

# Plumbing

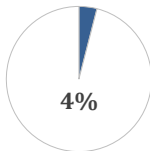
This Blueprint contains the subject matter content for the Career Essentials - Assessment.

**Note:** To fully prepare for the [Plumbing](#) 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 Customer Care Team at 844-875-4557 or [customercare@skillsusa.org](mailto:customercare@skillsusa.org)

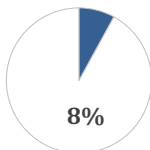
## Standards and Competencies

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

### Demonstrate foundational historical and career knowledge of the plumbing industry

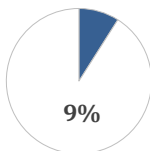


### Perform basic plumbing tasks using appropriate tools and equipment



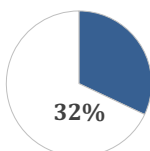
- Identify and use basic hand tools, power tools and equipment
- Measure lines to the nearest 1/16" with a ruler/tape measure
- Cut out an opening for various pipes and fixtures
- Demonstrate proper use of hangers and supports

### Read and interpret blueprints and perform measurements and calculations



- Read the architect's scale
- Read and develop an isometric sketch of a plumbing system
- Determine measurements from a manufacturer's specifications/rough-in drawing
- Properly lay-out rough-in locations
- Interpret riser diagrams

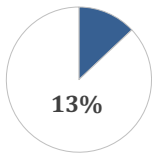
### Perform proper plumbing systems rough-in



- Properly install DWV systems
- Label a cross-section of a P-trap
- Identify the proper fittings required for a DWV system
- Calculate the slope required for drainage lines
- Install proper venting
- Install cleanouts
- Rough-in plumbing fixtures
- Perform DWV rough-in inspection test
- Properly install water supply systems

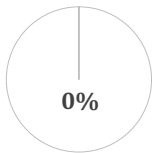
- Determine proper pipe sizing for hot and cold water systems
- Rough-in water supply lines for plumbing fixtures and appliances
- Perform approved water pressure tests
- Identify and perform the proper joining method for given piping material
- Join steel and CSS pipe and fittings
- Join cast iron pipe and fittings
- Join copper tube and fittings
- Join plastic pipe and fittings
- Identify types of fittings
- Identify size of fittings

### **Install plumbing fixtures, appliances and appurtenances**



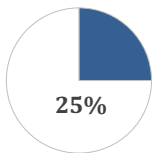
- Install fixture supply stops
- Install water supplies
- Install appropriate traps
- Install a faucet/valve
- Install a drain assembly
- Install the fixture level, plumb and secure
- Install appropriate relief valves

### **Perform plumbing systems service and repair**



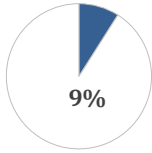
- Replace a section of damaged water supply pipe
- Repair damaged DWV pipe
- Repair a leaking faucet
- Repair a leaking shower valve
- Replace a water closet fill valve
- Replace a trap
- Clear obstructions from a drain
- Clear obstructions from a drain
- Clear obstructions from a water closet drain
- Clear obstructions from a main drain line

### **Perform plumbing tasks in a safe environment**



- Keep your work area clean and safe
- Understand and apply OSHA regulations that involve plumbing practices
- Use appropriate safety apparel for the task being performed
- Wear appropriate safety glasses, hard hats, work boots, respirators, ear protection, back and knee protection, etc., for a given situation
- Demonstrate safe piping installation practices
- Demonstrate correct procedure per piping material manufacturer instructions provided
- Demonstrate proper use of GFI in potentially hazardous conditions
- Demonstrate safe use of power and hand tools
- Maintain proper ventilation when working with chemicals and other potentially hazardous materials

## Employability



- Exhibit personal skills such as attendance, time management, individual responsibility and teamwork
- Practice good customer relations
- Fill out a job application completely and legibly
- Maintain professional conduct and appearance
- Demonstrate polite, attentive attitude
- Wear neat, clean clothing and be well groomed
- Respect the property of both your customer and employee

## COMMITTEE-IDENTIFIED ACADEMIC SKILLS

The SkillsUSA national technical committee has identified that the following academic skills are embedded in the Plumbing training program and assessment:

### 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: [www.nctm.org](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.

**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](http://www.ncte.org/standards)