3-D Visualization and Animation Blueprint

This Blueprint contains the subject matter content for the Career Essentials - Assessment.

Note: To fully prepare for the 3-D Visualization and Animation SkillsUSA Championships contest, refer to the current year’s SkillsUSA Championships Technical Standard, now included with your SkillsUSA Professional Membership. If you need help in accessing this benefit, contact the SkillsUSA Membership Office at 1-800-355-8422.

Standards and Competencies
Competencies are weighted throughout the assessment. The percent shown is the weight of the competency. There are 50 questions per assessment.

Concept & Design
- Identify pre-visualization and/or conceptual design techniques to tell a story
- Identify the importance of storyboards/animatic for an animated sequence
- Focus on the elements and the principles of design for a 3d animated short

Project Management
- Demonstrate proper object naming
- Demonstrate how to add objects in layers
- Demonstrate how to save files
- Demonstrate how to backup files
- Demonstrate how to set a project folder
- Demonstrate how to set undo levels
- Demonstrate how to group objects
- Create a selection set
- Understand how to work in a team

3D Modeling
- Edit splines/2D curves to create 3D models viewport shading modes
- Use Extrude, Loft and Revolve/Lathe commands to make a 3D geometry from 2D shapes
- Demonstrate knowledge of pivot points in creating 3D models from 2D shapes
- Demonstrate knowledge of how to set up units for scene creation
- Model from the world origin
- Use the Bend, Taper, Twist and Lattice functions to modify 3D geometry
- Utilize the Extrude command for polygonal modeling
- Utilize the Bridge command for polygonal modeling
- Maintain a good edge loop workflow whole modeling
- Weld and merge vertices and edges
- Demonstrate knowledge of beveling or chamfering edges
- Demonstrate knowledge of Quads vs Tris
- Demonstrate knowledge of mirroring geometry
- Demonstrate knowledge of smoothing geometry
- Demonstrate knowledge of transforms
Lighting your scene
- Utilize different lights types in the scene
- Demonstrate understanding of basic color theory
- Utilize three-point lighting
- Apply standard light theory
- Demonstrate ability to light only certain objects in your scene
- Apply light intensity to a scene
- Demonstrate understanding of light color
- Demonstrate understanding of shadows

Placing Cameras in your scene
- Demonstrate knowledge of camera angles-Close up, Extreme close up, Medium close-up, Establishing shot
- Demonstrate knowledge of the Rule of Thirds
- Demonstrate knowledge of focal length
- Demonstrate knowledge of safe Frames
- Utilize background images within camera placement
- Demonstrate knowledge of clip planes
- Demonstrate knowledge of depth of field

Texturing
- Demonstrate knowledge of the importance of mapping
- Utilize 2D and 3D procedural textures
- Utilize bitmaps as your textures
- Demonstrate the importance of alpha channels in maps
- Demonstrate knowledge of different shaders such as Blinn, Phong, and Anisotropic
- Demonstrate knowledge of transparency and opacity
- Utilize the specular feature
- Utilize the ambient feature
- Utilize the diffuse feature
- Utilize the reflections feature
- Utilize the raytrace feature

Animation
- Understand how to set keyframes with autokey and set key
- Demonstrate how to animate on a path
- Understand the importance of the Curve/Graph Editor for animation
- Understand the importance of the Dope Sheet in manipulating keyframes
- Demonstrate knowledge of Frames Per Second (fps)
- Demonstrate knowledge of object hierarchy with linking and parenting
- Utilize playback controls
- Demonstrate how to preview an animation
- Demonstrate how to copy and paste keyframes
- Understand the importance of Safe Frames in animation
- Utilize safe frames
- Demonstrate knowledge of animation principles and animation states
Rendering
- Render files into an .avi or a .mov format
- Correctly render still images
- Apply proper render resolution to files
- Utilize motion blur
- Utilize antialiasing

Effects
- Utilize the glow effect
- Utilize the fire effect
- Utilize the smoke effect
- Utilize the fog effect

Committee Identified Academic Skills
- The SkillsUSA national technical committee has identified that the following academic skills are embedded in the 3-D visualization and animation training program and assessment:

  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


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: 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 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.readwritethink.org/standards/index.html.