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# **PHCC Educational Foundation Plumbing Year 3**

## General Assessment Information

### Blueprint Contents

General Assessment Information  
Written Assessment Information

Specific Competencies Covered in the Test  
Sample Written Items

**Test Type:** This PHCC Educational Foundation certification assessment is a customized assessment for the Plumbing-Heating-Cooling Contractors (PHCC). This assessment measures technical skills at the occupational level and includes items which gauge factual and theoretical knowledge. This assessment offers a written component and can be used at the secondary and post-secondary levels. This assessment can be delivered in an online or paper/pencil format.

**Revision Team:** The assessment content is based on input from plumbing contractors, inspectors, and educators from the states of Maryland, New Jersey, Nevada, Ohio, Tennessee, and Virginia.



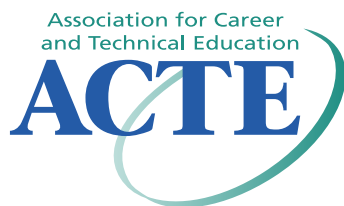
46.0503 – Plumbing  
Technology/Plumber



Career Cluster 2 - Architecture  
and Construction



47-2152.02 – Plumbers



The Association for Career and Technical Education (ACTE), the leading professional organization for career and technical educators, commends all students who participate in career and technical education programs and choose to validate their educational attainment through rigorous technical assessments. In taking this assessment you demonstrate to your school, your parents and guardians, your future employers and yourself that you understand the concepts and knowledge needed to succeed in the workplace. Good Luck!

## Written Assessment

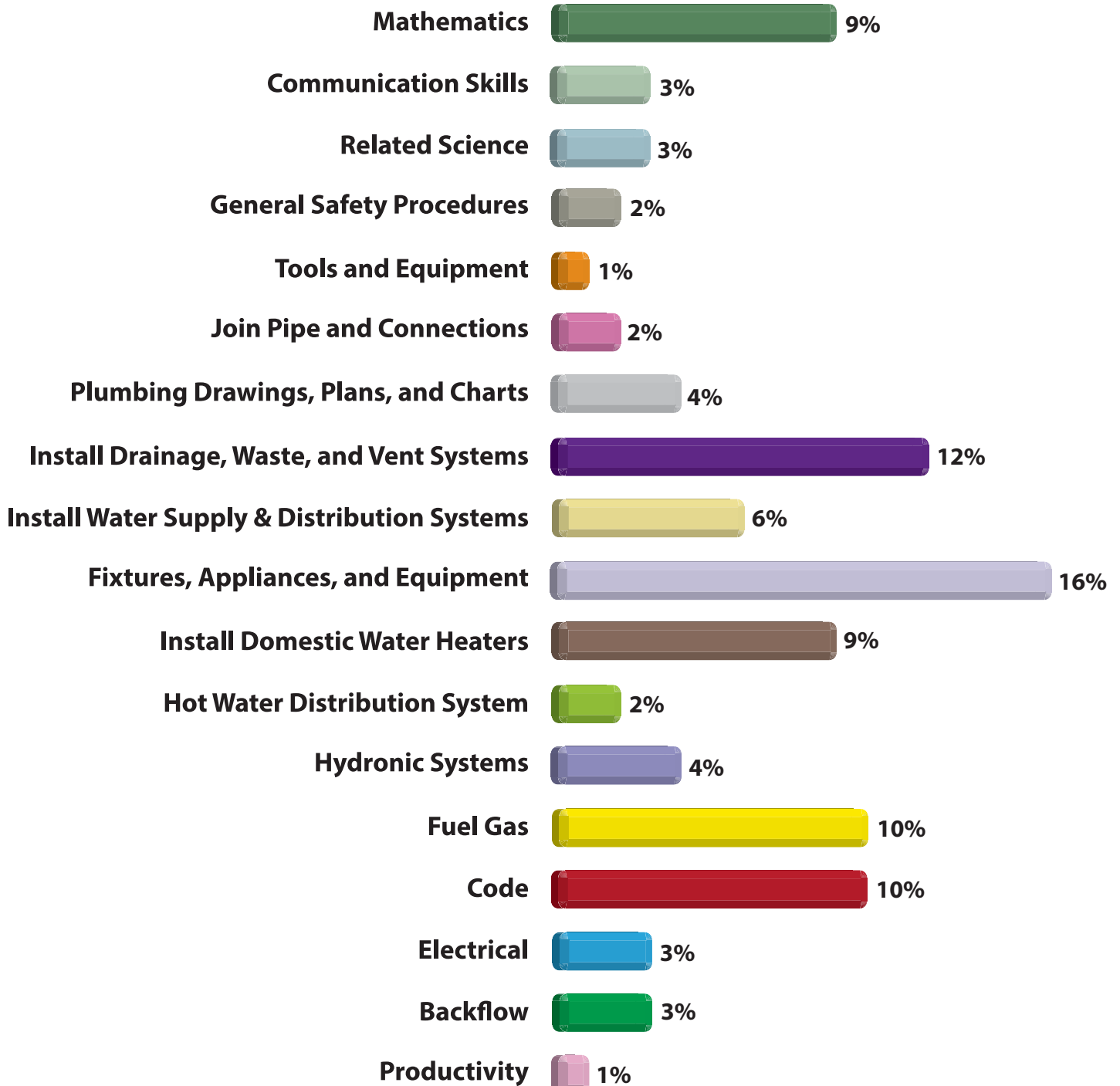
This written assessment consists of questions to measure an individual's factual theoretical knowledge.

**Administration Time:** 3 hours

**Number of Questions:** 187

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

### Areas Covered



## Specific Competencies and Skills Tested in this Assessment

### Mathematics

- Measure and calculate linear distances, circles, angles, and radii
- Identify common geometric shapes and compute volumes using basic geometry
- Measure water weight, volume, and pressure
- Calculate end-to-end and center-to-center measurements
- Solve multi-step problems using basic applied formulas
- Calculate grade, percent grade, drop, and run of piping

### Communication Skills

- Communicate with other trades and professionals
- Written communication
- Display professionalism

### Related Science

- Define goals of plumbing, water sources and waste disposal
- Understand and apply basic principles of heat transfer and combustion

### General Safety Procedures

- Understand and apply OSHA regulations that cover plumbing practices
- Apply PPE including safety glasses, electrical protection, shoes, hardhat, and other practices

### Tools and Equipment

- Level, transit, elevations, and grade

### Join Pipe and Connections

- Describe and apply proper procedures for measuring, fabricating, and testing flexible gas pipe
- Explain factors that affect the selection of proper fittings or valves for a specific installation

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## **Specific Competencies and Skills (continued)**

### **Plumbing Drawings, Plans and Charts**

- Interpret symbols, dimensions and placement of plumbing fixtures and piping on isometric drawing
- Sketch plan view and isometric drawings using standard plumbing fixture and piping symbols
- Read plan view and isometric drawings using standard plumbing fixture and piping symbols

### **Install Drainage, Waste, and Vent Systems**

- Layout and size the drainage systems
- Excavation and grade
- Install building drains
- Change of directions/fitting uses
- Soil and waste stacks, vent stacks, and stack vents
- Fixture venting
- Traps, cleanouts, and interceptors
- Floor drains
- Fixture supports
- Testing drainage systems
- Building sewer and public tie-ins (at curb)
- Storm and secondary drainage systems
- Foundation drains
- Diagnosing and repairing drainage and vent systems

### **Install Water Supply and Distribution Systems**

- Sizing the water supply systems
- Roughing-in for water supply and distribution systems
- Cross connections
- Water treatments
- Water and hydrostatic pressure testing
- Diagnosing and repairing water distribution systems

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## Specific Competencies and Skills (continued)

### **Fixtures, Appliances, and Equipment**

- Fixture rough-in
- Faucets
- Tubs and showers
- Strainers and port openings or pop-ups
- Water closets, urinals, and bidets
- Dishwashers
- Laundry tubs
- Trap and faucet connections
- Ejector systems
- Sump pumps
- Handicapped-accessible fixtures
- Lavatories
- Institutional fixtures and systems
- Emergency showers and eye wash stations
- Commission fixture appliances and equipment
- Diagnosing and repairing fixtures and appliances

### **Install Domestic Water Heaters**

- Domestic water heater components and operation
- Gas water heaters
- Electric water heaters
- Oil water heaters
- Point-Of-Use water heaters
- Tankless water heaters and systems
- Solar water heaters
- Domestic hot water boilers
- Indirect fired water heaters

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## Specific Competencies and Skills (continued)

### Hot Water Distribution Systems

- Mixing and tempering valves
- Diagnosing and repairing domestic water heating systems

### Hydronic Systems

- Principles of hydronic systems
- Install hydronic heating systems
- Hydronic heating systems startup
- Geothermal piping systems
- Hydronic cooling systems

### Fuel Gas

- Demonstrate knowledge of fuel gas code, materials and types of fuel gases
- Define fuel gas pipe sizing
- Define fuel gas piping, fittings, and connections
- Fuel gas piping, corrosion, and corrosion protection
- Diagnosing and repairing fuel gas systems



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## Specific Competencies and Skills (continued)

### Code

- Administration and basic principles, plumbing code definitions and general regulations
- Materials
- Joints and connections, fittings and appurtenances
- Plumbing fixtures and minimum fixture requirements
- Hangers and supports, indirect waste piping and special waste
- Water supply and distribution
- DWV and storm drain systems
- Tests and maintenance
- Individual sewage disposal systems
- Potable water supply systems

### Electrical

- Demonstrate knowledge of basic electricity, electric current and electric motors
- Demonstrate knowledge of electric circuits, circuit protection, and electrical safety
- Electric circuit troubleshooting

### Backflow

- Define backflow
- Describe mechanical equipment for cross-connection control

### Productivity

- Identify factors that enhance productivity





## Sample Questions

**The weight of a cubic foot of water is**

- A. 6.24 pounds
- B. 8.33 pounds
- C. 27 pounds
- D. 62.4 pounds

**If it is difficult working with another co-worker, as a professional the plumber should**

- A. avoid talking to the other co-worker as much as possible
- B. ask for reassignment to another project or threaten to quit
- C. attempt to work out the differences with the co-worker
- D. ask that the co-worker be reassigned or threaten to quit

**The amount of heat energy required to raise one gallon of water one degree Fahrenheit is**

- A. 1 BTU
- B. 8.3 BTU
- C. 16 BTU
- D. 144 BTU

**A guardrail system must withstand \_\_\_\_\_ of force.**

- A. 150 pounds
- B. 200 pounds
- C. 350 pounds
- D. 500 pounds

**The purpose of a backwater valve on a drainline is to**

- A. prevent discharge to the ground
- B. prevent reverse flow into the piping
- C. reduce system pressure
- D. restrict system flow



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**Sample Questions (continued)**

**The \_\_\_\_\_ determines which fixtures should be used for installing the plan view.**

- A. journeyman plumber
- B. job specifications
- C. contracting plumber
- D. working drawings

**A type of fitting that has no make-up is a**

- A. galvanized fitting
- B. copper fitting
- C. hubless fitting
- D. cast iron bell and spigot

**How many installed pumps are in a duplex sewage pumping system?**

- A. 1
- B. 2
- C. 4
- D. 5

**A gas cock is a \_\_\_\_\_ valve.**

- A. ball
- B. globe
- C. relief
- D. check

**Which of the following locations requires a cleanout?**

- A. base of stack
- B. beginning of branch
- C. end of battery
- D. intersection of branches

