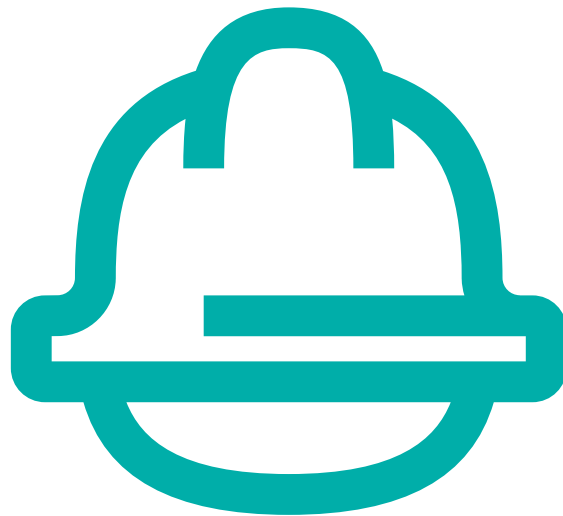




**NOCTI**  
State Customized  
Credential Blueprint



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# **Plumbing Technology/Plumber (PA)**

Code: 8117 / Version: 01  
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## General Assessment Information

### Blueprint Contents

General Assessment Information	Sample Written Items
Written Assessment Information	Performance Assessment Information
Specific Competencies Covered in the Test	Sample Performance Job

**Test Type:** The Plumbing Technology/Plumber PA assessment was developed based on a Pennsylvania statewide competency task list and contains a multiple-choice and performance component. This assessment is meant to measure technical skills at the occupational level and includes items which gauge factual and theoretical knowledge.

**Revision Team:** The assessment content is based on input from Pennsylvania educators who teach in approved career and technical education programs.



46.0503- Plumbing Technology/Plumber



Career Cluster- Architecture & Construction

## Written Assessment

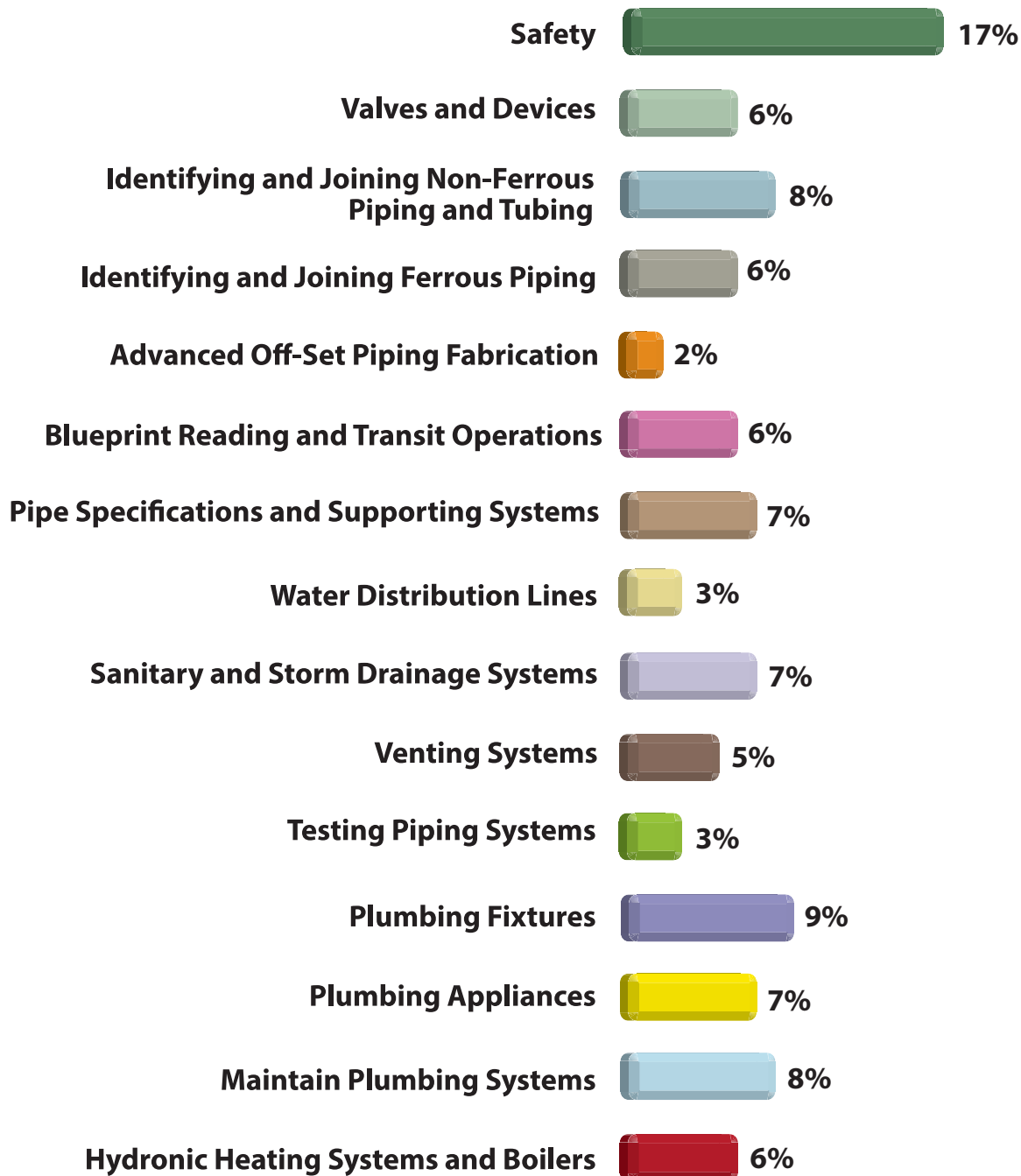
NOCTI written assessments consist of questions to measure an individual's factual theoretical knowledge.

**Administration Time:** 3 hours

**Number of Questions:** 200

**Number of Sessions:** This assessment may be administered in one, two, or three sessions.

### Areas Covered



## Specific Standards and Competencies Included in this Assessment

### Safety

- Follow rules for fire safety
- Follow rules for housekeeping safety
- Follow shop rules
- Follow rules for material handling safety
- Follow rules for eye protection
- Follow rules for hearing protection
- Follow rules for respiratory protection
- Follow rules for hand tool safety
- Follow rules for power equipment safety
- Follow rules for portable electric hand tool safety
- Follow rules for MSDS safety
- Follow safety rules as they relate to ECP (Exposure to Control Procedures: bloodborne pathogens, etc.)
- Follow OSHA (Occupational Safety and Health Act) regulations
- Discuss provisions, inspections, and citations of OSHA
- Identify the different types of ladders and scaffolds used on a worksite
- Describe how to use ladders and scaffolding safely
- Properly set up, inspect, and use stepladders, extension ladders, and scaffolding
- Identify basic hand tools, state their uses, and use them in the trade
- Identify power tools, safety, and use and maintenance



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## Specific Standards and Competencies (continued)

### Valves and Devices

- Identify usage and installation of backflow prevention devices
- Identify types of valves that start and stop flow
- Identify types of valves that regulate flow
- Identify valves that relieve pressure
- Identify valves that regulate the direction of flow
- Explain the factors that influence valve selection
- Disassemble and assemble various types of valves (such as grade valve, glove valve, and flush valve)

### Identifying and Joining Non-Ferrous Piping and Tubing

- Demonstrate skills in joining, cutting, and bending various types of copper tubing: solder, compression, flare, swage, and press fit
- Prepare and braze a joint
- Perform tests on all soldered and brazed joints
- Measure, cut, and assemble PVC, CPVC, and ABS
- Measure, cut, and assemble PEX and PE
- Measure, cut, and assemble HDPE
- Fabricate a crimp joint connection
- Fabricate a tubing type joint



### Identifying and Joining Ferrous Piping

- Thread steel pipe with an adjustable die, power threading machine, non-adjustable die
- Measure, cut, ream, thread, assemble, and test various types of steel piping
- Identify and use cast iron tools
- Measure and cut cast iron soil pipe with a chain cutter
- Assemble cast iron to various pipe types with no hub, Fernco, rubber gasket joints
- Construct various types and sizes of steel pipe projects using end to end, end to center, center to throat, and overall improvements

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## Specific Standards and Competencies (continued)

### **Advanced Off-Set Piping Fabrication**

- Calculate simple pipe offsets

### **Blueprint Reading and Transit Operations**

- Identify types of drawings
- Identify the various lines used on drawings
- Interpret specifications and dimensions
- Identify the three basic views of a drawing
- Create isometric drawings
- Identify piping systems according to color-coding
- Identify and set up a level and/or transit
- Set up the level and/or transit; shoot elevations and grade pipe

### **Pipe Specifications and Supporting Systems**

- Identify pipe and components according to specifications
- Demonstrate knowledge of pipefitting standards, codes, and specifications
- Read and interpret pipefitting specifications
- Identify and explain the types of piping systems
- Identify piping systems according to color-coding
- Explain the effects and corrective measures for thermal expansion in piping systems
- Explain types and applications of pipe insulation
- Identify various metals and specification process used in the plumbing and heating industry
- Use hangers to secure horizontal and vertical pipe lines to masonry, metal, and wood

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## Specific Standards and Competencies (continued)

### Water Distribution Lines

- Perform water pressure tests on water supply systems
- Rough-in water supply lines for bathtubs, wall mounted urinals, water closets, clothes washer, kitchen sink, lavatories
- Demonstrate knowledge of whirlpool tub installation
- Demonstrate knowledge of bidet installation

### Sanitary and Storm Drainage Systems

- Layout and establish grade/slope for drain lines
- Install backflow prevention valves
- Water or air test a drain
- Install air admittance valves
- Rough-in water lines and vents for bathtubs, lavatories, dishwashers, water closets, showers, bidets and urinals
- Install a grease interception trap in waste lines
- Install garbage disposal units
- Install sump pumps
- Install a sewage pump



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## Specific Standards and Competencies (continued)

### Venting Systems

- Install soil or waste back vents
- Install soil or waste loop vents
- Install vent terminals (roof-flashing)

### Testing Piping Systems

- Perform head pressure tests
- Perform hydrostatic tests
- Perform leak tests on gas supply lines

### Plumbing Fixtures

- Install tank-type water closets
- Install bathtubs
- Install wall mounted lavatories
- Install wall mounted urinals
- Install kitchen sink
- Install prefabricated shower base drains
- Install built-in lavatories
- Install flush valve-type water closets
- Install traps and cleanouts

### Plumbing Appliances

- Install dishwashers
- Install electric water heaters
- Install gas water heaters
- Install clothes washing machines
- Install oil-fired water heater
- Install water re-circulating pumps
- Install garbage disposal units
- Install sump pumps
- Install a sewage pump

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## Specific Standards and Competencies (continued)

### Maintain Plumbing Systems

- Clear obstructions from lavatory drains
- Remove obstructions from main drain lines
- Remove obstructions from water closets
- Repair/replace lavatory trap drains and leaking water faucets or valves
- Repair leaking shower valves
- Repair water flush valves on water closets
- Replace a section of galvanized water supply line
- Explain how to thaw frozen pipes
- Disassemble "P" traps to clear lavatory drains
- Repair/replace any type of water closets

### Hydronic Heating Systems and Boilers

- Identify and explain various boiler fittings and accessories, including thermo expansion devices
- Discuss the various types of boilers
- Identify and explain various boiler, steam, and hot water fittings, and piping
- Identify and explain feed water accessories
- Identify and explain steam and hot water accessories
- Explain the operation of a boiler and its various controls
- Explain the operation of the draft controls
- Identify and explain boiler safety
- Describe and design a hydronic heating system
- Describe and design a primary and secondary loop
- Explain operation of 3-way or 4-way mixing valve, injection pump, tempering valve accessories/controls of system

## Sample Questions

**What is the correct practice before using a chisel with a mushroom head?**

- A. peen with a hammer
- B. grind off and trim
- C. use as is
- D. pry off with a wrench

**When joining CPVC tubing, the plumber should use**

- A. both primer and cement
- B. Teflon® and pipe dope
- C. CPVC adaptor
- D. CPVC cement

**When setting up to survey using a tripod and builder's level, the plumber should first**

- A. take a reading on the rod
- B. establish a benchmark by using the transit
- C. select the right target
- D. level the instrument

**The plumber should place the branch vent**

- A. at an equal height as the trap
- B. 2 inches below the flood level rim
- C. 6 inches above the flood rim level
- D. at the same height as the crown weir

**The minimum size trap for an automatic washing machine box is**

- A. 1-1/2 inches
- B. 2 inches
- C. 2-1/2 inches
- D. 3 inches

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### Sample Questions (continued)

**When two different water supplies are connected and one of the supplies is of a questionable nature, the plumber must install a**

- A. pressure and temperature device
- B. gate valve
- C. globe valve
- D. backflow prevention device

**A Ridgid 65R universal threader can thread**

- A. 1/2 to 3/4 inch
- B. 1/4 to 3/8 inch
- C. 1 to 2 inches
- D. 2-1/2 to 4 inches

**What is the constant multiplier when calculating the offset using two 45-degree fittings?**

- A. 0.43
- B. 1.414
- C. 3.142
- D. 8.34

**The most common use for threaded pipe in a residence is piping.**

- A. water
- B. gas
- C. drainage
- D. sewer

**The pressure in pounds per square inch gauge (psig) at the base of a column of water 60 feet high is**

- A. 26 psig
- B. 30 psig
- C. 40 psig
- D. 60 psig

## Performance Assessment

NOCTI performance assessments allow individuals to demonstrate their acquired skills by completing actual jobs using the tools, materials, machines, and equipment related to the technical area.

**Administration Time:** 3 hours

**Number of Jobs:** 2

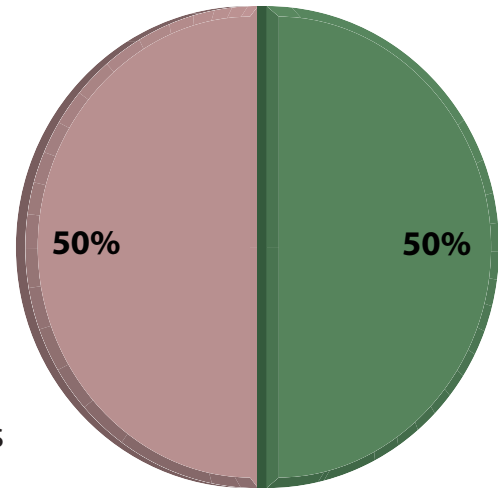
### Areas Covered:

#### **50% Install and Prepare to Leak Test a DWV System**

Participants will select and handle tools and materials, rough-in lavatories, use correct techniques to join pipes and fittings, use correct installation techniques, choose accurate fittings, leave workstation in good condition, adhere to local plumbing code, and perform a leak test.

#### **50% Install and Prepare to Leak Test a Water Supply System**

Participants will select and handle tools and equipment, rough-in lavatories, use correct techniques to join pipes and fittings, use correct installation techniques, choose accurate fittings, leave workstation in good condition, adhere to local plumbing code, and perform a leak test.



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## Sample Job

## Install and Pressure Test a DWV System

**Maximum Time:** 1 hour and 30 minutes

**Participant Activity:** Study the rough-in sketch and drawings provided for two lavatories; measure and cut the pipe to the correct size, selecting appropriate tools; assembly all connections per rough-in dimensions, install appropriate nail plates, and prepare DWV system for leak testing.

