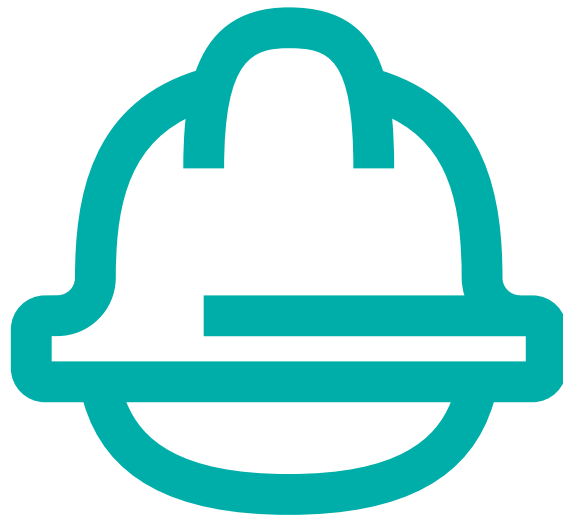




NOCTI
State Customized
Credential Blueprint



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



2- Architecture & Construction



In the lower division baccalaureate/associate degree category, 3 semester hours in Plumbing or General Technology (5/12). NOTE: An additional 1-2 credits may be awarded based on successful completion of the Performance Component when given in conjunction with the written proficiency examination.

Written Assessment

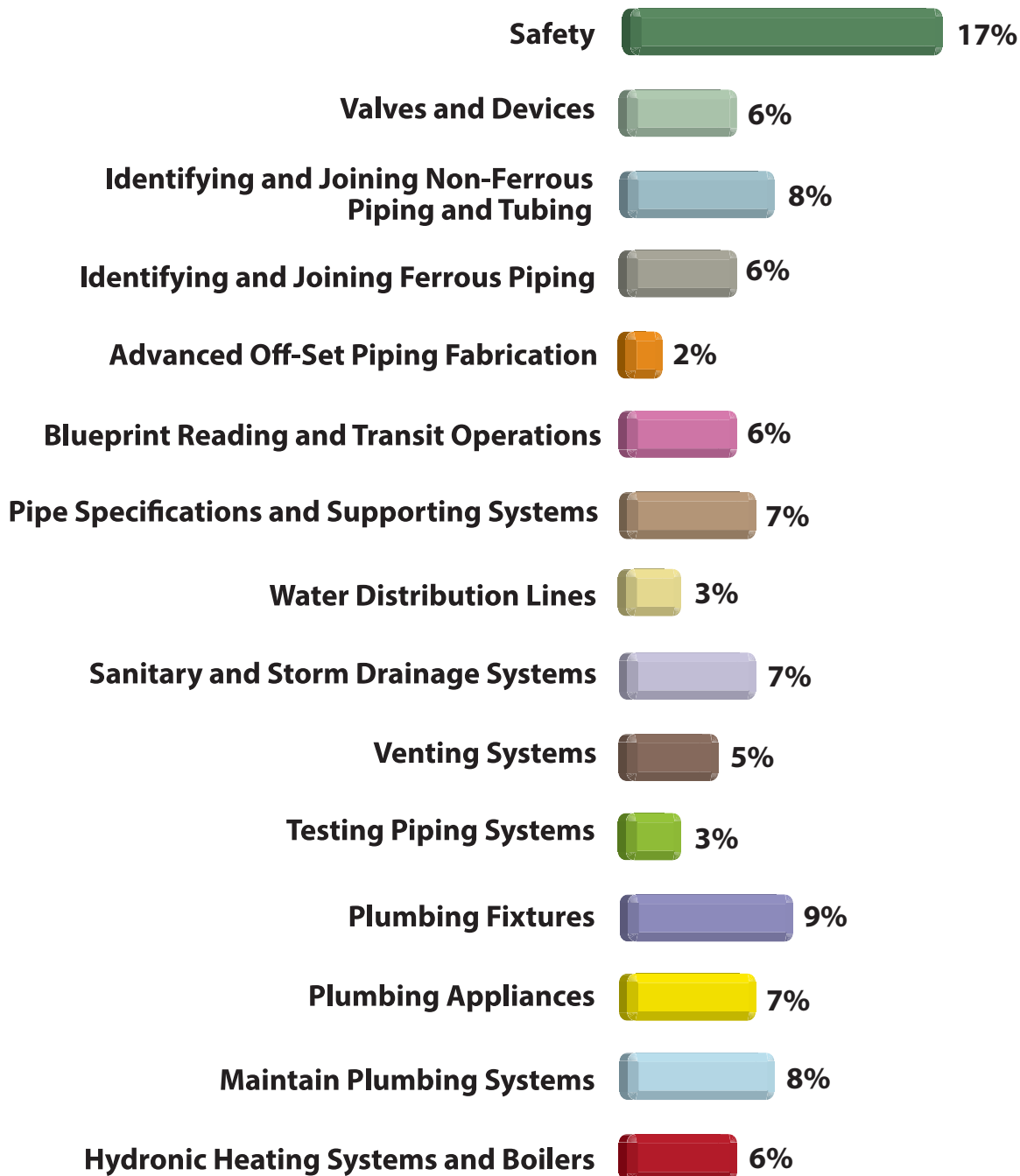
NOCTI written assessments consist of questions to measure an individual’s factual theoretical knowledge.

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

(Continued on the following page)

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

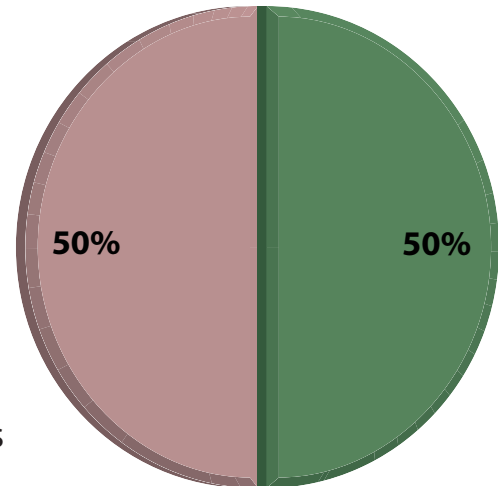
Areas Covered:

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.

