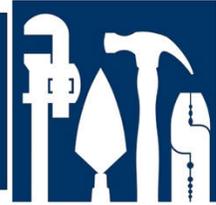




TEAMWORKS



SkillsUSA Championships Technical Standards

PURPOSE

This competition is designed to evaluate team preparation for employment and to recognize outstanding students for excellence and professionalism in the field of residential carpentry, roofing, masonry, plumbing, electrical and teamwork skills.

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

ELIGIBILITY (TEAM OF FOUR)

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 REQUIREMENTS

Class C: Competition Specific — Manufacturing/Construction Khaki Attire

- Official SkillsUSA khaki short-sleeve work shirt
- Khaki pants
- Black, brown or tan leather work shoes

Note: Safety glasses must have 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 1-888-501-2183.

Note: Competitors must wear their official competition clothing to the TeamWorks Orientation meeting.

SAFETY REQUIREMENT

Both the instructor and the competitors certify by agreeing to enter this competition that the competitors 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.

Competitors 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 the use of all provided equipment and materials. Competitors 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, power tools and hand tools. Competitors who wish to use their own tool belt may do so after technical committee approval. If competitors do not bring their own tool belt, one will be provided.
2. Supplied by the competitor:
All competitors must create a one-page resume. See “Resume Requirement” below for guidelines.

RESUME REQUIREMENT

Competitors must create a one-page resume to submit online. SkillsUSA national competitors should submit their resume by June 1. The link for resume submission will be published on <http://updates.skillsusa.org> on May 1. Failure to submit a resume will result in a 10-point penalty.

Your resume must be saved as a PDF file type using file name format of “Last Name_First Name.” For example, “Amanda Smith” would save her resume as **Smith_Amanda**. If you need assistance with saving your file as a PDF, visit [the Adobe website](http://the.adobe.com) for more information.

Note: Check the Competition Guidelines and/or the updates page on the SkillsUSA website at <http://updates.skillsusa.org>.

PROHIBITED DEVICES

Cell phones or other electronic devices not approved by a competition’s national technical committee are **NOT** allowed in the competition area. Please follow the guidelines in each technical standard for approved exceptions. Technical committee members may also approve exceptions onsite during the SkillsUSA Championships if deemed appropriate.

Penalties for Prohibited Devices

If a competitor’s electronic device makes noise or if the competitor is seen using it at any time

during the competition, an official report will be documented for review by the SkillsUSA Championships director. If confirmed that the competitor used the device in a manner which compromised the integrity of the competition, the competitor's scores may be canceled.

SCOPE OF THE COMPETITION

The competition is designed to assess a team's ability to show leadership, STEM skills and perform tasks, as a team, identified by the TeamWorks Technical Committee, which includes: Broan-NuTone, Allied Building, Bosch Power Tools, Train2Build, National Roofing Contractors Association, and independent trade experts.

KNOWLEDGE PERFORMANCE

The competition includes a written project timeline developed by team members for the purpose of assessing the team's knowledge of the building trades and their approach in completing the assigned project in the time provided.

The competition will also include a written knowledge test of 50 multiple-choice questions assessing knowledge of the building trades taken online. Competitors will complete the exam and an average score will be created based on individual results. Competitors are also required to take the SkillsUSA professional development test.

SKILL PERFORMANCE

The competition includes a team project assessing the ability to analyze a project drawing, complete a project timeline, professionally present the team project, and perform skills in residential carpentry, roofing, plumbing, electrical and masonry to complete the project as a team.

COMPETITION GUIDELINES

1. Each team will be given the project drawing during the TeamWorks orientation day. Each team will be required to complete a project timeline and submit to the judges during their presentation. Presentations will be conducted on the TeamWorks orientation day. This will allow each team a minimum of 30 minutes to prepare for their presentation.
2. Each team will conduct a seven to 10-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. Overall scoring will be based on meeting the project timeline, safety, cleanliness of the job site, adherence to the project plan, completion of the project and quality of workmanship.

STANDARDS AND COMPETENCIES

TW 1.0 — Present a Project Timeline after analyzing the project drawing

- 1.1. Analyze the project drawing
 - 1.1.1. Interpret and understand 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. A material list will be provided by the TeamWorks Technical Committee during the TeamWorks orientation day. The TeamWorks Technical Committee will supply ALL materials required to complete the project build. Teams will be responsible to pick up certain materials from designated areas on the competition floor during the competition. Teams taking more materials than listed on the material list(s) will be subjected to penalties of loss of points and possibly elimination from the competition.
- 1.2. Write the project timeline and give a presentation
 - 1.2.1. Organize, prepare and present a project timeline
 - 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 seven to ten 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)
 - 1.2.5. Presentations will be done on the Orientation Day and presented to the TeamWorks Technical Committee. A presentation schedule will be provided during the TeamWorks orientation.

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 TeamWorks Technical Committee
- 2.4. Communicate effectively among team members to complete given project in time allowed
- 2.5. Complete assigned project within 13.5 hours; including 10 minute morning Break, 30 minute Lunch and 10 minute afternoon Break each day of the competition build

TW 3.0 — Perform carpentry and roofing 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 all carpentry, roofing, electrical, plumbing and masonry hand or power tools
 - 3.1.5. A complete list of allowed equipment, materials and tools will be provided at the Orientation. *No exceptions allowed.*
- 3.2. Perform framing and install subfloor 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 subfloor
- 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 insulation, drywall or other interior materials
- 3.2.10. Install exterior sheathing, insulation, cement, wood or vinyl siding and trim materials
- 3.2.11. Install roof sheathing, shingles or other roofing materials

TW 4.0 — Perform masonry skills by laying and installing a brick/block wall

- 4.1. Estimate and use the materials 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 all carpentry, roofing, electrical, plumbing and masonry hand or power tools
 - 4.1.5. A complete list of allowed equipment, materials and tools will be provided at the Orientation. *No exceptions allowed.*
 - 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 all carpentry, roofing, electrical, plumbing and masonry hand or power tools
- 5.1.6. A complete list of allowed equipment, materials and tools will be provided at the Orientation. *No exceptions allowed.*
- 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 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
 - 5.3.7. Cut, ream and join PEX tubing to copper tubing by 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 all carpentry, electrical, plumbing and masonry hand or power tools
 - 6.1.8. A complete list of allowed equipment, materials and tools will be provided at the Orientation. *No exceptions allowed.*
- 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 electrical fixtures
- 7.5. Repair or replace a P-trap or other plumbing fixture
- 7.6. Build a brick/block composite wall
- 7.7. Complete exterior or interior carpentry finish work
- 7.8. Install shingles, insulation or other exterior residential materials
- 7.9. Install window(s)
- 7.10. Install door(s)
- 7.11. Install underlayment
- 7.12. Install floor coverings

TW 8.0 — 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 TeamWorks Technical Committee has identified that the following academic skills are embedded in this competition.

Math Skills

- Use fractions to solve practical problems.
- Use proportions and ratios to solve practical problems.
- 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.
- Construct three-dimensional models.
- Apply Pythagorean Theorem.
- Make comparisons, predictions and inferences using graphs and charts.
- Organize and describe data using matrices.
- 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 gasses.
- 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: <https://www.nctm.org/standards/>. Select “Standards & Positions” 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: www2.mcrel.org/compendium/.

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.