contestants will have 30 minutes to complete the exam. The test bank is from *Milady Standard Fundamentals.*

Skill Performance

An oral communication portion of the contest will assess the verbal presentation skills of the contestant. The technical skill performance tasks will assess skills in facial massage, basic facial, beauty and fantasy makeup application at multiple performance stations. Technique is scored in the performance tasks of facial massage, basic facial and beauty makeup application and creativity is assessed in the fantasy makeup application. An emphasis on safety and sanitation will be used in all segments of the skill performance areas. Observations during each segment and evaluation of the finished product will be considered in the scoring. The demonstration tasks of Spa Manicure and Fantasy Nail Art will be used to assess skills and creativity in the nail care sector of the beauty therapy industry. The scoring of demonstration tasks will not be included in final scores during the first year they are incorporated into an existing contest.

Contest Guidelines

1. The contest rules will be reviewed at the scheduled orientation. At the orientation, please be prepared to submit contestant resumes, written theme, 8"x10" photograph of completed fantasy makeup and an 8"x10" photograph of the two-hand fantasy nail art. Following a break after the orientation, contestants will be required to be dressed in official contest clothing, provide items for the kit check, take the written esthetics knowledge test
2. All contestants must keep their working area clean and organized at all times.
3. All contestants must follow sanitation and safety procedures throughout the contest at all times. Floor monitors/judges will assess decontamination procedures and safety practices throughout the contest.
4. All contestants must bring a model for the competition. Models are not required to attend the orientation.
    a. Contestants must have natural nails (short and not artificial) with no nail polish. Hair must be pulled back; no jewelry or facial piercings. (Penalty will result if these rules are not followed.)
    b. Models may have pre-applied nail extensions that are free of polish. Models must maintain hair off the face, and cosmetic free skin.
5. Contestants will prepare and perform an oral communication presentation. This will consist of a two- to three-minute oral presentation of the contestant's interpretation and/or the approach to the yearly theme for the fantasy make-up application.
6. Time limits
    a. Knowledge exam: 30 minutes
    b. Oral presentation: 2-3 minutes; facial station set-up, 5 minutes; cleansing massage, 15 minutes; basic facial procedure, 30 minutes
    c. DEMO: Spa Manicure, 60 minutes
    d. Beauty make-up application: 60 minutes; Fantasy make-up application, 60 minutes
    e. DEMO: Fantasy Nail Art, 90 minutes
7. Penalty points can occur for the following:
    a. Any rule not followed, with no exceptions
    b. Leaving the competition area before completion of task (applies to both contestant and model) without proper escort
    c. Unauthorized use of a product that is not allowed or that doesn't appear in the above listing
    d. Any product that appears to have been altered. All products and solutions must be properly identified with the manufacturer's original packaging and original labeling. Product labels cannot be defaced.

8. Professional attitude and communication is expected throughout the contest
9. Once time is called, the contestant must stop working. Touching the model after time is called will result in three penalty points.
10. Cellphones are not allowed in contest area. If models and/or contestants are using any digital communication device, (other than when permitted), points will be deducted.
11. Setup should only consist of items needed for the specific task in progress. Time will be allowed between each task to reset the table. All items should be brought to the contest site in an organized fashion.
12. Required implements and products must be clean, accounted for and professionally organized. Proper control and usage of products and tools will be expected at all times.
13. Props such as hair ornaments, wigs and jewelry may be used in the fantasy section but will not be considered in the judging. The chair will provide contestants time to add final props to the fantasy portion after judging is complete.
14. All products used in any portion of the skill contests must be considered safe for application to the skin. This includes any item used on or attached to the skin in the fantasy makeup application.
15. Conversation between contestant and model is limited. Any form of communication with observers, judges and other contestants is prohibited during the contest.
16. Demonstration task of spa manicure should fall within standard procedural guidelines. Models may have nail extensions upon arrival without colored polish. There are no parameters for nail length or shape. Focus areas will be treatments of the nail plate, cuticle and skin with proper application of red crème polish.
17. Demonstration task of fantasy nail art may use any variety of dimensional and artistic applications. No pre-developed artwork such as decals, stamps, etc. The completed Fantasy Nail Art should complement the yearly theme and Fantasy Makeup Application.

Standards and Competencies

EST 1.0 — Setup and Client Protection — judged in all areas of contest (basic facial, beauty and fantasy makeup; 5-minute time limit)

1.1 Sanitize hands
1.2 Disinfect work area or uses protective covering
1.3 Set up work area with supplies clearly labeled
1.4 No cross contamination of products to skin or skin to product
1.5 Disinfect or cover chair
1.6 Dispose of soiled materials using infection control procedures
1.7 Resanitize hands
1.8 Apply body drape or cover for protection
1.9 Apply hair drape or cover
1.10 Resanitize hands

EST 2.0 — Cleansing Massage (15 minutes)

2.1 Preparation
2.2 Remove cleanser from container using infection control procedures
2.3 Demonstration of cleansing the face
- 2.3.1 Cleanse the lips safely
- 2.3.2 Cleanse eye area safely
- 2.3.3 Distribute cleanser over entire face safely
- 2.3.4 Cleanse entire face safely (cleansing massage only)
- 2.3.5 Demonstration of massaging the face
  - a. Distribute massage product over entire face safely
  - b. Demonstrate effleurage movement
  - c. Demonstrate petrissage movement
  - d. Demonstrate tapotement movement
  - e. Demonstrate friction movement/vibration movement
  - f. Maintain continuous contact during massage
- 2.3.6 Remove massage product without dragging or pulling skin
- 2.3.7 Remove all residual cleansing massage product safely

EST 3.0 — Basic Facial (consisting of exfoliation, steaming, facial mask, toner and moisturizer; 30 minutes)

3.1 Exfoliation
- 3.1.1 Remove exfoliation product from container using infection control procedures
- 3.1.2 Demonstration of exfoliation application to the skin
- 3.1.3 Safe manipulation of exfoliation product
- 3.1.4 Removal of exfoliation product from the skin
- 3.1.5 Practice safety and infection control throughout exfoliation procedure

3.2 Steaming
- 3.2.1 Preparation for steaming of the face
- 3.2.2 Wring wet towels thoroughly
- 3.2.3 Test towel temperature on wrist safely
- 3.2.4 Demonstration of steaming the face
- 3.2.5 Drape towel to cover the face so nose and/or mouth are uncovered
- 3.2.6 Lift towel from face safely
- 3.2.7 Practice safety and infection control throughout steaming procedure

3.3 Facial Mask
- 3.3.1 Preparation for facial mask
- 3.3.2 Remove mask product from container using infection control procedures
- 3.3.3 Demonstration of facial mask
- 3.3.4 Apply mask product over entire face safely, excluding eyes, lips and nasal passages
- 3.3.5 Apply mask evenly and safely
- 3.3.6 Remove all residual mask product safely
- 3.3.7 Practice safety and infection control procedures throughout service

3.4 Apply toner or astringent safely

3.5 Apply moisturizer safely

3.6 Infection Control
- 3.6.1 Dispose of soiled materials using infection control procedures
- 3.6.2 Practice infection control procedures safely throughout service
- 3.6.3 Maintain work area in a safe manner throughout service

EST 4.0 — Beauty Makeup (60 minutes) Application of Daytime or Evening makeup following current trends

4.1 Preparation
- 4.1.1 All items necessary for beauty makeup and application must be in original packaging.
- 4.1.2 Protect clothing with protective covering or cape
- 4.1.3 Secure hair off face
- 4.1.4 Sanitize hands

4.2 Demonstration of facial beauty makeup
- 4.2.1 Apply primer/moisturizer to face
- 4.2.2 Apply foundation and concealer to enhance and balance the face
- 4.2.3 Apply powder
- 4.2.4 Apply eye shadow
- 4.2.5 Apply eyeliner (no liquid liners allowed)
- 4.2.6 Apply mascara to lashes
- 4.2.7 Groom eyebrows using shadow brow or brow pencil
- 4.2.8 Apply lip liner
- 4.2.9 Apply lip color
- 4.2.10 Apply makeup without lines of demarcation to have the face match the rest of the body in shade and tone

4.3 Safety and Infection Control
- 4.3.1 Dispose of soiled materials using infection control procedures
- 4.3.2 Practice infection control procedures safely throughout service
- 4.3.3 Maintain work area in a safe manner throughout service

Note: Time or supplies are not provided to remove beauty makeup; product removal may be done during the scheduled break time at the contest site.

EST 5.0 — Fantasy Makeup (60 minutes). A general theme is provided. Each contestant can choose character or inspiration from the theme.

5.1 Preparation
- 5.1.1 All items for fantasy makeup application must be in original packaging.
- 5.1.2 Protect shoulders with protective covering or a cape

5.1.3 Sanitize hands

5.2 Demonstration of facial fantasy makeup
- 5.2.1 Proper application of all necessary fantasy make up products
- 5.2.2 Creativity while staying within the theme
- 5.2.3 Completed look — impact of change

5.3 Safety and infection control
- 5.3.1 Dispose of soiled materials using infection control procedures
- 5.3.2 Practice infection control procedures safely throughout service
- 5.3.3 Maintain work area in a safe manner throughout service

EST 6.0 — Oral Presentation (2-3 minutes) Apply the knowledge and skills necessary for professional communication based on the contestants' interpretation and/or approach to the yearly theme to be used in the Fantasy Makeup Application.

6.0 Professional oral communication
6.1 Present oral communication to judges
6.2 Maintain a professional attitude
6.3 Use eye contact
6.4 Voice is used appropriately, including volume
6.5 Professional terminology is used, including grammar
6.6 Organization of thoughts exhibits flow

EST 7.0 DEMO — Spa Manicure (60 minutes) Demonstrate the necessary skills for completing a spa manicure service with application of red crème polish on 10 nails.

7.1 Preparation and setup for service
7.2 Treatment of nail plate
7.3 Treatment of cuticle
- 7.3.1 Soften, loosen and clip

7.4 Treatment of skin
- 7.4.1 Exfoliate
- 7.4.2 Massage
- 7.4.3 Paraffin

7.5 Finished look
- 7.5.1 Polish application with base coat, red crème polish and top coat on the nail plate

7.6 Post-service cleanup
7.7 Demonstrate safety and infection control throughout service

EST 8.0 DEMO — Nail Art (90 minutes) Demonstrate application of dimensional nail art on 10 nails. Design should complement the yearly theme

8.1 Preparation and setup for service
- 8.1.1 Items must be in original packaging

8.2 Proper application of necessary products to complete dimensional nail art on 10 nails
8.3 Creativity while staying within the theme
8.4 Demonstrate safety and infection control throughout service

Committee Identified Academic Skills

The technical committee has identified that the following academic skills are embedded in this contest.

Math Skills

- Use fractions to solve practical problems
- Use proportions and ratios to solve practical problems
- Solve practical problems involving percentages
- Measure angles
- Find volume and surface area of three-dimensional objects
- Apply transformations (rotate or turn, reflect or flip, translate or slide, and dilate or scale) to geometric figures
- Construct three-dimensional models
- Make predictions using knowledge of probability
- Solve problems using proportions, formulas and functions
- Use basic math skills for purpose of marketing and bookkeeping; addition, subtraction, multiplication, division and percentages

Science Skills

- Describe and recognize elements, compounds, mixtures, acids, bases and salts
- Describe and recognize solids, liquids and gases
- Describe characteristics of types of matter based on physical and chemical properties
- Use knowledge of physical properties (shape, density, solubility, odor, melting point, boiling point, color)

- Use knowledge of chemical properties (acidity, basicity, combustibility, reactivity)
- Describe and demonstrate simple compounds (formulas and the nature of bonding)
- Predict chemical changes to matter (types of reactions, reactants and products; and balanced equations)
- Use knowledge of potential and kinetic energy
- Use knowledge of mechanical, chemical and electrical energy
- Use knowledge of heat, light and sound energy
- Use knowledge of temperature scales, heat and heat transfer
- Use knowledge of the nature and technological applications of light
- Use knowledge of simple machines, compound machines, powered vehicles, rockets and restraining devices
- Use knowledge of principles of electricity and magnetism
- Use knowledge of static electricity, current electricity and circuits

Language Arts Skills

- Demonstrate use of such verbal communication skills as word choice, pitch, feeling, tone and voice
- Demonstrate use of such nonverbal communication skills as eye contact, posture, and gestures using interviewing techniques to gain information
- Demonstrate comprehension of a variety of informational texts
- Use text structures to aid comprehension
- Understand source, viewpoint and purpose of texts
- Demonstrate knowledge of appropriate reference materials
- Use print, electronic databases and online resources to access information in books and articles

Connections to National Standards

State-level academic curriculum specialists identified the following connections to national academic standards.

Math Standards

- Geometry
- Measurement
- Problem solving
- Communication
- Connections
- Representation

Source: NCTM Principles and Standards for School Mathematics. For more information, visit: http://www.nctm.org.

Science Standards

- Understands the principles of heredity and related concepts
- Understands relationships among organisms and their physical environment
- Understands the nature of scientific inquiry

Source: McREL compendium of national science standards. To view and search the compendium, visit: www2.mcrel.org/compendium/browse.asp.

Language Arts Standards

- Students apply a wide range of strategies to comprehend, interpret, evaluate and appreciate texts. They draw on their prior experience, their interactions with other readers and writers, their knowledge of word meaning and of other texts, their word identification strategies, and their understanding of textual features (e.g., sound-letter correspondence, sentence structure, context, graphics)
- Students adjust their use of spoken, written and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes
- Students use spoken, written and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion and the exchange of information)

Source: IRA/NCTE Standards for the English Language Arts. To view the standards, visit: www.ncte.org/standards.

FIREFIGHTING

PURPOSE
To evaluate each contestant's preparation for employment and to recognize outstanding students for excellence and professionalism in the field of firefighting.

First, download and review the General Regulations at: http://updates.skillsusa.org/.

ELIGIBILITY
Open to active SkillsUSA members enrolled in technical and career technology programs with protective services/firefighting as part of the curriculum and occupational objective.

CLOTHING REQUIREMENT
Official SkillsUSA light blue work shirt and navy pants, black leather work shoes.

These regulations refer to clothing items that are pictured and described at: www.skillsusastore.org. If you have questions about clothing or other logo items, call 800-401-1560 or 703-956-3723.

Note: Contestants must wear their official contest clothing to the contest orientation meeting.

For the Written Test and Oral Interview and Oral Professional Assessment (to be held on the same day): Blue collared/button-up SkillsUSA shirt, dark blue duty pants, black shoes or boots, black belt. Contestants should be shaven with a neat haircut and must exhibit command presence.

For the CPAT and Practical Skills test on the following day:
CPAT: Sweat pants or workout pants (no shorts), SkillsUSA T-shirt or fire department T-shirt, tennis shoes.

Practical Skills events after the CPAT: Class B dress — SkillsUSA or any non-generic shirt, no affiliation to state or school, dark blue duty pants, black shoes or boots, black belt as if answering a call from the fire station.

EQUIPMENT AND MATERIALS
1. Provided by the technical committee:
   All ladders, hose, hand tools, ropes, water supply, engine apparatus, salvage covers, training tower/facility

2. Supplied by the contestant:
   a. Complete set of firefighter personal protective equipment, including:
      1. Helmet with face-shield and chin strap
      2. Bunker coat and pant with liners
      3. Standard fire boots (with steel toe/shank/shin guard)
      4. Nomex hood and fire gloves
      5. Sneakers
      6. SCBA face piece
   b. Pen and/or pencil for written test (included in orientation)
   c. All competitors must create a one-page résumé and submit a hard copy to the technical committee chair at orientation. Failure to do so will result in a 10-point penalty.

   ***Note*:** Your contest may also require a hard copy of your résumé as part of the actual contest. Check the Contest Guidelines and/or the updates page on the SkillsUSA website at updates.skillsusa.org.

SCOPE OF THE CONTEST
This contest evaluates the contestants' ability to perform firefighting skills. Contestants will demonstrate their ability to perform skills selected from the IAFF/ICHIEFS Candidate Physical Ability Test (CPAT) Menu and National Fire Protection Association.

Knowledge Performance
The contest will include a written knowledge exam assessing general knowledge of firefighting. IFSTA Manual *Essentials of Firefighting*, 6th Edition.

Skill Performance
The contest will include 10 stations assessing skills needed for firefighting.

Contest Guidelines

1. For the first two stations — donning structural PPE (station 1) and ropes and knots (station 2) — competitors are required to wear full NFPA-approved turnout gear including coat, pants, helmet (with skull cap), firefighting gloves, leather or rubber (steel toe/shank/shin guard) boots and Nomex hood. All department/school names must be removed/covered prior to the competition.
2. For the remaining eight stations (the CPAT testing activities), contestants will be allowed to change from the official SkillsUSA competition uniform. Contestants must wear long pants, a T-shirt and sneakers while performing in the CPAT. The CPAT testing activities include: stair climb, hose drag, equipment carry, ladder raise and extension, forcible entry, search, rescue drag and ceiling pull.

   Below is the breakdown for times/points for the timed CPAT skills:

00:00 – 10:20:	70 points
10:21 – 10:40:	65 points
10:41 – 11:00:	60 points
11:01 – 11:20:	55 points
11:21 – 11:40:	50 points
11:41 – 12:00:	45 points
12:01 – 13:00:	40 points
13:01 – 14:00:	35 points
14:01 – 15:00:	30 points
15:01 and over:	25 points

   Ropes, Knots, and Tool Raise
   This Skills Tests will show the candidates ability to tie and dress useful Fire Service knots and to demonstrate their use to raise and lower a tool such as an axe, roof hook, or pike pole safely.

   The candidate will wear full PPE minus SCBA and will use Structural Firefighting Gloves while completing this skills test.

   The following knots will be tied in an open setting or they can be tied around a horizontal pole. (See below) A great website to study these knots is www.animatedknots.com and click on the Rescue Knots or look them up by name.

- Half Hitch
  Tie Around Bar
- Clove Hitch — Closed (around an object)
  Tie Around Bar
- Clove Hitch — Open Tie the knot in hand and slip it over an object
- Bowline
  Tie Around Bar or Tie in Hand
- Figure eight or Flemish knot
  Tie in Hand and lay it over the bar
- Figure Eight on a bight
  Tie in Hand and lay it over the bar
- Figure Eight Bend or Flemish Bend or Figure 8 Follow through
  Around Bar
- Becket Bend or Sheet Bend using two different sized ropes
  Around Bar
- Girth Hitch or Larks Head used for Hose Straps
  Around Bar

Tool Raise or Lower

The second part of this Skills Test is to show that the candidate can tie off a hand tool for it to be raised and or lowered safely using a utility rope. Given a long length of rope and an Axe, Pike Pole, and a Roof Hook, the candidate will draw a card to select the tool that will be tied for raising/lowering. This is a timed event. Time starts when the candidate touches the tool or rope and stops when the candidate holds up the finished assembly over his/her head. Ideally, the utility rope would have a simple change of direction by looping it over a fixed point overhead (beam or rail) with a pulley or carabiner attached so that the assembled product could be raised, and the tagline demonstrated.

A five-second penalty will be assessed for each knot or hitch that is incorrect and a 10-second penalty assessed if the tool is inverted or a tagline is not provided via incorrect knot placement.

24' Fire Service Extension Ladder Raise
This Skills Test will demonstrate how quickly the candidate can correctly move into place and safely raise a 24' fire service

extension ladder. This is a timed event that will focus on accuracy and safety. After raising the ladder correctly for time, the candidate will safely lower the ladder from the building.

At the beginning of the test, the ladder will be on the ground parallel to the building that is to be laddered approximately 15' from the building as if it had just been removed from the Fire apparatus and placed on the ground.

Time starts when the candidate wearing full PPE minus SCBA touches the ladder. The candidate will use commands and raise the ladder safely. The candidate will return the ladder safely to its original position on the ground.

Note: A firefighter will be present to assist only as a Spotter and safety backup. This spotter can be asked to assist with heeling or footing the ladder but must be asked. The spotter can also assist with heeling the ladder when it is lowered. The spotter is not to support or assist in any other way unless the ladder begins to get out of control. If the candidate and spotter are on opposite sides of the ladder and need to switch positions the command "Switch Right" will be used. The candidate will use loud audible commands that demonstrate that they are aware of the surroundings and so that others on the fire ground nearby will know what is happening. Owning this drill is important to self-confidence and the success of working with ladders.

Standards and Competencies

FF 1.0 — Demonstrate general knowledge of heat, heat transfer, fires, firefighting equipment, firefighting procedures and NFPA standards to the Firefighting I curriculum by NFPA

1.1 Explain the principles of heat, heat transfer and fire
1.2 Explain the relationships between heat and fire
1.3 Identify commonly referenced NFPA standards
1.4 Describe each of the components of PPE
1.5 Explain the use and care of PPE
1.6 Describe the proper use of common fire-fighting equipment
1.7 State general safety rules and principles
1.8 Locate safety standards for firefighting
1.9 State general firefighting procedures

FF 2.0 — Don structural personal protective equipment within 60 seconds

2.1 Don trousers and boots
2.2 Don coat
2.3 Adjust hood over the head
2.4 Don helmet, adjust chin strap
2.5 Ensure that all fasteners, snaps, buckles, etc., are fastened

FF 3.0 — Tie ropes and knots used in firefighting situations to related *IFSTA Essential, fifth edition standards*

3.1 Tie figure-eight on a bight
3.2 Tie and hoist an axe or pike pole

FF 4.0 — Complete a stair climb required in firefighting situations to CPAT expectations

4.1 Climb stairs while carrying an additional 25 lb. simulated hose pack

FF 5.0 — Demonstrate ability to drag hoses as required at a fire scene to CPAT expectations

5.1 Stretch uncharged hose lines around obstacles
5.2 Advance lines

FF 6.0 — Demonstrate ability to carry equipment used at fire scene to CPAT expectations

6.1 Remove power tools from fire apparatus
6.2 Carry tools to fire scene and return to apparatus

FF 7.0 — Demonstrate procedures to raise and extend single and double ground ladders to CPAT expectations

7.1 Place a ground single ladder at the fire scene
7.2 Extend and lower fly section of a 24' extension ladder

FF 8.0 — Demonstrate ability to force entry into a structure to CPAT expectations

8.1 Penetrate a locked door
8.2 Breach a wall

FF 9.0 — Complete search functions at a simulated fire scene to CPAT expectations

9.1 Crawl through dark unpredictable areas to search for victims
9.2 Use standard right- or left-hand search pattern
9.3 Pause to listen for sounds of distress

FF 10.0 — Demonstrate skills for a rescue drag to CPAT expectations

10.1 Remove victim from a fire scene by dragging

FF 11.0 — Demonstrate procedures for opening a ceiling with provided pike pole to CPAT expectations

11.1 Push the pike pole or ceiling hook through the ceiling with the hook pointed away from self
11.2 Pull the ceiling down and away

Committee Identified Academic Skills

The technical committee has identified that the following academic skills are embedded in this contest.

Math Skills

- Use fractions to solve practical problems
- Use proportions and ratios to solve practical problems
- Measure angles
- Find surface area and perimeter of two-dimensional objects

Science Skills

- Plan and conduct a scientific investigation
- Describe basic needs of organisms
- Describe and identify physical changes to matter
- Use knowledge of heat, light and sound energy
- Use knowledge of temperature scales, heat and heat transfer
- Use knowledge of simple machines, compound machines, powered vehicles, rockets and restraining devices

Language Arts Skills

- Provide information in conversations and in group discussions
- Demonstrate use of such verbal communication skills as word choice, pitch, feeling, tone and voice
- Demonstrate use of such nonverbal communication skills as eye contact, posture and gestures using interviewing techniques to gain information

Connections to National Standards

State-level academic curriculum specialists identified the following connections to national academic standards.

Math Standards

- Geometry
- Measurement
- Problem solving
- Communication
- Connections
- Representation

Source: NCTM Principles and Standards for School Mathematics. For more information, visit: www.nctm.org.

Science Standards

- Understands forces and motion
- Understands the nature of scientific inquiry

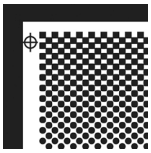
Source: McREL compendium of national science standards. To view and search the compendium, visit: http://www2.mcrel.org/compendium/browse.asp.

Language Arts Standards

- Students adjust their use of spoken, written and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes
- Students use spoken, written and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion, and the exchange of information)

Source: IRA/NCTE Standards for the English Language Arts. To view the standards, visit: www.ncte.org/standards.

GRAPHIC COMMUNICATIONS



PURPOSE
To evaluate each contestant's preparation for employment and to recognize outstanding students for excellence and professionalism in the field of graphic communications.

First, download and review the General Regulations at: http://updates.skillsusa.org.

CLOTHING REQUIREMENT
Class E: Contest specific — Business Casual
For men: Official SkillsUSA white polo shirt, black dress slacks, black socks, black leather shoes.
For women: Official SkillsUSA white polo shirt with black dress skirt (knee-length) or black slacks; black socks or black or skin-tone seamless hose; black leather dress shoes.

These regulations refer to clothing items that are pictured and described at: www.skillsusastore.org. If you have questions about clothing or other logo items, call 800-401-1560 or 703-956-3723.

Note: Contestants must wear their official contest clothing to the contest orientation meeting.

ELIGIBILITY
Open to active SkillsUSA members enrolled in programs with graphic communications as the occupational objective.

EQUIPMENT AND MATERIALS
1. Supplied by the technical committee:
   All equipment and materials used in the hands-on component of the contest
2. Supplied by the contestant:
   All competitors must create a one-page résumé and submit a hard copy to the technical committee chair at orientation. Failure to do so will result in a 10-point penalty.

   ***Note*:** Your contest may also require a hard copy of your résumé as part of the actual contest. Check the Contest Guidelines and/or the updates page on the SkillsUSA website: http://updates.skillsusa.org.

SCOPE OF THE CONTEST
This contest is related to competencies defined by the Graphic Arts Education and Research Foundation in PrintED competencies.

Knowledge Performance
The contest will include a written knowledge test. The test will consist of 100 items.

Skills Performance
The contest includes a series of testing stations designed to assess ability to perform identified competencies. Each year, the Graphic Communications technical committee defines contest stations.

Contest Guidelines
1. In accordance with the graphic communications industry, the contest consists of six unique but contributing performance stations:
   a. Digital workflow — the handling and checking of files prior to preflight to an output device.
   b. Electronic prepress — the re-creating of a created design using appropriate page layout software.
   c. Finishing — the operation of a paper cutter and tabletop folders according to instructions provided.
   d. Offset press operations — the handling of a prepared plate, mounting on a press and making all of the necessary adjustments to all of the press systems to include feeder, register, printing, inking, dampening and delivery. Also make necessary adjustments on placement of copy, and balancing of ink and water. Follow registration requirements.
   e. Oral professional assessment — the handling of an interview scenario requiring communications and deliberations with a professional flair and the ability to think on your feet.

f. Production planning — the solving of production problems related to paper and ink to include the different types of paper, basic sizes and weight; also ink characteristics and the determination of amounts of paper and ink needed, and the cost given certain specifications.

2. For equipment specifications, please check: updates.skillsusa.org.
3. As soon as the contestants have completed an assigned job and have fulfilled all the requirements on the rating sheet satisfactorily, they should notify a judge. The judges will gather the completed layout and answers for evaluation and scoring.

Standards and Competencies

GC 1.0 — Demonstrate competencies related to the digital workflow process to related PrintED competencies

1.1 Follow instructions on job ticket
- 1.1.1 Explain the nature and type of instruction relevant to this type of work
- 1.1.2 Determine all implications of the instructions on the steps that follow

1.2 Use page layout software
- 1.2.1 Use InDesign
- 1.2.2 Use QuarkXPress
- 1.2.3 Distinguish between the functionality of each page layout software

1.3 Check files in preparation for preflight
- 1.3.1 Describe the steps to be followed prior to preflight

1.4 Complete preflight procedures
- 1.4.1 Explain the process and concept of checking files to rip

1.5 Check and make necessary corrections to files prior to preflight
- 1.5.1 Apply the use of a checklist prior to preflight

1.6 Apply instructions for ripping of completed files
- 1.6.1 Explain terminology and directions prior to preflight

1.7 Demonstrate knowledge of the PMS color system

1.8 Demonstrate knowledge of type use in page layout design
- 1.8.1 Explain how type can affect design

1.9 Make adjustments when sending a job to an output device

1.10 Use InDesign in opening and exporting files to an output device
- 1.10.1 Describe the use of software in preflight and ripping

1.11 Use QuarkXPress in opening and exporting files to the output device
- 1.11.1 Describe the use of software in preflight and ripping

GC 2.0 — Demonstrate competencies related to electronic prepress processes to related PrintED competencies

2.1 Use page layout software, InDesign or QuarkXPress
- 2.1.1 Describe software functionality
- 2.1.2 Explain software use in page layout design

2.2 Follow instructions in designing page layout document
- 2.2.1 Define terms used in page layout
- 2.2.2 Apply instructions to an assigned work project

2.3 Import provided picture files
- 2.3.1 Explain considerations in the handling of pictures being imported to page layout

2.4 Import text files provided
- 2.4.1 Explain considerations in the handling of text being imported to page layout

2.5 Create colors for rules and headlines
- 2.5.1 Describe the procedures to add color to the page layout

2.6 Check for accuracy prior to saving a completed file
- 2.6.1 Explain the procedures for checking files before preflight

2.7 Save a completed file

GC 3.0 — Demonstrate competencies related to finishing processes to related PrintED competencies

3.1 Read instructions for use of tabletop folding equipment
- 3.1.1 Define terms used in folding procedures
- 3.1.2 Describe various folding procedures

3.2 Make adjustments on tabletop folder
- 3.2.1 Explain the components and functionality of the tabletop folder

3.3 Make adjustments for a letterfold
- 3.3.1 Describe the characteristics of a letterfold fold

3.4 Make adjustments for an accordion fold
- 3.4.1 Describe the characteristics of an accordion fold

3.5 Demonstrate knowledge of paper characteristics

GC 4.0 — Demonstrate competencies related to offset press operations processes to related PrintED competencies

4.1 Read job ticket instruction for job to be run on a press
- 4.1.1 Define terms used
- 4.1.2 Describe presswork procedures

4.2 Make necessary adjustments to a job in a given situation
- 4.2.1 Translate instructions into appropriate adjustments

4.3 Make adjustments in the feeder system
- 4.3.1 Explain the components and functionality of the feeder systems

4.4 Make adjustments in the register system
- 4.4.1 Explain the components and functionality of the register system

4.5 Make adjustments in the delivery system
- 4.5.1 Explain the components and functionality of the delivery system

4.6 Make adjustments in the inking system
- 4.6.1 Describe the characteristics of ink
- 4.6.2 Explain the components and functionality of the inking system

4.7 Make adjustments in the dampening system
- 4.7.1 Explain the components and functionality of the dampening system

4.8 Make adjustments in the printing system
- 4.8.1 Explain the components and functions of the printing system

4.9 Demonstrate understanding of paper handling procedures

4.10 Demonstrate knowledge of ink and water balance
- 4.10.1 Explain the theory of offset — ink and water do not mix

4.11 Demonstrate safe operations when running the press
- 4.11.1 Describe the safety implications of operating a press

4.12 Make necessary adjustments to comply with the job being printed in terms of color, placement and registration
- 4.12.1 Explain the overall offset press operations function

GC 5.0 — Demonstrate competencies related to production planning to related PrintED Competencies

5.1 Demonstrate knowledge of the characteristic of various types of paper, i.e., basic sizes, basis weight, etc.

5.2 Perform paper cutting problem solving
- 5.2.1 Describe the process to determine number out in paper use

5.3 Demonstrate knowledge of grain and how it affects run ability on the press and paper cutting

5.4 Demonstrate knowledge of inks: kinds and characteristics
- 5.4.1 Explain ink and its characteristics
- 5.4.2 Describe the composition of ink and its use in different processes
- 5.4.3 Perform ink consumption problems
- 5.4.4 Complete formulas and procedures to determine ink use

5.5 Determine total quantities of paper needed
- 5.5.1 Explain paper purchasing: pricing and quantities

5.6 Determine total quantity of ink needed
- 5.6.1 Describe ink use and ink requirements

5.7 Determine cost of paper and ink
- 5.7.1 Describe the process to determine total cost of ink and paper on a job

5.8 Make dummies for production planning purposes

GC 6.0 — Complete an oral professional assessment in a simulated customer situation

6.1 Perform customer service related activities when relating to a customer
  6.1.1 Explain the function of the customer service representative
6.2 Communicate professionally with technical knowledge
  6.2.1 Describe the workings of a production environment
  6.2.2 Explain the nature of work performed and requirements of customers
6.3 Respond quickly, accurately and professionally in a customer situation

Committee Identified Academic Skills

The technical committee has identified that the following academic skills are embedded in this contest.

Math Skills

- Use fractions to solve practical problems
- Simplify numerical expressions
- Solve practical problems involving percents
- Solve single variable algebraic expressions

Science Skills

None Identified

Language Arts Skills

- Provide information in conversations and in group discussions
- Provide information in oral presentations
- Demonstrate use of nonverbal communication skills: eye contact, posture and gestures using interviewing techniques to gain information
- Demonstrate knowledge of appropriate reference materials

Connections to National Standards

State-level academic curriculum specialists identified the following connections to national academic standards.

Math Standards

- Geometry
- Measurement
- Problem solving
- Communication
- Connections
- Representation

Source: NCTM Principles and Standards for School Mathematics. For more information, visit: http://www.nctm.org.

Science Standards

- Understands the structure and properties of matter
- Understands the sources and properties of energy
- Understands forces and motion
- Understands the nature of scientific inquiry

Source: McREL compendium of national science standards. To view and search the compendium, visit: http://www2.mcrel.org/compendium/browse.asp.

Language Arts Standards

- Students read a wide range of print and nonprint texts to build an understanding of texts, of themselves, and of the cultures of the United States and the world; to acquire new information; to respond to the needs and demands of society and the workplace; and for personal fulfillment. Among these texts are fiction and nonfiction, classic and contemporary works
- Students apply a wide range of strategies to comprehend, interpret, evaluate and appreciate texts. They draw on their prior experience, their interactions with other readers and writers, their knowledge of word meaning and of other texts, their word identification strategies and their understanding of textual features (e.g., sound-letter correspondence, sentence structure, context, and graphics)
- Students adjust their use of spoken, written and visual language (e.g., conventions, style, vocabulary) to communicate

effectively with a variety of audiences and for different purposes
- Students use a variety of technological and information resources (e.g., libraries, databases, computer networks and video) to gather and synthesize information and to create and communicate knowledge
- Students use spoken, written and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion and the exchange of information)

Source: IRA/NCTE Standards for the English Language Arts. To view the standards, visit: www.ncte.org/standards.

GRAPHIC IMAGING SUBLIMATION PRINTING

PURPOSE
To evaluate each contestant's preparation for employment and to recognize outstanding students for excellence and professionalism as a sublimation technician in the field of graphic imaging.

First, download and review the General Regulations at: http://updates.skillsusa.org.

ELIGIBILITY
Open to active SkillsUSA members enrolled in programs with graphic communications as the occupational objective.

CLOTHING REQUIREMENT
Class E: Contest specific — Business Casual
For men: Official SkillsUSA white polo shirt, black dress slacks, black socks, black leather shoes.
For women: Official SkillsUSA white polo shirt with black dress skirt (knee-length) or black slacks; black socks or black or skin-tone seamless hose; black leather dress shoes.

These regulations refer to clothing items that are pictured and described at: www.skillsusastore.org. If you have questions about clothing or other logo items, call 800-401-1560 or 703-956-3723.

Note: Contestants must wear their official contest clothing to the contest orientation meeting.

EQUIPMENT AND MATERIALS
The graphic imaging sublimation technical committee will supply all equipment and materials. Contestants are not required to furnish any materials or tools.

All competitors must create a one-page résumé using a word processor and have it available to give to the oral interview judge. Failure to do so will result in a 10-point penalty.

Note: Your contest may also require a hard copy of your résumé as part of the actual contest. Check the Contest Guidelines and/or the updates page on the SkillsUSA website: http://updates.skillsusa.org.

SCOPE OF THE CONTEST
The contest assesses knowledge and skills used by industries in the field of graphic imaging sublimation technology production processes.

Knowledge Performance
The knowledge contest will include a written exam assessing the general knowledge of graphic imaging sublimation technology processes. Written portions may be included during the skills portion of the contest. Knowledge of terms and principles used in graphic imaging sublimation processes will be required for the skill demonstration portion of the performance test.

Skills Performance
The skills performance test will include a demonstration of individual skills in producing graphic imaging sublimation products using equipment and technologies meeting graphic imaging sublimation industry standards. Some of the procedures to be demonstrated include, but are not limited to, printing on the following objects or materials: mugs, mouse pads, metal, glass, ceramic tiles, hardboard, polyester knit cloth, slate, fiber reinforced plastic, and pellons. A quality assessment will be performed on the product of each completed graphic imaging sublimation procedure.

Contest Guidelines
1. The competition will assess student participants' knowledge and skills of graphic imaging sublimation at some of the thirteen testing stations listed below:
    a. Design a digital image
    b. Print a transfer sheet using a sublimation printer

c. Print a graphic on mugs using a mug press
d. Print a graphic on mugs using a wrap and a convection oven
e. Print on a mouse pad
f. Print on a metal surface (license tag)
g. Print on a glass surface (cutting board)
h. Print on tiles (ceramic)
i. Print on hard board (basketball goal)
j. Print on polyester knit (t-shirt)
k. Print on stone (subli-slate)
l. Print on fiberglass reinforced plastic (FRP) signs
m. Print on pennant (car flag)
n. Take a written technical knowledge test
o. Participate in an oral professional assessment and submit a ~~resume~~ résumé to an interviewer.

2. For equipment specifications, check: updates.skillsusa.org.
3. As soon as the contestants have completed an assigned job and have fulfilled all the requirements presented at the testing station, they should notify the judge. The scorekeeper and judge will gather the contestant's product or worksheet for evaluation and scoring.

Standards and Competencies

GIS 1.0 — Digital Image Design

1.1 Set up computer operation
- 1.1.1 Open design software
- 1.1.2 Download digital images from the flash drive into "Contestant Folder" on the desktop
- 1.1.3 Save one photo image with proper naming convention for software being used. (Example: Contestant_101_Photo.psd) "X" is replaced with Contestant Badge Number.

1.2 Create Mosaic Tile design with design software
- 1.2.1 Reset all tools (to Essentials)
- 1.2.2 View Rulers in Inches
- 1.2.3 Create four (4.25" x 4.25") ceramic tiles in orientations of horizontal, vertical, or square design using CMYK at 300dpi
- 1.2.4 Save tile layout file, with proper naming convention for software being used. (Example: Contestant_101_Final Tile Design.psd) "X" is replaced with Contestant Badge Number
- 1.2.5 Place photo image from Contestant Folder
- 1.2.6 Place CMYK SkillsUSA Logo from the provided flash drive
- 1.2.7 Include required elements and techniques (each element on individual layer)
  - 1.2.7.1 Type one or more words with minimum size of 20-point font
  - 1.2.7.2 Use of Design Effects (minimum of three) such as:
    - Emboss
    - Drop shadow
    - Outer glow
    - Warp text
    - Pantone spot color (using the Pantone Spot Color to Process library)
    - Layer Mask
    - Reversed-out type
- 1.2.8 Save Contestant_X_Tile Design Final file to memory stick for printing station

GIS 2.0 — Print a transfer sheet using a sublimation printer

2.1 Set up and print a proofing file
- 2.1.1 Print mosaic tile to a regular color inkjet printer
  - 2.1.1.1 Adjust document size to allow contestant number to be printed in upper right hand corner
  - 2.1.1.2 Type "Contestant Number" in upper right hand corner of document
  - 2.1.1.3 Select "Landscape Orientation," "Center Image," and "Scale to Fit Media" to "Letter" size paper

2.1.1.4 Print and give proof copy to judge

2.2 Save tile segments into four separate files, named accordingly:
- 2.2.1 In Photoshop, "Save as a Copy" of file with layers unchecked in the "Print" dialogue box creating flattened image
- 2.2.2 In Illustrator, flatten layers, "Save a Copy" from the "File" menu

2.3 Use flattened *copy* of file for separating the four tile images

2.4 Select "Snap to Guides," add new vertical guides at 4¼", 8½" and 12¾"

2.5 Reposition important image parts away from tile breaks

2.6 Use image rotation to flip canvas horizontally

2.7 Select or Mask the 4¼" x 4 ¼" area of the first tile segment

2.8 Copy each selection and paste it to the four new files
- 2.8.1 Name each new file Tile_1 and consecutive files Tile_2, Tile_3 and Tile_4
- 2.8.2 Adjust each new file to accommodate a $^1/_{16}$" bleed (document size becomes 4.375")
  - 2.8.2.1 Photoshop: Change size in the Print dialogue box
  - 2.8.2.2 Illustrator: Change size in the Artboard dialogue box

2.9 Print individual tile segment documents on 8½" " x 11" from a sublimation printer

GIS 3.0 — Print a graphic on mugs using a mug press

3.1 Set up mug press for printing operation
- 3.1.1 Preheat mug press to 400 degrees
- 3.1.2 Set timer for 2 minutes 15 seconds
- 3.1.3 With the press open adjust the pressure setting to medium pressure

3.2 Print sublimation transfers on ceramic mug
- 3.2.1 Measure and cut the image transfer to fit the mug
- 3.2.2 Wrap the transfer around the mug and center
- 3.2.3 Tape the transfer to the mug with heat resistant tape
- 3.2.4 Place the mug in the press with the handle facing out
- 3.2.5 Close the press (the handle will lock into place when closed) to start the timer
- 3.2.6 Open the press when the timer sounds and remove the mug
- 3.2.7 Remove heat tape from transfer and peel paper from the mug
  - 3.2.7.1 Take care to avoid scratching the poly coating while the mug is hot
- 3.2.8 Stop dye sublimation by dipping mug in room temperature water (optional)

3.3 Evaluate image quality

3.4 Equipment clean up and work station housekeeping

GIS 4.0 — Print a graphic on mugs using a wrap and a convection oven

4.1 Set up convection oven for printing operation
- 4.1.1 Preheat convection oven to 400 degrees
- 4.1.2 Set timer for 11 seconds

4.2 Print sublimation transfers on ceramic mug
- 4.2.1 Prepare images, mugs and wraps
- 4.2.2 Crop the image transfer
- 4.2.3 Wrap the transfer around the mug and center
- 4.2.4 Tape the transfer to the mug with heat resistant tape
- 4.2.5 Place the mug on the wrap
  - 4.2.5.1 Hold wrap against the mug handle in correct position
  - 4.2.5.2 Wrap silicone rubber around the mug and secure properly
  - 4.2.5.3 Squeeze two halves of the mug wrap until it locks together
- 4.2.6 Place mug on the oven rack
- 4.2.7 Check timer setting and start timer for heating mug

4.2.8 On timer signal, remove mug from oven
4.2.9 Remove mug wrap and transfer
4.2.9.1 Place mug on table and release clasp
4.2.9.2 Remove heat tape from transfer and peel paper from mug
4.2.10 Stop dye sublimation by dipping mug in room temperature water (Optional)
4.3 Evaluate image quality
4.4 Equipment clean up and work station housekeeping

GIS 5.0 — Print on a mouse pad

5.1 Set up press for preprint operation
5.1.1 Preheat transfer press to 400 degrees
5.2 Pre-press the mouse pad. ***Note***: Section 5.2 pre-press is optional and may be omitted.
5.2.1 Set timer for 10 seconds
5.2.2 Adjust the press pressure
5.2.3 Place mouse pad on press and cover with a Teflon sheet
5.2.4 Press mouse pad to remove excess moisture
5.2.5 Remove mouse pad from press and lay on flat surface for cooling
5.3 Transfer the print to a mouse pad
5.3.1 Monitor the transfer press temperature (400 degrees fahrenheit or 205 degrees celsius)
5.3.2 Measure and cut the transfer to proper size to fit the mouse pad
5.3.3 Place the transfer onto the mouse pad in proper position
5.3.4 Use heat transfer tape to attach the mouse pad to the transfer
5.3.5 Place a Teflon sheet on the press
5.3.6 Put the mouse pad and the transfer on the press, transfer on top face down
5.3.7 Put another Teflon sheet on top of the transfer
5.3.8 Reset heat transfer press timer for 50 second dwell
5.3.9 Check heat transfer press temperature for 400 degrees
5.3.10 Press the mouse pad and transfer with medium pressure until the timer alarm sounds
5.3.11 Remove the transfer immediately after printing
5.3.12 Place mouse pad on counter and let it cool
5.4 Evaluate image quality related to resolution, definition and acutance
5.5 Equipment clean up and work station

GIS 6.0 — Print on a metal surface (license plate)

6.1 Set up heat press for printing operation
6.1.1 Preheat heat press to 400 degrees
6.1.2 Set timer for 1 minute 45 seconds
6.1.3 Adjust heat press for medium pressure
6.2 Print sublimation transfers on metal (license plate)
6.2.1 Remove the protective film from the license tag
6.2.2 Place license plate face up on a table and position transfer face down atop license plate
6.2.3 Tape transfer and license plate together
6.2.4 Place Teflon sheet on heat press lower platen
6.2.5 Place another Teflon sheet atop license plate and transfer
6.2.6 Check heat press timer for 1 minute 45 seconds dwell
6.2.7 Check heat press temperature for 400 degrees
6.2.8 Close the heat press
6.2.9 Press mouse pad and transfer until the timer alarm sounds
6.2.10 Open the heat press
6.2.11 Remove top Teflon sheet
6.2.12 Remove tape and peel transfer from license plate
6.2.13 Place license plate on a table and allow it to cool
6.3 Evaluate image quality
6.4 Equipment clean up and work station housekeeping

GIS 7.0 — Print on a glass surface (cutting board)

7.1 Set up heat press for preprint operation
- 7.1.1 Preheat heat press to 400 degrees
- 7.1.2 Set timer for 9 minutes
- 7.1.3 Adjust heat press medium pressure to avoid breaking the glass cutting board

7.2 Print image on a glass cutting board
- 7.2.1 Measure and cut the image transfer to fit the glass cutting board
- 7.2.2 Position transfer and cutting board on the heat press
  - 7.2.2.1 Place transfer face down on the cutting board face
- 7.2.3 Apply heat resistant tape to hold transfer and cutting board in position
- 7.2.4 Place a ½" to ¾" Nomex felt pad on heat press lower platen
- 7.2.5 Place a Teflon sheet on felt pad
- 7.2.6 Place the cutting board face up on Teflon sheet
- 7.2.7 Place transfer face down on cutting board
- 7.2.8 Place a second Teflon sheet atop the transfer and cutting board
- 7.2.9 Check press temperature for 400 degrees and timer for approximately 9 minutes
- 7.2.10 Check press setting for medium pressure
- 7.2.11 Close the heat press
- 7.2.12 Press cutting board and transfer until the timer alarm sounds.
- 7.2.13 Open the heat press, wearing gloves
  Note: The 400 degree heat press, transfer paper and cutting board will burn hands
- 7.2.14 Remove top Teflon sheet
- 7.2.15 Remove the glass cutting board from heat press
- 7.2.16 Remove heat resistant tape and peel transfer paper from glass cutting board
- 7.2.17 Place glass cutting board on a cool smooth surface and let it air cool

7.3 Evaluate image quality

7.4 Equipment clean up and work station housekeeping

GIS 8.0 — Print on tiles (ceramic)

8.1 Set up press for preprint operation
- 8.1.1 Preheat heat press to 400 degrees
- 8.1.2 Set timer for 8 minutes
- 8.1.3 Adjust the press for medium pressure

8.2 Print sublimation transfers on tiles (ceramic)
- 8.2.1 Measure and cut image transfer to fit tile
- 8.2.2 Position transfer and tile on the heat press
  - 8.2.2.1 Place transfer face down on the tile face
- 8.2.3 Apply heat resistant tape to hold the sublimation transfer and tile in position
- 8.2.4 Place a ½" to ¾" Nomex felt pad on bottom platen of heat press
- 8.2.5 Place a piece of protective Teflon sheet atop Nomex pad
- 8.2.6 Place tile face up on Teflon sheet
  Note: Transfer image will be taped to the tile face to face
- 8.2.7 Place a second Teflon sheet atop the transfer and tile
- 8.2.8 Check heat press timer for an 8-minute dwell
- 8.2.9 Check heat press temperature for 400 degrees
- 8.2.10 Close the heat press
- 8.2.11 Press tile and transfer until the timer alarm sounds
- 8.2.12 Open the heat press, wearing gloves
  Note: The 400-degree heat press, transfer paper and tile will bum hands
- 8.2.13 Remove top Teflon sheet
- 8.2.14 Remove heat resistant tape and peel transfer paper from tile
- 8.2.15 Place tile on a cool smooth surface and let it air cool

8.3 Evaluate image quality.

8.4 Equipment clean up and work station housekeeping

GIS 9.0 — Print on hard board (game boards)

9.1 Set up press for preprint operation
- 9.1.1 Preheat heat press to 400 degrees
- 9.1.2 Set timer for approximately 1-minute
- 9.1.3 Adjust the press for medium pressure

9.2 Print sublimation transfers on Hard Board (Game boards)
- 9.2.1 Measure and cut the image transfer to fit the hard board
- 9.2.2 Place the sublimation transfer on the table face up
- 9.2.3 Place the hard boards face down onto transfer and center it in all directions
- 9.2.4 Place heat tape to hold sublimation transfer and hard board together
- 9.2.5 Place a ½" to ¾" Nomex felt pad on bottom platen of heat press
- 9.2.6 Place a piece of protective Teflon sheet atop Nomex pad
- 9.2.7 Place hard board face up on the Teflon sheet
  Note: Transfer image will be taped to the hard board face to face
- 9.2.8 Place a second Teflon sheet atop the transfer and hard board
- 9.2.9 Check heat press timer for a 1-minute dwell
- 9.2.10 Check heat press temperature for 400 degrees
- 9.2.11 Close the heat press
- 9.2.12 Press tile and transfer until the timer alarm sounds.
- 9.2.13 Open the heat press, wearing gloves
  Note: The 400-degree heat press, transfer paper and tile will bum hands
- 9.2.14 Remove top Teflon sheet
- 9.2.15 Remove heat resistant tape and peel transfer paper from tile
- 9.2.16 Place the hard board on a cool surface and let it air cool

9.3 Evaluate image quality

9.4 Equipment clean up and work station housekeeping

GIS 10.0 — Print on polyester knit (t-shirt)

10.1 Set up press for preprint operation
- 10.1.1 Preheat heat press to 400 degrees
- 10.1.2 Set timer for approximately 10 seconds
- 10.1.3 Adjust the press for medium pressure

10.2 Pre-press polyester t-shirt. ***Note*:** Section 8.2 pre-press is optional and may be omitted
- 10.2.1 Use lint roller to remove dust and lint
- 10.2.2 Place Teflon sheet on the lower platen of heat press
- 10.2.3 Place shirt on heat press with a second Teflon sheet between shirt back and front
- 10.2.4 Press for 10 seconds at 400 degrees with medium pressure
- 10.2.5 Allow shirt to cool before positioning transfer

10.3 Print sublimation transfers on T-shirt
- 10.3.1 Trim excess edges from transfer
- 10.3.2 Place Teflon sheet on the lower platen of heat press
- 10.3.3 Place shirt on heat press with a second Teflon sheet between front and back of shirt
- 10.3.4 Position transfer face down on shirt, within vertical tolerance below the shirt collar
- 10.3.5 Use heat transfer tape to attach the transfer to shirt
- 10.3.6 Place Teflon sheet on top of transfer
- 10.3.7 Reset heat transfer press timer for 55-second dwell
- 10.3.8 Check heat transfer press temperature for 400 degrees
- 10.3.9 Close the heat press
- 10.3.10 Press shirt and transfer until the timer alarm sounds
- 10.3.11 Open the press
- 10.3.12 Remove the Teflon sheets
- 10.3.13 Remove tape and peel transfer paper from shirt promptly

10.4 Evaluate image quality

10.5 Equipment clean up and work station housekeeping

GIS 11.0 — Print on stone (Subli-state)

11.1 Set up press for preprint operation
- 11.1.1 Preheat heat press to 400 degrees
- 11.1.2 Set timer for approximately 1 minute 20 seconds
- 11.1.3 Adjust the press for medium pressure

11.2 Print sublimation transfers on stone (Subli-slate)
- 11.2.1 Measure and cut image transfer to fit stone
- 11.2.2 Position transfer and stone on the heat press
  - 11.2.2.1 Place transfer face down on the stone face
- 11.2.3 Apply heat resistant tape to hold the sublimation transfer and stone in position
- 11.2.4 Place a ½" to ¾" Nomex felt pad on bottom platen of heat press
- 11.2.5 Place a piece of protective Teflon sheet atop Nomex pad
- 11.2.6 Place stone face up on Teflon sheet
  Note: Transfer image will be taped to the stone face to face
- 11.2.7 Place a second Teflon sheet atop the transfer and stone
- 11.2.8 Check heat press timer for a 1 minute 20 seconds dwell
- 11.2.9 Check heat press temperature for 400 degrees
- 11.2.10 Close the heat press
- 11.2.11 Press stone and transfer until the timer alarm sounds
- 11.2.12 Open the heat press, wearing gloves
  Note: The 400-degree heat press, transfer paper and stone will bum hands
- 11.2.13 Remove top Teflon sheet
- 11.2.14 Remove heat resistant tape and peel transfer paper from stone
- 11.2.15 Place stone on a cool smooth surface and let it air cool

11.3 Evaluate image quality

11.4 Equipment clean up and work station housekeeping

GIS 12.0 — Print on stone (Subli-state)

12.1 Set up press for preprint operation
- 12.1.1 Preheat heat press to 400 degrees
- 12.1.2 Set timer for approximately 1 minute 45 seconds
- 12.1.3 Adjust the press for medium pressure

12.2 Print sublimation transfers on Fiberglass Reinforced Plastic (FRP) materials
- 12.2.1 Remove from the FRP sign blank's protective film
- 12.2.2 Place the transfer face up on work station table
- 12.2.3 Center the FRP sign blank to be printed on in all directions
- 12.2.4 Tape the FRP sign blank to be printed to the transfer
- 12.2.5 Place a Teflon sheet on the lower platen of heat press
- 12.2.6 Place the transfer face up on the Teflon sheet
- 12.2.7 Place the FRP sign blank on the transfer followed by a second sheet of Teflon
- 12.2.8 Check heat press timer for a 1 minute 45-second dwell
- 12.2.9 Check heat press temperature for 400 degrees
- 12.2.10 Close the heat press
- 12.2.11 Remove Teflon and transfer from the FRP sign blank, which has a transferred image
- 12.2.12 Place the FRP sign on a cool surface and let it air cool

12.3 Evaluate image quality

12.4 Equipment clean up and work station housekeeping

GIS 13.0 — Print on pennant or car flag

13.1 Set up press for preprint operation
- 13.1.1 Preheat transfer heat press to 400 degrees
- 13.1.2 Set timer for approximately 45 seconds
- 13.1.3 Adjust the press for medium pressure

13.2 Transfer an image to a pennant or car flag
- 13.2.1 Measure and cut the transfer to proper size to fit car flag
- 13.2.2 Accurately position a transfer onto a car flag blank

13.2.3 Place a Teflon sheet on the press
13.2.4 Put car flag and transfer on the heat press, transfer on top face down
13.2.5 Put another Teflon sheet on top of the transfer and car flag
13.2.6 Check heat transfer press timer for 45-second dwell
13.2.7 Check heat transfer press temperature for 400 degrees
13.2.8 Close the heat press
13.2.9 Press car flag and transfer with medium pressure
13.2.10 Open the heat press when the timer alarm sounds
13.2.11 Remove Teflon sheet off and peel transfer paper from car flag immediately.
13.2.12 Place car flag on counter and let it cool

13.3 Evaluate image quality
13.4 Equipment clean up and work station housekeeping

GIS 14.0 — Take a written technical knowledge test

14.1 Match various types of sublimation printing equipment to their function
14.2 Measure an image with a ruler and find the vertical center line of the image
14.3 Achieve a score of 70 percent or greater on the written exam

GIS 15.0 — Participate in an oral professional assessment

15.1 Submit a one-page, typewritten résumé to an interviewer
15.2 Respond positively to questions related to the five areas that follow:
15.2.1 Describe personal ability to handle job assignments
15.2.2 Demonstrate ability to answer questions in technical terms
15.2.3 Explain how to handle workplace situations in a professional manner
15.2.4 Demonstrate critical thinking during the oral interview
15.2.5 Present a realistic self concept

Committee Identified Academic Skills

The technical committee has identified that the following academic skills are embedded in this contest.

Math Skills

- Read a ruler (inch system, metric system, point/pica system)
- Use fractions to solve practical problems
- Use percentages multiplied times formula for inks mixing
- Simplify numerical expressions
- Solve practical problems involving percents
- Solve single variable algebraic expressions
- Calculations for image preparation (calculate proportional scaling solutions of two designs from artwork to garment, demonstrate ability to square and center an image during graphic imaging sublimation process)

Science Skills

None Identified

Language Arts Skills

- Provide information in conversations and in group discussions
- Provide information in oral presentations
- Demonstrate use of nonverbal communication skills: eye contact, posture and gestures using interviewing techniques to gain information
- Demonstrate knowledge of appropriate reference materials

Connections to National Standards

State-level academic curriculum specialists identified the following connections to national academic standards.

Math Standards

- Geometry
- Measurement
- Problem solving
- Communication
- Connections
- Representation

Source: NCTM Principles and Standards for School Mathematics. For more information, visit: www.nctm.org.

Science Standards

- Understands the structure and properties of matter
- Understands the sources and properties of energy
- Understands forces and motion
- Understands the nature of scientific inquiry

Source: McREL compendium of national science standards. To view and search the compendium, visit: http://www2.mcrel.org/compendium/browse.asp.

Language Arts Standards

- Students read a wide range of print and nonprint texts to build an understanding of texts, of themselves, and of the cultures of the United States and the world; to acquire new information; to respond to the needs and demands of society and the workplace; and for personal fulfillment. Among these texts are fiction and nonfiction, classic and contemporary works
- Students apply a wide range of strategies to comprehend, interpret, evaluate and appreciate texts. They draw on their prior experience, their interactions with other readers and writers, their knowledge of word meaning and of other texts, their word identification strategies and their understanding of textual features (e.g., sound-letter correspondence, sentence structure, context, and graphics)
- Students adjust their use of spoken, written and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes
- Students use a variety of technological and information resources (e.g., libraries, databases, computer networks and video) to gather and synthesize information and to create and communicate knowledge
- Students use spoken, written and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion and the exchange of information)

Source: IRA/NCTE Standards for the English Language Arts. To view the standards, visit: www.ncte.org/standards.

HEATING, VENTILATION, AIR CONDITIONING AND REFRIGERATION (HVACR)

PURPOSE
To evaluate contestants' preparation for employment and recognize outstanding students for excellence and professionalism in heating, ventilation, air conditioning and refrigeration.

First, download and review the General Regulations at: http://updates.skillsusa.org.

ELIGIBILITY
Open to active SkillsUSA members enrolled in programs with heating, ventilation, air conditioning and refrigeration as the occupational objective.

CLOTHING REQUIREMENT
Class C: Contest Specific — Manufacturing/Construction Khaki Attire
For both men and women: Official SkillsUSA khaki work shirt and pants; black, brown, or tan leather work shoes; safety glasses with side shields or goggles (prescription glasses may be used, only if they are equipped with side shields. If not, they must be covered with goggles).

These regulations refer to clothing items that are pictured and described at: www.skillsusastore.org. If you have questions about clothing or other logo items, call 800-401-1560 or 703-956-3723.

Note: Contestants must wear their official contest clothing to the contest orientation meeting.

EQUIPMENT AND MATERIALS
1. Supplied by the technical committee:
   a. All heating, refrigeration and air conditioning units necessary for the problem
   b. Power supply for units
   c. Test equipment
   d. All tools and supplies to complete the contest
   e. All necessary information and material for judges and technical committee
2. Supplied by the contestant:
   a. Safety goggles
   b. Hand-held, nonprogrammable calculator for the contestant meeting as well as for the contest. Cellphone calculators are not permitted.
   c. All competitors must create a one-page résumé and submit a hard copy to the technical committee chair at orientation. Failure to do so will result in a 10-point penalty.

   Note: Your contest may also require a hard copy of your résumé as part of the actual contest. Check the Contest Guidelines and/or the updates page on the SkillsUSA website: http://updates.skillsusa.org.

SCOPE OF THE CONTEST
This contest is defined by industry standards as set by the Air-Conditioning and Refrigeration Institute and the North American Technician Excellence (NATE) organization. The contest is divided into two parts: a written exam and a series of testing stations designed to assess knowledge in HVACR industry standards.

Knowledge Performance
The contest will include a written knowledge exam assessing knowledge of HVACR industry standards. The written test will be taken at orientation.

Skill Performance
The contest includes a series of testing stations designed to assess skills identified by industry HVACR standards. Industry equipment used during the workstations portion of the contest may include but is not limited to: ice machines, refrigerated display cases, small package HVAC

units, furnaces and split-system air conditioning and/or heat pump units.

Standards and Competencies

HVAC 1.0 — Demonstrate safety skills in typical HVACR work situations

1.1 Demonstrate safe practices when working in electrical control panels and electric supply devices
- 1.1.1 Demonstrate how to turn off power
- 1.1.2 Describe the purpose of lockout/tag-out devices
- 1.1.3 Demonstrate use of lockout/tag-out devices
- 1.1.4 Use electrically insulated tools suitable for the voltage involved

1.2 Use appropriate safety apparel for the task being performed
- 1.2.1 Wear appropriate safety glasses, gloves, work shoes, etc., for a given situation

1.3 Demonstrate safety when using brazing torches
- 1.3.1 Demonstrate correct procedure for connecting torch equipment including regulators, tanks, hose, torch and tips
- 1.3.2 Light torch using proper procedure and safe practice
- 1.3.3 Demonstrate safe practice when using open flame heating equipment
- 1.3.4 Extinguish torch flame using proper procedure and safe practice
- 1.3.5 Check for unsafe conditions such as cracked hoses, safety ring caps, damaged gauges, dented tanks and leaks
- 1.3.6 Explain the "never use oil" rule with regard to brazing torches

1.4 Demonstrate the safe use of electric test meter
- 1.4.1 Set meter for the test being performed
- 1.4.2 Hold meter leads with one hand when practical or use clip-on test lead

1.5 Demonstrate the safe handling of pressurized gases
- 1.5.1 Ensure valves are properly closed prior to removing attached hoses/caps
- 1.5.2 Show caution when removing attached components under pressure
- 1.5.3 Ensure that pressure vessels are not overfilled

HVAC 2.0 — Exhibit employment skills (Personal ethics and conduct and interpersonal relations)

2.1 Complete job application and résumé
- 2.1.1 Complete all questions on application
- 2.1.2 Compose concise professional résumé

2.2 Demonstrate interview skills
- 2.2.1 Smile, make eye contact with interviewer and speak up

2.3 Prepare correspondence related to employment process
- 2.3.1 Use proper grammar
- 2.3.2 Ensure spelling is correct

2.4 Exhibit personal skills such as attendance, time management, individual responsibility and teamwork
- 2.4.1 Provide references for confirming these skills

2.5 Maintain professional conduct and appearance
- 2.5.1 Demonstrate polite, attentive attitude
- 2.5.2 Wear neat, clean clothing and be well groomed

HVAC 3.0 — Demonstrate basic refrigeration skills

3.1 Explain the refrigeration cycle
- 3.1.1 Describe the refrigeration cycle and refrigerant circuits
- 3.1.2 Demonstrate knowledge of refrigerant flow, state of refrigerant in various parts of the circuit, superheat, sub cooling and the refrigerant pressure/temperature relationship

3.2 Evacuate a refrigeration system
- 3.2.1 Describe the procedure
- 3.2.2 Demonstrate the procedure

3.3 Pump down a refrigeration system
- 3.3.1 Describe the procedure
- 3.3.2 Demonstrate the procedure

3.4 Recover refrigerant from system and store in external container using self-contained recovery equipment
- 3.4.1 Describe the procedure
- 3.4.2 Demonstrate the procedure
- 3.4.3 Calculate the maximum capacity of a refrigerant cylinder
- 3.4.4 Demonstrate the correct refrigerant cylinder handling procedures

3.5 Check and troubleshoot a refrigerant metering device
- 3.5.1 Explain thermostatic expansion valve operation
- 3.5.2 Explain fixed orifice operation
- 3.5.3 Explain superheat measurement
- 3.5.4 Take a superheat measurement

3.6 Check a refrigeration system for leaks
- 3.6.1 Explain leak checking during evacuation
- 3.6.2 Demonstrate leak checking during evacuation
- 3.6.3 Explain leak checking of a charged system
- 3.6.4 Demonstrate leak checking of a charged system

3.7 Charge a refrigeration system
- 3.7.1 Read and interpret the equipment manufacturer's charging procedure
- 3.7.2 Follow manufacturer's charging procedure

3.8 Identify refrigerant type
- 3.8.1 Use a pressure/temperature chart to identify refrigerant type

HVAC 4.0 — Demonstrate electric knowledge and skills necessary for HVACR situations

4.1 Explain basic principles of electricity
- 4.1.1 Describe how electricity is generated and distributed to residences and businesses
- 4.1.2 Explain the interaction of voltage, resistance and current flow
- 4.1.3 Describe how transformers change voltage
- 4.1.4 Explain the importance of grounding electrical circuits

4.2 Explain the principle of electric circuits
- 4.2.1 Describe the components of an electric circuit including switches, loads and connectors
- 4.2.2 Define the function of various elements of an electric circuit; resistors, capacitors, contactors, motors, relays, fuses, circuit breakers, time delays, timers, etc.

4.3 Read and interpret wiring diagrams
- 4.3.1 Interpret basic types of diagrams: pictorial, schematic and ladder
- 4.3.2 Explain the use for each type
- 4.3.3 Describe electrical symbols
- 4.3.4 Identify individual circuits within the entire diagram

4.4 Diagnose electrical problems
- 4.4.1 Demonstrate the proper use of a multi-meter test instrument
- 4.4.2 Demonstrate the proper places within the circuit to measure electricity
- 4.4.3 Interpret and explain meter readings in relationship to a reported problem

HVAC 5.0 — Install, diagnose and service HVACR controls and control components

5.1 Install and replace a temperature control, a pressure control and a solid-state control

5.2 Calibrate and adjust a temperature control

5.3 Adjust a pressure control

5.4 Install, replace and adjust a defrost control

5.5 Install and service electrical components

5.6 Install, disconnect switch and circuit wiring

5.7 Install wiring from disconnect switch to equipment

5.8 Install and replace an electric motor

5.9 Install and replace electric contactor, current/potential relay, transformer, electric motor, capacitor, solenoid valve coil and circuit board
- 5.9.1 Explain the purpose of the control component
- 5.9.2 Describe the procedure to check out the control or control component
- 5.9.3 Describe the procedure to install or service the control or control component

HVAC 6.0 — Install and service mechanical components

6.1 Install and replace a compressor
- 6.1.1 Isolate compressor from refrigeration system
- 6.1.2 Remove refrigerant pressure
- 6.1.3 Remove compressor from refrigeration system
- 6.1.4 Use correct brazing procedure to prevent copper oxidation

6.2 Install and replace evaporators and condensers
- 6.2.1 Explain purpose of each
- 6.2.2 Describe operation of each
- 6.2.3 Measure superheat and sub cooling
- 6.2.4 Clean condenser and evaporator

6.3 Install and replace a filter/drier/cleanup kit, refrigerant metering device, solenoid valve body, sight-glass/moisture indicator and head pressure control
- 6.3.1 Explain the purpose of the component
- 6.3.2 Describe the procedure to install or service the component
- 6.3.3 Isolate component from refrigerant circuit prior to removal/service
- 6.3.4 Use procedures to prevent moisture contamination

6.4 Install and replace refrigerant piping
- 6.4.1 Cut, swage, flare, bend and braze steel, brass aluminum or copper tubing and fittings
- 6.4.2 Identify correct applications of different types of brazing filler metals and fluxes
- 6.4.3 Demonstrate correct preparation of materials
- 6.4.4 Demonstrate correct brazing procedures including the use of nitrogen to prevent copper oxidation
- 6.4.5 Complete project that matches a given plan

6.5 Install and replace a manifold gauge set
- 6.5.1 Explain operation of manifold gauge
- 6.5.2 Identify use of each of the various pressure measurements — absolute, gauge, inches mercury, microns
- 6.5.3 Calibrate manifold gauge

HVAC 7.0 — Diagnose and repair common problems in refrigeration systems according to applicable requirements identified by the Refrigeration Service Engineers Society

7.1 Diagnose electrical problems in self-contained refrigerated merchandisers
- 7.1.1 Use a schematic diagram to trace circuits in equipment
- 7.1.2 Diagnose problems in single-phase motor circuit
- 7.1.3 Diagnose merchandiser lighting problems

7.2 Diagnose refrigeration problems in self-contained refrigerated merchandisers
- 7.2.1 Determine reason for frosted evaporator
- 7.2.2 Explain defrost cycles

7.3 Diagnose air flow problems
- 7.3.1 Check and clean air passages
- 7.3.2 Check and clean evaporator
- 7.3.3 Check/replace evaporator fan
- 7.3.4 Diagnose air pattern disturbances

7.4 Diagnose flooded evaporator drain pan
- 7.4.1 Check condensate drain line for blockage
- 7.4.2 Explain principles of condensate traps including their application to evaporators mounted in the inlet or outlet of the system blower

7.5 Install and replace a plastic pipe
- 7.5.1 Preparation materials
- 7.5.2 Demonstrate correct gluing procedure

HVAC 8.0 — Diagnose and solve common problems related to air conditioners and heat pumps

8.1 Troubleshoot a refrigerant circuit
- 8.1.1 Explain the refrigerant circuit and its operation
- 8.1.2 Demonstrate a systematic approach to diagnosing the cause of an incorrect operation

8.2 Troubleshoot an electrical circuit
- 8.2.1 Explain the electrical circuit and its operation
- 8.2.2 Demonstrate a systematic approach to diagnosing the cause of an incorrect operation

8.3 Test a control thermostat, fuse, capacitor, compressor motor, electric motor and refrigerant metering device
- 8.3.1 Describe the purpose of each component

8.3.2 Explain the operation of each component
8.3.3 State the proper test methods for each component
8.3.4 Test each component

8.4 Inspect a condensate pump and drain, blower assembly and filter
8.4.1 Explain the function of component
8.4.2 Demonstrate inspection procedure

8.5 Check refrigerant charge
8.5.1 Read and interpret the equipment manufacturer's procedure for checking charge
8.5.2 Check charge to stated procedure

8.6 Check superheat
8.6.1 Explain the function of refrigeration superheat
8.6.2 Demonstrate the procedure to check superheat

8.7 Check sub cooling
8.7.1 Explain the function of refrigeration sub cooling
8.7.2 Demonstrate proper procedure to check sub cooling

8.8 Check wet-bulb depression
8.8.1 Explain wet-bulb depression
8.8.2 Define the difference from dry-bulb temperature
8.8.3 Demonstrate procedure to check wet-bulb depression

HVAC 9.0 — Install and service general heating systems

9.1 Install furnace or blower coil with electric auxiliary heat
9.1.1 Read and interpret the manufacturer's installation instructions
9.1.2 Explain the applicable codes
9.1.3 Demonstrate procedures

9.2 Explain operation of the system
9.2.1 Describe the sequence of operation
9.2.2 Explain the safety controls

9.3 Service electronic controls, timing devices, sensing devices and solid-state control boards
9.3.1 Describe the function of the component
9.3.2 Demonstrate test procedure
9.3.3 Demonstrate adjustment procedure

9.4 Troubleshoot and service various electrical capacitors, relays, contractors, motors, controls, heaters and transformers
9.4.1 Describe the function of the component
9.4.2 Demonstrate test procedure for each

9.5 Check and adjust gas furnace
9.5.1 Demonstrate gas leak checking procedure
9.5.2 Check line pressure, manifold pressure and firing rate
9.5.3 Explain the principles of gas venting
9.5.4 Explain the effects of altitude on furnace operation and steps needed during setup to compensate

9.6 Check and adjust electric heat section in coil blower
9.6.1 Explain operation of electric heat elements
9.6.2 Explain operation of electric heat sequencers
9.6.3 Explain operation of limits, fusible links and other safety devices
9.6.4 Check voltage and amperage draw of electric elements

9.7 Service blower in a forced-air system
9.7.1 Explain operation of blower including: correct rotation, blower housing and cutoff plate
9.7.2 Describe relationship between system static pressure, air flow and temperature rise

9.8 Clean and inspect a heating system

9.9 Measure air flow of air handling apparatus
9.9.1 Explain the various measurement methods

HVAC 10.0 — Install and service an air conditioner or heat pump system with auxiliary electric

10.1 Install an air conditioner or heat pump system
10.1.1 Read and interpret the manufacturer's installation instructions
10.1.2 Describe the applicable codes

10.1.3 Demonstrate knowledge of the necessary steps for correct installation

10.2 Explain the operation of the system
- 10.2.1 Explain the sequence of operation
- 10.2.2 State the purpose of safety controls and their operation

10.3 Service electronic controls, timing devices, sensing devices and solid-state control boards
- 10.3.1 Describe the function of the component
- 10.3.2 Demonstrate test procedure
- 10.3.3 Demonstrate adjustment procedure

10.4 Troubleshoot and service various electrical capacitors, relays, contractors, motors, controls, heaters and transformers
- 10.4.1 Describe the function of the component
- 10.4.2 Demonstrate test procedure
- 10.4.3 Demonstrate adjustment procedure

10.5 Troubleshoot and service various refrigeration components including reversing valves, check/expansion valves and shutoff valves
- 10.5.1 Describe the function of the component
- 10.5.2 Demonstrate test procedure
- 10.5.3 Demonstrate adjustment procedure

HVACR 11.0 — Use basic construction designs in HVACR situations

11.1 Read and interpret basic construction designs for piping/plumbing layouts, room specifications, roofs, ceilings, walls, floors, girders, trusses and duct layout

Committee Identified Academic Skills

The technical committee has identified that the following academic skills are embedded in this contest.

Math Skills

- Use fractions to solve practical problems
- Use proportions and ratios to solve practical problems
- Simplify numerical expressions
- Solve practical problems involving percentages
- Solve single variable algebraic expressions
- Measure angles
- Find surface area and perimeter of two-dimensional objects
- Find volume and surface area of three-dimensional objects
- Apply transformations (rotate or turn, reflect or flip, translate or slide, and dilate or scale) to geometric figures
- Apply Pythagorean Theorem
- Solve problems using proportions, formulas and functions

Science Skills

- Plan and conduct a scientific investigation
- Use knowledge of the particle theory of matter
- Describe and recognize solids, liquids and gases
- Use knowledge of physical properties (shape, density, solubility, odor, melting point, boiling point, color)
- Use knowledge of chemical properties (acidity, basicity, combustibility and reactivity)
- Understand the modern model of atomic structure
- Describe phases of matter
- Describe and identify physical changes to matter
- Predict chemical changes to matter (types of reactions, reactants, and products; and balanced equations)
- Use knowledge of potential and kinetic energy
- Use knowledge of mechanical, chemical and electrical energy
- Use knowledge of heat, light and sound energy
- Use knowledge of temperature scales, heat and heat transfer

- Use knowledge of sound and technological applications of sound waves
- Use knowledge of the nature and technological applications of light
- Use knowledge of speed, velocity and acceleration
- Use knowledge of Newton's laws of motion
- Use knowledge of work, force, mechanical advantage, efficiency and power
- Use knowledge of principles of electricity and magnetism
- Use knowledge of static electricity, current electricity and circuits
- Use knowledge of magnetic fields and electromagnets
- Use knowledge of motors and generators

Language Arts Skills

- Provide information in conversations and in group discussions
- Provide information in oral presentations
- Demonstrate use of such verbal communication skills as word choice, pitch, feeling, tone and voice
- Demonstrate use of such nonverbal communication skills as eye contact, posture, and gestures using interviewing techniques to gain information
- Demonstrate comprehension of a variety of informational texts
- Understand source, viewpoint and purpose of texts
- Demonstrate knowledge of appropriate reference materials
- Use print, electronic databases, and online resources to access information in books and articles
- Demonstrate informational writing
- Edit writing for correct grammar, capitalization, punctuation, spelling, sentence structure and paragraphing

Connections to National Standards

State-level academic curriculum specialists identified the following connections to national academic standards.

Math Standards

- Numbers and operations
- Algebra
- Geometry
- Measurement
- Data analysis and probability
- Problem solving
- Reasoning and proof
- Communication
- Connections
- Representation

Source: NCTM Principles and Standards for School Mathematics. For more information, visit: www.nctm.org.

Science Standards

- Understands the structure and properties of matter
- Understands the sources and properties of energy
- Understands forces and motion
- Understands the nature of scientific inquiry

Source: McREL compendium of national science standards. To view and search the compendium, visit: http://www2.mcrel.org/compendium/browse.asp.

Language Arts Standards

- Students read a wide range of print and non-print texts to build an understanding of texts, of themselves, and of the cultures of the United States and the world; to acquire new information; to respond to the needs and demands of society and the workplace; and for personal fulfillment. Among these texts are fiction and nonfiction, classic and contemporary works
- Students apply a wide range of strategies to comprehend, interpret, evaluate and appreciate texts. They draw on their prior experience, their interactions with other readers and writers, their knowledge of word meaning and of other texts, their word identification strategies, and their understanding of textual features (e.g., sound-letter correspondence, sentence structure, context, graphics)
- Students adjust their use of spoken, written and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes
- Students employ a wide range of strategies as they write and use different writing process elements appropriately to communicate with different audiences for a variety of purposes
- Students apply knowledge of language structure, language conventions (e.g.,

spelling and punctuation), media techniques, figurative language, and genre to create, critique and discuss print and nonprint texts
- Students use spoken, written and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion, and the exchange of information)

Source: IRA/NCTE Standards for the English Language Arts. To view the standards, visit: www.ncte.org/standards.

INDUSTRIAL MOTOR CONTROL

PURPOSE
To evaluate each contestant's preparation for employment and to recognize outstanding students for excellence and professionalism in the field of industrial motor controls.

First, download and review the General Regulations at: http://updates.skillsusa.org.

ELIGIBILITY
Open to active SkillsUSA members enrolled in programs with industrial motor control as the occupational objective.

CLOTHING REQUIREMENT
Class C: Contest Specific — Manufacturing/Construction Khaki Attire
For both men and women: Official SkillsUSA khaki work shirt and pants; black, brown, or tan leather work shoes; safety glasses with side shields or goggles (prescription glasses may be used, only if they are equipped with side shields. If not, they must be covered with goggles).

These regulations refer to clothing items that are pictured and described at: www.skillsusastore.org. If you have questions about clothing or other logo items, call 800-401-1560 or 703-956-3723.

EQUIPMENT AND MATERIALS
1. Supplied by the technical committee:
   a. All wiring panels, electrical supplies and materials as required by the problem assigned
2. Supplied by the contestant:
   a. Diagonal pliers
   b. Sidecutters
   c. Long-nose pliers
   d. Pump pliers
   e. Wire strippers
   f. Knife
   g. Assorted flat blade and Phillips screwdrivers
   h. 8' folding rule
   i. 12' (or longer) measuring tape
   j. Electrician's hammer
   k. Hacksaw
   l. Torpedo level
   m. Electrical tape and connectors
   n. Crimping tools
   o. ½" EMT conduit bender
   p. Multimeter
   q. Latest edition of the National Electrical Code as of the January prior to the SkillsUSA Championships
   r. Supplies for drawing ladder diagram (pencil, straightedge, etc.)
   s. Calculator
   t. All competitors must create a one-page résumé and submit a hard copy to the technical committee chair at orientation. Failure to do so will result in a 10-point penalty.

Note: Your contest may also require a hard copy of your résumé as part of the actual contest. Check the Contest Guidelines and/or the updates page on the SkillsUSA website: http://updates.skillsusa.org.

SCOPE OF THE CONTEST
The contest is defined by manufacturer and customer specifications, industry practice, federal regulations and industry standards such as the National Electrical Code. The contest is divided into three parts: a written portion, an oral interview, and a series of testing stations designed to demonstrate knowledge of manufacturer and customer specifications, industry practice, federal regulations and industry standards as well as the ability to apply both that knowledge and manual proficiency in applying and installing electrical wiring methods and equipment.

Knowledge Performance
The contest will include a written knowledge exam that will be administered during the contestants' meeting.

The contest will also include written descriptions of required electrical installations and/or job sheets with schematic diagrams and accompanying requirements for wiring an

industrial motor control installation. The purpose will be to select and install the wiring methods, devices and equipment to complete the specified installation. All work must conform to the specifications of the latest edition of the National Electrical Code as of the January prior to the SkillsUSA Championships.

Skill Performance

The contest will include a series of testing stations designed to test the ability to perform jobs or skills selected from the following list of competencies as determined by the SkillsUSA Championships technical committee.

Standards and Competencies

MOTR 1.0 — Demonstrate knowledge/application of basic academic, physical and employability skills

- 1.1 Demonstrate ability to read and comprehend
  - 1.1.1 Explain the meaning of safety rules and signs
  - 1.1.2 Summarize instruction sheets for tools and equipment
  - 1.1.3 Explain technical documents, codes and standards, customer and manufacturer instructions, and specifications
  - 1.1.4 Use graphs, charts and diagrams
- 1.2 Demonstrate ability to perform basic mathematical operations necessary to the occupation
  - 1.2.1 Perform addition, subtraction, multiplication and division of whole numbers, fractions, decimals, mixed numbers, ratios and percentages
  - 1.2.2 Convert square units and English and metric units
  - 1.2.3 Perform direct measurements of objects and distances
  - 1.2.4 Use basic algebra, calculate degrees and angles, and compute area and volume
  - 1.2.5 Read, interpret and perform math operations based on word problems
- 1.3 Use verbal, written and nonverbal communication skills
  - 1.3.1 Explain and use verbal instructions and warnings
  - 1.3.2 Communicate orally with others
  - 1.3.3 Communicate in writing with others
- 1.4 Demonstrate physical ability through the installation and operation of equipment
  - 1.4.1 Ensure ability to hear warning signals
  - 1.4.2 Verify ability to distinguish colors
  - 1.4.3 Maintain, balance and perform construction activities while on a ladder
  - 1.4.4 Use both hands to manipulate small objects and wires
  - 1.4.5 Operate two-handed power equipment
  - 1.4.6 Lift and carry objects up to 50 pounds
  - 1.4.7 Reach and stretch to position equipment while maintaining balance
- 1.5 Implement employability skills and workplace attributes to work independently and with a team
  - 1.5.1 Apply ability to be self-motivated, responsible and dependable without close supervision
  - 1.5.2 Demonstrate the ability to work smoothly with others as a team
  - 1.5.3 Demonstrate ability to remain calm in emergency situations
  - 1.5.4 Maintain good working relationships with others in a work setting
  - 1.5.5 Develop alternate solutions and choose the best alternative
  - 1.5.6 Plan and organize tasks to meet deadlines
  - 1.5.7 Implement the ability to supervise and monitor others

MOTR 2.0 — Follow OSHA rules and safety regulations to ensure job site and equipment safety

- 2.1 Apply job site and shop rules and regulations (OSHA)
- 2.2 Select and use electrical and hand tools correctly
- 2.3 Perform proper techniques and practices for working on and around live equipment
- 2.4 Apply knowledge of proper grounding methods

MOTR 3.0 — Apply knowledge of the National Electric Code

3.1 Read and interpret the National Electrical Code
3.2 Demonstrate ability to apply National Electrical Code requirements

MOTR 4.0 — Interpret and draw wiring and ladder diagrams

4.1 Draw wiring diagrams and ladder diagrams
4.2 Interpret wiring diagrams and ladder diagrams
4.3 Read and understand customer job specifications

MOTR 5.0 — Read and interpret written and oral customer and manufacturer specifications/instructions

MOTR 6.0 — Perform electrical calculations including sizing of circuits and conductors, and calculate conduit fill

6.1 Size branch circuit conductors
6.2 Size feeder conductors
6.3 Size control conductors
6.4 Size overcurrent protection for branch circuit
6.5 Size overcurrent protection for feeder circuit
6.6 Size overloads protection
6.7 Calculate conduit fill

MOTR 7.0 — Select materials and equipment to meet customer needs

7.1 Select materials and equipment based on manufacturer and customer specifications/instructions, wiring and ladder diagrams, calculations, and applicable codes and standards

MOTR 8.0 — Select and use hand, electrical and cutting tools properly

8.1 Demonstrate dexterity and proper use of hand tools
8.2 Demonstrate the ability to properly select and use electrical ohmmeters and volt-ohmmeters
8.3 Select and properly use special equipment (conduit benders, KO punches, etc.)
8.4 Properly select and operate electrical power tools
8.5 Properly select and use conduit cutting and reaming equipment

MOTR 9.0 — Lay out components on mounting boards based upon customer specifications

MOTR 10.0 — Select and install proper wiring methods, boxes and enclosures

10.1 Select the proper wiring methods, boxes and enclosures based on manufacturer and customer specifications, wiring/ladder diagrams and applicable codes and standards
10.2 Install the selected wiring methods
10.3 Mount boxes and enclosures according to manufacturer and customer specifications and instructions, federal regulations, and applicable codes and standards
10.4 Bend and install raceways using the proper tools and supplies

MOTR 11.0 — Demonstrate the ability to properly install and connect devices and equipment

11.1 Install and connect disconnect switches
11.2 Install and connect push buttons
11.3 Install and connect selector switches
11.4 Install and connect indicator lights
11.5 Install and connect limit switches
11.6 Install and connect control transformers
11.7 Install and connect control relays
11.8 Install and connect timing relays (all types)
11.9 Install and connect contractors
11.10 Install and connect motor starters
11.11 Install and connect photoelectric switches
11.12 Install and connect temperature control
11.13 Install and connect counters
11.14 Install and connect overload relays
11.15 Install and connect solid-state motor starters
11.16 Install, connect, and properly wire a dual-voltage motor
11.17 Install and connect reversing motor starters
11.18 Install and connect press-to-test pilot lights

MOTR 12.0 — Troubleshoot and repair power and control circuits

12.1 Use a wiring diagram or ladder diagram, and an electrical multimeter
12.2 Demonstrate the ability to troubleshoot a fault in either a power or control circuit

MOTR 13.0 — Complete necessary job tickets, reports and as-built drawings

13.1 Demonstrate the ability to prepare necessary job tickets, reports and as-built drawings as directed by your supervisor

Committee Identified Academic Skills

The technical committee has identified that the following academic skills are embedded in this contest.

Math Skills

- Use fractions to solve practical problems
- Use proportions and ratios to solve practical problems
- Simplify numerical expressions
- Use scientific notation
- Solve practical problems involving percents
- Solve single variable algebraic expressions
- Measure angles
- Find surface area and perimeter of two-dimensional objects
- Find volume and surface area of three-dimensional objects
- Construct three-dimensional models
- Apply Pythagorean Theorem
- Solve problems using proportions, formulas and functions
- Use laws of exponents to perform operations

Science Skills

- Use knowledge of work, force, mechanical advantage, efficiency and power
- Use knowledge of simple machines, compound machines, powered vehicles, rockets and restraining devices
- Use knowledge of principles of electricity and magnetism
- Use knowledge of static electricity, current electricity and circuits
- Use knowledge of magnetic fields and electromagnets
- Use knowledge of motors and generators

Language Arts Skills

- Provide information in conversations and in group discussions
- Demonstrate use of such verbal communication skills as word choice, pitch, feeling, tone and voice
- Demonstrate use of such nonverbal communication skills as eye contact, posture and gestures using interviewing techniques to gain information
- Demonstrate comprehension of a variety of informational texts
- Use text structures to aid comprehension
- Identify words and phrases that signal an author's organizational pattern to aid comprehension
- Demonstrate knowledge of appropriate reference materials
- Use print, electronic databases and online resources to access information in books and articles

Connections to National Standards

State-level academic curriculum specialists identified the following connections to national academic standards.

Math Standards

- Numbers and operations
- Algebra
- Geometry
- Measurement
- Data analysis and probability
- Problem solving
- Communication
- Connections
- Representation

Source: NCTM Principles and Standards for School Mathematics. For more information, visit: www.nctm.org.

Science Standards

- Understands the structure and properties of matter
- Understands the sources and properties of energy
- Understands forces and motion
- Understands the nature of scientific inquiry

Source: McREL compendium of national science standards. To view and search the compendium, visit: http://www2.mcrel.org/compendium/browse.asp.

Language Arts Standards

- Students read a wide range of print and nonprint texts to build an understanding of texts, of themselves, and of the cultures of the United States and the world; to acquire new information; to respond to the needs and demands of society and the workplace; and for personal fulfillment. Among these texts are fiction and nonfiction, classic and contemporary works
- Students apply a wide range of strategies to comprehend, interpret, evaluate and appreciate texts. They draw on their prior experience, their interactions with other readers and writers, their knowledge of word meaning and of other texts, their word identification strategies, and their understanding of textual features (e.g., sound-letter correspondence, sentence structure, context, graphics)
- Students adjust their use of spoken, written and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes
- Students employ a wide range of strategies as they write and use different writing process elements appropriately to communicate with different audiences for a variety of purposes
- Students apply knowledge of language structure, language conventions (e.g., spelling and punctuation), media techniques, figurative language and genre to create, critique, and discuss print and nonprint texts
- Students conduct research on issues and interests by generating ideas and questions, and by posing problems. They gather, evaluate and synthesize data from a variety of sources (e.g., print and nonprint texts, artifacts, people) to communicate their discoveries in ways that suit their purpose and audience
- Students use a variety of technological and information resources (e.g., libraries, databases, computer networks, video) to gather and synthesize information and to create and communicate knowledge
- Students use spoken, written and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion, and the exchange of information)

Source: IRA/NCTE Standards for the English Language Arts. To view the standards, visit: www.ncte.org/standards.

INFORMATION TECHNOLOGY SERVICES

PURPOSE

The Information Technology Services contest is established to evaluate each contestant's preparation for employment and to recognize outstanding students for excellence and professionalism in the field of information technology.

For the national contest, please review contest updates at http://updates.skillsusa.org. For state or local contests, please check with your SkillsUSA leadership for updates.

ELIGIBILITY

Open to active SkillsUSA members enrolled in programs focused on computer maintenance technology, computer networking and security, or information technology services.

CLOTHING REQUIREMENT

Class E: Contest specific — Business Casual

For men: Official SkillsUSA white polo shirt, black dress slacks, black socks, black leather shoes.
For women: Official SkillsUSA white polo shirt with black dress skirt (knee-length) or black slacks; black socks or black or skin-tone seamless hose; black leather dress shoes.

These regulations refer to clothing items that are pictured and described at: www.skillsusastore.org. If you have questions about clothing or other logo items, call 800-401-1560 or 703-956-3723.

Note: Contestants must wear their official contest clothing to the contest orientation meeting.

EQUIPMENT AND MATERIALS

1. Required materials supplied by the contest/technical committee:
   a. All schematics, diagrams and manuals required for modules within contest.
   b. Internet white-paper documents or reference material if required for a module (determined solely by the technical committee)
2. Required materials supplied by the contestant:
   a. Pencils/writing utensils
   b. A one-page résumé, which will be submitted during the contest briefing
3. Other Materials (Please check contest updates to determine if required/ encouraged/discouraged/prohibited)
   a. Basic hand tools suited for accessibility to a device, such as screwdrivers, needle-nose pliers, etc.
   b. Anti-static wrist strap with alligator clip end.
   c. Diagnostic software or malware detection/removal software. The contestant must bring proof that the software is released as "Open Source". A list of permitted "Open Source" licenses can be found at (https://opensource.org/licenses)
   d. Contestants may use standard technical data reference books such as those that include BIOS codes, HDD parameters, etc. Books intended for use as a classroom text will not be permitted
   e. State contests may require you to "bring your own machine" — the contestant will be required to bring a network-ready computer that can run virtualization software. Please check with your state contest updates to determine exact requirements.

***Note*:** Your contest may also require a hard copy of your résumé as part of the actual contest. Check the Contest Guidelines and/or the updates page on the SkillsUSA website: http://updates.skillsusa.org.

SCOPE OF THE CONTEST

The contest is defined by industry standards based off elements of the CompTIA A+ certification, specifically the 1001 and 1002 versions. The contest also has elements from the CompTIA Network+ and Security+ certifications, as well as industry trends as collected by the national technical committee.

Knowledge Performance

This portion of the contest will be a computer-based knowledge exam. Competencies evaluated on the written exam are congruent with those evaluated on the 1001 and 1002 versions of the CompTIA A+ Certification exam.

Skill Performance

This portion of the contest will be a series of modules through which each contestant will rotate on a fixed time schedule to troubleshoot or complete tasks with client, server or end user computing issues.

Contest Guidelines

1. The contests will have several hands-on skill scenarios that demonstrate a contestant's entry-level employment skills selected from the list of competencies as determined by the SkillsUSA Championships technical committee. Scenarios may include but are not limited to the following:
    a. Diagnose and service client issues with their relation to network interaction
    b. Diagnose and resolve operating system and startup problems
    c. Demonstrate ability to use utility software, drives and other peripherals
    d. Demonstrate knowledge and functions of components within a computer
    e. Install, configure and demonstrate proper operations of devices including desktop, laptop, tablets and mobile devices
    f. Demonstrate ability to create, manage and operate virtual machines
    g. Demonstrate ability to remotely connect to and manage customer end points
    h. Demonstrate ability to configure, interconnect and secure networks
    i. Demonstrate interpersonal and customer service skills using service order management systems, service requests and statements of work while interacting in both consumer, consulting and corporate practices
    j. Demonstrate a working knowledge of information technology employment policies and observance of security best practices
    k. Demonstrate an ability to use PowerShell, Linux/Bash, and Windows command-line skills.

Contest Scoring

1. Contestants will be awarded points based on their ability to solve problems or complete tasks within the allotted time. Partial points may be awarded for solving partial problems.
2. Winners will be determined on the basis of their total scores
3. Penalties will be assessed for failure to follow a judge's or modules instructions

Standards and Competencies

ITS 1.0 — Perform maintenance on systems and components

1.1 Identify the fundamental principles of using computing devices
    1.1.1 Identify the names, purposes and characteristics of storage devices
    1.1.2 Identify the names, purposes and characteristics of motherboards
    1.1.3 Identify the names, purposes and characteristics of power supplies
    1.1.4 Identify the names purposes and characteristics of processor/CPUs
    1.1.5 Identify the names, purposes and characteristics of memory
    1.1.6 Identify the names, purposes and characteristics of display devices
    1.1.7 Identify the names, purposes and characteristics of input devices
    1.1.8 Identify the names, purposes and characteristics of adapter cards
    1.1.9 Identify the names, purposes and characteristics of ports and cables
    1.1.10 Identify the names, purposes and characteristics of cooling systems

1.2 Install, configure, optimize and upgrade system components
    1.2.1 Add, remove and configure internal and external storage devices
    1.2.2 Install and configure graphical display devices
    1.2.3 Add, remove and configure basic input and multimedia devices

1.3 Identify tools, diagnostic procedures and troubleshooting techniques for systems and components
- 1.3.1 Recognize the basic aspects of troubleshooting
- 1.3.2 Identify and apply basic diagnostic procedures and troubleshooting techniques
- 1.3.3 Recognize and isolate issues with display, power, basic input devices, storage, memory, thermal, POST errors, peripherals, multimedia, specialty input devices, internal and external storage and CPUs
- 1.3.4 Apply basic troubleshooting techniques to check for problems (e.g., thermal issues, error codes, power and connections including cables and/or pins, compatibility, functionality, software/drivers) with components
- 1.3.5 Recognize the names, purposes, characteristics and appropriate application of tools, for example: BIOS, self-test, hard drive self-test and software diagnostics test
- 1.3.6 Identify the steps used to troubleshoot components (e.g., check proper seating, installation, appropriate components, settings and current driver)
- 1.3.7 Recognize names, purposes, characteristics and appropriate application of tools

1.4 Perform preventative maintenance on personal computer components
- 1.4.1 Identify and apply basic aspects of preventative maintenance theory
- 1.4.2 Identify and apply common preventive maintenance techniques for devices such as input devices and batteries

ITS 2.0 — Perform maintenance procedures on laptops and mobile devices

2.1 Identify the fundamental principles of using laptops, tablets and mobile devices
- 2.1.1 Identify names, purposes and characteristics of laptop-specific devices
- 2.1.2 Identify and distinguish between mobile and desktop motherboards and processors including throttling, power management and Wi-Fi
- 2.1.3 Identify appropriate applications for laptop-specific communication connections such as Bluetooth, infrared, cellular WAN and Ethernet
- 2.1.4 Identify appropriate laptop-specific power and electrical input devices and determine how amperage and voltage can affect performance
- 2.1.5 Identify the major components of the LCD including inverter, screen and video card

2.2 Install, configure, optimize and upgrade laptops and portable devices
- 2.2.1 Configure power management
- 2.2.2 Demonstrate safe removal of laptop-specific hardware such as peripherals, hot-swappable devices and non-hot-swappable devices
- 2.2.3 Remove laptop-specific hardware such as peripherals, hot-swappable and non-hot-swappable devices
- 2.2.4 Describe how video sharing affects memory upgrades

2.3 Identify tools, basic diagnostic procedures and troubleshooting techniques for laptops and mobile devices
- 2.3.1 Use procedures and techniques to diagnose power conditions, video, keyboard, pointer and wireless card issues
- 2.3.2 Use tools, diagnostic procedures and troubleshooting techniques for laptops and mobile devices
- 2.3.3 Use procedures and techniques to diagnose power conditions, video, keyboard, pointer and wireless card issues

2.4 Perform preventative maintenance on laptops and portable devices
- 2.4.1 Identify and apply common preventive maintenance techniques for laptops and mobile devices, for example: cooling devices, hardware and

video cleaning materials, operating environments including temperature and air quality, storage, transportation and shipping

ITS 3.0 — Manage operating systems

3.1 Identify the fundamentals of using operating systems
- 3.1.1 Identify differences between operating systems (e.g., Mac, Windows and Linux) and describe operating system revision levels including GUI, system requirements, application and hardware compatibility
- 3.1.2 Identify names, purposes and characteristics of the primary operating system components including registry, virtual memory and file system
- 3.1.3 Describe features of operating system interfaces
- 3.1.4 Identify the names, locations, purposes and characteristics of operating system files
- 3.1.5 Identify concepts and procedures for creating, viewing and managing disks, directories and files in operating systems
- 3.1.6 Use command-line functions and utilities to manage operating systems, including proper syntax and switches
- 3.1.7 Locate and use operating system utilities and available switches
- 3.1.8 Describe the purposes, functions and deployment methods with regard to operating system life cycles

3.2 Install, configure, optimize and upgrade operating systems
- 3.2.1 Identify procedures for installing and optimizing operating systems
- 3.2.2 Identify procedures for upgrading operating systems
- 3.2.3 Install/add a device including loading, adding device drivers and required software
- 3.2.4 Identify procedures and utilities used to optimize operating systems for example, virtual memory, hard drives, temporary files, service, startup and applications
- 3.2.5 Be able to manage Microsoft Windows 8, Windows 10, Macintosh OSX, and POSIX based linux distributions

3.3 Identify tools, diagnostic procedures and troubleshooting techniques for operating systems
- 3.3.1 Identify basic boot sequences, methods and utilities for recovering operating systems
- 3.3.2 Identify and apply diagnostic procedures and troubleshooting techniques
- 3.3.3 Recognize and resolve common operational issues such as blue screen, system lock-up, input/output device, application install, start or load and Windows-specific printing problems (e.g., print spool stalled, incorrect/incompatible driver for printer)
- 3.3.4 Explain common error messages and codes
- 3.3.5 Identify the names, locations, purposes and characteristics of operating system utilities
- 3.3.6 Demonstrate the ability to recover operating systems (e.g., boot methods, recovery console, ASR, ERD)
- 3.3.7 Use diagnostic utilities and tools to resolve operational problems

3.4 Perform preventative maintenance on operating systems
- 3.4.1 Describe common utilities for performing preventative maintenance on operating systems; for example, software and Windows updates (e.g., service packs), scheduled backups/restore and restore points
- 3.4.2 Demonstrate the ability to perform preventative maintenance on operating systems including software and Windows updates (e.g., service packs), scheduled backups/restore and restore points

3.4.3 Describe purpose and benefits of cloud storage and backups

ITS 4.0 — Install and configure printers and scanners successfully

4.1 Identify the fundamental principles of using printers and scanners
- 4.1.1 Identify differences between types of printer and scanner technologies
- 4.1.2 Identify names, purposes and characteristics of printer and scanner components and consumables
- 4.1.3 Identify the names, purposes and characteristics of interfaces used by printers and scanners including port and cable types
- 4.1.4 Describe processes used by printers and scanners including laser, ink dispersion, thermal, solid ink and impact printers and scanners

4.2 Identify basic concepts of installing, configuring, optimizing and upgrading printers and scanners
- 4.2.1 Install and configure printers/scanners
- 4.2.2 Optimize printer performance; for example, printer settings such as tray switching, print spool settings, media types and paper orientation, resolution, file format and default settings
- 4.2.3 Optimize scanning devices using proper calibration and resolution settings

4.3 Identify tools, basic diagnostic procedures and troubleshooting techniques for printers and scanners
- 4.3.1 Gather information about printer/scanner problems
- 4.3.2 Review and analyze collected data
- 4.3.3 Identify solutions to identified printer/scanner problems
- 4.3.4 Isolate and resolve an identified printer/scanner problem including defining the cause, applying the fix and verifying functionality
- 4.3.5 Identify appropriate tools used for troubleshooting and repairing printer/scanner problems

ITS 5.0 — Apply knowledge of networking and security principles to install, configure, optimize, upgrade, troubleshoot and secure networks

5.1 Identify the fundamental principles of networks
- 5.1.1 Describe basic networking concepts
- 5.1.2 Identify names, purposes and characteristics of the common network cables
- 5.1.3 Identify names, purposes and characteristics of network connectors
- 5.1.4 Identify names, purposes and characteristics of technologies for establishing connectivity
- 5.1.5 Identify names, purposes and characteristics of basic network protocols and terminologies
- 5.1.6 Identify names, purposes and functions of the OSI seven-layer model
- 5.1.7 Identify names, purposes and functions of the TCP/IP four-layer model
- 5.1.8 Compare and contrast the functions of the OSI seven-layer model with functions of the TCP/IP four-layer model
- 5.1.9 Identify names, purposes and characteristics of network topologies

5.2 Install, configure, optimize and upgrade networks
- 5.2.1 Install and configure bare metal or virtual network interfaces
- 5.2.2 Install, identify and obtain wired and wireless connections
- 5.2.3 Install, configure and secure Internet browsers
- 5.2.4 Establish network connectivity with bare metal or virtual interfaces
- 5.2.5 Demonstrate the ability to share network resources

5.2.6 Demonstrate the ability to identify interfaces by media access control address (MAC), TCP/IP address and Address Resolution Protocol (ARP
5.2.7 Demonstrate the ability to optimize networks by identifying and correcting poor performance
5.2.8 Describe the functions and purposes of static and dynamic addressing
5.2.9 Demonstrate the ability to determine number of network hosts through the process of subnetting
5.2.10 Demonstrate the process of improving network performance by separating network traffic

5.3 Identify tools, diagnostic procedures and troubleshooting techniques for networks
5.3.1 Explain status indicators, for example: speed, connection and activity lights and wireless signal strength
5.3.2 Identify names, purposes and characteristics of tools used to troubleshoot physical layer network issues
5.3.3 Diagnose and troubleshoot basic network issues using commands in Windows CLI, Windows PowerShell, Linux Bash, and/or Cisco IOS,
5.3.4 Diagnose and troubleshoot basic network issues by identifying network scope and misconfigurations

5.4 Apply measures to secure networks
5.4.1 Describe the purpose and functions of network address translations (NAT)
5.4.2 Describe the purpose and functions of access lists (ACL)
5.4.3 Describe the purpose and functions of authentication, authorization, and accounting framework (AAA)
5.4.4 Describe secure methods required to connect to network devices
5.4.5 Describe additional security measures taken to secure devices such as virtual terminal connections and timeouts

ITS 6.0 — Provide security measures for systems

6.1 Identify the fundamental principles of security
6.1.1 Identify names, purposes and characteristics of hardware and software security
6.1.2 Identify names, purposes and characteristics of wireless security
6.1.3 Identify names, purposes and characteristics of data and physical security
6.1.4 Describe importance and process of incidence reporting
6.1.5 Describe importance and process of forensics
6.1.6 Contrast the processes of incidence reporting versus forensics
6.1.7 Recognize and respond appropriately to social engineering situations
6.1.8 Identify the purposes and characteristics of access control
6.1.9 Identify the purposes and characteristics of auditing and event logging
6.1.10 Contrast the sequences of security processes and determine when they are relevant
6.1.11 Describe the process of risk management
6.1.12 Describe the purpose and methods related to sandbox testing
6.1.13 Outline the importance of employee education on protecting information and data through policy compliance

6.2 Install, configure, upgrade and optimize security
6.2.1 Install, configure, upgrade and optimize hardware, software and data security
6.2.2 Install and configure software, wireless and data security

6.3 Identify tool, diagnostic procedures and troubleshooting techniques for security
6.3.1 Diagnose and troubleshoot hardware, software and data security issues
6.3.2 Diagnose and troubleshoot software and data security issues

6.4 Perform preventative maintenance for computer security
- 6.4.1 Implement software security preventative maintenance techniques such as installing service packs and software patches
- 6.4.2 Implement software security measures for protecting systems against malware and viruses
- 6.4.3 Describe and identify the purpose of scan settings including real-time, scheduled and on-demand scanning and demonstrate when each method is required
- 6.4.4 Demonstrate file and folder level scanning exclusions versus the operational requirements of applications
- 6.4.5 Demonstrate the ability to configure software or hardware firewall settings based on port, service and application
- 6.4.6 Demonstrate the ability to configure software or hardware firewall settings based on MAC or IP filtering
- 6.4.7 Identify resources to safely inspect files and URLs
- 6.4.8 Demonstrate containment methods when a virus or malware has been introduced and is propagating in a networked environment
- 6.4.9 Demonstrate training of users with regard to malicious software prevention technologies

ITS 7.0 — Apply awareness of safety and environmental concerns surrounding information technology

7.1 Describe the aspects and importance of safety and environmental issues
- 7.1.1 Identify potential safety hazards and take preventative action
- 7.1.2 Use Material Safety Data Sheets (MSDS) or equivalent documentation and appropriate equipment documentation
- 7.1.3 Use appropriate repair tools
- 7.1.4 Describe methods to handle environmental and human (e.g., electrical, chemical, physical) accidents including incident reporting

7.2 Identify potential hazards and implement proper safety procedures including ESD precautions and procedures, safe work environment and equipment handling

7.3 Identify proper disposal procedures for batteries, display devices and chemical solvents and cans

ITS 8.0 — Display communication and professionalism while working in information technology

8.1 Use good communication skills, including listening and tact/discretion, when communicating with customers and colleagues
- 8.1.1 Use clear, concise and direct statements
- 8.1.2 Allow the customer to complete statements — avoid interrupting
- 8.1.3 Clarify customer statements — ask pertinent questions
- 8.1.4 Avoid using jargon, abbreviations and acronyms
- 8.1.5 Listen to customers

8.2 Use job-related professional behavior including notation of privacy, confidentiality and respect for the customer and customer's property
- 8.2.1 Identify workplace policies in regard to the protection of customer or personal information
- 8.2.2 Identify workplace policies in regard handling of inappropriate content or material
- 8.2.3 Identify workplace policies in regard to safeguarding data with end-of-lifecycle technology
- 8.2.4 Identify workplace policies in regard to electronic communications in workplace and in personal settings
- 8.2.5 Identify workplace policies in regard to distribution of company information internal to company operations
- 8.2.6 Identify workplace policies in regard to use of wireless communication

8.3 Use job-related workplace behavior when servicing customers in regard to:
- 8.3.1 Verifying customer or employee identification

8.3.2 Resetting customer or employee credentials
8.3.3 Protecting customer or employee data
8.3.4 Identifying and defining the security risks associated with the use of an external product or service
8.3.5 Verify source of information and/or trusted material
8.3.6 Providing information in electronic format

Committee Identified Academic Skills

The technical committee has identified that the following academic skills are embedded in this contest.

Math Skills

- Use scientific notation

Science Skills

- Use knowledge of mechanical, chemical and electrical energy
- Use knowledge of temperature scales, heat and heat transfer
- Use knowledge of work, force, mechanical advantage, efficiency and power
- Use knowledge of principles of electricity and magnetism
- Use knowledge of static electricity, current electricity and circuits
- Use knowledge of signal frequencies and baud rate
- Use knowledge of communication modes (full/half duplex)

Language Arts Skills

- Organize and synthesize information for use in written and oral presentations
- Demonstrate knowledge of appropriate reference materials

Connections to National Standards

State-level academic curriculum specialists identified the following connections to national academic standards.

Math Standards

- Algebra
- Data analysis and probability
- Problem solving
- Reasoning and proof
- Communication
- Connections
- Representation

Source: NCTM Principles and Standards for School Mathematics. For more information, visit: *www.nctm.org.*

Science Standards

- Understands relationships among organisms and their physical environment
- Understands the sources and properties of energy
- Understands forces and motion
- Understands the nature of scientific inquiry

Source: McREL compendium of national science standards. To view and search the compendium, visit: http://www2.mcrel.org/compendium/browse.asp.

Language Arts Standards

- Students apply a wide range of strategies to comprehend, interpret, evaluate and appreciate texts. They draw on their prior experience, their interactions with other readers and writers, their knowledge of word meaning and of other texts, their word identification strategies and their understanding of textual features (e.g., sound-letter correspondence, sentence structure, context, graphics)
- Students adjust their use of spoken, written and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes
- Students use spoken, written and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion and the exchange of information)

Source: IRA/NCTE Standards for the English Language Arts. To view the standards, visit: www.ncte.org/standards/ncte-ira.

Interactive Application and Video Game Creation

Purpose

To evaluate each contestant's preparation for employment and to recognize outstanding students for excellence and professionalism in the field of interactive application and video game creation.

First, download and review the General Regulations at: http://updates.skillsusa.org/.

Eligibility

Open to a team of two active SkillsUSA members enrolled in programs focused on creating interactive applications and/or video game design and development as occupational objectives. Up to four addition students from the same school and program may assist the team, as long as they are properly credited per the instructions below in Sections 2c and 2g.

Clothing Requirement

For men: Official SkillsUSA white polo shirt with black dress slacks, black socks and black dress shoes.
For women: Official SkillsUSA white polo shirt with black dress slacks or skirt, black socks or black or skin-toned seamless hose and black dress shoes. Blazers optional.

These regulations refer to clothing items that are pictured and described at: www.skillsusastore.org. If you have questions about clothing or other logo items, call 800-401-1560 or 703-956-3723.

Note: Contestants must wear their official contest clothing to the contest orientation meeting and on contest day.

Equipment and Materials

1. Supplied by the technical committee:
   a. Space for team prototypes. Each team will be allotted a minimum of either one six-foot (6') or one half of an eight-foot (8') conference table, based on availability, and two chairs to share among team members
   b. A 110-volt electrical outlet
   c. Written knowledge exam and pencils

   ***Note*:** No Internet access will be provided or allowed during the competition.

2. Supplied by contestants:

   Note: State and school identifiers should not appear in certain submitted items—specifically in the prototype (2.a), the written submission (2.f–i), and video submission (2.j) if required. School names/states should only appear on the affidavit, résumés and proof of licensing (2c–e). See below.

   a. A working sample or prototype of an interactive application or video game (the Game), including all source files and any necessary software and hardware. If different from the target playback platform, teams should also bring a computer capable of reading, displaying and compiling the Game from their source files.
   b. A multi-outlet power strip with surge protection.
   c. A loose-leaf affidavit signed by all team members on 8.5"x11" paper, countersigned by their school's administrator and instructor or SkillsUSA advisor, stating the team submission is original work created by the team members during the current school year. Credits for any students assisting in the project should be listed along with detail on the work they performed.
   d. A loose-leaf, typewritten, single-page résumé for each team member on 8.5"x11" paper.

e. A **Game Design Document (GDD)** organized as a series of digital documents in Microsoft Word or Adobe PDF files. Here are the sections of the GDD, document titles in bold:
   - A one page type-written **Overview** describing the Game, including the title, a summary, description of the target audience, main selling points, any competitive or inspirational game titles, est. total playtime, and measured performance metrics on the Game.
   - A one page **SWOT** Analysis table listing the primary Strenghts, Weaknesses, Opportunities and Threats for the Game.

   The Summary and SWOT should be submitted digitally in 8.5"x 11" single-spaced text in 12pt font.

   - Completed **Concept Artwork** and/or the storyboard used to develop the Game. Shrink to fit, if needed, and submit between two to four (2-4) pages, double-sided on 8.5"x11" paper (2 sheets max).
   - **Code Examples** of the higest quality and complexity of programming developed for the Game, between two to four (2-4) pages, formated in 8.5"x11". If a computer language was used, code should be single spaced in 12 pt font. If visual programming was used, submit screen captures of visual programming diagrams.

e. For the national finals (NLSC), two 1080p digital video files must be also be prepared and submitted with the full digital GDD on a USB drive AT THE CONTEST ORIENTATION MEETING. The digital videos should be tested in advance on WIN and MAC computers and viewable on movie players included with those operating systems.

   Here are details for the two videos:

   - The first digital video should be three to four (3-4) minutes long and entitled **"Intro",** where the contestants should introduce themselves and any students from their program who assisted them (by name only, careful not to reveal your school or state), detailing each person's role in the development process.

     Then, in the same video, one team member, acting as spokesperson, should give a quick overview of the Game, including its title, genre, target audience, how many levels, total approximate playtime developed, performance metrics, and any notable user interfaces (opening, closing screen, cut scenes, etc.)

   - The second digital video should be a one minute long and entitled **"Trailer"** pitching the Game, demonstrating and describing what is best about the Game, including gameplay, mechanics, significant objects or characters, levels, artwork, backgrounds, sound, with a focus on why the audience would want to play the Game. Think of this as an advertisement designed to drive player acquisition.

   Note: All documents, the digital GDD and videos (Section 2.c-g) must be handed in at the contest orientation.

Content may be submitted to other contests or events, but SkillsUSA must be granted unencumbered rights to use imagery and content from all submissions for marketing and nonprofit outreach.

Note: Your contest may also require a hard copy of your résumé as part of the actual contest. Check the Contest Guidelines and/or the updates page on the SkillsUSA website at http://updates.skillsusa.org/.

SCOPE OF THE CONTEST

The contest is a two-person team event that tests technical knowledge and production skills, including critical thinking, creative problem solving, team work, interpersonal and visual communication, artistic design, and technical programming.

Knowledge Performance

The contest will include a written exam assessing the team's knowledge of the industry, including its jargon, technologies and professional methods.

Skill Performance

Teams must produce an original prototype or sample of an interactive application or video game with at least one level and ten (10) minutes of interactive content. It must be created during the school year immediately preceding the contest deadline. The production should include the sample or prototype itself and other submissions described in Section 2 above. Résumés should include the skills gained from their experience developing the contest submission, the time they invested, and the professional and academic relevance to the contestant's career ambitions.

Contest Guidelines

1. Contestants will show up at the contest orientation meeting with their full submission of written documents, including a résumé for each team member, and their completed GDD and digital videos, pre-tested and ready for submission on a USB drive.
2. If an industry briefing or contest debriefing is offered, attendance is higly recommended but not required.
3. Later at the designated setup time, each team will assemble and test their sample/prototype and workstations.
4. Schedules will be disseminated with the time periods for interviews with the judges.
5. Outside their particular interview time, someone from the team should be on hand to demonstrate to the public and to watch over their equipment.
   We recommend this responsibility be shared among both team members.
6. The contest timeframe will depend on the total number of entries in the contest, not to exceed two (2) eight-hour days.
7. The technical committee reserves the right to photograph and videotape contest-related activities.
8. The technical committee will be responsible for developing the evaluation tools by which to objectively measure the competing team's performance. Judging criteria will be general in nature and will be done from the completed concept art/storyboard, demonstrated sample or prototype, any written and video submission, résumés, exam scores, and interviews with the judges.

   Specific criteria may be based on the demonstration of competency in the elements of conceptualization, design, artwork, content creation, gameplay, or effective simulation, programming effectiveness, user-interface design, implementation, functionality, and performance on the target platform.

9. The setup, configuration, and teardown of all contestant-provided equipment will be the team's responsibility.

Standards and Competencies

The technical committee has identified the following professional competencies addressed in the contest:

VG 1.0 — Solve a problem or create a conceptual design in a visual format

1.1 Conceptualization, visual communications for artists and storyboarding techniques
- 1.1.1 Solve problems and/or develop stories creatively
- 1.1.2 Define how a problem will be solved or how a story will be told
- 1.1.2 Describe the concept visually with enough depth to substantially and accurately communicate the final output for

team members and interested third parties

VG 2.0 — Create and manipulate 2D, 3D, and audio computer-generated objects (assets)

2.1 Create assets using various technologies
- 2.1.1 Create and modify 2D artwork, including textures, sprites, and backgrounds
- 2.1.2 Create and modify 3D geometry to produce characters, objects, and environmental elements (models) that possess shape and texture
- 2.1.3 Create and modify audio elements
- 2.1.4 Optimize all assets for use in real-time, interactive environments
- 2.1.5 Use programming to apply physics and other properties to assets for creating complex behaviors and relationships

VG 3.0 — Develop, optimize and deploy complex interactive multimedia applications

3.1 Position assets, lights, and cameras and organize environments into scenes/levels, and output as a functional, interactive multimedia application or video game
- 3.1.1 Apply logical properties to lights, cameras, and other assets so they appear and behave properly
- 3.1.2 Add sounds, particles and/or visual effects to enhance the quality of the user experience
- 3.1.3 Create a functional user interface
- 3.1.5 Test, optimize and deploy as an application or video game

VG 4.0 — Demonstrate the ability to work in a team environment

4.1 Cooperate with others to achieve the solution to a problem or bring a project from concept through development
- 4.1.1 Demonstrate consensus building
- 4.1.2 Apply written- and visual-communication skills to convey ideas between team members and interested third parties
- 4.1.3 Divide tasks, set goals, and meet deadlines to complete complex projects with multiple contributors

VG 5.0 — Demonstrate proficiency in technical, small-group communications

5.1 Show the judges that your submission evokes the intended response from the audience by using technical presentation skills and other communication techniques
- 5.1.1 Demonstrate in a manner appropriate to the audience
- 5.1.2 Capture and retain the audience's attention and interest
- 5.1.3 Elicit intended aesthetic responses to visual, auditory, and kinesthetic stimuli
- 5.1.4 Achieve learning, familiarization, persuasion, or other intended objectives

Committee Identified Academic Skills

The education committee has identified that the following academic skills are addressed in this contest.

Math Skills

- Use fractions to solve practical problems
- Use proportions and ratios to solve practical problems
- Solve practical problems involving percents
- Solve single variable algebraic expressions
- Measure angles
- Apply transformations (rotate or turn, reflect or flip, translate or slide, or dilate or scale) to geometric figures
- Construct 3D models
- Solve problems involving symmetry and transformation

Science Skills

- Use knowledge of physical properties (shape, density, solubility, odor, melting point, boiling point and color)
- Use knowledge of the nature and technological applications of light
- Use knowledge of speed velocity and acceleration

Language Arts Skills

- Provide information in conversations and in group discussions
- Provide information in oral presentations
- Demonstrate use of such verbal communication skills as word choice, pitch, feeling, tone and voice
- Demonstrate comprehension of a variety of informational texts
- Organize and synthesize information for use in written and oral presentations
- Demonstrate knowledge of appropriate reference materials
- Demonstrate narrative writing

Connections to National Standards

State-level academic curriculum specialists identified the following connections to national academic standards.

Math Standards

- Geometry
- Measurement
- Problem solving
- Communication
- Connections
- Representation

Source: NCTM Principles and Standards for School Mathematics. For more information, visit: www.nctm.org.

Science Standards

- Understand forces and motion
- Understand the nature of scientific inquiry

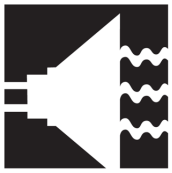
Source: McREL compendium of national science standards. To view and search the compendium, visit: http://www2.mcrel.org/compendium/browse.asp.

Language Arts Standards

- Adjust use of spoken, written and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes
- Use a variety of technological and information resources (e.g., libraries, databases, computer networks, video) to gather and synthesize information and to create and communicate knowledge
- Participate as knowledgeable, reflective, creative, and critical members of a variety of communities
- Use spoken, written and visual language to accomplish their own purposes (e.g., learning, enjoyment, persuasion and the exchange of information)

Source: IRA/NCTE Standards for the English Language Arts. To view the standards, visit: www.ncte.org/standards.

INTERNET OF THINGS AND SMART HOME



PURPOSE

To evaluate each contestant's preparation for employment and to recognize outstanding students for excellence and professionalism in the field of home technology integration.

First, download and review the General Regulations at: http://updates.skillsusa.org.

ELIGIBILITY

Open to active SkillsUSA members enrolled in programs with computer networking, telecommunications cabling, home theater installation, electronics applications and/or electronics technology as the occupational objectives.

CLOTHING REQUIREMENT

Class E: Contest specific — Business Casual

For men: Official SkillsUSA white polo shirt, black dress slacks, black socks, black leather shoes.
For women: Official SkillsUSA white polo shirt with black dress skirt (knee-length) or black slacks; black socks or black or skin-tone seamless hose; black leather dress shoes.

These regulations refer to clothing items that are pictured and described at: www.skillsusastore.org. If you have questions about clothing or other logo items, call 800-401-1560 or 703-956-3723.

Note: Contestants must wear their official contest clothing to the contest orientation meeting.

EQUIPMENT AND MATERIALS

1. Supplied by the technical committee:
    a. All necessary information for the judges and technical committee
2. Supplied by the contestant:
    a. Multimeter
    b. Telephone buttset
    c. Toner
    d. Signal generation
    e. Cable tester
    f. Laptop computer
    g. Coax (hex) crimpers
    h. RJ11/RG45 crimpers
    i. Coax compression tool (BNC, F&RCA)
    j. Coax strippers
    k. High gauge wire strippers (20-25 AWG)
    l. Diagonal cutters (small)
    m. Needle-nose pliers (small)
    n. All competitors must create a one-page résumé and submit a hard copy to the technical committee chair at orientation. Failure to do so will result in a 10-point penalty.

***Note*:** Your contest may also require a hard copy of your résumé as part of the actual contest. Check the Contest Guidelines and/or the updates page on the SkillsUSA website at http://updates.skillsusa.org.

SCOPE OF THE CONTEST

The contest is defined by industry standards as set by the current industry technical committee. The contest will be divided into two parts: general knowledge test and a skilled performance.

Knowledge Performance

The contest will include a written exam assessing general knowledge of residential electronics installation and maintenance including smart house technologies. Written portions may also exist during the skills portion of the contest.

Skill Performance

The skills performance event assesses the ability of the contestant to install, maintain and troubleshoot a variety of devices encountered in a residential setting. A practical problem(s) will be given to evaluate the contestant's ability to function on a basic entry level.

Contest Guidelines

1. The contests will have several hands-on skill scenarios that demonstrate one's ability to perform jobs or skills selected from the list of competencies as determined by the SkillsUSA Championships technical committee. Scenarios may include any or several of the following:

a. Diagnose and service personal residential electronic systems
b. Diagnose and resolve operational and startup problems
c. Locate and identify defective modules within residential electronic equipment
d. Demonstrate ability to use diagnostic utility software and equipment
e. Install, configure and demonstrate proper operations of devices within the residence.

2. The hardware problems will relate to any residential networked systems.
3. Contestants will be awarded points based on their ability to solve the provided problems within the allotted time. Partial points can be awarded for solving partial problems.
4. Competence in the provided tasks is considered when a contestant acquires 75 percent of the available points.
5. Contestants will be provided, as required, manufacturers' documentation of the devices to be installed and/or serviced.
6. Winners will be determined on the basis of their total scores (regardless of result on certification test), which includes diagnostic procedures, speed, standard industry procedures, accuracy of adjustments and correct component replacements.
7. Specific penalties will be assessed for the failure to properly use anti-static straps at all times when in contact with the computers and for the introduction of computer viruses into the contest computers. Penalties will be assessed at one point per occurrence, and notice of infractions will be communicated to the contestant when they occur.

Standards and Competencies

Networking

RSIM 1.0 — Identify basic networking protocols and their uses and know when/how to apply them

1.1 DHCP
1.2 UDP
1.3 DNS
1.4 TCP/IP
1.5 Subnet masks

RSIM 2.0 — Recognize and implement methods of network security

2.1 Personal computer (PC) security
2.2 Antivirus
2.3 Home networking security
2.4 Firewall knowledge

RSIM 3.0 — Configure setup and maintain a residential LAN (Local Area Network)

3.1 Client configuration
  3.1.1 Resource sharing
  3.1.2 Peer-to-peer
3.2 Remote access setup
3.3 Network device setup and integration
  3.3.1 Broadband configuration (e.g., DSL, cable and satellite)
  3.3.2 Routers
  3.3.3 Hubs
  3.3.4 Switches
  3.3.5 PoE (power over ethernet)

RSIM 4.0 — Configure setup and maintain a secure wireless network

4.1 Differentiate applications of hardwired vs. wireless networks
4.2 Assess networking security and encryption standards
  4.2.1 WEP
  4.2.2 WPA
  4.2.3 MAC filtering
  4.2.4 SSID
  4.2.5 WPA2
4.3 Wireless networking integration and troubleshooting
  4.3.1 Frequency management
4.4 Wireless protocol standards
  4.4.1 802.11 a/b/g/n

RSIM 5.0 — Identify and define network cabling characteristics and performance

5.1 Cable types
  5.1.1 CAT5
  5.1.2 CAT5e
  5.1.3 CAT6
  5.1.4 Fiber
  5.1.5 COAX
5.2 Cable length limitations
5.3 Protocols
  5.3.1 10BaseT
  5.3.2 100BaseT
  5.3.3 1000BaseT
5.4 Shielded (STP) vs. unshielded (UTP)
5.5 Plenum vs. non-plenum
5.6 Importance of conductor colors

Audio/Video

RSIM 6.0 — Implement, maintain and troubleshoot multi-room audio systems. Identify common interference sources

6.1 Control devices
- 6.1.1 Keypads
- 6.1.2 Rotary volume controls
- 6.1.3 Sliders
- 6.1.4 Push button controls
- 6.1.5 Touch screen
- 6.1.6 Wireless keypads
- 6.1.7 Handheld devices

6.2 Differentiate and define single source, multi-source and local source.
- 6.2.1 Analog audio system
- 6.2.2 Analog CAT5 audio system
- 6.2.3 Digital CAT5 audio system

6.3 Proper cable use
- 6.3.1 Line level vs. speaker level

6.4 Amplification
- 6.4.1 Ohm's Law (e.g., impedance matched or non-impedance matched)
- 6.4.2 Watts vs. dB
- 6.4.3 Local amplification
- 6.4.4 Centralized amplification

6.5 Speaker types
- 6.5.1 In wall
- 6.5.2 Surface mounted
- 6.5.3 Ceiling mounted
- 6.5.4 Freestanding
- 6.5.5 Fixed
- 6.5.6 Animated

6.6 Speaker specifications
- 6.6.1 Frequency response
- 6.6.2 Efficiency
- 6.6.3 Power handling

RSIM 7.0 — Install, configure and maintain a residential home theater system

7.1 Audio components
- 7.1.1 Define basics of acoustics (e.g., sound reflection, speaker placement, sound cancellation, sound balance)
- 7.1.2 Audio/Video components setup and integration (e.g., digital signal cables and lengths, legacy devices)
- 7.1.3 Multichannel surround (e.g., SACD, DVDA, DTS, DTSES, DDEX, DD, etc.) (e.g., crossovers and speaker setup)

7.2 Video components
- 7.2.1 Display types (e.g., plasma, DLP, LCD, LCOS, CRT, rear projection, front projection, direct view)
- 7.2.2 High-definition resolutions options (e.g., 720p, 1080i, 1080p, etc.)
- 7.2.3 Tuner types (e.g., NTSC, PAL, ATSC, QAM, cable card, VSB, NDVBT, DVBS)
- 7.2.4 Video processing (e.g., scalers, processors, up-conversion)
- 7.2.5 Aspect ratios
- 7.2.6 Video setup (calibration e.g., color balance, contrast, brightness, etc.)
- 7.2.7 Digital video cable and connector types (e.g., DVI and HDMI — compatibility and interoperability issues)

7.3 Use MRAV (Multi-Room Audio/Video) standards if/when applicable

RSIM 8.0 — Assess, install and configure content management systems and describe their applications in a residential environment

8.1 Describe typical applications and physical connections of sources
- 8.1.1 Media servers
- 8.1.2 Media PC
- 8.1.3 MP3 players
- 8.1.4 DVD players
- 8.1.5 Satellite
- 8.1.6 Cable
- 8.1.7 DVR
- 8.1.8 Gaming systems
- 8.1.9 Satellite radio
- 8.1.10 Legacy devices
- 8.1.11 Streaming media

8.2 Summarize types of media storage, methods to transfer and backup data
- 8.2.1 Memory cards
- 8.2.2 NAS devices (Network Attached Devices)
- 8.2.3 Remote storage
- 8.2.4 Local storage
- 8.2.5 Frequency of backup

8.3 Other connection considerations
- 8.3.1 Digital rights management

RSIM 9.0 — Implement, maintain and troubleshoot multi-room video systems.

9.1 Define signal types and their applications
- 9.1.1 Digital distribution (e.g., analog to IP converters, IP to analog converters, wireless distribution, IEEE 1394)
- 9.1.2 RF distribution characteristics. Identify and troubleshoot noise and interference. (e.g., splitters and taps, active and passive, attenuators, bidirectional, modulation and filtration, amplification, IR over COAX)
- 9.1.3 Analog Distribution (e.g., Composite, Component, and SVideo, Balun.)

9.2 Identify cable types and their applications
- 9.2.1 COAX (e.g., RG-59, RG-6, RG-6 QS, DV, Serial data, CCS, BC)
- 9.2.2 CAT5/5e/6

9.3 Termination (e.g., RCA, BNC, and F)

9.4 Satellite
- 9.4.1 Multi-switches
- 9.4.2 Diplexer
- 9.4.3 LNB (Low Noise Block Down Converter)

Telephony/VoIP

RSIM 10.0 — Differentiate and describe POTS vs. VoIP delivery. Identify and troubleshoot common issues

10.1 VoIP
- 10.1.1 Compatibility issues
- 10.1.2 Whole house distribution of VoIP
- 10.1.3 Performance and Quality of Service (QoS)

10.2 POTS
- 10.2.1 Cross talk
- 10.2.2 Radio interference
- 10.2.3 Dead ports
- 10.2.4 REN (Ringer Equivalence Number)

RSIM 11.0 — Describe and define fundamentals of telephone systems.

11.1 Multi-line
11.2 Paging
11.3 Intercom
11.4 Voice messaging/Unified messaging
11.5 Door entry/Gate entry
11.6 PBX
11.7 Key systems
11.8 Telecommunication services (e.g., caller ID, voice mail, rollover)

Security and Surveillance Systems

RSIM 12.0 — Maintain, configure and troubleshoot basic security systems and applications

12.1 Define monitored and notification methods
- 12.1.1 Phone line
- 12.1.2 Cellphone
- 12.1.3 Radio frequency
- 12.1.4 IP based

RSIM 13.0 — Describe basic security terminology and apply installation procedures and methodologies

13.1 Installation and configuration of security panel
- 13.1.1 Zone types
- 13.1.2 Delays
- 13.1.3 Battery backup and power supply requirements

13.2. Monitoring formats
- 13.2.1 SIA and Contact ID
- 13.2.2 4/2 and 3/1

13.3 Define types of peripherals and accessories
- 13.3.1 Motion sensors
- 13.3.2 Glass-break detectors
- 13.3.3 Magnetic contacts
- 13.3.4 Smoke fire (e.g., smoke detection, heat detection)
- 13.3.5 Environmental sensors (e.g., carbon monoxide, gas, water, temperature)
- 13.3.6 Vehicle detection
- 13.3.7 Photoelectric beam devices
- 13.3.8 Microwave beam devices
- 13.3.9 Pressure sensors
- 13.3.10 Sirens, strobes
- 13.3.11 Security keypads
- 13.3.12 Keyfobs
- 13.3.13 Panic buttons

13.4 Describe security infrastructure types
- 13.4.1 Wired, 22/4- standard power devices, 22/2- Magnetic contacts, 2 and 4 conductor fire wire (e.g., keypads, sounders, power supplies, smoke and fire detectors), Power supervision relays, Polarity reversal relays,

Line seizure, End of line resistors)
13.4.2 Wireless
13.5 Identify access control devices and protocols
13.5.1 Devices (e.g., keypads, card readers, biometric readers, proximity readers, door strikes, electronic deadbolts, magnetic locks)
13.5.2 Protocols (e.g., Weigand)

RSIM 14.0 — Identify, configure, install, maintain and troubleshoot security and surveillance cameras

14.1 Camera types
14.1.1 IP
14.1.2 Analog
14.1.3 Hybrid
14.2 Camera specifications
14.2.1 Lens type
14.2.2 Lux rating
14.2.3 Resolution
14.2.4 B&W vs. color
14.2.5 IR illumination
14.2.6 Power consumption
14.3 Camera applications
14.3.1 Indoor/outdoor
14.3.2 Day/night
14.3.3 Fixed vs. animated
14.3.4 Surveillance (e.g., door cams, nanny cams)
14.3.5 Recording (e.g., DVR, triggers – internal vs. external detection)
14.3.6 Sequencing vs. multiplexing

Home Control and Management

RSIM 15.0 — Identify user interfaces and their appropriate applications

15.1 Device types
15.1.1 Remote controls
15.1.2 Keypads
15.1.3 Touchscreens
15.1.4 Keyfobs
15.1.5 Telephones
15.1.6 Smartphones
15.1.7 Cellphones
15.1.8 PDAs
15.1.9 Web tablets
15.1.10 Personal computers
15.1.11 Laptops
15.2 Describe the importance of simplicity and ease of use as it pertains to the end user

RSIM 16.0 — Define and recognize control systems that integrate subsystems in the home. Describe their functionality, characteristics and purpose

16.1 Embedded control systems and personal computer (PC) based control systems
16.1.1 Compatibility and interoperability issues

RSIM 17.0 — Identify commonly used communication protocols and their application

17.1 IR
17.2 Serial
17.3 IP
17.4 RF
17.5 Bluetooth
17.6 Contact closure
17.7 Inputs (zones)
17.8 Z-wave and Zigbee
17.9 ASCII
17.10 Proprietary protocols

RSIM 18.0 — Describe basic HVAC (Heating, Ventilation and Air Conditioning) terminology and install peripheral control devices

18.1 Control layer
18.1.1 Compatibility
18.2 Communication layer
18.2.1 Compatibility
18.2.2 IP based, wireless, serial and proprietary
18.3 Zones HVAC
18.3.1 Master slave configuration
18.3.2 Microprocessor controlled configuration
18.4 Programmable thermostats
18.5 Importance of referencing manufacturerspecification and compatibility

RSIM 19.0 — Describe basic lighting terminology and install peripheral control devices

19.1 Identify lighting control applications
19.1.1 Indoor and outdoor
19.1.2 Centralized and distributed
19.1.3 Dimming
19.1.4 Scenes
19.1.5 Relay/switching
19.1.6 Occupancy/motion sensing

19.1.7 Time- and event-driven
19.1.8 Window treatments
19.1.9 Energy management
19.1.10 Security interface
19.1.11 Lighting connectivity
19.1.12 Motor speed control

19.2 Communication interface/bridge
19.2.1 Power line phase couplers

19.3 Identify lighting control protocols (Open standards)
19.3.1 Z-wave
19.3.2 ZigBee
19.3.3 Powerline carrier (X10 protocol/PLC)
19.3.4 UPB (Universal Powerline Bus)

19.4 Proprietary RF and proprietary low voltage
19.4.1 Recognize compatibility issues

RSIM 20.0 — Identify and install component power protection devices

20.1 Identify whole house protection options
20.1.1 Surge suppression
20.1.2 Power conditioning

20.2 Identify and install point protection
20.2.1 Surge protectors (high voltage and ancillary low voltage devices: e.g., satellite, CATV, etc.)
20.2.2 UPS (uninterruptible power supply)
20.2.3 Power conditioning

Troubleshooting Methodology and Documentation

RSIM 21.0 — Identify and apply the fundamentals of troubleshooting and diagnostics

21.1 Use of testing equipment
21.1.1 Multimeter
21.1.2 Telephone buttset
21.1.3 Toner
21.1.4 Signal generation
21.1.5 Cable tester

21.2 Refer to prior documentation

21.3 Demonstrate when to communicate with technical support and what information is relevant

21.4 Troubleshoot common wireless interference issues: infrared, radio frequency, etc.

21.5 Identify demarcation and responsibilities of associated trades and/or utilities

RSIM 22.0 — Given a scenario, demonstrate how to apply troubleshooting skills to integrate subsystems

22.1 Networking
22.2 Audio/video
22.3 Telephony
22.4 Security
22.5 Home control

RSIM 23.0 —List and describe the benefits of verification of installation

23.1 Properly label wires
23.2 Wire mapping
23.3 Importance of documenting work upon completion
23.3.1 Input/output verification for all systems
23.3 2 Document wire placement

23.4 Certification of cable installation

RSIM 24.0 —Deliver appropriate manuals and documentation to the end user upon completion of installation.

24.1 Select, archive and appropriately distribute critical system information: Passwords, access codes, user IDs, credentials, etc.

RSIM 25.0 — Ability to safely measure AC and DC voltages

25.1 Measure AC and DC voltages using a digital multimeter (DMM)
25.2 Measure AC and DC current using a digital multimeter (DMM)
25.3 Measure the resistance of a circuit consisting of resistors using a digital multimeter (DMM)

RSIM 26.0 — Ability to test basic analog and digital circuits and repair them

26.1 Setup and operate test equipment for analog circuits
26.2 Troubleshoot switching power supplies
26.3 Analyze motor and phase control circuits
26.4 Apply logical and systematic approach to troubleshooting analog circuit devices

RSIM 27.0 — Ability to use multimeters and oscilloscopes and interpret results

27.1 Solve basic trigonometric problems as applicable to electronics (prerequisite to AC)

27.2 Identify properties of an AC signal
27.3 Identify AC sources
27.4 Analyze and measure AC signals using oscilloscope, frequency meters and generators
27.5 Analyze, construct and troubleshoot AC capacitive circuits, AC inductive circuits, RLC circuits (series, parallel, complex) series and parallel resonant circuits, filter circuits and polyphase circuits
27.6 Analyze basic motor theory and operation
27.7 Analyze basic generator theory and operation
27.8 Set up and operate oscilloscopes frequency counters, signal generators, capacitor-inductor analyzers and impedance bridges for AC circuits
27.9 Analyze and apply principles of transformers to AC circuits

Committee Identified Academic Skills

The technical committee has identified that the following academic skills are embedded in this contest.

Math Skills

- Solve practical problems involving percents
- Solve single variable algebraic expressions
- Solve multiple variable algebraic expressions
- Make comparisons, predictions and inferences using graphs and charts

Science Skills

- Plan and conduct a scientific investigation
- Use knowledge of the particle theory of matter
- Describe characteristics of types of matter based on physical and chemical properties
- Use knowledge of physical properties (shape, density, solubility, odor, melting point, boiling point, color)
- Use knowledge of classification of elements as metals, metalloids and nonmetals
- Understand Law of Conservation of Matter and Energy
- Describe phases of matter
- Describe and identify physical changes to matter
- Use knowledge of potential and kinetic energy
- Use knowledge of mechanical, chemical, and electrical energy
- Use knowledge of heat, light and sound energy
- Use knowledge of temperature scales, heat and heat transfer
- Use knowledge of work, force, mechanical advantage, efficiency and power
- Use knowledge of simple machines, compound machines, powered vehicles, rockets and restraining devices
- Use knowledge of principles of electricity and magnetism
- Use knowledge of static electricity, current electricity and circuits
- Use knowledge of magnetic fields and electromagnets
- Use knowledge of motors and generators

Language Arts Skills

- Demonstrate comprehension of a variety of informational texts
- Use text structures to aid comprehension
- Demonstrate knowledge of appropriate reference materials
- Use print, electronic databases and online resources to access information in books and articles

Connections to National Standards

State-level academic curriculum specialists identified the following connections to national academic standards.

Math Standards

- Numbers and operations
- Algebra
- Geometry
- Measurement
- Data analysis and probability
- Problem solving
- Reasoning and proof

Source: NCTM Principles and Standards for School Mathematics. For more information, visit: http://www.nctm.org.

Science Standards

- Understands the structure and properties of matter
- Understands the sources and properties of energy

- Understands forces and motion
- Understands the nature of scientific knowledge
- Understands the nature of scientific inquiry

Source: McREL compendium of national science standards. To view and search the compendium, visit: http://www2.mcrel.org/compendium/browse.asp.

Language Arts Standards

- Students read a wide range of print and nonprint texts to build an understanding of texts, of themselves and of the cultures of the United States and the world; to acquire new information; to respond to the needs and demands of society and the workplace; and for personal fulfillment. Among these texts are fiction and nonfiction, classic and contemporary works
- Students apply a wide range of strategies to comprehend, interpret, evaluate and appreciate texts. They draw on their prior experience, their interactions with other readers and writers, their knowledge of word meaning and of other texts, their word identification strategies and their understanding of textual features (e.g., sound-letter correspondence, sentence structure, context, graphics
- Students adjust their use of spoken, written, and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes
- Students employ a wide range of strategies as they write and use different writing process elements appropriately to communicate with different audiences for a variety of purposes
- Students apply knowledge of language structure, language conventions (e.g., spelling and punctuation), media techniques, figurative language and genre to create, critique and discuss print and nonprint texts
- Students conduct research on issues and interests by generating ideas and questions, and by posing problems. They gather, evaluate and synthesize data from a variety of sources (e.g., print and nonprint texts, artifacts, people) to communicate their discoveries in ways that suit their purpose and audience
- Students use a variety of technological and information resources (e.g., libraries, databases, computer networks, video) to gather and synthesize information and to create and communicate knowledge
- Students use spoken, written and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion and the exchange of information)

Source: IRA/NCTE Standards for the English Language Arts. To view the standards, visit: www.ncte.org/standards.

INTERNETWORKING

PURPOSE
To evaluate each contestant's preparation for employment and to recognize outstanding students for excellence and professionalism in the field of internetworking.

First, download and review the General Regulations at: http://updates.skillsusa.org.

ELIGIBILITY
Open to all active SkillsUSA members enrolled in a computer networking training program with internetworking as the occupational goal.

CLOTHING REQUIREMENT
Class E: Contest specific — Business Casual
For men: Official SkillsUSA white polo shirt, black dress slacks, black socks, black leather shoes.
For women: Official SkillsUSA white polo shirt with black dress skirt (knee-length) or black slacks; black socks or black or skin-tone seamless hose; black leather dress shoes.

These regulations refer to clothing items that are pictured and described at: www.skillsusastore.org. If you have questions about clothing or other logo items, call 800-401-1560 or 703-956-3723.

Note: Contestants must wear their official contest clothing to the contest orientation meeting.

EQUIPMENT AND MATERIALS
1. Supplied by the technical committee:
   a. Computer workstation for the written portion of the contest
   b. Cisco routers, switches and equipment not listed as supplied by the contestant
2. Supplied by contestant:
   a. Copper cable terminating tools (punchdown tool and crimpers cable stripper, DB9 to RJ45)
   b. Cable tester
   c. Laptop computer with wireless, Ethernet connection and COM port (USB with adapter)
   d. All competitors must create a one-page résumé and submit a hard copy to the technical committee chair at orientation. Failure to do so will result in a 10-point penalty.

   Note: Your contest may also require a hard copy of your résumé as part of the actual contest. Check the Contest Guidelines and/or the updates page on the SkillsUSA website: http://updates.skillsusa.org.

SCOPE OF THE CONTEST
The contest is defined by industry standards as set by the current industry technical standards. The contest will consist of three parts: a troubleshooting problem, an online written test and end to end networking hands-on evaluation. Assume it is a normal week for an IT expert.

Knowledge Performance
The contest will include an online written knowledge exam assessing knowledge of general networking concepts.

Skill Performance
The contest may include but is not limited to the following assessments:

1. **Design problem** — The network design problem, as formulated by the national technical committee, assesses a student's ability to design functionality, scalability, adaptability and manageability of an internetworking system. The problem is built into each activity the competitor does in the three days of the contest. Competitors may not see a specific topic design, but they are being scored on how their knowledge of network design makes the tasks easier for them.

2. **Hands-on evaluation** — The hands-on evaluation component of the contest tests a student's ability to professionally design, install and maintain internetworks. Given a set of networking equipment (cable, fiber, hubs/switches routers, etc.), the student

must, in a finite amount of time, install or repair a network and demonstrate that the installation properly runs internet applications.
Given a logical topology and network requirements, the students will be able to develop a usable network that meets or exceeds the documentation provided. The vision and context is that client companies would request a demonstration booth that runs a particular internet application, and the student, given equipment and tools, would provide the appropriate connectivity for the application to run successfully.

3. **Technical Assistance Call** — The student must solve a networking problem while on the phone with a customer. This is a simulation of working in a Technical Assistance Center.

4. **Written Exam** — The student must answer questions related to CCNA-level networking.

Standards and Competencies

WORK 1.0 — Explain common networking concepts and terminology

1.1 Identify the basic characteristics of LANs and WANs
1.2 Explain the concept of bandwidth and throughput and factors that affect them
1.3 List and describe the components necessary to create a small LAN using wire or wireless media
1.4 Identify the roles of various network devices in a network (NICs, hubs, switches, routers, firewalls, AP)
1.5 Explain the concept of latency and how it can be minimized
1.6 Describe the advantages and disadvantages associated with implementing common physical topologies: star/extended star, ring and mesh
1.7 Explain the importance of implementing basic security in computer networks

WORK 2.0 — Install and troubleshoot basic hardware and software required to communicate in a simple network and test for connectivity

2.1 Identify the pin-outs and construct a UTP (patch, console and crossover) cable for connectivity
2.2 Specify the cable type required for the various Ethernet connections
2.3 Configure a host with the appropriate addressing parameters to connect to a network
2.4 Verify and troubleshoot basic connectivity using various testing tools, utilities and commands (cable testers, ping, trace, IP configuration, etc.)
2.5 Document the physical and logical aspects of network topology
2.6 Determine and install the appropriate network cabling and media required for connectivity between devices
2.7 Configure, connect, verify and troubleshoot issues with the operation of an Ethernet NIC
2.8 Determine the physical issues associated with cabling network equipment working over a WAN link
2.9 Configure wireless appliances as needed in an office or in a meshed environment

WORK 3.0 — Compare and contrast various types of media used for networking

3.1 Explain the characteristics and benefits of copper cable, fiber and wireless network media (air) in network applications, including data transmission speeds
3.2 Identify the basic characteristics of UTP and fiber cables
3.3 Identify Ethernet cabling issues that can cause degraded service
3.4 Explain practical factors that cause attenuation of data signals over the different network media types (copper, fiber, air [radio frequency], and identify possible solutions to a media problem
3.5 Identify basic concerns of implementing faster Ethernet

WORK 4.0 — Explain the fundamental concepts associated with media access techniques (Ethernet operation, MAC, LLC, CSMA/CD)

4.1 Describe the differences between full duplex and half duplex transmissions
  4.1.1 Describe media access considerations of each
4.2 Explain the function of auto negotiation of speed and duplex
4.3 Describe the function of the Data Link Layer as it applies to Ethernet, including MAC and LLC sublayers
4.4 Explain the concept of broadcast media and the addressing of a layer 2 broadcast on an Ethernet media
4.5 Describe and discuss CSMA/CD, including the process, listen, send, collision, jam and back off

WORK 5.0 — Optimize network design in regard to segmentation, collision domains and broadcast domains

5.1 Describe basic operation of hubs and repeaters as they apply to Ethernet
5.2 Explain how collisions are detected and managed in Ethernet networks
5.3 Explain the concepts of collision domains and network segmentation
5.4 Explain the benefits of using a switch versus using a hub in an Ethernet network
5.5 Explain how collisions and excessive broadcasts occur in networks
  5.5.1 Identify devices used to minimize collision and excessive broadcast effects

WORK 6.0 — Implement and correct problems associated with basic IP addressing and sub netting schemes

6.1 Explain the purpose of an IP address, subnet mask and a default gateway
  6.1.1 Identify the appropriate address required for internetwork communication between hosts
6.2 Categorize the different IP v4 address classes and their identifying features
6.3 Explain the advantages and disadvantages of using public and private IP v4 addresses
6.4 Determine whether an IP address is a network, broadcast, subnet, public or private IP v4 address
6.5 Determine the appropriate subnet mask and IP addressing scheme required to meet network requirements for scalability and functionality
6.6 Identify the methods for a node to obtain an IP address (include static and dynamic methods)
6.7 Correct common problems associated with implementing basic IP addressing schemes in a network environment
6.8 Contrast IP v4 with IP v6

WORK 7.0 — Describe fundamental concepts of switching and routing

7.1 Explain the major functions of a switch
7.2 Explain the major functions of a router
7.3 Explain the basic use of routed and routing protocols in network
7.4 Describe the forwarding of frames and packets in switched and routed networks
7.5 Describe the characteristics and functions of IP (connectionless and unreliable)
7.6 Compare the basic concepts of static and dynamic routing
7.7 Explain the OSI model and its functionality in computer networking

WORK 8.0 — Define the Layers of the OSI model

8.1 Explain the benefits of using the OSI model as a conceptual framework for network communication
8.2 Explain the process of encapsulation and identify the protocol data units associated with each OSI Layer model
8.3 Identify and describe the functions of network devices at each layer of the OSI model
8.4 Explain ARP and when it is used
8.5 Compare and contrast connection and connectionless delivery of packets in a network
8.6 Describe the primary functions of the transport layer
8.7 Compare and contrast characteristics of TCP and UDP
8.8 Identify and describe the major TCP/IP protocols used at each layer of the OSI model
8.9 Identify basic issues that occur at each layer using the OSI model
  8.9.1 Identify the fields in the headers of protocol data units

8.9.2 Describe their role in propagating data in a network (MAC address, IP address, TCP port number)

WORK 9.0 — Describe the importance of a router in a WAN configuration

9.1 Compare WAN connections to LAN connections
9.2 Identify the role of a router in a WAN
9.3 Describe the importance of a WAN router
9.4 Describe router physical characteristics
9.5 Connect all router external connections, management, LAN and WAN

WORK 10.0 — Configure a router to multiple networks by using the IOS software

10.1 Identify the workings of an operating system works with the router
10.2 Determine the state of the router interfaces using the LED indicators
10.3 Identify the features of the IOS for services that will be delivered on the network

WORK 11.0 — Log in to a router, record the IOS and running configuration and use troubleshooting commands

11.1 Describe the boot process
11.2 Log in and navigate throughout the router IOS
11.3 Fix errors by using troubleshooting command line errors
11.4 View the image names and memory of the router by using the show version command 6

WORK 12.0 — Configure a router and switch utilizing the CLI

12.1 Use CLI command modes
12.2 Configure a host names
12.3 Configure passwords
12.4 Use the show commands
12.5 Configure interfaces
12.6 Change configurations
12.7 Configure interface descriptions
12.8 Configure login banners and MOTD
12.9 Configure host tables
12.10 Back up the configuration file by using the copy command to back up the configuration file
12.11 Configure spanning tree

WORK 13.0 — Discover other devices on the network using the router

13.1 Document neighboring routers and Cisco devices by using Cisco Discovery Protocol (CDP) commands
13.2 Monitor CDP
13.3 Disable CDP
13.4 Troubleshoot CDP
13.5 Gather information about remote devices by using Telnet
13.6 Establish and verify a Telnet connection
13.7 Disconnect and suspend Telnet sessions
13.8 Use advanced Telnet operation
13.9 Troubleshoot IP address issues

WORK 14.0 — Manage the IOS software

14.1 Identify where a Cisco device locates and loads IOS
14.2 Use the boot system command
14.3 Configure the register
14.4 Troubleshoot IOS boot failure
14.5 Manage the Cisco file system
14.6 Identify IOS naming conventions
14.7 Use TFTP to manage and copy

WORK 15.0 — Configure routing protocols

15.1 Identify the workings of a static route
15.2 Configure static routes
15.3 Configure default route forwarding
15.4 Verify static route configuration
15.5 Troubleshoot static route configuration
15.6 Identify the purpose of a routing protocol and autonomous system
15.7 Identify the classes of routing protocols
15.8 Identify distance vector routing protocol features and examples
15.9 Discuss link-state routing protocol features and examples
15.10 Describe path determination
15.11 Configure EIGRP, RIPv2 and OSPF single- and multi-area

WORK 16.0 — Identify and use distance vector routing protocols

16.1 View distance vector routing updates, hold-down timers, and RIP processes
16.2 Eliminate routing loops through split horizon, route poisoning, triggered updates
16.3 Use RIP as the routing protocol
16.4 Configure RIP
16.5 Use the IP classless command

16.6 Verify RIP configuration
16.7 Troubleshoot RIP update issues
16.8 Load balance using RIP
16.9 Load balance across multiple paths
16.10 Integrate static routes with RIP

WORK 17.0 — Use TCP/IP suite error and control messages to troubleshoot a router

17.1 Identify TCP/IP error message
17.2 Use ICMP
17.3 Use ICMP message delivery
17.4 Discover unreachable networks
17.5 Use ping to test destination reach ability
17.6 Define echo messages
17.7 Use the TCP/IP suite control messages
17.8 Use ICMP redirect/change request
17.9 Use requests and reply message formats
17.10 Use congestion and flow control message
17.11 Configure QoS and Nbar to control congestion

WORK 18.0 — Use basic show commands to troubleshoot the router

18.1 Use the show IP route command to determine the gateway of last resort, route source and destination, L2 and L3 addresses, administrative distance, route metric, the route next hop, last route update and multiple paths to destination
18.2 Identify OSI layers
18.3 Troubleshoot Layer 1 using show interface
18.4 Troubleshoot Layer 2 using show interface
18.5 Troubleshoot using show CDP
18.6 Troubleshoot using trace route
18.7 Troubleshoot routing issues
18.8 Troubleshoot using show controllers serial
18.9 Use the debug command

WORK 19.0 — Identify the intermediate TCP/IP operations and porting

19.1 Identify synchronization process or three-way handshake
19.2 Define a denial-of-service attack
19.3 Identify how windowing, sequencing numbers and positive ACK work together to deliver data packets
19.4 Compare UDP with TCP
19.5 Observe transport layer ports
19.6 Test multiple conversations between hosts
19.7 Define ports for services, clients and numbering and well-known port numbers
19.8 Compare and contrast MAC addresses, IP addresses and port numbers

WORK 20.0 — Identify and use access control lists (ACLs) to add security to the network

20.1 Describe access control list fundamentals
20.2 Create ACLs
20.3 Discuss the function of a wildcard mask
20.4 Use an ACL by Verify
20.5 Compare standard, extended ACLs and named ACLs
20.6 Place an ACL to create the requested security inside a firewall

WORK 21.0 — Define and use variable length subnet masking (VLSM)

21.1 Define VLSM and why is it used
21.2 Recognize when to use VLSM
21.3 Calculate subnets with VLSM
21.4 Recognize route aggregation with VLSM
21.5 Configure VLSM on a multi-router network

WORK 22.0 — Describe how RIP Version 2 is incorporated in a routed network

22.1 Compare RIP v1 and v2
22.2 Configure RIP v2
22.3 Verify RIP v2
22.4 Troubleshoot RIP v2

WORK 23.0 — Understand how to design and implement single-area and multi-area OSPF

23.1 Recognize link-state routing protocol
23.2 Compare the advantages and disadvantages of link-state routing
23.3 Compare and contrast distance vector and link-state routing
23.4 Compare OSPF with distance vector routing protocols
23.5 Observe single-area OSPF configuration
23.6 Configure the OSPF routing process
23.7 Configure OSPF loopback address and router priority
23.8 Modify OSPF cost metric
23.9 Configure OSPF authentication
23.10 Configure OSPF timers

23.11 Verify the OSPF configuration
23.12 Troubleshoot OSPF configuration

WORK 24.0 — Describe and implement EIGRP routing protocol

24.1 Recognize EIGRP concepts
24.2 Describe EIGRP concepts and terminology
24.3 Configure EIGRP
24.4 Configure EIGRP summarization
24.5 Verify basic EIGRP
24.6 Troubleshoot EIGRP configuration

WORK 25.0 — Understand how switching operates as well as switching concepts

25.1 Recognize Ethernet/802.3 LAN technologies
25.2 Recognize factors that affect network performance
25.3 Recognize network segmentation using hardware devices
25.4 Recognize basic operations of a switch
25.5 Compare Layer 2 and Layer 3 switching
25.6 Compare symmetric and asymmetric switching
25.7 Recognize micro segmentation implementation
25.8 Recognize the effects switches have on a collision domain

WORK 26.0 — Understand the use of the access, distribution and core layers in switching and routing

26.1 Describe LAN design goals
26.2 Use a 1,2,3 layered model in the switch design

WORK 27.0 — Understand how to do a complete switch configuration

27.1 Verify port LEDs during switch POST
27.2 View initial boot output from the switch
27.3 Examine keyboard help in the switch CLI
27.4 Recognize switch modes
27.5 Configure the switch
27.6 Verify the catalyst switch default configuration
27.7 Configure the catalyst switch
27.8 Manage the MAC address table
27.9 Configure static MAC addresses
27.10 Configure port security
27.11 Execute a plan for adds, moves and changes
27.12 Manage switch operating system
27.13 Define password recover
27.14 Recognize firmware upgrade

WORK 28.0 — Understand how spanning tree protocol has an effect on network design and setup

28.1 Describe redundant topologies
28.2 Describe a broadcast storm
28.3 Recognize redundant topology and spanning tree
28.4 Describe spanning tree operations
28.5 Design the configuration to select a root bridge
28.6 Select the stages of spanning tree port states
28.7 Describe spanning tree recalculation and its effects on the network

WORK 29.0 — Describe how virtual LANs help to control broadcast domains and how this benefits the LAN network

29.1 Recognize VLAN concepts
29.2 Demonstrate the relationship between broadcast domains with VLANs and routers
29.3 Describe VLAN types

WORK 30.0 — Configure a VLAN-using network design concept

30.1 Define geographic VLANs
30.2 Configure static VLANs
30.3 Verify VLAN configuration
30.4 Save VLAN configuration
30.5 Delete VLANs
30.6 Troubleshoot VLANS

WORK 31.0 — Use virtual trunking protocol to set up multiple ports on a router and switch

31.1 Describe Trunking concepts
31.2 Describe Trunking operation
31.3 Describe VTP concepts and how to configure and implement them in a physical and logical network design
31.4 Divide physical interfaces into sub-interfaces
31.5 Configure inter-VLAN routing

WORK 32.0 — Demonstrate how to use NAT and PAT to scale IP addresses over a multi-network configuration

32.1 Name the private address spaces
32.2 Identify the features of NAT and PAT
32.3 Configure NAT and PAT

32.4 Verify PAT configuration
32.5 Troubleshoot NAT and PAT configurations
32.6 Identify and use DHCP in a router configuration
32.7 Verify DHCP operation
32.8 Troubleshoot DHCP

WORK 33.0 — Recognize the use of WAN technologies in the configuration of a router and the delivery of data

33.1 Name the WAN devices
33.2 Identify WAN standards and encapsulation types
33.3 Compare packet and circuit switching
33.4 Name the WAN link options and technology related to them
33.5 Incorporate WAN design into the network scheme
33.6 Know how to identify and select networking capabilities
33.7 Use a three-layer design model

WORK 34.0 — Understand and configure a secure PPP serial connection

34.1 Define serial point-to-point links
34.2 Define time-division multiplexing
34.3 Use demarcation point as a reference for security
34.4 Define DTE-DCE
34.5 Compare HDLC encapsulation to PPP
34.6 Configure PPP authentication
34.7 Compare password authentication Protocol (PAP) to challenge handshake authentication protocol
34.8 Configure PPP
34.9 Verify the serial PPP encapsulation configuration
34.10 Troubleshoot the serial PPP encapsulation configuration

WORK 35.0 — Network Systems Administration

35.1 Installation, configuration, and management of Windows workstation software
35.2 Installation, configuration, and management of Windows Server software
35.3 Installation, configuration and management of LINUX software
35.4 Installation and configuration Network Services
35.5 Installation, configuration and management of Virtualized Environments

WORK 36.0 — Configure a point-to-point and multi-point Frame Relay circuit

36.1 Describe frame relay concepts
36.2 Define frame relay terminology
36.3 Configure a basic frame relay
36.4 Configure a static frame relay map
36.5 Configure frame relay sub-interfaces
36.6 Verify the frame relay configuration
36.7 Troubleshoot frame relay configuration

WORK 37.0 — Demonstrate best practices of network administration

37.1 Define and compare workstations and servers
37.2 Define NOS
37.3 Use network operating systems Microsoft Windows 7,8,10, VM, and LINUX versions as they relate to a network
37.4 Describe SNMP and CMIP standards
37.5 Configure SNMP and use syslogs to monitor networks

WORK 38.0 — Provide customer support

38.1 Converse effectively and correctly with a customer
38.2 Speak clearly and to the point when conversing about products and solutions for the customer
38.3 Repeat name, location and phone number back to the customer during technical support conversations
38.4 Record all conversations with customers as either information, need to know or solution delivered
38.5 Make good comparisons that the customer can relate to when troubleshooting a problem
38.6 Take the needed actions to fix the customer's problem
38.7 Close the conversation with a positive, reassuring attitude

Committee Identified Academic Skills

The technical committee has identified that the following academic skills are embedded in this contest.

Math Skills

- Use fractions to solve practical problems
- Use proportions and ratios to solve practical problems
- Use scientific notation
- Solve practical problems involving percents
- Solve single variable algebraic expressions
- Measure angles
- Find surface area and perimeter of two-dimensional objects
- Find volume and surface area of three-dimensional objects
- Make predictions using knowledge of probability
- Make comparisons, predictions, and inferences using graphs and charts
- Organize and describe data using matrixes
- Solve problems using proportions, formulas and functions
- Binary number systems
- Bolean logic functions

Science Skills

- Plan and conduct a scientific investigation
- Describe characteristics of types of matter based on physical and chemical properties
- Use knowledge of physical properties (shape, density, solubility, odor, melting point, boiling point and color)
- Understand the modern model of atomic structure
- Use knowledge of classification of elements as metals, metalloids and nonmetals
- Describe phases of matter
- Use knowledge of potential and kinetic energy
- Use knowledge of mechanical, chemical and electrical energy
- Use knowledge of heat, light and sound energy
- Use knowledge of sound and technological applications of sound waves
- Use knowledge of the nature and technological applications of light
- Use knowledge of principles of electricity and magnetism
- Use knowledge of static electricity, current electricity and circuits

Language Arts Skills

- Provide information in oral presentations
- Demonstrate use of such verbal communication skills as word choice, pitch, feeling, tone and voice
- Demonstrate use of such nonverbal communication skills as eye contact, posture and gestures using interviewing techniques to gain information
- Demonstrate comprehension of a variety of informational texts
- Understand source, viewpoint and purpose of texts
- Demonstrate knowledge of appropriate reference materials
- Use print, electronic databases and online resources to access information in books and articles
- Demonstrate informational writing

Connections to National Standards

State-level academic curriculum specialists identified the following connections to national academic standards.

Math Standards

- Numbers and operations
- Problem solving
- Reasoning and proof
- Communication
- Connections
- Representation

Source: NCTM Principles and Standards for School Mathematics. For more information, visit: www.nctm.org.

Science Standards

- Understands the sources and properties of energy
- Understands forces and motion
- Understands the nature of scientific inquiry

Source: McREL compendium of national science standards. To view and search the compendium, visit: http://www2.mcrel.org/compendium/browse.asp.

Language Arts Standards

- Students apply a wide range of strategies to comprehend, interpret, evaluate and appreciate texts. They draw on their prior experience, their interactions with other readers and writers, their knowledge of word meaning and of other texts, their word identification strategies and their understanding of textual features (e.g., sound-letter correspondence, sentence structure, context, graphics)
- Students adjust their use of spoken, written and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes
- Students employ a wide range of strategies as they write and use different writing process elements appropriately to communicate with different audiences for a variety of purposes
- Students use spoken, written and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion and the exchange of information)

Source: IRA/NCTE Standards for the English Language Arts. To view the standards, visit: www.ncte.org/standards.

Major Appliance and Refrigeration Technology

Purpose
To evaluate each contestant's preparation for employment and to recognize outstanding students for excellence and professionalism in the field of major appliance and refrigeration technology.

First, download and review the General Regulations at: http://updates.skillsusa.org.

Eligibility
Open to active SkillsUSA members enrolled in programs with major appliance repair technology within its career objective.

Clothing Requirement
Class C: Contest Specific — Manufacturing/Construction Khaki Attire
For both men and women: Official SkillsUSA khaki work shirt and pants; black, brown, or tan leather work shoes; safety glasses with side shields or goggles (prescription glasses may be used, only if they are equipped with side shields. If not, they must be covered with goggles).

These regulations refer to clothing items that are pictured and described at: www.skillsusastore.org. If you have questions about clothing or other logo items, call 800-401-1560 or 703-956-3723.

Note: Contestants must wear their official contest clothing to the contest orientation meeting.

Equipment and Materials
1. Supplied by the technical committee:
   a. Contest appliances
   b. Contest specialized tools
2. Supplied by the contestant:
   a. Tool box, tool bag or tool case
   b. Assortment or sets of hand screwdrivers (e.g., flat, Phillips, Roberts, torx head screwdrivers)
   c. Nut drivers, standard SAE and metric
   d. Assortment or sets of pliers (e.g., common, needle nose, channel lock, diagonal, arc joint)
   e. ¼" drive socket set, standard SAE and metric sockets
   f. 10-12 oz. hammer
   g. Adjustable wrenches, assorted sizes (e.g., 4", 6", 8")
   h. Allen wrenches, standard SAE and metric, assorted sizes
   i. Assortment or sets of open-end and box-end wrenches, standard SAE and metric
   j. Flashlight
   k. Pocket thermometer
   l. Volt-Ohm meter with standard probes and mini electronic probes
   m. Amperage meter, probe or clamp-on style. Can be integrated with a Volt-Ohm meter
   n. Gloves (optional)
   q. All competitors must create a one-page résumé and submit a hard copy to the technical committee chair at orientation. Failure to do so will result in a 10-point penalty.

Note: The tools listed above are a minimal suggestion. The contestant may bring additional tools at their discretion. No electric or battery-powered tools are allowed.

***Note*:** Your contest may also require a hard copy of your résumé as part of the actual contest. Check the Contest Guidelines and/or the updates page on the SkillsUSA website: http://updates.skillsusa.org.

Scope of the Contest
The contest is defined by industry standards and is subject to the manufacturers involved; make sure to check website for updates.

Knowledge Performance
The contest will include three written knowledge assessments that assess knowledge:
1. Technical assessment: Installing, servicing and repairing household appliances
2. Customer Relations assessment
3. Employability assessment

Skill Performance

The contest includes a series of stations where contestants will demonstrate the ability to perform jobs and skills selected from the following list of standards and competencies as determined by the SkillsUSA Championships technical committee.

Contest Guidelines

1. The contest will assess a participant's skill while practicing accuracy, good workmanship, speed and the safe use of tools and test equipment.
2. All industry standard and safety practices will be followed and assessed as a part of this contest.

Standards and Competencies

MAT 1.0 — Diagnose and repair common failures on various types of domestic top-load and front-load washing machines according to the manufacturer's specifications

- 1.1 Use diagnostic tools, equipment and technical literature
  - 1.1.1 Display knowledge of a volt/ohm meter
  - 1.1.2 Display knowledge of an amperage meter
  - 1.1.3 Demonstrate correct use of basic hand tools
  - 1.1.4 Demonstrate correct use of specialty tools
  - 1.1.5 Read wiring schematic/diagrams and tech sheets
- 1.2 Understand and operate electrical/mechanical components
  - 1.2.1 Repair problems associated with systems: hoses, diverters, check valves, pumps, valves and seals
  - 1.2.2 Demonstrate knowledge associated with motors: single speed, multiple speed, multi-phase and direct current
  - 1.2.3 Demonstrate knowledge of switches: all types
  - 1.2.4 Demonstrate knowledge of mechanical timer controls
  - 1.2.5 Demonstrate knowledge of electronic controls
  - 1.2.6 Demonstrate knowledge of customer user interfaces
  - 1.2.7 Demonstrate knowledge of drive systems: belts, transmissions, agitators, clutches, brakes, pulleys and multi-phase drive motors
  - 1.2.8 Demonstrate knowledge of water heating systems: thermistors, heaters, relays
  - 1.2.9 Demonstrate knowledge of mechanical systems: leveling legs, suspension systems, cabinet/base structure, door lock systems
  - 1.2.10 Demonstrate knowledge of other electrical components: alternating current line filters, capacitors, relays, solenoids, transformers, fuses, light bulbs of all types
  - 1.2.11 Demonstrate knowledge of washer steam systems

MAT 2.0 — Diagnose and repair common failures on various types of domestic electric and gas dryers per manufacturer's specifications

- 2.1 Use diagnostic tools, equipment and technical literature
  - 2.1.1 Display knowledge of a volt/ohm meter
  - 2.1.2 Display knowledge of an amperage meter
  - 2.1.3 Demonstrate correct use of basic hand tools
  - 2.1.4 Demonstrate correct use of specialty tools
  - 2.1.5 Read wiring schematic/diagrams and tech sheets
- 2.2 Possess the ability to service components related to domestic electrical and gas dryers
  - 2.2.1 Demonstrate knowledge to service and repair heating systems: heating elements, operating thermostats, hi-limit thermostats, thermistors, thermal fuses and motor centrifugal switches
  - 2.2.2 Demonstrate knowledge to service and repair gas heating systems: safety valves, igniters, flame sensors, operating thermostats, hi-limit thermostats, thermistors, thermal fuses and

motor centrifugal switch, gas valves, gas tubing and orifices

2.2.3 Demonstrate knowledge to service and repair switches: all types

2.2.4 Demonstrate knowledge to service and repair mechanical timer controls

2.2.5 Demonstrate knowledge to service and repair electronic controls

2.2.6 Demonstrate knowledge to service and repair customer user interface

2.2.7 Demonstrate knowledge to service and repair drive system: belts, idler pulleys and motors of all types

2.2.8 Demonstrate knowledge to service and repair drying systems: time dry, auto dry, sensor control dry and electronic control dry

2.2.9 Demonstrate knowledge to service and repair mechanical systems: leveling legs, drum rollers, drum support bearings, drum glides, door springs, door latches and cabinet/base structure

2.2.10 Demonstrate knowledge to service and repair other electrical components: relays, solenoids, transformers, fuses, light bulbs of all types

2.2.11 Demonstrate knowledge to service and repair air flow systems: cabinet duct system, blower wheels, drum/door seals, lint filter and air flow sensors

2.2.12 Demonstrate knowledge of dryer steam systems

MAT 3.0 — Diagnose and repair common failures on various types of domestic refrigerators per manufacturer's specifications

3.1 Use diagnostic tools, equipment and technical literature

3.1.1 Display knowledge of a volt/ohm meter

3.1.2 Display knowledge of an amperage meter

3.1.3 Demonstrate correct use of basic hand tools

3.1.4 Demonstrate correct use of basic specialty tools

3.1.5 Read wiring schematic/diagrams and tech sheets

3.2 Possess an understanding of the operation of mechanical/electrical components

3.2.1 Demonstrate knowledge of water systems: hoses, water valves, storage tank and filters

3.2.2 Demonstrate knowledge associated with motors and compressors: single speed, multiple speed, multi-phase and direct current

3.2.3 Demonstrate knowledge of switches: all types

3.2.4 Demonstrate knowledge of defrost systems: mechanical defrost timers, electronic controls, heaters, thermostat and thermistors

3.2.5 Demonstrate knowledge of electronic controls

3.2.6 Demonstrate knowledge of customer user interface

3.2.7 Demonstrate knowledge of icemaker system; module, thermostat, thermistor, cube mold/tray and heater

3.2.8 Demonstrate knowledge of ice and water dispenser systems; auger motor, crusher mechanism, ice bucket components, dispenser door mechanism, condensation heaters and ice-level sensing devices

3.2.9 Demonstrate knowledge of mechanical systems: leveling legs/rollers, door operation/alignment, door gasket replacement, freezer/fresh food compartment controls

3.2.10 Demonstrate knowledge of air-circulation systems: air ducts, diverters, baffles and fan motors

3.2.11 Demonstrate knowledge of other electrical components: alternating current line filters, capacitors, relays, solenoids, fuses and light bulbs of all types

3.2.12 Demonstrate knowledge of sealed system: basic refrigeration theory, identify/diagnose leaks and restrictions in condenser/post loop tubing/evaporator/heat exchanger/drier filter, compressor operation and diagnostics

3.2.13 Demonstrate knowledge and understanding of various refrigerant gasses currently used in refrigeration products with a sealed system

MAT 4.0 — Diagnose and repair common failures on various types of domestic electric and gas ranges per manufacturer's specifications

4.1 Use diagnostic tools, equipment and technical literature

4.1.1 Display knowledge of a volt/ohm meter

4.1.2 Display knowledge of an amperage meter

4.1.3 Demonstrate correct use of basic hand tools

4.1.4 Demonstrate correct use of basic specialty tools

4.1.5 Read wiring schematic/diagrams and tech sheets

4.2 Possess a knowledge of cooking systems: surface cooking, standard/convection bake and broil

4.2.1 Demonstrate knowledge of LP and natural gas fundamentals and theory

4.2.2 Demonstrate knowledge of conventional electric and induction cooking systems: heating elements, thermostats, hi limit thermostats, thermistors, thermal fuses, burner and selector switches

4.2.3 Demonstrate knowledge of gas cooking systems: safety valve, spark igniter, direct spark ignition, igniter electrodes, operating thermostats, hi limit thermostats, thermistors, thermal fuses, selector switches, gas valves, gas tubing, orifices, gas conversion

4.2.4 Demonstrate knowledge of switches: all types

4.2.5 Demonstrate knowledge of mechanical controls

4.2.6 Demonstrate knowledge of electronic controls

4.2.7 Demonstrate knowledge of customer user interfaces

4.2.8 Demonstrate knowledge of self-clean system

4.2.9 Demonstrate knowledge of motors: fan, servo/actuator

4.2.10 Demonstrate knowledge of mechanical systems: leveling legs, door locks, door structure and seals, door springs/hinges, cabinet/base structure

4.2.11 Demonstrate knowledge of other electrical components: relays, solenoids, transformers, fuses and light bulbs of all types

MAT 5.0 — Diagnose and repair common failures on various types of domestic microwaves per manufacturer's specifications

5.1 Use diagnostic tools, equipment and technical literature

5.1.1 Display knowledge of a volt/ohmmeter

5.1.2 Display knowledge of an amperage meter

5.1.3 Demonstrate correct use of basic hand tools

5.1.4 Demonstrate correct use of specialty tools

5.1.5 Read wiring schematic/diagrams and tech sheets

5.1.6 Demonstrate knowledge of microwave operations: conventional, convection and inverter technologies

5.1.7 Demonstrate knowledge of microwave cooking theory

5.1.8 Demonstrate knowledge of motors: fan, servo/actuator

5.1.9 Demonstrate knowledge of switches: all types

5.1.10 Demonstrate knowledge of mechanical controls

5.1.11 Demonstrate knowledge of electronic controls

5.1.12 Demonstrate knowledge of customer user interfaces

5.1.13 Demonstrate knowledge of door lock mechanisms
5.1.14 Demonstrate knowledge of high-voltage heating system: magnetron, transformer, capacitor and diode
5.1.15 Demonstrate knowledge of convection components
5.1.16 Demonstrate knowledge of mechanical systems: door structure and seals, door springs/hinges, wave guide and cabinet/base structure
5.1.17 Demonstrate knowledge of other electrical components: alternating current line filters, capacitors, relays, solenoids, transformers, fuses, light bulbs of all types

MAT 6.0 — Diagnose and repair common failures on various types of domestic dishwashers per manufacturer's specifications

6.1 Use diagnostic tools, equipment and technical literature
6.1.1 Display knowledge of a volt/ohmmeter
6.1.2 Display knowledge of an amperage meter
6.1.3 Demonstrate correct use of basic hand tools
6.1.4 Demonstrate correct use of basic specialty tools
6.1.5 Read wiring schematic/diagrams and tech sheets
6.2 Possess a knowledge of dishwasher operations
6.2.1 Demonstrate knowledge of water circulation system: hoses, diverters, check valves, pumps, valves and seals
6.2.2 Demonstrate knowledge of motors: single speed, multiple speed, multi-phase and direct current
6.2.3 Demonstrate knowledge of switches: all types
6.2.4 Demonstrate knowledge of mechanical timer controls
6.2.5 Demonstrate knowledge of electronic controls
6.2.6 Demonstrate knowledge of customer user interfaces
6.2.7 Demonstrate knowledge of water heating and drying system: thermistors, heaters and relays
6.2.8 Demonstrate knowledge of mechanical systems: leveling legs, cabinet/base structure, door lock mechanism, door structure and door/tub gasket
6.2.9 Demonstrate knowledge of other electrical components: alternating current line filters, capacitors, relays, solenoids, transformers, fuses, turbidity sensors and all types of light bulbs
6.2.10 Demonstrate theoretical knowledge of thermal, chemical and mechanical energy of temperature, detergent, water quality and circulation

MAT 7.0 — Assemble a standard brazing project that exhibits all techniques of brazing copper and steel tubing using brazing/connecting equipment, hand tools and specialty tools to precisely complete a domestic refrigeration sealed system repair per manufacturers' specifications

7.1 Demonstrate correct usage of the acetylene/oxygen or turbo torch brazing equipment and connection(s) joint using a refrigeration compression fitting such as LOKRING
7.2 Braze materials using heat trap paste, flux, 45-percent high silver alloy brazing material, 15-percent silver alloy brazing rod and saddle/access valves
7.3 Use of basic/specialty hand tools: swedging tool, tubing bender, triangular file, burr remover, sanding cloth, valve core removal tool, triangular file or cap tube cutter, process tube adaptor, pinch off tools and fitting/cleaning brush
7.4 Practice leak detection methods
7.4.1 Follow proper safety practices: fire extinguisher at hand, gloves, safety glasses and flame retardant mat

MAT 8.0 — Demonstrate knowledge of installing, servicing and repairing major household appliances with practical problems and proper use of test equipment in a written assessment.

8.1 Complete a written Technical Skills assessment

MAT 9.0 — Demonstrate ability to use spoken, written and visual language to perform competency tasks to display professional and personal interaction with employers

9.1 Fill out an employment application
9.2 Submit a hard copy one-page résumé to the judge at the mock employer job interview (a 10-point penaly will be assessed if a résumé is not submitted)
9.3 Interact in a mock employer job interview scenario
9.4 Complete a written employability skills assessment

MAT 10.0 — Demonstrate ability to use spoken, written and visual language to perform competency tasks to display professional and personal interaction with customers

10.1 Complete a written customer relations assessment
10.2 Interact in a mock customer relations interview scenario

Committee Identified Academic Skills

The technical committee has identified that the following academic skills are embedded in this contest.

- Provide information in oral presentations

Math Skills

- Use fractions to solve practical problems
- Solve practical problems involving percentages

Science Skills

- Describe and recognize elements, compounds, mixtures, acids, bases and salts
- Describe and recognize solids, liquids and gases
- Describe characteristics of types of matter based on physical and chemical properties
- Use knowledge of physical properties (shape, density, solubility, odor, melting point, boiling point, color)
- Use knowledge of chemical properties (acidity, basicity, combustibility, reactivity)
- Understand the modern model of atomic structure
- Use knowledge of classification of elements as metals, metalloids and nonmetals
- Understand Law of Conservation of Matter and Energy
- Describe phases of matter
- Describe and identify physical changes to matter
- Predict chemical changes to matter (types of reactions, reactants, products and balanced equations)
- Use knowledge of mechanical, chemical and electrical energy
- Use knowledge of heat, light and sound energy
- Use knowledge of temperature scales, heat and heat transfer
- Use knowledge of speed, velocity and acceleration
- Use knowledge of work, force, mechanical advantage, efficiency and power
- Use knowledge of principles of electricity and magnetism
- Use knowledge of static electricity, current electricity and circuits
- Use knowledge of magnetic fields and electromagnets
- Use knowledge of motors and generators

Language Arts Skills

- Provide information in conversations and in group discussions
- Provide information in oral presentations
- Demonstrate use of such verbal communication skills as word choice, pitch, feeling, tone and voice
- Demonstrate use of such nonverbal communication skills as eye contact, posture and gestures using interviewing techniques to gain information
- Analyze mass media messages
- Identify words and phrases that signal an author's organizational pattern to aid comprehension
- Understand source, viewpoint and purpose of texts
- Organize and synthesize information for use in written and oral presentations
- Demonstrate knowledge of appropriate reference materials

- Use print, electronic databases and online resources to access information in books and articles
- Demonstrate persuasive writing
- Demonstrate informational writing
- Edit writing for correct grammar, capitalization, punctuation, spelling, sentence structure and paragraphing

Connections to National Standards

State-level academic curriculum specialists identified the following connections to national academic standards.

Math Standards

- Numbers and operations
- Algebra
- Measurement
- Data analysis and probability
- Problem solving
- Reasoning and proof
- Communication
- Connections
- Representation

Source: NCTM Principles and Standards for School Mathematics. For more information, visit: www.nctm.org.

Science Standards

- Understands the structure and properties of matter
- Understands the sources and properties of energy
- Understands forces and motion
- Understands the nature of scientific inquiry
- Understands the scientific enterprise

Source: McREL compendium of national science standards. To view and search the compendium, visit: http://www2.mcrel.org/compendium/browse.asp.

Language Arts Standards

- Students read a wide range of print and nonprint texts to build an understanding of texts, of themselves, and of the cultures of the United States and the world; to acquire new information; to respond to the needs and demands of society and the workplace; and for personal fulfillment. Among these texts are fiction and nonfiction, classic and contemporary works
- Students apply a wide range of strategies to comprehend, interpret, evaluate and appreciate texts. They draw on their prior experience, their interactions with other readers and writers, their knowledge of word meaning and of other texts, their word identification strategies, and their understanding of textual features (e.g., sound-letter correspondence, sentence structure, context, graphics)
- Students adjust their use of spoken, written and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes
- Students employ a wide range of strategies as they write and use different writing process elements appropriately to communicate with different audiences for a variety of purposes
- Students conduct research on issues and interests by generating ideas and questions and by posing problems. They gather, evaluate and synthesize data from a variety of sources (e.g., print and nonprint texts, artifacts, people) to communicate their discoveries in ways that suit their purpose and audience
- Students use a variety of technological and information resources (e.g., libraries, databases, computer networks, video) to gather and synthesize information and to create and communicate knowledge
- Students use spoken, written and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion and the exchange of information)

Source: IRA/NCTE Standards for the English Language Arts. To view the standards, visit: www.ncte.org/standards.

MARINE SERVICE TECHNOLOGY

PURPOSE
To evaluate each contestant's preparation for employment and to recognize outstanding students for excellence and professionalism in the field of marine service technology.

First, download and review the General Regulations at: http://updates.skillsusa.org.

ELIGIBILITY
Open to active SkillsUSA members enrolled in programs with marine service technology as an occupational objective.

CLOTHING REQUIREMENT
Class D: Contest Specific — Blue Attire
For both men and women: Official SkillsUSA light blue work shirt; navy pants; black, brown, or tan leather work shoes safety shoes (with protective toe cap.) Safety glasses with side shields or goggles (prescription glasses may be used only if they are equipped with side shields. If not, they must be covered with goggles).

These regulations refer to clothing items that are pictured and described at: www.skillsusastore.org. If you have questions about clothing or other logo items, call 800-401-1560 or 703-956-3723.

Note: Contestants must wear their official contest clothing to the contest orientation meeting..

EQUIPMENT AND MATERIALS
1. Supplied by the technical committee:
   a. All necessary engines, engine parts, work benches, test stands, gasoline and oil, and specialized tools
   b. Industry manuals, including service and repair instruction manuals
2. Supplied by the contestant:
   a. All competitors must create a one-page résumé and submit a hard copy to the technical committee chair at orientation. Failure to do so will result in a 10-point penalty.

Note: Your contest may also require a hard copy of your résumé as part of the actual contest. Check the Contest Guidelines and/or the updates page on the SkillsUSA website: http://updates.skillsusa.org.

SCOPE OF THE CONTEST
The contest is defined by industry standards as established by the American Boat and Yacht Council (ABYC) and industry manufacturers involved in the event. Check the SkillsUSA website for updates.

Knowledge Performance
The contest will include a written knowledge exam to assess the knowledge of marine diagnostics, service and repair of boats and personal water craft with accessory items.

Skills Performance
The contest includes four skill stations assessing skills in two- and four-cycle engines, outboard and stern drive applications, and two- and four-cycle inboard troubleshooting/repair. In addition, proficiency must be demonstrated in marine application electrical/ignition systems, fuel systems, cooling systems, lubrication systems, drive/transmission systems, and boat and trailer rigging and repair.

Contest Guidelines
1. Contestants will be evaluated on safe work practices, cleanliness, organizational skills, accuracy, speed, completion of assigned tasks, worksheets and paperwork.
2. Judging criteria and points assigned will be determined by the difficulty of the tasks assigned.

Standards and Competencies

MT 1.0 — Demonstrate general shop practices

1.1 Establish proper shop safety tool and equipment procedures
1.2 Apply MSDS and procedures specific to the workplace environment
1.3 Recognize and use proper personnel protection related to marine service and repair procedures
1.4 Follow HAZMAT storage and disposal requirements

MT 2.0 — Use marine engine components and theory of operation

2.1 Apply knowledge of four-cycle gasoline-fueled engines:
- 2.1.1 Employ the principles of operation of a four-stroke gasoline-fueled engine
- 2.1.2 Identify internal components of a typical marinized four-cycle gasoline-fueled engine and describe how the components interact during the four cycles

2.2 Demonstrate knowledge of four-stroke diesel engines.
- 2.2.1 Differentiate between the diesel and gasoline-fueled four-cycle
- 2.2.2 Differentiate between compression ignitions and spark ignitions
- 2.2.3 Perform valve adjustment procedures on overhead valve and pushrod engine
- 2.2.4 Perform valve adjustment on overhead cam engine
- 2.2.5 Use precision measuring instruments such as micrometers, dial indicators, vernier calipers and feeler gauges

2.3 Understand two-cycle outboard engines.
- 2.3.1 Demonstrate principles of operation of a two-stroke outboard engine
- 2.3.2 Identify internal components of a typical two-stroke outboard engine and describe how the components interact with each other to achieve proper engine operation

MT 3.0 — Display knowledge of industry standards related to engine installations

3.1 Identify relevant American Boat and Yacht Council Standards as they apply to inboard engine installations. Specifically, these are engine control systems, belt guards and oil sump design, and fuel and exhaust system requirements recommended by the ABYC and the U.S. Code of Federal Regulations (CFRs)

MT 4.0 — Exhibit knowledge of marine electrical systems

4.1 Apply basic electrical theory, circuit design and application
4.2 Use a digital multi-meter (DMM) to perform electrical troubleshooting procedures such as voltage and amperage measurements, as well as to test for electrical continuity and measure electrical resistance values
4.3 Follow electrical system installation requirements as recommended by the ABYC and mandated by the U.S. Coast Guard's CFR specific to recreational boats, particularly in regard to battery installations, over-current protection requirements, ignition protection requirements and accepted wire sizing techniques for both AC and DC marine systems
4.4 Terminate wire connections using the proper techniques
4.5 Demonstrate knowledge of ABYC requirements for proper wire support and chafe protection
4.6 Demonstrate circuit troubleshooting procedures
- 4.6.1 Examine engine starting systems
- 4.6.2 Assess battery condition
- 4.6.3 Monitor engine ignition system
- 4.6.4 Check battery charging systems

4.7 Read and use wiring diagrams and follow troubleshooting flow charts to diagnose electrical system problems

MT 5.0 — Use knowledge of marine fuel system services

5.1 Identify fuel system components and their functions in the system
- 5.1.1 Disassemble, clean and replace, and adjust standard carburetor internal components associated with an overhaul

5.1.2 Perform fuel system pressure tests on both carbureted and fuel injected fuel systems
5.1.3 Properly mix fuel stabilization additives and prepare fuel systems for extended lay-up

MT 6.0 — Demonstrate knowledge of marine cooling systems

6.1 Identify raw water and closed cooling system component functions on a variety of marinized engines
6.1.1 Access water pump assemblies on outboard and inboard/outboard engines
6.1.2 Remove service and install water pumps on same
6.1.3 Overhaul a conventional raw water pump on an inboard engine assembly
6.1.4 Identify the need for sacrificial anodes in raw water cooling systems
6.1.5 Identify correct procedures for cooling system anode selection and replacement
6.1.6 Determine engine coolant condition and freeze level protection level
6.1.7 Differentiate between ethylene glycol and propylene glycol anti-freeze and where each must be used
6.1.8 Identify heat exchanger design and service procedures
6.1.9 Replace and properly adjust engine drive belts, both v and serpentine types
6.1.10 Determine proper thermostat operation and replacement if required
6.1.11 Use an infrared heat sensing gun to track coolant flow through engine and heat exchangers and explain temperature readings as they relate to the cooling system's condition
6.1.12 Pressure test cooling systems and coolant recovery container caps to locate potential leaks and proper pressure rating of container caps

MT 7.0 — Apply knowledge of lubrication systems

7.1 Classify engine oil ratings as established by the American Petroleum Institute (API)
7.2 Determine engine oil quantity and type recommended using engine workshop manuals
7.3 Change engine oil and filter following manufacturer's recommendations for the engine
7.4 Determine maintenance interval adjustments or excessive component wear by an analysis of a lubrication lab
7.4 1 Interpret an oil analysis report and describe potential internal component faults to both engines and gear units

MT 8.0 — Exhibit knowledge of gear drive systems, inboard and outboard

8.1 Demonstrate knowledge of power flow through a manual inboard engine reverse gear assembly in both forward and reverse operation
8.1.1 Explain why gear ratios vary from one installation to another
8.1.2 Distinguish between gear and bearing types and the advantages/disadvantages of different types in torque and load handling capabilities
8.2 Demonstrate knowledge of inboard engine propeller shaft alignment techniques and acceptable tolerances based on engine shaft sizes
8.3 Relate knowledge of power flow through an outboard engine from power head to propeller
8.4 Disassemble and reassemble an outboard engine lower unit/drive assembly using manufacturer-supplied special tools and manuals
8.4.1 Take measurements using precision measurement tools such as dial indicators and micrometers according to manufacturer workshop manual instructions
8.5 Contrast a power flow through a typical inboard/outboard upper and lower unit drive assembly

8.5.1 Perform pressure and vacuum tests to an IO gear drive unit to determine seal integrity

8.6 Disassemble and reassemble an IO drive assembly following correct manufacturer procedures and using manufacturer supplied special tools and manuals

MT 9.0 — Service and repair boat and trailer rigging

9.1 Properly wire boat trailer and connect to various vehicle types

9.2 Establish trailer tongue weight and match to vehicle capacity

9.3 Service trailer wheel bearings and ensure proper lubrication

9.4 Service trailer braking systems

MT 10.0 — Service and repair marine sanitation systems

10.1 Identify marine sanitation system types and their application in accordance with EPA standards and regional laws

10.2 Identify pump types used in marine sanitation systems and the advantages and disadvantages of each type for a specific application

10.3 Disassemble and reassemble a typical marine head piston type pump system and replace key pump components as needed

10.4 Demonstrate knowledge of typical type-3 marine sanitation system installation including all components such as through-hull valves, anti-siphon valves and holding tanks

MT 11.0 — Demonstrate knowledge of marine materials, composites, woodworking and metalworking

11.1 Identify modern composite materials used in boat construction and repair

11.1.1 Identify composite cloth material types (fiberglass, Kevlar, carbon fiber) and the application of each in marine construction or repair procedures

11.1.2 Identify the characteristics of the various cloth materials used in laminate construction and repair

11.2 Distinguish between three primary resin types (polyester, vinylester, epoxy) and the characteristics of each as they apply to specific applications

11.2.1 Practice safe storage and use of the various resin types

11.2.2 Recognize catylization procedures for the various resin types and the use of ratios and proportions for mixing of same to ensure proper curing and pot life while working

11.2.3 Identify core materials used in composite construction and the advantages/disadvantages of each type for a given application

11.3 Recognize various marine woods used in marine construction and the characteristics of each type for a specific application

11.4 Identify proper hand and power tools used to cut and shape marine woods, as well as safety practices specific to each of the tools commonly used such as table saws, band saws, jig saws and power sanding equipment

11.5 Measure properly in order to build small wooden cabinets and shelving as is common to marine applications

11.6 Identify safe and effective use of metal-working equipment such as drill presses, band saws, hand drills and taps and die sets used for threading metal

11.7 Demonstrate knowledge of marine metal applications and the susceptibility of common stainless steel, aluminum, mild steel and bronze metals to various types of corrosion such as crevice, poultice, galvanic and stray current

MT 12.0 — Model proper customer service/employability skills

12.1 Recognize proper boat care while conducting service procedures

12.2 Demonstrate basic warranty procedures related to dealer-installed equipment

12.3 Complete a standard work order form and gather necessary service-related information before work is performed

12.4 Communicate effectively in written and verbal form with customers relative to service procedures either recommended or performed

12.5 Demonstrate professionalism in appearance (proper attire) and work habits such as promptness and adhering to a schedule and deadlines

Committee Identified Academic Skills

The technical committee has identified that the following academic skills are embedded in this contest.

Math Skills

- Use fractions to solve practical problems
- Use proportions and ratios to solve practical problems
- Simplify numerical expressions
- Solve practical problems involving percents
- Measure angles
- Find surface area and perimeter of two-dimensional objects
- Find volume and surface area of three-dimensional objects
- Make predictions using knowledge of probability
- Make comparisons, predictions and inferences using graphs and charts
- Solve problems using proportions, formulas and functions
- Find slope of a line

Science Skills

- Use knowledge of mechanical, chemical and electrical energy
- Use knowledge of temperature scales, heat and heat transfer
- Use knowledge of speed, velocity and acceleration
- Use knowledge of Newton's laws of motion
- Use knowledge of work, force, mechanical advantage, efficiency and power
- Use knowledge of simple machines, compound machines, powered vehicles, rockets and restraining devices
- Use knowledge of principles of electricity and magnetism
- Use knowledge of static electricity, current electricity and circuits
- Use knowledge of magnetic fields and electromagnets
- Use knowledge of motors and generators

Language Arts Skills

- Provide information in conversations and in group discussions
- Provide information in oral presentations
- Demonstrate use of verbal communication skills: word choice, pitch, feeling, tone and voice
- Demonstrate use of nonverbal communication skills: eye contact, posture and gestures using interviewing techniques to gain information
- Demonstrate comprehension of a variety of informational texts
- Use text structures to aid comprehension
- Understand source, viewpoint and purpose of texts
- Organize and synthesize information for use in written and oral presentations
- Demonstrate knowledge of appropriate reference materials
- Use print, electronic databases and online resources to access information in books and articles

Connections to National Standards

State-level academic curriculum specialists identified the following connections to national academic standards.

Math Standards

- Numbers and operations
- Algebra
- Geometry
- Measurement
- Data analysis and probability
- Problem solving
- Communication
- Connections
- Representation

Source: NCTM Principles and Standards for School Mathematics. For more information, visit: www.nctm.org.

Science Standards

- Understands relationships among organisms and their physical environment
- Understands the structure and properties of matter
- Understands the sources and properties of energy
- Understands forces and motion
- Understands the nature of scientific inquiry

Source: McREL compendium of national science standards. To view and search the compendium, visit: http://www2.mcrel.org/compendium/browse.asp.

Language Arts Standards

- Students read a wide range of print and nonprint texts to build an understanding of texts, of themselves and of the cultures of the United States and the world; to acquire new information; to respond to the needs and demands of society and the workplace; and for personal fulfillment. Among these texts are fiction and nonfiction, classic and contemporary works
- Students apply a wide range of strategies to comprehend, interpret, evaluate and appreciate texts. They draw on their prior experience, their interactions with other readers and writers, their knowledge of word meaning and of other texts, their word identification strategies, and their understanding of textual features (e.g., sound-letter correspondence, sentence structure, context, graphics)
- Students adjust their use of spoken, written and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes
- Students use a variety of technological and information resources (e.g., libraries, databases, computer networks, video) to gather and synthesize information and to create and communicate knowledge
- Students use spoken, written and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion and the exchange of information)

Source: IRA/NCTE Standards for the English Language Arts.
To view the standards, visit: www.ncte.org/standards.

MASONRY

PURPOSE
To evaluate each contestant's preparation for employment and to recognize outstanding students for excellence and professionalism in the field of masonry.

First, download and review the General Regulations at: http://updates.skillsusa.org.

ELIGIBILITY
Open to active SkillsUSA members enrolled in programs with masonry or bricklaying as the occupational objective.

CLOTHING REQUIREMENT
Class C: Contest Specific — Manufacturing/Construction Khaki Attire
For both men and women: Official SkillsUSA khaki work shirt and pants; black, brown, or tan leather work shoes; safety glasses with side shields or goggles (prescription glasses may be used, only if they are equipped with side shields. If not, they must be covered with goggles).

These regulations refer to clothing items that are pictured and described at: www.skillsusastore.org. If you have questions about clothing or other logo items, call 800-401-1560 or 703-956-3723.

Note: Contestants must wear their official contest clothing to the contest orientation meeting.

EQUIPMENT AND MATERIALS
1. Supplied by the technical committee:
   a. Tenders
   b. Hose
   c. Three 55-gallon water drums
   d. Mortar pans, boards, pails, and wheelbarrows
   e. Hoes
   f. Square-nosed, short-handled shovels
   g. Sand
   h. Masonry mix or ready-mixed mortar
   i. Resin paper or suitable area covering
2. Supplied by the contestant:
   a. One trowel
   b. Two levels (24" and 48")
   c. One "S" jointer
   d. Long jointer
   e. One brick hammer
   f. Two 6-foot folding rules (one modular, one standard)
   g. One carrying bag
   h. One pencil
   i. One square
   j. One brush
   k. One brick chisel
   l. Line and line blocks
   m. All competitors must create a one-page résumé and submit a hard copy to the technical committee chair at orientation. Failure to do so will result in a 10-point penalty.

   ***Note*:** Your contest may also require a hard copy of your résumé as part of the actual contest. Check the Contest Guidelines and/or the updates page on the SkillsUSA website: http://updates.skillsusa.org.

SCOPE OF THE CONTEST
The contest is defined by industry standards as determined by the SkillsUSA Championships technical committee comprised of the Arizona Masonry Contractors Association, Bon Tool Co., Brick Industry Association, Brick Industry Association SE Region, E/Z Grout Corp., Hanley-Wood LLC, Marshalltown Co., Mason Contractors Association of America, Masonry Institute of Tennessee, National Concrete Masonry Association and SPEC MIX Inc.

Knowledge Performance
The contest will include a written knowledge exam assessing mastery of the knowledge of brick masonry techniques including but not limited to: safety; identification and usage of hand tools, power tools, measuring tools and equipment; and blueprint reading.

Skill Performance

The contest will include a skills performance demonstration that will assess the ability of the contestant to safely construct a composite brick and block project.

Contest Guidelines

1. Contestants will construct a project or wall system using brick or brick and block, according to project specifications and drawings, within an allotted period of time.
2. The project will include components of the most frequently used details in residential construction. In addition, the assessment will also include the vital elements of quality workmanship.

Standards and Competencies

* Considered essential competencies

** Should be mastered at the journeyman level

All other items are considered supplemental.

M 1.0 — Practice safe brick and masonry techniques according to industry standards as set forth by the SkillsUSA technical committee

1.1 *Choose proper tools and materials
1.2 *Perform work in a reasonable amount of time as determined by the instructor and/or industry standards
1.3 **Lay up masonry products in an accurate and professional manner
1.4 *Load and unload materials as directed
1.5 *Clean up work areas properly and thoroughly

M 2.0 — Model safety standards according to and following OSHA regulations

2.1 *Demonstrate appropriate safety precautions when performing all tasks
2.2 *Demonstrate awareness of potential hazards when performing all tasks
2.3 *Accept responsibility for the safety of other workers
2.4 *Keep work areas neat and organized
2.5 *Wear proper safety equipment and clothing
2.6 Follow prescribed OSHA standards

M 3.0 — Use hand tools and equipment according to industry standards as set forth by the SkillsUSA technical committee

3.1 *Cut masonry safely around others
3.2 *Place mortar cautiously in the mortar pan or on the mortar board
3.3 *Keep tools out of the paths of other people working on the job
3.4 *Handle tools properly

M 4.0 — *Identify and use basic hand tools used in brick masonry according to industry standards as set forth by the SkillsUSA technical committee

4.1 *Demonstrate an understanding of the specific uses of each hand tool
4.2 *Practice the safety rules for each hand tool
4.3 *Identify quality tools
4.4 *Store and care for hand tools

M 5.0 — Use measuring tools according to industry standards as set forth by the SkillsUSA technical committee

5.1 Use and maintain a modular ruler and a spacing ruler
5.2 Set and use a story pole
5.3 Power tool identification and usage

M 6.0 — Identify and use brick masonry power tools according to industry standards as set forth by the SkillsUSA technical committee

6.1 *Demonstrate the specific uses of each power tool
6.2 *Practice the safety rules for each power tool
6.3 Maintain power tools
6.4 *Set up power tools correctly

M 7.0 — Use equipment according to industry standards as set forth by the SkillsUSA technical committee

7.1 *Identify equipment generally used in brick masonry
7.2 Correctly use each piece of equipment
7.3 Store, maintain and repair all equipment
7.4 Inspect, assemble and disassemble rigging and scaffolding properly

M 8.0 — Use masonry levels according to industry standards as set forth by the SkillsUSA technical committee

8.1 **Use a 24" and 48" level for plumbing and leveling
8.2 *Care for and maintain a level

M 9.0 — Possess an appropriate knowledge of the fundamental theories in brick masonry

9.1 Demonstrate knowledge of trade terminology
- 9.1.1 **Identify terms used in brick masonry
- 9.1.2 **Incorporate trade terminology into oral communication relating to masonry tasks

9.2 Demonstrate knowledge of basic math
- 9.2.1 *Add, subtract, multiply and divide with whole numbers, decimals and fractions
- 9.2.2 *Figure proportions to mix masonry materials according to specifications
- 9.2.3 *Compute percentages to estimate and determine material requirements, work performed, schedules and costs
- 9.2.4 *Express answers relative to the trade

9.3 Read blueprints
- 9.3.1 *Read basic drawings and sketches and understand the information contained in them
- 9.3.2 *Know the meanings of basic architectural symbols and abbreviations
- 9.3.3 *Use a builder's level relative to a benchmark

M 10.0 — Use materials and methods according to industry standards as set forth by the SkillsUSA technical committee

10.1 Use brick masonry materials with accuracy
- 10.1.1 *Arrange masonry materials for efficient use
- 10.1.2 *Place mortar pans properly
- 10.1.3 *Temper or shake-up mortar with proper shovels

10.2 Use hod-carrying
- 10.2.1 *Arrange masonry materials for efficient use
- 10.2.2 *Place mortar pans properly
- 10.2.3 *Temper or shake-up mortar with proper shovels

10.3 Use trowels properly
- 10.3.1 **Manipulate a trowel properly
- 10.3.2 **Cut and roll, and cut and cup mortar to load trowel properly
- 10.3.3 **Spread and furrow mortar properly

M 11.0 — Prepare mortar according to industry standards as set forth by the SkillsUSA technical committee

11.1 Follow correct safety practices when mixing mortar
11.2 *Proportion mortar ingredients for specific mixes
11.3 *Mix mortar manually with hoe and mortar box
11.4 *Mix mortar with a mortar mixer

M 12.0 — Demonstrate bonding methods according to industry standards as set forth by the SkillsUSA technical committee

12.1 *Possess knowledge of different types of bonding used in masonry construction
12.2 **Lay out bond
12.3 **Determine coursing

M 13.0 — Use tool and point joints according to industry standards as set forth by the SkillsUSA technical committee

13.1 **Use tool concave joints
13.2 Use a tool rake, weather, V-jointer, grapevine and struck joints
13.3 Perform cut/rough joints
13.4 *Tuck-point a wall properly
13.5 **Brush and touch up a wall

M 14.0 — Clean brick and structural tile according to industry standards as set forth by the SkillsUSA technical committee

14.1 *Follow correct procedures for keeping masonry work clean
14.2 *Follow correct procedures in cleaning brick and structural tile
14.3 *Follow correct procedures for rubbing and tuck pointing concrete block and slag block
14.4 Clean and tuck-point stonework

M 15.0 — Lay brick and blocks according to industry standards as set forth by the SkillsUSA technical committee

15.1 Lay straight brick wall
- 15.1.1 *Lay brick at the rate of 75–100 bricks per hour
- 15.1.2 **Attach a line block and line pins to a wall
- 15.1.3 **Set a trig

15.1.4 **Lay brick to a line while holding bond
15.1.5 **Throw a full head joint

15.2 Lay straight block wall
15.2.1 *Spread bed joints and throw on full head joints for block units
15.2.2 *Lay block units to the line

15.3 Build the brick corner
15.3.1 *Lay out a wall in preparation for building a brick corner
15.3.2 *Construct a rack-back lead
15.3.3 *Construct an outside and inside corner lead (+ or – $^{11}/_{16}$")

15.4 Lay the block corner
15.4.1 *Lay out a wall in preparation for building a block corner
15.4.2 *Install wire reinforcements in bed joints
15.4.3 *Build a block corner to a specified height

15.5 Lay brick veneer wall
15.5.1 Determine type of brick to be used
15.5.2 *Bond the wall
15.5.3 *Scale each course
15.5.4 *Lay brick in mortar to scale
15.5.5 *Secure wall with ties at desired intervals
15.5.6 *Point and joint the wall

15.6 Lay brick masonry cavity wall
15.6.1 *Determine width of cavity and type of brick to be used
15.6.2 *Construct components of the wall in the proper sequence
15.6.3 *Spread mortar to achieve the required bond without getting mortar into the cavity
15.6.4 **Install wall ties that join the exterior and interior wythes together into a single cavity wall
15.6.5 **Install flashings and construct weep holes in a manner that permits effective drainage of moisture from cavity
15.6.6 **Construct and maintain the cavity during construction so that the air space provides insulation

15.7 Lay single Wythe brick (load-bearing wall using units that are a minimum of 5" wide)
15.7.1 Determine type of brick to be used
15.7.2 *Bond the wall
15.7.3 *Scale each course
15.7.4 *Lay brick in mortar to scale
15.7.5 **Secure wall with ties at desired intervals
15.7.6 *Point and joint the wall

15.8 Lay a brick and block composite wall
15.8.1 Determine type of brick and block to be used
15.8.2 *Bond the wall
15.8.3 *Scale each course
15.8.4 *Lay brick and block in mortar to scale
15.8.5 *Secure wall with ties at desired intervals
15.8.6 *Point and joint the wall

M 16.0 — Construct fireplaces and chimneys according to industry standards as set forth by the SkillsUSA technical committee

16.1 Identify various components of a fireplace
16.2 Build a fireplace according to plans
16.3 Identify various components of a chimney
16.4 Build a one-flue chimney from given plans

M 17.0 — Construct arches, columns and piers according to industry standards as set forth by the SkillsUSA technical committee

17.1 Demonstrate knowledge of architectural features including aesthetic trims, course designs, period and antique applications
17.2 Construct an arch using given plans
17.3 Construct a column using given plans
17.4 Construct a pier using given plans

M 18.0 — Lay floors, pavers and stairs according to industry standards as set forth by the SkillsUSA technical committee

18.1 Lay floors according to given plans
18.2 Lay pavers according to given plans
18.3 Lay stairs according to given plans
18.4 Concrete work

M 19.0 — Prepare footers according to industry standards as set forth by the SkillsUSA technical committee

19.1 Lay out footings properly
19.2 Place rebar properly
19.3 Place and rough finish concrete properly

M 20.0 — Lay out and establish foundations according to industry standards as set forth by the SkillsUSA technical committee

20.1 Lay out and establish grades for foundation
20.2 *Establish corners and lay out concrete block according to a specific bonding plan
20.3 Lay foundation wall to joist and brick shelf height
20.4 Waterproof foundation wall
20.5 *Install flashing, anchor bolts, termite shield and weep holes

Committee Identified Academic Skills

The technical committee has identified that the following academic skills are embedded in this contest.

Math Skills

- Use fractions to solve practical problems
- Use proportions and ratios to solve practical problems
- Simplify numerical expressions
- Solve practical problems involving percents
- Measure angles
- Find surface area and perimeter of two-dimensional objects
- Find volume and surface area of three-dimensional objects
- Make predictions using knowledge of probability
- Make comparisons, predictions, and inferences using graphs and charts
- Solve problems using proportions, formulas and functions
- Find slope of a line
- Find arc length and the area of a sector

Science Skills

None Identified

Language Arts Skills

- Provide information in conversations and in group discussions

Connections to National Standards

State-level academic curriculum specialists identified the following connections to national academic standards.

Math Standards

- Numbers and operations
- Algebra
- Geometry
- Measurement
- Problem solving
- Communication
- Connections
- Representation

Source: NCTM Principles and Standards for School Mathematics. For more information, visit: *www.nctm.org.*

Science Standards

- Understands the structure and properties of matter
- Understands the sources and properties of energy
- Understands forces and motion
- Understands the nature of scientific inquiry

Source: McREL compendium of national science standards. To view and search the compendium, visit: http://www2.mcrel.org/compendium/browse.asp.

Language Arts Standards

- Students apply a wide range of strategies to comprehend, interpret, evaluate and appreciate texts. They draw on their prior experience, their interactions with other readers and writers, their knowledge of word meaning and of other texts, their word identification strategies, and their understanding of textual features (e.g., sound-letter correspondence, sentence structure, context, graphics)
- Students adjust their use of spoken, written and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes
- Students use a variety of technological and information resources (e.g., libraries, databases, computer networks, video) to gather and synthesize information and to create and communicate knowledge
- Students use spoken, written, and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion, and the exchange of information)

Source: IRA/NCTE Standards for the English Language Arts. To view the standards, visit: www.ncte.org/standards.

MECHATRONICS

PURPOSE

To evaluate each team's preparation for employment and to recognize outstanding students for excellence and professionalism in the field of Mechatronics. Mechatronics is a career and educational discipline that combines the industrial skills of mechanics, electronics and computer-based controls with a team-oriented approach to problem solving. Skilled Mechatronic technicians are required for the maintenance, repair and operation of modern automated manufacturing systems.

First, download and review the General Regulations at: updates.skillsusa.org.

ELIGIBILITY (TEAM OF 2)

Open to active SkillsUSA members enrolled in Mechatronics technology programs as the occupational objective. Where this program is not yet available, students may compete if they are enrolled in industrial electricity, fluid power technology, programmable logic controls (PLC) technology or industrial automation programs.

CLOTHING REQUIREMENTS

Class C: Contest Specific — Manufacturing/Construction Khaki Attire

For both men and women: Official SkillsUSA khaki work shirt and pants; black, brown, or tan leather work shoes; safety glasses with side shields or goggles (prescription glasses may be used, only if they are equipped with side shields. If not, they must be covered with goggles).

These regulations refer to clothing items that are pictured and described at: www.skillsusastore.org. If you have questions about clothing or other logo items, call 800-401-1560 or 703-956-3723.

Note: Contestants must wear their official contest clothing to the contest orientation meeting.

EQUIPMENT AND MATERIALS

Requirements for Secondary/High School Team

1. Supplied by the technical committee:
   a. All specialized tools, materials and equipment needed to compete in the contest
   b. 24VDC, 3A power supply
2. Supplied by contestants:
   a. All competitors must create a one-page résumé and submit a hard copy to the technical committee chair at orientation. Failure to do so will result in a 10-point penalty.
   b. All hand tools and supplies will be provided by the technical committee (i.e., screwdrivers, wire and tubing cutters, wrenches, meters, etc.)

   ***Note*:** Your contest may also require a hard copy of your résumé as part of the actual contest. Check the Contest Guidelines and/or the updates page at: updates.skillsusa.org.

Requirements for College/Postsecondary Team Supplied PLC Assemblies

In addition to the previous list, the following are supplied by college/postsecondary contestants only:

1. One (1) PLC assembly. Teams competing at the college/ postsecondary level will be required to write a PLC program. This necessitates each college/postsecondary team to provide its own PLC assembly and programming device/software (e.g., laptop computers or hand-held programming devices). The PLC assembly must meet the following requirements:
   a. Power supply: The PLC must be capable of operation at 24VDC, or 120VAC.

   All 120VAC units must be wired ahead of time to an in-line ground-fault interrupter device and standard (NEMA 5-15P) 120VAC line cord. All 120VAC wiring must meet PLC manufacturer's requirements and follow standard industry practice. Judges reserve the right to disallow the use of any contestant-supplied equipment that

presents a safety hazard. No line cords or 120VAC wiring devices will be supplied at the contest.

b. PLC shall have a minimum of 16 digital inputs and 16 digital outputs.
c. Inputs shall be 24VDC Sinking (inputs shall be activated by application of a +24VDC signal to the input terminal).
d. Outputs shall be 24VDC Sourcing (outputs shall supply a +24VDC signal to the load when activated). All loads will be returned to ground. Output capacity shall be no less than 0.5A, each.

No Analog I/O will be required.

Terminal blocks and wire will be provided by the technical committee. Contestants will wire their PLC I/O points to these blocks, per instructions given out at the time of the contest.

Scope of the Contest

Knowledge Performance

The contest will include a 50- to 100-question written knowledge exam assessing general knowledge of Mechatronics technology. Questions pertaining to mechanics, industrial electricity, fluid power systems (pneumatic and hydraulic), and programmable controllers will be included.

Skill Performance

The contest includes an oral assessment and multiple challenges, including a troubleshooting and construction project. Teams of two contestants, in a timed event, will accurately and neatly perform system troubleshooting and repair a faulty machine system. In this event, general interdisciplinary knowledge of the individual technologies and interactions in an integrated system will be examined by the judges.

Contest Guidelines

1. The contest will be a team-oriented event. Teams will consist of two contestants from the same school in the same division.
2. The contest will consist of various tasks selected from the list of standards and competencies as determined by the SkillsUSA Championships technical committee. Committee membership includes Festo Corp.
3. Teams can freely choose who performs tasks separately or together.
4. Contestants will be rotated through identical stations with time limits determined by the national technical committee.
5. The judging criteria and the points assigned will be determined by the difficulty of the task assigned.
6. The oral examination assesses the team's ability to effectively communicate the operation and behavior of Mechatronics systems or sub-systems and to analyze a circuit diagram.
7. Contestants will be tested on familiarity with ISO symbols, interpretation of relationships between components, and ability to develop sequential operations.
8. Teams competing at the college/postsecondary level will be required to write a PLC program. This necessitates each college/postsecondary team to provide its own PLC assembly and programming device/software (e.g., laptop computers or hand-held programming devices).

Standards and Competencies

MECH 1.0 — Read and interpret blueprints

1.1 Read and interpret electrical schematics
1.2 Read and interpret mechanical drawings
1.3 Read and interpret fluid power circuit diagrams

MECH 2.0 — Build a Mechatronic device based upon given specifications

2.1 Use measurement tools
2.2 Select fasteners to mount components
2.3 Use appropriate wires to make correct electrical connections
2.4 Use appropriate tubing to make pneumatic connections
2.5 Employ best practices in laying out wires and tubes for neatness, security and safe operation
2.6 Adjust subsystems by utilizing interdisciplinary skills

2.7 Adjust and calibrate subsystems by using interdisciplinary skills
2.8 Employ proper safety equipment and practice

MECH 3.0 — Mechanical devices

3.1 Calculate belt and pulley diameters to obtain desired speed and torque parameters
3.2 Use specialized tools to measure speeds of motors and other mechanical devices
3.3 Use specialized tools to make adjustments on mechanical subsystems, including physical alignment and belt/chain tensions

MECH 4.0 — Identify and troubleshoot contest modified mechanical, pneumatic, electrical and electronic components

4.1 Use resistance, voltage, and current to test electrical equipment properly
4.2 Install, adjust and troubleshoot programmable logic controllers and systems
4.3 Select and install threaded fasteners
4.4 Perform precision measuring on mechanical components
4.5 Install, service, adjust and troubleshoot pneumatic and hydraulic systems
4.6 Install, adjust and troubleshoot electro-pneumatic and electro-hydraulic systems
4.7 Read construction, electrical and mechanical blueprints
4.8 Successfully answer a 50- to 100-question test

College/postsecondary students will also:

MECH 5.0 — Install a PLC

5.1 Identify input and output terminals on the PLC
5.2 Connect appropriate wires to each input and output
5.3 Connect the wires to the applicable actuators and sensors

MECH 6.0 — Program a PLC

6.1 Develop, debug and download a PLC program designed to make the system function according to plan using proper software and interfaces

Committee Identified Academic Skills

The technical committee has identified that the following academic skills are embedded in this contest:

Math Skills

- Solve single variable algebraic expressions
- Make comparisons, predictions and inferences using graphs and charts
- Organize and describe data using matrixes

Science Skills

- Understand Law of Conservation of Matter and Energy
- Use knowledge of potential and kinetic energy
- Use knowledge of mechanical, chemical and electrical energy
- Use knowledge of heat, light and sound energy
- Use knowledge of principles of electricity and magnetism
- Use knowledge of static electricity, current electricity and circuits
- Use knowledge of magnetic fields and electromagnets

Language Arts Skills

- Demonstrate comprehension of a variety of informational texts
- Use text structures to aid comprehension
- Demonstrate knowledge of appropriate reference materials
- Use print, electronic databases and online resources to access information in books and articles

Connections to National Standards

State-level academic curriculum specialists identified the following connections to national academic standards.

Math Standards

- Numbers and Operations
- Algebra
- Geometry
- Measurement
- Problem Solving
- Reasoning and Proof
- Communication
- Connections
- Representation

Source: NCTM Principles and Standards for School Mathematics. For more information, visit: http://www.nctm.org.

Science Standards

- Understands the sources and properties of energy
- Understands forces and motion
- Understands the nature of scientific inquiry

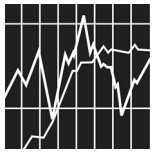
Source: McREL compendium of national science standards. To view and search the compendium, visit: http://www2.mcrel.org/compendium/browse.asp.

Language Arts Standards

- Students read a wide range of print and non-print texts to build an understanding of texts, of themselves, and of the cultures of the United States and the world; to acquire new information; to respond to the needs and demands of society and the workplace; and for personal fulfillment. Among these texts are fiction and nonfiction, classic and contemporary works
- Students apply a wide range of strategies to comprehend, interpret, evaluate, and appreciate texts. They draw on their prior experience, their interactions with other readers and writers, their knowledge of word meaning and of other texts, their word identification strategies, and their understanding of textual features (e.g., sound-letter correspondence, sentence structure, context, graphics)
- Students adjust their use of spoken, written and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes
- Students use a variety of technological and information resources (e.g., libraries, databases, computer networks, video) to gather and synthesize information and to create and communicate knowledge
- Students use spoken, written and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion and the exchange of information)

Source: IRA/NCTE Standards for the English Language Arts. To view the standards, visit: www.ncte.org/standards.

MEDICAL ASSISTING



PURPOSE
To evaluate each contestant's preparation for employment and to recognize outstanding students for excellence and professionalism in the field of medical assisting.

First, download and review the General Regulations at: http://updates.skillsusa.org.

ELIGIBILITY
Open to active SkillsUSA members enrolled in programs with medical assisting as the occupational objective.

CLOTHING REQUIREMENT
Class B: Healthcare Attire
For both men and women: Official blue scrubs; white socks or skin-tone seamless hose; health-professional's white leather work shoes. Shoes must be all-white leather (no canvas), completely enclosed (no open-toe or open-heel). Athletic-style shoes that meet the aforementioned criteria are acceptable.

Scrubs should fit appropriately for all health contests and should be properly hemmed and wrinkle free. Only plain, white, collarless t-shirts may be worn underneath the scrubs. Hair must be pinned up and off the collar.

These regulations refer to clothing items that are pictured and described at: www.skillsusastore.org. If you have questions about clothing or other logo items, call 800-401-1560 or 703-956-3723.

Note: Contestants must wear their official contest clothing to the contest orientation meeting.

EQUIPMENT AND MATERIALS
1. Supplied by the technical committee:
   a. All instruments, equipment and materials required for the contest

2. Supplied by the contestant:
   a. Watch
   b. Pen (black ink)
   c. Stethascope
   d. Sterile gloves
   e. Lister bandage scissors
   f. Small blank note pad
      Note: Latex allergic contestants should bring latex-free gloves.
   g. All competitors must create a one-page résumé and submit a hard copy to the technical committee chair at orientation. Failure to do so will result in a 10-point penalty.

   Note**:** Your contest may also require a hard copy of your résumé as part of the actual contest. Check the Contest Guidelines and/or the updates page on the SkillsUSA website at http://updates.skillsusa.org.

SCOPE OF THE CONTEST
The contest assesses the ability to perform skills needed as a medical assistant. The contest uses *Health Occupations: Core Knowledge and Skills* and the American Medical Association accreditation and certification standards.

Knowledge Performance
The contest includes a written knowledge test including topics identified in *Health Occupations: Core Knowledge and Skills*. Contestants will also be expected to demonstrate knowledge and skills ability in the performance portion of the contest. College/postsecondary contestants will be required to complete several advanced stations (e.g., but not limited to: invasive procedures, sterile procedures, collection and transportation, insurance filing and coding, critical thinking, etc.)

Skills Performance
The contest will consist of simulated office situations and demonstrations.

Contest Guidelines

1. Contestants will demonstrate their ability to perform procedures or skills selected from the list of competencies below as determined by the SkillsUSA Championships health occupations technical committee.
2. Contestants, as part of the demonstration, should voluntarily express pertinent information.

Standards and Competencies

MA 1.0 — Perform general office procedures to accreditation and certification standards recognized by the American Medical Association

1.1 Place and receive telephone calls
1.2 Arrange for client admission to hospital
1.3 Arrange physician's travel accommodations
1.4 Schedule client appointments
1.5 Complete history and assessment for client
1.6 Explain doctor's fee and office policies
1.7 File letters, diagnostic reports and progress notes in client's records
1.8 Gather data for necessary reports regarding referrals to other doctors
1.9 Prepare medical file for a new client
1.10 Maintain appointment book and reminder system
1.11 Make referral appointments for client
1.12 Prepare release form and obtain the necessary signatures
1.13 Process mail
1.14 Prepare medical records for daily appointment schedule
1.15 Receive clients and visitors
1.16 Schedule patients for outpatient diagnostic tests
1.17 Prepare statements for mailing
1.18 Prepare correspondence from rough draft
1.19 Prepare medical records
1.20 Demonstrate ICD-10 coding
1.21 Demonstrate CPT coding
1.22 Apply computer concepts to office practices
1.23 Plan and organize daily office activities
1.24 Update inventory list of office supplies and equipment
1.25 Prepare purchase requisitions
1.26 Complete peg board
1.27 Operate calculator

MA 2.0 — Perform general accounting procedures to accreditation and certification standards recognized by the American Medical Association

2.1 Collect and post payments
2.2 Collect delinquent bills
2.3 Maintain a file of unpaid accounts
2.4 Maintain a petty cash fund
2.5 Make financial arrangements with clients
2.6 Prepare bank deposit slips
2.7 Process charge slips
2.8 Prepare checks for doctor's signature
2.9 Prepare payroll
2.10 Reconcile bank statements
2.11 Reconcile cash count and receipts
2.12 Review invoices for validity and accuracy

MA 3.0 — Complete government and third party insurance forms and other financial reports to accreditation and certification standards recognized by the American Medical Association

3.1 Complete insurance forms for filing assigned insurance claims
3.2 Complete insurance forms for client reimbursement
3.3 Complete Medicare forms
3.4 Complete worker's compensation forms
3.5 Complete Medicaid forms

MA 4.0 — Perform general laboratory procedures to accreditation and certification standards recognized by the American Medical Association

4.1 Assist with the collection of clean catch or sterile urine specimens
4.2 Assist with the collection of microorganism smear
4.3 Assist with the collection of Pap smear
4.4 Prepare urine specimen for microscopic examination
4.5 Collect eye, nose and throat specimens for culture and sensitivity
4.6 Assist with the collection of a random voided urine specimen
4.7 Perform urinalysis testing
4.8 Perform cholesterol tests
4.9 Perform blood sugar screening test
4.10 Perform mono screening tests
4.11 Conduct urine pregnancy test
4.12 Perform urine specific gravity tests

4.13 Prepare requisitions for test outside of office
4.14 Prepare specimens for shipping
4.15 Test stool specimens for occult blood

MA 5.0 — Perform hematology procedures to accreditation and certification standards recognized by the American Medical Association

5.1 Obtain a capillary blood specimen
5.2 Perform hematocrit test
5.3 Perform hemoglobin test
5.4 Perform venipuncture using vacuum setup (high school contestants will not participate in the venipuncture skills, but may be required to identify equipment and supplies used in this procedure).
5.5 Separate plasma or serum from cells
5.6 Perform variety of testing using blood from vacuum tube(s)

MA 6.0 — Perform electrocardiogram (EKG) procedures to accreditation and certification standards recognized by the American Medical Association

6.1 Perform EKG test
6.2 Clean EKG equipment after use

MA 7.0 — Demonstrate knowledge of pharmaceutical principles and provide medication administration to accreditation and certification standards recognized by the American Medical Association

7.1 Monitor supply of controlled substances
7.2 Identify commonly administered drugs, their uses and effects
7.3 Use correct pharmaceutical abbreviations and terminology
7.4 Identify various methods and routes of drug administration
7.5 Perform medication administration: oral, ID, SC, IM, topical or transdermal
Note: High school contestants will not participate in the medication administration skill, but may be required to identify equipment, medications or supplies used in this procedure.
7.6 Explain the six rights of medication safety

MA 8.0 — Perform clinical office procedures to accreditation and certification standards recognized by the American Medical Association

8.1 Assist with minor surgery
8.2 Assist with dressing change
8.3 Create and maintain a sterile field
- 8.3.1 Pour Betadine into sterile bowl on sterile field
- 8.3.2 Add sterile instruments or gauze
- 8.3.3 Cover sterile field and maintain field integrity

8.4 Assist with physical examination
8.5 Assist with biopsy procedure
8.6 Perform visual and auditory acuity tests
8.7 Position and drape patient
8.8 Apply elastic bandage
8.9 Apply roller bandage
8.10 Apply triangular bandage
8.11 Apply tubular bandage
8.12 Demonstrate knowledge and use of pressure points to control bleeding
8.13 Provide first aid for syncope
8.14 Prepare for catheterization
8.15 Prepare patient for minor surgery
8.16 Prepare room and equipment for examination, procedures and minor surgery
8.17 Measure and record temperature using oral, rectal, auxiliary, temporal or aural equipment
8.18 Measure and record pulse
8.19 Measure and record respiration
8.20 Measure and record blood pressure
8.21 Perform hot and cold therapies
8.22 Perform basic adult, infant and child CPR
8.23 Identify medical instruments and equipment
8.24 Measure height and weight
8.25 Chart pertinent observations/information
8.26 Demonstrate emergency measures for choking
8.27 Provide patient education on tests, medications, procedures, etc.
8.28 Use medical terminology and abbreviations as needed
8.29 Perform proper documentation for all procedures, manually or electronically

Health Occupations: Core Knowledge and Skills (for reference)

1. Academic Foundations
   a. Apply knowledge of human structure and function to client care situations
   b. Apply concepts of basic human needs to client care
   c. Apply knowledge of nutrition
   d. Apply basic mathematical concepts

2. Communication Skills — Core
   a. Demonstrate oral, written, and telephone communication skills with patients, families and staff
   b. Modify communication to meet client needs
   c. Spell, pronounce, define and utilize medical terms and abbreviations
   d. Observe, report and document pertinent patient data
   e. Demonstrate effective interpersonal relationships
   f. Be sensitive to multicultural and multilingual needs
   g. Provide for emotional support of client during procedure/treatment

3. Safety — Core
   a. Report and/or correct safety hazards
   b. Apply principles of body mechanics
   c. Maintain equipment in proper working order
   d. Maintain a safe client environment
   e. Follow emergency procedures
   f. Verify identity of client
   g. Use precautions in the presence of ionizing radiation
   h. Manage hazardous materials

4. Infection Control and Asepsis — Core
   a. Perform correct handwashing technique
   b. Use appropriate personal protective equipment
   c. Identify at-risk behaviors and modes of transmission of pathogens
   d. Use standard precautions outlined by the CDC
   e. Apply principles of medical asepsis
   f. Clean and restock client environment
   g. Apply principles of disinfection

5. Asepsis — Advanced
   a. Create and maintain sterile field
   b. Don and remove sterile gloves/gown
   c. Assist with minor surgical procedures
   d. Apply principles of sterilization
   e. Clean, disinfect and sterilize surfaces, instruments, supplies and equipment utilizing appropriate methods
   f. Prepare and/or package equipment for sterilization

6. Ethical/Legal
   a. Operate within the legal framework of liability in his/her scope of work
   b. Maintain confidentiality in the health care setting
   c. Explain client rights
   d. Recognize and report signs of neglect and abuse

7. Employment Skills
   a. Exhibit such personal skills as attendance, time management, individual responsibility and teamwork
   b. Maintain professional conduct and appearance
   c. Complete job application and résumé
   d. Demonstrate interview skills
   e. Prepare correspondence related to the employment process

Committee Identified Academic Skills

The technical committee has identified that the following academic skills are embedded in this contest.

Math Skills

- Use fractions to solve practical problems
- Use proportions and ratios to solve practical problems
- Solve practical problems involving percents
- Make comparisons, predictions and inferences using graphs and charts
- Organize and describe data using matrixes
- Use basic mathematical functions (addition, subtraction, division and multiplication)

Science Skills

- Plan and conduct a scientific investigation
- Use knowledge of cell theory
- Use knowledge of patterns of cellular organization (cells, tissues, organs, systems)
- Describe basic needs of organisms

- Classify living organisms
- Use knowledge of reproduction and transmission of genetic information
- Describe and recognize elements, compounds, mixtures, acids, bases and salts
- Describe and recognize solids, liquids and gases
- Use knowledge of chemical properties (acidity, basicity, combustibility, reactivity)
- Predict chemical changes to matter (types of reactions, reactants and products, and balanced equations)

Language Arts Skills

- Provide information in conversations and in group discussions
- Demonstrate use of such verbal communication skills as word choice, pitch, feeling, tone, and voice
- Demonstrate use of such nonverbal communication skills as eye contact, posture, and gestures using interviewing techniques to gain information
- Demonstrate comprehension of a variety of informational texts
- Understand source, viewpoint and purpose of texts
- Organize and synthesize information for use in written and oral presentations
- Demonstrate knowledge of appropriate reference materials
- Use print, electronic databases and online resources to access information in books and articles
- Demonstrate narrative writing
- Demonstrate informational writing
- Edit writing for correct grammar, capitalization, punctuation, spelling, sentence structure and paragraphing

Connections to National Standards

State-level academic curriculum specialists identified the following connections to national academic standards.

Math Standards

- Numbers and operations
- Geometry
- Measurement
- Data analysis and probability
- Problem solving
- Communication
- Connections
- Representation

Source: NCTM Principles and Standards for School Mathematics. For more information, visit: http://www.nctm.org.

Science Standards

- Understands the principles of heredity and related concepts
- Understands the structure and function of cells and organisms
- Understands biological evolution and the diversity of life
- Understands the structure and properties of matter
- Understands the nature of scientific knowledge
- Understands the nature of scientific inquiry
- Understands the scientific enterprise

Source: McREL compendium of national science standards. To view and search the compendium, visit: http://www2.mcrel.org/compendium/browse.asp.

Language Arts Standards

- Students read a wide range of print and nonprint texts to build an understanding of texts, of themselves and of the cultures of the United States and the world; to acquire new information; to respond to the needs and demands of society and the workplace; and for personal fulfillment. Among these texts are fiction and nonfiction, classic and contemporary works
- Students apply a wide range of strategies to comprehend, interpret, evaluate and appreciate texts. They draw on their prior experience, their interactions with other readers and writers, their knowledge of word meaning and of other texts, their word identification strategies, and their understanding of textual features (e.g., sound-letter correspondence, sentence structure, context, graphics)
- Students adjust their use of spoken, written and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes
- Students employ a wide range of strategies as they write and use different writing process elements appropriately to

communicate with different audiences for a variety of purposes
- Students apply knowledge of language structure, language conventions (e.g., spelling and punctuation), media techniques, figurative language and genre to create, critique and discuss print and nonprint texts
- Students conduct research on issues and interests by generating ideas and questions, and by posing problems. They gather, evaluate and synthesize data from a variety of sources (e.g., print and nonprint texts, artifacts, people) to communicate their discoveries in ways that suit their purpose and audience
- Students use a variety of technological and information resources (e.g., libraries, databases, computer networks, video) to gather and synthesize information and to create and communicate knowledge
- Students develop an understanding of and respect for diversity in language use, patterns, and dialects across cultures, ethnic groups, geographic regions and social roles
- Students participate as knowledgeable, reflective, creative and critical members of a variety of literacy communities
- Students use spoken, written and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion and the exchange of information)

Source: IRA/NCTE Standards for the English Language Arts. To view the standards, visit: www.ncte.org/standards.

MOBILE ELECTRONICS INSTALLATION

PURPOSE
To evaluate each contestant's preparation for employment and to recognize outstanding students for excellence and professionalism in the field of mobile electronic installation.

First, download and review the General Regulations at: http://updates.skillsusa.org.

ELIGIBILITY
Open to active SkillsUSA members enrolled in technology programs that include mobile electronics installations.

CLOTHING REQUIREMENT
Class E: Contest specific — Business Casual
For men: Official SkillsUSA white polo shirt, black dress slacks, black socks, black leather shoes.
For women: Official SkillsUSA white polo shirt with black dress skirt (knee-length) or black slacks; black socks or black or skin-tone seamless hose; black leather dress shoes.

These regulations refer to clothing items that are pictured and described at: www.skillsusastore.org. If you have questions about clothing or other logo items, call 800-401-1560 or 703-956-3723.

Note: Contestants must wear their official contest clothing to the contest orientation meeting.

EQUIPMENT AND MATERIALS
1. Supplied by the technical committee:
   a. Necessary materials, schematics and equipment required for the contest
2. Supplied by the contestant:
   a. Pencils
   b. Safety glasses
   c. Calculator
   d. Soldering iron
   e. Wire crimpers (Kline type)
   f. Wire strippers
   g. Digital multimeter (DMM)
   h. All competitors must create a one-page résumé and submit a hard copy to the technical committee chair at orientation. Failure to do so will result in a 10-point penalty.

***Note*:** Your contest may also require a hard copy of your résumé as part of the actual contest. Check the Contest Guidelines and/or the updates page on the SkillsUSA website at http://updates.skillsusa.org.

SCOPE OF THE CONTEST
1. The scope of the contest will be consistent with the industry standards outlined in the competencies listed for the Mobile Electronics Certified Professional Basic Installation Technician exam produced by the Consumer Electronics Association (CEA). See www.mecp.com. Following are the major skills areas:

Section 1 — Basic and Advanced Electrical
   a. Electrical laws and formulas for the mobile electronics environment
   b. Electrical components
   c. Basic electrical troubleshooting
   d. Filters
   e. Relays, batteries and cable
   f. Semiconductors
   g. Automotive, electrical and charging systems
   h. Troubleshooting

Section 2 — Mobile Electronics Installation Knowledge and Techniques
   a. Basic installation practices
   b. Noise troubleshooting
   c. Battery troubleshooting
   d. Meters and test equipment
   e. General installation and equipment
   f. Shop safety
   g. Troubleshooting guide

Section 3 — Introduction to Autosound, Security, Wireless and Navigation
   a. Introduction to audio — autosound basics
   b. Introduction to security
   c. Wireless communications: The basics of installation

d. Navigation basics
e. Satellite radio
The current MECP Basic Mobile Electronics Installer competency standards are available on the Web at: www.mecp.com.

2. Contestants will demonstrate their ability to perform jobs or skills selected from the competencies listed below as determined by the SkillsUSA Championships technical committee.
3. **Installing, Diagnosing and Servicing**: This section of the competition consists of several test-station activities. Contestants must successfully complete assigned tasks at each station. The tasks are designed to provide a variety of challenges based on the MECP recommended practices. Approximately 45 minutes are allowed at each station.

Knowledge Performance

The written test is based on the Mobile Electronics Certified Professional Basic Installation Technician exam produced by the Consumer Electronics Association (CEA). See www.mecp.com.

Skill Performance

The event includes a professional interview and five hands-on applications that include taking electrical measurements, installing consumer electronic equipment in a mobile environment, soldering, working with relay circuits and troubleshooting electronic circuitry.

Standards and Competencies

MEI 1.0 — Charging and Electrical System Measurements

Comprised of one task associated with using standard test instruments to establish a State of Health report for a given vehicle.

MEI 2.0 — Removing and Replacing Headunits

Comprised of one task related to removing an existing head unit and replacing it with an OEM upgrade head unit.

MEI 3.0 — Installing Audio Amplifiers

Comprised of one task related to physically adding an audio amplifier to an existing mobile audio installation and configuring it for safe usage by the customer.

MEI 4.0 — Using Relays

Comprised of one task requiring the contestant to design and configure a relay-based circuit to perform the requested mobile installation related to upgrading consumer electronic systems in a vehicle.

MEI 5.0 — Locating and Diagnosing Open and Short Circuits

Comprised of one task related to locating and repairing an open circuit and/or a short circuit condition. Judged on ability to locate, identify and repair all malfunctions; and adherence to safety and ESD procedures.

MEI 6.0 — Electronics Installer Theory Exam

Contestants will take an examination covering their knowledge of basic and advanced electrical theory, installation knowledge and techniques, and mobile consumer electronics systems. Questions cover basic 12-volt circuits and devices, mobile consumer electronics systems and subsystems (sound, security, wireless and navigation), and basic mobile electronics diagnostic and troubleshooting questions. The exam consists of multiple-choice questions and lasts up to two hours.

MEI 7.0 — Customer Service

Contestants will respond to questions related to providing professional customer service techniques.

MEI 8.0 — Personal Interview

A business/industry preliminary interview will be conducted with an industry professional, focusing on the customer service culture.

MEI 9.0 — Determining Winners

Winners will be determined on the basis of total scores, including diagnosis and troubleshooting, soldering, assembly, customer service and personal interview interaction, and theory exam.

MEI 10.0 — Items Evaluated

Relative point values for each item below will be determined by the technical committee.

- 10.1 Installing, diagnosing and service scoring
  - 10.1.1 Read and understand the manufacturer's training literature about the device
  - 10.1.2 Use test equipment to make specified measurements
  - 10.1.3 Follow recommended manufacturer's sequence of installation procedures and troubleshooting practices
  - 10.1.4 Identify the scope of the task or problem
  - 10.1.5 Identify any defective component
- 10.2 Practical Skills
  - 10.2.1 Soldering techniques
  - 10.2.2 Workmanship and assembly techniques
  - 10.2.3 Final operation of installations tasks
  - 10.2.4 Ability to locate, identify and/or repair malfunctions
  - 10.2.5 Safety and ESD procedures
- 10.3 Customer Service
- 10.4 Personal Interview
- 10.5 Written Exam

Mobile Robotics Technology

Purpose
To evaluate each contestant's preparation for employment in the field of robotics with emphasis on the team approach to problem solving in a work environment. To recognize outstanding students for their excellence and professionalism in the emerging field of mobile robotics.

First, download and review the General Regulations at: http://updates.skillsusa.org.

Eligibility
Open to a team of two active SkillsUSA members enrolled in a career and technical education engineering program or a program that integrates robotics, engineering or pre-engineering techniques as an integral component of the instructional program.

Clothing Requirement
Class E: Contest specific — Business Casual
For men: Official SkillsUSA white polo shirt, black dress slacks, black socks, black leather shoes.
For women: Official SkillsUSA white polo shirt with black dress skirt (knee-length) or black slacks; black socks or black or skin-tone seamless hose; black leather dress shoes.

These regulations refer to clothing items that are pictured and described at: www.skillsusastore.org. If you have questions about clothing or other logo items, call 800-401-1560 or 703-956-3723.

Note: Contestants must wear their official contest clothing to the contest orientation meeting.

Equipment and Materials
1. Supplied by the technical committee:
   a. All necessary information for judges and technical committee
   b. A 10' x 10' space for working and displaying the robot
   c. One standard 120-volt electrical outlet
   d. One standard 8' conference table
   e. Description of robotic challenge
   f. All the necessary tools and equipment for the contest
   g. Vex Robotic Starter Kit or Festo Robotino
2. Supplied by the contestant:
   a. Wi-Fi-capable computer with C++ or JAVA programming software installed and licensed
   b. Programming cable or other connection devices
   c. Engineering notebook
   d. All competitors must create a one-page résumé and submit a hard copy to the technical committee chair at orientation. Failure to do so will result in a 10-point penalty.

   ***Note*:** Your contest may also require a hard copy of your résumé as part of the actual contest. Check the Contest Guidelines and/or the updates page on the SkillsUSA website at http://updates.skillsusa.org.

Scope of the Contest
Teams are given a task they are asked to solve using a mobile robotic system provided by the technical committee. Teams will program a virtual robot and construct the mobile robot from reference documentation in engineering notebooks created by the teams prior to the contest. The contest will test the ability to document, construct, program and exhibit their solution to industry-based judges.

Knowledge Performance
The contest will include a written exam assessing general knowledge of robotics operations and programming. Written portions may also exist during the skills portion of the contest.

Skill Performance

The contest will include activities that simulate situations encountered by robotic programmers and support professionals.

Contest Guidelines

1. Teams must be comprised of two members.
2. Teams are given a task that they will solve using a mobile robotic system provided by the technical committee.
3. Each team will have 10 minutes to present its engineering notebook to the judges.
4. Teams can only use an engineering notebook during the contest as a reference tool in the construction and programming of their robot.
5. The engineering notebook is a tool for students to document their designs prior to the competition. It can include pictures, printed out sections of code, detailed assembly instructions, etc. All pages must be bound and numbered.
6. Robot(s) can only be constructed by the materials supplied by the technical committee.
7. Teams will have two scored chances to solve the mobile robotic challenge.
8. Once a team has performed the required task or set of tasks, a design change may be introduced.
9. Contestants are required to adhere to industry safety standards using the hardware and software provided.
10. All team members are responsible for double-checking each other's work and quality control.
11. All engineering notebooks, forms, documentation and programs must be turned in to the judges.
12. All team members and advisors are required to attend a debriefing session after the competition has concluded.

Standards and Competencies

MR 1.0 — Demonstrate knowledge in safety rules and practices

1.1 Maintain a safe work area
1.2 Demonstrate correct use of hand tools
1.3 Follow safety rules during robotic assembly
1.4 Demonstrate proper use of safety equipment
1.5 Define and document all safety issues

MR 2.0 — Produce technical documentation

2.1 Maintain professional engineering notebook
2.2 Document assembly instructions and illustrations
2.3 Produce Bill of Materials (BOM)
2.4 Document the engineering design process

MR 3.0 — Apply knowledge of robotic assembly and part identification

3.1 Identify various parts used on a mobile robot (wheels, motors, gears, etc.)
3.2 Identify the various systems in a mobile robot
3.3 Demonstrate the use of various components of a mobile robot
3.4 Demonstrate proper assembly techniques

MR 4.0 — Understand mechanical systems of a robot

4.1 Understand and identify the various types of gears and their application
4.2 Demonstrate the use of gears on a mobile robot
4.3 Understand and identify the various types of chain and sprocket mechanisms
4.4 Demonstrate proper mechanical component alignment

MR 5.0 — Wire a mobile robot

5.1 Demonstrate proper wiring techniques
5.2 Maintain and analyze battery voltage
5.3 Understand and use multiple types of mobile robotic sensors
5.4 Understand and differentiate different types of motors and motor controllers

MR 6.0 — Produce examples of basic computer programming and flowcharting

6.1 Draw a programming flow chart representing a robot program for a given scenario
6.2 Develop a basic computer program to control robot
6.3 Manipulate feedback from robotic sensors in a program

6.4 Demonstrate proper commenting of code in a mobile robot program

MR 7.0 — Presenting technical information and technical problem solving

7.1 Demonstrate the knowledge of various visual aids used to present technical information
7.2 Present technical material in a professional manner
7.3 Demonstrate proper presentation techniques
7.4 Define team roles and responsibilities
7.5 Demonstrate ability to solve problems as a team in a given time frame
7.6 Demonstrate and document a comprehensive plan to solve an engineering problem
7.7 Use proper time management when solving a problem
7.8 Demonstrate efficient project management and planning

MR 8.0 — Identify communication protocols for mobile robots

8.1 Understand basic communication techniques in mobile robotics
8.2 Demonstrate proper communication between a transmitter and a robot

Committee Identified Academic Skills

The technical committee has identified that the following academic skills are embedded in this contest.

Math Skills

- Use fractions to solve practical problems
- Use proportions and ratios to solve practical problems
- Simplify numerical expressions
- Use scientific notation
- Solve practical problems involving percents
- Solve single variable algebraic expressions
- Solve multiple variable algebraic expressions
- Apply transformations (rotate or turn, reflect or flip, translate or slide, and dilate or scale) to geometric figures
- Construct three-dimensional models
- Apply Pythagorean Theorem
- Make predictions using knowledge of probability
- Make predictions using knowledge of probability
- Organize and describe data using matrixes
- Find slope of a line
- Solve practical problems involving complementary, supplementary and congruent angles
- Solve problems involving symmetry and transformation
- Make comparisons, predictions and inferences using graphs and charts
- Organize and describe data using matrixes
- Solve problems using proportions, formulas and functions
- Use measures of interior and exterior angles of polygons to solve problems
- Find arc length and the area of a sector
- Demonstrate measuring skills

Science Skills

- Plan and conduct a scientific investigation
- Use knowledge of physical properties (shapes, density, solubility, odor, boiling point, color)
- Use knowledge of potential and kinetic energy
- Use knowledge of mechanical, chemical and electrical energy
- Use knowledge of heat, light and sound energy
- Use knowledge of temperature scales, heat and heat transfer
- Use knowledge of sound and technological applications of sound waves
- Use knowledge of the nature and technological applications of light
- Use knowledge of speed, velocity and acceleration
- Use knowledge of Newton's laws of motion
- Use knowledge of work, force, mechanical advantage, efficiency and power
- Use knowledge of simple machines, compound machines, powered vehicles, rockets and restraining devices
- Use knowledge of principles of electricity and magnetism
- Use knowledge of static electricity, current electricity and circuits
- Use knowledge of motors and generators

Language Arts Skills

- Provide information in conversations and in group discussions
- Provide information in oral presentations
- Demonstrate use of such verbal communication skills as word choice, pitch, feeling, tone and voice
- Demonstrate use of such nonverbal communication skills as eye contact, posture and gestures using interviewing techniques to gain information
- Analyze mass media messages
- Demonstrate comprehension of a variety of informational texts
- Use text structures to aid comprehension
- Identify words and phrases that signal an author's organizational pattern to aid comprehension
- Understand source, viewpoint and purpose of texts
- Organize and synthesize information for use in written and oral presentations
- Demonstrate knowledge of appropriate reference materials
- Use print, electronic databases and online resources to access information in books and articles
- Demonstrate narrative writing
- Demonstrate informational writing
- Edit writing for correct grammar, capitalization, punctuation, spelling, sentence structure and paragraphing

Connections to National Standards

State-level academic curriculum specialists identified the following connections to national academic standards.

Math Standards

- Numbers and operations
- Algebra
- Measurement
- Problem solving
- Reasoning and proof
- Communication
- Connections
- Representation

Source: NCTM Principles and Standards for School Mathematics. For more information, visit: http://www.nctm.org.

Science Standards

- Understands the sources and properties of energy
- Understands forces and motion
- Understands the nature of scientific inquiry

Source: McREL compendium of national science standards. To view and search the compendium, visit: http://www2.mcrel.org/compendium/browse.asp.

Language Arts Standards

- Students adjust their use of spoken, written and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes
- Students use a variety of technological and information resources (e.g., libraries, databases, computer networks, video) to gather and synthesize information and to create and communicate knowledge
- Students use spoken, written and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion and the exchange of information)

Source: IRA/NCTE Standards for the English Language Arts. To view the standards, visit: www.ncte.org/standards.

MOTORCYCLE SERVICE TECHNOLOGY

PURPOSE
To evaluate each contestant's preparation for employment and to recognize outstanding students for excellence and professionalism in the field of motorcycle service technology.

First, download and review the General Regulations at: http://updates.skillsusa.org.

CLOTHING REQUIREMENT
Class D: Contest Specific — Blue Attire
For both men and women: Official SkillsUSA light blue work shirt; navy pants; black, brown, or tan leather work shoes safety shoes (with protective toe cap.) Safety glasses with side shields or goggles (prescription glasses may be used only if they are equipped with side shields. If not, they must be covered with goggles).

These regulations refer to clothing items that are pictured and described at: www.skillsusastore.org. If you have questions about clothing or other logo items, call 800-401-1560 or 703-956-3723.

Note: Contestants must wear their official contest clothing to the contest orientation meeting.

ELIGIBILITY
Open to active SkillsUSA members enrolled in career and technical programs that include motorcycle service technology as an occupational objective.

EQUIPMENT AND MATERIALS
1. Supplied by the technical committee:
   a. All necessary tools, equipment, supplies and publications for the contest
2. Supplied by the contestant:
   a. All competitors must create a one-page résumé and submit a hard copy to the technical committee chair at orientation. Failure to do so will result in a 10-point penalty.

Note: Your contest may also require a hard copy of your résumé as part of the actual contest. Check the Contest Guidelines and/or the updates page on the SkillsUSA website at http://updates.skillsusa.org.

SCOPE OF THE CONTEST
The scope of the contest is defined by industry standards as set by the current industry technical standards. The contest is divided into two parts: a written exam and series of skill-related tests designed to assess skills selected from the following lists of competencies as determined by the SkillsUSA Championships technical committee.

Knowledge Performance
The contest will include a written knowledge exam assessing knowledge of industry standards and competencies as identified by the technical committee.

Skill Performance
The contest will include a series of tests designed to assess skills identified by industry standards in the areas of accuracy, proper use of tools and equipment, and safety practices.

Contest Guidelines
1. Contestants will be tested on a variety of motorcycles, ATVs and scooters commonly found in the United States using both metric and American threads/wrenches.
2. Contestants will be judged on accuracy, proper use of tools and equipment and safety practices. Rating sheets will reflect each specific skill requirement as determined by the national technical committee.

Standards and Competencies

MST 1.0 — Implement skills and apply knowledge needed to perform general shop procedures

1.1 Use the parts manual to identify part numbers of specified parts

1.2 Apply the knowledge needed to use and read service manuals to find specifications and procedures

1.3 Apply the knowledge to use proper techniques in the care and use of equipment
1.4 Demonstrate proper safety procedures
1.5 Fill out repair orders

MST 2.0 — Apply the knowledge and skills needed to test the performance of engine/drive train condition in a motorcycle service situation

2.1 Determine engine condition by performing a cylinder leak down and compression test
2.2 Use dial bore gauges, micrometer and feeler gauges to determine the condition of cylinders, pistons, rings and other engine parts
2.3 Remove, measure and reinstall clutch components
2.4 Adjust valve clearance of screw-type and shim- (pad) type valves
2.5 Diagnose, service and repair chain and sprocket and/or shaft-driven and/or belt type final drive systems
2.6 Identify and inspect transmission components

MST 3.0 — Implement the skills and knowledge needed to run a carburetion and fuel injection inspection in a motorcycle service situation

3.1 Remove and disassemble carburetor, adjust the float, identify components and reassemble and reinstall carburetor
3.2 Remove and disassemble intake runner, identify components, reassemble and reinstall
3.3 Inspect, service and reinstall an oil-foam air filter
3.4 Synchronize carburetors
3.5 Reflash ECM/BCM

MST 4.0 — Apply the knowledge needed and the skills required to inspect, repair and service wheels in a motorcycle service situation

4.1 Inspect, repair and service tubeless tires (street and ATV type)
4.2 Inspect, repair and service tube tires
4.3 Diagnose, service and repair disc and drum brake systems
4.4 Measure radial and lateral run out of a rim using a dial indicator true spoke wheel
4.5 Static balance the wheel

MST 5.0 — Demonstrate the skills needed to perform a routine inspection and maintenance check in a motorcycle service situation

5.1 Inspect, service and replace cables
5.2 Inspect, service and reinstall crankcase breather
5.3 Inspect fluid levels
5.4 Adjust ignition timing
5.5 Adjust clutch mechanisms and cable

MST 6.0 — Apply the knowledge and the skills needed to perform an electrical inspection in a motorcycle service situation

6.1 Use a multimeter to measure and diagnose resistance of specified components, amperage drain key off and on, battery voltage key off and key on, charging voltage and amperage
6.2 Locate and repair other electrical problems
6.3 Inspect the ignition timing

Committee Identified Academic Skills

The technical committee has identified that the following academic skills are embedded in this contest.

Math Skills

- Use fractions to solve practical problems
- Simplify numerical expressions
- Solve problems using proportions, formulas and functions

Science Skills

- Use knowledge of chemical properties (acidity, basicity, combustibility and reactivity)
- Use knowledge of mechanical, chemical and electrical energy
- Use knowledge of speed, velocity and acceleration
- Use knowledge of Newton's laws of motion
- Use knowledge of work, force, mechanical advantage, efficiency and power
- Use knowledge of simple machines, compound machines, powered vehicles, rockets and restraining devices
- Use knowledge of principles of electricity and magnetism
- Use knowledge of static electricity, current electricity and circuits

- Use knowledge of magnetic fields and electromagnets
- Use knowledge of motors and generators

Language Arts Skills

- Understand source, viewpoint and purpose of texts
- Demonstrate knowledge of appropriate reference materials
- Demonstrate informational writing

Connections to National Standards

State-level academic curriculum specialists identified the following connections to national academic standards.

Math Standards

- Numbers and operations
- Algebra
- Geometry
- Measurement
- Data analysis and probability
- Problem solving
- Communication
- Connections
- Representation

Source: NCTM Principles and Standards for School Mathematics. For more information, visit: http://www.nctm.org..

Science Standards

- Understands the structure and properties of matter
- Understands the sources and properties of energy
- Understands forces and motion
- Understands the scientific enterprise

Source: McREL compendium of national science standards. To view and search the compendium, visit: http://www2.mcrel.org/compendium/browse.asp.

Language Arts Standards

- Students read a wide range of print and non-print texts to build an understanding of texts, of themselves and of the cultures of the United States and the world; to acquire new information; to respond to the needs and demands of society and the workplace; and for personal fulfillment. Among these texts are fiction and nonfiction, classic and contemporary works
- Students apply a wide range of strategies to comprehend, interpret, evaluate and appreciate texts. They draw on their prior experience, their interactions with other readers and writers, their knowledge of word meaning and of other texts, their word identification strategies and their understanding of textual features (e.g., sound-letter correspondence, sentence structure, context, graphics)
- Students adjust their use of spoken, written and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes
- Students employ a wide range of strategies as they write and use different writing process elements appropriately to communicate with different audiences for a variety of purposes
- Students use a variety of technological and information resources (e.g., libraries, databases, computer networks, video) to gather and synthesize information and to create and communicate knowledge
- Students use spoken, written and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion and the exchange of information)

Source: IRA/NCTE Standards for the English Language Arts. To view the standards, visit: www.ncte.org/standards.

NAIL CARE

PURPOSE

To evaluate each contestant's preparation for employment and to recognize outstanding students for excellence and professionalism in the field of nail care.

First, download and review the General Regulations at: http://updates.skillsusa.org.

ELIGIBILITY

Open to active SkillsUSA members enrolled in programs with cosmetology/nail care as the occupational objective.

CLOTHING REQUIREMENT

Class E: Contest specific — Business Casual

For men: Official SkillsUSA white polo shirt, black dress slacks, black socks, black leather shoes.
For women: Official SkillsUSA white polo shirt with black dress skirt (knee-length) or black slacks; black socks or black or skin-tone seamless hose; black leather dress shoes.

These regulations refer to clothing items that are pictured and described at: www.skillsusastore.org. If you have questions about clothing or other logo items, call 800-401-1560 or 703-956-3723.

Note: Contestants must wear their official contest clothing to the contest orientation meeting.

EQUIPMENT AND MATERIALS

1. Supplied by the technical committee
   a. Disinfectant jar (for implements with disinfection solution)
   b. Technical guidelines for the specific applications required to be performed
   c. Plastic bags for disposal and refuse
   d. One electrical outlet per contestant
   e. Pedicure basin with disposable liner
   f. Foot stool
2. Supplied by the contestant
   a. Safety glasses for contestant and model
   b. White terry towels (no holes or stains allowed)
   c. Disposable towels for the table
   d. Water dispenser (optional)
   e. All items necessary to complete a basic pedicure on one foot of model. ***Note:*** Implements should be brought to the contest ready to use (i.e., cleaned and disinfected, or new). Lotion, masks, scrubs and/or callus removers must be from the same professional manufacturer
   f. Any items necessary for a three- to four-minute mock client consultation on natural nail care services
   g. All items necessary to complete five sculptured acrylic nails. ***Note:*** Dappen dishes much have covers; monomer, polymer and primer must be from the same manufacturer; two or more of the four basic acrylic colors (pink, white, clear or natural) must be used to complete two-tone/French manicure sculpted nails
   h. All items necessary to complete five nails with a tip and light-cured enhancement overlay. Can be a hard gel or a hybrid gel/acrylic product. ***Note:*** Gel polish, temporary or no-light gels may not be used
   i. Dark red crème lacquer/polish
   j. All items allowed to complete the flat nail art application: Medium choices: acrylic paints, polishes/lacquers, colored powders (acrylic and dip), gel polish, rhinestones sizes 20ss and under, glitters and dusts, and adhesives, i.e., gel top coats/glue ***Note:*** No pre-prepared items can be used; items are limited to those intended for use on nails. Top coat may be used as a sealer
   k. A written description of the nail art theme. Themes are to be typewritten and contained within a plastic sleeve. ***Note:*** Due at contest check-in
   l. A CD with a digital photo of nail art to be created during the contest. Photo may include props. ***Note:*** Due at contest check-in
   m. Portable kit organizer (to transport all items necessary for the contest)

n. Manicure table lamp and electrical extension cord (optional)
o. All competitors must create a one-page résumé and submit a hard copy to the technical committee chair at orientation. Failure to do so will result in a 10-point penalty

Note: Your contest may also require a hard copy of your résumé as part of the actual contest. Check the Contest Guidelines and/or the updates page on the SkillsUSA website at: http://updates.skillsusa.org.

3. Items not allowed:
   a. Electric files/drills

Scope of the Contest

The contest is defined by industry standards as set by the current industry technical standards. The contest is divided into two parts: a written exam and a series of testing situations designed to assess knowledge in nail care industry standards.

Knowledge Performance

The contest will include a written knowledge exam assessing all aspects of nail care including safety and sanitation, natural nail and foot care, and artificial nails, as well as a written description of nail art theme.

Skill Performance

The contest will include a series of testing situations including oral presentations and technical applications. The areas that will be evaluated are customer service, safety and sanitation, natural nail care, artificial nails, and nail lacquer and art application. Observations during each segment and evaluation of the finished product will be considered in the scoring.

References

Milady Standard Nail Technology Textbook, Fifth Edition: www.milady.com

Salon Fundamentals: Nail Technology: www.pivot-point.com

Contest Guidelines

1. All contestants must bring a model for the competition.
2. Contestants are not permitted to touch their models before the competition begins or between segments.
3. Conversation between contestant and model is limited. Communication with observers, judges and other contestants is prohibited during the contest.
4. Disqualification or penalty points taken can occur for the following:
   a. Any rule not followed, with *no* exceptions
   b. Leaving competition area before completion of model (applies to both contestant and model) without proper escort
   c. Unauthorized use of a product that is not allowed or that doesn't appear in the above listing
   d. Any product that appears to have been altered
5. Contestants should come prepared to do the following:
   a. A three- to five-minute mock nail care consultation on the benefits of natural nail care. You will address the judges as if they are a new client of yours in the salon. Props may be used. The consultation should include the following points: (1) Recommended natural nail care services; (2) Results the client should expect; (3) The home care products the client would need to purchase and use to obtain these results.
   b. A basic pedicure on one foot of their model. Procedures should include, but not be limited to, shaping toenails, pushing back cuticles, cleaning under toenails, refining skin and polishing.
   c. All five fingers of the model's right hand are to be sculpted with acrylic using forms, no tips, in a two-tone/French-manicure (pink and white) technique. Two or more colors of acrylic may be used.
   d. All five fingers of the model's left hand are to have nail tips applied and overlaid with a light-cured gel or a light-cured hybrid acrylic/gel. Any type of tip may be used.

e. A 50-question, multiple-choice exam on all aspects of nail care.
f. Two coats of dark red crème lacquer/polish is to be applied to the model's right hand.
g. Flat nail art is to be applied to all five fingers of the model's left hand. A specific theme is to be carried through on all five fingers and in a written description. Contestants must have written and submitted a description of the theme they intend to create at the contest check in. Themes should be typewritten, may be decorated and must be contained in the plastic sleeve. Diagrams of the art you intend to create can be used; however, these are limited to the finished product and may not be step-by-step instructions. Judging will be on the overall balance of the use of different mediums and the creative use of the mediums to support the theme, as well as your attention to detail. Once all judging is complete, props may be used to enhance art during the parade of models.

Standards and Competencies

NAIL 1.0 — Apply the knowledge and skills needed to perform safety and sanitation in a nail care situation.

1.1 Show safety in handling products
- 1.1.1 Set up table to consist of items needed for the specific contest application in progress (e.g., if sculptured nail is in progress, the tip and wrap and nail art materials should not be visible during this time)
- 1.1.2 Identify all products and solutions properly with the manufacturer's original packaging and labeling (e.g., cannot be defaced)
- 1.1.3 Ensure that bottles and containers are securely closed after use
- 1.1.4 Demonstrate when and how safety glasses and gloves are used

1.2 Perform sanitary practices
- 1.2.1 Ensure that all implements and files are brought to the contest cleaned, disinfected or new and are labeled as such
- 1.2.2 Ensure that any implement or file that becomes contaminated during the contest is disposed of or cleaned and disinfected

1.3 Perform safe usage of implements and tools
- 1.3.1 Verify there are no cuts on surrounding skin
- 1.3.2 Verify there are no cuticle abrasions

1.4 Apply knowledge of sanitation and disinfection, how they are accomplished and how they differ
- 1.4.1 Define sanitation and disinfection
- 1.4.2 List and explain proper procedure for sanitation and disinfection
- 1.4.3 Contrast sanitation and disinfection
- 1.4.4 Describe importance of proper sanitation
- 1.4.5 Describe importance of proper disinfection

1.5 Show cleanliness and organization of the working environment
- 1.5.1 Ensure that workspace is clean and organized throughout contest
- 1.5.2 Verify that only needed items are out on the table
- 1.5.3 Ensure that required tools and products are accounted for and professionally organized

NAIL 2.0 — Implement skills that are needed for quality customer service in a nail care situation

2.1 Evaluate client needs and demonstrate listening skills
- 2.1.1 Analyze nails
- 2.1.2 Question client about current state of natural nails
- 2.1.3 Question client on desired results
- 2.1.4 Understand client's current situation versus desired situation

2.2 Demonstrate effective communication while talking with the client
- 2.2.1 Develop and recommend services and products that relate to client needs

2.2.2 Use a pleasant tone of voice, smile, and exude positive body language
2.2.3 Be persuasive

2.3 Model professional behavior and a positive attitude throughout the contest
2.3.1 Listen to directions
2.3.2 Follow all rules
2.3.3 Be punctual

NAIL 3.0 — Apply the knowledge and the skills needed to perform natural nail care in a nail care situation

3.1 Describe natural nail care services including a basic manicure and add-on services and results that can be obtained through these services
3.1.1 Propose a service or combination of services for specific client needs
3.1.2 Describe a basic manicure and additional services
3.1.3 Describe the results that can be obtained through these services

3.2 Describe home care products and the results of their use
3.2.1 Prescribe needed home care products and their purposes
3.2.2 Describe the results that can be obtained by using these products

NAIL 4.0 — Apply the knowledge and the skills needed to perform foot care in a nail care situation

4.1 Perform a basic pedicure
4.1.1 Demonstrate knowledge of proper steps for a basic pedicure
4.1.2 Demonstrate knowledge of safe and sanitary pedicure procedures

4.2 Describe add-on foot care services and the results that can be obtained
4.2.1 List additional services that can be performed as part of a basic pedicure
4.2.2 Describe the benefits of pedicures and other foot care add-on services

4.3 Distinguish signs of infection that would prohibit you from performing pedicure services
4.3.1 Recognize signs of infection
4.3.2 Identify common foot disease

4.4 Describe proper sanitation and disinfection of a pedicure basin, whirlpool spa or no-pipe basin
4.4.1 List steps to properly sanitize and disinfect a pedicure basin
4.4.2 Contrast sanitation and disinfection
4.4.3 Describe importance of proper sanitation
4.4.4 Describe importance of proper disinfection

NAIL 5.0 — Apply the knowledge and skills needed to perform artificial nails services in a nail care situation

5.1 Build an acrylic nail
5.1.1 Ensure product control; clarity/no bubbles, smile line
5.1.2 Verify that the cuticle and nail grove are smooth and thin
5.1.3 Identify that the contour, the highest point of nail, is in the center at the natural stress area
5.1.4 Ensure that the shape and length is consistent on each finger
5.1.5 Identify that the surface finish is smooth, with a high-gloss shine

5.2 Demonstrate proper application and blending of a nail tip
5.2.1 Perform tip application (i.e., fit and alignment)
5.2.2 Perform tip blending
5.2.3 Perform product control (i.e., no adhesive seepage)
5.2.4 Perform tool control (i.e., no excessive filing on skin or natural nail)

5.3 Describe the proper application of a nail wrap and resin
5.3.1 Differentiate types of wrap materials and describe proper application
5.3.2 Describe the proper application of resin

5.4 Demonstrate application of a light-cured gel nail
5.4.1 Define a light-cured gel
5.4.2 Differentiate light-cured gels from other material used to create artificial nails
5.4.3 Describe benefits of light-cured gels
5.4.4 Demonstrate application of light-cured gel (e.g., cover nail completely, no excess gel in cuticle area)

5.4.5 Identify that the contour, the highest point of nail, is in the center at the natural stress area
5.4.6 Ensure that the shape and length is consistent on each finger
5.4.7 Ensure that surface finish is smooth, with a high-gloss shine

5.5 Prepare or describe preparation of a natural nail for any type of artificial enhancement
5.5.1 List steps for properly preparing a natural nail for an artificial enhancement
5.5.2 Identify importance of proper preparation

5.6 Demonstrate proper finishing techniques for any type of artificial enhancements
5.6.1 List steps to finish an artificial nail
5.6.2 Understand and contrast different file grits
5.6.3 Describe the proper contour for the strongest artificial nail

5.7 Describe the different materials used to create artificial nails
5.7.1 Compare and contrast acrylic nails, wrap systems and light-cured gels

5.8 Describe the different methods of creating artificial nails
5.8.1 Compare and contrast overlays, tip with overlays, and sculpting methods of creating artificial nails

5.9 Describe maintenance required for artificial nails
5.9.1 Describe maintenance for acrylic nails
5.9.2 Describe maintenance for wrap system nails
5.9.3 Describe maintenance for light-cured gel nails

NAIL 6.0 — Implement the knowledge and skills needed to perform nail lacquer and art application in a nail care situation

6.1 Show proper application of nail lacquer, including any necessary cleanup
6.1.1 Ensure neatness, coverage, evenness and cuticle involvement

6.2 Show proper application of flat paints/lacquers
6.2.1 Implement creativity; theme, follow-through of theme, artist expression, and color coordination
6.2.2 Perform at the proper level of difficulty and complexity of design
6.2.3 Ensure precision, neatness and clarity of lines

6.3 Describe the theme you intend to create with nail art in one to two written paragraphs (grammar, creativity and language will be evaluated)

Committee Identified Academic Skills

The technical committee has identified that the following academic skills are embedded in this contest.

Math Skills

- Solve practical problems involving percentages
- Solve problems using proportions, formulas and functions
- Use basic math skills for the purposes of sales and marketing (addition, subtraction, multiplication, division, percentages)
- Use basic math skills for the purposes of bookkeeping (addition, subtraction)

Science Skills

- Use knowledge of patterns of cellular organization (cells, tissues, organs, systems)
- Classify living organisms as it applies to infection control
- Describe and recognize elements, compounds, mixtures, acids, bases and salts
- Describe and recognize solids, liquids and gases
- Describe characteristics of types of matter based on physical and chemical properties
- Use knowledge of physical properties (shape, density, solubility, odor, melting point, boiling point, color)
- Describe and demonstrate simple compounds (formulas and the nature of bonding)
- Predict chemical changes to matter (types of reactions, reactants and products; and balanced equations)
- Use knowledge of heat, light and sound energy

Language Arts Skills

- Demonstrate use of such verbal communication skills as word choice, pitch, feeling, tone and voice
- Demonstrate use of such nonverbal communication skills as eye contact, posture and gestures using interviewing techniques to gain information
- Demonstrate comprehension of a variety of informational texts
- Understand source, viewpoint and purpose of texts
- Demonstrate knowledge of appropriate reference materials
- Use print, electronic databases and online resources to access information in books and articles
- Edit writing for correct grammar, capitalization, punctuation, spelling, sentence structure and paragraphing

Connections to National Standards

State-level academic curriculum specialists identified the following connections to national academic standards.

Math Standards

None Identified

Source: NCTM Principles and Standards for School Mathematics. For more information, visit: http://www.nctm.org.

Science Standards

- Understands the structure and properties of matter
- Understands the sources and properties of energy
- Understands the nature of scientific inquiry

Source: McREL compendium of national science standards. To view and search the compendium, visit: http://www2.mcrel.org/compendium/browse.asp.

Language Arts Standards

- Students apply a wide range of strategies to comprehend, interpret, evaluate and appreciate texts. They draw on their prior experience, their interactions with other readers and writers, their knowledge of word meaning and of other texts, their word identification strategies, and their understanding of textual features (e.g., sound-letter correspondence, sentence structure, context, graphics)
- Students adjust their use of spoken, written and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes
- Students employ a wide range of strategies as they write and use different writing process elements appropriately to communicate with different audiences for a variety of purposes
- Students apply knowledge of language structure, language conventions (e.g., spelling and punctuation), media techniques, figurative language and genre to create, critique and discuss print and nonprint texts

- Students use spoken, written and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion, and the exchange of information)

Source: IRA/NCTE Standards for the English Language Arts. To view the standards, visit: www.ncte.org/standards.

NURSE ASSISTING

PURPOSE
To evaluate each contestant's preparation for employment and to recognize outstanding students for excellence and professionalism in the field of nurse assisting.

First, download and review the General Regulations at: http://updates.skillsusa.org.

ELIGIBILITY
Open to active SkillsUSA members enrolled in programs with nurse assisting as the occupational objective.

CLOTHING REQUIREMENT
Class B: Healthcare Attire
For both men and women: Official blue scrubs; white socks or skin-tone seamless hose; health-professional's white leather work shoes. Shoes must be all-white leather (no canvas), completely enclosed (no open-toe or open-heel). Athletic-style shoes that meet the aforementioned criteria are acceptable.

Scrubs should fit appropriately for all health contests and should be properly hemmed and wrinkle free. Only plain, white, collarless t-shirts may be worn underneath the scrubs. Hair must be pinned up and off the collar.

These regulations refer to clothing items that are pictured and described at: www.skillsusastore.org. If you have questions about clothing or other logo items, call 800-401-1560 or 703-956-3723.

Note: Contestants must wear their official contest clothing to the contest orientation meeting.

EQUIPMENT AND MATERIALS
1. Supplied by the technical committee:
   a. All instruments, equipment and materials required for the contest
2. Supplied by the contestant:
   a. Watch
   b. Pen (black ink)
   c. Safety glasses/shield
   d. All competitors must create a one-page résumé and submit a hard copy to the technical committee chair at orientation. Failure to do so will result in a 10-point penalty.

   ***Note*:** Your contest may also require a hard copy of your résumé as part of the actual contest. Check the Contest Guidelines and/or the updates page on the SkillsUSA website at http://updates.skillsusa.org.

SCOPE OF THE CONTEST
The contest is set within the framework of accepted industry standards.

Knowledge Performance
The contest includes a written knowledge exam assessing areas that include, but are not limited to, functions of body parts, basic human needs pertaining to client care, nutrition, observation and assessment, employability skills, safety, communication, infection control, ethics, basic mathematical operations, malpractice and liability issues, and medical terms and abbreviations. The test will be administered during the orientation meeting.

Skill Performance
The contest includes an assessment of proficiency in the areas of activities of daily living, personal care, CPR, employability assessment, observation and communication skills.

Contest Guidelines
1. Contestants perform procedures or skills selected from the following list of Standards and Competencies as determined by the SkillsUSA health occupations technical committee.
2. All procedures must be performed using safety precautions and correct body mechanics.
3. All skills demonstrated will be based on nationally accepted accreditation and certification standards.

4. Contestants, as part of the demonstration, should voluntarily express pertinent information.

Standards and Competencies

NA 1.0 — Display knowledge of human anatomy and physiology

1.1 Identify body parts on a mannequin
1.2 Apply knowledge of body part function

NA 2.0 — Employ knowledge of basic client care in the areas of nutrition, medical mathematical operations and malpractice/liability issues

2.1 Explain how basic human needs pertain to client care
2.2 Apply knowledge of nutrition
2.3 Perform basic mathematical operations, including computations and weights and measures
2.4 Describe malpractice and liability issues

NA 3.0 — Exhibit basic employability skills and professional demeanor when writing a résumé, completing a job application, and interviewing in accordance with work force development guidelines

3.1 Complete an error-free job application and résumé
3.2 Demonstrate personal interview skills
3.3 Exhibit professionalism in appearance, communications and ethics

NA 4.0 — Explain infection control and methods of preventing the spread of infections

4.1 Define infection control
4.2 Demonstrate correct hand-washing techniques
4.3 Discuss appropriate hand hygiene principles
4.4 Utilize appropriate personal protective equipment

NA 5.0 — Perform nurse assistant skills/procedures, including dressing; undressing and bathing patients; providing hair and oral care; and transferring, turning and assisting patients with walking

5.1 Assist patient in dressing and undressing
5.2 Provide or assist with bath
5.3 Provide hair care
5.4 Provide oral hygiene
5.5 Demonstrate denture care
5.6 Demonstrate use of transfer belt
5.7 Assist patient to stand using a transfer belt
5.8 Transfer patient to and from wheelchair using a transfer belt
5.9 Assist with ambulation
5.10 Assist with walker
5.11 Turn and position patient
5.12 Perform occupied or unoccupied bed making

NA 6.0 — Implement knowledge of patient care regarding nutrition and elimination

6.1 Assist with nutrition and elimination needs
6.2 Identify general/special diets
6.3 Assist client with meal tray
6.4 Feed client
6.5 Measure and record food/fluid intake
6.6 Assist client in reaching bathroom or commode
6.7 Assist with bedpan
6.8 Observe, measure and record urine output

NA 7.0 — Provide patient with basic nursing procedures and restorative care

7.1 Apply elastic stockings
7.2 Assist with or provide range-of-motion exercises
7.3 Assist with dangling
7.4 Log roll client

NA 8.0 — Monitor patient's vital signs

8.1 Measure and record radial or apical pulse
8.2 Identify pulse sites
8.3 Measure and record temperature
8.4 Measure and record respiration
8.5 Measure and record blood pressure

NA 9.0 — Perform adult, child and infant CPR and first aid in accordance with current guidelines provided by the American Heart Association and the American Red Cross

9.1 Perform adult, child and infant CPR following current guidelines established by the American Heart Association
9.2 Treat a choking patient in an emergency following current guidelines established by the American Red Cross

NA 10.0 — Communicate effectively with co-workers and clients

10.1 Demonstrate ability to modify communication to meet client needs
10.2 Use medical terms and abbreviations correctly
10.3 Display sensitivity to multicultural and multilingual needs

NA 11.0 — Manage patient care to prevent legal issues

11.1 Observe all aspects of patient confidentiality
11.2 Ask for clarification when needed
11.3 Identify patient prior to providing care
11.4 Observe, report and document pertinent patient data

Committee Identified Academic Skills

The technical committee has identified that the following academic skills are embedded in this contest.

Math Skills

- Use fractions to solve practical problems
- Simplify numerical expressions
- Solve problems using proportions, formulas and functions
- Perform basic mathematical computations
- Convert between metric and household measurements

Science Skills

- Use knowledge of patterns of cellular organization (cells, tissues, organs, systems)
- Describe basic needs of organisms
- Classify living organisms
- Use knowledge of temperature scales, heat, and heat transfer
- Describe the ideal environment for microorganism growth
- Prevent transmission of microorganisms

Language Arts Skills

- Provide information in conversations and in group discussions
- Provide information in oral presentations
- Demonstrate use of such verbal communication skills as word choice, pitch, feeling, tone and voice
- Demonstrate use of such nonverbal communication skills as eye contact, posture and gestures using interviewing techniques to gain information
- Demonstrate comprehension of a variety of informational texts
- Use text structures to aid comprehension
- Organize and synthesize information for use in written and oral presentations
- Demonstrate knowledge of appropriate reference materials
- Use print, electronic databases and online resources to access information in books and articles
- Demonstrate narrative writing
- Demonstrate informational writing
- Edit writing for correct grammar, capitalization, punctuation, spelling, sentence structure and paragraphing

Connections to National Standards

State-level academic curriculum specialists identified the following connections to national academic standards.

Math Standards

- Numbers and operations
- Algebra
- Geometry
- Measurement
- Data analysis and probability
- Problem solving
- Communication
- Connections
- Representation

Source: NCTM Principles and Standards for School Mathematics. For more information, visit: http://www.nctm.org.

Science Standards

- Understands the principles of heredity and related concepts
- Understands the structure and function of cells and organisms
- Understands the nature of scientific inquiry

Source: McREL compendium of national science standards. To view and search the compendium, visit: http://www2.mcrel.org/compendium/browse.asp.

Language Arts Standards

- Students apply a wide range of strategies to comprehend, interpret, evaluate and appreciate texts. They draw on their prior experience, their interactions with other readers and writers, their knowledge of word meaning and of other texts, their word identification strategies and their understanding of textual features (e.g., sound-letter correspondence, sentence structure, context, graphics)
- Students adjust their use of spoken, written and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes
- Students employ a wide range of strategies as they write and use different writing process elements appropriately to communicate with different audiences for a variety of purposes
- Students use spoken, written and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion, and the exchange of information)

Source: IRA/NCTE Standards for the English Language Arts. To view the standards, visit: www.ncte.org/standards.

PHOTOGRAPHY

PURPOSE
To evaluate each contestant's preparation for employment and to recognize outstanding students for excellence and professionalism in the field of (still) photography.

First, download and review the General Regulations at: http://updates.skillsusa.org.

ELIGIBILITY
Open to active SkillsUSA members enrolled in programs with photography as the occupational objective.

CLOTHING REQUIREMENT
Class E: Contest specific — Business Casual
For men: Official SkillsUSA white polo shirt, black dress slacks, black socks, black leather shoes.
For women: Official SkillsUSA white polo shirt with black dress skirt (knee-length) or black slacks; black socks or black or skin-tone seamless hose; black leather dress shoes.

Tuesday (Orientation):
Contestants must wear the official SkillsUSA clothing requirement listed above.

Thursday (Contest Site):
Contestants must wear the official SkillsUSA clothing requirement listed above.

These regulations refer to clothing items that are pictured and described at: www.skillsusastore.org. If you have questions about clothing or other logo items, call 800-401-1560 or 703-956-3723.

Note: Contestants must wear their official contest clothing to the contest orientation meeting.

EQUIPMENT AND MATERIALS
This is a minimum required equipment list. Any additional accessories are acceptable and up to the discretion of the student (e.g., on-camera flash, reflector, additional lenses, etc.). The technical committee supplies systems for Printing, Portrait Studio, Troubleshooting, Color Correction and Job Interview sections. Remember that all equipment brought on the "field assignment" must be carried by the student and fit in shared bus seating (in essence, one medium to large camera bag).
Provided by the contestant:
1. One DSLR or mirrorless camera with removable lens capabilities (bridge or compacts not accepted)
2. Minimum: two batteries with charger
3. Minimum: two 16 GB memory cards
4. One speedlight flash with wireless transmitter (be sure they work together)
5. One hand-held flash meter
6. USB card reader or camera USB cable
7. Computer with USB and/or SD card slot (laptop preferred). Please record the school's login password for the student.
8. Adobe Photoshop (be sure Photoshop can open the camera's RAW files)
9. Two images for Print Competition (see guidelines in "Scope of Contest)
10. All competitors must create a one-page résumé and submit a hard copy to the technical committee chair at orientation. Failure to do so will result in a 10-point penalty.

***Note*:** Your contest may also require a hard copy of your résumé as part of the actual contest. Check the Contest Guidelines and/or the updates page on the SkillsUSA website at http://updates.skillsusa.org.

SCOPE OF THE CONTEST
The contest is defined by industry standards. The contest is divided into two parts: a written exam testing overall photographic knowledge and a skill performance.

Knowledge Performance
The contest will include a written knowledge exam that assesses the overall photographic knowledge through a series of multiple-choice questions.

Skill Performance

The contest will include a series of hands-on performance activities assessing overall photographic mechanics and techniques.

Contest Guidelines

1. **Written Test:** This test has a series of multiple choice questions that cover some of the following topics:
   a. History of Photography (iconic photographers and advancements in technology)
   b. Exposure controls and their effects on images
   c. Lens choices given a photographic situation (sports, jewelry, studio portraits, etc.)
   d. General terminology
   e. Photoshop tools, workflow, processes, etc.

2. **Field Assignment:** The assignment evaluates the contestant's creative ability and adherence to contest guidelines. Contestants are brought to an undisclosed location to capture images based on a theme chosen by the technical committee. Contestants will then choose their best images and apply global edits and light editing before producing a contact sheet for judging. Scoring is based on:
   a. Technical: exposure and focus control
   b. Creative: overall use of composition, lighting, impact, etc.
   c. Level of editing (edits must be global in nature and must not be overdone)
   d. Contestant's adherence to time limits, location and theme

3. **Conceptual Assignment:** Contestants will use Adobe Photoshop to combine a minimum of three images from their chosen field assignment to product a creative conceptual piece of art. Very few parameters are put on this contest, as it is meant to evaluate creativity.

4. **Portrait Studio:** Students will be evaluated on their use and understanding of studio lighting (strobes). Scoring is based on, but not limited to:
   a. Standard studio portrait lighting patterns (e.g., split, hatchet, Rembrandt, loop, butterfly, broad, short, etc.)
   b. Light ratios (due to a variety of teaching methods, contestants will be given a "main" light aperture setting [e.g., f/11] and a stop difference for the "fill" light [e.g., two stops])
   c. Use of a hand-held light/flash meter
   d. Interaction with the model and posing quality

5. **Commercial Studio:** Due to the varying nature of subject, students' commercial images will be evaluated on the final photograph. Judging is based on, but not limited to:
   a. Product placement
   b. Lighting of product
   c. Clarity of product name
   d. Use of props
   e. Overall creativity and impact of image

6. **Digital Editing:** Contestants are given images to manipulate in Adobe Photoshop. This contest evaluates the student's knowledge of professional editing techniques, including, but not limited to:
   a. Selections and refine edge
   b. Layer masks and adjustment layers
   c. Green Screen extractions
   d. Color correction
   e. Resizing layers
   f. Correct naming and formatting

7. **Troubleshooting:** Contestants will be shown a series of images that have issues commonly found in today's digital processing. Contestants must correctly identify these problems from the list provided. These problems include but are not limited to:
   a. Chromatic aberration
   B. Barrel distortion
   C. Aliasing
   D. White balance
   E. Halos
   F. Posterization
   G. JPEG artifacts
   H. Parallax

8. **Print Competition:** Contestants must submit two prints produced before the competition in any category of their choice. Prints will be on public display and must *not* contain any questionable content including but not limited to: drugs, sex, violence, illegal activity, etc. Prints must adhere to the following criteria:
   a. Print size must be an 11"x14" or 10"x15"
   b. Both prints must be mounted to a 16"x20" black foam core board (¼" thick) with a 16"x20" black over mat
   c. Each print must have a label placed on the back upper middle section that includes the following information:
      1. Contestant number (given at the contest)
      2. Cellphone number
   d. Prints must be brought to the first orientation meeting of the contest (Tuesday, unless otherwise announced). Prints received after the meeting will receive a penalty

9. **Job Interview:** Contestants will be given an interview to assess their communication skills and overall job readiness.

Standards and Competencies

P 1.0 — Apply and implement overall photographic knowledge through a multiple-choice written test

1.1 Identify advancements in photographic history
1.2 Define a variety of camera functions
1.3 Explain studio lighting patterns and settings
1.4 Define a variety of digital photographic terms and terminologies

P 2.0 — Apply the knowledge and skill needed to conduct a photographic field assignment and produce a contact sheet for judging

2.1 Demonstrate technical proficiency in the areas of proper manual exposure and focus
2.2 Demonstrate artistic ability through use of standard rules of art and design including, but not limited to: rule of thirds, balance, leading lines, worm's/bird's eye, etc.
2.3 Demonstrate an ability to capture images that adhere to the "theme" of the assignment
2.4 Demonstrate the ability to format, edit and save the contact sheet using contest guidelines

P 3.0 — Apply the artistic techniques to manipulate multiple images in a free-form conceptual assignment

3.1 Demonstrate the ability to use various manipulative tools in Adobe Photoshop
3.2 Show an ability to adhere to contest guidelines by using the minimum number of chosen "field assignment" images for this assignment stated by the chairperson
3.3 Show a creative relationship between the elements used in the assignment

P 4.0 — Apply the knowledge and skill needed to create a standard studio portrait or commercial image

4.1 Show an understanding of proper lighting patterns on a subject's face in a head-and-shoulder portrait (e.g., split, Rembrandt, loop, butterfly, broad, short)
4.2 Demonstrate the ability to professionally light and capture a product for use in a commercial ad
4.3 Demonstrate correct placement of main and fill lights
4.4 Demonstrate correct lighting ratios by the setting of main and fill lights (i.e., main light = f/8 and fill light = f/4)
4.5 Demonstrate understanding of correct camera settings (e.g., white balance, ISO, aperture, shutter speed)
4.6 Demonstrate the ability to correctly crop the image in-camera (e.g., head/product placement, horizontal/vertical)
4.7 Demonstrate the ability to professionally pose a portrait subject
4.8 Demonstrate the ability to use creative compositional techniques in creating a commercial image

P 5.0 — Demonstrate the ability to use a variety of tools and techniques in Adobe Photoshop

5.1 Apply the knowledge of manipulating a digital image through several techniques, including:
- 5.1.1 Change orientation of an image
- 5.1.2 Change image size and/or crop
- 5.1.3 Use selection tools
- 5.1.4 Transform selections
- 5.1.5 Create layer masks
- 5.1.6 Use adjustment layers
- 5.1.7 Make tonal adjustments
- 5.1.8 Save and correctly name file

P 6.0 — Show the ability to identify common problems in the processing and printing of digital images

6.1 Apply knowledge of troubleshooting digital images by distinguishing between a series of images. Examples may include:
- 6.1.1 Identify over-exposure
- 6.1.2 Identify blooming
- 6.1.3 Identify aliasing
- 6.1.4 Identify JPEG artifacts
- 6.1.5 Identify noise
- 6.1.6 Identify white balance incorrect setting
- 6.1.7 Identify over-sharpening
- 6.1.8 Identify color-fringing
- 6.1.9 Identify posterization
- 6.1.10 Identify under-exposure
- 6.1.11 Identify camera shake
- 6.1.12 Identify barrel distortion
- 6.1.13 Identify halos
- 6.1.14 Identify improper gamma
- 6.1.15 Identify flash synch – too fast
- 6.1.16 Identify over saturation
- 6.1.17 Identify perspective shift (keystoning)
- 6.1.18 Identify HDR (over done)
- 6.1.19 Identify parallax
- 6.1.20 Identify dirty sensor
- 6.1.21 Identify clogged printer nozzle
- 6.1.22 Identify lens vignetting

P 7.0 — Apply the knowledge and skill to submit two portfolio prints that are consistent with the following criteria:

7.1 Meet required image size of 11"x14"

7.2 Show ability to present all prints mounted to a *black* 16"x20" foam core board (¼" preferred)

7.3 Show ability to use *black* over mat on each print

7.4 Demonstrate technical proficiency through proper exposure, focus, etc.

7.5 Demonstrate artistic ability through use of standard rules of art and design such as rule of thirds, leading lines, texture and use of positive-negative space

P 8.0 — Demonstrate the knowledge skills necessary for a job interview

8.1 Present a résumé for the interview

8.2 Present a digital or print portfolio of photographic work

8.3 Demonstrate an ability to communicate knowledge of the field of photography

8.4 Demonstrate soft skills necessary for the workplace

Committee Identified Academic Skills

The technical committee has identified that the following academic skills are embedded in this contest.

Math Skills

- Use fractions to solve practical problems
- Use proportions and ratios to solve practical problems
- Use scientific notation
- Solve practical problems involving percents
- Apply transformations (rotate or turn, reflect or flip, translate or slide, and dilate or scale) to geometric figures
- Make predictions using knowledge of probability
- Make comparisons, predictions and inferences using graphs and charts
- Solve problems using proportions, formulas and functions

Science Skills

- Use knowledge of heat, light and sound energy
- Use knowledge of the nature and technological applications of light

Language Arts Skills

- Provide information in conversations and in group discussions
- Provide information in oral presentations

- Demonstrate use of such verbal communication skills as word choice, pitch, feeling, tone and voice
- Demonstrate use of such nonverbal communication skills as eye contact, posture and gestures using interviewing techniques to gain information

Connections to National Standards

State-level academic curriculum specialists identified the following connections to national academic standards.

Math Standards

- Numbers and operations
- Geometry
- Measurement
- Problem solving
- Communication
- Connections
- Representation

Source: NCTM Principles and Standards for School Mathematics. For more information, visit: http://www.nctm.org.

Science Standards

- Understands the structure and properties of matter
- Understands the sources and properties of energy
- Understands the nature of scientific inquiry

Source: McREL compendium of national science standards. To view and search the compendium, visit: http://www2.mcrel.org/compendium/browse.asp.

Language Arts Standards

- Students apply a wide range of strategies to comprehend, interpret, evaluate and appreciate texts. They draw on their prior experience, their interactions with other readers and writers, their knowledge of word meaning and of other texts, their word identification strategies and their understanding of textual features (e.g., sound-letter correspondence, sentence structure, context, graphics)
- Students adjust their use of spoken, written and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes
- Students use spoken, written and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion and the exchange of information)

Source: IRA/NCTE Standards for the English Language Arts. To view the standards, visit: www.ncte.org/standards.

PLUMBING

PURPOSE
To evaluate each contestant's preparation for employment and to recognize outstanding students for excellence and professionalism in the field of residential plumbing.

First, download and review the General Regulations at: http://updates.skillsusa.org.

ELIGIBILITY
Open to active SkillsUSA members enrolled in programs with residential plumbing as the occupational objective.

CLOTHING REQUIREMENT
Class D: Contest Specific — Blue Attire
For both men and women: Official SkillsUSA light blue work shirt; navy pants; black, brown, or tan leather work shoes safety shoes (with protective toe cap.) Safety glasses with side shields or goggles (prescription glasses may be used only if they are equipped with side shields. If not, they must be covered with goggles).

These regulations refer to clothing items that are pictured and described at: www.skillsusastore.org. If you have questions about clothing or other logo items, call 800-401-1560 or 703-956-3723.

Note: Contestants must wear their official contest clothing to the contest orientation meeting.

EQUIPMENT AND MATERIALS
1. Supplied by the technical committee:
   a. All necessary supplies and appliances required for the project
   b. Tank and tips will be provided
2. Supplied by the contestant:
   a. 8' steel tape measure
   b. Copper tubing cutter with reamer
   c. Striker
   d. Arc joint pliers (channel lock type)
   e. 8" or 10" adjustable wrench
   f. Set of assorted slotted and Phillips screwdrivers
   g. Torpedo level
   h. 14-16 oz. claw hammer
   i. Plastic (PVC) pipe reamer or suitable knife
   j. Suitable saw or shear to cut PVC pipe
   k. Copper cleaning tool (inside and outside)
   l. 2H pencil and eraser
   m. Cutters suitable for cast-iron soil pipe
   n. Torque wrench for no-hub clamps
   o. $^{5}/_{16}$" nut driver
   p. Hacksaw
   q. $^{3}/_{8}$" drive socket set
   r. Portable battery screw gun
   s. Plumb bob
   t. Wiping rag
   u. All competitors must create a one-page résumé and submit a hard copy to the technical committee chair at orientation. Failure to do so will result in a 10-point penalty.

   ***Note*:** Your contest may also require a hard copy of your résumé as part of the actual contest. Check the Contest Guidelines and/or the updates page on the SkillsUSA website at http://updates.skillsusa.org.

SCOPE OF THE CONTEST
The contest is defined by industry standards as set by the current industry technical standards.

Knowledge Performance
The contest will include a written knowledge exam assessing knowledge of the industry standards.

Skill Performance
The contest includes a testing station with a series of changes designed to test the ability to perform jobs or skills selected from the following list of competencies as determined by the SkillsUSA Championships technical committee.

Contest Guidelines
All piping will be visually inspected and may be tested for leaks.

Standards and Competencies

PLB 1.0 — Perform basic plumbing tasks using appropriate tools and equipment

1.1 Identify and use basic hand tools, power tools and equipment
- 1.1.1 Measure lines to the nearest $^{1}/_{16}$" with a ruler/tape measure
- 1.1.2 Cut out an opening for various pipes and fixtures

1.2 Demonstrate proper use of hangers and supports

PLB 2.0 — Read and interpret blueprints and perform measurements and calculations

2.1 Read the architect's scale
2.2 Read and develop an isometric sketch of a plumbing system
2.3 Determine measurements from a manufacturer's specifications
2.4 Determine rough-in locations
2.5 Interpret riser diagrams

PLB 3.0 — Perform proper plumbing systems rough-in

3.1 Properly install DWV systems
- 3.1.1 Label a cross-section of a P-trap
- 3.1.2 Identify the proper fittings required for a DWV system
- 3.1.3 Calculate the slope required for drainage lines
- 3.1.4 Install proper venting
- 3.1.5 Install cleanouts
- 3.1.6 Rough-in plumbing fixtures
- 3.1.7 Perform DWV rough-in inspection test

3.2 Properly install water supply systems
- 3.2.1 Determine proper pipe sizing for hot and cold water systems
- 3.2.2 Rough-in water supply lines for plumbing fixtures and appliances
- 3.2.3 Perform approved water pressure tests

3.3 Identify and perform the proper joining method for given piping material
- 3.3.1 Join steel and CSS pipe and fittings
- 3.3.2 Join cast iron pipe and fittings
- 3.3.3 Join copper tube and fittings
- 3.3.4 Join plastic pipe and fittings

3.4 Identify types of fittings
3.5 Identify size of fittings

PLB 4.0 — Install plumbing fixtures, appliances and appurtenances

4.1 Install fixture supply stops
4.2 Install water supplies
4.3 Install appropriate traps
4.4 Install a faucet/valve
4.5 Install a drain assembly
4.6 Install the fixture level, plumb and secure
4.7 Install appropriate relief valves

PLB 5.0 — Perform plumbing systems service and repair

5.1 Replace a section of damaged water supply pipe
5.2 Repair damaged DWV pipe
5.3 Repair a leaking faucet
5.4 Repair a leaking shower valve
5.5 Replace a water closet fill valve
5.6 Replace a trap
5.7 Clear obstructions from a drain
- 5.7.1 Clear obstructions from a drain
- 5.7.2 Clear obstructions from a water closet drain
- 5.7.3 Clear obstructions from a main drain line

PLB 6.0 — Perform plumbing tasks in a safe environment

6.1 Keep your work area clean and safe
6.2 Understand and apply OSHA regulations that involve plumbing practices
6.3 Use appropriate safety apparel for the task being performed
- 6.3.1 Wear appropriate safety glasses, hard hats, work boots, respirators, ear protection, back and knee protection, etc., for a given situation

6.4 Demonstrate safe soldering practices
- 6.4.1 Demonstrate correct procedure for connecting torch equipment including regulators, tanks, hose, torch and tips
- 6.4.2 Ignite and extinguish torch using safe practices
- 6.4.3 Check for unsafe conditions such as cracked hoses, damaged gauges and leaks

6.5 Demonstrate proper use of GFI in potentially hazardous conditions
6.6 Demonstrate safe use of power and hand tools

6.7 Maintain proper ventilation when working with chemicals and other potentially hazardous materials

PLB 7.0 — Employability

7.1 Exhibit personal skills such as attendance, time management, individual responsibility and teamwork
7.2 Practice good customer relations
7.3 Fill out a job application completely and legibly
7.4 Maintain professional conduct and appearance
  7.4.1 Demonstrate polite, attentive attitude
  7.4.2 Wear neat, clean clothing and be well-groomed
7.5 Respect the property of both your customer and employer

Committee Identified Academic Skills

The technical committee has identified that the following academic skills are embedded in this contest.

Math Skills

- Solve single variable algebraic expressions
- Solve multiple variable algebraic expressions
- Measure angles
- Find volume and surface area of three-dimensional objects
- Apply transformations (rotate or turn, reflect or flip, translate or slide and dilate or scale) to geometric figures
- Construct three-dimensional models
- Find slope of a line
- Solve practical problems involving complementary, supplementary and congruent angles
- Use measures of interior and exterior angles of polygons to solve problems

Science Skills

- Plan and conduct a scientific investigation
- Describe characteristics of types of matter based on physical and chemical properties
- Use knowledge of physical properties (shape, density, solubility, odor, melting point, boiling point, color)
- Use knowledge of classification of elements as metals, metalloids and nonmetals
- Describe phases of matter
- Describe and identify physical changes to matter
- Use knowledge of potential and kinetic energy
- Use knowledge of mechanical, chemical and electrical energy
- Use knowledge of speed, velocity and acceleration
- Use knowledge of Newton's laws of motion
- Use knowledge of work, force, mechanical advantage, efficiency and power
- Use knowledge of simple machines, compound machines, powered vehicles, rockets and restraining devices

Language Arts Skills

- Demonstrate comprehension of a variety of informational texts
- Use text structures to aid comprehension
- Demonstrate knowledge of appropriate reference materials
- Use print, electronic databases and online resources to access information in books and articles

Connections to National Standards

State-level academic curriculum specialists identified the following connections to national academic standards.

Math Standards

- Numbers and operations
- Algebra
- Geometry
- Measurement
- Data analysis and probability
- Problem solving
- Communication
- Connections
- Representation

Source: NCTM Principles and Standards for School Mathematics. For more information, visit: http://www.nctm.org.

Science Standards

- Understands the structure and properties of matter
- Understands the sources and properties of energy
- Understands forces and motion

- Understands the nature of scientific inquiry
- Understands the scientific enterprise

Source: McREL compendium of national science standards. To view and search the compendium, visit: http://www2.mcrel.org/compendium/browse.asp.

Language Arts Standards

- Students use a variety of technological and information resources (e.g., libraries, databases, computer networks, video) to gather and synthesize information and to create and communicate knowledge

Source: IRA/NCTE Standards for the English Language Arts. To view the standards, visit: www.ncte.org/standards.

Power Equipment Technology

Purpose
To evaluate each contestant's preparation for employment and recognize outstanding students for excellence and professionalism in engine and equipment diagnostics, overhaul and repair of both liquid and air-cooled engines. It will also evaluate the ability to troubleshoot and possibly overhaul the power train components of a piece of powered equipment and/or machinery.

First, download and review the General Regulations at: http://updates.skillsusa.org.

Eligibility
Open to active SkillsUSA members enrolled in programs with small air-cooled engine repair or power equipment-related repair programs with that as its occupational objective.

Clothing Requirement
Class D: Contest Specific — Blue Attire
For both men and women: Official SkillsUSA light blue work shirt; navy pants; black, brown, or tan leather work shoes safety shoes (with protective toe cap.) Safety glasses with side shields or goggles (prescription glasses may be used only if they are equipped with side shields. If not, they must be covered with goggles).

These regulations refer to clothing items that are pictured and described at: www.skillsusastore.org. If you have questions about clothing or other logo items, call 800-401-1560 or 703-956-3723.

Note: Contestants must wear their official contest clothing to the contest orientation meeting.

Equipment and Materials
1. Supplied by the technical committee:
   a. All necessary engines, engine parts, workstations, test stands, power equipment, gasoline, oil and all basic hand tools as well as necessary specialty tools
   b. Industry manuals, including service and repair instruction manuals
2. Supplied by the contestant:
   a. All competitors must create a one-page résumé and submit a hard copy to the technical committee chair at orientation. Failure to do so will result in a 10-point penalty.

   ***Note*:** Your contest may also require a hard copy of your résumé as part of the actual contest. Check the Contest Guidelines and/or the updates page on the SkillsUSA website at http://updates.skillsusa.org.

Scope of Contest
The contest assesses understanding of two-cycle and four-cycle engines, 2 through 42 horsepower, and of both L-head and overhead valve design, as well as both single and twin cylinder design, drive train and hydraulic drive trains.

Knowledge Performance
The contest will include a written knowledge exam based on an industry standard test. Additionally, the test could cover manufacturer's engines, parts identification, ordering and/or related equipment. There will also be the possibility of additional written portions during the day of the skill event.

Skill Performance
The contest will include a series of testing stations to assess skill performance.

Contest Guidelines
1. Contestants should have an understanding of engine theory, engine operation, diagnostic, failure analysis and repair and testing of engines and related power equipment as identified in the Standards and Competencies section following.

2. Contestants will demonstrate their ability to perform skills taken from the following areas:
   a. Ignition, Charging, Fuel and Governor Systems
   b. Starter, Cooling and Lubrication Systems
   c. Valves, Exhaust and Engine Block Systems
   d. Diagnostic and Failure Analysis
   e. Shop Procedures
   f. Business Operations
   g. Transmission/Power Train
   h. General Competencies

Standards and Competencies

PET 1.0 — Ignition, Charging, Fuel and Governor Systems

1.1 Ignition and Charging Systems
- 1.1.1 Understand and be able to disassemble ignition system, inspect and test ignition components
- 1.1.2 Show proficiency in testing coil/ignition modules
- 1.1.3 Repair/replace electronic ignition components
- 1.1.4 Test and troubleshoot equipment-related switches and harnesses along with stators, regulators and any related wiring harnesses

1.2 Fuel Systems
- 1.2.1 Explain and be able to inspect, service, repair and adjust carburetors, gaseous fuel regulators and mixers
- 1.2.2 Inspect, clean and replace filters
- 1.2.3 Check fuel tanks and service and repair fuel pumps and solenoids
- 1.2.4 Test equipment-related fuel tanks, lines and related systems and understand the procedures for testing for compliance systems as they are related to emission requirements and standards

1.3 Governor Systems
- 1.3.1 Understand and be able to explain the various governor systems
- 1.3.2 Inspect, service and reassemble governors
- 1.3.3 Understand and be able to explain which components cause engines to increase or decrease in the number of revolutions per minute

PET 2.0 — Starter, Cooling and Lubrication Systems

2.1 Starter Systems
- 2.1.1 Recognize and be able to demonstrate the ability to inspect, service and adjust the various starting systems; use wiring schematics of related equipment systems

2.2 Cooling Systems
- 2.2.1 Recognize, test and troubleshoot both liquid and air-cooled cooling systems of both engines and equipment
- 2.2.2 Understand and recognize signs of heat-related failures or problems

2.3 Lubricating Systems
- 2.3.1 Define and understand the various styles and types of lubrication systems
- 2.3.2 Demonstrate the ability to check oil levels and fuel/oil mixtures
- 2.3.3 Demonstrate the method of checking oil pressurized systems with the use of required tools
- 2.3.4 Understand and explain the various grades of oils and uses in the proper engines/equipment

PET 3.0 — Valves, Exhaust and Engine Block Systems

3.1 Valves
- 3.1.1 Identify and be able to service various types and styles of valve train components; explain why sealing these components is important

3.2 Exhaust Systems
- 3.2.1 Identify the various types of exhaust systems and explain how they relate to the engine and or equipment
- 3.2.2 Inspect and service exhaust and understand the procedures for testing for compliance systems as they are related to emission requirements and standards

3.3 Engine Block Components
- 3.3.1 Understand, identify and provide the necessary service/repair techniques to the various manufacturers within the industry; this could include disassembly, inspection and measuring of crankshafts, connecting rod bearings, journals, cylinders, piston and rings
- 3.3.2 Complete repairs to correct torque of critical fasteners and replace any gaskets and/or sealants

PET 4.0 — Diagnostic and Failure Analysis

4.1 Demonstrate the proper use of the various specialized tools of the industry. Be able to test crankcase vacuum, compression gauge, leak down testers, voltmeters/multimeters and any other required tools

4.2 Analyze failed engine components to determine the correct type of failure; determine best method to repair and estimate cost of repair

PET 5.0 — Shop Procedures

5.1 Demonstrate the proper techniques in the care and use of tools and equipment

5.2 Demonstrate the ability to work accurately with precision instruments

5.3 Use proper safety procedures; demonstrate ability to use service manuals and/or bulletins

5.4 Perform tasks within assigned time limits

5.5 Give a verbal response to a customer and answer customer-related problematic questions

5.6 Prepare equipment for delivery

PET 6.0 — Business Operation

6.1 Demonstrate the ability to look up proper part numbers by using paper, microfiche and/or electronic means available

6.2 Prepare both shop repair tickets and warranty claims

6.3 Demonstrate the ability to calculate costs accurately

6.4 Understand and operate equipment within equipment manufacturer's guidelines

6.5 Understand effective customer interaction and professional customer communications and relations

PET 7.0 — Transmission/Power Train

7.1 Understand the theory of transmission and transaxle components

7.2 Disassemble power train components, assemble power train components and diagnose and correct a potential problem

7.3 Understand the different types of transmissions and what types of lubrication systems are necessary for each

PET 8.0 — General Competencies

8.1 Basic reading and comprehension

8.2 Understand basic two- and four-stroke theory

8.3 Understand electrical theory

8.4 Understand carburetion theory and other related fuel systems

8.5 Read and follow schematics for hydraulics, electrical, etc.

8.6 Communicate effectively to others

8.7 Demonstrate basic computer skills

Additional Resources and Notes

Additional source material can be found on the manufacturers' websites, through the local central distributors, dealers or manufacturers within each state. Those manufacturers are:

- **Briggs & Stratton Corp**.
  www.briggsandstratton.com
- **Kohler Engines**
  www.kohlerengines.com
  www.kohlerplus.com
- **Equipment and Training Council**
  www.eetc.org
- **MTD**
  www.mtdproducts.com
- **Simplicity**
  www.simplicity.com

- **Miller Welders**
  www.millerwelds.com

- **John Deere**
  www.johndeere.com

Committee Identified Academic Skills

The technical committee has identified that the following academic skills are embedded in this contest.

Math Skills

- Use proportions and ratios to solve practical problems
- Use scientific notation
- Solve practical problems involving percents
- Measure angles
- Find surface area and perimeter of two-dimensional objects
- Find volume and surface area of three-dimensional objects
- Make predictions using knowledge of probability
- Make comparisons, predictions and inferences using graphs and charts
- Organize and describe data using matrixes
- Find slope of a line

Science Skills

- Plan and conduct a scientific investigation
- Use knowledge of patterns of cellular organization (cells, tissues, organs, systems)
- Describe basic needs of organisms
- Describe and recognize elements, compounds, mixtures, acids, bases and salts
- Describe and recognize solids, liquids and gases
- Describe characteristics of types of matter based on physical and chemical properties
- Use knowledge of classification of elements as metals, metalloids and nonmetals
- Describe and demonstrate simple compounds (formulas and the nature of bonding)
- Understand Law of Conservation of Matter and Energy
- Predict chemical changes to matter (types of reactions, reactants and products; and balanced equations)
- Use knowledge of potential and kinetic energy
- Use knowledge of mechanical, chemical and electrical energy
- Use knowledge of heat, light and sound energy
- Use knowledge of temperature scales, heat and heat transfer
- Use knowledge of sound and technological applications of sound waves
- Use knowledge of the nature and technological applications of light
- Use knowledge of speed, velocity and acceleration
- Use knowledge of Newton's laws of motion
- Use knowledge of work, force, mechanical advantage, efficiency and power
- Use knowledge of simple machines, compound machines, powered vehicles, rockets and restraining devices
- Use knowledge of principles of electricity and magnetism
- Use knowledge of static electricity, current electricity and circuits
- Use knowledge of magnetic fields and electromagnets
- Use knowledge of motors and generators

Language Arts Skills

- Provide information in conversations and in group discussions
- Provide information in oral presentations
- Demonstrate use of such verbal communication skills as word choice, pitch, feeling, tone and voice
- Demonstrate use of such nonverbal communication skills as eye contact, posture and gestures using interviewing techniques to gain information
- Analyze mass media messages
- Demonstrate comprehension of a variety of informational texts
- Use text structures to aid comprehension
- Identify words and phrases that signal an author's organizational pattern to aid comprehension
- Understand source, viewpoint and purpose of texts
- Organize and synthesize information for use in written and oral presentations

- Demonstrate knowledge of appropriate reference materials
- Use print, electronic databases and online resources to access information in books and articles
- Demonstrate narrative writing
- Demonstrate persuasive writing
- Demonstrate informational writing
- Edit writing for correct grammar, capitalization, punctuation, spelling, sentence structure and paragraphing

Connections to National Standards

State-level academic curriculum specialists identified the following connections to national academic standards.

Math Standards

- Numbers and Operations
- Measurement
- Problem Solving
- Reasoning and Proof
- Communication
- Connections
- Representation

Source: NCTM Principles and Standards for School Mathematics. For more information, visit: http://www.nctm.org.

Science Standards

- Understands the structure and properties of matter
- Understands the sources and properties of energy
- Understands forces and motion
- Understands the nature of scientific inquiry

Source: McREL compendium of national science standards. To view and search the compendium, visit: http://www2.mcrel.org/compendium/browse.asp.

Language Arts Standards

- Students apply a wide range of strategies to comprehend, interpret, evaluate and appreciate texts. They draw on their prior experience, their interactions with other readers and writers, their knowledge of word meaning and of other texts, their word identification strategies and their understanding of textual features (e.g., sound-letter correspondence, sentence structure, context, graphics)
- Students adjust their use of spoken, written and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes
- Students use spoken, written and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion and the exchange of information)

Source: IRA/NCTE Standards for the English Language Arts. To view the standards, visit: www.ncte.org/standards.

PRACTICAL NURSING

PURPOSE
To evaluate each contestant's preparation for employment and to recognize outstanding students for excellence and professionalism in the field of practical nursing.

First, download and review the General Regulations at: http://updates.skillsusa.org.

ELIGIBILITY
Open to active SkillsUSA members enrolled in programs with practical nursing as the occupational objective.

CLOTHING REQUIREMENT
Class B: Healthcare Attire
For both men and women: Official blue scrubs; white socks or skin-tone seamless hose; health-professional's white leather work shoes. Shoes must be all-white leather (no canvas), completely enclosed (no open-toe or open-heel). Athletic-style shoes that meet the aforementioned criteria are acceptable.

Scrubs should fit appropriately for all health contests and should be properly hemmed and wrinkle free. Only plain, white, collarless t-shirts may be worn underneath the scrubs. Hair must be pinned up and off the collar.

These regulations refer to clothing items that are pictured and described at: www.skillsusastore.org. If you have questions about clothing or other logo items, call 800-401-1560 or 703-956-3723.

Note: Contestants must wear their official contest clothing to the contest orientation meeting.

EQUIPMENT AND MATERIALS
1. Supplied by the technical committee:
   a. All instruments, equipment and materials required for the contest

2. Supplied by the contestant:
   a. A watch with a second hand
   b. A pen with black ink
   c. A pencil
   d. Stethoscope
   e. Scissors for removing bandages
   f. CPR mask — no shield
   g. CPR card — to be shown to the technical committee chair at orientation
   h. Blood pressure unit (Aneroid sphygmomanometer with an adult cuff)
   i. Penlight
   j. All competitors must create a one-page résumé and submit a hard copy to the technical committee chair at orientation. Failure to do so will result in a 10-point penalty.

   ***Note*:** Your contest may also require a hard copy of your résumé as part of the actual contest. Check the Contest Guidelines and/or the updates page on the SkillsUSA website at http://updates.skillsusa.org.

SCOPE OF THE CONTEST
The contest is defined by industry standards set by the industry supporting the contest. Check website for updates.

Knowledge Performance
The contest will include a written knowledge test assessing knowledge of medical terminology, body structure and function, nutrition, medications and nursing care. Practical nursing requires the application of all levels of cognitive ability.

Skills Performance
The contest will assess fundamentals of the clinical problem-solving process, caring, communications and documentation. All skills demonstrated will be based on nationally accepted accreditation and certification standards. Contestants, as part of the demonstration, should voluntarily express pertinent information. Situations or case studies

may be presented to test the contestants' ability to make judgment decisions.

Standards and Competencies

PN 1.0 — Provide coordinated care to meet clients' individualized needs

1.1 Plan responses to a client's complaints or demands
1.2 Use resources to learn more about the culture of a client
1.3 Intervene when a client's dignity or privacy is being violated
1.4 Determine if a client needs to be referred for a hearing, vision or speech problem
1.5 Evaluate the effectiveness of a patient's recreational therapy
1.6 Ask physician if medical treatment can be modified to meet a client's special needs
1.7 Check with a physician about contraindicated medication or treatment
1.8 Recommend a change in drug therapy based upon a client's behavior
1.9 Suggest revising or discontinuing a medication order
1.10 Collaborate with other healthcare providers to help clients adopt healthful roles after illness
1.11 Participate in a multidisciplinary team conference in planning care
1.12 Transcribe a physician's orders
1.13 Identify clients who require isolation

PN 2.0 — Delegate responsibilities effectively and educate other staff

2.1 Instruct staff on the need for client confidentiality
2.2 Plan patient care assignments for staff
2.3 Teach staff about safety precautions for special equipment

PN 3.0 — Implement procedures that provide quality assurance

3.1 Evaluate a staff member's understanding of infection control procedures
3.2 Look for the source of repeated infection
3.3 Document treatment errors or accidents
3.4 Develop standards of care for clients with particular problems
3.5 Intervene in situations involving unsafe or inadequate care

PN 4.0 — Provide goal-oriented patient care through the development of nursing care plans, communication within the healthcare team and individualized patient care

4.1 Write a nursing care plan
4.2 Alter a care plan to accommodate a client's values, customs, or habits
4.3 Plan alternative methods of communication for a client with a hearing, speech or vision problem
4.4 Plan nursing measures to promote sleep
4.5 Schedule the administration of medications
4.6 Modify a client's care based on the results of diagnostic tests
4.7 Give a report to the nurses on the next shift
4.8 Check accuracy of orders and client data
4.9 Ask clients about allergies
4.10 Refer to research literature in planning care
4.11 Use reference works to check on expected effects of therapy
4.12 Develop plans for a client's discharge or transfer

PN 5.0 — Create a safe environment for patients and co-workers to ensure safety to meet individualized client needs

5.1 Arrange a room to promote client safety
5.2 Analyze environmental hazards in the community, school or workplace
5.3 Plan measures to reduce sources of discomfort in a client's environment
5.4 Plan safety needs of a client with a perceptual disorder
5.5 Carry out radiation protection measures
5.6 Check that electronic equipment is working properly
5.7 Identify clients who need restraints
5.8 Verify the identity of a client
5.9 Set up a sterile field
5.10 Sterilize equipment

PN 6.0 — Prepare a client for medical treatments and procedures including diagnostic tests, surgery and delivery

6.1 Prepare a client for a diagnostic test
6.2 Verify that a client or family has information needed for informed consent
6.3 Explain to a client the expected outcomes of the treatment or therapy
6.4 Check that a client is emotionally ready for surgery or other obtrusive procedure

6.5 Check that a client is physically prepared for surgery or delivery

PN 7.0 — Prepare equipment for surgery and provide patient and surgeon assistance during a procedure

7.1 Check the functioning of suction equipment
7.2 Maintain asepsis for a client at risk
7.3 Pass instruments during a surgical procedure
7.4 Stay with a client to promote safety and reduce fear
7.5 Monitor a client's status during surgery or other obtrusive procedure

PN 8.0 — Collect and disperse medical specimens from clients for laboratory tests

8.1 Obtain specimens from clients for laboratory tests
8.2 Label and prepare specimens for transmission to the laboratory

PN 9.0 — Observe and communicate changes in a client's medical status

9.1 Report changes in client's level of consciousness
9.2 Notify a physician about significant changes in a client's condition

PN 10.0 — Evaluate a patient's health state and provide emergency medical care to a patient when needed

10.1 Perform cardiopulmonary resuscitation (CPR) in accordance with current American Heart Association guidelines
10.2 Provide tracheotomy care
10.3 Provide emergency care for a wound in accordance with current American Red Cross guidelines
10.4 Determine if a client with chest trauma needs emergency care
10.5 Administer oxygen
10.6 Suction a client's respiratory tract
10.7 Manage a medical emergency until a physician arrives

PN 11.0 — Monitor a patient's vital signs

11.1 Check bowel sounds
11.2 Assess respiratory status
11.3 Assess cardiovascular status
11.4 Assess a client's tolerance for physical activity
11.5 Assess a client's nutrition and hydration status
11.6 Assess a client's neurosensory functions
11.7 Check a client for bleeding

PN 12.0 — Reduce risk potential by monitoring patient's reaction to medical treatments

12.1 Withhold medication if there is adverse reaction
12.2 Observe clients for side effects of chemotherapy or radiation therapy
12.3 Check for interactions among client's drugs, foods and fluids
12.4 Check for complications due to a cast
12.5 Assess the progress of wound healing

PN 13.0 — Ensure a patient's mobility by monitoring the patient and providing assistance with mobility

13.1 Check a client for complications due to immobility
13.2 Check that traction devices are set up properly
13.3 Do passive range of motion exercises for a client
13.4 Help a client in and out of bed
13.5 Evaluate a client's use of crutches or other walking aids

PN 14.0 — Anticipate client's needs for pain management and educate client on pain coping methods

14.1 Plan measures to minimize anticipated pain
14.2 Teach a client pain management techniques
14.3 Evaluate a client's response to nursing measures for controlling pain or discomfort
14.4 Assess the need for administration of PRN medications

PN 15.0 — Provide patients with basic care such as monitoring patient health and ensuring patient comfort

15.1 Modify food and fluid intake to promote fluid and electrolyte balance
15.2 Assist a client with personal hygiene
15.3 Position or turn a client
15.4 Weigh a client
15.5 Help a client eat
15.6 Schedule activities to provide opportunities for clients to rest
15.7 Give a back rub
15.8 Give a tube feeding

15.9 Test urine specimen
15.10 Give an enema
15.11 Administer oral medications
15.12 Position a client who has a spinal cord injury
15.13 Record intake and output
15.14 Plan measures to improve a client's appetite
15.15 Give perinea care
15.16 Apply a dressing to a wound
15.17 Record the characteristics of tube drainage
15.18 Assess the patency of drainage and decompression tubes
15.19 Insert an indwelling urinary catheter
15.20 Plan measures to prevent circulatory complications
15.21 Take measures to prevent respiratory complications
15.22 Administer intramuscular or subcutaneous medications
15.23 Plan measures to prevent neurological complications
15.24 Take measures to counteract the effects of poisons or the side effects of medications
15.25 Plan measures to maintain skin integrity

PN 16.0 — Assess client for negative behaviors to self and others and educate client on treatment options

16.1 Check a client for signs and symptoms of alcohol/drug withdrawal
16.2 Record client behaviors that indicate delusions or hallucinations
16.3 Assess orientation to a person, place and time
16.4 Teach a client early signs and symptoms of recurring depression
16.5 Develop a plan to emphasize the strengths of a client with low self-esteem
16.6 Teach the family of an emotionally disturbed client the techniques for managing behavior
16.7 Assess a client's potential for violence to self or others
16.8 Assess the environment of a suicidal client for potential hazards
16.9 Counsel suspected victims of abuse
16.10 Counsel a client with a drug/alcohol problem
16.11 Record baseline data for behavior modification program
16.12 Plan measures to control or help a client to control disruptive behavior

PN 17.0 — Educate clients on adaptation and coping skills needed to deal with emotional and physical illness

17.1 Assess whether a client is getting adequate emotional support
17.2 Encourage clients to talk about their fears
17.3 Record observations of behavior that indicate a client's mood
17.4 Evaluate a client's learning of relaxation techniques
17.5 Help a client to deal with negative attitudes related to illness
17.6 Encourage clients to persist with therapy
17.7 Assess a client's adjustment to changes in body image
17.8 Assess the emotional adjustment of a client with a physical or emotional impairment
17.9 Assess a client's need for an increase or decrease in sensory stimulation
17.10 Plan measures to deal with a client's anxiety due to pain or change in body function

PN 18.0 — Provide education to clients regarding healthy prenatal and postnatal care

18.1 Assess parents' understanding of normal infant growth and development
18.2 Check the skill of new parents at infant feeding
18.3 Teach parenting skills
18.4 Assess new mothers for complications
18.5 Evaluate a client's understanding of risks to unborn children
18.6 Conduct a prenatal care session
18.7 Conduct a prenatal and fetal status check during labor
18.8 Assess the health of a newborn
18.9 Identify clients with problems related to sexuality or reproduction
18.10 Assess clients' attitudes toward various birth control measures

PN 19.0 — Counsel patients and teach self-care procedures to ensure the delivery of quality self-administered medical care

19.1 Refer a client to a self-help group
19.2 Analyze a client's ability for self-care

19.3 Compare the physical development of a client to norms
19.4 Compare a client's behavioral development to norms
19.5 Teach clients about normal nutrition
19.6 Plan measures to help a client cope with anxiety about shortness of breath
19.7 Assess the need of clients for teaching about personal hygiene
19.8 Teach clients about self-administration of prescribed medications
19.9 Teach clients how to avoid infection
19.10 Evaluate a client's performance of breathing exercises
19.11 Plan a bowel or bladder retraining program
19.12 Counsel a client with urinary or bowel incontinence
19.13 Identify differences between clients' views about their conditions and the medical view
19.14 Evaluate a client's understanding of ostomy care
19.15 Plan counseling for a client who is trying to lose or gain weight
19.16 Teach a client how to do exercises
19.17 Prepare client teaching materials
19.18 Teach clients about the use of artificial devices that improve daily functions
19.19 Help a client to perform activities of daily living
19.20 Adapt a diet to special needs of a client
19.21 Assess low-income clients' ability to meet their nutritional needs
19.22 Teach clients with physical impairments how to care for themselves
19.23 Evaluate a client's use of home remedies and over-the-counter drugs
19.24 Help clients choose recreational activities that fit their age and condition
19.25 Evaluate a client's compliance with prescribed therapy

PN 20.0 — Evaluate and assess the integrity of family-based support systems and intervene to ensure optimal patient care

20.1 Assess the safety of a client's home environment
20.2 Assess a client's/family's understanding about the causes of illness
20.3 Arrange for spiritual support during transitions or crises
20.4 Support terminally ill clients and their families
20.5 Teach home-care givers about the client's therapy
20.6 Counsel the family of a client with a mental, social or physical handicap
20.7 Adjust visiting hours to meet a family's needs
20.8 Assess a family's emotional reaction to a client's chronic disorder
20.9 Evaluate the quality of home care
20.10 Assess patterns of family interactions
20.11 Help a client/family adjust to role changes due to illness, accident or developmental changes
20.12 Look for signs of burnout in family members giving home care

PN 21.0 — Provide prevention procedures for early treatment of disease

21.1 Administer an immunizing agent
21.2 Conduct screening sessions
21.3 Interpret skin tests for allergy or tuberculosis

PN 22.0 — Perform venous access and intravenous infusion treatment modalities

22.1 Prepare for the insertion of the intravenous line
22.2 Insert an over-the-needle catheter (ONC)
22.3 Insert a winged-infusion set
22.4 Convert a peripheral catheter to an intermittent infusion device
22.5 Calculate and establish infusion flow rate
22.6 Apply an armboard
22.7 Add new parenteral fluid container to existing IV line
22.8 Change peripheral IV administration set tubing
22.9 Change central venous administration tubing
22.10 Change peripheral IV site dressings
22.11 Change central venous site dressings
22.12 Maintain patency of peripheral heparin-locked intermittent infusion devices
22.13 Maintain patency of peripheral saline-locked intermittent infusion devices
22.14 Discontinue a peripheral IV site
22.15 Use a primary pressure-sensitive, check-valve set with a short secondary set to administer an IVPB

22.16 Use a primary standard infusion set and a second standard administration set to administer an IVPB
22.17 Use a standard administration set and an intermittent infusion device to administer an IVPB
22.18 Perform phlebotomy

Committee Identified Academic Skills

The technical committee has identified that the following academic skills are embedded in this contest.

Math Skills

- Use fractions to solve practical problems
- Use proportions and ratios to solve practical problems
- Solve practical problems involving percents
- Solve single variable algebraic expressions
- Make comparisons, predictions and inferences using graphs and charts
- Organize and describe data using matrixes
- Solve problems using proportions, formulas and functions

Science Skills

- Plan and conduct a scientific investigation
- Use knowledge of cell theory
- Use knowledge of patterns of cellular organization (cells, tissues, organs, systems)
- Describe basic needs of organisms
- Classify living organisms
- Use knowledge of reproduction and transmission of genetic information
- Describe and recognize elements, compounds, mixtures, acids, bases and salts
- Describe and recognize solids, liquids and gases
- Use knowledge of physical properties (shape, density, solubility, odor, melting point, boiling point, color)
- Use knowledge of chemical properties (acidity, basicity, combustibility, reactivity)
- Predict chemical changes to matter (types of reactions, reactants and products; and balanced equations)
- Use knowledge of simple machines, compound machines, powered vehicles, rockets and restraining devices
- Use knowledge of principles of electricity and magnetism

Language Arts Skills

- Provide information in conversations and in group discussions
- Provide information in oral presentations
- Demonstrate use of such verbal communication skills as word choice, pitch, feeling, tone and voice
- Demonstrate use of such nonverbal communication skills as eye contact, posture and gestures using interviewing techniques to gain information
- Demonstrate comprehension of a variety of informational texts
- Use text structures to aid comprehension
- Demonstrate knowledge of appropriate reference materials
- Use print, electronic databases and online resources to access information in books and articles
- Demonstrate informational writing

Connections to National Standards

State-level academic curriculum specialists identified the following connections to national academic standards.

Math Standards

- Numbers and operations
- Algebra
- Geometry
- Measurement
- Data analysis and probability
- Problem solving
- Communication
- Connections
- Representation

Source: NCTM Principles and Standards for School Mathematics. For more information, visit: http://www.nctm.org.

Science Standards

- Understands the principles of heredity and related concepts
- Understands the structure and function of cells and organisms
- Understands relationships among organisms and their physical environment
- Understands biological evolution and the diversity of life
- Understands the structure and properties of matter

- Understands the sources and properties of energy
- Understands the nature of scientific knowledge
- Understands the nature of scientific inquiry
- Understands the scientific enterprise

Source: McREL compendium of national science standards. To view and search the compendium, visit: http://www2.mcrel.org/compendium/browse.asp.

Language Arts Standards

- Students read a wide range of print and nonprint texts to build an understanding of texts, of themselves and of the cultures of the United States and the world; to acquire new information; to respond to the needs and demands of society and the workplace; and for personal fulfillment. Among these texts are fiction and nonfiction, classic and contemporary works
- Students apply a wide range of strategies to comprehend, interpret, evaluate and appreciate texts. They draw on their prior experience, their interactions with other readers and writers, their knowledge of word meaning and of other texts, their word identification strategies and their understanding of textual features (e.g., sound-letter correspondence, sentence structure, context, graphics)
- Students adjust their use of spoken, written and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes
- Students employ a wide range of strategies as they write and use different writing process elements appropriately to communicate with different audiences for a variety of purposes
- Students apply knowledge of language structure, language conventions (e.g., spelling and punctuation), media techniques, figurative language and genre to create, critique and discuss print and nonprint texts
- Students conduct research on issues and interests by generating ideas and questions and by posing problems. They gather, evaluate and synthesize data from a variety of sources (e.g., print and nonprint texts, artifacts, people) to communicate their discoveries in ways that suit their purpose and audience
- Students use a variety of technological and information resources (e.g., libraries, databases, computer networks, video) to gather and synthesize information and to create and communicate knowledge
- Students develop an understanding of and respect for diversity in language use, patterns and dialects across cultures, ethnic groups, geographic regions and social roles
- Students participate as knowledgeable, reflective, creative and critical members of a variety of literacy communities
- Students use spoken, written and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion and the exchange of information)

Source: IRA/NCTE Standards for the English Language Arts. To view the standards, visit: www.ncte.org/standards.

Restaurant Service

Purpose
To evaluate each contestant's preparation for employment and to recognize outstanding students for excellence and professionalism in food and beverage hospitality service**.** This service will range from bistro and banquet service to fine dining.

First, download and review the General Regulations at: http://updates.skillsusa.org.

Eligibility
Open to active SkillsUSA members enrolled in programs that include food and beverage service as a part of their instruction and occupational objective.

Clothing Requirement
Class H: Contest Specific — Restaurant Service
For men: Official SkillsUSA white long-sleeved dress shirt, or long-sleeved plain white collared shirt; black dress slacks with belt; plain black tie with no pattern or SkillsUSA black tie; black socks; shined black leather work shoes.
For women: Official SkillsUSA white long-sleeved dress shirt, or long-sleeved plain white collared shirt; black skirt (knee-length) or black dress slacks with belt; black socks or black or skin-colored seamless hose; shined black flat heels.

Note: Bistro aprons are the official apron for Restaurant Service and are required. Waiter's jackets, bow ties, vests, cummerbunds or half aprons are not permitted

These regulations refer to clothing items that are pictured and described at: www.skillsusastore.org. If you have questions about clothing or other logo items, call 800-401-1560 or 703-956-3723.

Note: Contestants must wear their official contest clothing to the contest orientation meeting.

Equipment and Materials
1. Supplied by the technical committee:
   a. All equipment, "food," beverages, chairs, tables, flatware, trays, table settings, cloths, napkins and tax charts. Guest checks, check presentation folders, contest materials, menus and description of the daily chef's featured dishes will be provided.
2. Supplied by the contestant:
   a. One ink pen (blue or black)
   b. No. 2 pencil for written test
   c. Calculator for tax rate
   d. Table crumbers are part of a waiter's uniform (wine tool for college/postsecondary)
   e. All competitors must create a one-page résumé using a word processor and submit the résumé electronically at: www.skillsusa.org/compete/updates.shtml

***Note*:** Your contest may also require a hard copy of your résumé as part of the actual contest. Check the Contest Guidelines and/or the updates page on the SkillsUSA website at http://updates.skillsusa.org.

Scope of the Contest
Knowledge Performance
The contest includes a written knowledge test consisting of approximately 30 true/false and multiple-choice questions assessing food safety and sanitation, service styles, techniques and limited wine knowledge. The test will be given at orientation.

Skill Performance
The contest will focus on guest service and guest relations in the dining room and "front of the house" skills of guest hospitality and food and beverage services.

Contest Guidelines
1. Contestants should be prepared to perform the duties of a dining room server as well as seating host/hostess.
2. Actual food from a kitchen may or may not be used, depending on the facility. Mock plates will be used. Beverages will be served.

3. Contestants will be judged on personal appearance, tableside manner, professionalism, ease with guests, courtesy, general knowledge and technical and verbal skills.
4. Presentations will be made to actual "guests" who will not rate contestants.
5. A minimum of one tableside service will be demonstrated, which could include any of the following (Demos will be done in front of customers and/or judges.):
   a. Caesar salad for two
   b. Guacamole for two
   c. Wine presentation (college/postsecondary only)
   d. Fruit tray for two
   e. Cappuccino (two)
6. Judging will be in separate increments: grooming/uniform, napkin folds, table setup and service, host and greeting, tableside service, check calculations and presentation.
7. Eight unique napkin folds with name card for each fold.
8. One tableside presentation will occur during the competition. Can be held as part of the service or stand-alone competition station.
9. For college/postsecondary, a basic wine knowledge to include proper glass and wine service will be included.
10. Menu knowledge and possible chef's special will also be evaluated.

Standards and Competencies

RS 1.0 — Set up various table arrangements per standards outlined by the technical committee

1.1 The formal table setup to be used will be posted on updates and again during orientation
1.2 Sanitation during the table setup will be judged, e.g., glasses clear of smudges and spotless silverware, proper handling of all items used for setup
1.3 Any napkin fold may be used

RS 2.0 — Perform the role of host to guests per standards outlined by the technical committee

2.1 Greet and welcome guests to the restaurant
2.2 Make small conversation during seating
2.3 Escort guests to tables and provide the name of their server
2.4 Proper presentation of food menu
2.5 Proper presentation of wine menu

RS 3.0 — Perform the role of dining room server/waiter/waitress per standards outlined by the technical committee

Each contestant will have 60 minutes (20 minutes for table setup and 40 minutes from introducing themselves to guest check presentation. One tableside service must be completed. Only one will be ordered from the guest.

3.1 Answer food selection questions on the menu
   3.1.1 Explain the chef's special
   3.1.2 Ask if there are any food allergies the chef should be aware of
3.2 Perform basic upselling techniques such as appetizer, wine by the glass and dessert with coffee or aperitif
3.3 Take guests' orders accurately and efficiently
3.4 Bring beverages to guests including water, iced tea, coffee and wine, cordial, and aperitif in proper glassware
3.5 Serve the appetizer
3.6 Serve the soup or salad
3.7 Present guests with bread and butter. Served with the first course after the appetizer – Silver Service
3.8 Serve the entrée
3.9 Serve dessert and coffee or aperitif
3.10 Clear the table after each course
3.11 Prepare and properly present the check
3.12 Pick up the check
3.13 Return the form of payment and conclude the service
3.14 Eight unique napkin folds — must include name card for each fold
3.15 Tableside component(s) may be included as part of service or held as a stand-alone station

RS 4.0 — Display appropriate grooming and uniform per guidelines of the contest technical committee

4.1 Restrain hair if it extends below the collar
4.2 Nails should be trimmed, clean and unpolished (ServSafe)
4.3 Exhibit good hygiene and cleanliness

4.4 Keep jewelry to a professional minimum (ServSafe)

Committee Identified Academic Skills

The technical committee has identified that the following academic skills are embedded in this contest.

Math Skills

- Solve practical problems involving percents
- Construct three-dimensional models
- Use basic addition, multiplication, division and subtraction

Science Skills

None Identified

Language Arts Skills

- Provide information in conversations and in group discussions
- Provide information in oral presentations
- Demonstrate use of such verbal communication skills as word choice, pitch, feeling, tone and voice
- Demonstrate use of such nonverbal communication skills as eye contact, posture and gestures using interviewing techniques to gain information
- Use text structures to aid comprehension

Connections to National Standards

State-level academic curriculum specialists identified the following connections to national academic standards.

Math Standards

- Numbers and operations
- Geometry
- Measurement
- Problem solving
- Communication
- Connections
- Representation

Source: NCTM Principles and Standards for School Mathematics. For more information, visit: http://www.nctm.org.

Science Standards

- Understands the nature of scientific inquiry

Source: McREL compendium of national science standards. To view and search the compendium, visit: http://www2.mcrel.org/compendium/browse.asp.

Language Arts Standards

- Students adjust their use of spoken, written and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes
- Students use spoken, written and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion and the exchange of information)

Source: IRA/NCTE Standards for the English Language Arts. To view the standards, visit: www.ncte.org/standards.

ROBOTICS AND AUTOMATION TECHNOLOGY

PURPOSE

To evaluate each contestant's preparation for employment in the emerging arena of robotics and automation with emphasis on the team approach to problem-solving in a work environment. To recognize outstanding performance in the use of new work styles and technology by contestants.

First, download and review the General Regulations at: http://updates.skillsusa.org.

ELIGIBILITY (TEAM OF 2)

Open to active SkillsUSA members enrolled in programs with robotics, automation and/or manufacturing as the occupational objective.

CLOTHING REQUIREMENT

Class C: Contest Specific — Manufacturing/Construction Khaki Attire

For both men and women: Official SkillsUSA khaki work shirt and pants; black, brown, or tan leather work shoes; safety glasses with side shields or goggles (prescription glasses may be used, only if they are equipped with side shields. If not, they must be covered with goggles).

These regulations refer to clothing items that are pictured and described at: www.skillsusastore.org. If you have questions about clothing or other logo items, call 800-401-1560 or 703-956-3723.

Note: Contestants must wear their official contest clothing to the contest orientation meeting.

EQUIPMENT AND MATERIALS

1. Supplied by technical committee:
   a. Necessary equipment to construct the workcell that is designed by the technical committee for the contest task.
2. Supplied by contestants:
   a. Necessary equipment:
      1. Computer
      2. Wire cutters/diagonals 3" to 6"
      3. Screwdrivers (3" to 6" blade length)
         a. Common set to include $^1/_8$", $^1/_4$" and $^3/_8$" minimum
         b. Phillips set to include No. 0, No. 1 and No. 2 minimum
      4. Long nose/needle nose pliers 3" to 6"
      5. Wire strippers
      6. Safety glasses — clear lenses (two pairs)
      7. Hookup wire, 20–24 AWG, red, black yellow, blue and green (other colors may be substituted), 150' each color
      8. Allen wrenches, set to include 5mm, 3mm and $^7/_{64}$" minimum
      9. Multimeter with leads
      10. Two pencils (sharpened)
      11. 6" or 12" ruler
      12. Power screwdriver or drill with screwdriver bits to mount fixtures to work surface
   b. All competitors must create a one-page résumé and submit a hard copy to the technical committee chair at orientation. Failure to do so will result in a 10-point penalty.

   ***Note*:** Your contest may also require a hard copy of your résumé as part of the actual contest. Check the Contest Guidelines and/or the updates page on the SkillsUSA website at http://updates.skillsusa.org.

Note: Each team must supply at least one laptop computer to complete programming required. The computer should have all security software disabled and the team should have any necessary passwords for the machine.

Contestants are asked to check the SkillsUSA Championships April 15 update (updates.skillsusa.org) to see any applicable changes that apply to the task for that year.

Computer Specifications:

Each team is to provide one computer with the following minimum specifications:

- Pentium 4, 1 GHz processor or higher with CD-ROM drive
- 1 GB RAM (or more)
- 100 MB available on the hard disk
- Windows Operating System (no older than XP)
- Super VGA or better graphics display, minimum 256 colors
- Mouse
- USB port

Scope of the Contest

1. Teams must be comprised of two students who will demonstrate their ability to compile and perform the skills and knowledge as determined by the Robotics and Automation Technology technical committee.
2. The teams will be provided with a detailed description of the tasks and objectives required for an automated robotic workcell.
    a. Setting up an automated robotic workcell
        1. Assemble robotic workcell
        2. Establish communication between computer and robot
        3. Establish communication with peripheral equipment, which may include a PLC
        4. Document all I/O connections and robot positions for approval by judges
    b. Working with hand tools and integrating peripherals
        1. Wiring communication between robot and computer
        2. Wiring communication between peripherals (power supply, light stack and sensors)
        3. Verify electronic connections using a multimeter
    c. Creating robot positions and verifying safe arm travel
        1. Determine minimum number of positions required to perform assigned tasks
        2. Lay out robot within the workcell for maximum efficiency
        3. Teach and record each required position
        4. Verify arm path between positions
    d. Programming of robot and PLC
        1. Determine sequencing and logic
        2. Determine input/output communication logic
        3. Develop logic diagram
        4. Write robot and PLC program

Team Organization Goal

This is a team competition, and members may interact at will. The competition will be conducted as performed in industry. The robot operators will locate and position the robot to specific locations, and the programmers will tell the robot exactly what is expected and when to perform specific functions. The contest is designed to promote creativity in the organization of production responsibility.

All team members are responsible for double-checking each other's work and quality control.

General Information

There will be a six-hour practice session (with one hour for lunch) one day prior to the contest. During this practice session, students and teachers will have the opportunity to verify computer compatibility with equipment provided. *Students must bring their toolboxes and safety glasses to the practice day.* They will be able to configure, hardwire wire and apply power to test out the hardware. The computers will be set up to allow students to write a sample program and ask the contest officials questions on the practice day. There will be a written exam on the practice day.

Note: The judging criteria and the points assigned will be determined by the technical committee each year.

Knowledge Performance

The contest will include a written exam and oral presentation assessing competitors' knowledge of the principles of robotics, automation technology and safety practices.

Skill Performance

Students will work in teams of two from the same school to create a robotic workcell.

Contest Guidelines

1. Teams must be comprised of two students who will demonstrate their ability to compile and perform the skills and knowledge as determined by the Robotics and Automation Technology technical committee.
2. Teams are given a task that they will solve using a vertically articulated five-axis robot and additional peripherals used to create a workcell.
3. Each team will be required to provide documentation of its proposed workcell, based on the design criteria provided.
4. Teams will present the proposed workcell to the judges for approval and be given the go-ahead to implement their design.
5. Students will present their implemented workcell, including any changes to their original design.
6. The workcell will be judged based on hardware layout, wiring, power and external devices such as sensors and pneumatic actuators.
7. The robot will be fully functional with a program based on their original program design (flowchart). This will include the robot program, positions that tell the robot exactly what is expected and when to perform specific functions.
8. The contest is designed to mirror industry, promoting creativity using a standard design and organization of production responsibility. All team members are responsible for double-checking each other's work and quality control.
9. Contestants are required to adhere to industry safety standards using the hardware and software provided.
10. All equipment provided by the technical committee will be in place and set up on the Monday before the competition begins. On the Tuesday before the competition, there will be an orientation/practice for all teams. Teams must bring the equipment listed above to the orientation on Tuesday. Space will be made available for the teams to leave their tools in the competition area. Each team will have a three-hour practice session with one hour for lunch. During this practice session, students and teachers will have the opportunity to verify computer compatibility with the equipment provided.
11. The written exam will be held on the same day as the practice session.
12. During the practice period or the days of the competition, tampering with or removing any of the equipment provided is grounds for disqualification.

Standards and Competencies

RAT 1.0 — Demonstrate knowledge in safety rules and practices

1.1 Maintain a safe work area
1.2 Demonstrate correct use of hand tools
1.3 Follow safety rules during installation and layout of a robotic workcell
1.4 Program robot and PLC with appropriate use of safety devices

RAT 2.0 — Demonstrate ability to read and interpret electrical drawings

2.1 Interpret electric circuits used in a robotic workcell
2.2 Wire series and parallel electric circuits
2.3 Set up and operate DVM

RAT 3.0 — Produce examples of basic computer programming and flowcharting in a given scenario

3.1 Draw program flow chart using appropriate symbols representing robot program
3.2 Develop basic computer program to control robot and peripherals

RAT 4.0 — Demonstrate electrical wiring in a robotic work cell

4.1 Adhere to electrical and safety standards
4.2 Use the appropriate hand tools and electrical wiring standards
4.3 Wire and connect different types of sensors used in a workcell, including contact and inductive proximity sensors
4.4 Wire and connect output devices such as warning lights, solenoids and relays and pneumatic actuators

RAT 5.0 — Install and adjust any electro-pneumatic devices provided

5.1 Adhere to safety practices
5.2 Use the appropriate hand tools and electric wiring standards
5.3 Wire and connect sensors used in a workcell

RAT 6.0 — Create appropriate documentation used in a robotic work cell

6.1 Define and document all safety issues
6.2 Document and describe system (workcell) layout
6.3 Describe and document controller input and output devices including peripheral device connections, input, output, program positions, wiring diagrams and system layout

RAT 7.0 — Write and verify a robot and PLC program

7.1 Develop a flowchart that outlines a robot program based on customer specifications
7.2 Develop a robot program based on customer specifications
7.3 Use program subroutines, variables and appropriate program remarks when developing a robot program
7.4 Design interfacing to input and output devices
7.5 Document workcell positions and show the standards used
7.6 Program the use of a pneumatic part feeder and press
7.7 Program the use of a conveyor
7.8 Demonstrate consideration for operation and maintenance of robot

Committee Identified Academic Skills

The technical committee has identified that the following academic skills are embedded in this contest.

Math Skills

- Use fractions to solve practical problems
- Use proportions and ratios to solve practical problems
- Simplify numerical expressions
- Use scientific notation
- Solve practical problems involving percentages
- Solve single variable algebraic expressions
- Solve multiple variable algebraic expressions
- Measure angles
- Apply transformations (rotate or turn, reflect or flip, translate or slide and dilate or scale) to geometric figures
- Construct three-dimensional models
- Make comparisons, predictions and inferences using graphs and charts
- Organize and describe data using matrixes
- Solve problems using proportions, formulas and functions
- Use measures of interior and exterior angles of polygons to solve problems
- Find arc length and the area of a sector

Science Skills

- Plan and conduct a scientific investigation
- Use knowledge of potential and kinetic energy
- Use knowledge of mechanical, chemical and electrical energy
- Use knowledge of heat, light and sound energy
- Use knowledge of temperature scales, heat and heat transfer
- Use knowledge of sound and technological applications of sound waves
- Use knowledge of the nature and technological applications of light
- Use knowledge of speed, velocity and acceleration
- Use knowledge of Newton's laws of motion
- Use knowledge of work, force, mechanical advantage, efficiency and power
- Use knowledge of simple machines, compound machines, powered vehicles, rockets and restraining devices
- Use knowledge of principles of electricity and magnetism
- Use knowledge of static electricity, current electricity and circuits
- Use knowledge of magnetic fields and electromagnets
- Use knowledge of motors and generators

Language Arts Skills

- Provide information in conversations and in group discussions
- Provide information in oral presentations
- Demonstrate use of such verbal communication skills as word choice, pitch, feeling, tone and voice

- Demonstrate use of such nonverbal communication skills as eye contact, posture and gestures using interviewing techniques to gain information
- Analyze mass media messages
- Demonstrate comprehension of a variety of informational texts
- Use text structures to aid comprehension
- Identify words and phrases that signal an author's organizational pattern to aid comprehension
- Understand source, viewpoint and purpose of texts
- Organize and synthesize information for use in written and oral presentations
- Demonstrate knowledge of appropriate reference materials
- Use print, electronic databases and online resources to access information in books and articles
- Demonstrate narrative writing
- Demonstrate informational writing
- Edit writing for correct grammar, capitalization, punctuation, spelling, sentence structure and paragraphing

Connections to National Standards

State-level academic curriculum specialists identified the following connections to national academic standards.

Math Standards

- Numbers and operations
- Algebra
- Measurement
- Problem solving
- Reasoning and proof
- Communication
- Connections
- Representation

Source: NCTM Principles and Standards for School Mathematics. For more information, visit: http://www.nctm.org.

Science Standards

- Understands the sources and properties of energy
- Understands forces and motion
- Understands the nature of scientific inquiry

Source: McREL compendium of national science standards. To view and search the compendium, visit: http://www2.mcrel.org/compendium/browse.asp.

Language Arts Standards

- Students adjust their use of spoken, written and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes
- Students use a variety of technological and information resources (e.g., libraries, databases, computer networks, video) to gather and synthesize information and to create and communicate knowledge
- Students use spoken, written and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion and the exchange of information)

Source: IRA/NCTE Standards for the English Language Arts. To view the standards, visit: www.ncte.org/standards.

ROBOTICS: URBAN SEARCH AND RESCUE

PURPOSE

To evaluate each contestant's preparation for employment and to recognize outstanding students for excellence and professionalism in the field of robotics.

First, download and review the General Regulations at: http://updates.skillsusa.org.

ELIGIBILITY (TEAM OF 2)

Open to active SkillsUSA members enrolled in programs with robotics, engineering, automation, manufacturing, electronics, and emergency services as the occupational objectives.

CLOTHING REQUIREMENT

Class E: Contest specific — Business Casual

For men: Official SkillsUSA white polo shirt, black dress slacks, black socks, black leather shoes.
For women: Official SkillsUSA white polo shirt with black dress skirt (knee-length) or black slacks; black socks or black or skin-tone seamless hose; black leather dress shoes.

These regulations refer to clothing items that are pictured and described at: www.skillsusastore.org. If you have questions about clothing or other logo items, call 800-401-1560 or 703-956-3723.

Note: Contestants must wear their official contest clothing to the contest orientation meeting.

EQUIPMENT AND MATERIALS

1. Supplied by technical committee:
   a. Challenge field: 12' x 12' simulated neighborhood
   b. Field elements: components of a residential area and obstacles to traverse, open, and manipulate in order to locate and dispose of simulated explosive ordnances
   c. A command center area equipped with a table, two chairs, and a video monitor
   d. General workspace for each team designated as a "pit" area, including one table, two chairs, and access to a 120-volt electrical supply
2. Supplied by the contestant:
   a. Safety equipment — eye protection is required at all times in the contest area
   b. Laptop computer (optional) for technical presentation purposes only. Laptop not used for robot operation.
   c. Fully assembled, tested, and operational ordnance disposal robot conforming to the guidelines and parts restrictions listed in this document (see "Urban Search and Rescue Challenge Kit Bill of Materials" in Appendix)
   d. Team number affixed to robot
   e. Presentation software for oral presentation to judges (optional)
   f. CAD/CAM software for blueprint design (optional)
   g. Completed Engineering Notebook
      Note: Technical drawing/blueprint of robot drive chassis must be included in notebook
   h. Pens, pencils and paper
   i. Tools:
      1. Allen wrench set (English)
      2. Clamping vise
      3. Metal tin snips
      4. Power strip
      5. Calculator
      6. Tape measure
      7. Hammer
      8. Metal file
      9. Flat-head and Phillips-head screwdrivers
      10. Wire strippers (one set)
      11. Wire cutters/snips (one set)
      12. Roll of electrical tape
      13. 4" nylon wire ties (25 pack)
      14. Multimeter
      15. Multinut pliers
      16. Metal-cutting hacksaw (manual)
      17. Cordless drill with charger
      18. Set of standard drill bits
      19. Pliers (needle nose or regular)
      20. Set of box wrenches
   j. All competitors must create a one-page résumé and submit a hard copy to the technical committee chair at

orientation. Failure to do so will result in a 10-point penalty.

***Note*:** Your contest may also require a hard copy of your résumé as part of the actual contest. Check the Contest Guidelines and/or the updates page on the SkillsUSA website at http://updates.skillsusa.org.

SCOPE OF THE CONTEST

Knowledge Performance

This portion of the contest will entail a knowledge exam. Competencies evaluated on the written portion will be general principles used in robotics. There will be a 30-minute limit for the written test.

Skill Performance

A two-member team builds its robot and arm mechanism prior to the competition and then, during the competition, remotely operates the robot, which should be capable of locating, grabbing and moving simulated ordnances on the challenge course. This remotely operated vehicle (ROV) must traverse the course, locate the ordnances, secure them and properly dispose of them. Each team will perform one round of competition consisting of a time-limited mission to locate and dispose of two ordnances.

Contest Guidelines

1. Teams must be comprised of two students. If a team member is absent, the lone team member will be allowed to compete, but a 30-point penalty will be applied to the overall score.
2. Each robot must have an identification label with the team's number listed.
3. Each technical presentation should last for 12 minutes and should be primarily oral, with supporting materials of printed or electronic media and physical models. Penalty for presentation over/under 12 minutes will be assessed. Students should be prepared to discuss the roles they played, their robot design, and the functions of their robot. (***Note***: The technical committee will not provide projector, screen or other presentation equipment.)
4. Team members should design, build, and experiment with robots constructed for the SkillsUSA Urban Search and Rescue Challenge. Other approved parts and raw materials may also be used. The prebuilt robot and arm mechanism will be required to grab, hold and move objects during the mission.
5. The robot's arm mechanism must be capable of opening a standard-size mailbox and reaching *into the box up to five inches*, grabbing the simulated ordnance and pulling it out of the mailbox. The arm mechanism must be capable of reaching items positioned *up to nine inches above the floor*.
6. Part Restrictions:
   a. Limit of four continuous rotation DC motors or servo motors per competing robot
   b. Limit of four standard-scale proportional servo motors or equivalent
   c. Maximum of one transmitter (up to six channels)
   d. Maximum of two DC motor controllers
   e. One rechargeable battery pack for drivetrain motor power, maximum 12V
   f. One battery pack for receiver and/or servo power, maximum 6V
   g. One battery operated wireless camera, maximum 9V. This single camera must be mounted to the robot
   h. Robot must fit into an 18" x 18" x 18" space when starting but may be expanded to a larger size during the challenge.
   i. Any other battery-operated components installed on the robot must use one of the above-listed power sources
   j. Each team must provide in its engineering notebook a technical drawing or blueprint detailing the construction of its robot drive chassis and additional drawings/blueprints for its associated arm mechanism.
   k. The robot and arm mechanism must be assembled by the team prior to the competition.
   l. All robots will be required to pass inspection by judges to determine if all of the parts used are from the list of allowed parts.
   m. Robots will not be allowed to compete with an arm mechanism that poses

danger to competitors or could potentially cause damage to the challenge field.

n. Accuracy of the robot's construction matching the blueprint will be considered during scoring. All necessary parts and tools for construction must be brought to the competition site.

o. Team members will be required to follow proper safety procedures and use eye protection at all times in the contest area.

p. Teams may bring a laptop computer and blueprint drawings of their robot and arm mechanism designs to the contest building area. A description of the assembly process is required to be within the Engineering Notebook. The designs also may be printed or hand-drawn copies.

Engineering Notebook

The Engineering Notebook will be submitted for judging at check-in. Required elements include:

1. Overall neat and professional appearance
2. A complete bill of materials for the robot drive chassis and arm mechanism designed and used in competition at the event
3. A detailed description of the assembly process for the robot drive chassis and arm mechanism
4. Illustrations, sketches, photos, and written log entries accurately documenting the design and prototyping iterations detailing the evolution and logical progression of the robot's design
5. Explanations noting how testing was conducted, why modifications were made, skills learned, and how robot might further be modified to improve performance and achieve desired objectives if no restrictions were in place

Challenge Course Rules

***Note*:** Team members must wear safety glasses at all times while they are in the competition area! All teams will be expected to adhere to the official rules for the Urban Search & Rescue Challenge competition and compete in a positive and professional manner.

1. *New in 2017*: A time trial must be completed prior to the timed mission. The ordnance will be placed in a specified location on the course and the route traveled to retrieve and dispose of the ordnance must be identical for all teams. This route will be determined by the event chairperson.
2. At the competition site, the simulated residential area will be provided and maintained by the technical committee. During competition, the course will be reset to its original state before each team competes. The ordnance pieces will be placed before each team competes.
3. The Urban Search and Rescue Challenge event will consist of a time trial and a single timed mission for each team. During the mission, the robot has up to six minutes to navigate the course, complete the challenge and return to home base.
4. Each team will operate its mobile robot and navigate by line of sight and by the video feed from an onboard wireless camera. The command center will be within view of the playing field, and team members must remain seated at the command center while competing.
5. An official will be in charge of placing the team's robot at the starting point on the challenge course. (Reminder: The robot must fit within an 18" x 18" x 18" space at the start but may expand to any size after it enters the neighborhood.)
6. After a "clear" signal is issued by a challenge course official, time will begin as soon as the robot moves. Following completion of a mission, time will stop upon successful return to home base following disposal of two simulated explosive ordnances or expiration of the six-minute time limit.
7. Robots should remain on roads and paths within the neighborhood to avoid property damage. Shortcuts are not allowed and will result in penalties.
8. The mission will last a maximum of six minutes.
9. Team members are not allowed to touch their robot at any time while a mission is in progress, unless instructed to do so by a judge.

10. The containment unit where the ordnance pieces are placed by the robot after removal from the course must remain outside the field of play and as close to the starting position as possible. Any team that deliberately moves the containment unit from its starting point will be penalized.
11. An official will award points for the team's mission based on the official contest rubric.

Penalties

1. A deduction will be assessed each time an ordnance is dropped.
2. Each time the robot stalls or becomes hung up and has to be freed by officials, a deduction will be assessed. An official will free a robot at the request of a team member.
3. A deduction will be assessed whenever a robot goes off the designated path within the neighborhood or outside of the course boundaries. Shortcuts are not allowed.

Approved Materials

Approved robot materials and quantity to be used:

Urban Search and Rescue Challenge Bill of Materials

4" wheel	6
16T sprocket	4
24T Sprocket	6
32T Sprocket	2
Chain w/Link	1
Chain Breaker	1
Gear Hub Spacer	10
100 mm Axle	12
DC Drive Motor	2
Motor Mount	2
Axle Set Collar	12
288 mm Channel	6
160 mm Channel	4
96 mm Channel	4
32 mm Channel	6
L Bracket	6
Flat Building Plate	2
Flat Bracket	6
2" Standoff Post	12
1" Standoff Post	12
180 Servo	2
Single Servo Bracket	2
Bronze Bushing	24
Axle Hub	12
Motor Hub	2
1/8" Axle Spacer	24
3/8" Axle Spacer	6
Motor Power Cable	2
On/Off Switch	1
12-volt Battery	1
Motor Speed Controller	1
1/2 SHCS	200
Hex Keys	1
Zip Tie Pack	20
Kep Nut	200
3/8" BHCS	50
NiMH Battery Charger	1
4ch R/C Controller	1
288 mm Flat Bar	4
Servo Pivot w/Bearing	1
80T Gear	2
40T Gear	2
Electronics Deck	1
Green Bin	1
Lid	1
Top Card	1
Side Label Sticker	1

Camera Pack

900 MHz Camera	1
9-volt Adaptor	1
Camera Mount	1

Control System

2.4 GHz 6ch R/C Controller	1

Additional parts and raw materials legal for use:

1. Other robot parts similar in size and design to Urban Search and Rescue Challenge materials
2. One 12" x 24" sheet of acrylic plastic, maximum thickness of 0.250"
3. One 12" x 24" sheet of aluminum, maximum thickness of .080"
4. 3-D-printed parts of original design
5. Raw material used for fabricating custom robot part

Standards and Competencies

RR 1.0 — Demonstrate knowledge in safety rules and practices

1.1 Maintain a safe work area
1.2 Demonstrate safe and correct use of hand tools
1.3 Follow safety rules during robotic assembly
1.4 Demonstrate safe operation of robotic equipment in tele-op mode

RR 2.0 — Produce technical documentation

2.1 Keep an engineering notebook detailing design discussions, design details, design changes and troubleshooting notes
2.2 Develop a technical drawing of the final competitive robot design
2.3 Produce a bill of materials for the final competitive robot design
2.4 Explain design choices and changes made within the engineering design process

RR 3.0 — Demonstrate knowledge of robot parts

3.1 Identify mechanical and delectrical parts of the final robot design
3.2 Demonstrate understanding of the mechanical and electrical functions of the parts of the final robot design

RR 4.0 — Demonstrate understanding of robot mechanical systems

4.1 Identify mechanical systems within the final robot design
4.2 Demonstrate the function of control systems of the final robot design
4.3 Demonstrate and explain the functioning of the drive train of the robot
4.4 Demonstrate and explain the functioning of the package delivery system of the robot

RR 5.0 — Demonstrate understanding of robot electrical systems

5.1 Identify electrical/electronic systems within the final robot design
5.2 Demonstrate and explain the function of electrical control systems of the final robot design

RR 6.0 — Demonstrate tele-op skills and real-time problem solving

6.1 Demonstrate ability to safely and quickly maneuver the robot through rough and unknown terrain via tele-op
6.2 Demonstrate ability to overcome challenging areas of course terrain via tele-op
6.3 Demonstrate ability to locate objects through remote robotic manipulation via tele-op
6.4 Demonstrate ability to transport objects via tele-op

RR 7.0 — Demonstrate ability to present and explain technical information

7.1 Demonstrate correct and effective use of oral, written and technological tools to present technical information regarding engineering design process, robot construction and robotic tele-op control
7.2 Demonstrate knowledge of design choices and implementations during the engineering design process
7.3 Demonstrate knowledge of team processes and individual team member contributions

Committee Identified Academic Skills

The technical committee has identified that the following academic skills are embedded in this contest.

Math Skills

- Use scientific notation
- Use fractions in contextual applications to solve problems
- Students use percentages in contextual applications to solve problems.
- Students solve problems through the contextual application of proportions.
- Students measure time, distance, and angles within contextual problem-solving applications.
- Students simplify numeric expressions.
- Students use comparisons, predictions, and inferences in analyzing data to solve a problem.
- Students use modeling techniques to solve problems.

- Students write and solve algebraic expressions in one or more variables.
- Students use derived measurements to solve problems.

Science Skills

- Plan and conduct a scientific investigation
- Apply knowledge of heat, sound, mechanical, chemical, electrical and light energy within contextual problem-solving applications
- Apply knowledge of kinetic and potential energy in contextual applications to solve problems
- Use knowledge of Newton's laws of motion
- Use knowledge of simple and compound machines to solve problems
- Apply knowledge of gears, motors and linkages to solve problems within contextual applications
- Use formulas to solve problems
- Apply scientific knowledge within the engineering design process
- Apply knowledge of force and motion concepts in contextual problem solving
- Use knowledge of mechanical, chemical and electrical energy
- Use knowledge of temperature scales, heat and heat transfer
- Use knowledge of work, force, mechanical advantage, efficiency and power
- Use knowledge of principles of electricity and magnetism
- Use knowledge of static electricity, current electricity and circuits
- Use knowledge of signal frequencies and baud rate
- Use knowledge of communication modes (full/half duplex)

Engineering Skills

- Apply the engineering design process to solve a contextual problem
- Apply the principles of circuit analysis
- Apply the elements of circuit design and construction
- Understand and apply energy and power types, sources, and conversions
- Apply methods of maintaining, servicing, troubleshooting and repairing systems
- Apply skills and techniques related to building, repairing, and maintaining robotic mechanisms
- Apply techniques and technologies related to the production of technical drawings
- Apply basic mechanical skills related to robotic design, construction, and troubleshooting
- Understand and apply knowledge of safety during construction and use of equipment
- Apply problem-solving and engineering-design processes to solve unforeseen challenges

Language Arts Skills

- Make effective use of spoken, written, and visual communications with team members within the problem-solving and engineering-design processes
- Make effective use of spoken, written, and visual communications with a variety of audiences
- Use appropriate information resources within the research-and-design process
- Organize and synthesize information for use in research-and-design processes and in written and oral presentations
- Demonstrate the ability to correctly read and interpret rules, instructions, and specifications within the robotic challenge
- Demonstrate the proper use of language, both written and verbal
- Demonstrate knowledge of appropriate reference materials

Connections to National Standards

State-level academic curriculum specialists identified the following connections to national academic standards.

Math Standards

- Algebra
- Data analysis and probability
- Problem solving
- Reasoning and proof
- Communication
- Connections
- Representation

Source: NCTM Principles and Standards for School Mathematics. For more information, visit: http://www.nctm.org.

Science Standards

- Understands relationships among organisms and their physical environment
- Understands the sources and properties of energy
- Understands forces and motion
- Understands the nature of scientific inquiry

Source: McREL compendium of national science standards. To view and search the compendium, visit: http://www2.mcrel.org/compendium/browse.asp.

Language Arts Standards

- Students apply a wide range of strategies to comprehend, interpret, evaluate and appreciate texts. They draw on their prior experience, their interactions with other readers and writers, their knowledge of word meaning and of other texts, their word identification strategies and their understanding of textual features (e.g., sound-letter correspondence, sentence structure, context, and graphics)
- Students adjust their use of spoken, written and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes
- Students use spoken, written and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion and the exchange of information)

Source: IRA/NCTE Standards for the English Language Arts. To view the standards, visit: www.ncte.org/standards.

Screen Printing Technology

Purpose
To evaluate each contestant's preparation for employment and to recognize outstanding screen printers for their professionalism in the field of graphic communications.

First, download and review the General Regulations at: http://updates.skillsusa.org.

Eligibility
Open to active SkillsUSA members enrolled in programs with graphic imaging technology as their occupational objective.

Clothing Requirement
Class E: Contest specific — Business Casual
For men: Official SkillsUSA white polo shirt, black dress slacks, black socks, black leather shoes.
For women: Official SkillsUSA white polo shirt with black dress skirt (knee-length) or black slacks; black socks or black or skin-tone seamless hose; black leather dress shoes.

These regulations refer to clothing items that are pictured and described at: www.skillsusastore.org. If you have questions about clothing or other logo items, call 800-401-1560 or 703-956-3723.

Note: Contestants must wear their official contest clothing to the contest orientation meeting.

Equipment and Materials
1. Supplied by the Screen Printing technical committee:
   a. All equipment and materials used during the performance test
2. Supplied by the contestants:
   a. All competitors must create a one-page résumé and submit a hard copy to the technical committee chair at orientation. Failure to do so will result in a 10-point penalty.

   ***Note*:** Your contest may also require a hard copy of your résumé as part of the actual contest. Check the Contest Guidelines and/or the updates page on the SkillsUSA website at http://updates.skillsusa.org.

Scope of the Contest
The contest assesses knowledge and skills used by industries in the field of screen printing technology production processes.

Knowledge Performance
The knowledge contest will include a written exam assessing the general knowledge of screen printing technology processes. Written portions may be included during the skills portion of the contest. Knowledge of terms and principles used in screen printing processes will be required for the skill demonstration portion of the contest.

Skills Performance
The skills contest will include a demonstration of individual skills in producing screen-printed products using equipment and technologies meeting screen printing industry standards. Some (not all) of the skills to be demonstrated are: screen tensioning, screen coating, stencil exposure/washout, image registration, garment printing, screen reclaiming and quality assessment of completed screen printing.

Contest Guidelines
1. The competition will assess student participants' knowledge and skills of screen printing technology at nine testing stations:
   a. Demonstrate the fundamentals of screen preparation and tensioning
   b. Coat and dry screens with a direct photosensitive emulsion
   c. Create screens (stencils) with film positive registration, exposure/washout procedures
   d. Register screens on a rotary screen printing press, and proof the design
   e. Print textiles while demonstrating production procedures that meet industry standards
   f. Reclaim screens

g. Solve a quality control problem by assessing the printing quality of a garment production sample
h. Take a written technical knowledge test
i. Submit a résumé to an interviewer and participate in an oral professional assessment

2. For equipment specifications, check updates.skillsusa.org.
3. As soon as the contestants have completed an assigned job and have fulfilled all the requirements presented at the testing station, they should notify the judge. The scorekeeper and judge will gather the contestant's product or worksheet for evaluation and scoring.

Standards and Competencies

SPT 1.0 — Demonstrate the fundamentals of screen preparation

1.1 Define essential components of screen printing processes
- 1.1.1 Design and image generation
- 1.1.2 Image carrier (positives, screens) mesh and tension
- 1.1.3 Squeegees and flood bars
- 1.1.4 Substrates (textiles, ceramics, paper, plastics)
- 1.1.5 Inks — formulate inks by weight usage per shirt per order
- 1.1.6 File management
- 1.1.7 Equipment clean up and shop housekeeping.

1.2 Calculations for image preparation
- 1.2.1 Calculate proportional scaling solutions from designs to artwork to garment

1.3 Measure and set mesh tension on a screen designed for re-tensioning

SPT 2.0 — Coat and dry screens with a direct photosensitive emulsion

2.1 Name the major types of stencil systems.
- 2.1.1 Describe the properties of direct emulsion stencils
- 2.1.2 Describe the properties of capillary film stencils
- 2.1.3 List the names of two indirect films used to create stencils
- 2.1.4 List two advantages provided by knife-cut film stencils

2.2 Evaluate stencil quality: related to resolution, definition and acutance

2.3 Measure a stencil system's EOM and Rz

SPT 3.0 — Create screens (stencils) with film positive registration, exposure/washout procedures

3.1 Demonstrate knowledge of exposure sources

3.2 Coat screens with a photosensitive direct emulsion

3.3 Register film positives to unexposed screens

3.4 Use ultraviolet light source to expose emulsion coated screens

3.5 Wash out the unexposed emulsion from a screen to create a stencil

SPT 4.0 — Register screens on a rotary screen printing press, and proof the design

4.1 Set up press for preprint operation
- 4.1.1 Determine printing order for screens
- 4.1.2 Apply block-out tape to squeegee side of the screen
- 4.1.3 Secure screens to a rotary press with clamps
- 4.1.4 Demonstrate ability to square and center an image for printing
- 4.1.5 Set off contact at the front and back of the screens
- 4.1.6 Zero rotary press heads to center screens
- 4.1.7 Register images with registration marks or images' outline
- 4.1.8 Ink to the screens
- 4.1.9 Select squeegee, according to size, type and durometer
- 4.1.10 Check all screens and screen frames for unwanted ink
- 4.1.11 Apply the adhesive to the platen
- 4.1.12 Flood newly registered screen with ink
- 4.1.13 Print a test image on appropriate substrate
- 4.1.14 Tape over registration marks on the garment side of the stencil.

SPT 5.0 — Print textiles while demonstrating industry production procedures

5.1 Print garments using the spot color process

5.1.1 Comprehend and follow tolerances and printing order

5.2 Apply adhesive to platen
- 5.2.1 Use proper type and amount of adhesive

5.3 Place a garment or substrate on the platen

5.4 Flood each screen with ink

5.5 Hold down each screen and print the image

5.6 Remove the garment from the platen

5.7 Cure garment design with an appropriate drying appliance

5.8 Use a temperature gun or temperature strip to determine curing temperature

SPT 6.0 — Reclaiming screens processes

6.1 Demonstrate a consideration for a healthy working environment

6.2 Work safely in the reclaiming environment
- 6.2.1 Remove ink and block out materials
- 6.2.2 Remove the stencil
- 6.2.3 Remove ghost haze if needed

6.3 Store clean screens in dry, dust-free area with medium temperature levels

6.4 Clean up spills promptly

6.5 Dispose of reclaim waste properly

SPT 7.0 — Solve a quality control problem by assessing garment printing quality of a production sample

7.1 Use 10 qualty factors for a saleable screen-printed image
- 7.1.1 Image printed on correct vertical dimension
- 7.1.2 Image printed on center
- 7.1.2 Image not crooked
- 7.1.4 Ink smudges on sample garment
- 7.1.5 Color density does not vary across the image
- 7.1.6 Ink printed in non-image area due to pinhole
- 7.1.7 Last color covers previous colors
- 7.1.8 Missed register between colors
- 7.1.9 Ink transferred from a garment in lot pile
- 7.1.10 Colors match the customer's standard

SPT 8.0 — Take a written technical knowledge test

8.1 Achieve a score of 70 percent or greater on the written exam

8.2 Match various types of screen printing equipment to their function

SPT 9.0 — Participate in an oral professional assessment

9.1 Submit a one-page, typewritten résumé to an interviewer

9.2 Respond positively to questions related to the five areas that follow:
- 9.2.1 Describe personal ability to handle job assignments
- 9.2.2 Ability to answer questions in technical terms
- 9.2.3 Explain how to handle workplace situations in a professional manner
- 9.2.4 Demonstrate critical thinking during the oral interview
- 9.2.5 Present a realistic self-concept

Committee Identified Academic Skills

The technical committee has identified that the following academic skills are embedded in this performance test.

Math Skills

- Read a ruler (inch system, metric system, point/pica system)
- Use fractions to solve practical problems
- Use percentages multiplied times formula for inks mixing
- Simplify numerical expressions
- Solve practical problems involving percentages
- Solve single variable algebraic expressions
- Calculations for image preparation (calculate proportional scaling solutions of two designs from artwork to garment, demonstrate ability to square and center an image during screen printing process)

Science Skills

None Identified

Language Arts Skills

- Provide information in conversations and in group discussions
- Provide information in oral presentations
- Demonstrate use of nonverbal communication skills: eye contact, posture

and gestures using interviewing techniques to gain information
- Demonstrate knowledge of appropriate reference materials

Connections to National Standards

State-level academic curriculum specialists identified the following connections to national academic standards.

Math Standards

- Geometry
- Measurement
- Problem Solving
- Communication
- Connections
- Representation

Source: NCTM Principles and Standards for School Mathematics. For more information, visit: http://www.nctm.org.

Science Standards

- Understands the structure and properties of matter
- Understands the sources and properties of energy
- Understands forces and motion
- Understands the nature of scientific inquiry

Source: McREL compendium of national science standards. To view and search the compendium, visit: http://www2.mcrel.org/compendium/browse.asp.

Language Arts Standards

- Students read a wide range of print and nonprint texts to build an understanding of texts, of themselves, and of the cultures of the United States and the world; to acquire new information; to respond to the needs and demands of society and the workplace; and for personal fulfillment. Among these texts are fiction and nonfiction, classic and contemporary works
- Students apply a wide range of strategies to comprehend, interpret, evaluate and appreciate texts. They draw on their prior experience, their interactions with other readers and writers, their knowledge of word meaning and of other texts, their word identification strategies and their understanding of textual features (e.g., sound-letter correspondence, sentence structure, context, and graphics)
- Students adjust their use of spoken, written and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes.
- Students use a variety of technological and information resources (e.g., libraries, databases, computer networks and video) to gather and synthesize information and to create and communicate knowledge
- Students use spoken, written and visual language to accomplish their own purposes. (e.g., for learning, enjoyment, persuasion and the exchange of information)

Source: IRA/NCTE Standards for the English Language Arts. To view the standards, visit: www.ncte.org/standards.

SHEET METAL

PURPOSE
To evaluate each contestant's preparation for employment and to recognize outstanding students for excellence and professionalism in the field of sheet metal.

First, download and review the General Regulations at: http://updates.skillsusa.org.

ELIGIBILITY
Open to active SkillsUSA members enrolled in programs with sheet metal as the occupational objective.

CLOTHING REQUIREMENT
Class C: Contest Specific — Manufacturing/Construction Khaki Attire
For both men and women: Official SkillsUSA khaki work shirt and pants; black, brown, or tan leather work shoes; safety glasses with side shields or goggles (prescription glasses may be used, only if they are equipped with side shields. If not, they must be covered with goggles).

These regulations refer to clothing items that are pictured and described at: www.skillsusastore.org. If you have questions about clothing or other logo items, call 800-401-1560 or 703-956-3723.

Note: Contestants must wear their official contest clothing to the contest orientation meeting.

EQUIPMENT AND MATERIALS
1. Supplied by the technical committee:
   a. All necessary equipment, tools, materials and work benches
2. Supplied by the contestant:
   a. Tool box
   b. One each: Aviation M1, Aviation M2, Aviation M3 and combination or pattern tinner's snips
   c. 8" sheet metal worker's vice grips
   d. 8" or 10" regular vice grips
   e. 12" combination square with glass level
   f. 24" flat steel square
   g. 8" combination pliers
   h. One each: 6" and 12" straight-leg sprint dividers
   i. Flexible steel tape measure
   j. Scratch awl
   k. Screwdriver set (minimum one slotted and one Phillips)
   l. One each: ball peen, setting and riveting hammers
   m. Wood, leather or rubber mallet
   n. Two hand groovers, one for ¼" grooved lock, one for 5/16" grooved lock
   o. 36" straightedge
   p. Pop rivet gun
   q. Two wooden pencils
   r. Drive cleat turner
   s. Handheld calculator for written test
   t. Additional tools as desired, subject to approval of the technical committee
   u. Center punch
   v. One pound rivet set
   w. Marking pen
   x. Small trammel points
   y. Scratch gauges
   z. All competitors must create a one-page résumé and submit a hard copy to the technical committee chair at orientation. Failure to do so will result in a 10-point penalty.

***Note*:** Your contest may also require a hard copy of your résumé as part of the actual contest. Check the Contest Guidelines and/or the updates page on the SkillsUSA website at http://updates.skillsusa.org.

SCOPE OF THE CONTEST
The contest is defined by industry standards as established by the SkillsUSA Championships technical committee. The knowledge and skills tests will assess the ability to fabricate and install mechanical systems, specialty sheet metal and architectural/roofing sheet metal, and to lay out, develop and solve sheet metal problems.

Knowledge Performance
The contest will include a written knowledge exam assessing the areas of (but not limited to)

shop safety procedures and sheet metal fabrication and installation.

Skill Performance

The contest will assess the ability to complete a sheet metal project involving a 26-gauge to 18-gauge galvanized or mild steel sheets on the basis of using hand tools, correctness of layout and shop safety procedures.

Contest Guidelines

1. Contestants will be judged on their ability to perform such jobs as connecting sheet metal pieces with drive cleats, spot welding and riveting.
2. Skills tested may include straight duct, transition fitting and 45-degree entry tap fitting.
3. Contestants will be given a job sheet explaining the job to be completed and the required time limits.
4. All layouts will be checked by the judges prior to cutting.
5. Contestants are not allowed to bring layout books to the contest.

Standards and Competencies

SM 1.0 — Lay out and develop various sheet metal problems using the principles of parallel line development, radial line development and triangulation development

1.1 Lay out rectangular sheet metal
1.2 Lay out round sheet metal
1.3 Transition sheet metal layout

SM 2.0 — Fabricate and install a variety of mechanical systems as outlined by the contest technical committee

2.1 Fabricate and install rectangular ductwork including:
- 2.1.1 Fabricate and install a straight duct (one piece construction)
- 2.1.2 Fabricate and install a rectangular radius throat and radius heel duct elbow
- 2.1.3 Fabricate and install a rectangular square throat and heel duct elbow
- 2.1.4 Fabricate and install a rectangular duct ogee offset
- 2.1.5 Fabricate and install a rectangular duct transition
- 2.1.6 Fabricate and install a rectangular duct Y branch
- 2.1.7 Fabricate and install a rectangular shoe tap

2.2 Properly use flats, bars, drive cleats and pocket/government locks in rectangular ductwork fittings
- 2.2.1 Use flats in rectangular ductwork fittings
- 2.2.2 Use bars in rectangular ductwork fittings
- 2.2.3 Use drive cleats in rectangular ductwork fittings
- 2.2.4 Use pocket/government locks in rectangular ductwork fittings

2.3 Fabricate and install round ductwork
- 2.3.1 Fabricate and install round straight duct
- 2.3.2 Fabricate and install round duct elbow
- 2.3.3 Fabricate and install round duct Y branch
- 2.3.4 Fabricate and install round duct offset
- 2.3.5 Fabricate and install round duct taper (transition)
- 2.3.6 Fabricate and install round duct lateral (round tap)
- 2.3.7 Fabricate and install round saddle tap

2.4 Connect joints of round or rectangular duct together end to end using a companion angle
2.5 Fabricate and install single wall equipment casing/housing
2.6 Fabricate and install double wall equipment casing/housing
2.7 Fabricate and install flanged duct section
2.8 Fabricate and install drop-cheek elbow
2.9 Fabricate and install rectangular twisted transition

SM 3.0 — Fabricate and install architectural/roofing sheet metal including seam metal, standing and metal flat-lock roof panels; gutters; downspouts/conductors; louvers; column covers; and a metal ceiling panel

3.1 Fabricate and install seam metal roof panel, batten and cap
3.2 Fabricate and install a standing seam metal roof panel
3.3 Fabricate and install a metal flat-lock roof panel
3.4 Fabricate and install an ogee gutter
3.5 Fabricate and install half-round gutter

3.6 Fabricate and install a rectangular downspout/conductor
3.7 Fabricate and install an offset in rectangular downspout/conductor
3.8 Fabricate and install a conductor head
3.9 Flashing
3.10 Coping
3.11 Fabricate and install a gravel stop fascia
3.12 Fabricate and install a metal siding panel
3.13 Fabricate and install louvers
3.14 Fabricate and install column covers
3.15 Fabricate and install a metal ceiling panel

SM 4.0 — Fabricate and install specialty sheet metal including single and multi-blade damper, hoppers, dust collectors, chutes, tubes, signs and support saddles

4.1 Fabricate and install a rectangular single blade damper in frame
4.2 Fabricate and install a rectangular multi-blade damper in frame
4.3 Fabricate and install a hopper
4.4 Fabricate and install a cyclone dust collector
4.5 Fabricate and install a helical (spiral) chute
4.6 Fabricate and install a rectangular tube
4.7 Fabricate and install a round tube
4.8 Fabricate and install a hollow metal letter
4.9 Fabricate and install a metal sign
4.10 Fabricate and install a round duct support saddle (floor mounted)

Committee Identified Academic Skills

The technical committee has identified that the following academic skills are embedded in this contest.

Math Skills

- Use fractions to solve practical problems
- Use proportions and ratios to solve practical problems
- Simplify numerical expressions
- Solve practical problems involving percents
- Solve single variable algebraic expressions
- Measure angles
- Find surface area and perimeter of two-dimensional objects
- Find volume and surface area of three-dimensional objects
- Apply transformations (rotate or turn, reflect or flip, translate or slide, and dilate or scale) to geometric figures
- Construct three-dimensional models
- Apply Pythagorean Theorem
- Solve problems using proportions, formulas and functions
- Find slope of a line
- Use laws of exponents to perform operations
- Use measures of interior and exterior angles of polygons to solve problems
- Find arc length and the area of a sector

Science Skills

None Identified

Language Arts Skills

None Identified

Connections to National Standards

State-level academic curriculum specialists identified the following connections to national academic standards.

Math Standards

- Numbers and operations
- Geometry
- Measurement
- Data analysis and probability
- Problem solving
- Communication
- Connections
- Representation

Source: NCTM Principles and Standards for School Mathematics. For more information, visit: http://www.nctm.org.

Science Standards

- Understands the structure and properties of matter
- Understands the sources and properties of energy
- Understands forces and motion

Source: McREL compendium of national science standards. To view and search the compendium, visit: http://www2.mcrel.org/compendium/browse.asp.

Language Arts Standards

- Students apply a wide range of strategies to comprehend, interpret, evaluate and appreciate texts. They draw on their prior experience, their interactions with other

readers and writers, their knowledge of word meaning and of other texts, their word identification strategies, and their understanding of textual features (e.g., sound-letter correspondence, sentence structure, context, graphics)

Source: IRA/NCTE Standards for the English Language Arts. To view the standards, visit: www.ncte.org/standards.

TEAM ENGINEERING CHALLENGE (MIDDLE SCHOOL)

PURPOSE

This contest is designed to evaluate and recognize outstanding students for excellence and professionalism in creative- and critical-thinking skills and the decision-making process needed to solve a problem. The contest is intended to foster creativity, innovation, teamwork and problem-solving skills.

First, download and review the General Regulations at: updates.skillsusa.org.

ELIGIBILITY

This contest is open to active SkillsUSA members enrolled in a middle school chapter (grades six-eight). A team consists of three students from the same local chapter. Teams must qualify from their local state conference.

CLOTHING REQUIREMENT

For boys: Official blazer, jacket or sweater; black dress slacks; white dress shirt; plain black tie with no pattern or SkillsUSA black tie; black socks and black shoes.

For girls: Official blazer or jacket; black dress skirt (knee-length) or slacks with business like white, collarless blouse or white blouse with small, plain collar that may not extend onto the lapels of the blazer; black sheer or skin-tone seamless hose and black dress shoes.

These regulations refer to clothing items that are pictured and described at: www.skillsusastore.org. If you have questions about clothing or other logo items, call 800-401-1560 or 703-956-3723.

Note: Contestants *must* wear their official contest clothing to the contest orientation meeting

OBSERVER RULE

Observers will be allowed to watch the match providing space is available. No talking or gesturing will be permitted. The event chair or moderator may remove observers and/or close the event to observers for cause.

EQUIPMENT AND MATERIALS

1. Supplied by the technical committee:
   a. All tools, materials and supplies necessary to solve the contest problem (e.g., hacksaw, glue guns, cordless drill, etc.) except those items listed under number two below
   b. All necessary information and furnishings for judges and technical committee
2. Supplied by the students:
   a. Drawing equipment (team's choice, e.g., ruler, straight edge, t-square, triangle, scale, pencils, pens, compass, etc.)
   b. Safety glasses
   c. Calculator
   d. Scissors
   e. Exacto knife or equivalent
   f. Coloring/writing utensils (markers, crayons, colored pencils, etc.). Paint is not allowed
   g. Students are not allowed materials that will add to their prototype, e.g., tape, glue, paper, staples, paper clips, etc.
   h. Other tools as listed on the contest update page of the national website (updates.skillsusa.org).

SCOPE OF THE CONTEST

1. Contestants will be identified by number only.
2. The team written test will be taken during the pre-contest briefing.
3. The technical committee will provide each team with the problem and the contest supplies at the time of the pre-contest briefing.
4. Each team's solution will be constructed on site.
   a. Construction is *only* allowed in the contest area and during the contest times as presented in the pre-contest briefing.

5. Contest judges will interview each team as a part of the contest.
    a. Team interview time slots will be available during the pre-contest briefing.

Knowledge Performance

The contest includes a written test to be taken by all members of the team at the same time.

Skill Performance

The demonstration is a presentation of an occupational skill accompanied by a clear explanation of the topic through the use of examples, experiments, displays and practical testing operations.

Contest Guidelines

The Team Engineering Challenge contest will allow SkillsUSA members to demonstrate their ability to work together to solve a problem.

1. The challenge will be selected from an area such as, but not limited to:
    a. Transportation
    b. Communications
    c. Construction
    d. Manufacturing
    e. Biotechnology
    f. Engineering
2. The contestant's advisor/instructor must attend the mandatory orientation meeting with the contestant.
3. Contestants will ***not*** take the skills-related written or professional development test as outlined in the general regulations.
4. In the event of a tie, the tie will be broken using the options below, in order.
    a. Solution: Performance (highest score from team rubrics)
    b. Interview: problem-solving/teamwork
    c. Written test score

Standards and Competencies

TEC 1.0 — Perform effectively as team members

1.1 Demonstrate group problem-solving techniques
1.2 Demonstrate team proficiency in construction of a building project
1.3 Perform additional teamwork competencies as determined by the technical committee

TEC 2.0 — Wear appropriate clothing for the national contest

2.1 Display clothing that meets national standards for competition
2.2 Demonstrate good grooming in dress and personal hygiene

TEC 3.0 — Integrate knowledge of basic engineering principles into technical writing and presentations following the guidelines the contest technical committee has established

3.1 Apply engineering knowledge in the areas of force, work, rate, resistance, energy, power, force transformers, momentum, waves and vibrations, energy converters, transducers, radiation, optical systems

TEC 4.0 — Transform existing systems into conceptual models

4.1 Transform conceptual models into determinable models
4.2 Use determinable models to obtain system specifications
4.3 Select optimum specifications and create physical models
4.4 Apply the results from physical models to create real target systems
4.5 Critically review real target systems and personal performance
4.6 Design effective and usable IT-based solutions and integrate them into the user environment
4.7 Assist in the creation of an effective project plan
4.8 Identify and evaluate current and emerging technologies and assess their applicability to address the users' needs

TEC 5.0 — Showcase knowledge of project planning

5.1 Apply brainstorming techniques
5.2 Implement benchmarking
5.3 Discuss continuous improvement
5.4 Explain cause and effect relationships
5.5 Apply knowledge of customer satisfaction
5.6 Demonstrate how to collect data
5.7 Apply decision-making skills
5.8 Define and describe a process
5.9 Empower team members
5.10 Recognize methods of idea generation
5.11 Prioritize tasks
5.12 Reach consensus amongst the team
5.13 Display teamwork during the contest
- 5.13.1 Have equal team participation
- 5.13.2 Show positive group dynamics
- 5.13.3 Define team roles

Committee Identified Academic Skills

The technical committee has identified that the following academic skills are embedded in this contest.

Math Skills

None Identified

Science Skills

None Identified

Language Arts Skills

- Provide information in oral presentations
- Demonstrate use of verbal communication skills: choice, pitch, feeling, tone and voice
- Demonstrate use of nonverbal communication skills: eye contact, posture and gestures using interviewing techniques to gain information
- Identify words and phrases that signal an author's organizational pattern to aid comprehension
- Organize and synthesize information for use in written and oral presentations
- Demonstrate knowledge of appropriate reference materials
- Demonstrate understanding of skill

Connections to National Standards

State-level academic curriculum specialists identified the following connections to national academic standards.

Math Standards

None Identified

Source: NCTM Principles and Standards for School Mathematics. To view high school standards, visit: standards.nctm.org/document/chapter7/index.htm. Select "Standards" from menu.

Science Standards

None Identified

Source: McREL compendium of national science standards. To view and search the compendium, visit: www.mcrel.org/standards-benchmarks.

Language Arts Standards

- Students adjust their use of spoken, written and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes
- Students employ a wide range of strategies as they write and use different writing process elements appropriately to communicate with different audiences for a variety of purposes
- Students use spoken, written and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion and the exchange of information)

Source: IRA/NCTE Standards for the English Language Arts. To view the standards, visit: www.ncte.org/standards.

TEAMWORKS

PURPOSE
This contest is designed to evaluate team preparation for employment and to recognize outstanding students for excellence and professionalism in the field of residential carpentry, masonry, plumbing, electricity, and teamwork skills.

First, download and review the General Regulations at: http://updates.skillsusa.org.

ELIGIBILITY
Open to a team of four SkillsUSA members enrolled in a program or programs with building trades as the occupational objective. Team members may be from different chapters (schools).

CLOTHING REQUIREMENT
Class C: Contest Specific — Manufacturing/Construction Khaki Attire
For both men and women: Official SkillsUSA khaki work shirt and pants; black, brown, or tan leather work shoes; safety glasses with side shields or goggles (prescription glasses may be used, only if they are equipped with side shields. If not, they must be covered with goggles).

These regulations refer to clothing items that are pictured and described at: www.skillsusastore.org. If you have questions about clothing or other logo items, call 800-401-1560 or 703-956-3723.

Note: Contestants must wear their official contest clothing to the contest orientation meeting.

SAFETY REQUIREMENT
Both the instructor and the contestants certify by agreeing to enter this contest that the contestants have received instructions and have satisfactorily passed an examination on the safe use of portable electric power tools (including cordless) and all hand tools. All team members are required to have an OSHA Certification prior to competition. To take the OSHA Certification test, go to: www.careersafeonline.com.
The contestants are responsible for inspecting the tools supplied and making sure they are in safe working condition. Further, they agree that SkillsUSA Inc., the SkillsUSA Championships technical committees, volunteers and the national judges are released from all responsibility relating to personal injuries resulting from their use. Contestants will be removed from competition if proper training has not been provided and/or they are using the equipment in an unsafe manner.

EQUIPMENT AND MATERIALS
1. Supplied by the technical committee:
   All equipment, materials and most tools. Contestants who wish to use their own tool belt may do so after technical committee approval. If contestants do not bring their own tool belt, one will be provided. Any tools contestants are required to bring will be published in the SkillsUSA Championships Update annually at: http://updates.skillsusa.org.
2. Supplied by the contestant:
   All competitors must create a one-page résumé and submit a hard copy to the technical committee chair at orientation. Failure to do so will result in a 10-point penalty.

   ***Note*:** Your contest may also require a hard copy of your résumé as part of the actual contest. Check the Contest Guidelines and/or the updates page on the SkillsUSA website at updates.skillsusa.org.

SCOPE OF THE CONTEST
The contest is designed to assess a team's ability to perform tasks identified by the national technical committee, which includes: Robert Bosch Tool Corp., The Stanley Works, Train2Build, Construction Management Advisory Group, State Farm Insurance, International Brotherhood of Electrical Workers, Lowe's Companies Inc., D&J Kitchens

and Baths, and the National Association of the Remodeling Industry.

Knowledge Performance

The contest includes a written action plan developed by team members for the purpose of assessing the team's knowledge of the building trades.

Skill Performance

The contest includes a team project assessing the ability to analyze a project drawing, write an action plan, professionally present the team project, and perform skills in residential carpentry, plumbing, electricity and masonry.

Contest Guidelines

1. Each team will be given the project drawing at the contest orientation meeting and given two hours to meet as a team, analyze the drawing and formulate a written action plan.
2. Each team will conduct a three- to five-minute professional presentation to the judges on how the team plans to accomplish the project.
3. Each team member is required to have an active part in the presentation.
4. The written action plan and the presentation will be judged.
5. Cleanliness of job site, timeliness of completion of the project, effective ordering of material and inventorying tools and equipment will be assessed.

Standards and Competencies

TW 1.0 — Present an action plan after analyzing the project drawing

1.1 Analyze the project drawing
- 1.1.1 Interpret and determine dimensions from multi-view drawings
- 1.1.2 Interpret specifications, abbreviations, symbols, and drawing notes
- 1.1.3 Interpret oral and written changes
- 1.1.4 Prepare material take-off from blueprint

1.2 Write the action plan and give a presentaton
- 1.2.1 Organize, prepare and present an action plan
- 1.2.2 Use data display instruments such as flow charts or cause and effect diagrams
- 1.2.3 As a team, develop a presentation that is three to five minutes in length portraying how your team will accomplish the building project including the team's safety plan
- 1.2.4 Use of visuals is permitted (e.g., flip chart with notes or diagrams, PowerPoint presentation). Each team will be provided with a flip chart stand.

TW 2.0 — Perform effectively as team members

2.1 Demonstrate group problem-solving techniques

2.2 Demonstrate team proficiency in construction of a building project

2.3 Perform additional teamwork competencies as determined by the technical committee

TW 3.0 — Perform carpentry skills

3.1 Estimate and use the amount of materials needed and proper tools
- 3.1.1 Identify, receive and inspect materials
- 3.1.2 Store materials correctly around work area
- 3.1.3 Use the correct amount of materials for the project in the correct manner
- 3.1.4 Identify and safely use carpentry hand and power tools

3.2 Perform framing and install sub-floor and common roof rafters
- 3.2.1 Frame and install sill plate, girders, floor joists and bridging
- 3.2.2 Use dimensional and engineered wood products and steel products
- 3.2.3 Frame floor opening and install sub-floor
- 3.2.4 Frame and brace walls to include corners, openings, trimmers, cripples, partitions, plumbing partitions, fixture backing and sheathing

3.2.5 Frame stair stringer and other components
3.2.6 Calculate and use the rise and run of a common roof
3.2.7 Lay out a common roof plan
3.2.8 Lay out, cut and install common rafters, ridge board, ceiling joists and collar ties
3.2.9 Install roof sheathing

TW 4.0 — Perform masonry skills by laying and installing a brick/block wall

4.1 Estimate and use the amount of materials needed and proper tools
- 4.1.1 Identify, receive, and inspect materials
- 4.1.2 Store materials correctly around work area
- 4.1.3 Use the correct amount of materials for the project in the correct manner
- 4.1.4 Identify and safely use masonry hand and power tools
- 4.1.6 Organize area neatly
- 4.1.7 Place mortar pans properly
- 4.1.8 Select and effectively arrange masonry tools

4.2 Tool and polish joints
- 4.2.1 Tool concave, rake weather, V-jointer, grapevine, and struck joints
- 4.2.2 Polish the joints
- 4.2.3 Tuckpoint a wall
- 4.2.4 Brush and touch up a wall

4.3 Lay a brick/block wall
- 4.3.1 Lay out a wall in preparation for building a straight and/or corner wall
- 4.3.2 Spread and furrow mortar correctly for brick units
- 4.3.3 Construct a straight wall
- 4.3.4 Construct an outside and inside corner lead
- 4.3.5 Spread bed joints and throw on full head joints for block units
- 4.3.6 Build a block corner to a specified height
- 4.3.7 Install lintels and moisture drainage such as masonry flashing and weep holes
- 4.3.8 Install brick detailing if requested

TW 5.0 — Perform plumbing by installing cleanout drains, roughing in water supply lines, performing pressure tests and cutting, reaming, and joining

5.1 Estimate and use materials and proper tools
- 5.1.1 Identify, receive and inspect materials
- 5.1.2 Store materials correctly around work area
- 5.1.3 Use the correct amount of materials for the project in the correct manner
- 5.1.4 Identify fittings from a sketch of a piping system
- 5.1.5 Identify and safely use plumbing hand and power tools

5.2 Rough in water supply lines and perform pressure tests
- 5.2.1 Calculate the slope required for waste and vent lines
- 5.2.2 Rough in waste and vent lines for sinks, lavatories, bathtubs, showers, and water closets
- 5.2.3 Install cleanout drains
- 5.2.4 Secure horizontal and vertical lines of pipe to wood, metal, and masonry surfaces
- 5.2.5 Rough in water supply lines for sinks, lavatories, bathtubs, showers, and water closets
- 5.2.6 Perform pressure tests on water supply system

5.3 Join pipes
- 5.3.1 Cut, ream and join copper tubing using the sweat method
- 5.3.2 Cut, ream and join copper tubing using the compression method
- 5.3.3 Cut, ream and join CPVC and other similar pipe
- 5.3.4 Cut, ream and join PVC pipe
- 5.3.5 Cut, ream and join ABS pipe
- 5.3.6 Cut, ream and join copper tubing by sweat, compression or other methods

TW 6.0 — Perform electrical skills by laying out electrical installations

6.1 Estimate and use materials and use tools properly
- 6.1.1 Apply the current National Electrical Code
- 6.1.2 Plan, work and lay out electrical installations

6.1.3 Identify, receive, and inspect materials
6.1.4 Correlate specifications, prints and job sites
6.1.5 Use the correct amount of materials for the project in the correct manner
6.1.6 Store materials correctly around work area
6.1.7 Identify and safely use electrical hand and power tools

6.2 Rough in
6.2.1 Choose size and install ganged, octagon and surface mount boxes to a specified height
6.2.2 Install and staple all electrical wire essentially free from hazard according to a blueprint
6.2.3 Perform splices and junctions in boxes

6.3 Install devices such as single pole switch, three-way switch, four-way switch, duplex grounded receptacle, ground fault circuit interrupter, light fixtures and wall plates

TW 7.0 — Prepare for unique tasks that may be included in a given situation

7.1 Run conduit in the electrical unit
7.2 Troubleshoot electrical circuits
7.3 Install plumbing fixtures
7.4 Install electric fixtures
7.5 Repair or replace a P trap
7.6 Build a brick/block composite wall
7.7 Complete exterior or interior carpentry finish work
7.8 Install shingles
7.9 Install window(s)
7.10 Install door(s)
7.11 Install underlayment
7.12 Install floor coverings

Committee Identified Academic Skills

The technical committee has identified that the following academic skills are embedded in this contest.

Math Skills

- Use fractions to solve practical problems
- Use proportions and ratios to solve practical problems
- Solve practical problems involving percents
- Solve single variable algebraic expressions
- Solve multiple variable algebraic expressions
- Measure angles
- Find surface area and perimeter of two-dimensional objects
- Construct three-dimensional models
- Apply Pythagorean Theorem
- Make comparisons, predictions and inferences using graphs and charts
- Organize and describe data using matrixes
- Find slope of a line
- Solve practical problems involving complementary, supplementary and congruent angles
- Find arc length and the area of a sector

Science Skills

- Plan and conduct a scientific investigation
- Use knowledge of the particle theory of matter
- Describe and recognize elements, compounds, mixtures, acids, bases and salts
- Describe and recognize solids, liquids and gases
- Describe characteristics of types of matter based on physical and chemical properties
- Use knowledge of physical properties (shape, density, solubility, odor, melting point, boiling point, color)
- Use knowledge of classification of elements as metals, metalloids and nonmetals
- Describe and identify physical changes to matter
- Use knowledge of potential and kinetic energy
- Use knowledge of mechanical, chemical and electrical energy
- Use knowledge of heat, light and sound energy
- Use knowledge of temperature scales, heat and heat transfer
- Use knowledge of speed, velocity and acceleration
- Use knowledge of Newton's laws of motion
- Use knowledge of work, force, mechanical advantage, efficiency and power
- Use knowledge of simple machines, compound machines, powered vehicles, rockets and restraining devices
- Use knowledge of principles of electricity and magnetism

- Use knowledge of static electricity, current electricity and circuits
- Use knowledge of magnetic fields and electromagnets

Language Arts Skills

- Demonstrate comprehension of a variety of informational texts
- Use text structures to aid comprehension
- Demonstrate knowledge of appropriate reference materials
- Use print, electronic databases and online resources to access information in books and articles

Connections to National Standards

State-level academic curriculum specialists identified the following connections to national academic standards.

Math Standards

- Numbers and operations
- Algebra
- Geometry
- Measurement
- Data analysis and probability
- Problem solving
- Reasoning and proof
- Communication
- Connections
- Representation

Source: NCTM Principles and Standards for School Mathematics. To view high school standards, visit: standards.nctm.org/document/chapter7/index.htm. Select "Standards" from menu.

Science Standards

- Understands the structure and function of cells and organisms
- Understands relationships among organisms and their physical environment
- Understands biological evolution and the diversity of life
- Understands the structure and properties of matter
- Understands the sources and properties of energy
- Understands forces and motion
- Understands the nature of scientific inquiry
- Understands the scientific enterprise

Source: McREL compendium of national science standards. To view and search the compendium, visit: www.mcrel.org/standards-benchmarks.

Language Arts Standards

- Students read a wide range of print and nonprint texts to build an understanding of texts, of themselves and of the cultures of the United States and the world; to acquire new information; to respond to the needs and demands of society and the workplace; and for personal fulfillment. Among these texts are fiction and nonfiction, classic and contemporary works
- Students apply a wide range of strategies to comprehend, interpret, evaluate and appreciate texts. They draw on their prior experience, their interactions with other readers and writers, their knowledge of word meaning and of other texts, their word identification strategies and their understanding of textual features (e.g., sound-letter correspondence, sentence structure, context, graphics)
- Students adjust their use of spoken, written and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes
- Students employ a wide range of strategies as they write and use different writing process elements appropriately to communicate with different audiences for a variety of purposes
- Students use a variety of technological and information resources (e.g., libraries, databases, computer networks, video) to gather and synthesize information and to create and communicate knowledge
- Students develop an understanding of and respect for diversity in language use, patterns and dialects across cultures, ethnic groups, geographic regions and social roles
- Students use spoken, written and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion and the exchange of information)

Source: IRA/NCTE Standards for the English Language Arts. To view the standards, visit: www.ncte.org/standards.

TECHNICAL COMPUTER APPLICATIONS

PURPOSE

To evaluate each contestant's preparation for employment and to recognize outstanding students for excellence and professionalism in the field of technical computer applications.

First, download and review the General Regulations at: http://updates.skillsusa.org.

ELIGIBILITY

Open to active SkillsUSA members enrolled in programs with computer literacy as part or all of the occupational objective.

CLOTHING REQUIREMENT

Class E: Contest specific — Business Casual

For men: Official SkillsUSA white polo shirt, black dress slacks, black socks, black leather shoes.
For women: Official SkillsUSA white polo shirt with black dress skirt (knee-length) or black slacks; black socks or black or skin-tone seamless hose; black leather dress shoes.

These regulations refer to clothing items that are pictured and described at: www.skillsusastore.org. If you have questions about clothing or other logo items, call 800-401-1560 or 703-956-3723.

Note: Contestants must wear their official contest clothing to the contest orientation meeting.

EQUIPMENT

1. Supplied by technical committee:
   a. Power strip
   b. Network storage and networking equipment to connect to an Ethernet network
2. Supplied by the contestant:
   a. Computer with the following minimum specifications
      1. Computer/laptop manufactured within last 18 months
      2. NIC card for a wired Ethernet connection
      3. Full administrative rights with all user passwords disabled or uninstalled
      4. Software suite accessibility, including a minimum of word processing, spreadsheet, database presentation software
   b. All competitors must create a one-page résumé and submit a hard copy to the technical committee chair at orientation. Failure to do so will result in a 10-point penalty.
3. Any changes to the hardware or software requirements will be announced annually in the SkillsUSA Championships update at: http://updates.skillsusa.org.
4. No cellphones or PDAs will be allowed during the contest.

   ***Note*:** Your contest may also require a hard copy of your résumé as part of the actual contest. Check the Contest Guidelines and/or the updates page on the SkillsUSA website at http://updates.skillsusa.org.

SCOPE OF THE CONTEST

This contest is defined by industry standards as set by the current industry technical standards. The contest assesses the ability of a candidate to perform jobs and skills selected from the list of competencies as determined by the SkillsUSA Championships technical committee.

Knowledge Performance

A written exam will be given that covers the installation and operation of the software, hardware and cabling plus general computer support knowledge. Topics also include information as related to the Internet, networking and data sharing.

Skill Performance

A series of demonstrations will be performed during the skill performance portion of this contest. The competencies outlined by the contest technical committee will be used as the foundation for this assessment. Contestants should be familiar with using a Windows-based, open source and/or Macintosh operating system. All work must be done independently.

Standards and Competencies

TECH 1.0 — Administer topics relating to the Internet standards and guidelines as set forth by the technical committee

1.1 Describe email functions
1.2 Define FTP
1.3 Explain networking processes
1.4 Display knowledge of server installation
1.5 Describe wireless and Bluetooth technology

TECH 2.0 — Install and configure an operating system per standards and guidelines as set forth by the technical committee

2.1 Modify the configuration setting for an operating system
2.2 Create users and policies for users
2.3 Manipulate application software as needed

TECH 3.0 — Demonstrate the use of application software per standards and guidelines as set forth by the technical committee

3.1 Use features in email
- 3.1.1 Originate and respond to email and instant messages
- 3.1.2 Attach files to items
- 3.1.3 Create and modify a personal signature for messages
- 3.1.4 Modify email message settings and delivery options
- 3.1.5 Create and edit contacts
- 3.1.6 Accept, decline and delegate tasks
- 3.1.7 Create and modify appointments, meetings and events
- 3.1.8 Update, cancel and respond to meeting requests
- 3.1.9 Customize calendar settings
- 3.1.10 Create, modify and assign tasks
- 3.1.11 Create and modify distribution lists
- 3.1.12 Link contacts to other items
- 3.1.13 Create and modify notes
- 3.1.14 Organize items using folders
- 3.1.15 Search for items
- 3.1.16 Save items in different file formats
- 3.1.17 Assign items to categories
- 3.1.18 Preview and print items

3.2 Use features in word processing
- 3.2.1 Format text and paragraphs
- 3.2.2 Apply and format columns
- 3.2.3 Insert and modify content in headers and footers
- 3.2.4 Modify document layout and page setup
- 3.2.5 Create new documents using a template
- 3.2.6 Review and modify document properties
- 3.2.7 Organize documents using file folders
- 3.2.8 Save documents in appropriate formats for different users
- 3.2.9 Print documents, envelopes and labels
- 3.2.10 Preview documents and Web pages
- 3.2.11 Insert and edit text, symbols and special characters
- 3.2.12 Insert frequently used and pre-defined text
- 3.2.13 Navigate to specific content
- 3.2.14 Insert, position and size graphics
- 3.2.15 Create and modify diagrams and charts
- 3.2.16 Locate, select and insert supporting information
- 3.2.17 Change and organize document views and windows
- 3.2.18 Insert and modify tales
- 3.2.19 Create bulleted lists, numbered lists and outlines
- 3.2.20 Insert and modify hyperlinks
- 3.2.21 Circulate documents for review
- 3.2.22 Compare and merge documents
- 3.2.23 Insert, view and edit comments
- 3.2.24 Track, accept and reject proposed changes

3.3 Use features of spreadsheets
- 3.3.1 Enter and edit cell content
- 3.3.2 Locate specific cell content
- 3.3.3 Locate, select and insert supporting information
- 3.3.4 Insert, position and size graphics
- 3.3.5 Filter lists using the AutoFilter feature
- 3.3.6 Sort lists
- 3.3.7 Insert and modify formulas
- 3.3.8 Use statistical, date and time, financial and logical functions
- 3.3.9 Create, modify and position diagrams and charts based on worksheet data

- 3.3.10 Apply and modify cell formats
- 3.3.11 Apply and modify cell styles
- 3.3.12 Modify row and column formats
- 3.3.13 Format worksheets
- 3.3.14 Insert, view and edit comments
- 3.3.15 Create new workbooks from templates
- 3.3.16 Insert, delete and move cells
- 3.3.17 Create and modify hyperlinks
- 3.3.18 Organize worksheets
- 3.3.19 Preview data in other views
- 3.3.20 Customize window layout
- 3.3.21 Setup pages for printing
- 3.3.22 Print data
- 3.3.23 Organize workbooks using file folders
- 3.3.24 Save data in appropriate formats for different uses

3.4 Use features in presentation software
- 3.4.1 Create new presentations from templates
- 3.4.2 Insert and edit text-based content
- 3.4.3 Insert tables, charts and diagrams
- 3.4.4 Insert pictures, shapes and graphics
- 3.4.5 Insert objects
- 3.4.6 Format text-based content
- 3.4.7 Format pictures, shapes and graphics
- 3.4.8 Format slides
- 3.4.9 Apply animation schemes
- 3.4.10 Apply slide transitions
- 3.4.11 Customize slide templates
- 3.4.12 Work with masters
- 3.4.13 Track, accept and reject changes in a presentation
- 3.4.14 Add, edit and delete comments in a presentation
- 3.4.15 Compare and merge presentations
- 3.4.16 Organize a presentation
- 3.4.17 Set up slide shows for delivery
- 3.4.18 Rehearse timing
- 3.4.19 Deliver presentations
- 3.4.20 Prepare presentations for remote delivery
- 3.4.21 Save and publish presentations
- 3.4.22 Print slides, outlines, handouts and speaker notes
- 3.4.23 Export a presentation to another Microsoft Office program

3.5 Web page development tools

3.6 Web browser

TECH 4.0 — Complete a hands-on demonstration of the Internet per standards and guidelines as set forth by the technical committee

4.1 Show proper use of email

4.2 Exhibit knowledge of FTP

4.3 Employ knowledge of networking

4.4 Share data across the Internet

Committee Identified Academic Skills

The technical committee has identified that the following academic skills are embedded in this contest.

Math Skills

- Use fractions to solve practical problems
- Use proportions and ratios to solve practical problems
- Solve practical problems involving percents
- Solve single variable algebraic expressions
- Solve multiple variable algebraic expressions
- Apply transformations (rotate or turn, reflect or flip, translate or slide and dilate or scale) to geometric figures
- Make predictions using knowledge of probability
- Make comparisons, predictions and inferences using graphs and charts
- Organize and describe data using matrixes
- Solve problems using proportions, formulas and functions
- Use laws of exponents to perform operations

Science Skills

None Identified

Language Arts Skills

- Provide information in conversations and in group discussions
- Provide information in oral presentations
- Demonstrate use of such verbal communication skills as word choice, pitch, feeling, tone and voice
- Demonstrate use of such nonverbal communication skills as eye contact, posture and gestures using interviewing techniques to gain information
- Demonstrate comprehension of a variety of informational texts
- Use text structures to aid comprehension

- Organize and synthesize information for use in written and oral presentations
- Demonstrate knowledge of appropriate reference materials
- Use print, electronic databases and online resources to access information in books and articles

Connections to National Standards

State-level academic curriculum specialists identified the following connections to national academic standards.

Math Standards

- Algebra
- Data analysis and probability
- Problem solving
- Communication
- Connections
- Representation

Source: NCTM Principles and Standards for School Mathematics. For more information, visit: http://www.nctm.org.

Science Standards

- Understands the sources and properties of energy
- Understands the nature of scientific inquiry
- Understands the scientific enterprise

Source: McREL compendium of national science standards. To view and search the compendium, visit: http://www2.mcrel.org/compendium/browse.asp.

Language Arts Standards

- Students apply a wide range of strategies to comprehend, interpret, evaluate and appreciate texts. They draw on their prior experience, their interactions with other readers and writers, their knowledge of word meaning and of other texts, their word identification strategies and their understanding of textual features (e.g., sound-letter correspondence, sentence structure, context, graphics)
- Students adjust their use of spoken, written and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes
- Students employ a wide range of strategies as they write and use different writing process elements appropriately to communicate with different audiences for a variety of purposes
- Students apply knowledge of language structure, language conventions (e.g., spelling and punctuation), media techniques, figurative language and genre to create, critique and discuss print and non-print texts
- Students use a variety of technological and information resources (e.g., libraries, databases, computer networks, video) to gather and synthesize information and to create and communicate knowledge.
- Students use spoken, written and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion and the exchange of information)

Source: IRA/NCTE Standards for the English Language Arts. To view the standards, visit: www.ncte.org/standards.

TECHNICAL DRAFTING

PURPOSE

To evaluate each contestant's preparation for employment and to recognize outstanding students for excellence and professionalism in the field of technical drafting.

First, download and review the General Regulations at: http://updates.skillsusa.org.

ELIGIBILITY

Open to active SkillsUSA members enrolled in programs with technical drafting as the occupational objective.

CLOTHING REQUIREMENT

Class E: Contest specific — Business Casual

For men: Official SkillsUSA white polo shirt, black dress slacks, black socks, black leather shoes.
For women: Official SkillsUSA white polo shirt with black dress skirt (knee-length) or black slacks; black socks or black or skin-tone seamless hose; black leather dress shoes.

These regulations refer to clothing items that are pictured and described at: www.skillsusastore.org. If you have questions about clothing or other logo items, call 800-401-1560 or 703-956-3723.

Note: Contestants must wear their official contest clothing to the contest orientation meeting.

EQUIPMENT

1. Supplied by the technical committee for each contestant:
   a. Flat table space approximately 24"x72"
   b. Chair
   c. Two 110-volt electric outlets
   d. Flash drive
   e. Printer with toner
   f. Paper
2. Supplied by the contestant (These materials cannot be shared with other contestants.):
   a. A personal computer
   b. Computer-aided drafting software that is able to create 3D models.
   c. Battery-powered calculator (not a cell phone).
   d. *Machinery's Handbook* and a maximum of three additional published reference books
   e. All competitors must create a one-page résumé and submit a hard copy to the technical committee chair at orientation. Failure to do so will result in a 10-point penalty.

   ***Note*:** Your contest may also require a hard copy of your résumé as part of the actual contest. Check the Contest Guidelines and/or the updates page on the SkillsUSA website at http://updates.skillsusa.org.

COMPUTER/SOFTWARE REQUIREMENTS

Contestants should have installed and/or set when arriving at the contest:

1. Network Configuration
   The following network components must be installed:
   • Client for Microsoft Networking
   • 10/100 10-Base T Ethernet Network Interface Card (wireless not supported)
   • TCP/IP Protocol

   Contestants should *not* install file and printer sharing for Microsoft networks.

   Contestants should be prepared to connect to a Microsoft Windows 2000 Server domain named "DOMAIN". This means the computer's workgroup name should be DOMAIN, and Windows NT, Windows 2000 and Windows XP computers should have a local user named "USER", and USER should be a member of the LOCAL ADMINISTRATOR group. (Windows Vista is not supported for this contest.)

   All computers (but particularly notebooks) should be prepared to connect to a *wired* 10-Base T network. Vista is not allowed.

2. Printer Driver Information
   Hewlett Packard DeskJet 1220 Driver should be installed. This driver is available at: www.hp.com.

3. Application Software
   The latest service packs and updates should be applied to application software before the contest. This is the contestant's responsibility. Ability to correctly plot cannot be guaranteed unless the latest service packs and updates are applied to contestant's application software.

4. It is advisable for contestants to bring their system software and the software they will be using for the contest in case they have setup trouble.

   There will be technicians on the floor the day of setup to assist contestants if they need help with cables, software, drivers, etc. Contestants renting computers can get help at that time.

Scope of the Contest

The contest will focus on the application of appropriate entry-level technical drafting skills to solve visualization and presentation problems of a mechanical nature as designed by the national technical committee.

Knowledge Performance

The contest will include a written exam that assesses technical drafting general knowledge (see standards and competencies).

Skill Performance

The contestants are assessed on their ability to create 3D models and extract properly scaled 2D views from those models for placement and annotation on standard inch or metric sized drawing sheets.

Contest Guidelines

1. The contestants are required to create part and assembly drawings of a mechanical product. The number of drawings will vary depending on the product. The drawing portfolio may vary between five to 10 drawings.
2. Contestant-supplied computer aided drafting and design software is used.
3. The contestants work independently. No assistance may be given by other contestants, instructors, advisors or observers.
4. All contestants start, break for lunch, and finish at the same time. No one is allowed to work during lunch or past the contest conclusion. If contestants are waiting to print after the contest conclusion, they are allowed to print one drawing only.
5. Contestants will store all their drawings in PDF format on supplied flash drives for printing.
6. Contestants' drawings are judged relative to pre-established criteria for each drawing in the drawing portfolio. The total contest points include points from the written exam and drawings.

Standards and Competencies

The following items are included in the written exam and skill performance parts of the contest.

TD 1.0 — Create 3D computer models of mechanical parts

1.1 Use sketches, solids and Boolean operations of union, subtraction and intersection to build model geometry
1.2 Use sketches and paths to create lofted and helical features
1.3 Add draft to models
1.4 Add threads, fillets, rounds and chamfers to models
1.5 Use mass properties commands to determine part weight, mass, center-of-gravity, etc.

TD 2.0 — Build assemblies using 3D computer models

2.1 Use assembly constraints to position and relate constructed models to each other
2.2 Create an exploded assembly

TD 3.0 — Demonstrate knowledge of drawing borders and title blocks

See the ASME Y14.1-2005 Decimal Inch Drawing Sheet Size and Formats, ASME Y14.1M-2005 Metric Drawing Sheet Size and Format standards, ASME Y14-100-2013 Engineering Drawing Practices.

3.1 Recall and create inch and metric sized borders and title blocks

TD 4.0 — Demonstrate knowledge of different drawing types

See the ASME Y14.24-1999 Types and Application of Engineering Drawings and ASME Y14.8 Castings, Forgings and Molded Part Drawings standards.

4.1 Describe and create 2D monodetail, inseparable assembly and final assembly drawings
  4.1.1 Add parts lists and item balloons to inseparable assembly and final assembly drawings
4.2 Add symbols and notes associated with castings, forgings and molded parts

TD 5.0 — Demonstrate knowledge of the alphabet of lines and lettering

See ASME Y14.2-2014 Line Conventions and Lettering.

5.1 Recognize the different types of lines used on drawings
5.2 Recall letter heights used on different areas of a drawing

TD 6.0 — Extract 2-D orthographic and pictorial views from 3-D computer models to create 2-D drawings

See the ASME Y14.3-2012 Orthographic and Pictorial Views standard.

6.1 Recognize the differences between first angle, third angle and arrow methods of projection
6.2 Lay out orthographic views using the third angle projection method
6.3 Project true size and shape auxiliary views from inclined surfaces shown in principle orthographic views

TD 7.0 — Demonstrate knowledge of section views

See the ASME Y14.3-2012 Orthographic and Pictorial Views standard.

7.1 Describe and create full, half and broken-out sections

TD 8.0 — Demonstrate knowledge of datum features

See ASME Y14.5-2009 Dimensioning and Tolerancing standard.

8.1 Apply surface and size feature datums
8.2 Apply datum targets

TD 9.0 — Apply general and geometric dimensions and tolerances to 2-D part views.

See the ASME B4.1-R1999 Preferred Limits and Fits for Cylindrical Parts and ASME Y14.5-2009 Dimensioning and Tolerancing standards.

9.1 Recognize and calculate size tolerances for clearance and interference fits
9.2 Recognize and apply limit, bilateral, unilateral, and unequal bilateral tolerances
9.3 Recognize and apply general and geometric dimensioning symbols

TD 10.0 — Demonstrate knowledge of metal material codes

10.1 Recognize and apply material codes as specified by the American Iron and Steel Institute (AISI), the Society of Automobile Engineers (SAE), the American Society for Testing and Materials (ASTM), the American Society of Mechanical Engineers (ASME), and Unified Numbering System (UNS)

TD 11.0 — Demonstrate knowledge of threaded fastener notation

See the ASME Y14.6-2001 Screw Thread Representation standard.

11.1 Recognize and apply inch and metric thread notes

TD 12.0 — Demonstrate knowledge of surface texture notation

See the ASME Y14.36-1996 Surface Texture Symbols standard.

12.1 Recognize and apply roughness averages, cutoff values and lay symbols to surface texture symbols

TD 13.0 — Demonstrate knowledge of weld notation

See the AWS A02.4-2012 Standard Symbols for Welding standard.

13.1 Recognize and apply weld type symbols, weld size and weld process abbreviations to basic weld symbols

TD 14.0 — Demonstrate knowledge of drawing revisions

See the ASME Y14.35 Drawing Revisions standard.

14.1 Create an appropriate revision block
14.2 Apply revision balloons

14.3 Create a document change notice (DCN)

Committee Identified Academic Skills

The technical committee has identified that the following academic skills are embedded in this contest.

Math Skills

- Solve single variable algebraic expressions

Science Skills

- Have a basic understanding of common material properties

Language Arts Skills

- Provide information in conversations and in group discussions
- Provide information in oral presentations
- Demonstrate use of such verbal communication skills as word choice, pitch, feeling, tone and voice
- Demonstrate use of such nonverbal communication skills as eye contact, posture and gestures using interviewing techniques to gain information
- Demonstrate knowledge of appropriate reference materials

Connections to National Standards

State-level academic curriculum specialists identified the following connections to national academic standards.

Math Standards

- Numbers and operations
- Algebra
- Geometry
- Measurement
- Problem solving
- Communication
- Connections
- Representation

Source: NCTM Principles and Standards for School Mathematics. For more information, visit: http://www.nctm.org.

Science Standards

- Understands the structure and properties of matter
- Understands the sources and properties of energy
- Understands forces and motion
- Understands the nature of scientific inquiry

Source: McREL compendium of national science standards. To view and search the compendium, visit: http://www2.mcrel.org/compendium/browse.asp.

Language Arts Standards

- Students read a wide range of print and nonprint texts to build an understanding of texts, of themselves and of the cultures of the United States and the world; to acquire new information; to respond to the needs and demands of society and the workplace; and for personal fulfillment. Among these texts are fiction and nonfiction, classic and contemporary works
- Students apply a wide range of strategies to comprehend, interpret, evaluate and appreciate texts. They draw on their prior experience, their interactions with other readers and writers, their knowledge of word meaning and of other texts, their word identification strategies and their understanding of textual features (e.g., sound-letter correspondence, sentence structure, context, graphics)
- Students adjust their use of spoken, written, and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes
- Students employ a wide range of strategies as they write and use different writing process elements appropriately to communicate with different audiences for a variety of purposes
- Students apply knowledge of language structure, language conventions (e.g., spelling and punctuation), media techniques, figurative language and genre to create, critique and discuss print and nonprint texts
- Students conduct research on issues and interests by generating ideas and questions, and by posing problems. They gather, evaluate and synthesize data from a variety of sources (e.g., print and nonprint texts,

artifacts, people) to communicate their discoveries in ways that suit their purpose and audience
- Students use a variety of technological and information resources (e.g., libraries, databases, computer networks, video) to gather and synthesize information and to create and communicate knowledge
- Students use spoken, written and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion and the exchange of information)

Source: IRA/NCTE Standards for the English Language Arts. To view the standards, visit: www.ncte.org/standards.

TELECOMMUNICATIONS CABLING

PURPOSE

To evaluate each contestant's preparation for employment and to recognize outstanding students for excellence and professionalism in the field of telecommunications cabling.

First, download and review the General Regulations at: http://updates.skillsusa.org.

ELIGIBILITY

Open to active SkillsUSA students enrolled in a career and technical education program with telecommunications cabling (systems connectivity) as the occupational objective.

CLOTHING REQUIREMENT

Class E: Contest specific — Business Casual

For men: Official SkillsUSA white polo shirt, black dress slacks, black socks, black leather shoes.
For women: Official SkillsUSA white polo shirt with black dress skirt (knee-length) or black slacks; black socks or black or skin-tone seamless hose; black leather dress shoes.

These regulations refer to clothing items that are pictured and described at: www.skillsusastore.org. If you have questions about clothing or other logo items, call 800-401-1560 or 703-956-3723.

Note: Contestants must wear their official contest clothing to the contest orientation meeting.

EQUIPMENT AND MATERIALS

1. Supplied by the technical committee:
   a. Mock wall, cable ladder, equipment racks, cable, telecommunications outlets, termination blocks, modular plugs and cable labeling device
   b. Connectors RJ-45 CAT 6, BNC F-Type, coax connectors, 110 blocks with C-4 and C-5 clips
   c. Fiber optic termination connectors, fiber optic cable
2. Supplied by contestant:
   a. Eye protection
   b. Hard hat
   c. IDC and compression tool necessary to terminate 8-pin modular plugs
   d. Compression tool for use with coaxial F-style snap and seal connectors
   e. Cable preparation tools such as electrician's scissors, stripping tools, etc.
   f. Fish tape
   g. Electrical tape
   h. Mechanical probe-pic
   i. Cable labeling device
   j. Volt ohmmeter or DMM
   k. Cable wire mapping tester
   l. Fiber-optic continuity tester (small flashlight)
   m. All competitors must create a one-page résumé and submit a hard copy to the technical committee chair at orientation. Failure to do so will result in a 10-point penalty.

   ***Note*:** Your contest may also require a hard copy of your résumé as part of the actual contest. Check the Contest Guidelines and/or the updates page on the SkillsUSA website at http://updates.skillsusa.org.

SCOPE OF THE CONTEST

Knowledge Performance

The contest includes a written knowledge exam to assess knowledge of structured cabling. Questions from the written evaluation will be taken from the following general telecommunications cabling topic areas and are verbalized in the attached competencies: cable pulling, copper media (UTP cabling), fiber optic media, fire stopping, grounding and bonding, horizontal cabling, installation of support structures, plans (blueprint and drawing), safety practices, splicing, standards and codes, telecommunications cabling systems, testing UTP cabling, transmission theory and troubleshooting.

Skill Performance

The purpose of the hands-on component of the contest will be to evaluate the ability to install, terminate and manage telecommunications cabling.

Contest Guidelines

1. An installation will be tested to industry standard requirements.
2. The cabling project must be completed within the given time and certified for use.
3. Equipment and tools needed to install the appropriate connectivity for the project will be provided by the committee and the contestant as described above in "Supplied by the Technical Committee."
4. Skills that are to be evaluated are outlined in the competencies provided by the contest technical committee. Standards are congruent with those established by the ETA Competency Requirements for Certified Data Cabling Installers.
5. Two industry certifications—Customer Service Specialist and Data Cabling Installer—may be earned as part of the contest. The Customer Service Specialist certification requires a passing score of 75 percent on a written evaluation that tests soft skills and work readiness. The Customer Service Specialist written evaluation is five percent of the total contest points. The Data Cabling Installer Certification requires both a passing score of 75 percent on a written evaluation and a score of 85 percent on the performance parts of the contest (Cable Installing, Cable Termination, Cable Construction, Cable Troubleshooting, and Fiber Optic Troubleshooting). The Data Cabling Installer Certification written evaluation is 10 percent of the total contest points. Both written exams will be administered at the orientation meeting.

Standards and Competencies

CAB 1.0 — Show knowledge of telecommunications safety as outlined by the ETA

1.1 Demonstrate basic workspace and ladder safety knowledge
1.2 Identify personal protective gear/equipment used in telecommunications cabling work
1.3 Exercise safety practices for cabling pathways
1.4 Identify safety issues specific to working with fiber optics cables
1.5 Demonstrate knowledge of OSHA safety regulations applicable to telecommunication installers
1.6 Demonstrate safety knowledge for confined spaces
1.7 Demonstrate knowledge of telecommunication safety hazards and threats

CAB 2.0 — Apply knowledge of telecommunications and electronics theory

2.1 Explain the relationship between voltage, current, resistance and power
2.2 Calculate voltage, current and resistance using Ohms Law
2.3 Identify passive components and active components in cabling circuits
2.4 Identify the electrical properties of inductors and capacitors
2.5 Recognize and explain the difference between DC and AC circuits
2.6 Identify the periodic units of sinusoidal AC
2.7 Explain the frequency response difference between inductive reactance and capacitive reactance
2.8 Define impedance and explain its relationship with reactance and resistance
2.9 Describe and identify resonant frequency, bandwidth and basic filter types
2.10 Explain how noise is generated in communications components
2.11 Define signal-to-noise ratio

CAB 3.0 — Apply knowledge of structured cabling components, elements and functional groups as outlined by the posted ETA competencies based on industry standards

3.1 Identify Inside Plant (ISP) LAN structured cabling elements
3.2 Identify and explain the function of the entrance facility
3.3 Identify and explain the function of the equipment room
3.4 Identify structured cabling elements
3.5 Identify codes and standards applicable to cable types, jackets and applications
3.6 Identify ground system components
3.7 Identify ground wiring minimum code requirements
3.8 Explain the function and importance of grounding/earthing systems to communications
3.9 Describe and apply ground codes and standards

CAB 4.0 — Apply knowledge of copper cabling installation including color coding, cable pulling and installation, connector terminations and cable testing as outlined by the contest technical committee

4.1 Demonstrate knowledge of the TIA standard color code for 4-pair and 25-pair UTP cabling
4.2 Demonstrate proper conduit cable pulling techniques
4.3 Demonstrate proper cable ladder cable pulling techniques
4.4 Install and terminate a ground conductor
4.5 Install and terminate to UTP patch panels
4.6 Install and terminate UTP wall outlets
4.7 Terminate a 25-pair cable to 66-style connecting blocks
4.8 Terminate a 25-pair cable to 110-style connecting block
4.9 Install and terminate UTP 4 pair CAT 6 modular outlets. Two modular outlets at faceplate
4.10 Install and terminate coaxial "F" style connectors
4.11 Install and terminate coaxial BNC style connectors
4.12 Test UTP and coaxial cabling continuity

CAB 5.0 — Describe terms related to analog and digital communication systems as outlined by the posted ETA competencies based on industry standards

5.1 Define asynchronus communications
5.2 Define synchronus communications
5.3 Describe the general characteristics of analog communications
5.4 Define the general characteristics of digital communications
5.5 Describe packet communications

CAB 6.0 — Explain common definitions, symbols and abbreviations relevant to telecommunications systems as outlined by the posted ETA competencies based on industry standards

6.1 Define the audio spectrum range
6.2 Define radio frequency
6.3 Explain channel bandwidth
6.4 Explain the difference between frequency, bit rate, baud and symbol rate
6.5 Convert signals from voltage levels to their corresponding decibel equivalents and decibel levels to their corresponding voltage or current levels
6.6 Convert signal gains or losses to comparative decibel readings

CAB 7.0 — Describe basic cable construction elements and cable types as outlined by the posted ETA competencies based on industry standards

7.1 Describe the basic components of:
  7.1.1 twisted-pair cables
  7.1.2 coaxial cables
7.2 Explain the differences between shielded twisted pair (STP) and unshielded twisted pair (UTP) cable
7.3 Read cable cordage and calculate cable length
7.4 Describe the use for standard cable jacket ratings:
  7.4.1 Plenum
  7.4.2 Riser
  7.4.3 General
7.5 Identify the NEC codes covering communication cabling use
7.6 Describe a composite cable
7.7 Describe a hybrid cable
7.8 Describe the performance differences between CAT 5 and 6 telephone-data cables

CAB 8.0 — Describe the copper cabling electrical performance characteristics, standards and terminology as outlined by the posted ETA competencies based on industry standards

8.1 Define cabling characteristic impedance
8.2 Define cabling attenuation
8.3 Define cabling return loss
8.4 Define pair cross talk
8.5 Describe the difference between near and far-end cross talk
8.6 Describe the cable elements:
  8.6.1 Jacket
  8.6.2 Conductor
  8.6.3 Pair
  8.6.4 Binder
  8.6.5 Shield
8.7 Identify electrical units of inductance, capacitance and resistance in relation to cable construction
8.8 Identify the terms "self-inductance" and "mutual inductance" and describe their application within cable construction
8.9 Describe the difference between balanced and unbalanced communications cabling

CAB 9.0 — Demonstrate knowledge of fiber optic technology and cable construction as outlined by the posted ETA competencies based on industry standards

9.1 List the name and function of optical cabling construction components:
  9.1.1 Core
  9.1.2 Cladding
  9.1.3 Buffer
  9.1.4 Tubing
9.2 Identify loose tube and tight buffered cables
9.3 Explain the TIA 598 fiber color code
9.4 Describe the difference and function of:
  9.4.1 Single-mode fiber
  9.4.2 Multi-mode fiber
9.5 Describe the operating wavelength bands for:
  9.5.1 Single-mode fiber
  9.5.2 Multi-mode fiber
9.6 Explain the optical terms and units of:
  9.6.1 Wavelength
  9.6.2 Attenuation
  9.6.3 Power
  9.6.4 Reflectance
9.7 Identify industry standard fiber connector types, including SC, ST, LC, MPO and Array
9.8 Evaluate the "end-face" of a fiber optic connector
9.9 Test optical fiber continuity
9.10 Measure optical power
9.11 Terminate fiber optic cables
9.12 Splice fiber optic cables

CAB 10.0 — Explain the purpose and basic requirements of the following standards as outlined by the posted ETA competencies based on industry standards

10.1 ANSI/TIA/EIA-568 standard
10.2 ANSI/TIA/EIA-569 standard
10.3 ANSI/TIA/EIA-606 standard
10.4 ANSI/TIA/EIA-607 standard
10.5 ANSI/TIA/EIA-570 (residential telecom cabling) standard
10.6 ISO/IEC-11801 standard

CAB 11.0 — Explain basic computer network physical topologies and explain the advantages of each as outlined by the posted ETA competencies based on industry standards

11.1 Draw a diagram of a physical network for each of the following topologies:
  11.1.1 STAR topology
  11.1.2 BUS topology
  11.1.3 RING topology
11.2 Explain the advantages of each type of topology:
  11.2.1 STAR topology
  11.2.2 BUS topology
  11.2.3 RING topology

CAB 12.0 — Describe basic Ethernet network equipment as outlined by the posted ETA competencies based on industry standards

12.1 Describe Ethernet hub
12.2 Describe Ethernet switch
12.3 Describe Ethernet router
12.4 Describe Ethernet bridge

CAB 13.0 — Display knowledge of the National Electric Code (NEC)

13.1 Understand and have knowledge of all chapters in the NEC book
13.2 Explain TIA/EIA 606 administration standard for networks

CAB 14.0 — Explain structured cabling system components as outlined by the posted ETA competencies based on industry standards

14.1 Describe horizontal and backbone cables
14.2 Explain why patch cords are used and describe them
14.3 Explain the differences between the various segments of cabling pathways
14.4 Describe the purpose, construction and usage of communications wiring closets
14.5 Define MDF or ER (Equipment Room) and IDF or TR (Communications Room)
14.6 Explain the purpose and use of a punch down block
14.7 Compare power sources for telephone-data cabling equipment

CAB 15.0 — Demonstrate the use of Data Cabling Installer installation tools as outlined by the posted ETA competencies based on industry standards

15.1 Explain the purpose and proper usage of wire strippers, wire cutters, punch-down tools and other cable prep tools
15.2 Demonstrate the use of wire strippers, wire cutters, and other cable prep tools
15.3 Demonstrate the proper method of using cable crimpers (TP and coaxial)
15.4 Demonstrate the use of a punch-down tool
15.5 Demonstrate the use of fish tapes and other pull devices

CAB 16.0 — Discuss proper identification numbers and use of connectors and outlets as outlined by the posted ETA competencies based on industry standards

16.1 List the proper identification numbers for twisted pair plugs and jacks
16.2 List the proper identification numbers for coaxial cable plugs, splices and jacks
16.3 Describe fixed design wall plates and explain where they are used
16.4 Describe a modular wall plate, why it is used, and where it is used
16.5 Describe a biscuit jack and why it is used
16.6 Describe a floor telecom outlet
16.7 Describe a cable junction box

CAB 17.0 — Demonstrate the steps, precautions and methods used in cabling installation as outlined by the posted ETA competencies based on industry standards

17.1 Describe the steps used in installing communications cabling
17.2 Explain cable stress and the precautions that should be taken during aerial, underground, duct and plenum installations
17.3 Define pulling tension and bend radius
17.4 Describe cabling dressing and methods of securing cabling
17.5 Explain proper labeling of cables
17.6 Describe a wire map
17.7 Explain the concept of cabling management and proper outlet placement and requirements
17.8 Demonstrate proper cable stripping, termination and installation techniques
17.9 Explain how ducts are used for cabling installations
17.10 Describe how the telecommunications closet is wired
17.11 Demonstrate the proper selection and use of cable testing tools and equipment

CAB 18.0 — Demonstrate proper installations of connectors, and describe the color code for pin/pair assignments as outlined by the posted ETA competencies based on industry standards

18.1 Demonstrate proper installation of twisted pair connectors
18.2 Demonstrate proper installation of coaxial cable connectors
18.3 Describe the color code for telecom cabling and the pin/pair assignments

CAB 19.0 — Explain and demonstrate methods of cable troubleshooting as outlined by the posted ETA competencies based on industry standards

19.1 Explain how to establish a baseline for testing or repairing a cabling system
19.2 Demonstrate methods for locating a cabling defect or problem
19.3 Describe commonly encountered cable problems and the methods used to resolve them
19.4 Explain cross-talk and florescent lighting interference
19.5 Explain loop-testing
19.6 Describe a radio detector and how it is used to locate interference sources

CAB 20.0 — Explain cable plant testing, certification and documentation as outlined by the posted ETA competencies based on industry standards

20.1 Explain the purpose of installation testing
20.2 Describe the purpose and methods of certifying the cable plant
20.3 Explain the purpose of documenting a cabling installation
20.4 Explain the required ingredients of the installation documents
20.5 Prepare a sample cable documentation record that meets industry standards

Committee Identified Academic Skills

The technical committee has identified that the following academic skills are embedded in this contest.

Math Skills

- Use fractions to solve practical problems
- Use proportions and ratios to solve practical problems
- Simplify numerical expressions
- Use scientific notation
- Solve practical problems involving percents
- Solve single variable algebraic expressions
- Construct three-dimensional models
- Make predictions using knowledge of probability
- Make comparisons, predictions and inferences using graphs and charts
- Organize and describe data using matrixes
- Solve problems using proportions, formulas and functions

Science Skills

- Use knowledge of mechanical, chemical and electrical energy
- Use knowledge of heat, light and sound energy
- Use knowledge of sound and technological applications of sound waves
- Use knowledge of the nature and technological applications of light
- Use knowledge of work, force, mechanical advantage, efficiency and power
- Use knowledge of principles of electricity and magnetism
- Use knowledge of static electricity, current electricity and circuits
- Use knowledge of magnetic fields and electromagnets

Language Arts Skills

- Provide information in conversations and group discussions
- Provide information in oral presentations
- Demonstrate use of verbal communication skills: word choice, pitch, feeling, tone and voice
- Demonstrate use of nonverbal communication skills: eye contact, posture and gestures using interviewing techniques to gain information
- Demonstrate comprehension of a variety of informational texts
- Identify words and phrases that signal an author's organizational pattern to aid comprehension
- Demonstrate knowledge of appropriate reference materials
- Use print, electronic databases and online resources to access information in books and articles
- Demonstrate informational writing

Connections to National Standards

State-level academic curriculum specialists identified the following connections to national academic standards.

Math Standards

- Numbers and operations
- Algebra
- Geometry
- Measurement
- Problem solving
- Reasoning and proof
- Communication
- Connections
- Representation

Source: NCTM Principles and Standards for School Mathematics. For more information, visit: http://www.nctm.org.

Science Standards

- Understands the structure and properties of matter
- Understands the sources and properties of energy
- Understands forces and motion
- Understands the nature of scientific inquiry

Source: McREL compendium of national science standards. To view and search the compendium, visit: http://www2.mcrel.org/compendium/browse.asp

Language Arts Standards

- Students read a wide range of print and nonprint texts to build an understanding of texts, of themselves, and of the cultures of the United States and the world; to acquire new information; to respond to the needs and demands of society and the workplace; and for personal fulfillment. Among these texts are fiction and nonfiction, classic and contemporary works
- Students apply a wide range of strategies to comprehend, interpret, evaluate and appreciate texts. They draw on their prior experience, their interactions with other readers and writers, their knowledge of word meaning and of other texts, their word identification strategies and their understanding of textual features (e.g., sound-letter correspondence, sentence structure, context, graphics)
- Students adjust their use of spoken, written and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes
- Students apply knowledge of language structure, language conventions (e.g., spelling and punctuation), media techniques, figurative language and genre to create, critique and discuss print and nonprint texts
- Students use a variety of technological and information resources (e.g., libraries, databases, computer networks, video) to gather and synthesize information and to create and communicate knowledge
- Students use spoken, written and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion and the exchange of information)

Source: IRA/NCTE Standards for the English Language Arts. To view the standards, visit: www.ncte.org/standards.

Television (Video) Production

Purpose

To evaluate each contestant's preparation for employment and to recognize outstanding students for excellence and professionalism in the field of television/video production.

First, download and review the General Regulations at: http://updates.skillsusa.org.

Clothing Requirements

Class E: Contest specific — Business Casual

For men: Official SkillsUSA white polo shirt, black dress slacks, black socks, black leather shoes.
For women: Official SkillsUSA white polo shirt with black dress skirt (knee-length) or black slacks; black socks or black or skin-tone seamless hose; black leather dress shoes.

These regulations refer to clothing items that are pictured and described at: www.skillsusastore.org. If you have questions about clothing or other logo items, call 800-401-1560 or 703-956-3723.

Note: Contestants must wear their official contest clothing to the contest orientation meeting.

Eligibility

Open to a team of two active SkillsUSA members enrolled in a career and technical education (CTE) program with video production as the occupational objective.

Equipment and Materials

1. Supplied by the national technical committee: facilities, USB thumb drive for each team, music (see more detail about music below)
2. Supplied by the contestants:
    a. A camera system capable of recording video and outputting video. Submissions must be one of the following: Quicktime (.mov) file, H.264, or MPEG-2. If using Quicktime, it must be compressed using either the H.264 or MPEG-2 codec.
    - Aspect Ratios: 4:3 (4x3) or 16:9 (16x9)
    - Frame Rates: 24fps, 29.97fps, or 30fps.
    - Scanning: Progressive or Interlaced
    - Resolution: 480 (SD) formats, and 720,1080 (HD) formats are acceptable up to 30fps.
    - Codecs: H.264 or MPEG-2

    Videos will be exported as files and transferred to USB thumb drive media for submission. Audio and video must be in the same file; submissions with separate audio and video files cannot be accepted.
    Note: Contestants may shoot (record) in any format/frame rate/resolution desired, but the final project to be turned in must follow the specs outlined above.
    b. One nonlinear editing system (multiple computers are not allowed)
    c. Microphone (wired and/or wireless)
    d. Batteries and power supply/charger for camera
    e. Critical requirement: The recording media for your system *should be new and unwrapped — still in its package*. Exception: P2 cards may be previously opened. (Any previously opened media must be verified by contest staff.)
    f. 20' AC extension cord
    g. Multiple outlet power strip
    h. Camera support system (tripod, monopod, shoulder mount, sliders, steadicam, etc. are all allowed; dollys, jibs/cranes, drones, however, are not permitted.) Our goal is to create as little a "footprint" as possible while shooting because of safety and traffic flow concerns.
    i. Headphone splitters, if desired, must be supplied by contestants.
    j. The contest coordinators may provide a selection of music freely available for contest use. If contestants want to bring their own music beds/libraries, then a written copyright permission letter

from the copyright holder must be submitted with entry. A blanket letter from a music library may be used. In lieu of a letter, a copy of the receipt for the purchase or lease of the library may be submitted. *Videos containing music not properly licensed will result in severe point reduction.*
Note: Contestants may also create their own music during post-production.

k. No. 2 pencil will be needed for the orientation meeting to complete Scantron test.
l. All competitors must create a one-page résumé and submit a hard copy to the technical committee chair at orientation. Failure to do so can result in a 10-point penalty. This contest requires a hard copy of your résumé as part of the actual contest.
m. Contestants may use an on-camera (battery or camera-powered) light, but we cannot allow lights that require wall power or light stands.
n. Any software editing/compositing/mixing system may be used, but no third-party templates may be used.
o. No stock photography, no stock video, no stock animation or graphics packages are allowed.
p. Sound effects and sound effects libraries may be used.

***Note*:** Check the Contest Guidelines and/or the updates page on the SkillsUSA website at http://updates.skillsusa.org.

Safety Requirements

Both the instructor and the contestant certify by agreeing to enter this contest that the contestant has received instructions and has satisfactorily passed an examination on the safe use of tripods and other mounts (if used). They also certify that the equipment has been thoroughly inspected and is in safe working condition. Further, they agree that SkillsUSA Inc., the SkillsUSA Championships technical committees and judges are released from all responsibility relating to personal injuries resulting from its use. Contestants will be removed from competition if proper training has not been provided and/or they are using the equipment in an unsafe manner.

Scope of the Contest

The contest is defined by industry standards as set by the current industry technical standards. The contest will be divided into three portions: a résumé, a written exam and a video assignment to be completed in teams of two that will assess knowledge in industry standards.

Knowledge Performance

The contest will include a written exam to be taken as a team covering basic video knowledge.

Skill Performance

The contest will include a video assignment to be completed by a team of two student members from the same school and same division. The assignment will consist of the following:

1. A video that conveys the assigned theme/objective that will appeal to the indicated target audience (demographic)
2. Contestants are to edit a 60-second video production (penalties will be assessed for video projects under/over 60 seconds)
3. The completed video production must convey an adequate representation of the subject or theme
4. Designated time periods will be provided for recording and editing
5. Emphasis will be placed on: professional production of the video by industry standards, quality of audio and video, and conveyance of theme to the viewer (target audience)

All teams will submit projects on a SkillsUSA provided USB thumb drive or as a computer file using a CODEC specified during the contest. Contestants will demonstrate their ability to perform jobs or skills selected from the following list of competencies as determined by the SkillsUSA Championships technical committee.

Standards and Competencies

TV 1.0 — Apply the knowledge and skills necessary to describe the production overview

1.1 Describe video production careers
1.2 Explain production overview
1.3 Complete program proposal and treatment for a production
1.4 Explain the three production steps
  1.4.1 Explain pre-production
  1.4.2 Define the production stage
  1.4.3 Explain the post-production step
1.5 Complete storyboards for a production
1.6 Define scriptwriting guidelines
1.7 Explain costing out a production
1.8 Define world video standards
1.9 Define HDTV standards

TV 2.0 — Implement the knowledge needed to describe how television works, video quality and color

2.1 Describe fields and frames
2.2 Define interlaced and progressive scanning
2.3 Describe analog and digital signals
2.4 Describe component and composite video signals
2.5 Demonstrate use of waveform monitor and vectorscope
2.6 Describe principles of color

TV 3.0 — Apply the knowledge needed to describe and demonstrate lens operation and control

3.1 Describe the type of lenses
3.2 Define angle of view
3.3 Describe zoom ratio
3.4 Demonstrate f-stops iris
3.5 Demonstrate control of depth of field
3.6 Illustrate focusing/follow focus/rack focus/macro focus
3.7 Explain the application of filters
3.8 Explain image stabilization

TV 4.0 — Apply the knowledge and skills necessary to describe and demonstrate camera operation and control

4.1 Define video resolution
4.2 Describe and demonstrate camera mounts and tripod use
4.3 Operate camera pan heads
4.4 Demonstrate basic camera moves (i.e., pan/tilt/dolly/truck/pedestal)
4.5 Illustrate black balancing and white balancing
4.6 Describe shutter speed
4.7 Demonstrate control of exposure through the use of f-stops
4.8 Explain frame rate
4.9 Demonstrate use of camera viewfinder
4.10 Describe safe area

TV 5.0 — Implement the skills and knowledge needed for describing and demonstrating composition

5.1 Describe form vs. content
5.2 Demonstrate insert and cutaway shots
5.3 Describe static composition
5.4 Describe dynamic composition
5.5 Define single center of interest
5.6 Describe shifting the center of interest
5.7 Demonstrate leading the subject
5.8 Describe the Rule of Thirds
5.9 Define maintaining tonal balance
5.10 Define balance of mass
5.11 Demonstrate frame central subject matter
5.12 Define controlling the number of prime objects

TV 6.0 — Apply the knowledge and skills needed to describe and demonstrate video lighting

6.1 Describe hard and soft lighting
6.2 Define color temperature
6.3 Demonstrate intensity control through varying distance
6.4 Identify lighting instruments
6.5 Identify attachments to lighting instruments
6.6 Demonstrate three-point lighting (i.e., key/fill/back light)
6.7 Describe lighting ratios
6.8 Describe back light intensity
6.9 Describe subject-to-background distance
6.10 Describe area lighting
6.11 Apply the uses of existing (natural) light
6.12 Demonstrate drawing of a light plot
6.13 Identify lighting controls
6.14 Calculate on-location power needs

TV 7.0 — Implement the skills and knowledge needed to describe and demonstrate audio

7.1 Describe the frequency-loudness relationship
7.2 Define room acoustics
7.3 Differentiate major microphone designs
7.4 Describe directional characteristics

7.5 Define handheld and personal microphones
7.6 Position microphones
7.7 Identify audio connectors
7.8 Demonstrate positioning of microphone cables
7.9 Describe types and uses of wireless microphones
7.10 Describe phase cancellation
7.11 Describe methods of creating the stereo effect
7.12 Describe digital audio
7.13 Describe analog audio
7.14 Demonstrate operation of audio mixer controls
7.15 Describe issues of using audio from a PA system
7.16 Describe production communication systems

TV 8.0 — Apply the knowledge and skills needed to describe and demonstrate video recording media

8.1 Describe the videotape recording process
8.2 Describe hard drive-based recording
8.3 Describe disk-based camcorders
8.4 Define solid state memory storage
8.5 Describe video servers
8.6 Describe consumer video formats
8.7 Define digital compression
  8.7.1 Describe MPEG-2
  8.7.2 Describe MPEG-4
  8.7.3 Describe JPEG
8.8 List professional video formats

TV 9.0 — Apply the knowledge and skills needed to describe and demonstrate video editing

9.1 Describe continuity editing
9.2 Demonstrate continuity techniques
9.3 Demonstrate cutaways
9.4 Define relational and thematic editing
9.5 Demonstrate bridging jumps in action
9.6 Demonstrate bridging interview edits
9.7 Illustrate shooting angles
9.8 Describe or demonstrate audio continuity
9.9 Demonstrate maintaining consistency in action and detail
9.10 Demonstrate operation of software-based editors
9.11 Use linear and non-linear editing systems
9.12 Explain time-code
9.13 Define on-line and off-line editing

TV 10.0 — Apply the knowledge and skills needed to describe and demonstrate graphics

10.1 Describe titling
10.2 Describe character generator

TV 11.0 — Apply the knowledge and skills needed to describe and demonstrate location production

11.1 Complete a location survey
11.2 Define camera placement
11.3 Illustrate microphone placement for on-location audio
11.4 Demonstrate on-location lighting techniques
11.5 Illustrate on-location production communication
11.6 Define multiple-camera production
11.7 Define single-camera production
11.8 Define film-style dramatic production

Committee Identified Academic Skills

The technical committee has identified that the following academic skills are embedded in this contest.

Math Skills

- Measure angles
- Apply transformations (rotate or turn, reflect or flip, translate or slide, and dilate or scale) to geometric figures
- Find slope of a line

Science Skills

- Use knowledge of mechanical, chemical and electrical energy
- Use knowledge of heat, light and sound energy
- Use knowledge of temperature scales, heat and heat transfer
- Use knowledge of sound and technological applications of sound waves
- Use knowledge of the nature and technological applications of light
- Use knowledge of static electricity, current electricity and circuits

Language Arts Skills

- Demonstrate use of such verbal communication skills as word choice, pitch, feeling, tone and voice
- Analyze mass media messages

Connections to National Standards

State-level academic curriculum specialists identified the following connections to national academic standards.

Math Standards

- Numbers and operations
- Geometry
- Measurement
- Data analysis and probability
- Problem solving
- Communication
- Connections
- Representation

Source: NCTM Principles and Standards for School Mathematics. For more information, visit: http://www.nctm.org.

Science Standards

- Understands the structure and properties of matter
- Understands the sources and properties of energy
- Understands forces and motion
- Understands the nature of scientific inquiry
- Understands the scientific enterprise

Source: McREL compendium of national science standards. To view and search the compendium, visit: http://www2.mcrel.org/compendium/browse.asp.

Language Arts Standards

- Students adjust their use of spoken, written and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes
- Students employ a wide range of strategies as they write and use different writing process elements appropriately to communicate with different audiences for a variety of purposes
- Students conduct research on issues and interests by generating ideas and questions and by posing problems. They gather, evaluate and synthesize data from a variety of sources (e.g., print and nonprint texts, artifacts, people) to communicate their discoveries in ways that suit their purpose and audience
- Students use spoken, written and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion and the exchange of information)

Source: IRA/NCTE Standards for the English Language Arts. To view the standards, visit: www.ncte.org/standards.

WEB DESIGN

PURPOSE
To evaluate each contestant's preparation for employment and to recognize outstanding students for excellence and professionalism in the field of Web design and development.

First, download and review the General Regulations at: http://updates.skillsusa.org.

ELIGIBILITY
Open to a team of two active SkillsUSA members enrolled in programs using Web design or Web development as an occupational objective.

CLOTHING REQUIREMENT
Class E: Contest specific — Business Casual
For men: Official SkillsUSA white polo shirt, black dress slacks, black socks, black leather shoes.
For women: Official SkillsUSA white polo shirt with black dress skirt (knee-length) or black slacks; black socks or black or skin-tone seamless hose; black leather dress shoes.

These regulations refer to clothing items that are pictured and described at: www.skillsusastore.org. If you have questions about clothing or other logo items, call 800-401-1560 or 703-956-3723.

Note: Contestants must wear their official contest clothing to the contest orientation meeting.

EQUIPMENT AND MATERIALS
1. Supplied by technical committee:
   a. Workstation with table space for two computers, with two chairs, 110-volt electrical outlet
2. Supplied by the contestant team:
   a. All competitors must create a one-page résumé and submit a hard copy to the technical committee chair at orientation. Failure to do so will result in a 10-point penalty.

***Note*:** Your contest may also require a hard copy of your résumé as part of the actual contest. Check the Contest Guidelines and/or the updates page on the SkillsUSA website at http://updates.skillsusa.org.

   b. Two multiple outlet surge protectors
   c. Sketch pad for storyboarding
   d. Computers with CD-RW drive or USB port, and an Ethernet connection
   e. Hub and patch cables for interconnecting team computers
   f. Related Web authoring and graphics software accompanied by proof of license
   g. Design and development tools necessary to build a complete website

SCOPE OF THE CONTEST
The contest is defined by industry standards and set by the current industry technical committee.

Knowledge Performance
The contest consists of a written knowledge exam assessing the team's general knowledge of definitions, software, processes and procedures relevant to Web design in such areas as: graphics, design, layout, programming, code and process.

This team event includes topics such as: programming (HTML, XHTML, JavaScript, client side scripting), Web graphics, website design (usability), website management, project management and Web multimedia. Legal issues surrounding the field of Web design will also be considered a part of this contest.

Skill Performance
The contest includes a Web design project and a written document providing an overview explaining how the Web content supports a designated theme to assess Web design and development skills.

Contest Guidelines

Web Design Project

1. The project requires a team of two: a Web designer and Web developer/webmaster. The team of two is to demonstrate how a developed project with an educational theme has been completed through the application of graphics, multimedia, design and layout.
2. Attention will be paid to the quality of code and the quality of the website development process.
3. The national technical committee will provide a template, which describes the site development process.
4. All entries to the contest must be created by the teams during the contest.
5. Teams will be issued a work order on Tuesday during the orientation meeting. Each team's website will be constructed at the contest site for evaluation and continual work on the day of the contest.
6. Specific schedules outlining equipment setup, storyboarding and specific judging criteria will be distributed during the orientation meeting on Tuesday.
7. All copyright laws are to be followed.
8. Violations will result in disqualification.
9. No hard or soft copy reference material such as HTML, CSS or JavaScript documentation will be permitted for use during the contest. Some written reference materials will be available on site.

Explanation Document

1. Teams shall provide an overview document that shows how developed Web content supports the educational theme. Criteria include:
    a. Theme and content must be educational in nature
    b. Content must support the theme
    c. Quality of the site organization and navigation
    d. Acceptable use of language and conventions: paragraph structure, grammar, spelling, punctuation, etc.
    e. Any multimedia elements used should contribute to the site content
    f. The site can be viewed in more than one browser on both Mac and Windows platforms
    g. Links are valid and all multimedia components load properly and within a reasonable period of time

For further information and FAQ, visit: www.webdesigncontest.org.

Standards and Competencies

WEB 1.0 — Use appropriate and thematic graphic elements that contribute to the understanding of concepts, ideas and relationships of the Web design to related standards of Certified Web Designer Associate-apprentice

1.1 Demonstrate a consistent and appropriate variation in the use of type sizes
1.2 Demonstrate an appropriate use of colors
1.3 Incorporate objects and background images
1.4 Use color, graphics, navigation design and consistency from page to page
1.5 Identify the critical elements of Web design
1.6 Explain the use of copyright, intellectual property and trademark laws as related to Web design

WEB 2.0 — Illustrate the use of various multimedia tools in the Web design and layout, which are clearly thought out, appropriately used and error-free to contribute to the best explanation of concepts, ideas and relationships to related standards of CWDSA-apprentice

2.1 Use animated GIFs as a part of the final product
2.2 Choose appropriate tools for supporting the development of the concepts, ideas and relationships
2.3 Optimize the usage of graphic files and file management
2.4 Incorporate electronic images, photo files and scanned images into the final product
2.5 Incorporate a good blend of audio and video files
2.6 Use hyperlinks and anchors
2.7 Create a corporate identity and design

WEB 3.0 — Design a website navigation that is well architected, easy to use, and consistent throughout the site with considerations made to programming and compatibility to related standards of CWDSA-apprentice

3.1 Demonstrate the use of contemporary Web browsers
3.2 Design a standards-based site that supports many common Web browsers
3.3 Ensure the capability of code structure and design
3.4 Apply HTML, CSS and JavaScript to create a well crafted website
3.5 Format and document the code

WEB 4.0 — Create a process with incorporated strategies and organizational tools that help persons access the site at different levels to related standards of CWDSA-apprentice

4.1 Design activities with a scaffolding of information from basic knowledge to higher-level thinking
4.2 Contribute to the richness of the process
  4.2.1 Help others experience different perspectives
  4.2.2 Share responsibilities in accomplishing a task

Committee Identified Academic Skills

The technical committee has identified that the following academic skills are embedded in this contest.

Math Skills

- Organize and describe data using matrixes

Science Skills

None Identified

Language Arts Skills

- Provide information in conversations and group discussions
- Provide information in oral presentations
- Demonstrate use of such verbal communication skills as word choice, pitch, feeling, tone and voice
- Demonstrate use of such nonverbal communication skills such as eye contact, posture and gestures using interviewing techniques to gain information
- Analyze mass media messages
- Demonstrate comprehension of a variety of informational texts
- Use text structures to aid comprehension
- Understand source, viewpoint and purpose of texts
- Organize and synthesize information for use in written and oral presentations
- Demonstrate knowledge of appropriate reference materials
- Demonstrate narrative writing
- Demonstrate expository writing
- Demonstrate persuasive writing
- Demonstrate informational writing
- Edit writing for correct grammar, capitalization, punctuation, spelling, sentence structure and paragraphing

Connections to National Standards

State-level academic curriculum specialists identified the following connections to national academic standards.

Math Standards

- Geometry
- Measurement
- Problem solving
- Reasoning and proof
- Communication
- Connections
- Representation

Source: NCTM Principles and Standards for School Mathematics. For more information, visit: http://www.nctm.org.

Science Standards

- Understands the nature of scientific inquiry
- Understands the scientific enterprise

Source: McREL compendium of national science standards. To view and search the compendium, visit: http://www2.mcrel.org/compendium/browse.asp.

Language Arts Standards

- Students apply a wide range of strategies to comprehend, interpret, evaluate and appreciate texts. They draw on their prior experience, their interactions with other readers and writers, their knowledge of word meaning and of other texts, their word identification strategies, and their understanding of textual features (e.g., sound-letter correspondence, sentence structure, context, graphics)

- Students adjust their use of spoken, written and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes
- Students employ a wide range of strategies as they write and use different writing process elements appropriately to communicate with different audiences for a variety of purposes
- Students apply knowledge of language structure, language conventions (e.g., spelling and punctuation), media techniques, figurative language and genre to create, critique and discuss print and nonprint texts
- Students conduct research on issues and interests by generating ideas and questions, and by posing problems. They gather, evaluate and synthesize data from a variety of sources (e.g., print and nonprint texts, artifacts, people) to communicate their discoveries in ways that suit their purpose and audience
- Students use a variety of technological and information resources (e.g., libraries, databases, computer networks, video) to gather and synthesize information and to create and communicate knowledge
- Students develop an understanding of and respect for diversity in language use, patterns, and dialects across cultures, ethnic groups, geographic regions and social roles
- Students participate as knowledgeable, reflective, creative and critical members of a variety of literacy communities
- Students use spoken, written and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion and the exchange of information)

Source: IRA/NCTE Standards for the English Language Arts. To view the standards, visit: www.ncte.org/standards.

WELDING

PURPOSE

To evaluate each contestant's preparation for employment and to recognize outstanding students for excellence and professionalism in the field of welding.

First, download and review the General Regulations at: http://updates.skillsusa.org/.

ELIGIBILITY

Open to active SkillsUSA members enrolled in programs with welding as the occupational objective.

CLOTHING REQUIREMENT

Official SkillsUSA khaki work shirt and pants (both the shirt and pants must be 100 percent cotton); black, brown or tan leather high-top work boots (no shoes of any kind, leather or otherwise); and safety glasses with side shields or goggles. (Prescription glasses can be used only if they are equipped with side shields. If not, they must be covered with goggles.)

These regulations refer to clothing items that are pictured and described at: www.skillsusastore.org. If you have questions about clothing or other logo items, call 800-401-1560 or 703-956-3723.

Note: Contestants must wear their official contest clothing to the contest orientation meeting.

EQUIPMENT AND MATERIALS

1. Supplied by the technical committee:
   a. All necessary welding equipment, filler metals and base materials
   b. All instructions, Welding Procedure Specifications (WPS) and prints
   c. The technical committee will provide on the SkillsUSA website a preview of the current year's national contest consisting of cut lists and/or partial prints no later than April 15
2. Supplied by the contestant:
   a. Hearing and/or ear protection
   b. Welding gloves—full length (gauntlet) for SMAW, GMAW and FCAW
   c. Welding gloves — appropriate for GTAW
   d. Welding cap/beanie
   e. Welding helmet with appropriate filter plate/lens and protective cover lens for tacking and welding; auto darkening filter plate/lens permissible. Spare filter plate and cover lens
   f. Cutting goggles—with shade 5 lens/cover lens for OFC/PAC; helmet with shade 5 capibility permissible; faceshield head gear with shade 5 permissible. Spare filter and cover lens
   g. Pocket calculator
   h. Fillet weld gauge—standard set
   i. Lead pencil and/or ballpoint pen
   j. Soap stone with or without holder
   k. Scribe with or without magnet
   l. Compass
   m. Protractor
   n. Combination square set
   o. 10-foot (3.1 meters) minimum steel tape measure
   p. 16-ounce (.45 kilogram) ball peen hammer
   q. Center punch
   r. Cold chisel
   s. 11R or 10-inch (254 millimeters) vise grips
   t. 6-inch (152 millimeters) side cutting pliers or diagonal cutting pliers
   u. 6-inch (152 millimeters) needle nose pliers – welpers permissible
   v. Chipping hammer
   w. Carbon steel wire brush
   x. Stainless steel wire brush
   y. Friction lighter (striker) and tip cleaner
   z. All competitors must create a one-page résumé and submit a hard copy to the technical committee chair at orientation. Failure to do so will result in a 10-point penalty.

***Note*:** Your contest may also require a hard copy of your résumé as part of the actual contest. Check the Contest Guidelines and/or the updates page on the SkillsUSA website at http://updates.skillsusa.org/.

Scope of the Contest

The scope of the contest is defined by industry standards as identified by the American Welding Society, Emmert Welding and Manufacturing Co. Inc., Honeywell Engines and Systems, ITW Hobart Brothers Co., The Lincoln Electric Co., Matheson Tri-Gas Inc., Miller Electric Co. Inc., and the International Association of Bridge, Structural, Ornamental and Reinforcing Iron Workers. All drawings, welding symbols and welding terms conform to the latest edition of the American Welding Society (AWS) standards.

Knowledge Performance

The contest includes a written knowledge exam that assesses welding and associated topics including safety, math for welders and print reading. It also includes a brief oral interview comprised of several questions before a group of technical committee members.

Skill Performance

The skill performance assessment may include: steel project(s), aluminum project(s), stainless steel project(s) in various positions using a variety of filler metals. Contestants will be involved in a series of stations testing various aspects of welding.

Contest Guidelines

1. Contestants must correctly use the welding equipment during the contest. The contest chairman and/or any technical committee member may stop a contestant at any section of the contest if they deem a contestant's manner to be hazardous to either themselves or others. Such stoppage shall be documented as a warning. If the contestant is warned a second time, he or she will be disqualified for that section of the contest.
2. As soon as the contestants enter the contest area—as defined by the surrounding tables—no communication shall occur between the contestants or between the contestants and anyone else, except as directed by the contest chair, technical committee members or judges. Any such communication will result in the contestant being disqualified from that section of the contest. If any taped lines on the floor within the contest area are present, all contestants shall stay within the taped lines. Failure to stay within the taped lines, except for being escorted to the restroom, will result in penalties as follows: First violation, disqualification of the nearest segment of the contest. Second violation, disqualification as a contest participant.
3. Time limits will be established on the contest procedure sheets for all segments of the test.
4. Evaluation of the completed project will be judged visually. Nondestructive and/or destructive tests may be used to complete the project evaluation.
5. Welding and cutting instructions will be provided to the contestants and specified on the Welding Procedure Specifications (WPS) and prints provided in the welding booths and near cutting stations.
6. Welding equipment used in the contest may be obtained from a variety of manufacturers and may include transformers, rectifiers and/or inverters.
7. Filler metals will be detailed on the Welding Procedure Specification (WPS) and/or the prints.
8. Welds will be evaluated visually using a rating system as established by the SkillsUSA technical committee. Nondestructive and/or destructive tests may be used to complete the project evaluation.
9. Final judging of the welded projects will be evaluated according to the difficulty of the assigned task and by using the following visual inspection criteria: dimensional accuracy, including distortion; conformity to drawing requirements, including determination of whether all welds have been completed and whether the finished welds conform to the required size and contour; and visual examination of the welds for cracks, undercut, overlap, crater fill, spatter, arc strikes, porosity, convexity and reinforcement.
10. Print assembly tolerance will be +/- $\frac{1}{16}$" unless otherwise noted.
11. If no print assembly dimensions are given to orient any project part, the part is to be approximately located based on the print's isometric view.

Standards and Competencies

W 1.0 — Identify safety standards and demonstrate safety and health practices of welders in accordance to ANSI Z49

1.1 Demonstrate proper use of equipment used for protection of personnel
1.2 Demonstrate proper use and inspection of equipment used for ventilation
1.3 Demonstrate Hot Work operation
1.4 Demonstrate working in confined spaces properly
1.5 Understand precautionary labeling

W 2.0 — Demonstrate an understanding of practical measurement

2.1 Identify basic metal-working tools used in measuring
2.2 Use visual measuring tools to accuracy of 1/32"
2.3 Employ the components of a combination square set
2.4 Use layout and marking tools as required

W 3.0 — Read and interpret prints

3.1 Apply information found in the information block of the drawing
3.2 Identify the basic views used on prints including assembly, detail and fit-up drawings
3.3 Identify common types of lines, abbreviations and symbols in accordance with national drawing standards (ANSI)
3.4 Identify basic welding symbols and components of a symbol (such as arrow, reference line, tail, size, length and location) in accordance with the current national welding symbol standard AWS A 2.4, current edition

W 4.0 — Produce welds using a Shielded Metal Arc Welding (SMAW) process to AWS QC10 standards

4.1 Demonstrate safety procedures for SMAW
4.2 Demonstrate ability to correctly set up SMAW power sources, related welding equipment and do basic process and equipment troubleshooting for welding of carbon steel and/or stainless steel
4.3 Select correct type of electrode based on carbon steel and/or stainless steel plate (¼" to ½" thickness)
4.4 Prepare carbon steel and/or stainless steel for welding

W 5.0 — Produce welds using a Gas Metal Arc Welding (GMAW) process to AWS QC10 standards

5.1 Demonstrate correct safety procedures for GMAW
5.2 Demonstrate ability to correctly set up GMAW power sources, related welding equipment and do basic process and equipment troubleshooting
5.3 Identify short circuiting, globular, spray and pulsed transfer welding of carbon steel, stainless steel and/or aluminum
5.4 Select correct type of filler metal, type of shielding gas, amperage and voltage based on carbon steel, stainless steel and/or aluminum sheet and/or plate (1/16" to 3/8" thickness)
5.5 Prepare the carbon steel, stainless steel and/or aluminum for welding

W 6.0 — Produce welds using a Fluxed Cored Arc Welding (FCAW) process to AWS QC10 standards

6.1 Demonstrate correct safety procedures for FCAW
6.2 Demonstrate ability to correctly set up FCAW power sources, related welding equipment and do basic process and equipment troubleshooting
6.3 Select correct type of filler metal, type of shielding gas, amperage and voltage based upon carbon steel and/or stainless steel sheet and/or plate (¼" to 3/8" thickness)
6.4 Prepare stainless steel and/or carbon steel for welding

W 7.0 — Produce welds using a Gas Tungsten Arc Welding (GTAW) process to AWS QC10 standards

7.1 Demonstrate safety procedures for GTAW
7.2 Demonstrate ability to correctly set up GTAW power sources, related welding equipment and do basic process and equipment troubleshooting for regular and pulsed welding of aluminum, stainless steel and/or carbon steel
7.3 Select the correct type of tungsten and/or filler metal based on aluminum, stainless steel or carbon steel sheet and/or plate (1/16" to ¼" thickness)

7.4 Prepare aluminum, stainless steel and/or carbon steel for welding

W 8.0 — Produce cut materials using an Oxygen Fuel Cutting (OFC) process to AWS QC10 standards

8.1 Demonstrate safety procedures for OFC
8.2 Demonstrate ability to correctly set up the OFC equipment for cutting and do basic process troubleshooting

W 9.0 — Produce cut materials using a Plasma Arc Cutting (PAC) process to AWS QC10 standards

9.1 Demonstrate safety procedures for PAC
9.2 Demonstrate ability to correctly set up the PAC power sources, related cutting equipment and do basic process and equipment troubleshooting
9.3 Set up and shut down equipment for cutting carbon steel, stainless steel and/or aluminum

W 10.0 — Demonstrate knowledge of visual inspection

10.1 Examine and measure undercut
10.2 Examine and measure porosity
10.3 Measure fillet size
10.4 Examine and measure weld reinforcement
10.5 Determine acceptability of welded samples in accordance with provided acceptance criteria

W 11.0 — Demonstrate knowledge of welding positions and terminology

11.1 Start, stop and restart stringer beads in the flat, horizontal, vertical up and down, and overhead positions
11.2 Weld a pad with a multiple pass weld in the flat, horizontal, vertical up and down, and overhead positions
11.3 Weld a lap joint with a single pass, fillet weld in flat, horizontal, vertical up and down, and overhead positions
11.4 Weld a lap joint with a multiple pass, fillet weld in the flat, horizontal, vertical up and down, and overhead positions
11.5 Weld a T-joint with a single pass, fillet weld in the flat, horizontal, vertical up and down, and overhead positions
11.6 Weld a T-joint with a multiple pass, fillet weld in the flat, horizontal, vertical up and down, and overhead positions
11.7 Weld a butt joint with a single pass square groove weld in the flat, horizontal, vertical up and down, and overhead positions
11.8 Weld a butt joint with a partial joint penetration, single pass, double V-groove weld in the flat, horizontal, vertical up and down, and overhead positions
11.9 Weld a butt joint with a multiple pass V-groove weld in the flat, horizontal, vertical up and down, and overhead positions
11.10 Weld a butt joint with complete joint penetration, multiple pass, double groove weld in the flat, horizontal, vertical up and down, and overhead positions
11.11 Weld a 2" to 8" diameter, schedules 40 to 80 pipe, single/multiple pass V-groove weld in the 2G, 5G and 6G positions
11.12 Lay out, weld, cut and prepare coupons for evaluation

Committee Identified Academic Skills

The technical committee has identified that the following academic skills are embedded in this contest.

Math Skills

- Use fractions to solve practical problems
- Convert fractions to decimals and vice versa
- Measure angles
- Construct three-dimensional models

Science Skills

- Describe and recognize solids, liquids and gases
- Use knowledge of principles of electricity and magnetism

Language Arts Skills

- Provide information in oral presentations

Connections to National Standards

State-level academic curriculum specialists identified the following connections to national academic standards.

Math Standards

- Geometry
- Measurement
- Problem solving

- Communication
- Connections
- Representation

Source: NCTM Principles and Standards for School Mathematics. For more information, visit: http://www.nctm.org.

Science Standards

- Understands the structure and properties of matter
- Understands the sources and properties of energy
- Understands forces and motion
- Understands the nature of scientific inquiry

Source: McREL compendium of national science standards. To view and search the compendium, visit: http://www2.mcrel.org/compendium/browse.asp.

Language Arts Standards

- Students apply a wide range of strategies to comprehend, interpret, evaluate and appreciate texts. They draw on their prior experience, their interactions with other readers and writers, their knowledge of word meaning and of other texts, their word identification strategies, and their understanding of textual features (e.g., sound-letter correspondence, sentence structure, context, graphics)

Source: IRA/NCTE Standards for the English Language Arts. To view the standards, visit: www.ncte.org/standards.

WELDING FABRICATION

PURPOSE

To evaluate each contestant's preparation for employment and to recognize outstanding students for excellence and professionalism in the field of welding fabrication.

First, download and review the General Regulations at: http://updates.skillsusa.org/.

ELIGIBILITY (TEAM OF THREE)

Open to active SkillsUSA members enrolled in programs with welding as the occupational objective. This is a team event. Each team will be comprised of three student members from the same school and training program.

CLOTHING REQUIREMENT

Official SkillsUSA khaki work shirt (long sleeved) and pants (both the pants and shirt must be 100 percent cotton); black, brown or tan leather work shoes; and safety glasses with side shields or goggles. (Prescription glasses can be used only if they are equipped with side shields. If not, they must be covered with goggles.)

These regulations refer to clothing items that are pictured and described at: www.skillsusastore.org. If you have questions about clothing or other logo items, call 800-401-1560 or 703-956-3723.

Note: Contestants must wear their official contest clothing to the contest orientation meeting.

EQUIPMENT AND MATERIALS

1. Supplied by the technical committee:
   a. All necessary welding equipment and materials
   b. For all drawings and procedure, please refer to: http://updates.skillsusa.org/
   c. Power tools needed for the competition
   d. Some tools will be provided; please see updated list on the SkillsUSA website prior to the competition
2. Supplied by the contestant team:
   a. Hearing and/or ear protection
   b. Welding helmet with appropriate filter plate/lens and protective cover plate/lens in a flip or slide front. Auto darkening shields are permissible
   c. Spare spatter and filter lenses/plates for arc welding helmet and oxyacetylene goggles
   d. Pocket calculator
   e. Lead pencil and/or ballpoint pen
   f. Soap stone with holder
   g. Scribe with magnet
   h. Combination square set
   i. Fillet weld gauge
   j. Center punch
   k. Chipping hammer with or without wire brush
   l. Stainless steel wire brush
   m. All competitors must create a one-page résumé and submit a hard copy to the technical committee chair at orientation. Failure to do so will result in a 10-point penalty.

   ***Note*:** Your contest may also require a hard copy of your résumé as part of the actual contest. Check the Contest Guidelines and/or the updates page on the SkillsUSA website at http://updates.skillsusa.org/.

   Project drawings will be posted ahead of time for students, also at http://updates.skillsusa.org/.

SCOPE OF THE CONTEST

The scope of the contest is defined by industry standards as identified by the following companies: American Welding Society Inc., Harris Products Group, Hobart Brothers Co., Lincoln Electric Co., Linweld Inc. and Miller Electric Manufacturing Co. All drawings, welding symbols and welding terms conform to the latest edition of the American Welding Society (AWS) standards.

Knowledge Performance

The contest will include a written knowledge exam that assesses the practical knowledge of welding, including safety, measurement and blueprint reading. Other common fabrication operations will also be assessed such as saw operation, drilling, grinding and material handling.

Skill Performance

The skill performance assessment includes the completion of a metal project and a demonstration of the ability to weld carbon steel, aluminum or stainless steel project in various positions using a variety of filler metals. Contestants will be involved in the completion of a metal project that involves various manufacturing methods.

Contest Guidelines

1. Contestants must correctly use the welding equipment during the contest. The contest chairman and contest coordinator may stop contestants at any section of the contest if they deem a contestant's manner to be hazardous to either him- or herself or others. Such stoppage shall disqualify the participant for that section of the contest. If the contestant is warned a second time, he or she will be disqualified as a contest participant.
2. While the contest is in progress, there shall be no communication between the contestants or between other teams or anyone else, except as directed by a judge, contest coordinator or contest chair. It is expected that team members will communicate to each other.
3. Time limits will be established on the contest procedure sheets for all segments of the test.
4. Evaluation of the completed project will be judged visually. Nondestructive and/or destructive tests may be used to complete the project evaluation.
5. Welding and cutting operation instructions will be specified in drawings and procedure sheets provided to the contestants.
6. Welding equipment used in the contest may be obtained from a variety of manufacturers and may include transformers, rectifiers and/or inverters.
7. Filler metals will be compatible with the metals being welded and will be detailed on the contest procedure sheet. Instructions to the contestants will define more specifically the filler metals that may be used.
8. Welds will be evaluated visually using a rating system as established by the SkillsUSA technical committee. Nondestructive and/or destructive tests may be used to complete the project evaluation.
9. Final judging of the welded projects will be evaluated according to the difficulty of the assigned task and by using the following visual inspection criteria: dimensional accuracy, including distortion; conformity to drawing requirements, including determination of whether all welds have been completed and whether the finished welds conform to the required size and contour; and visual examination of the welds for cracks, undercut, overlap, crater fill, spatter, arc strikes, porosity, convexity and reinforcement.

Standards and Competencies

WF 1.0 — Identify safety standards on a test in accordance to ANSI Z49

1.1 Demonstrate proper use and inspection of equipment used for protection of personnel
1.2 Model proper work area operation
1.3 Demonstrate proper use and inspection of equipment used for ventilation
1.4 Demonstrate proper Hot Zone operation
1.5 Demonstrate proper procedures for working in confined spaces
1.6 Understand precautionary labeling
1.7 Model proper use and inspection of equipment used for each required welding or thermal cutting process

WF 2.0 — Demonstrate an understanding of practical measurement

2.1 Identify basic metal-working tools used in measuring
2.2 Use visual measuring tools to accuracy of $\frac{1}{64}$ of an inch
2.3 Employ the components of a combination square set
2.4 Use layout and marking tools as required

2.5 Determine wire feed speed as indicated on drawing

WF 3.0 — Read and interpret blueprints

3.1 Apply information found in the information block of the drawing
3.2 Read and understand three-dimensional drawings
3.3 Identify the basic views used in blueprints including assembly, detail and fit-up drawings
3.4 Identify common types of lines, abbreviations and symbols in accordance with national drawing standards (ANSI)
3.5 Identify basic welding symbols and components of a symbol (such as arrow, reference line, tail, size or length) in accordance with the current national welding symbol standard, AWS A 2.4, current edition

WF 4.0 — Produce welds using a Shielded Metal Arc Welding (SMAW) process to AWS QC10 standards

4.1 Demonstrate safety procedures for SMAW
4.2 Demonstrate ability to correctly set up SMAW power sources and related welding equipment and do basic process and equipment troubleshooting
4.3 Correctly identify base metal prior to welding
4.4 Set up and shut down equipment for welding of carbon steel and/or stainless steel
4.5 Select correct type of filler metal size of electrode based on carbon steel and/or stainless steel plate (¼-inch to ½-inch thickness)
4.6 Prepare carbon steel and/or stainless steel for welding
4.7 Start, stop and restart stringer beads on carbon steel and/or stainless steel in the flat, horizontal, vertical up and down, and overhead positions
4.8 Weld a pad with a multiple-pass weld on carbon steel and stainless steel plate in the flat, horizontal, vertical up and down, and overhead positions
4.9 Weld a lap joint with a single-pass, fillet weld on carbon steel and stainless steel sheet/plate in flat, horizontal, vertical up and down, and overhead positions
4.10 Weld a lap joint with a multiple-pass, fillet weld on carbon steel and stainless steel plate in the flat, horizontal, vertical up and down, and overhead positions
4.11 Weld a T-joint with a single-pass, fillet weld on carbon steel and stainless steel sheet/plate in the flat, horizontal, vertical up and down, and overhead positions
4.12 Weld a T-joint with a multiple-pass, fillet weld on carbon steel and stainless steel plate in the flat, horizontal, vertical up and down, and overhead position
4.13 Weld a butt joint with a single-pass, square groove weld on carbon steel and stainless steel sheet/plate in the flat, horizontal, vertical up and down, and overhead positions
4.14 Weld a butt joint with a partial joint penetration, single pass, double V-groove weld on carbon steel and stainless steel plate in the flat, horizontal, vertical up and down, and overhead positions
4.15 Weld a butt joint with a multiple-pass, V-groove weld on carbon steel and stainless steel plate in the flat, horizontal, vertical up and down, and overhead positions
4.16 Weld a butt joint with complete joint penetration, multiple pass, double groove weld on carbon steel and stainless steel plate in the flat, horizontal, vertical up and down, and overhead positions
4.17 Weld 2- to 8-inch diameter, schedules 40 to 80 carbon steel and stainless steel pipe, single/multiple-pass V-groove weld in the 2G, 5G and 6G positions
4.18 Lay out, weld, cut and prepare coupons for evaluation
4.19 Test the prepared coupon

WF 5.0 — Produce welds using a Gas Metal Arc Welding (GMAW) process to AWS QC10 standards

5.1 Demonstrate correct safety procedures for GMAW
5.2 Demonstrate ability to correctly set up GMAW power sources and related welding equipment and do basic process and equipment troubleshooting
5.3 Correctly identify base metal prior to welding
5.4 Set up and shut down equipment for short circuiting, globular, spray and

pulsed transfer welding of carbon steel, stainless steel and/or aluminum

5.5 Select correct type of filler metal size of electrode, type of shielding gas, wire feed speed and voltage based on carbon steel, stainless steel and/or aluminum sheet and/or plate ($\frac{1}{16}$-inch to $\frac{3}{8}$-inch thickness)

5.6 Prepare the carbon steel, stainless steel and/or aluminum for welding

5.7 Start, stop and restart stringer beads on carbon steel, stainless steel and aluminum steel sheet/plate in the flat, horizontal, vertical up and down, and overhead positions

5.8 Weld a pad with a multiple-pass weld on carbon steel, stainless steel and aluminum sheet/plate in the flat, horizontal, vertical up and down and overhead positions

5.9 Weld a lap joint with a single-pass, fillet weld on carbon steel, stainless steel and aluminum sheet/plate in flat, horizontal, vertical up and down and overhead positions

5.10 Weld a lap joint with a multiple-pass, fillet weld on carbon steel, stainless steel and aluminum plate in the flat, horizontal, vertical up and down and overhead positions

5.11 Interrupt root pass at mid point and restart arc

5.12 Weld a T-joint with a single-pass, fillet weld on carbon steel, stainless steel and aluminum sheet/plate in the flat, horizontal, vertical up and down and overhead positions

5.13 Weld a T-joint with a multiple-pass, fillet weld on carbon steel, stainless steel and aluminum plate in the flat, horizontal, vertical up and down and overhead positions

5.14 Weld a butt joint with a single-pass, square groove weld on carbon steel, stainless steel and aluminum sheet/plate in the flat, horizontal, vertical up and down and overhead positions

5.15 Weld a butt joint with a partial joint penetration; single-pass, and double V-groove weld on carbon steel, stainless steel and aluminum plate in the flat, horizontal, vertical up and down and overhead positions

5.16 Weld a butt joint with a multiple-pass, V-groove weld on carbon steel, stainless steel and aluminum plate in the flat, horizontal, vertical up and down and overhead positions

5.17 Weld a butt joint with complete joint penetration; multiple-pass, and double V-groove weld on carbon steel, stainless steel and aluminum plate in the flat, horizontal, vertical up and down and overhead positions

5.18 Weld 2- to 8-inch diameter, schedule 40 to 80 carbon steel, stainless steel and aluminum pipe, single/multiple pass V-groove weld in the 2G, 5G and 6G positions

5.19 Lay out, weld, cut and prepare coupons for evaluation

5.20 Test prepared coupons

WF 6.0 — Produce welds using a Fluxed Cored Arc Welding (FCAW) process to AWS QC10 standards

6.1 Demonstrate correct safety procedures for FCAW

6.2 Demonstrate ability to correctly set up FCAW power sources and related welding equipment and do basic process and equipment troubleshooting

6.3 Correctly identify base metal prior to welding

6.4 Set up and shut down equipment for welding of carbon steel and/or stainless steel

6.5 Select correct type of filler metal, size of electrode, type of shielding gas (if needed), wire feed speed and voltage based upon carbon steel and/or stainless steel sheet and/or plate ($\frac{1}{16}$-inch to $\frac{3}{8}$-inch thickness)

6.6 Prepare carbon steel and/or stainless steel for welding

6.7 Start, stop and restart stringer beads on carbon steel and stainless steel sheet/plate in the flat, horizontal, vertical up and overhead positions

6.8 Weld a pad with a multiple-pass weld on carbon steel and stainless steel sheet/plate in the flat, horizontal, vertical up and overhead positions

6.9 Weld a lap joint with a single-pass, fillet weld on carbon steel and stainless steel sheet/plate in flat, horizontal, vertical up and overhead positions

6.10 Weld a lap joint with a multiple-pass, fillet weld on carbon steel and stainless steel plate in the flat, horizontal, vertical up and overhead positions. Stop and restart in the middle of the joint
6.11 Weld a T-joint with a single-pass, fillet weld on carbon steel and stainless steel sheet/plate in the flat, horizontal, vertical up and overhead positions
6.12 Weld a T-joint with a multiple-pass, fillet weld on carbon steel and stainless steel plate in the flat, horizontal, vertical up and overhead positions
6.13 Weld a butt joint with a single-pass, square groove weld on carbon steel and stainless steel sheet/plate in the flat, horizontal, vertical up and overhead positions
6.14 Weld a butt joint with a partial joint penetration, single pass, double V-groove weld on carbon steel and stainless steel plate in the flat, horizontal, vertical up and overhead positions
6.15 Weld a butt joint with a multiple-pass, V-groove weld on carbon steel and stainless steel plate in the flat, horizontal, vertical up and overhead positions
6.16 Weld a butt joint with complete joint penetration, multiple-pass, double V-groove weld on carbon steel and stainless steel plate in the flat, horizontal, vertical up and overhead positions
6.17 Weld 2- to 8-inch diameter, schedules 40 to 80 carbon steel and stainless steel pipe, single/multiple pass V-groove weld in the 2G, 5G and 6G positions
6.18 Lay out, cut and prepare coupons for evaluation
6.19 Test prepared coupons

WF 7.0 — Produce welds using a Gas Tungsten Arc Welding (GTAW) process to AWS QC10 standards

7.1 Demonstrate safety procedures for GTAW
7.2 Demonstrate ability to correctly set up GTAW power sources and related welding equipment and do basic process and equipment troubleshooting
7.3 Correctly identify base metal prior to welding
7.4 Set up and shut down equipment for regular and pulsed welding of aluminum, stainless steel and/or carbon steel
7.5 Select the correct size and type of tungsten and/or filler metal based on aluminum, stainless steel or carbon steel sheet and/or plate ($\frac{1}{16}$-inch to $\frac{1}{4}$-inch thickness)
7.6 Prepare aluminum, stainless steel and/or carbon steel for welding
7.7 Start, stop and restart stringer beads on aluminum, stainless steel and carbon steel sheet/plate in the flat, horizontal, vertical up and down and overhead positions
7.8 Weld a pad with multiple-pass weld on aluminum, stainless steel and carbon steel sheet/plate in the flat, horizontal, vertical up and down and overhead positions
7.9 Weld a lap joint with a single-pass, fillet weld on aluminum, steel, stainless steel and carbon steel sheet/plate in flat, horizontal, vertical up and down and overhead positions.
7.10 Weld a lap joint with a multiple-pass, fillet weld on aluminum, stainless steel and carbon steel plate in the flat, horizontal vertical up and down and overhead positions
7.11 Weld a T-joint with a single-pass fillet weld on aluminum, stainless steel and carbon steel sheet/ plate in the flat, horizontal, vertical up and down and overhead positions
7.12 Weld a T-joint with a multiple-pass, fillet weld on aluminum, stainless steel and carbon steel plate in the flat, horizontal, vertical up and down and overhead positions
7.13 Weld a butt joint with a single-pass, square groove weld on aluminum, stainless steel and carbon steel sheet/plate in the flat, horizontal, vertical up and down and overhead positions
7.14 Weld a butt joint with a partial joint penetration, single-pass, double V-groove weld on aluminum, stainless steel and carbon steel plate in the flat, horizontal vertical up and down and overhead positions
7.15 Weld a butt joint with a multiple-pass, V-groove weld on aluminum, stainless steel and carbon steel plate in the flat, horizontal, vertical up and down and overhead positions

7.16 Weld a butt joint with complete joint penetration, multiple-pass, and double V-groove weld on aluminum, stainless steel and carbon steel plate in the flat, horizontal, vertical up and down and overhead positions
7.17 Weld 2- to 8-inches diameter, schedules 40 to 80 aluminum, stainless steel, carbon steel pipe, single/multiple pass V-groove weld in the 2G, 5G and 6G positions
7.18 Lay out, weld, cut and prepare coupons for evaluation
7.19 Test prepared coupons

WF 8.0 — Produce cut materials using an Oxygen Fuel Cutting (OFC) process to AWS QC10 standards

8.1 Demonstrate safety procedures for OFC
8.2 Demonstrate ability to correctly set up the OAC equipment for cutting and do basic process troubleshooting
8.3 Correctly identify base metal prior to cutting
8.4 Set up and shut down equipment for cutting carbon steel plate
8.5 Select correct tip size and gas pressure for serving carbon steel plate (¼-inch to ½-inch thickness)
8.6 Prepare carbon steel for cutting
8.7 Cutting operations will be specified in drawings and procedure sheets provided to the contestants
8.8 Properly light, adjust the flame on, and shut down the oxygen fuel equipment
8.9 Use a straight edge and soapstone laying out the prescribed pattern
8.10 Make a square cut on carbon steel in flat, horizontal, vertical and overhead positions
8.11 Make a bevel cut (45-degree angle) on carbon steel plate in the flat, horizontal, vertical and overhead positions
8.12 Pierce a hole on carbon steel in the flat, horizontal, vertical and overhead position
8.13 Make a pipe and tubing cut on carbon steel pipe in flat, horizontal, vertical and overhead positions
8.14 Make a gouge and groove cut on carbon steel in flat, horizontal, vertical and overhead positions.
8.15 Lay out, weld, cut and prepare coupons for evaluation
8.16 Test prepared coupon

WF 9.0 — Produce cut materials using a Plasma Arc Cutting (PAC) process to AWS QC10 standards

9.1 Demonstrate safety procedures for PAC
9.2 Demonstrate ability to correctly set up the PAC power sources and related cutting equipment and do basic process and equipment troubleshooting
9.3 Correctly identify base metal prior to cutting
9.4 Set up and shut down equipment for cutting carbon steel, stainless steel and/or aluminum
9.5 Select correct cutting head and gas pressure for severing carbon steel, stainless steel or aluminum plate and/or sheet (1/16-inch to ¼-inch thickness)
9.6 Prepare carbon steel, stainless steel and/or aluminum for cutting
9.7 Cutting operations will be specified in drawings and procedure sheets provided to the contestants
9.8 Properly adjust and use the plasma arc equipment
9.9 Use a straight edge and soapstone laying out the prescribed pattern
9.10 Make a square cut on carbon steel, stainless steel and aluminum sheet/plate in flat, horizontal, vertical and overhead positions
9.11 Make a bevel cut (45-degree angle) on carbon steel, stainless steel and aluminum sheet/plate in the flat, horizontal, vertical and overhead positions
9.12 Pierce a hole on carbon steel, stainless steel and aluminum sheet/plate in the flat, horizontal, vertical and overhead position
9.13 Make a pipe and tubing cut on carbon steel, stainless steel and aluminum pipe in the horizontal position
9.14 Make a gouge and groove cut on carbon steel, stainless steel and aluminum sheet/plate in the flat position
9.15 Lay out, cut and prepare coupons for evaluation
9.16 Test prepared coupon

WF 10.0 — Demonstrate knowledge of visual inspection

10.1 Examine and measure undercut
10.2 Examine and measure porosity

10.3 Measure fillet size
10.4 Examine and measure weld reinforcement
10.5 Determine acceptability of welded samples in accordance with provided acceptance criteria

Committee Identified Academic Skills

The technical committee has identified that the following academic skills are embedded in this contest.

Math Skills

- Use fractions to solve practical problems
- Measure angles
- Construct three-dimensional models

Science Skills

- Describe and recognize solids, liquids and gases
- Use knowledge of principles of electricity and magnetism

Language Arts Skills

- Provide information in oral presentations

Connections to National Standards

State-level academic curriculum specialists identified the following connections to national academic standards.

Math Standards

- Geometry
- Measurement
- Problem Solving
- Communication
- Connections
- Representation

Source: NCTM Principles and Standards for School Mathematics. For more information, visit: http://www.nctm.org.

Science Standards

- Understands the structure and properties of matter
- Understands the sources and properties of energy
- Understands forces and motion
- Understands the nature of scientific inquiry

Source: McREL compendium of national science standards. To view and search the compendium, visit: http://www2.mcrel.org/compendium/browse.asp.

Language Arts Standards

- Students apply a wide range of strategies to comprehend, interpret, evaluate and appreciate texts. They draw on their prior experience, their interactions with other readers and writers, their knowledge of word meaning and of other texts, their word identification strategies, and their understanding of textual features (e.g., sound-letter correspondence, sentence structure, context, graphics)

Source: IRA/NCTE Standards for the English Language Arts. To view the standards, visit: www.ncte.org/standards.

WELDING SCULPTURE

PURPOSE
To evaluate each contestant's preparation for employment and to recognize outstanding students for excellence and professionalism in the field of welding or metal trades.

First, download and review the General Regulations at: http://updates.skillsusa.org.

ELIGIBILITY
Open to active SkillsUSA members enrolled in career and technical programs with welding or metal trades as the occupational objective.

CLOTHING REQUIREMENT
Class E: Contest specific — Business Casual
For men: Official SkillsUSA white polo shirt, black dress slacks, black socks, black leather shoes.
For women: Official SkillsUSA white polo shirt with black dress skirt (knee-length) or black slacks; black socks or black or skin-tone seamless hose; black leather dress shoes.

Alternative: Official SkillsUSA red blazer with white shirt may be worn instead of SkillsUSA white polo.

These regulations refer to clothing items that are pictured and described at: www.skillsusastore.org. If you have questions about clothing or other logo items, call 800-401-1560 or 703-956-3723.

Note: Contestants must wear their official contest clothing to the contest orientation meeting.

EQUIPMENT AND MATERIALS
1. Supplied by the technical committee:
   a. All necessary information for the judges and technical committee
   b. One 4-foot table
2. Supplied by the contestant:
   a. All competitors must create a one-page résumé and submit the résumé at the contest orientation.
   ***Note*:** Your contest may also require a hard copy of your résumé as part of the actual contest. Check the Contest Guidelines and/or the updates page on the SkillsUSA website at: http://updates.skillsusa.org.
   b. Student-designed and -produced sculpture
   c. Notebook to serve as professional portfolio (see description below)

SCOPE OF THE CONTEST
The contest consists of three parts:
1. Evaluation of the sculpture
2. Notebook
2. Interview (All contestants will be asked the same questions, determined by the judges, before the start of the contest.)

Knowledge Performance
There will be a skill-related written test to evaluate student knowledge of basic welding and cutting processes. General questions about GMAW, GTAW, SMAW, PAC and OFC will be included on this test.

Skill Performance
The contest is designed to assess the ability of the competitor to design and produce a sculpture of that design, as well as answer questions in a brief interview related to all aspects of his or her creation of the design.

Contest Guidelines
***No modifications may be made to sculptures after regional/state contests,* except polishing and clear coat.**

Sculpture Design and Workmanship
1. Materials used must be ferrous or nonferrous metals. The sculpture must be an original and creative work of the student.
2. Sculptures shall be welded, brazed, or soldered, depending on the material used. No mechanical fasteners or adhesives are permitted.

3. Projects are to be left unpainted, including primers and other coatings. (Exception: sculptures may be clear coated.) Naturally achieved patinas shall be limited to air, water or heat, or any combination thereof. (No chemically enhanced finishes are permitted.)
4. All copyright laws must be followed in the creation of the design.
5. The sculpture must be one continual piece, not multiple pieces unconnected. Movement is allowed but not required. Moving parts are permitted provided they do not affect the size parameters or integrity of the piece, or create a safety hazard.
6. The sculpture cannot exceed the maximum size of 18" tall x 12" wide x 18" long and cannot exceed a weight of 100 lbs. At orientation, students will place a box with said dimensions over their sculpture so that judges may verify the sculpture meets the size requirement. Sculptures will also be weighed. (A severe point penalty will be taken for oversize or overweight sculptures.)
7. No additional appurtenances can be used (mirrors, stands, etc.). The sculpture shall stand alone. No presentation pieces are permitted.

Notebook

1. A three-ring binder must be placed with the sculpture prior to judging. It must contain pictures and supporting evidence (i.e., receipts). It must include a brief description of the project and processes used to develop the sculpture.
2. The first page of the notebook must be a tabbed table of contents. The notebook must include a letter certifying that the sculpture was designed and constructed by the student. The letter must contain an itemized list of all expenses. The letter must identify the school, city, state and local advisor. The letter must identify the student to be interviewed, division (high school or college/postsecondary), and the letter must be signed by the school administrator.
3. Any welds that are hidden or ground must be documented through photographs with captions in the notebook.
4. A photograph of the student with his/her sculpture along with the state director at regional and state competitions must be provided to ensure the same sculpture has been used throughout SkillsUSA contests.
5. An electronic copy of the notebook must be provided at orientation on a USB drive; USB drives will be returned to students during the contest.

Interview

The student will participate in a three- to five-minute interview. Questions from the judges will be related (but not limited) to sculpture, creation, inspiration, materials, processes and workmanship.

Items Evaluated Possible Points

Sculpture (450 points)

A. Metal Working (Fitting and Techniques) 100
B. Welding (100 points total)
   - Fit-up 25
   - Function of welds 25
   - Amount of welds 25
   - Quality of welds 25
C. Cutting (50 points total)
   - Function of cuts 25
   - Quality of cuts 25

   Note: No extra credit or deductions for CNC cutting
D. Design/Creativity (200 points total)
   - Level of difficulty 50
   - Creative use material/process 50
   - Creativity 50
   - Original Design 50

Notebook (2"–3" tabbed binder) (300 points total)

Note: Does *not* need to be SkillsUSA binder

A. Tabbed table of contents 25
   Note: Must be first page
B. Verification letter (125 points total)
   Note: All information must be included in one letter.
   1. School letterhead: letter signed by school administrator 25
   2. Verification: student constructed sculpture 25
   3. Itemized list of expenses with receipts 25
   4. ID school, city, state, advisor 25

5. List of approximate time in each process 25
   Note: actual receipts, photocopies of receipts, invoice or proof of donated materials required for expenses.

C. Photographs with captions (minimum 10) 50
   Note 1: Photos must include student, who must be identifiable working on his or her sculpture throughout various stages of construction; captions must depict the process demonstrated
   Note 2: If welds are ground or removed, photo documentation of original welds must be provided
D. Photographs: regional and state contests 25
   (Student with sculpture, medal/ certificate and state director to verify same sculpture used for all contests)
E. Drawings (50 points total)
   1. Concept drawing(s) 25
   2. Drawings — approximate dimensions 25
F. Supporting documents 50
   (Examples: additional photos of process, design, cutting, welding, forming; explanation of creative use of process, etc.)

Interview [200 points total]

A. Greeting and Closing 20
B. Eye Contact 10
C. Knowledge of Project 50
D. Complete Answers 20
E. Level of Detail 25
F. Professionalism 50
G. Employability 25

Written Test [50 points total] 50

Penalties

A. Workmanship: exceeds size limits -100
B. Workmanship: exceeds 100 lbs. -100
C. Workmanship: paint/finish -50
D. Workmanship: copyright infraction -50
E. Résumé Penalty -10
F. Clothing Penalty -10

Total Possible Points 1,000