



3D VISUALIZATION AND ANIMATION



SkillsUSA Championships Technical Standards • 2022-23

PURPOSE

To evaluate each competitor'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. Each state may send one high school and one college/postsecondary team.

CLOTHING REQUIREMENTS

Class E: Competition Specific — Business Casual

- Official SkillsUSA white polo shirt
- Black dress slacks or black dress skirt (knee-length minimum)
- Black closed-toe dress shoes

Note: Wearing socks or hose is no longer required. If worn, socks must be black dress socks and hose must be either black or skin-tone and seamless/nonpattern.

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 competition orientation meeting.

EQUIPMENT AND MATERIALS

1. Supplied by the technical committee:
 - a. Workspace for two personal computers and two chairs
 - b. 110-volt power outlet
 - c. 64 GB USB3 drives to be available for competition practical submissions

2. Supplied by the competitors:
 - a. Two complete graphics workstations, including personal computers, monitors and input devices. Competitors may use any brand or type of personal computer from any source. Software must be preloaded and configured. Competitors should test the system carefully prior to the competition. Limited technical assistance will be available at setup and on competition 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 that recommended configurations are used whenever possible. For example, Epic's Unreal Engine hardware requirements can be found here: <https://docs.unrealengine.com/5.0/en-US/hardware-and-software-specifications-for-unreal-engine/>.

 - b. Competitors may bring the software suite of their choice. Software package(s) must be capable of producing both 2-D and 3-D assets and real-time renderings of the final animations.

Note: In the past on average, 2-3 teams per year (over 10% of competitors) failed because their renderings didn't work or were not done in time. However, the reasons industry is moving to real-time rendering are more than failure aversion. Learn more on the paradigm shift to real-time pipelines here: www.awn.com/animationworld/talking-real-time-animation-dneg-bron-and-chromosphere.

Find the full video of the referenced panel event ("Real-Time Animation: Unlocking Story and Style") here: www.youtube.com/watch?v=9JiMSoIDgYY.

Note: Real-time rendering software, self-paced learning content and instructional materials for the classroom are all available at no charge, including Unreal Engine, Unity3D, Blender and from other vendors. Proof of licensing for software programs installed on the competitors' computers must be provided to the technical committee at the competition setup.

- c. Two 6' multiple-outlet surge protectors

- d. Paper and art supplies for storyboard development to include at a minimum, colored pencils and two 11"x17" tablets. Other materials should include chalk, charcoal and/or regular pencils, etc. These supplies are subject to approval of the technical committee.

- e. Competitors may bring published reference books and software manuals. Reference materials may not take up more than $\frac{1}{2}$ cubic foot of space per team member (total of 1 cubic foot).
- f. 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](#) 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 defined by industry standards as set by the current technical standards within the industry. The competition is a two-person team event and tests technical knowledge, production skills, creative/artistic abilities and storyboarding.

KNOWLEDGE PERFORMANCE

The competition will include a written exam assessing technical knowledge, production skills and creative/artistic abilities.

SKILL PERFORMANCE

The competition 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 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.

COMPETITION 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 is only a means to that end. So, the storyboarding process will be used to judge competitors 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. Render three (3) still images from varied scenes and perspectives in 1080p resolution (1920x1080 pixels) and true color (24, or 32 per pixel). These images should clearly show superiority in modeling, texturing, lighting and composition. In addition, two high-resolution screen captures must be taken showing model wireframes. Images must be output to either: TIF(F), TGA, PNG or JPG and submitted to the judging station on the supplied USB drive at the completion of the practical competition.
3. Render animation at 1080p resolution (1920x1080) and medium color depth (16 bit) for playback at 30 frames per second (with a minimum length of 15-second/450 frames and a maximum of 30 seconds or 900 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 competition, the competitors 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 competition 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.

8. 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** — 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. **Real-Time Engine rendering/ preview** — digital artists need to understand the full context of how their artwork is used. Teams should be able to import their assets into a real-time engine, tweak textures, lighting, and UVW maps to generate previews or renderings of the artwork in context.
 - f. **UI/Controllers** — custom user interface (UI) elements and animation controllers are often required to maximize the utility of the digital art. Teams should be able to automate animation sequences and actions with simple, custom controllers.
 - g. **Originality** — creative techniques.
 - h. **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.
9. The setup, configuration and tear-down of all competitor-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 identified that this competition addresses the following academic skills:

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: 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: 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