



- 1.3 Identify and utilize equipment used in the plumbing trade
  - 1.3.1 Light and adjust the air-acetylene torch
  - 1.3.2 Set up and adjust the builder's level
  - 1.3.3 Set up and light a propane furnace
  - 1.3.4 Set up an inflatable rubber test plug in a pipe
  - 1.3.5 Set up a mechanical test plug in a pipe

**PLB 2.0 — Apply the knowledge and skills needed to perform basic services with blueprints, measurements and calculations in a plumbing service situation**

- 2.1 Read and interpret blueprint reading
  - 2.1.1 Read the architect's scale
  - 2.1.2 Develop an isometric sketch of a drainage system
  - 2.1.3 Determine measurements from a manufacturer's specifications
  - 2.1.4 Determine rough-in locations
  - 2.1.5 Establish grade lines for installing plumbing
  - 2.1.6 Convert weight (mass) measurements from English system to metric system

**PLB 3.0 — Implement the knowledge and skills needed to perform services with systems rough-in in a plumbing service situation**

- 3.1 Perform the required steps to service drainage systems
  - 3.1.1 Label a cross-section of a P-trap
  - 3.1.2 Identify fittings required on a drainage system
  - 3.1.3 Install bathtub waste overflow and trap
  - 3.1.4 Calculate the slope required for building sewer lines
  - 3.1.5 Install soil or waste back vents
  - 3.1.6 Install cleanouts on drains
  - 3.1.7 Rough-in waste lines and vents for built-in lavatories
  - 3.1.8 Rough-in waste lines and vents for bathtubs
  - 3.1.9 Secure horizontal and vertical lines of pipe to wood, metal and masonry surfaces
- 3.2 Perform the required steps to service water systems
  - 3.2.1 Make an isometric drawing of a hot and cold water system for a two-story house
  - 3.2.2 Determine pipe sizes for a hot and cold water system for a two-story house

- 3.2.3 Rough-in water supply lines for bathtubs
- 3.2.4 Rough-in water supply lines for water closets
- 3.2.5 Rough-in water supply lines for water heaters
- 3.2.6 Conduct water pressure tests on water supply systems
- 3.3 Perform the required steps to service joining pipes
  - 3.3.1 Cut, ream, thread and join steel pipe
  - 3.3.2 Measure, cut and join cast iron pipe to a cast-iron fitting using the caulking method
  - 3.3.3 Join cast iron pipe to a cast iron fitting using a no-hub joint
  - 3.3.4 Join cast iron pipe to a cast iron fitting using a compression joint
  - 3.3.5 Cut, ream and join copper tubing using the sweat method
  - 3.3.6 Cut, ream and join copper tubing using a compression joint
  - 3.3.7 Cut, ream and join copper tubing using a flare joint
  - 3.3.8 Join cast iron pipe to a P.V.C. pipe using a no-hub joint
  - 3.3.9 Join cast iron pipe to a P.V.C. pipe using a P.V.C. adapter
  - 3.3.10 Join P.V.C pipe to P.V.C. fittings
- 3.4 Perform the required steps to service pipe and pipe fittings
  - 3.4.1 Read fitting sizes
  - 3.4.2 Identify fittings from a sketch of a piping system
  - 3.4.3 Construct a materials take-off list from an isometric drawing

**PLB 4.0 — Implement the knowledge and skills needed to perform services with residential systems in a plumbing service situation**

- 4.1 Compute the cost for plumbing supplies
- 4.2 Perform leak tests on various piping systems

**PLB 5.0 — Implement the skills and knowledge needed to perform fixture and appliance installation in a plumbing service situation**

- 5.1 Demonstrate the skills needed to install water valves and faucets
  - 5.1.1 Install a kitchen sink faucet
  - 5.1.2 Install a dual control lavatory faucet with pop-out drain plug
  - 5.1.3 Disassemble and reassemble a single kitchen sink faucet
- 5.2 Demonstrate the skills needed to install drainage connection

- 5.2.1 Install a cast iron water closet flange
- 5.2.2 Install a plastic water closet flange
- 5.2.3 Install a lavatory trap
- 5.2.4 Install a kitchen sink trap
- 5.3 Demonstrate the skills needed to install fixtures and appliances
  - 5.3.1 Install a water closet (floor mount)
  - 5.3.2 Install a lavatory (wall hung type)
  - 5.3.3 Install a bathtub
  - 5.3.4 Install an electric water heater
  - 5.3.5 Install a dishwasher
  - 5.3.6 Install a garbage disposal unit
  - 5.3.7 Install a gas water heater

**PLB 6.0 — Apply the knowledge and skills needed to perform system maintenance and repair in a plumbing service situation**

- 6.1 Perform the skills needed to repair and service water systems
  - 6.1.1 Replace a section of galvanized water supply line
  - 6.1.2 Thaw a frozen pipe with a plumber's torch
  - 6.1.3 Repair a leaking water faucet or valve
  - 6.1.4 Repair a leaking shower valve
  - 6.1.5 Repair a ball cock on a water closet
  - 6.1.6 Insulate water lines
- 6.2 Perform maintenance and repair to drainage systems
  - 6.2.1 Replace a lavatory trap
  - 6.2.2 Clear obstructions from a lavatory drain
  - 6.2.3 Clear obstructions from a water closet drain
  - 6.2.4 Clear obstructions from a main drain line

**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.  
 To view high school standards, visit:  
[standards.nctm.org/document/chapter7/index.htm](http://standards.nctm.org/document/chapter7/index.htm)  
 Select “Standards” from menu.

**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:  
[www.mcrel.org/standards-benchmarks/](http://www.mcrel.org/standards-benchmarks/).

**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.readwritethink.org/standards/index.html](http://www.readwritethink.org/standards/index.html).

**CONTEST SCORECARD**

<b>Items Evaluated</b>	<b>Possible Points</b>
Accuracy Laundry Tray .....	24
Accuracy WC Stubout .....	60
Accuracy Lav. Stubout.....	90
Accuracy Lav. Ht. ....	60
Accuracy Vent Tee.....	60
Accuracy Trans Ht.....	40
Accuracy Cl. ....	60
Accuracy PVC Grade.....	100
Neatness Copper.....	200
Neatness PVC.....	80
Safety Glasses/Work .....	10
Oral Interview .....	36
Tool Box Tools .....	80
Knowledge Test .....	100
	<b>Sub Total            1000</b>
	<b>Résumé Penalty    _____</b>
	<b>Clothing Penalty    _____</b>
	<b>Extra Material Penalty _____</b>
	<b>TOTAL                    _____</b>