Acknowledgments

The components of this instructional framework were developed by the following curriculum development panelists:

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Course Description

Suggested Grade Level: 10 or 11

Students are introduced to the plumbing profession and practice mathematical calculations required for plumbing systems. They learn to safely assemble, install, and repair pipes and fittings, and are introduced to installing fixtures of heating, water, and drainage systems, according to specification and plumbing codes.

As noted in Superintendent's Memo #058-17 (2-28-2017), this Career and Technical Education (CTE) course must maintain a maximum pupil-to-teacher ratio of 20 students to one teacher, due to safety regulations. The 2016-2018 biennial budget waiver of the teacher-to-pupil ratio staffing requirement does not apply.
### Task Essentials Table

- Tasks/competencies designated by plus icons (⊕) in the left-hand column(s) are essential.
- Tasks/competencies designated by empty-circle icons (⊙) are optional.
- Tasks/competencies designated by minus icons (⊖) are omitted.
- Tasks marked with an asterisk (*) are sensitive.

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<th>Task Number</th>
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<td>Comply with federal, state, and local safety legal requirements.</td>
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<td>Identify PPE (personal protective equipment) requirements.</td>
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<td>Identify the types of fires and the methods used to extinguish them.</td>
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<td>Inspect course-specific hand and power tools to visually identify defects.</td>
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<td>Demonstrate lifting and carrying techniques.</td>
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<td>Demonstrate safe scaffolding techniques.</td>
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<td>Report personal injuries and environmental and equipment safety violations to the appropriate authority.</td>
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<td>Earn the Construction Industry OSHA 10 card.</td>
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<td>Pass a safety exam for lab/site safety and the use of tools and equipment specific to the construction industry.</td>
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<td><strong>Focusing on the Plumbing Profession</strong></td>
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<td>⊕</td>
<td>Discuss the historical development of the plumbing trade.</td>
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<td>Describe the importance of plumbers in modern society.</td>
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<td>Explain the importance of code compliance to the profession.</td>
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<td>Discuss the role of teams in a plumbing trade.</td>
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<td>Develop a list of tools and safety equipment to be carried in work vehicle.</td>
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<td>Describe chemical risks associated with the plumbing occupation.</td>
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<td>Identify plumbing-related career and educational opportunities.</td>
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<td>Identify how green technology is incorporated into plumbing.</td>
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<td><strong>Applying Basic Mathematics to the Plumbing Profession</strong></td>
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<td>Measure pipe dimensions.</td>
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<td>Calculate fitting allowance.</td>
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<td>Calculate offsets using the Pythagorean Theorem.</td>
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<td>Calculate a 45-degree offset using the constant method.</td>
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<td>⊕</td>
<td>Perform mathematical calculations using feet and inches as the unit of measure, including addition, subtraction, and conversion (feet to inches, inches to feet).</td>
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<td>65</td>
<td>⊕</td>
<td>Convert decimals to fractions and fractions to decimals.</td>
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<td>66</td>
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<td>Convert metric measurements to standard measurements.</td>
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<td><strong>Reading Drawings for the Plumbing Profession</strong></td>
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<td>Identify fixtures depicted on a blueprint.</td>
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<td>Develop an overhead and an isometric drawing.</td>
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<td>Develop fitting/material lists based on drawings.</td>
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<td>Interpret the schedule on a blueprint.</td>
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<td>Interpret specifications on a blueprint.</td>
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<td>Describe how code requirements apply to certain drawings.</td>
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<td><strong>Working with Plastic Pipe and Fittings</strong></td>
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<td>Identify the types of plastic pipe.</td>
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<td>Identify the material properties, storage, and handling requirements of plastic pipe.</td>
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<td>Identify the types of fittings and valves used with plastic pipe.</td>
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<td>Identify the techniques used in hanging and supporting plastic pipe.</td>
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<td>Join plastic pipe.</td>
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<td>Identify the hazards and safety precautions associated with plastic pipe.</td>
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<td><strong>Working with Copper Tube and Fittings</strong></td>
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<td>Identify types of copper tube.</td>
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<td></td>
<td>Identify the material properties, storage, and handling requirements of copper tube.</td>
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<tr>
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<td>Identify the types of fittings and valves used with copper tube.</td>
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<td>Identify the techniques used in hanging and supporting copper tube.</td>
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<td>Join copper tube.</td>
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<td></td>
<td>Identify the hazards and safety precautions associated with copper tube.</td>
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<td><strong>Working with Cast-Iron Pipe and Fittings</strong></td>
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<td>Identify types of cast-iron pipe.</td>
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<td>Identify the material properties, storage, and handling requirements of cast-iron pipe.</td>
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<td>Identify the types of fittings and valves used with cast-iron pipe.</td>
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<td>Identify the techniques used in hanging and supporting cast-iron pipe.</td>
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<td>Join cast-iron pipe.</td>
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<td>Identify the hazards and safety precautions associated with cast-iron pipe.</td>
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<td><strong>Working with Steel Pipe and Fittings</strong></td>
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<td>Identify types of steel pipe.</td>
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<td>Identify the material properties, storage, and handling requirements of steel pipe.</td>
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<td>Identify the hazards and safety precautions associated with steel pipe.</td>
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<td>Cut and deburr copper tubing.</td>
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<td>Operate torches commonly used in the plumbing trade.</td>
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<td>Construct a copper tubing assembly using solder joints.</td>
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<td>Install press fittings.</td>
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<td><strong>Installing Drainage, Waste, and Vent (DWV) Systems</strong></td>
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<td>Identify the steps of roughing-in a DWV (drainage, waste, and vent) assembly of PVC/ABS, for the following: water closet, lavatory, bathtub, shower, kitchen or bar sink, washing machine, bidet, urinal, indirect waste.</td>
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<td>Explain how waste moves from a fixture through the drain system to the environment.</td>
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<td>104</td>
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<td>Identify the major components of a drainage system and their functions.</td>
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<td>Identify types of traps and their components.</td>
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<td>Identify significant code and health issues, violations, and consequences related to DWV systems.</td>
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<td>Exploring Rough-in of Water Distribution Components</td>
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<td>Describe the installation of a water distribution system of hard drawn copper, CPVC, and PEX.</td>
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<td>Describe air- and water-pressure tests.</td>
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<td>Identify the basic types of materials used in the manufacture of plumbing fixtures.</td>
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<td>Identify common types of sinks, lavatories, and faucets.</td>
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<td>Identify common bathtubs and showers.</td>
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<td>Identify common toilets, urinals, and bidets.</td>
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<td>Identify common types of appliances connected by a plumber.</td>
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Legend: ✦ Essential  ○ Non-essential  ⏤ Omitted

Curriculum Framework

Applying Basic Construction Safety Standards (Core Safety)

Task Number 39

Comply with federal, state, and local safety legal requirements.

Definition

Compliance should include

- understanding the roles of the Occupational Safety and Health Administration (OSHA), Virginia Occupational Safety and Health (VOSH), and the Environmental Protection Agency (EPA)
- identifying the OSHA Hazard Communication Standard (HazCom)
- interpreting the information included on safety data sheets (SDS)
- describing the responsibilities of employers and employees under HazCom.

Process/Skill Questions

- Where should hazardous materials be stored?
- What information can be found on an SDS?

NCCER Core Curriculum: Introductory Craft Skills, 2015
00101-15 Basic Safety
Module One (00101-15) explains the importance of safety in the construction and industrial crafts. Trainees will learn how to identify and follow safe work practices and procedures and how to properly inspect and use safety equipment. Trainees will be able to describe the safety practices associated with elevated work; energy release; and various hazards encountered on job sites. NOTE: The successful completion of this module will award a Construction Site Safety Orientation credential.

NCCER Plumbing Standards

Level 1, Module 02102-12: Plumbing Safety
This module reviews the common causes of plumbing-related accidents and injuries. Trainees will learn how to identify hazardous situations and unsafe conditions as well as how to handle and respond to these situations and conditions.

Task Number 40

Identify PPE (personal protective equipment) requirements.

Definition

Identification could include procedures for inspecting, wearing, and removing

- eye protection
- respirator
- hard hat
- gloves
- safety harness
- hearing protection
- safety shoes.

Identification should also include explaining when particular PPE is required.

Process/Skill Questions

- What are some dangerous effects of sun exposure, and how can these risks be mitigated?
- Why is wearing jewelry prohibited while in the lab or on the job site?

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NCCER Plumbing Standards
Task Number 41

Maintain a safe working environment.

Definition

Maintaining safety should be an ongoing process and should result in identifying potential hazards on a job site or in the lab, such as unstable or improperly erected scaffolding, electrical hazards, job-site debris, improperly stored materials, and air quality hazards. When present, hazards must be remedied by appropriate measures, in compliance with school and instructor guidelines.

Process/Skill Questions

- What are examples of job-site hazards?
- Why is it important to use good housekeeping standards on a job site?
- Why is it important to store materials and tools in their proper places?

NCCER Core Curriculum: Introductory Craft Skills, 2015

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Task Number 42

Explain safe working practices around electrical hazards.

Definition

Explanation should include
identifying equipment used to test electrical circuits
- describing safe working conditions (e.g., grounding, using ground-fault circuit interrupters [GFCIs] and cords)
- demonstrating safe work habits

according to industry standards and instructor's guidelines.

**Process/Skill Questions**

- What is the definition of *proximity work*?
- What are safe working clearances according to the National Electrical Code (NEC) code?
- What are considered safe working conditions and safe work habits?
- What is the unseen hazard with electrical work?
- What are some common electrical workplace issues?

**NCCER Core Curriculum: Introductory Craft Skills, 2015**

*00101-15 Basic Safety*

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**NCCER Plumbing Standards**

*Level 1, Module 02102-12: Plumbing Safety*

This module reviews the common causes of plumbing-related accidents and injuries. Trainees will learn how to identify hazardous situations and unsafe conditions as well as how to handle and respond to these situations and conditions.

**Task Number 43**

**Identify emergency first-aid procedures.**

**Definition**

Identification should include standard first-aid procedures and school policies regarding incidents involving

- bodily fluids
- electrical injuries
- eye injuries
- falls
- burns.

**Process/Skill Questions**
• What are the steps that should be followed after an accident?
• Why is knowing cardiopulmonary resuscitation (CPR) an important skill in the construction trades?
• Why is it important to be certified to administer first aid?
• What are the different degrees of electrical burns?

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Task Number 44

Identify the types of fires and the methods used to extinguish them.

Definition
Identification should include classifications of fires (e.g., Classes A, B, C, and D), causes and prevention of fires, types of extinguishers, and, when possible, the demonstrated use of a fire extinguisher, in accordance with government regulations and instructor guidelines.

Process/Skill Questions

• Why do fires have different classifications, and what are they?
• What is the fire triangle and the fire tetrahedron?
• What are the three things necessary to start a fire?
• Why is it important to know the classification of fire when trying to extinguish it?
• Why should extinguishers be inspected, and how often should they be inspected?
• What are the classifications of extinguishers?

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Task Number 45
Inspect course-specific hand and power tools to visually identify defects.

Definition

Inspection of tools should include

- identifying the components of the machinery (e.g., guards, blades, moving parts, start/stop switches)
- identifying standard safety procedures (i.e., shop practices and manufacturer recommendations)
- observing a demonstration of the safe operation and use of each piece of machinery in the lab
- identifying tool defects.

Process/Skill Questions

- What are some of the basic power tools used in construction?
- What are the proper actions to take before using a circular saw?
- Why should a power tool always be grounded?

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NCCER Plumbing Standards

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This module reviews the common causes of plumbing-related accidents and injuries. Trainees will learn how to identify hazardous situations and unsafe conditions as well as how to handle and respond to these situations and conditions.

Task Number 46

Demonstrate lifting and carrying techniques.

Definition

Demonstration involves lifting and carrying materials and equipment based on the principles of

- lifting with the legs
- keeping the back straight
- holding the load close to the body
- getting help, if necessary.
Process/Skill Questions

- What are common injuries associated with improper lifting techniques?
- What can one do to prevent injury?
- How does positioning affect technique?

NCCER Core Curriculum: Introductory Craft Skills, 2015

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Task Number 47

Demonstrate safe laddering techniques.

**Definition**

Demonstration should include using appropriate conduct and safety procedures while

- using aluminum ladders (e.g., three-point contact)
- carrying ladders (e.g., two people at all times)
- erecting and setting ladders (e.g., use the 4:1 rule)
- identifying types of ladders and the components and safety features of each (e.g., wall or straight, extension, roof, stepladder, attic, special-purpose, solid-beam, aluminum, wood/aluminum truss ladder, fiberglass).

**Process/Skill Questions**

- Why are ladders rated for certain weights?
- Why is the apex (highest point) of a stepladder not considered a step?
- What other methods are used to adjust ladders?

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NCCER Plumbing Standards
Task Number 48

Demonstrate safe scaffolding techniques.

Definition

Demonstration should include inspecting settings, duty ratings, and safety tags.

Process/Skill Questions

- How can one determine the safe weight limit of any particular scaffolding?
- When is scaffolding preferred or required?

NCCER Core Curriculum: Introductory Craft Skills, 2015

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Task Number 49

Report personal injuries and environmental and equipment safety violations to the appropriate authority.

Definition

Report should include

- providing a verbal or written statement
- identifying the violation
- documenting the date when the incident or behavior was observed
- following the protocol for submitting the report to the instructor, the supervisor, or the local OSHA inspectors.

Process/Skill Questions
• What ethical considerations might be involved when reporting coworkers?
• Why is it important to follow reporting procedures?
• What is *liability*?

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**Task Number 50**

**Earn the Construction Industry OSHA 10 card.**

**Definition**
Earning a Construction Industry OSHA 10 card will

• recognize that one has acquired 10 hours of safety instruction
• help teach national standards for personal safety within a lab environment
• validate safety skills to the industry
• help workers become more safety-conscious and responsible.

**Process/Skill Questions**

• What are the benefits of earning the Construction Industry OSHA 10 card?
• What is OSHA, and how are its standards validated?
• Why was OSHA established, and how has it evolved?

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**Task Number 51**

**Pass a safety exam for lab/site safety and the use of tools and equipment specific to the construction industry.**
Definition

Assessment must measure participation in safety training programs, including attending safety meetings and periodically demonstrating knowledge and skills gained from program topics (e.g., interpretation of SDS).

Process/Skill Questions

- How often should one participate in safety training programs? Why?
- Why are retraining programs relevant to a company's insurance policy?
- What is workers' compensation?

NCCER Core Curriculum: Introductory Craft Skills, 2015

00101-15 Basic Safety

Module One (00101-15) explains the importance of safety in the construction and industrial crafts. Trainees will learn how to identify and follow safe work practices and procedures and how to properly inspect and use safety equipment. Trainees will be able to describe the safety practices associated with elevated work; energy release; and various hazards encountered on job sites. NOTE: The successful completion of this module will award a Construction Site Safety Orientation credential.

Focusing on the Plumbing Profession

Task Number 52

Discuss the historical development of the plumbing trade.

Definition

Discussion will include historical landmarks in the development of the plumbing trade, beginning with its origins (circa 4000 B.C.), with emphasis on the Roman aqueducts, the sanitation problems of the Middle Ages, and the development of modern sanitation systems.

Process/Skill Questions

- What are the roots of the word *plumbing*?
- Where did indoor plumbing originate?

NCCER Plumbing Standards

Level 1, Module 02101-12: Introduction to the Plumbing Profession

This module introduces trainees to the plumbing profession. Trainees will become familiar with the tasks and responsibilities of professionals in the construction industry.
Task Number 53

Describe the importance of plumbers in modern society.

Definition

Description will relate the plumbing trade to sanitation and public health.

Process/Skill Questions

- How has plumbing been instrumental in preventing the spread of disease?
- How has the plumbing trade evolved over the last 200 years?
- What modern conveniences depend on plumbing technologies?

NCCER Plumbing Standards

Level 1, Module 02101-12: Introduction to the Plumbing Profession
This module introduces trainees to the plumbing profession. Trainees will become familiar with the tasks and responsibilities of professionals in the construction industry.

Task Number 54

Explain the importance of code compliance to the profession.

Definition

Explanation should include the role of the Plumbing Code in guiding plumbers' work.

Process/Skill Questions

- What components are included in the code?
- What are some consequences of failure to follow code?

Task Number 55

Discuss the role of teams in a plumbing trade.

Definition

Discussion will include the concept of total quality management (TQM), focusing on instructor-provided materials. A student-produced organizational flow chart will demonstrate the roles of various team members.

Process/Skill Questions
• How can teamwork better accomplish a task?
• Why is it important to get along with team members?
• Why is conflict resolution crucial to successful teamwork?

NCCER Plumbing Standards

Level 1, Module 02101-12: Introduction to the Plumbing Profession
This module introduces trainees to the plumbing profession. Trainees will become familiar with the tasks and responsibilities of professionals in the construction industry.

Task Number 56

Develop a list of tools and safety equipment to be carried in work vehicle.

Definition
Development of a basic tool and safety equipment list should be generated according to instructor's guidelines and industry standards.

Process/Skill Questions

• Why is it important to overprepare for any job?
• Why is it important to use the right tool for the right job?
• Why is it important to maintain an organized work vehicle?

NCCER Plumbing Standards

Level 1, Module 02103-12: Tools of the Plumbing Trade
This module reviews the basic plumbing tools used to measure, lay out, cut, drill, bore, and ream. Trainees will learn how to safely use, properly care for, and maintain plumbing tools.

Task Number 57

Describe chemical risks associated with the plumbing occupation.

Definition
Description of chemicals should include those in primers, acids, cement, flux, and pipe joint compound, as well as others listed on the SDS. Full description of associated risk should include

• locating SDS
• identifying the ingredients of the materials used
• describing the reactivity of the materials
• describing first aid for inhalation, ingestion, or skin/eye contact with the materials
• identifying potential immediate and long-term health hazards related to the use of materials.

Process/Skill Questions

• Where should SDS be posted?
• Why should multiple copies of an SDS be posted?
• Who created SDS, and for what purpose was that information created?

Task Number 58

Identify plumbing-related career and educational opportunities.

Definition

Identification should include various careers related to plumbing, including

• pipe fitters
• steam fitters
• union
• commercial/industrial
• residential
• service and repair.

Process/Skill Questions

• What are some job titles directly related to plumbing?
• What are some job titles that share skills with those required to be a plumber?
• Why is there a shortage of skilled plumbers?

NCCER Plumbing Standards

Level 1, Module 02101-12: Introduction to the Plumbing Profession
This module introduces trainees to the plumbing profession. Trainees will become familiar with the tasks and responsibilities of professionals in the construction industry.

Task Number 59

Identify how green technology is incorporated into plumbing.

Definition

Identification could include

• dual-flush and low-flush toilets
• waterless urinals
• sensored lavatory faucets
• automatic shut-off valves
• tankless water heaters.

**Process/Skill Questions**

• How do tankless water heaters work?
• Are there drawbacks to using waterless urinals? Explain.
• How do low-flush toilets differ from traditional toilets?

**NCCER Plumbing Standards**

**Level 1, Module 02101-12: Introduction to the Plumbing Profession**
This module introduces trainees to the plumbing profession. Trainees will become familiar with the tasks and responsibilities of professionals in the construction industry.

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**Applying Basic Mathematics to the Plumbing Profession**

**Task Number 60**

**Measure pipe dimensions.**

**Definition**

Measurement will include the ability to read a rule accurately, to within +/- 1/16 inch. Pipe may be measured end-to-end, center-to-center, face-to-face, or in other ways, as determined by the instructor.

**Process/Skill Questions**

• Are pipes measured by the inside or the outside diameters?
• What are the standard wall thicknesses?
• Why are accurate measurements important when completing a plumbing task?
• What is meant by *nominal pipe diameter*?

**NCCER Plumbing Standards**

**Level 1, Module 02104-12: Introduction to Plumbing Math**
This module introduces some of the basic math used by plumbers in the field. Trainees will learn how to use basic math to calculate pipe length.
Task Number 61

Calculate fitting allowance.

Definition

Calculations must be accurate to within +/- 1/16 inch.

Process/Skill Questions

- Why is fitting allowance necessary in a fitting project?
- How is takeoff calculated for fitting allowance?
- Is fitting allowance the same for all sizes of pipes?

NCCER Plumbing Standards

Level 1, Module 02104-12: Introduction to Plumbing Math
This module introduces some of the basic math used by plumbers in the field. Trainees will learn how to use basic math to calculate pipe length.

Task Number 62

Calculate offsets using the Pythagorean Theorem.

Definition

Calculation should be accurate and should include application of the Pythagorean Theorem.

Process/Skill Questions

- Who was Pythagoras, and why is he an important figure?
- What are the three parts of an offset?
- How are offsets used in plumbing?

NCCER Plumbing Standards

Level 2, Module 02201-13: Plumbing Math Two
Module one (02201-13) explains the Pythagorean theorem, reviews methods for laying out square corners, and discusses the techniques used to calculate simple and rolling offsets, as well as offsets on parallel runs of pipe.

Task Number 63

Calculate a 45-degree offset using the constant method.
Definition
Calculation should be accurate and should include the application of 1.414 as a constant.

Process/Skill Questions

- What is an alternative method for calculating a 45-degree offset?
- What is the constant method?
- On what number is the constant method based?

NCCER Plumbing Standards

Level 2, Module 02201-13: Plumbing Math Two
Module one (02201-13) explains the Pythagorean theorem, reviews methods for laying out square corners, and discusses the techniques used to calculate simple and rolling offsets, as well as offsets on parallel runs of pipe.

Task Number 64

Perform mathematical calculations using feet and inches as the unit of measure, including addition, subtraction, and conversion (feet to inches, inches to feet).

Definition
Performance must be accurate according to instructor's guidelines.

Process/Skill Questions

- Why is it important to be proficient in calculations using feet and inches?
- How many inches are in a foot?
- What countries use the standard English measuring system?

NCCER Plumbing Standards

Level 1, Module 02104-12: Introduction to Plumbing Math
This module introduces some of the basic math used by plumbers in the field. Trainees will learn how to use basic math to calculate pipe length.

Task Number 65

Convert decimals to fractions and fractions to decimals.

Definition
Conversion must be accurate, using printed charts and/or a calculator.

**Process/Skill Questions**

- What are the basic converting units for one inch, one foot, one meter, one liter, and one gallon?
- Where are decimal measurements most commonly found?
- Which are easier for you to work with, fractions or decimals? Explain.

**NCCER Plumbing Standards**

**Level 1, Module 02104-12: Introduction to Plumbing Math**

This module introduces some of the basic math used by plumbers in the field. Trainees will learn how to use basic math to calculate pipe length.

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**Task Number 66**

**Convert metric measurements to standard measurements.**

**Definition**

Conversion should include reading conversion charts.

**Process/Skill Questions**

- Where can a plumber find conversion charts?
- What information is included on a conversion chart?

**NCCER Plumbing Standards**

**Level 1, Module 02104-12: Introduction to Plumbing Math**

This module introduces some of the basic math used by plumbers in the field. Trainees will learn how to use basic math to calculate pipe length.

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**Reading Drawings for the Plumbing Profession**

**Task Number 67**

**Identify fixtures depicted on a blueprint.**

**Definition**

Identification of standard fixtures must come from a commercial blueprint.
Process/Skill Questions

- What are some symbols typically associated with standard plumbing fixtures?
- Are all plumbing fixtures always shown on a blueprint? Why?

NCCER Plumbing Standards

Level 1, Module 02105-12: Introduction to Plumbing Drawings
This module introduces the types of construction drawings typically used in the plumbing trade, explains the relationship among these drawings, and discusses applicable code requirements. Trainees will learn how to read, interpret, and sketch construction drawings, as well as how to draw lines to scale.

Task Number 68

Read an architect’s scale.

Definition

Reading an architect’s scale should include

- measuring
- applying measurements from a drawing for an install and material list.

Process/Skill Questions

- How is an architect’s pen used?
- With what types of drawings might a plumber use an architect's scale?

NCCER Plumbing Standards

Level 1, Module 02105-12: Introduction to Plumbing Drawings
This module introduces the types of construction drawings typically used in the plumbing trade, explains the relationship among these drawings, and discusses applicable code requirements. Trainees will learn how to read, interpret, and sketch construction drawings, as well as how to draw lines to scale.

Task Number 69

Develop an overhead and an isometric drawing.

Definition

Development must be to scale, symbols must be correct, and overall drawings should be neat and accurate.

Process/Skill Questions
• Can pipe lengths be determined by an isometric drawing?
• Can pipe lengths be measured from an overhead view?
• What pipe measurement cannot be determined from the overhead view?
• Why is scale so important to drawings?

NCCER Plumbing Standards

Level 1, Module 02105-12: Introduction to Plumbing Drawings
This module introduces the types of construction drawings typically used in the plumbing trade, explains the relationship among these drawings, and discusses applicable code requirements. Trainees will learn how to read, interpret, and sketch construction drawings, as well as how to draw lines to scale.

Task Number 70

Develop fitting/material lists based on drawings.

Definition

Development should include using addition and subtraction of decimals, fractions, and an ability to convert decimals to fractions.

Process/Skill Questions

• Why is a fitting/material list important to a plumber?
• How are fitting/material lists used to determine the costs, and therefore, the cost effectiveness of jobs?

NCCER Plumbing Standards

Level 1, Module 02105-12: Introduction to Plumbing Drawings
This module introduces the types of construction drawings typically used in the plumbing trade, explains the relationship among these drawings, and discusses applicable code requirements. Trainees will learn how to read, interpret, and sketch construction drawings, as well as how to draw lines to scale.

Task Number 71

Interpret the schedule on a blueprint.

Definition

Interpretation should include

• reading the schedule
• identifying the make and model of fixtures and equipment.

Process/Skill Questions
• How are makes and models identified on a blueprint?
• How is the Americans with Disabilities Act (ADA) addressed in schedules?

NCCER Plumbing Standards

Level 1, Module 02105-12: Introduction to Plumbing Drawings
This module introduces the types of construction drawings typically used in the plumbing trade, explains the relationship among these drawings, and discusses applicable code requirements. Trainees will learn how to read, interpret, and sketch construction drawings, as well as how to draw lines to scale.

Task Number 72
Interpret specifications on a blueprint.

Definition
Interpretation should include

- reading the specifications
- applying the specifications to the materials used and/or ordered.

Process/Skill Questions

- Why is it important to apply specifications when ordering materials?
- What information is included in specifications?

NCCER Plumbing Standards

Level 1, Module 02105-12: Introduction to Plumbing Drawings
This module introduces the types of construction drawings typically used in the plumbing trade, explains the relationship among these drawings, and discusses applicable code requirements. Trainees will learn how to read, interpret, and sketch construction drawings, as well as how to draw lines to scale.

Task Number 73
Describe how code requirements apply to certain drawings.

Definition
Description should include

- code requirements that apply to drawings
- an indication of code requirements in drawings.

Process/Skill Questions
• Why is it important that code requirements be included in drawings?
• Who is responsible for ensuring drawings include code requirements?

NCCER Plumbing Standards

Level 1, Module 02105-12: Introduction to Plumbing Drawings
This module introduces the types of construction drawings typically used in the plumbing trade, explains the relationship among these drawings, and discusses applicable code requirements. Trainees will learn how to read, interpret, and sketch construction drawings, as well as how to draw lines to scale.

Working with Plastic Pipe and Fittings

Task Number 74

Identify the types of plastic pipe.

Definition

Identification may include

• ABS (acrylonitrile butadiene styrene)
• PVC (polyvinyl chloride)
• CPVC (chlorinated polyvinyl chloride)
• PE (polyethylene)
• HDPE (high-density polyethylene)
• PEX (cross-linked polyethylene)
• PB (polybutylene).

Process/Skill Questions

• What are some benefits of using PEX? Some drawbacks?
• How have pipe materials evolved over the past 75 years?

NCCER Plumbing Standards

Level 1, Module 02106-12: Plastic Pipe and Fittings
This module introduces the various types of materials, schedules, and applications of plastic piping. Trainees will learn how to determine the appropriate types of fittings, valves, hangers, and supports needed for plastic piping. Trainees will learn to properly measure, cut, and join plastic piping.

Task Number 75
Identify the material properties, storage, and handling requirements of plastic pipe.

Definition

Identification should include

- material properties of thermoset plastics and thermoplastic
- importance of storage temperature
- importance of keeping material out of ultraviolet light.

Process/Skill Questions

- Why must medical pipe be wrapped and stored separately?
- How can ultraviolet light affect plastic pipe?

NCCER Plumbing Standards

Level 1, Module 02106-12: Plastic Pipe and Fittings
This module introduces the various types of materials, schedules, and applications of plastic piping. Trainees will learn how to determine the appropriate types of fittings, valves, hangers, and supports needed for plastic piping. Trainees will learn to properly measure, cut, and join plastic piping.

Task Number 76

Identify the types of fittings and valves used with plastic pipe.

Definition

Identification should include

- fittings:
  - Barbed
  - Glue
  - Compression
  - Couplings
  - Crimp
  - Mechanical joints
  - 90-degree elbows
  - 45-degree elbows
  - Tees
- valves:
  - Ball
  - Gate
  - Check
  - Backwater
Process/Skill Questions

- What information is provided by the writing on pipe fittings?
- Where would a backwater valve be used in a plumbing system?

NCCER Plumbing Standards

Level 1, Module 02106-12: Plastic Pipe and Fittings
This module introduces the various types of materials, schedules, and applications of plastic piping. Trainees will learn how to determine the appropriate types of fittings, valves, hangers, and supports needed for plastic piping. Trainees will learn to properly measure, cut, and join plastic piping.

Task Number 77

Identify the techniques used in hanging and supporting plastic pipe.

Definition

Identification should include

- referencing the code book
- following the manufacturer’s recommendations.

Process/Skill Questions

- Where are manufacturer's recommendations located?
- What are some consequences of failure to hang plastic pipe correctly?

NCCER Plumbing Standards

Level 1, Module 02106-12: Plastic Pipe and Fittings
This module introduces the various types of materials, schedules, and applications of plastic piping. Trainees will learn how to determine the appropriate types of fittings, valves, hangers, and supports needed for plastic piping. Trainees will learn to properly measure, cut, and join plastic piping.

Task Number 78

Join plastic pipe.

Definition

Procedure should include

- measuring the length of pipe
- cutting with pipe cutters, hand saws, and mechanical saws
• selecting the fitting based on the type of plastic pipe
• selecting the joining method.

**Process/Skill Questions**

• What safety considerations should be taken when using hand saws, mechanical saws, and pipe cutters?
• How does the type of pipe determine the fitting used?

**NCCER Plumbing Standards**

**Level 1, Module 02106-12: Plastic Pipe and Fittings**
This module introduces the various types of materials, schedules, and applications of plastic piping. Trainees will learn how to determine the appropriate types of fittings, valves, hangers, and supports needed for plastic piping. Trainees will learn to properly measure, cut, and join plastic piping.

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**Task Number 79**

**Identify the hazards and safety precautions associated with plastic pipe.**

**Definition**

Identification should include

• chemical exposure
• SDS.

**Process/Skill Questions**

• How can chemical exposure be limited when working with plastic pipe?
• What can an SDS tell about plastic pipe?

**NCCER Plumbing Standards**

**Level 1, Module 02106-12: Plastic Pipe and Fittings**
This module introduces the various types of materials, schedules, and applications of plastic piping. Trainees will learn how to determine the appropriate types of fittings, valves, hangers, and supports needed for plastic piping. Trainees will learn to properly measure, cut, and join plastic piping.

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**Working with Copper Tube and Fittings**

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**Task Number 80**
Identify types of copper tube.

Definition

Identification should include

- hard copper
- soft copper
- M
- L
- K
- drain, waste, and vent (DWV)
- air-conditioning and refrigeration (ACR).

Process/Skill Questions

- What is the main difference between type L and type M copper pipes?
- In what parts of a plumbing system is hard copper used?

NCCER Plumbing Standards

Level 1, Module 02107-12: Copper Tube and Fittings
This module discusses the materials, schedules, and properties of copper tube, fittings, and valves. Trainees will learn how to measure, ream, cut, join, and groove copper tube, as well as how to hang and support copper tube.

Task Number 81

Identify the material properties, storage, and handling requirements of copper tube.

Definition

Identification should include

- material properties
- storage requirements (i.e., must be kept dry and secured)
- handling precautions (e.g., wearing gloves).

Process/Skill Questions

- Why must medical pipe be wrapped and stored separately?
- Why is it important to understand the material qualities of copper?

NCCER Plumbing Standards

Level 1, Module 02107-12: Copper Tube and Fittings
This module discusses the materials, schedules, and properties of copper tube, fittings, and valves. Trainees will learn how to measure, ream, cut, join, and groove copper tube, as well as how to hang and support copper tube.

**Task Number 82**

**Identify the types of fittings and valves used with copper tube.**

**Definition**

Identification should include

- **fittings:**
  - Compression
  - Couplings
  - Press
  - Mechanical joints
  - 90-degree elbows
  - 45-degree elbows
  - Tees
  - Victaulic brand

- **valves:**
  - Ball
  - Gate
  - Check

**Process/Skill Questions**

- How is copper pipe attached to a compression fitting?
- How does a ball valve control water flow?

**NCCER Plumbing Standards**

**Level 1, Module 02107-12: Copper Tube and Fittings**

This module discusses the materials, schedules, and properties of copper tube, fittings, and valves. Trainees will learn how to measure, ream, cut, join, and groove copper tube, as well as how to hang and support copper tube.

**Task Number 83**

**Identify the techniques used in hanging and supporting copper tube.**

**Definition**

Identification should include

- referencing the code book
following the manufacturer’s recommendations.

Process/Skill Questions

• Where can the code book be found?

NCCER Plumbing Standards

Level 1, Module 02107-12: Copper Tube and Fittings
This module discusses the materials, schedules, and properties of copper tube, fittings, and valves. Trainees will learn how to measure, ream, cut, join, and groove copper tube, as well as how to hang and support copper tube.

Task Number 84

Join copper tube.

Definition

Procedure may include

• measuring the length of pipe
• cutting with pipe cutters, tubing cutters, a band saw, and a hack saw
• joining by solder, press fittings, push fittings, flare, compression, braze, and mechanical.

Process/Skill Questions

• When should soldering be used to join copper tube?
• What precautions should be taken when cutting copper tube?

NCCER Plumbing Standards

Level 1, Module 02107-12: Copper Tube and Fittings
This module discusses the materials, schedules, and properties of copper tube, fittings, and valves. Trainees will learn how to measure, ream, cut, join, and groove copper tube, as well as how to hang and support copper tube.

Task Number 85

Identify the hazards and safety precautions associated with copper tube.

Definition

Identification should include
• chemical exposure
• exposure to fumes, burns, cuts, and copper shavings
• SDS.

Process/Skill Questions

• What should a plumber do to limit exposure to copper shavings?
• What information do SDS provide about chemical exposure?

NCCER Plumbing Standards

Level 1, Module 02107-12: Copper Tube and Fittings
This module discusses the materials, schedules, and properties of copper tube, fittings, and valves. Trainees will learn how to measure, ream, cut, join, and groove copper tube, as well as how to hang and support copper tube.

Working with Cast-Iron Pipe and Fittings

Task Number 86

Identify types of cast-iron pipe.

Definition

Identification should include

• heavy and standard
• no-hub and hub-and-spigot or bell-and-spigot.

Process/Skill Questions

• What is the average lifespan of cast-iron pipes?
• Where are cast-iron pipes most likely found?

NCCER Plumbing Standards

Level 1, Module 02108-12: Cast-Iron Pipe and Fittings
This module discusses proper and improper applications of cast-iron piping. Trainees will learn how to identify materials, schedules, and fittings used with cast-iron piping, as well as how to properly measure, cut, join, and support cast-iron piping.

Task Number 87
Identify the material properties, storage, and handling requirements of cast-iron pipe.

Definition

Identification should include

- material properties
- storage requirements
- handling precautions (e.g., lifting methods).

Process/Skill Questions

- What are some disadvantages of cast iron's material properties?
- How should one lift and carry cast-iron pipes?

NCCER Plumbing Standards

Level 1, Module 02108-12: Cast-Iron Pipe and Fittings
This module discusses proper and improper applications of cast-iron piping. Trainees will learn how to identify materials, schedules, and fittings used with cast-iron piping, as well as how to properly measure, cut, join, and support cast-iron piping.

Task Number 88

Identify the types of fittings and valves used with cast-iron pipe.

Definition

Identification should include

- DWV fittings
- backwater valves.

Process/Skill Questions

- How are cast-iron pipes connected?
- What is the purpose of a backwater valve?

NCCER Plumbing Standards

Level 1, Module 02108-12: Cast-Iron Pipe and Fittings
This module discusses proper and improper applications of cast-iron piping. Trainees will learn how to identify materials, schedules, and fittings used with cast-iron piping, as well as how to properly measure, cut, join, and support cast-iron piping.
Task Number 89

Identify the techniques used in hanging and supporting cast-iron pipe.

Definition

Identification should include

- referencing the code book
- following the manufacturer's recommendations.

Process/Skill Questions

- What should be used to hang cast-iron pipe?
- What are some common problems associated with cast-iron pipe supports?

NCCER Plumbing Standards

Level 1, Module 02108-12: Cast-Iron Pipe and Fittings
This module discusses proper and improper applications of cast-iron piping. Trainees will learn how to identify materials, schedules, and fittings used with cast-iron piping, as well as how to properly measure, cut, join, and support cast-iron piping.

Task Number 90

Join cast-iron pipe.

Definition

Procedure may include using

- measuring the length of pipe
- cutting with snap cutters, a band saw, a chop saw, ratchet cutters, and a reciprocating saw
- using no-hub band, gasket, and repair coupling
- using a torque wrench and caulkimg tools.

Process/Skill Questions

- How is a torque wrench used?
- When might a plumber need to cut installed cast-iron pipe?

NCCER Plumbing Standards

Level 1, Module 02108-12: Cast-Iron Pipe and Fittings
This module discusses proper and improper applications of cast-iron piping. Trainees will learn how to identify materials, schedules, and fittings used with cast-iron piping, as well as how to properly measure, cut, join, and support cast-iron piping.

**Task Number 91**

**Identify the hazards and safety precautions associated with cast-iron pipe.**

**Definition**

Identification should include

- proper lifting technique
- PPE
- exposure to lead and burns
- SDS.

**Process/Skill Questions**

- How can one limit exposure to lead when working with cast iron?
- What PPE should be worn when cutting cast-iron pipe?

**NCCER Plumbing Standards**

**Level 1, Module 02108-12: Cast-Iron Pipe and Fittings**

This module discusses proper and improper applications of cast-iron piping. Trainees will learn how to identify materials, schedules, and fittings used with cast-iron piping, as well as how to properly measure, cut, join, and support cast-iron piping.

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**Working with Steel Pipe and Fittings**

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**Task Number 92**

**Identify types of steel pipe.**

**Definition**

Identification should include

- stainless
• galvanized
• black iron
• corrugated stainless steel (CSST)
• ductile.

Process/Skill Questions

• What are some benefits of using steel pipe?
• What are common uses of CSST?

NCCER Plumbing Standards

Level 1, Module 02109-12: Steel Pipe and Fittings
This module discusses the types of steel pipe and fittings used in plumbing applications. Trainees will learn about common fittings and valves; measuring, cutting, and joining steel pipe; and the hangers and supports used with steel pipe.

Task Number 93

Identify the material properties, storage, and handling requirements of steel pipe.

Definition

Identification should include

• material properties
• storage requirements (i.e., must be kept dry)
• handling precautions (e.g., lifting methods).

Process/Skill Questions

• What are the consequences of failure to keep steel pipes dry?
• What sizes of steel pipe are commonly used?

NCCER Plumbing Standards

Level 1, Module 02109-12: Steel Pipe and Fittings
This module discusses the types of steel pipe and fittings used in plumbing applications. Trainees will learn about common fittings and valves; measuring, cutting, and joining steel pipe; and the hangers and supports used with steel pipe.

Task Number 94
Identify the types of fittings and valves used with steel pipe.

Definition

Identification should include

- fittings:
  - Compression
  - Couplings
  - Press
  - Mechanical joints
  - 90-degree elbows
  - 45-degree elbows
  - Tees
  - Victaulic brand

- valves:
  - Ball
  - Gate
  - Check

Process/Skill Questions

- Where are Victaulic fittings commonly used?
- How does a gate valve work?

NCCER Plumbing Standards

Level 1, Module 02109-12: Steel Pipe and Fittings
This module discusses the types of steel pipe and fittings used in plumbing applications. Trainees will learn about common fittings and valves; measuring, cutting, and joining steel pipe; and the hangers and supports used with steel pipe.

Task Number 95

Identify the techniques used in hanging and supporting steel pipe.

Definition

Identification should include

- referencing the code book
- following the manufacturer’s recommendations.

Process/Skill Questions

- What is the most common method for hanging steel pipe?
Task Number 96

Join steel pipe.

Definition

Procedure may include using

- measuring the length of pipe
- cutting by hand and using a pipe vice and cutting oil
- threading by hand and using a pony threader
- joining by welding and mechanical pipe joining systems.

Process/Skill Questions

- How does a pony threader work?
- When should welding be used with steel pipes?

Task Number 97

Identify the hazards and safety precautions associated with steel pipe.

Definition

Identification should include

- SDS
- PPE.
Process/Skill Questions

- What PPE should be worn when working with steel pipe?

NCCER Plumbing Standards

Level 1, Module 02102-12: Plumbing Safety
This module reviews the common causes of plumbing-related accidents and injuries. Trainees will learn how to identify hazardous situations and unsafe conditions as well as how to handle and respond to these situations and conditions.

Level 1, Module 02109-12: Steel Pipe and Fittings
This module discusses the types of steel pipe and fittings used in plumbing applications. Trainees will learn about common fittings and valves; measuring, cutting, and joining steel pipe; and the hangers and supports used with steel pipe.

Performing Pipe Cutting and Joining

Task Number 98

Cut and deburr copper tubing.

Definition

Tubing is cut to correct length +/- 1/16"; deburring tool must be correctly used according to instructor's guidelines.

Process/Skill Questions

- Why is it necessary to deburr copper tubing?
- What tools can be used to deburr copper tubing?

NCCER Plumbing Standards

Level 1, Module 02107-12: Copper Tube and Fittings
This module discusses the materials, schedules, and properties of copper tube, fittings, and valves. Trainees will learn how to measure, ream, cut, join, and groove copper tube, as well as how to hang and support copper tube.

Task Number 99

Operate torches commonly used in the plumbing trade.

Definition
Operation of soldering/brazing equipment is demonstrated by the

- adherence to a soldering/brazing assignment
- identification of the types of gases used
- proper shut-down of equipment
- use of PPE and accessories

in accordance with industry and OSHA guidelines.

Process/Skill Questions

- What precautions should one take when lighting the torch?
- What are the procedures to aid someone who is injured by the torch?
- How often should soldering/brazing equipment be inspected? Why?

Task Number 100

Construct a copper tubing assembly using solder joints.

Definition

Construction should include these steps:

- Clean pipe with sandpaper or a wire brush.
- Apply flux with a brush.
- Apply heat for solder.
- Apply solder.
- Test the assembly for leaks.
- Wipe off excess flux after the assembly cools.

Process/Skill Questions

- What scientific principle allows molten solder to flow into a joint?
- What material must be absent from solder used in domestic water systems?
- Why is flux so important in soldering?

NCCER Plumbing Standards

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Task Number 101

Install press fittings.
Definition

Installation should include

- marking fitting for proper makeup
- deburring and chamfering
- pressing.

Process/Skill Questions

- How is deburring accomplished? Chamfering?
- What tools are used when installing press fittings?

Installing Drainage, Waste, and Vent (DWV) Systems

Task Number 102

Identify the steps of roughing-in a DWV (drainage, waste, and vent) assembly of PVC/ABS, for the following: water closet, lavatory, bathtub, shower, kitchen or bar sink, washing machine, bidet, urinal, indirect waste.

Definition

The DWV should be roughed-in according to the Plumbing Code, manufacturer's specifications, and industry standards.

Process/Skill Questions

- What is meant by rough-in?
- What is another name for a water closet?
- In which direction does all drainage water flow?
- What is indirect waste?

NCCER Plumbing Standards

Level 1, Module 02111-12: Introduction to Drain, Waste, and Vent (DWV) Systems
This module explains the factors that influence DWV system design and how different types of drains, fittings, vents, and pipe are used to move waste out of a building. Trainees will learn installation requirements that prevent malfunctions in the system.

Task Number 103

Explain how waste moves from a fixture through the drain system to the environment.

Definition

Explanation should include

- gravity through a DWV system that is sloped properly
- pumps
- vacuum systems
- septic systems.

Process/Skill Questions

- How does a vacuum system work to move waste?
- What procedures are required for maintain a septic system?

NCCER Plumbing Standards

Level 1, Module 02111-12: Introduction to Drain, Waste, and Vent (DWV) Systems
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Task Number 104

Identify the major components of a drainage system and their functions.

Definition

Identification should include

- building sewer
- building drain
- branch system
- traps
- vents
• clean-outs.

Process/Skill Questions

• What are some consequences of vents not working properly?
• How does a branch system operate?

NCCER Plumbing Standards

Level 1, Module 02111-12: Introduction to Drain, Waste, and Vent (DWV) Systems
This module explains the factors that influence DWV system design and how different types of drains, fittings, vents, and pipe are used to move waste out of a building. Trainees will learn installation requirements that prevent malfunctions in the system.

Task Number 105

Identify types of traps and their components.

Definition

Identification should include

• anti-siphon traps
• bell traps
• clay traps
• drum traps
• grease traps
• hair traps
• lint traps
• oil separators
• p-traps
• running traps
• s-traps.

Process/Skill Questions

• Why are traps important?
• How can traps lose their seals?

NCCER Plumbing Standards

Level 1, Module 02111-12: Introduction to Drain, Waste, and Vent (DWV) Systems
This module explains the factors that influence DWV system design and how different types of drains, fittings, vents, and pipe are used to move waste out of a building. Trainees will learn installation requirements that prevent malfunctions in the system.
Task Number 106

Identify significant code and health issues, violations, and consequences related to DWV systems.

Definition

Identification should include

- transmission of disease (e.g., hepatitis)
- consequences, such as
  - stoppages
  - leaks
  - explosions
  - contamination of potable water
  - contamination of soil
  - death.

Process/Skill Questions

- What can cause explosions in a DWV system?
- How should DWV systems be maintained?

NCCER Plumbing Standards

Level 1, Module 02111-12: Introduction to Drain, Waste, and Vent (DWV) Systems
This module explains the factors that influence DWV system design and how different types of drains, fittings, vents, and pipe are used to move waste out of a building. Trainees will learn installation requirements that prevent malfunctions in the system.

Exploring Rough-in of Water Distribution Components

Task Number 107

Describe the installation of a water distribution system of hard drawn copper, CPVC, and PEX.

Definition
Description should include installation according to blueprints, manufacturer's specifications, and the Plumbing Code.

**Process/Skill Questions**

- How are water systems sized?
- How are the three types of pipes joined?
- Which type of system costs the least to install?

**NCCER Plumbing Standards**

**Level 1, Module 02112-12: Introduction to Water Distribution Systems**

This module discusses the processes in which water is distributed. Trainees will learn to identify the components and functions of a water distribution system, as well as explain the relationships among the components.

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**Task Number 108**

**Describe air- and water-pressure tests.**

**Definition**

Description should include

- steps for performing tests
- pressure gauge to measure pressure.

**Process/Skill Questions**

- At what pressure should an air test be conducted?
- What materials are needed to perform the test?
- Who checks the tests on the piping?

**NCCER Plumbing Standards**

**Level 2, Module 02206-13: Installing and Testing Water Supply Piping**

Module Six (02206-13) provides trainees with the proper techniques for locating, installing, and testing complete water service and distribution systems, including meters, water heaters, water softeners, and hose bibbs. The module also introduces basic backflow prevention and water hammer prevention, and discusses the installation of shower and tub valves, ice maker and washing machine boxes, and pipe stubouts and supports.

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**Introducing Plumbing Fixtures**
Task Number 109

Identify the basic types of materials used in the manufacture of plumbing fixtures.

Definition

Identification should include

- porcelain
- cast iron
- brass steel
- stainless steel
- acrylic
- fiberglass
- plastic
- tile
- concrete.

Process/Skill Questions

- What are the benefits and drawbacks of using concrete for plumbing fixtures?
- Which material is most commonly used for plumbing fixtures in new homes today?

NCCER Plumbing Standards

Level 1, Module 02110-12: Introduction to Plumbing Fixtures
This module discusses the materials commonly used to make fixtures, the most common types of fixtures, and the types of faucets available. Trainees will learn how each type of fixture and faucet operates, as well as how to choose the proper fixtures and faucets for a variety of installations.

Task Number 110

Identify common types of sinks, lavatories, and faucets.

Definition

Identification should include

- drop-in
- wall-mount
- under-mount
- pedestal
- integral
- floor-mount
- floor sinks
- hand sinks
- laundry/utility sinks
- single-handle faucets
- two-handle faucets
- touchless faucets
- tub and shower faucets.

Process/Skill Questions

- Where are floor sinks most commonly found?
- What considerations are taken when installing wall-mount lavatories?

NCCER Plumbing Standards

**Level 1, Module 02110-12: Introduction to Plumbing Fixtures**
This module discusses the materials commonly used to make fixtures, the most common types of fixtures, and the types of faucets available. Trainees will learn how each type of fixture and faucet operates, as well as how to choose the proper fixtures and faucets for a variety of installations.

**Task Number 111**

**Identify common bathtubs and showers.**

**Definition**

Identification should include

- claw tub
- fiberglass
- one-piece
- three-piece
- ADA-compliant
- steel
- recessed
- jetted tub
- soaker tub
- corner tub
- tile.

Process/Skill Questions

- What features must bathtubs and showers have to be ADA compliant?
- How are jetted tubs different from non-jetted tubs, from a plumbing standpoint?

NCCER Plumbing Standards

**Level 1, Module 02110-12: Introduction to Plumbing Fixtures**
This module discusses the materials commonly used to make fixtures, the most common types of fixtures, and the types of faucets available. Trainees will learn how each type of fixture and faucet operates, as well as how to choose the proper fixtures and faucets for a variety of installations.

Task Number 112

Identify common toilets, urinals, and bidets.

Definition

Identification should include:

- one-piece
- two-piece
- flushometer
- wall-mount
- floor-mount
- floor-mount, back outlet
- ADA-compliant
- macerating toilet
- bariatric toilet
- waterless urinal
- bidet.

Process/Skill Questions

- Under what circumstances might a macerating toilet need to be installed?
- Where are bidets most commonly found?

NCCER Plumbing Standards

Level 1, Module 02110-12: Introduction to Plumbing Fixtures
This module discusses the materials commonly used to make fixtures, the most common types of fixtures, and the types of faucets available. Trainees will learn how each type of fixture and faucet operates, as well as how to choose the proper fixtures and faucets for a variety of installations.

Task Number 113

Identify common drinking fountains and water coolers.

Definition

Identification should include:

- high-low
- recessed
- bottle-filler
- sensor
- stand-alone
- bubbler
- outside water cooler.

**Process/Skill Questions**

- What plumbing requirements are needed when installing a bottle-filler water cooler?
- What is a high-low water fountain?

**NCCER Plumbing Standards**

*Level 1, Module 02110-12: Introduction to Plumbing Fixtures*

This module discusses the materials commonly used to make fixtures, the most common types of fixtures, and the types of faucets available. Trainees will learn how each type of fixture and faucet operates, as well as how to choose the proper fixtures and faucets for a variety of installations.

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**Task Number 114**

**Identify common types of appliances connected by a plumber.**

**Definition**

Identification should include

- ice maker
- dishwasher
- washing machine
- dryer
- water softener
- gas stove
- water heater
- gas fireplace
- heat pump
- boiler
- garbage disposal.

**Process/Skill Questions**

- Why might a plumber be needed when installing a gas stove?
- What plumbing elements are associated with an ice maker?

**NCCER Plumbing Standards**

*Level 1, Module 02110-12: Introduction to Plumbing Fixtures*
This module discusses the materials commonly used to make fixtures, the most common types of fixtures, and the types of faucets available. Trainees will learn how each type of fixture and faucet operates, as well as how to choose the proper fixtures and faucets for a variety of installations.

## SOL Correlation by Task

<table>
<thead>
<tr>
<th>Task</th>
<th>English:</th>
<th>History and Social Science:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comply with federal, state, and local safety legal requirements.</td>
<td>10.5, 11.5</td>
<td>GOVT.1, GOVT.8, GOVT.9, GOVT.15, GOVT.16</td>
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<tr>
<td>Identify PPE (personal protective equipment) requirements.</td>
<td>10.5, 11.5</td>
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<tr>
<td>Maintain a safe working environment.</td>
<td>10.5, 11.5</td>
<td>GOVT.9, GOVT.14, GOVT.15, GOVT.16, VUS.8, WHII.8</td>
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<tr>
<td>Explain safe working practices around electrical hazards.</td>
<td>10.5, 11.5</td>
<td>GOVT.1, GOVT.9, GOVT.15, GOVT.16</td>
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<tr>
<td>Identify emergency first-aid procedures.</td>
<td>10.5, 11.5</td>
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<tr>
<td>Identify the types of fires and the methods used to extinguish them.</td>
<td>10.5, 11.5</td>
<td>CH.1</td>
</tr>
<tr>
<td>Inspect course-specific hand and power tools to visually identify defects.</td>
<td>10.5, 11.5</td>
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<tr>
<td>Demonstrate lifting and carrying techniques.</td>
<td>10.5, 11.5</td>
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<tr>
<td>Demonstrate safe laddering techniques.</td>
<td>10.5, 11.5</td>
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<tr>
<td>Demonstrate safe scaffolding techniques.</td>
<td>10.5, 11.5</td>
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<tr>
<td>Report personal injuries and environmental and equipment safety violations to the appropriate authority.</td>
<td>10.1, 11.1</td>
<td>GOVT.1, GOVT.7, GOVT.8, GOVT.9, GOVT.15, GOVT.16</td>
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<tr>
<td>Earn the Construction Industry OSHA 10 card.</td>
<td>10.5, 11.5</td>
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<tr>
<td>Pass a safety exam for lab/site safety and the use of tools and equipment specific to the construction industry.</td>
<td>10.5, 11.5</td>
<td>GOVT.7, GOVT.8, GOVT.9, GOVT.14, GOVT.15</td>
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<tr>
<td>Discuss the historical development of the plumbing trade.</td>
<td>10.1, 10.5, 11.1, 11.5</td>
<td>GOVT.9, VUS.14, WG.17, WHI.5, WHI.6, WHI.10, WHI.14, WHII.14</td>
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<tr>
<td>Task</td>
<td>Relevant Subjects</td>
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<td>----------------------------------------------------------------------</td>
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<tr>
<td>Describe the importance of plumbers in modern society.</td>
<td>English: 10.5, 11.5</td>
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<tr>
<td>Explain the importance of code compliance to the profession.</td>
<td>History and Social Science: GOVT.9, VUS.14, WG.17, WHII.14</td>
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<tr>
<td>Discuss the role of teams in a plumbing trade.</td>
<td>English: 10.1, 10.5, 11.1, 11.5</td>
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<tr>
<td>Develop a list of tools and safety equipment to be carried in work vehicle.</td>
<td>English: 10.5, 10.6, 11.5, 11.6</td>
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<td>Describe chemical risks associated with the plumbing occupation.</td>
<td>English: 10.5, 11.5</td>
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<tr>
<td>Identify plumbing-related career and educational opportunities.</td>
<td>Science: CH.1</td>
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<tr>
<td>Identify how green technology is incorporated into plumbing.</td>
<td>English: 10.5, 11.5</td>
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<tr>
<td>Measure pipe dimensions.</td>
<td>English: 10.5, 11.5</td>
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<td>Calculate fitting allowance.</td>
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<tr>
<td>Calculate offsets using the Pythagorean Theorem.</td>
<td>Mathematics: G.2, G.8</td>
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<td>Calculate a 45-degree offset using the constant method.</td>
<td>Mathematics: G.2</td>
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<tr>
<td>Perform mathematical calculations using feet and inches as the unit of measure, including addition, subtraction, and conversion (feet to inches, inches to feet).</td>
<td>English: 10.5, 11.5</td>
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<tr>
<td>Convert decimals to fractions and fractions to decimals.</td>
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<td>Convert metric measurements to standard measurements.</td>
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<td>Identify fixtures depicted on a blueprint.</td>
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<tr>
<td>Read an architect’s scale.</td>
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<tr>
<td>Develop an overhead and an isometric drawing.</td>
<td>English: 10.6, 11.6</td>
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<tr>
<td>Develop fitting/material lists based on drawings.</td>
<td>Mathematics: A.1</td>
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<td>Interpret the schedule on a blueprint.</td>
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<td>Interpret specifications on a blueprint.</td>
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<td>Describe how code requirements apply to certain drawings.</td>
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</tbody>
</table>
Green Building Infusion Units

The Green Building Infusion Unit (GBIU) was designed to encourage teachers to infuse instructional units on green building knowledge and skills into designated CTE courses. The infusion unit is not mandatory, and, as such, the tasks/competencies are marked as “optional,” to be taught at the instructor’s discretion.

Entrepreneurship Infusion Units

Entrepreneurship Infusion Units may be used to help students achieve additional, focused competencies and enhance the validated tasks/competencies related to identifying and starting a new business venture. Because the unit is a complement to certain designated courses and is not mandatory, all tasks/competencies are marked “optional.”
Appendix: Credentials, Course Sequences, and Career Cluster Information

**Industry Credentials: Only apply to 36-week courses**

- College and Work Readiness Assessment (CWRA+)
- Core: Introductory Craft Skills Entry-Level Assessment
- Customer Service Examination
- Customer Service Specialist (CSS) Examination
- ICC Certificates of Completion Examinations
- International Code Council Residential Plumbing Inspector (P1) Examination
- National Career Readiness Certificate Assessment
- Plumbing Assessment
- Plumbing Examination
- Plumbing Level One Entry-Level Assessment
- Plumbing-Heating-Cooling Contractors Educational Foundation Examinations
- Pre-Apprenticeship Certificate Training (PACT) Core Examinations
- Professional Communications Certification Examination
- Workplace Readiness Skills for the Commonwealth Examination

**Concentration sequences:** *A combination of this course and those below, equivalent to two 36-week courses, is a concentration sequence. Students wishing to complete a specialization may take additional courses based on their career pathways. A program completer is a student who has met the requirements for a CTE concentration sequence and all other requirements for high school graduation or an approved alternative education program.*

- Plumbing II (8552/36 weeks, 280 hours)

**Career Cluster: Architecture and Construction**

<table>
<thead>
<tr>
<th>Pathway</th>
<th>Occupations</th>
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<tbody>
<tr>
<td>Construction</td>
<td>Construction Manager</td>
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<td></td>
<td>General Contractor</td>
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<tr>
<td></td>
<td>Plumber, Pipefitter</td>
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<tr>
<td>Design/Pre-Construction</td>
<td>Building Code Inspector</td>
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<td></td>
<td>Cost Estimator</td>
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<tr>
<td>Maintenance and Operations</td>
<td>Plumber, Pipefitter</td>
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