



CONSTRUCTION TECHNOLOGY

Competencies / Objectives

MODULE 68101-09 – SITE LAYOUT ONE: DISTANCE MEASUREMENT AND LEVELING

1. Describe the major responsibilities of the carpenter relative to site layout.
2. Convert measurements stated in feet and inches to equivalent measurements stated in decimal feet, and vice versa.
3. Use and properly maintain tools and equipment associated with taping.
4. Use manual or electronic equipment and procedures to make distant measurements and perform site layout tasks.
5. Determine approximate distances by pacing.
6. Recognize, use, and properly care for tools and equipment associated with differential leveling.
7. Use a builder's level and differential leveling procedures to determine site and building elevations.
8. Record site layout data and information in field notes using accepted practices.
9. Check and/or establish 90-degree angles using the 3-4-5 rule.

MODULE 68102-09 – INTRODUCTION TO CONCRETE, REINFORCING MATERIALS, AND FORMS

1. Identify the properties of cement.
2. Describe the composition of concrete.
3. Perform volume estimates for concrete quantity requirements.
4. Identify types of concrete reinforcement materials and describe their uses.
5. Identify various types of footings and explain their uses.
6. Identify the parts of various types of forms.
7. Explain the safety procedures associated with the construction and use of concrete forms.
8. Erect, plumb, and brace a simple concrete form with reinforcement.

MODULE 68103-09 – HANDLING AND PLACING CONCRETE

1. Recognize the various equipment used to transport and place concrete.
2. Describe the factors that contribute to the quality of concrete placement.
3. Demonstrate the correct methods for placing and consolidating concrete into forms.
4. Demonstrate how to use a screed to strike off and level concrete to the proper grade in a form.
5. Demonstrate how to use tools for placing, floating, and finishing concrete.
6. Determine when conditions permit the concrete finishing operation to start.
7. Name the factors that affect the curing of concrete and describe the methods used to achieve proper curing.
8. Properly care for and safely use hand and power tools used when working with concrete.

MODULE 68104-09 - INTRODUCTION TO MASONRY

1. Discuss the history of masonry.
2. Describe modern masonry materials and methods.
3. Explain career ladders and advancement possibilities in masonry work.
4. Describe the skills, attitudes, and abilities needed to work as a mason.
5. State the safety precautions that must be practiced at a work site, including the following:
 - Safety practices
 - Fall-protection procedures
 - Forklift-safety operations
6. Perform the following basic bricklaying procedures:
 - Mixing of mortar
 - Laying a mortar bed
 - Laying bricks
7. Put on eye protection, respiratory protection, and a safety harness.
8. Use the correct procedures for fueling and starting a gasoline-powered tool.

MODULE 68105-09 - MASONRY UNITS AND INSTALLATION TECHNIQUES

1. Describe the most common types of masonry units.
2. Describe and demonstrate how to set up a wall.
3. Lay a dry bond.
4. Spread and furrow a bed joint, and butter masonry units.
5. Describe the different types of masonry bonds.
6. Cut brick and block accurately.
7. Lay masonry units in a true course.

MODULE 68106-09 – FLOOR SYSTEMS

1. Identify the different types of framing systems.
2. Read and interpret drawings and specifications to determine floor system requirements.
3. Identify floor and sill framing and support members.
4. Name the methods used to fasten sills to the foundation.
5. Given specific floor load and span data, select the proper girder/beam size from a list of available girders/beams.
6. List and recognize different types of floor joists.
7. Given specific floor load and span data, select the proper joist size from a list of available joists.
8. List and recognize different types of bridging.
9. List and recognize different types of flooring materials.
10. Explain the purposes of subflooring and underlayment.
11. Match selected fasteners used in floor framing to their correct uses.
12. Estimate the amount of material needed to frame a floor assembly.
13. Demonstrate the ability to:
 - Lay out and construct a floor assembly
 - Install bridging
 - Install joists for a cantilever floor
 - Install a subfloor using butt-joint plywood/OSB panels
 - Install a single floor system using tongue-and-groove plywood/OSB panels

MODULE 68107-09 – WALL AND CEILING FRAMING

1. Identify the components of a wall and ceiling layout.
2. Describe the procedure for laying out a wood frame wall, including plates, corner posts, door and window openings, partition Ts, bracing, and firestops.
3. Describe the correct procedure for assembling and erecting an exterior wall.
4. Identify the common materials and methods used for installing sheathing on walls.
5. Lay out, assemble, erect, and brace exterior walls for a frame building.
6. Describe wall framing techniques used in masonry construction.
7. Explain the use of metal studs in wall framing.
8. Describe the correct procedure for laying out ceiling joists.
9. Cut and install ceiling joists on a wood frame building.
10. Estimate the materials required to frame walls and ceilings.

MODULE 68108-09 – ROOF FRAMING

1. Understand the terms associated with roof framing.
2. Identify the roof framing members used in gable and hip roofs.
3. Identify the methods used to calculate the length of a rafter.
4. Identify the various types of trusses used in roof framing.
5. Use a rafter framing square, speed square, and calculator in laying out a roof.
6. Identify various types of sheathing used in roof construction.
7. Frame a gable roof with vent openings.
8. Frame a roof opening.
9. Erect a gable roof using trusses.
10. Estimate the materials used in framing and sheathing a roof.

MODULE 68109-09 – ROOFING APPLICATIONS

1. Identify the materials and methods used in roofing.
2. Explain the safety requirements for roof jobs.
3. Install fiberglass shingles on gable and hip roofs.
4. Close up a valley using fiberglass shingles.
5. Explain how to make various roof projections watertight when using fiberglass shingles.
6. Complete the proper cuts and install the main and hip ridge caps using fiberglass shingles.
7. Lay out, cut, and install a cricket or saddle.
8. Install wood shingles and shakes on roofs.
9. Describe how to close up a valley using wood shingles and shakes.
10. Explain how to make roof projections watertight when using wood shakes and shingles.
11. Complete the cuts and install the main and hip ridge caps using wood shakes/shingles.
12. Demonstrate the techniques for installing other selected types of roofing materials.

MODULE 68110-09 – EXTERIOR FINISHING

1. Describe the purpose of wall insulation and flashing.
2. Install selected common cornices.
3. Demonstrate lap and panel siding estimating methods.
4. Describe the types and applications of common wood siding.
5. Describe fiber-cement siding and its uses.
6. Describe the types and styles of vinyl and metal siding.

7. Describe the types and applications of stucco and masonry veneer finishes.
8. Describe the types and applications of special exterior finish systems.
9. Install three types of siding commonly used in your area.

MODULE 68111-09 – BASIC STAIR LAYOUT

1. Identify the various types of stairs.
2. Identify the various parts of stairs.
3. Identify the materials used in the construction of stairs.
4. Interpret construction drawings of stairs.
5. Calculate the total rise, number and size of risers, and number and size of treads required for a stairway.
6. Lay out and cut stringers, risers, and treads.
7. Build a small stair unit with a temporary handrail.

MODULE 68112-09 – ELECTRICAL SAFETY

1. Recognize safe working practices in the construction environment.
2. Explain the purpose of OSHA and how it promotes safety on the job.
3. Identify electrical hazards and how to avoid or minimize them in the workplace.
4. Explain safety issues concerning lockout/tagout procedures, confined space entry, respiratory protection, and fall protection systems.
5. Develop a task plan and a hazard assessment for a given task and select the appropriate PPE and work methods to safely perform the task.

MODULE 68113-09 – RESIDENTIAL ELECTRICAL SERVICES

1. Explain the role of the National Electrical Code[®] in residential wiring and describe how to determine electric service requirements for dwellings.
2. Explain the grounding requirements of a residential electric service.
3. Calculate and select service-entrance equipment.
4. Select the proper wiring methods for various types of residences.
5. Compute branch circuit loads and explain their installation requirements.
6. Explain the types and purposes of equipment grounding conductors.
7. Explain the purpose of ground fault circuit interrupters and tell where they must be installed.
8. Size outlet boxes and select the proper type for different wiring methods.
9. Describe rules for installing electric space heating and HVAC equipment.
10. Describe the installation rules for electrical systems around swimming pools, spas, and hot tubs.
11. Explain how wiring devices are selected and installed.
12. Describe the installation and control of lighting fixtures.

MODULE 68114-09 – INTRODUCTION TO HVAC

1. Explain the basic principles of heating, ventilating, and air conditioning.
2. Identify career opportunities available to people in the HVAC trade.
3. Explain the purpose and objectives of an apprentice training program.
4. Describe how certified apprentice training can start in high school.
5. Describe what the *Clean Air Act* means to the HVAC trade.
6. Describe the types of regulatory codes encountered in the HVAC trade.
7. Identify the types of schedules/drawings used in the HVAC trade.

MODULE 68115-09 – INTRODUCTION TO DRAIN, WASTE, AND VENT (DWV) SYSTEMS

1. Explain how waste moves from a fixture through the drain system to the environment.
2. Identify the major components of a drainage system and describe their functions.
3. Identify the different types of traps and their components, explain the importance of traps, and identify the ways that traps can lose their seals.
4. Identify the various types of drain, waste, and vent (DWV) fittings and describe their applications.
5. Identify significant code and health issues, violations, and consequences related to DWV systems.

MODULE 68116-09 – PLASTIC PIPE AND FITTINGS

1. Identify types of materials and schedules of plastic piping.
2. Identify proper and improper applications of plastic piping.
3. Identify types of fittings and valves used with plastic piping.
4. Identify and determine the kinds of hangers and supports needed for plastic piping.
5. Identify the various techniques used in hanging and supporting plastic piping.
6. Properly measure, cut, and join plastic piping.
7. Explain proper procedures for the handling, storage, and protection of plastic pipes.

MODULE 68117-09 – COPPER PIPE AND FITTINGS

1. Identify the types of materials and schedules used with copper piping.
2. Identify the material properties, storage, and handling requirements of copper piping.
3. Identify the types of fittings and valves used with copper piping.
4. Identify the techniques used in hanging and supporting copper piping.
5. Properly measure, ream, cut, and join copper piping.
6. Identify the hazards and safety precautions associated with copper piping.



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CONSTRUCTION TECHNOLOGY

Materials and Equipment

MODULE 68101-09 – SITE LAYOUT I: DISTANCE MEASUREMENT AND LEVELING

Overhead projector and screen
Transparencies
Blank acetate sheets
Transparency pens
Whiteboard/chalkboard
Markers/chalk
Pencils and scratch paper
Appropriate personal protective equipment
Site plot plans for selected construction sites
Assortment of hubs, stakes, and laths
Assortment of different colored flagging tape
Permanent markers for marking stakes
Field notebooks for recording data
2" × 4" or 2" × 6" ledger boards
2" × 4" batter boards
Nylon string
Calculator
100 foot steel tape
Range poles
Plumb bobs/gammon reels
Hand sight levels
Tension spring
Chaining pins
Builder's level
Transit level
Tripods
Laser level
Assortment of leveling rods and accessories
Quick Quizzes
Module Examinations
Performance Profile Sheets

MODULE 68102-09 – INTRODUCTION TO CONCRETE, REINFORCING MATERIALS, AND FORMS

Transparencies
Markers/chalk
Blank acetate sheets
Transparency pens
Pencils and scratch paper
Overhead projector and screen
Whiteboard/chalkboard
Appropriate personal protective equipment
Hand calculator
Concrete calculator
Copies of a concrete table
Form boards, stakes, braces, ties, and spreaders
16-gauge tying wire
Samples of various aggregates
Samples of concrete mix
Various bar supports and accessories
Various mechanical splices for reinforcement steel
Various sizes, types, and grades of reinforcement materials
Samples of various types and sizes of wire fabric
Exterior plywood or plyform
Steel tape or rule
Basic carpenter's toolbox
Level
Plumb bob
String line
Duplex nails
Plan for simple form
Circular saw and extension cord
Copies of Worksheet 1
Module Examinations
Performance Profile Sheets

MODULE 68103-09 – HANDLING AND PLACING CONCRETE

Overhead projector and screen

Transparencies

Blank acetate sheets

Transparency pens

Whiteboard/chalkboard

Markers/chalk

Pencils and scratch paper

Appropriate personal protective equipment

Equipment for moving, placing, and consolidating concrete, including:

Moveable chutes (such as used with mixer trucks)

Drop chutes

Elephant trunk

Wheelbarrow

Power buggy and/or carts

Crane and bucket

Belt conveyor

Concrete pump

Pneumatic gun

Internal vibrator

Rollerbug tamper

Equipment for screeding, leveling, and finishing concrete, including:

Manual/power screeds

Knee boards

Darby floats/bullfoats

Pointed trowels

Edgers

Jointers (groovers)

Power saws

Hand floats

Hand trowels

Finishing machines

Brooms

Assortment of combination tools

Pointing and margin trowels

Cement hammers

Carborundum rubbing stones

Sprayers

Power grinders

Properly-constructed concrete formworks

Sand

Boxes to contain wet sand

Copies of Quick Quiz*

Module Examinations**

Performance Profile Sheet**

MODULE 68104-09 - INTRODUCTION TO MASONRY

Overhead projector and screen
Transparencies
Whiteboard/chalkboard
Markers/chalk
Blank acetate sheets
Transparency pens
Pencils and scratch paper
Appropriate personal protective equipment:
 Various types of eye and respiratory protection
 Safety harness and hardware
ASTM standards on concrete block and masonry mortar
Various types of brick
Various types of concrete blocks
Various trowels
Mortar mix
Mortar mixing pan
Mortar hoe
Wheelbarrow
Standard bricks
Standard concrete blocks
Module Examinations
Performance Profile Sheets

MODULE 68105-09 - MASONRY UNITS AND INSTALLATION TECHNIQUES

Overhead projector and screen
Transparencies
Whiteboard/chalkboard
Markers/chalk
Blank acetate sheets
Transparency pens
Pencils and scratch paper
Appropriate personal protective equipment
ASTM standards for CMUs
ASTM standards for concrete bricks
Bricks
Chalkline
Crayons or wax markers
Medicine dropper
Spacing jigs
Concrete blocks
Brick set chisels
Block set chisels
Hammers
Mason's hammers
Mason's lines
Line blocks
Line pins
Line trigs
Masonry saw

MODULE 68105-09 - MASONRY UNITS AND INSTALLATION TECHNIQUES (CONTINUED)

Masonry power saw
Mashes
Mortar mix
Mortar pans
Trowels
Mason's levels
Plumb bobs
Rakers
Jointers
Sledrunners
Splitters
Masonry brushes
Tuckpointers
MSDS for masonry cleaning solution
Module Examinations
Performance Profile Sheets

MODULE 68106-09 – FLOOR SYSTEMS

Transparencies
Markers/chalk
Blank acetate sheets
Transparency pens
Pencils and scratch paper
Overhead projector and screen
Whiteboard/chalkboard
Appropriate personal protective equipment
Floor adhesive (optional)
Beam material
Grout
Plywood or OSB butt-joint panels to cover floor area
Plywood or OSB (tongue-and-groove, 1/4") to cover floor area
Shim materials
Sill sealer
Steel bridging and instructions
Termite shield
2 3 6s for sills
2 3 10s for joists and headers
1 3 4s or 2 3 10s for bridging
8d box nails for bridging
8d box, screw, or ring shank nails for flooring
16d box nails for joists and headers
8d doublehead box nails
Pictures, photographs, etc., showing braced, balloon, platform, and post-and-beam framing
Sets of building working drawings and specifications
Examples of several floor plans and specifications
Pictures/photos of building damage that resulted from defective floor and sill framing (optional)
Tool box consisting of standard carpenter's hand tools

MODULE 68106-09 – FLOOR SYSTEMS (CONTINUED)

Chalkline
Electric drill and assorted drill and flat bits
Framing square
Level
100' tape
Power circular saw and extension cord
Reciprocating saw
Tin snips
Copies of Worksheets 1 through 3
Copies of Job Sheets 1 through 5
Module Examinations
Performance Profile Sheets

MODULE 68107-09 – WALL AND CEILING FRAMING

Transparencies
Markers/chalk
Blank acetate sheets
Transparency pens
Pencils and scratch paper
Overhead projector and screen
Whiteboard/chalkboard
Appropriate personal protective equipment
8d common nails
16d box nails
Floor plan
2 3 4 or 2 3 6 framing lumber for studs and joists
2 3 12 header material
¼" CD plywood for header spacers
½" CD plywood
Stock for blocking
Metal brace material
Sheathing material
Joist lumber
Chalkline
25' tape
Steel tape
Framing hammer
Framing square or speed square
Circular saw
Extension cord
4' level
6' stepladder
Copies of Job Sheets 1 through 5
Module Examinations
Performance Profile Sheets

MODULE 68108-09 – ROOF FRAMING

Transparencies
Markers/chalk
Blank acetate sheets
Transparency pens
Pencils and scratch paper
Overhead projector and screen
Whiteboard/chalkboard
Appropriate personal protective equipment
Scientific calculator
8d common nails
8d box nails
16d box nails
16d common nails
Roof framing plan
2 3 4 or 2 3 6 framing lumber for rafters and ridgeboards
Joist and header material for roof opening
½" CD plywood or other sheathing material
Nails for sheathing
H-clips
Roof trusses
1 3 6 lumber or plywood for catwalk
2 3 4 lumber for braces and stakes
Sample blueprints
Chalkline
String line
Steel tape with markings at 16" OC
Framing hammer
Claw hammer
Spreader for lifting trusses (if applicable)
Crane for lifting trusses (if applicable)
Rafter framing square
Sawhorses
Speed square and booklet
Circular saw
Extension cord
Handsaw
4' level
6' stepladders
Plumb bob and line
Copies of Job Sheets 1 through 6
Module Examinations
Performance Profile Sheets

MODULE 68109-09 – ROOFING APPLICATIONS

Overhead projector and screen
Transparencies
Blank acetate sheets
Transparency pens
Whiteboard/chalkboard
Markers/chalk
Pencils and scratch paper
Appropriate personal protective equipment
Composition shingles
Architectural shingles
Roll roofing material
Wood roofing shingles
Wood roofing shakes
Wood shingle panels
Hardboard simulated shingle panels
Metal simulated shingle panels
Slate shingles
Roofing tiles
Metal roofing
Synthetic tiles, shakes, and shingles
Membrane roofing
Corrugated metal roofing
Installation literature on standing-seam metal roofing
Scaffolding tags
Roofing brackets
Metal drip edge
Flashing
Fiberglass shingles
Torch-down roofing material
Single-ply roofing material
Ice edging
Prepared roof deck for composite shingles with a valley, hip roof intersection, horizontal abutment, and sidewall (all sheathed and with underlay in place)
Prepared roof deck for wood shingles with spaced sheathing and hip roof intersection
Prepared low-pitch (flat roof) roof with sheathing in place
2 x 4s to build saddle
Roofing nails
Plastic cement
Felt underlayment
Weatherproof membrane
Prefabricated soil pipe flashing
Backsaw
Power circular saw
Crowbar
Handsaw
Carpenter's level

MODULE 68109-09 – ROOFING APPLICATIONS (continued)

Nail apron
Sliding T-bevel
Keyhole saw
Pop riveter
Chalkline
Power saber saw
Angle square
Power drill
Caulking gun
Tin snips
Pry bar
Utility knife
Scribing compass
Drill bit set (regular and masonry)
Framing square
Claw hammer
Pneumatic nail guns
Shingle hatchet
Straightedge
Composition shingle knife
Roofing hammer
Slater's tools
Score and snap tile cutter
Hand grinder with diamond wheel
Portable metal brake
Margin trowel
Scaffolding
Materials moving equipment
Ladders and jacks
Full body harness with lanyard and decelerations device
Damaged personal fall protection equipment
Propane torch and tank
Copies of the Quick Quiz
Module Examinations
Performance Profile Sheets

MODULE 68110-09 – EXTERIOR FINISHING

Overhead projector and screen

Transparencies

Blank acetate sheets

Transparency pens

Whiteboard/chalkboard

Markers/chalk

Pencils and scratch paper

Sample of building wrap

MSDS

Samples of aluminum and vinyl fascia and soffits and installation instructions

2 × 4s with different types of tail rafter cuts

2 × 4s for lookouts

2 × 4s for lookout ledger

2 × 6s for false fascia

1 × 8s for fascia

1 × 2s for frieze

Plywood for soffit

Galvanized 4d box nails for soffit

Galvanized 8d casing nails for fascia

8d box nails for lookout ledger

16d box nails for lookouts

Samples of various types of wood siding

Nails used to secure wood siding

Samples of vinyl or metal siding

Manufacturer's installation instructions for metal and vinyl siding

Quantity of one style of vinyl or metal siding

Various manufactured vinyl or metal siding trim and starter components

Metal and PVC trim coils

Samples of various stucco, brick, stone, and synthetic stone veneer

Samples of DEFS/EIFS wall cladding

1 × 3s for story poles

6 bevel wood siding and or wood lap siding

Board-and-batten siding

Tongue-and-groove siding

Shiplap siding

Shingles and shakes

Panelized shake or shingle siding

4 × 8 plywood siding

4 × 8 panel and lap-style hardboard/particleboard siding

Lap and panel styles of fiber-cement siding

Manufacturer's installation instructions for fiber-cement siding

Manufacturer's installation instructions for plywood siding

Caulk

Inside and outside corner materials

Furring strips for starter course

Spacing gauges (fabricated)

MODULE 68110-09 – EXTERIOR FINISHING (continued)

Siding gauges (fabricated)
Drip caps
Flashing
Building paper
Nails
Radial arm saw
Framing square
Steel measuring tape
Claw hammer
4 level
Handsaw
Chalkline
Combination square
Water level
Circular saw or table saw
Fine-toothed, carbide-tipped, circular saw blade
Dry-diamond circular saw blade
Sawhorses or cutting table
Electric/pneumatic carbide-tipped power hand shears
Score-and-snap knife with tungsten carbide tip
Caulking gun
Pliers
Tin snips
Aviation shears
Steel awl
Putty knife
Utility knife
Snaplock punch
Vinyl siding unlocking tool
Nail hole punch
Flat-blade screwdriver
Portable brake
Copies of the Quick Quiz
Module Examinations

MODULE 68111-09 – BASIC STAIR LAYOUT

Transparencies
Markers/chalk
Blank acetate sheets
Transparency pens
Pencils and scratch paper
Overhead projector and screen
Whiteboard/chalkboard
Appropriate personal protective equipment
 Basic carpenter's toolbox
 Framing square
 Level
 Circular saw and extension cord
 Hand saw
 Stair gauges
 Calculator
 2 3 12s for stringers
 2 3 12s for treads
 1 3 8s for risers
 Handrail and brackets
 8d box nails
 16d box nails
 16d casing nails
 Stair plans
 Copies of Job Sheet 1
 Module Examinations
 Performance Profile Sheets

MODULE 68112-09 – ELECTRICAL SAFETY

Overhead projector and screen
Transparencies
Blank acetate sheets
Transparency pens
Whiteboard/chalkboard
Markers/chalk
Pencils and scratch paper
Copy of the latest edition of the *National Electrical Code*®
OSHA Electrical Safety Guidelines (pocket guide)
NFPA 70E
Various types of personal protective and safety equipment, including:
 Rubber gloves
 Insulating blankets
 Hot sticks
 Fuse pullers
 Shorting probes
 Safety glasses
 Face shields
 Company safety manual

MODULE 68112-09 – ELECTRICAL SAFETY (continued)

- GFCI device
- Company lockout/tagout procedures
- Step ladders
- Straight ladders
- Solvent MSDS
- Fall arrest system
- Safety harnesses
- Lockout/tagout devices and labels
- Access to eye wash station
- TV/DVD/VCR player (optional)
- Safety videos (optional)
- Module Examinations
- Performance Profile Sheet

MODULE 68113-09 – RESIDENTIAL ELECTRICAL SERVICES

- Transparencies
- Blank acetate sheets
- Transparency pens
- Whiteboard/chalkboard
- Markers/chalk
- Pencils and scratch paper
- Appropriate personal protective equipment
- Copy of the latest edition of the *National Electrical Code*®
- Calculator
- Residential floor plan
- Blank worksheet
- Various types of GFCIs
- Panelboard
- Examples of cable, including:
 - Type NM
 - Type AC
 - Type UF
 - Type SE/USE
- Examples of raceways, including:
 - Rigid
 - IMC
 - EMT
 - Flexible
 - PVC
- Various grounding devices
- Examples of made-type grounding electrodes
- Assortment of metallic and plastic outlet boxes
- Assorted types of electrical receptacles

MODULE 68113-09 – RESIDENTIAL ELECTRICAL SERVICES (continued)

Assortment of switches, including:

Single-pole

Three-way

Four-way

Photoelectric switches

Dimmer

Relays

Module Examination

Performance Profile Sheet

MODULE 68114-09 – INTRODUCTION TO HVAC

Overhead projector and screen

Transparencies

Blank acetate sheets

Transparency pens

Whiteboard/chalkboard

Markers/chalk

Pencils and scratch paper

Appropriate personal protective equipment

HVAC drawings for a commercial building (optional)

Air conditioner

Commercial drawing set

Building codes

Copy of an employee manual

Job announcements for HVAC technicians from local newspapers (want ads)

NCCER Apprentice Training Recognition Forms

MODULE 68115-09 – INTRODUCTION TO DRAIN, WASTE, AND VENT (DWV) SYSTEMS

Transparencies

Markers/chalk

Blank acetate sheets

Transparency pens

Pencils and scratch paper

Overhead projector and screen

Whiteboard/chalkboard

Appropriate personal protective equipment

Copies of your local code

DWV system design drawings

P-traps

Copies of *Figure 8* with the callouts covered

Drainage fittings made from a variety of materials

**MODULE 68115-09 – INTRODUCTION TO DRAIN, WASTE, AND VENT (DWV) SYSTEMS
(continued)**

DWV fittings, including:

Bends

Adapters

Cleanouts

Tees

Wyes

Increasers

Offsets

Torpedo level

Plans for a municipal waste treatment plant

Plans for a private waste disposal system

Module Examinations

Performance Profile Sheets

MODULE 68116-09 – PLASTIC PIPE AND FITTINGS

Transparencies

Markers/chalk

Blank acetate sheets

Transparency pens

Pencils and scratch paper

Overhead projector and screen

Whiteboard/chalkboard

Appropriate personal protective equipment

Copies of your local code

Flexible pipe

Pipe labels

Sections of plastic pipe:

- ABS (acrylonitrile-butadiene-styrene)

- PVC (polyvinyl chloride)

- CPVC (chlorinated polyvinyl chloride)

- PE (polyethylene)

- PEX (cross-linked polyethylene)

- PB (polybutylene)

Sample material safety data sheets (MSDS) for plastic pipe

Tools for measuring

Tools for cutting pipe

Deburring tools

Miter box

Plastic saw for cutting PVC pipe

CPVC or PVC cement or all-purpose cement conforming to *ASTM F-493* standards

PVC bell-and-spigot pipe

Lubricant

Tools used to join PEX tubing:

- Insert and crimp-ring system

- Tubing cutter

- Hand-crimping tool

- Go-no-go gauge

Cutter designed for plastic tubing

PEX ring

Expander tool

Mechanical joints and clamps

Compression collars

Tools for the butt-fusion method:

- Temperature indicator stick

- Heating tool

- Fusion timer

- Socket face

- Cold ring

Manufacturers Standardization Society's MSS40 hanger standard

National Fire Protection Association (NFPA) Chapter 13

Module Examinations

Performance Profile Sheets

Copies of Quick Quiz

MODULE 68117-09 – COPPER PIPE AND FITTINGS

Transparencies
Markers/chalk
Blank acetate sheets
Transparency pens
Pencils and scratch paper
Overhead projector and screen
Whiteboard/chalkboard
Appropriate personal protective equipment
Copies of your local code
Access to a fire extinguisher
Sections of copper pipe
Tee-pulling tool
Fittings and valves:
 Water supply fittings
 Water supply valves
 DWV fittings
 Alternative fittings
Tools for measuring copper pipe
Copper cutter
Handheld tube cutter
Internal tube cutter
Sizing tool
Tools to form sweat joints, compression joints, and flare joints
Variety of soldering tools, including an acetylene torch
Tools to roll groove and cut groove copper pipe
Pipe attachments for wood-frame construction
National Fire Protection Association (NFPA) Chapter 13
Manufacturers Standardization Society MSS40 hanger standards
Pressure gauge
Test plug
Module Examinations
Performance Profile Sheets



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CONSTRUCTION TECHNOLOGY

Performance Tasks

MODULE 68101-09 – SITE LAYOUT I: DISTANCE MEASUREMENT AND LEVELING

Task Number	Item	Date(s)	Recorded By
1	Interpret a construction site/plot drawing and relate the man-made and topographic features and other project information to the layout and topography of the actual site.		
2	Convert measurements given in feet and inches to equivalent decimal measurements stated in feet, tenths, and hundredths, and vice versa.		
3	Properly use taping equipment and procedures to make distance and site layout measurements.		
4	Determine approximate distances by pacing.		
5	Set up, adjust, and field test a leveling instrument.		
6	Use a builder's level, leveling rods, and differential leveling procedures to determine site and building elevations.		
7	Record differential leveling data in field notes in accordance with accepted practices.		
8	Use differential leveling and distance measurement procedures to transfer elevations up a structure.		
9	Check and/or establish 90-degree angles using the 3-4-5 rule.		

MODULE 68102-09 – INTRODUCTION TO CONCRETE, REINFORCING MATERIALS, AND FORMS

Task Number	Item	Date(s)	Recorded By
1	Perform volume estimates for concrete quantity requirements.		
2	Construct a simple concrete form with reinforcement.		

MODULE 68103-09 – HANDLING AND PLACING CONCRETE

Task Number	Item	Date(s)	Recorded By
1	Properly handle, place, and consolidate concrete in selected concrete forms.		
2	Use a screed to strike off and level a concrete surface.		
3	Use a bullfloat and/or darby to level and smooth a concrete surface.		
4	Use an edger to form a radius at the edges of a concrete pad, slab, etc.		
5	Use a jointer to make control joints in a concrete surface.		
6	Use a hand float and finishing trowel to level high spots, remove imperfections, and smooth a concrete surface.		

MODULE 68104-09 – INTRODUCTION TO MASONRY

Task Number	Item	Date(s)	Recorded By
1	Put on eye protection, respiratory protection, and a safety harness.		
2	Demonstrate the ability to properly use a trowel to spread and furrow bed joints and butter head joints.		

MODULE 68105-09 – MASONRY UNITS AND INSTALLATION TECHNIQUES

Task Number	Item	Date(s)	Recorded By
1	Lay a dry bond.		
2	Accurately cut masonry units with a brick set and masonry hammer, a block set and mash, and a masonry hammer, power saw, and splitter.		
3	Spread, edge, and furrow bed joints.		
4	Butter bricks and blocks and place them on a bed joint.		
5	Lay masonry units in courses that are true for height, level, plumb, and straightness.		
6	Build a rackback corner lead.		
7	Lay masonry units to the line.		

MODULE 69106-09 – FLOOR SYSTEMS

Task Number	Item	Date(s)	Recorded By
1	Lay out and construct a floor assembly.		
2	Install bridging.		
3	Install joists for a cantilever floor.		
4	Install a subfloor using butt-joint plywood/OSB panels.		
5	Install a single floor system using tongue-and-groove plywood/OSB panels.		
6	Estimate the amount of material needed to frame a floor assembly.		
7	Given specific floor load and span data, select the proper girder/beam and joist size from a list of available girders/beams/joists.		

MODULE 69107-09 – WALL AND CEILING FRAMING

Task Number	Item	Date(s)	Recorded By
1	Lay out, assemble, erect, and brace exterior walls.		
2	Cut and install ceiling joists on a wood frame building.		
3	Estimate the materials required to frame walls and ceilings.		

MODULE 69108-09 – ROOF FRAMING

Task Number	Item	Date(s)	Recorded By
1	Use a framing square and speed square in laying out a roof.		
2	Frame and sheathe a gable roof with an opening.		
3	Erect a gable roof using trusses.		
4	Estimate the materials used in framing and sheathing a roof.		

MODULE 69109-09 – ROOFING APPLICATIONS

Task Number	Item	Date(s)	Recorded By
1	Install fiberglass shingles on gable and hip roofs.		
2	Close up a valley using fiberglass shingles.		
3	Complete the proper cuts and install the main and hip ridge caps using fiberglass shingles.		
4	Lay out, cut, and install a cricket or saddle.		
5	Install wood shingles and shakes on roofs.		
6	Complete the cuts and install the main and hip ridge caps using shakes/shingles.		
7	Demonstrate the techniques for installing other selected types of roofing materials.		

MODULE 69110-09 – EXTERIOR FINISHING

Task Number	Item	Date(s)	Recorded By
1	Install a selected cornice or box cornice using the proper safety precautions.		
2	Estimate the amount of lap or panel siding required for a structure.		
3	Install three of the most common siding types in your area.		

MODULE 68111-09 – BASIC STAIR LAYOUT

Task Number	Item	Date(s)	Recorded By
1	Lay out and build a small stair unit with a handrail to a given rise.		

MODULE 68112-09 – ELECTRICAL SAFETY

Task Number	Item	Date(s)	Recorded By
1.	Perform a visual inspection on various types of ladders.		
2.	Set up a ladder properly to perform a task.		
3.	Properly don a harness.		
4.	Perform a hazard assessment of a job such as replacing the lights in your classroom. <ul style="list-style-type: none">• Discuss the work to be performed and the hazards involved.• Locate the closest phone to the work site and ensure that the local emergency telephone numbers are either posted at the phone or known by you and your partner(s).• Plan an escape route from the location in the event of an accident.		

MODULE 69113-09 – RESIDENTIAL ELECTRICAL SERVICES

Task Number	Item	Date(s)	Recorded By
1.	For a residential dwelling of a given size, and equipped with a given list of major appliances, demonstrate or explain how to: <ul style="list-style-type: none">• Compute the lighting, small appliance, and laundry loads.• Compute the loads for large appliances.• Determine the number of branch circuits required.• Size and select the service-entrance equipment (conductors, panelboard, and protective devices).		
2.	Using an unlabeled diagram of a panelboard (Performance Profile Sheet 3), label the lettered components.		
3.	Select the proper type and size outlet box needed for a given set of wiring conditions.		

MODULE 68114-09 – INTRODUCTION TO HVAC

Task Number	Item	Date(s)	Recorded By
03101-1	Identify the following within a HVAC drawing provided by the instructor: <ul style="list-style-type: none">• Piping• Air-handling equipment• AC System(s)• HVAC component diagram• Schematics		

MODULE 68115-09 – Introduction to Drain, Waste, and Vent (DWV) Systems

Task Number	Item	Date(s)	Recorded By
1	Sketch a simple DWV system, label its components, and size the pipe.		

MODULE 68116-09 – PLASTIC PIPE AND FITTINGS

Task Number	Item	Date(s)	Recorded By
1	Select correct types of materials for plastic piping systems.		
2	Identify types of fittings and valves and their uses.		
3	Select the appropriate personal protective equipment for working with plastic piping.		
4	Properly measure, cut, and join plastic piping.		
5	Select the correct hanger or support for the application.		

MODULE 68117-09 – Copper Pipe and Fittings

Task Number	Item	Date(s)	Recorded By
1	Select correct types of materials for copper piping systems.		
2	Identify types of fittings and valves and their uses.		
3	Select the appropriate personal protective equipment for working with copper piping.		
4	Correctly measure, cut, ream, join, and groove copper piping.		
5	Select the correct hanger or support for the application.		