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## **HBI Pre-Apprenticeship Certificate Training (PACT) Plumbing**

## General Assessment Information

### Blueprint Contents

General Assessment Information  
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**Test Type:** This certification assessment is a customized assessment for the Home Builders Institute. This assessment measures technical skills at the occupational level and includes items which gauge factual and theoretical knowledge. This assessment offers both a written and performance component and can be used at the secondary level and postsecondary level. This assessment can be delivered in an online or paper/pencil format.

**Revision Team:** The assessment content is based on input from secondary, post-secondary, and business/industry representatives from the state of Arizona, California, Indiana, Maryland, North Carolina, Pennsylvania, South Carolina, Tennessee, and Washington.



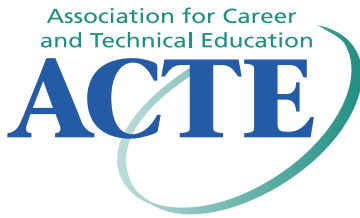
46.0503 – Plumbing Technology/Plumber



Career Cluster - 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!



The Home Builders Institute (HBI) trains skilled workers for the building industry. Through pre-apprenticeship training, certification programs and job placement services, HBI provides graduates with the skills and experience they need to build a career and change their lives. HBI assessments, in partnership with the National Association of Home Builders (NAHB), are based on national skills standards set by industry professionals and educators. Participants passing the assessments are eligible for certification through HBI/NAHB at the entry, semi-skilled, or skilled levels.

Selection of curricula and instructional materials chosen to support assessment achievement must be obtained from material that has been aligned to the Residential Construction National Skill Standards and approved by HBI. For a current listing, please go to <http://www.hbi.org/curriculum/>

Visit [www.hbi.org](http://www.hbi.org) for more information.

## Written Assessment

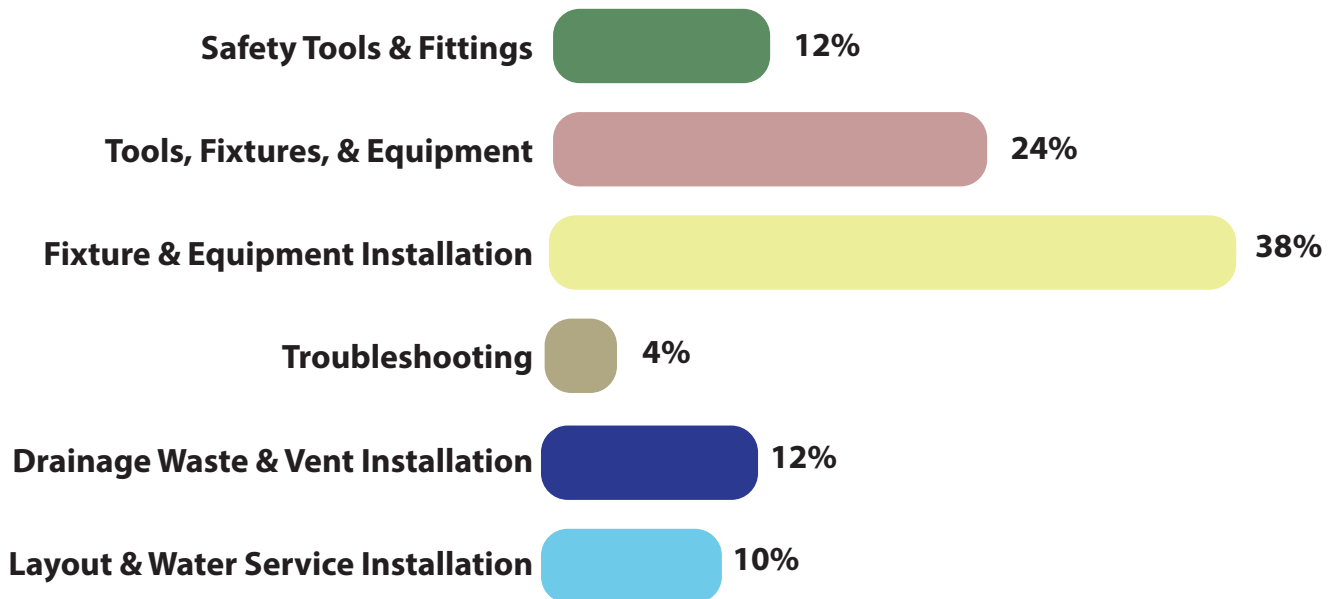
This written assessment consists of questions to measure an individual's factual theoretical knowledge.

**Administration Time:** 60 minutes

**Number of Questions:** 50

**Number of Sessions:** This assessment may be administered in one session.

### Areas Covered



## Specific Competencies and Skills Tested in this Assessment

### Safety Tools and Fittings

- Understand and apply OSHA regulations.
- Understand and apply proper safety procedures when working with pressurized systems, electrical energy
- Apply OSHA ladder and scaffold safety and maintenance procedures.
- Properly identify and select piping, valves, and fittings.
- Apply brazing and soldering safety procedures.

### Tools, Fixtures, and Equipment

- Describe and apply proper procedures for measuring.
- Understand and apply OSHA regulations.
- Identify common plumbing tools and equipment.
- Properly identify and select plumbing fixtures.
- Identify common valve types and their uses.
- Identify common plumbing tools and equipment.
- Explain the causes and prevention of backflow.
- Understand and apply principles of building drains.
- Describe the different types of water closets and bidets used in residential and commercial construction.
- Describe the purpose of expansion tanks.
- Identify common plumbing materials and fittings used for supply and DWV systems.

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## Specific Competencies and Skills (continued)

### Fixture and Equipment Installation

- Install water closets and bidets according to manufacturer specifications.
- Install handicapped accessible fixtures according to manufacturer specifications and codes.
- Understand and apply basic principles of BTU.
- Read plan view and isometric drawings using standard plumbing fixture and piping symbols.
- Install a water service according to plans and specifications.
- Describe and apply proper procedures for measuring and fabricating copper pipe.
- Cut, ream, and thread black iron or galvanized pipe using pipe cutter, ratchet threader, and reamer.
- Describe the proper trap and faucet connections commonly used in residential construction.
- Determine drainage system sizing using drainage fixture units.
- Understand and apply basic principles of expansion of water and effect on plumbing.
- Identify select, measure, and install the proper type of pipe and tubing.
- Describe the purposes of traps and cleanouts.
- Explain procedures for testing DWV systems using hydrostatic means.
- Cut and join PVC/CPVC using appropriate tools and methods.
- Describe the operation of vacuum breakers, back-flow preventers, and anti-siphon devices.
- Describe the benefits and methods of installing PEX tubing, fittings, use expanders, and insert fitting.
- Install handicapped accessible fixtures according to manufacturer specifications and codes.

### Troubleshooting

- Identify components of gas and electric water heaters.

### Drainage Waste and Vent Installation

- Understand and apply basic principles of drainage, waste, and vent systems.
- Secure horizontal and vertical lines of pipe to wood and metal surfaces.
- Identify piping materials used to fabricate stacks.
- Understand and apply principles of proper use of change of direction fittings.
- Install sewer and public tie-ins at proper grade with proper supports.

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## Specific Competencies and Skills (continued)

### **Layout and Water Service Installation**

- Read plan view and isometric drawings using standard plumbing fixture and piping symbols.
- Describe the different piping materials for water service.
- Comply with local codes.
- Explain the purpose of check valves, gate valves, and unions in connection with sump pumps and ejector systems.

## Sample Questions

Which of these is a characteristic of a male adapter?

- A. Internal threads
- B. External threads
- C. A thread cover
- D. A slip-joint and washer

Which of these is used to connect the tailpiece to a kitchen sink?

- A. Lock nut
- B. Check valve
- C. Basket strainer
- D. Trap adapter

Which of these is required to install non-insulated copper pipe?

- A. A copper plated hanger
- B. A rubber coated hanger
- C. A PVC clip strap
- D. A black steel clamp

Which of these is the lowest horizontal portion of the drainage system inside the building?

- A. The building drain
- B. The waste stack
- C. The stack vent
- D. The building sewer

Which of these is most likely to cause a leak in a toilet tank?

- A. Loose closet bolts
- B. The wax ring
- C. Close-couple gasket
- D. Improper vent