MODULE OVERVIEW

This module introduces the carpentry trainee to the carpentry trade, including the apprenticeship process and the opportunities within the trade.

PREREQUISITES

Prior to training with this module, it is suggested that the trainee shall have successfully completed *Core Curriculum*.

OBJECTIVES

Upon completion of this module, the trainee will be able to do the following:

1. Describe the history of the carpentry trade.
2. Identify the aptitudes, behaviors, and skills needed to be a successful carpenter.
3. Identify the training opportunities within the carpentry trade.
4. Identify the career and entrepreneurial opportunities within the carpentry trade.
5. Identify the responsibilities of a person working in the construction industry.
6. State the personal characteristics of a professional.
7. Explain the importance of safety in the construction industry.

PERFORMANCE TASKS

This is a knowledge-based module—there is no performance testing.

MATERIALS AND EQUIPMENT LIST

Transparencies
Markers/chalk
Blank acetate sheets
Transparency pens
Pencils and scratch paper
Overhead projector and screen
Whiteboard/chalkboard
Appropriate personal protective equipment
Module Examinations*

* Single-module AIG purchases include the printed exam and performance task sheet. If you have purchased the perfect-bound version of this title, download these materials from the IRC using your access code.

TEACHING TIME FOR THIS MODULE

An outline for use in developing your lesson plan is presented below. Note that each Roman numeral in the outline equates to one session of instruction. Each session has a suggested time period of 2½ hours. This includes 10 minutes at the beginning of each session for administrative tasks and one 10-minute break during the session. Approximately 2½ hours are suggested to cover *Orientation to the Trade*. You will need to adjust the time required for hands-on activity and testing based on your class size and resources.

Topic	**Planned Time**
Session I. Orientation to the Trade	
A. Introduction	_____
B. History of Carpentry	_____
C. Modern Carpentry	_____
D. Opportunities in the Construction Industry	_____
1. Formal Construction Training	_____
2. Apprenticeship Program	_____
3. Responsibilities of the Employee	_____
4. What You Should Expect from Your Employer	_____

5. What You Should Expect from a Training Program _____
6. What You Should Expect from the Apprenticeship Committee _____

E. Human Relations _____
1. Making Human Relations Work _____
2. Human Relations and Productivity _____
3. Attitude _____
4. Maintaining a Positive Attitude _____

F. Employer and Employee Safety Obligations _____

G. Review _____

H. Module Examination _____
1. Trainees must score 70 percent or higher to receive recognition from NCCER.
2. Record the testing results on Craft Training Report Form 200, and submit the results to the Training Program Sponsor.

Building Materials, Fasteners, and Adhesives
Annotated Instructor's Guide

Module 27102-06

MODULE OVERVIEW

This module introduces the carpentry trainee to wood building materials, fasteners, and adhesives.

PREREQUISITES

Prior to training with this module, it is suggested that the trainee shall have successfully completed *Core Curriculum*; *Carpentry Fundamentals Level One*, Module 27101-06.

OBJECTIVES

Upon completion of this module, the trainee will be able to do the following:

1. Identify various types of building materials and their uses.
2. State the uses of various types of hardwoods and softwoods.
3. Identify the different grades and markings of wood building materials.
4. Identify the safety precautions associated with building materials.
5. Describe the proper method of storing and handling building materials.
6. State the uses of various types of engineered lumber.
7. Calculate the quantities of lumber and wood products using industry-standard methods.
8. Describe the fasteners, anchors, and adhesives used in construction work and explain their uses.

PERFORMANCE TASKS

Under the supervision of the instructor, the trainee should be able to do the following:

1. Calculate the quantities of lumber and wood products using industry-standard methods.
2. Given a selection of building materials, identify a particular material and state its use.

MATERIALS AND EQUIPMENT LIST

Transparencies
Markers/chalk
Blank acetate sheets
Transparency pens
Pencils and scratch paper
Overhead projector and screen
Whiteboard/chalkboard
Appropriate personal protective equipment
Samples of lumber containing:
  Grade stamps
  Natural defects
  Manufacturing defects
Samples of plywood containing grade stamps
Samples of engineered sheet materials
  (OSB, particleboard, etc.)
Samples of engineered lumber
  (LVL, PSL, glulam, etc.)
Samples of various concrete blocks
Samples of metal framing materials
Samples of various kinds of:
  Nails
  Screws
  Bolts
  Anchors
  Construction adhesives
Cross section of a tree trunk (optional)
Drill and bits
Hammer
Screwdriver
Calculator
Module Examinations*
Performance Profile Sheets*

* Single-module AIG purchases include the printed exam and performance task sheet. If you have purchased the perfect-bound version of this title, download these materials from the IRC using your access code.

SAFETY CONSIDERATIONS

Ensure that the trainees are equipped with appropriate personal protective equipment.

ADDITIONAL RESOURCES

This module is intended to present thorough resources for task training. The following reference works are suggested for both instructors and motivated trainees interested in further study. These are optional materials for continued education rather than for task training.

Basic Construction Materials. Upper Saddle River, NJ: Prentice Hall.

Principles and Practices of Light Construction. Upper Saddle River, NJ: Prentice Hall.

Principles and Practices of Commercial Construction. Upper Saddle River, NJ: Prentice Hall.

Building Construction Illustrated. New York, NY: John Wiley & Sons.

Fundamentals of Building Construction: Materials and Methods. New York, NY: John Wiley & Sons.

Buildings in Wood: The History and Traditions of Architecture's Oldest Building Material. New York: Rizzoli/Universe International Publications.

TEACHING TIME FOR THIS MODULE

An outline for use in developing your lesson plan is presented below. Note that each Roman numeral in the outline equates to one session of instruction. Each session has a suggested time period of 2½ hours. This includes 10 minutes at the beginning of each session for administrative tasks and one 10-minute break during the session. Approximately 7½ hours are suggested to cover *Building Materials, Fasteners, and Adhesives.* You will need to adjust the time required for hands-on activity and testing based on your class size and resources. Because laboratories often correspond to Performance Tasks, the proficiency of the trainees may be noted during these exercises for Performance Testing purposes.

Topic	**Planned Time**
Session I. Introduction; Lumber Sources and Uses; Lumber Defects; Lumber Grading; Plywood	
A. Introduction	_____
B. Lumber Sources and Uses	_____
1. Lumber Cutting	_____
2. General Classifications of Lumber	_____
C. Lumber Defects	_____
1. Moisture and Warping	_____
2. Preventing Warping and Splitting	_____
D. Lumber Grading	_____
1. Grading Terms	_____
2. Classification of Manufacturing Defects	_____
3. Abbreviations	_____
E. Plywood	_____
1. Plywood Sheet Sizes	_____
2. Grading for Softwood Construction Plywood	_____
3. Plywood Storage	_____
Session II. Building Boards; Engineered Wood Products; Pressure-Treated Lumber; Calculating Lumber Quantities; Concrete Block Construction; Commercial Construction Methods	
A. Building Boards	_____
1. Hardboard	_____
2. Particleboard	_____
3. High-Density Overlay (HDO) and Medium-Density Overlay (MDO) Plywood	_____
4. Oriented Strand Board (OSB)	_____
5. Mineral Fiberboards	_____

B. Engineered Wood Products _____
   1. Laminated Veneer Lumber (LVL) _____
   2. Parallel Strand Lumber (PSL) _____
   3. Laminated Strand Lumber (LSL) _____
   4. Wood I-Beams _____
   5. Glue-Laminated Lumber (Glulam) _____
C. Pressure-Treated Lumber _____
D. Calculating Lumber Quantities _____
E. Laboratory _____

   Have the trainees calculate the quantities of lumber and wood products required for an instructor-supplied project. This laboratory corresponds to Performance Task 1.

F. Concrete Block Construction _____
G. Commercial Construction Methods _____
   1. Floors _____
   2. Exterior Walls _____
   3. Interior Walls and Partitions _____
   4. Metal Framing Materials _____

Session III. Nails; Staples; Screws; Bolts; Mechanical Anchors; Epoxy Anchoring Systems; Adhesives; Review; Module Examination and Performance Testing

A. Nails _____
B. Staples _____
C. Screws _____
   1. Wood Screws _____
   2. Sheet Metal Screws _____
   3. Machine Screws _____
   4. Lag Screws and Shields _____
   5. Concrete/Masonry Screws _____
   6. Deck Screws _____
   7. Drywall Screws _____
   8. Drive Screws _____
   9. Hammer-Driven Pins and Studs _____
D. Bolts _____
   1. Stove Bolts _____
   2. Machine Bolts _____
   3. Carriage Bolts _____
E. Mechanical Anchors _____
   1. Anchor Bolts _____
   2. One-Step Anchors _____
   3. Bolt Anchors _____
   4. Screw Anchors _____
   5. Self-Drilling Anchors _____
   6. Guidelines for Drilling Anchor Holes in Hardened Concrete or Masonry _____
   7. Hollow-Wall Anchors _____

F. Epoxy Anchoring Systems _____

G. Adhesives _____

1. Glues _____
2. Construction Adhesives _____
3. Mastics _____
4. Shelf Life _____

H. Laboratory _____

Have the trainees identify and state the use of various building materials. This laboratory corresponds to Performance Task 2.

I. Review _____

J. Module Examination _____

1. Trainees must score 70 percent or higher to receive recognition from NCCER.
2. Record the testing results on Craft Training Report Form 200, and submit the results to the Training Program Sponsor.

K. Performance Testing _____

1. Trainees must perform each task to the satisfaction of the instructor to receive recognition from NCCER. If applicable, proficiency noted during laboratory exercises can be used to satisfy the Performance Testing requirements.
2. Record the testing results on Craft Training Report Form 200, and submit the results to the Training Program Sponsor.

Hand and Power Tools
Annotated Instructor's Guide

Module 27103-06

MODULE OVERVIEW

This module expands upon the hand and power tool information provided in the *Core Curriculum* and introduces the carpentry trainee to additional tools used in the carpentry trade.

PREREQUISITES

Prior to training with this module, it is suggested that the trainee shall have successfully completed *Core Curriculum*; *Carpentry Fundamentals Level One*, Modules 27101-06 and 27102-06.

OBJECTIVES

Upon completion of this module, the trainee will be able to do the following:

1. Identify the hand tools commonly used by carpenters and describe their uses.
2. Use hand tools in a safe and appropriate manner.
3. State the general safety rules for operating all power tools, regardless of type.
4. State the general rules for properly maintaining all power tools, regardless of type.
5. Identify the portable power tools commonly used by carpenters and describe their uses.
6. Use portable power tools in a safe and appropriate manner.

PERFORMANCE TASKS

Under the supervision of the instructor, the trainee should be able to do the following:

1. Demonstrate the safe and proper use of the following hand tools:
   - Levels
   - Squares
   - Planes
   - Clamps
   - Saws
2. Demonstrate or describe the safe and proper use of five of the following power tools:
   - Circular saw
   - Portable table saw
   - Compound miter saw
   - Frame and trim saw
   - Drill press
   - Router/laminate trimmer
   - Portable power plane
   - Power metal shears
   - Pneumatic nailer/stapler

MATERIALS AND EQUIPMENT LIST

Transparencies
Markers/chalk
Blank acetate sheets
Transparency pens
Pencils and scratch paper
Overhead projector and screen
Whiteboard/chalkboard
Appropriate personal protective equipment
Soapstone
Yard-long lengths of 1" reinforcing rod
1 × 4 stock about 18" to 24" long
2 × 4s 18" to 24" long
2 × 4s 4' long
6" × 12" pieces of ¾" plywood
Pieces of crown molding 4' long
Angle iron, steel rod, or pipe for cutting
Wood stock of various sizes
Laminate samples
Blocks of scrap wood
Fasteners (nails and staples) designed for the pneumatic fastener being used
Sheet metal stock
Folding rule or steel tape
Levels:
- Line
- Water
- Builder's
- Transit
- Laser

Squares:
- Try
- Sliding T-bevel
- Speed square
- Miter
- Framing
- Adjustable T-square

Planes:
- Block
- Jack
- Smoothing
- Jointer

Clamps:
- Web
- Hand-screw
- Bar
- Spring
- Locking C
- Pipe

Saws:
- Hacksaw and replacement blades
- Backsaw
- Dovetail
- Compass
- Coping

Chalkline
Clamping device
Portable circular saw
Circular saw protractor
Portable table saw
Miter/compound miter saw
Frame and trim saw
Demolition saw
Chop saw
Miter gauge
Ripping fence for portable circular saw
Push stick
Sawhorses or other solid support
Drill press and chuck key
Portable power plane and blades
Power metal shears
Router and router bits
Laminate trimmer and bits
Pneumatic fastener and manufacturer's instruction manual
Electric air compressor with air hose
Copies of Worksheet 1*
Copies of Job Sheets 1 through 7*
Module Examinations**
Performance Profile Sheets**

* Packaged with this Annotated Instructor's Guide.

**Single-module AIG purchases include the printed exam and performance task sheet. If you have purchased the perfect-bound version of this title, download these materials from the IRC using your access code.

SAFETY CONSIDERATIONS

Ensure that the trainees are equipped with appropriate personal protective equipment.

ADDITIONAL RESOURCES

This module is intended to present thorough resources for task training. The following reference works are suggested for both instructors and motivated trainees interested in further study. These are optional materials for continued education rather than for task training.

The Art of Fine Tools. Newton, CT: Taunton Press, Inc.

Field Guide to Tools. Philadelphia, PA: Quirk Publishing.

Measure Twice, Cut Once. Boston, MA: Little, Brown & Company.

Power Tools. Newton, CT: Taunton Press, Inc.

Selecting and Using Hand Tools. Newton, CT: Taunton Press, Inc.

Tools Rare and Ingenious: Celebrating the World's Most Amazing Tools. Newton, CT: Taunton Press, Inc.

Tricks of the Trade: Jigs, Tools and Other Labor-Saving Devices. Newton, CT: Taunton Press, Inc.

Black & Decker. **www.blackanddecker.com**

Bosch Tool Corporation. **www.boschtools.com**

Delta Machinery. **www.deltamachinery.com**

DeWalt Industrial Tool Company. **www.dewalt.com**

Makita Tools USA. **www.makita.com**

Milwaukee Electric Tool Company. **www.milwaukeetool.com**

Porter-Cable Corporation. **www.portercable.com**

Ridge Tool Company. **www.ridgid.com**

The Stanley Works. **www.stanleytools.com**

L.S. Starrett Company. **www.starrett.com**

TEACHING TIME FOR THIS MODULE

An outline for use in developing your lesson plan is presented below. Note that each Roman numeral in the outline equates to one session of instruction. Each session has a suggested time period of 2½ hours. This includes 10 minutes at the beginning of each session for administrative tasks and one 10-minute break during the session. Approximately 10 hours are suggested to cover *Hand and Power Tools.* You will need to adjust the time required for hands-on activity and testing based on your class size and resources. Because laboratories often correspond to Performance Tasks, the proficiency of the trainees may be noted during these exercises for Performance Testing purposes.

Topic	**Planned Time**
Session I. Introduction; Hand Tools	
A. Introduction	_____
B. Hand Tools	_____
1. Levels	_____
2. Laboratory	_____
Under your supervision, have the trainees practice using various levels. This laboratory corresponds to Performance Task 1.	
3. Squares	_____
4. Laboratory	_____
Hand out Job Sheet 27103-1. Under your supervision, have the trainees perform the tasks on the Job Sheet. This laboratory corresponds to Performance Task 1.	

5. Planes _____
6. Laboratory _____

   Under your supervision, have the trainees practice using various planes. This laboratory corresponds to Performance Task 1.

7. Clamps _____
8. Laboratory _____

   Under your supervision, have the trainees practice using various clamps. This laboratory corresponds to Performance Task 1.

9. Saws _____
10. Laboratory _____

    Hand out Job Sheet 27103-2. Under your supervision, have the trainees perform the tasks on the Job Sheet. Note the proficiency of each trainee.

Session II. Guidelines for Using All Power Tools; Power Saws

A. Guidelines for Using All Power Tools _____
   1. Safety Rules Pertaining to All Power Tools _____
   2. Guidelines Pertaining to the Care of All Power Tools _____

B. Power Saws _____
   1. Circular Saws _____
   2. Laboratory _____

      Hand out Worksheet 27103-1 and Job Sheets 27103-3 and -4. Under your supervision, have the trainees complete the circular saw safety test prior to performing the related tasks on the Job Sheets. Note the proficiency of each trainee.

   3. Portable Table Saws _____
   4. Laboratory _____

      Hand out Worksheet 27103-1 and Job Sheets 27103-3 and -4. Under your supervision, have the trainees complete the table saw safety test before performing the related tasks on the Job Sheets. Note the proficiency of each trainee.

   5. Power Miter Saws/Compound Miter Saws _____
   6. Laboratory _____

      Hand out Worksheet 27103-1 and Job Sheet 27103-5. Under your supervision, have the trainees complete the compound miter saw safety test before performing the related tasks on the Job Sheet. Note the proficiency of each trainee.

   7. Frame and Trim Saws _____
   8. Laboratory _____

      Hand out Worksheet 27103-1 and Job Sheet 27103-5. Under your supervision, have the trainees complete the frame and trim saw safety test before performing the related tasks on the Job Sheet. Note the proficiency of each trainee.

   9. Abrasive Saws
   10. Power Saw Blades _____

Session III. Drill Press; Routers/Laminate Trimmers; Portable Power Planes; Power Metal Shears; Pneumatic/Cordless Nailers and Staplers

A. Drill Press _____
   1. Laboratory _____

      Hand out Worksheet 27103-1 and Job Sheet 27103-6. Under your supervision, have the trainees complete the drill press safety test prior to performing the related tasks on the Job Sheet. Note the proficiency of each trainee.

B. Routers/Laminate Trimmers _____

1. Laboratory _____

   Hand out Worksheet 27103-1. Under your supervision, have the trainees complete the router and laminate trimmer safety test before operating these tools. Note the proficiency of each trainee.

C. Portable Power Planes _____

1. Laboratory _____

   Hand out Worksheet 27103-1. Under your supervision, have the trainees complete the power plane safety test before operating these tools. Note the proficiency of each trainee.

D. Power Metal Shears _____

1. Laboratory _____

   Hand out Worksheet 27103-1. Under your supervision, have the trainees complete the power metal shears safety test before using the shears. Note the proficiency of each trainee.

E. Pneumatic/Cordless Nailers and Staplers _____

1. Laboratory _____

   Hand out Worksheet 27103-1 and Job Sheet 27103-7. Under your supervision, have the trainees complete the pneumatic fasteners safety test before performing the related tasks on the Job Sheet. Note the proficiency of each trainee.

Session IV. Review; Module Examination and Performance Testing

A. Review _____

B. Module Examination _____

1. Trainees must score 70 percent or higher to receive recognition from NCCER.
2. Record the testing results on Craft Training Report Form 200, and submit the results to the Training Program Sponsor.

C. Performance Testing _____

1. Trainees must perform each task to the satisfaction of the instructor to receive recognition from NCCER. If applicable, proficiency noted during laboratory exercises can be used to satisfy the Performance Testing requirements.
2. Record the testing results on Craft Training Report Form 200, and submit the results to the Training Program Sponsor.

MODULE OVERVIEW

This module reviews and builds on the construction drawing (blueprint) material introduced in the *Core Curriculum*. It also introduces new information and techniques relevant to the carpentry trade for reading construction drawings and specifications.

PREREQUISITES

Prior to training with this module, it is recommended that the trainee shall have successfully completed *Core Curriculum*; and *Carpentry Fundamentals Level One*, Modules 27101-06 through 27103-06.

OBJECTIVES

Upon completion of this module, the trainee will be able to do the following:

1. Describe the types of drawings usually included in a set of plans and list the information found on each type.
2. Identify the different types of lines used on construction drawings.
3. Identify selected architectural symbols commonly used to represent materials on plans.
4. Identify selected electrical, mechanical, and plumbing symbols commonly used on plans.
5. Identify selected abbreviations commonly used on plans.
6. Read and interpret plans, elevations, schedules, sections, and details contained in basic construction drawings.
7. State the purpose of written specifications.
8. Identify and describe the parts of a specification.
9. Demonstrate or describe how to perform a quantity takeoff for materials.

PERFORMANCE OBJECTIVES

Under supervision of the instructor, the trainee should be able to do the following:

1. Interpret selected symbols and abbreviations used on drawings.
2. Read and interpret site/plot plans.
3. Read and interpret foundation, floor, and other plan view drawings.
4. Read and interpret elevation view drawings.
5. Read and interpret section and detail drawings.
6. Read and interpret schedules.
7. Read and interpret written specifications.
8. Perform a quantity takeoff for materials.

MATERIALS AND EQUIPMENT LIST

Transparencies
Markers/chalk
Blank acetate sheets
Transparency pens
Pencils and scratch paper
Overhead projector and screen
Whiteboard/chalkboard
Appropriate personal protective equipment
Set(s) of architect's or general contractor's drawings
Examples of formal and informal construction specifications
Example specification in the Construction Specification Institute (CSI) format
Detailed copy of the Construction Specification Institute (CSI) specification format
Copies of local building codes
Copies of quantity takeoff forms
Architect's and engineer's rule
Calculator
Copies of Worksheets 1 through 4*
Module Examinations**
Performance Profile Sheets**

* Packaged with this Annotated Instructor's Guide.

**Single-module AIG purchases include the printed exam and performance task sheet. If you have purchased the perfect-bound version of this title, download these materials from the IRC using your access code.

SAFETY CONSIDERATIONS

Ensure that the trainees are equipped with appropriate personal protective equipment.

ADDITIONAL RESOURCES

This module is intended to present thorough resources for task training. The following reference works are suggested for both instructors and motivated trainees interested in further study. These are optional materials for continued education rather than for task training.

Architectural Drawing and Light Construction. Upper Saddle River, NJ: Prentice Hall.

Blueprint Reading for the Building Trades. Carlsbad, CA: Craftsman Book Company.

Code Check. Newton, CT: Taunton Press.

Design Drawing. New York, NY: John Wiley & Sons.

Graphic Guide to Frame Construction. Newton, CT: Taunton Press.

International Building Code 2003. Falls Church, VA: International Code Council.

MasterFormat™ 2004 Edition. Alexandria, VA: The Construction Specifications Institute (CSI) and Construction Specifications Canada (CSC).

Measuring, Marking, and Layout. Newton, CT: Taunton Press.

Plan Reading & Material Takeoff. Kingston, MA: R.S. Means Company.

Reading Architectural Plans for Residential and Commercial Construction, Ernest R. Weidhaas. Upper Saddle River, NJ: Prentice Hall, 1998.

The Construction Specifications Institute. An organization that seeks to facilitate communication among all those involved in the building process. **www.csinet.org**

International Code Council. A membership organization dedicated to building safety and fire prevention through development of building codes. **www.iccsafe.org**

TEACHING TIME FOR THIS MODULE

An outline for use in developing your lesson plan is presented below. Note that each Roman numeral in the outline equates to one session of instruction. Each session has a suggested time period of 2½ hours. This includes 10 minutes at the beginning of each session for administrative tasks and one 10-minute break during the session. Approximately 20 hours are suggested to cover *Reading Plans and Elevations*. You will need to adjust the time required for hands-on activity and testing based on your class size and resources. Because laboratories often correspond to Performance Tasks, the proficiency of the trainees may be noted during these exercises for Performance Testing purposes.

Topic	**Planned Time**
Session I. Introduction; Drawing Set	
A. Introduction	_____
B. Drawing Set	_____
1. Title Sheets, Title Blocks, and Revision Blocks	_____
2. Plan View Drawings	_____
3. Elevation Drawings	_____
4. Section Drawings	_____
5. Detail Drawings	_____
6. Schedules	_____
7. Structural Drawings	_____
8. Plumbing, Mechanical, and Electrical Plans	_____
9. Shop Drawings	_____
10. As-Built Drawings	_____
11. Soil Reports	_____

Session II. Reading and Interpreting Drawings

A. Reading and Interpreting Drawings _____

1. Lines Used on Drawings _____
2. Symbols Used on Drawings _____
3. Dimensioning _____
4. Abbreviations _____
5. Architectural Terms Used in Drawings and Specifications _____

B. Laboratory _____

Hand out Worksheet 27104-1. Have the trainees complete the Worksheet. This laboratory corresponds to Performance Task 1.

Session III. Guidelines for Reading a Drawing Set

A. Guidelines for Reading a Drawing Set _____

Session IV. Laboratory

A. Laboratory _____

Hand out Worksheets 27104-2 and 27104-3. Have the trainees complete the Worksheets. This laboratory corresponds to Performance Tasks 2 through 6.

Session V. Specifications

A. Specifications _____

1. Organization and Types of Specifications _____

B. Laboratory _____

Hand out Worksheet 27104-4. Have the trainees complete the Worksheet. This laboratory corresponds to Performance Task 7.

Session VI. Building Codes; Quantity Takeoffs

A. Building Codes _____

B. Quantity Takeoffs _____

C. Laboratory _____

Under your supervision, and using an instructor-supplied drawing set and specifications, have the trainees practice doing a material quantity takeoff for a building, or one room in a building, etc. This laboratory corresponds to Performance Task 8.

Session VII. Project Organization; Working with Other Trades; Project Schedules; Review

A. Project Organization _____

B. Working with Other Trades _____

C. Project Schedules _____

D. Review _____

Session VIII. Module Examination and Performance Testing

A. Module Examination _____

1. Trainees must score 70 percent or higher to receive recognition from NCCER.
2. Record the testing results on Craft Training Report Form 200, and submit the results to the Training Program Sponsor.

B. Performance Testing _____

1. Trainees must perform each task to the satisfaction of the instructor to receive recognition from NCCER. If applicable, proficiency noted during laboratory exercises can be used to satisfy the Performance Testing requirements.
2. Record the testing results on Craft Training Report Form 200, and submit the results to the Training Program Sponsor.

MODULE OVERVIEW

This module introduces the carpentry trainee to residential floor systems. It covers the materials and general methods used to construct floor systems, with emphasis placed on the platform method of floor framing.

PREREQUISITES

Prior to training with this module, it is suggested that the trainee shall have successfully completed *Core Curriculum*; and *Carpentry Fundamentals Level One,* Modules 27101-06 through 27104-06.

OBJECTIVES

Upon completion of this module, the trainee will be able to do the following:

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

PERFORMANCE TASKS

Under the supervision of the instructor, the trainee should be able to do the following:

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.

MATERIALS AND EQUIPMENT LIST

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, 1¼") to cover floor area
Shim materials
Sill sealer
Steel bridging and instructions
Termite shield
2 × 6s for sills
2 × 10s for joists and headers
1 × 4s or 2 × 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
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**

* Packaged with this Annotated Instructor's Guide.

**Single-module AIG purchases include the printed exam and performance task sheet. If you have purchased the perfect-bound version of this title, download these materials from the IRC using your access code.

SAFETY CONSIDERATIONS

Ensure that the trainees are equipped with appropriate personal protective equipment.

ADDITIONAL RESOURCES

This module is intended to present thorough resources for task training. The following reference works are suggested for both instructors and motivated trainees interested in further study. These are optional materials for continued education rather than for task training.

Builder Tips: Steps to Construct a Solid, Squeak-Free Floor System. Tacoma, WA: APA – The Engineered Wood Association.

Building with Floor Trusses. Madison, WI: Wood Truss Council of America (11-minute DVD or video).

Field Guide for Prevention and Repair of Floor Squeaks. Boise, ID: Trus Joist, a Weyerhauser business.

I-Joist Construction Details: Performance-Rated I-Joists in Floor and Roof Framing. Tacoma, WA: APA – The Engineered Wood Association.

Quality Floor Construction. Tacoma, WA: APA – The Engineered Wood Association (15-minute video).

Storage, Handling, Installation & Bracing of Wood Trusses. Madison, WI: Wood Truss Council of America (69-minute DVD or video).

American Wood Council. A trade association that develops design tools and guidelines for wood construction. **www.awc.org.**

Western Wood Products Association. A trade association representing softwood lumber manufacturers in 12 western states and Alaska. **www.wwpa.com**

Wood I-Joist Manufacturers Association. An organization representing manufacturers of prefabricated wood I-joist and structural composite lumber. **www.i-joist.org**

Wood Truss Council of America. An international trade association representing structural wood component manufacturers. **www.woodtruss.com**

TEACHING TIME FOR THIS MODULE

An outline for use in developing your lesson plan is presented below. Note that each Roman numeral in the outline equates to one session of instruction. Each session has a suggested time period of 2½ hours. This includes 10 minutes at the beginning of each session for administrative tasks and one 10-minute break during the session. Approximately 25 hours are suggested to cover *Floor Systems.* You will need to adjust the time required for hands-on activity and testing based on your class size and resources. Because laboratories often correspond to Performance Tasks, the proficiency of the trainees may be noted during these exercises for Performance Testing purposes.

Topic	**Planned Time**
Session I. Introduction; Methods of Framing Houses; Building Working Drawings and Specifications	
A. Introduction	_____
B. Methods of Framing Houses	_____
1. Platform Frame	_____
2. Braced Frame	_____
3. Balloon Frame	_____
4. Post-and-Beam Frame	_____
C. Building Working Drawings and Specifications	_____
1. Architectural Drawings	_____
2. Plumbing, Mechanical, and Electrical Plans	_____
3. Reading Blueprints	_____
4. Specifications	_____
Session II. The Floor System	
A. The Floor System	_____
1. Sills	_____
2. Beams/Girders and Supports	_____
3. Floor Joists	_____
4. Bridging	_____
5. Subflooring	_____
Session III. Laying Out and Constructing a Platform Floor Assembly	
A. Laying Out and Constructing a Platform Floor Assembly	_____
1. Checking the Foundation for Squareness	_____
2. Installing the Sill	_____
3. Installing a Beam/Girder	_____
4. Laying Out Sills and Girders for Floor Joists	_____
5. Laying Out Joist Locations for the Partition and Floor Openings	_____
6. Cutting and Installing Joist Headers	_____
7. Installing Floor Joists	_____
8. Framing Opening(s) in the Floor	_____
9. Installing Bridging	_____
10. Installing Subflooring	_____
B. Laboratory Hand out Worksheets 27105-1 and 27105-2. Have the trainees complete the tasks on the Worksheets. Note the proficiency of each trainee.	_____

Session IV. Laboratory

A. Laboratory _____

Hand out Job Sheet 27105-1. Under your supervision, have the trainees perform the tasks on the Job Sheet. This laboratory corresponds to Performance Task 1.

Session V. Laboratory

A. Laboratory _____

Hand out Job Sheet 27105-2. Under your supervision, have the trainees perform the tasks on the Job Sheet. This laboratory corresponds to Performance Task 2.

Session VI. Laboratory

A. Laboratory _____

Hand out Job Sheet 27105-3. Under your supervision, have the trainees perform the tasks on the Job Sheet. This laboratory corresponds to Performance Task 3.

Session VII. Laboratory

A. Laboratory _____

Hand out Job Sheet 27105-4. Under your supervision, have the trainees perform the tasks on the Job Sheet. This laboratory corresponds to Performance Task 4.

Session VIII. Installing Joists for Projections and Cantilevered Floors

A. Installing Joists for Projections and Cantilevered Floors _____

B. Laboratory _____

Hand out Job Sheet 27105-5. Under your supervision, have the trainees perform the tasks on the Job Sheet. This laboratory corresponds to Performance Task 5.

Session IX. Estimating the Quantity of Floor Materials

A. Estimating the Quantity of Floor Materials _____

1. Sill, Sill Sealer, and Termite Shield _____
2. Beams/Girders _____
3. Joists and Joist Headers _____
4. Bridging _____
5. Flooring _____

B. Laboratory _____

Hand out Worksheet 27105-3. Have the trainees complete the tasks on the Worksheet. This laboratory corresponds to Performance Task 6.

Session X. Guidelines for Determining Proper Girder and Joist Sizes; Review; Module Examination and Performance Testing

A. Guidelines for Determining Proper Girder and Joist Sizes _____

1. Sizing Girders _____
2. Sizing Joists _____

B. Laboratory _____

Have the trainees select the proper girder/beam and joist size from the tables in the Trainee Module for various floor plans, floor loads, and span data. This laboratory corresponds to Performance Task 7.

C. Review _____

D. Module Examination _____

1. Trainees must score 70 percent or higher to receive recognition from NCCER.
2. Record the testing results on Craft Training Report Form 200, and submit the results to the Training Program Sponsor.

E. Performance Testing _____

1. Trainees must perform each task to the satisfaction of the instructor to receive recognition from NCCER. If applicable, proficiency noted during laboratory exercises can be used to satisfy the Performance Testing requirements.
2. Record the testing results on Craft Training Report Form 200, and submit the results to the Training Program Sponsor.

MODULE OVERVIEW

This module introduces the carpentry trainee to the materials and general procedures used in wall and ceiling framing.

PREREQUISITES

Prior to training with this module, it is suggested that the trainee shall have successfully completed *Core Curriculum*; and *Carpentry Fundamentals Level One*, Modules 27101-06 through 27105-06.

OBJECTIVES

Upon completion of this module, the trainee will be able to do the following:

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.

PERFORMANCE TASKS

Under the supervision of the instructor, the trainee should be able to do the following:

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.

MATERIALS AND EQUIPMENT LIST

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 × 4 or 2 × 6 framing lumber for studs and joists
2 × 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**

* Packaged with this Annotated Instructor's Guide.

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SAFETY CONSIDERATIONS

Ensure that the trainees are equipped with appropriate personal protective equipment.

ADDITIONAL RESOURCES

This module is intended to present thorough resources for task training. The following reference works are suggested for both instructors and motivated trainees interested in further study. These are optional materials for continued education rather than for task training.

Builder's Essentials: Advanced Framing Methods. Kingston, MA: R.S. Means Company.

Builder's Essentials: Framing & Rough Carpentry. Kingston, MA: R.S. Means Company.

Framing Floors, Walls and Ceilings. Newton, CT: Taunton Press.

Framing Walls (DVD). Newton, CT: Taunton Press.

Graphic Guide to Frame Construction. Newton, CT: Taunton Press.

Precision Framing for Pros by Pros. Newton, CT: Taunton Press.

The Proper Construction and Inspection of Ceiling Joists and Rafters (DVD and workbook). Falls Church, VA: International Code Council.

Residential Steel Framing Handbook. New York, NY: McGraw-Hill.

International Code Council. A membership organization dedicated to building safety and fire prevention through development of building codes. **www.iccsafe.org**

National Association of Home Builders. A trade association whose mission is to enhance the climate for housing and the building industry. **www.nahb.org**

TEACHING TIME FOR THIS MODULE

An outline for use in developing your lesson plan is presented below. Note that each Roman numeral in the outline equates to one session of instruction. Each session has a suggested time period of 2½ hours. This includes 10 minutes at the beginning of each session for administrative tasks and one 10-minute break during the session. Approximately 20 hours are suggested to cover *Wall and Ceiling Framing.* You will need to adjust the time required for hands-on activity and testing based on your class size and resources. Because laboratories often correspond to Performance Tasks, the proficiency of the trainees may be noted during these exercises for Performance Testing purposes.

Topic	**Planned Time**
Session I. Introduction; Components of a Wall; Laying Out a Wall; Measuring and Cutting Studs; Assembling and Erecting Walls	
A. Introduction	_____
B. Components of a Wall	_____
1. Corners	_____
2. Partition Intersections	_____
3. Headers	_____
C. Laying Out a Wall	_____
1. Laying Out Wall Openings	_____
D. Measuring and Cutting Studs	_____
E. Assembling the Wall	_____
1. Firestops	_____
F. Erecting the Wall	_____
1. Plumbing and Aligning Walls	_____
Session II. Laying Out a Wall	
A. Laying Out a Wall	_____
B. Laboratory	_____
Hand out Job Sheet 27106-1. Under your supervision, have the trainees perform the tasks on the Job Sheet. This laboratory corresponds to Performance Task 1.	

Session III. Measuring and Cutting Studs

A. Measuring and Cutting Studs _____

B. Laboratory _____

Hand out Job Sheet 27106-2. Under your supervision, have the trainees perform the tasks on the Job Sheet. This laboratory corresponds to Performance Task 1.

Session IV. Assembling Walls

A. Assembling Walls _____

B. Laboratory _____

Hand out Job Sheet 27106-3. Under your supervision, have the trainees perform the tasks on the Job Sheet. This laboratory corresponds to Performance Task 1.

Session V. Erecting Walls

A. Erecting Walls _____

B. Laboratory _____

Hand out Job Sheet 27106-4. Under your supervision, have the trainees perform the tasks on the Job Sheet. This laboratory corresponds to Performance Task 1.

Session VI. Ceiling Layout and Framing

A. Ceiling Layout and Framing _____

1. Cutting and Installing Ceiling Joists _____

Session VII. Laboratory

A. Laboratory _____

Hand out Job Sheet 27106-5. Under your supervision, have the trainees perform the tasks on the Job Sheet. This laboratory corresponds to Performance Task 2.

Session VIII. Estimating Materials; Wall Framing in Masonry; Steel Studs in Framing; Review; Module Examination and Performance Testing

A. Estimating Materials _____

B. Laboratory _____

Have the trainees estimate the materials required to frame example walls and ceilings. This laboratory corresponds to Performance Task 3.

C. Wall Framing in Masonry _____

1. Framing Door and Window Openings in Masonry _____

D. Steel Studs in Framing _____

1. Fabrication _____

E. Review _____

F. Module Examination _____

1. Trainees must score 70 percent or higher to receive recognition from NCCER.
2. Record the testing results on Craft Training Report Form 200, and submit the results to the Training Program Sponsor.

G. Performance Testing _____

1. Trainees must perform each task to the satisfaction of the instructor to receive recognition from NCCER. If applicable, proficiency noted during laboratory exercises can be used to satisfy the Performance Testing requirements.
2. Record the testing results on Craft Training Report Form 200, and submit the results to the Training Program Sponsor.

MODULE OVERVIEW

This module introduces the carpentry trainee to the methods and procedures used in roof framing.

PREREQUISITES

Prior to training with this module, it is suggested that the trainee shall have successfully completed *Core Curriculum*; and *Carpentry Fundamentals Level One*, Modules 27101-06 through 27106-06.

OBJECTIVES

Upon completion of this module, the trainee will be able to do the following:

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.

PERFORMANCE TASKS

Under the supervision of the instructor, the trainee should be able to do the following:

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.

MATERIALS AND EQUIPMENT LIST

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 × 4 or 2 × 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 × 6 lumber or plywood for catwalk
2 × 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

continued

Handsaw
4' level
6' stepladders
Plumb bob and line

Copies of Job Sheets 1 through 6*
Module Examinations**
Performance Profile Sheets**

* Packaged with this Annotated Instructor's Guide.
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SAFETY CONSIDERATIONS

Ensure that the trainees are equipped with appropriate personal protective equipment.

ADDITIONAL RESOURCES

This module is intended to present thorough resources for task training. The following reference works are suggested for both instructors and motivated trainees interested in further study. These are optional materials for continued education rather than for task training.

Advanced Framing Methods. Kingston, MA: R.S. Means Company.

Build a Better Home: Roofs. Tacoma, WA: APA – The Engineered Wood Association.

Framing Roofs. Newton, CT: Taunton Press.

Graphic Guide to Frame Construction. Newton, CT: Taunton Press.

Miller's Guide to Framing and Roofing. New York: McGraw-Hill Professional.

New Roof Construction. Sumas, WA: Cedar Shake and Shingle Bureau (15-minute video).

Quality Roof Construction. Tacoma, WA: APA – The Engineered Wood Association (15-minute video).

Roof Framer's Bible: The Complete Pocket Reference to Roof Framing. Jenkintown, PA: M.E.I. Publishing.

Wood Frame Construction Manual. Washington, D.C.: American Wood Council.

American Wood Council. A trade association that develops design tools and guidelines for wood construction. **www.awc.org.**

Cedar Shake and Shingle Bureau. A trade organization that promotes the common interests of members involved in quality cedar shake and shingle roofing. **www.cedarbureau.org.**

Western Wood Products Association. A trade association representing softwood lumber manufacturers in 12 western states and Alaska. **www.wwpa.com.**

Wood I-Joist Manufacturers Association. An organization representing manufacturers of prefabricated wood I-joist and structural composite lumber. **www.i-joist.org.**

Wood Truss Council of America. An international trade association representing structural wood component manufacturers. **www.woodtruss.com.**

TEACHING TIME FOR THIS MODULE

An outline for use in developing your lesson plan is presented below. Note that each Roman numeral in the outline equates to one session of instruction. Each session has a suggested time period of 2½ hours. This includes 10 minutes at the beginning of each session for administrative tasks and one 10-minute break during the session. Approximately 37½ hours are suggested to cover *Roof Framing*. You will need to adjust the time required for hands-on activity and testing based on your class size and resources. Because laboratories often correspond to Performance Tasks, the proficiency of the trainees may be noted during these exercises for Performance Testing purposes.

Topic **Planned Time**

Session I. Introduction; Types of Roofs; Basic Roof Layout

A. Introduction _____

B. Types of Roofs _____

C. Basic Roof Layout _____

1. Rafter Framing Square _____
2. Basic Rafter Layout _____

Session II. Laboratory

A. Laboratory _____

Hand out Job Sheet 27107-1. Under your supervision, have the trainees perform the tasks on the Job Sheet. This laboratory corresponds to Performance Task 1.

Session III. Erecting a Gable Roof

A. Erecting a Gable Roof _____

1. Installing Rafters _____

Session IV. Laboratory

A. Laboratory _____

Hand out Job Sheet 27107-2. Under your supervision, have the trainees perform the tasks on the Job Sheet. This laboratory corresponds to Performance Task 2.

Session V. Framing the Gable Ends; Framing a Gable Overhang

A. Framing the Gable Ends _____

B. Framing a Gable Overhang _____

Session VI. Laboratory

A. Laboratory _____

Hand out Job Sheet 27107-3. Under your supervision, have the trainees perform the tasks on the Job Sheet. This laboratory corresponds to Performance Task 2.

Session VII. Framing an Opening in the Roof

A. Framing an Opening in the Roof _____

Session VIII. Laboratory

A. Laboratory _____

Hand out Job Sheet 27107-4. Under your supervision, have the trainees perform the tasks on the Job Sheet. This laboratory corresponds to Performance Task 2.

Session IX. Installing Sheathing

A. Installing Sheathing _____

B. Laboratory _____

Hand out Job Sheet 27107-5. Under your supervision, have the trainees perform the tasks on the Job Sheet. This laboratory corresponds to Performance Task 2.

Session X. Rafter Layout Using a Speed Square

A. Rafter Layout Using a Speed Square _____

1. Procedure for Laying Out Common Rafters _____

Session XI. Truss Construction

A. Truss Construction _____

1. Truss Installation _____
2. Bracing of Roof Trusses _____

Session XII. Laboratory

A. Laboratory _____

Hand out Job Sheet 27107-6. Under your supervision, have the trainees perform the tasks on the Job Sheet. This laboratory corresponds to Performance Task 3.

Session XIII. Determining Quantities of Materials

A. Determining Quantities of Materials _____

1. Determine Materials Needed for a Gable Roof _____

B. Laboratory _____

Have the trainees estimate the materials used in framing and sheathing a roof. This laboratory corresponds to Performance Task 4.

Session XIV. Dormers; Plank-and-Beam Framing

A. Dormers _____

B. Plank-and-Beam Framing _____

Session XV. Metal Roof Framing; Review; Module Examination and Performance Testing

A. Metal Roof Framing _____

B. Review _____

C. Module Examination _____

1. Trainees must score 70 percent or higher to receive recognition from NCCER.
2. Record the testing results on Craft Training Report Form 200, and submit the results to the Training Program Sponsor.

D. Performance Testing _____

1. Trainees must perform each task to the satisfaction of the instructor to receive recognition from the NCCER. If applicable, proficiency noted during laboratory exercises can be used to satisfy the Performance Testing requirements.
2. Record the testing results on Craft Training Report Form 200, and submit the results to the Training Program Sponsor.

Introduction to Concrete, Reinforcing Materials, and Forms Annotated Instructor's Guide

Module 27108-06

MODULE OVERVIEW

This module introduces the carpentry trainee to various cements and other materials that, when mixed together, form various types of concrete. Concrete volume estimates and concrete forms are also covered. In addition, reinforcement materials such as reinforcement bars, bar supports, and welded-wire fabric are discussed.

PREREQUISITES

Prior to training with this module, it is recommended that the trainee shall have successfully completed *Core Curriculum*; and *Carpentry Fundamentals Level One*, Modules 27101-06 through 27107-06.

OBJECTIVES

Upon completion of this module, the trainee will be able to do the following:

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.

PERFORMANCE TASKS

Under supervision of the instructor, the trainee should be able to do the following:

1. Perform volume estimates for concrete quantity requirements.
2. Construct a simple concrete form with reinforcement.

MATERIALS AND EQUIPMENT LIST

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**

* Packaged with this Annotated Instructor's Guide.

**Single-module AIG purchases include the printed exam and performance task sheet. If you have purchased the perfect-bound version of this title, download these materials from the IRC using your access code.

SAFETY CONSIDERATIONS

Ensure that the trainees are equipped with appropriate personal protective equipment.

ADDITIONAL RESOURCES

This module is intended to present thorough resources for task training. The following reference works are suggested for both instructors and motivated trainees interested in further study. These are optional materials for continued education rather than for task training.

Concrete Masonry Handbook for Architects, Engineers, and Builders, Fifth Edition. W.C. Panarese, S.H. Kosmatka, and F.A. Randall, Jr. Portland Cement Association.

The Homeowner's Guide to Building with Concrete, Brick, and Stone. The Portland Cement Association.

TEACHING TIME FOR THIS MODULE

An outline for use in developing your lesson plan is presented below. Note that each Roman numeral in the outline equates to one session of instruction. Each session has a suggested time period of 2½ hours. This includes 10 minutes at the beginning of each session for administrative tasks and one 10-minute break during the session. Approximately 10 hours are suggested to cover *Introduction to Concrete, Reinforcing Materials, and Forms.* You will need to adjust the time required for hands-on activity and testing based on your class size and resources. Because laboratories often correspond to Performance Tasks, the proficiency of the trainees may be noted during these exercises for Performance Testing purposes.

Topic	**Planned Time**
Session I. Introduction; Concrete and Concrete Materials; Normal Concrete Mix Proportions and Measurements; Special Types of Concrete; Curing Methods and Materials; Concrete Slump Testing	
A. Introduction	_____
B. Concrete and Concrete Materials	_____
1. Portland Cement	_____
2. Aggregates for Concrete	_____
3. Water for Concrete	_____
4. Admixtures for Concrete	_____
C. Normal Concrete Mix Proportions and Measurements	_____
D. Special Types of Concrete	_____
E. Curing Methods and Materials	_____
F. Concrete Slump Testing	_____
Session II. Estimating Concrete Volume; Concrete Reinforcement Materials	
A. Estimating Concrete Volume	_____
1. Rectangular Volume Calculations	_____
2. Circular Volume Calculations	_____
B. Laboratory	_____
Hand out Worksheet 27108-1. Have the trainees complete the Worksheet. This laboratory corresponds to Performance Task 1.	
C. Concrete Reinforcement Materials	_____
1. Reinforcing Bars	_____
2. Bar Supports	_____
3. Splicing Reinforcing Bars	_____
4. Welded-Wire Fabric	_____

Session III. Concrete Forms

A. Concrete Forms _____
   1. Form Safety _____
   2. Footings _____
   3. Wall Forms _____
   4. Edge Forms _____
   5. Removing Forms _____

B. Laboratory _____

   Under your supervision, have the trainees erect, plumb, and brace a simple concrete form. This laboratory corresponds to Performance Task 2.

Session IV. Review; Module Examination and Performance Testing

A. Review

B. Module Examination _____
   1. Trainees must score 70 percent or higher to receive recognition from NCCER.
   2. Record the testing results on Craft Training Report Form 200, and submit the results to the Training Program Sponsor.

C. Performance Testing _____
   1. Trainees must perform each task to the satisfaction of the instructor to receive recognition from NCCER. If applicable, proficiency noted during laboratory exercises can be used to satisfy the Performance Testing requirements.
   2. Record the testing results on Craft Training Report Form 200, and submit the results to the Training Program Sponsor.

MODULE OVERVIEW

This module introduces the carpentry trainee to methods and procedures used in the selection and installation of residential windows and exterior doors.

PREREQUISITES

Prior to training with this module, it is suggested that the trainee shall have successfully completed *Core Curriculum*; and *Carpentry Fundamentals Level One*, Modules 27101-06 through 27108-06.

OBJECTIVES

Upon completion of this module, the trainee will be able to do the following:

1. Identify various types of fixed, sliding, and swinging windows.
2. Identify the parts of a window installation.
3. State the requirements for a proper window installation.
4. Install a pre-hung window.
5. Identify the common types of exterior doors and explain how they are constructed.
6. Identify the parts of a door installation.
7. Identify the types of thresholds used with exterior doors.
8. Install a pre-hung exterior door.
9. Identify the various types of locksets used on exterior doors and explain how they are installed.
10. Install a lockset.

PERFORMANCE TASKS

Under the supervision of the instructor, the trainee should be able to do the following:

1. Install a pre-hung window.
2. Install a pre-hung exterior door.
3. Install a lockset.

MATERIALS AND EQUIPMENT LIST

Transparencies
Markers/chalk
Blank acetate sheets
Transparency pens
Pencils and scratch paper
Overhead projector and screen
Whiteboard/chalkboard
Appropriate personal protective equipment
Manufacturer's catalogs and brochures on windows
Nails:
- 4d finish
- 6d finish
- 8d finish or casing
- 16d casing

Pre-hung window unit
Shims
Flashing or drip cap
Pre-hung door unit
Wood shingles for blocking shims
Fiberglass insulation or sill sealer
Lockset with manufacturer's instructions and template (if needed)
Weatherstripping
Screws for attaching weatherstripping
Threshold and manufacturer's installation instructions
Concrete screw anchors and screws
Miter saw
Hand levels
Handsaw
Claw hammer
Framing square
Combination square
Steel tape
30" level
Nail set
Caulking gun and sealer
Boring jig (if available)
Wood chisels
Tin snips
Utility knife

Screwdriver
Drill
Drill bits

Copies of Job Sheets 1 through 6*
Module Examinations**
Performance Profile Sheets**

* Packaged with this Annotated Instructor's Guide.

**Single-module AIG purchases include the printed exam and performance task sheet. If you have purchased the perfect-bound version of this title, download these materials from the IRC using your access code.

SAFETY CONSIDERATIONS

Ensure that the trainees are equipped with appropriate personal protective equipment.

ADDITIONAL RESOURCES

This module is intended to present thorough resources for task training. The following reference works are suggested for both instructors and motivated trainees interested in further study. These are optional materials for continued education rather than for task training.

Window and Door Manufacturers Association. A trade organization representing 145 U.S. window and door manufacturers. **www.wdma.com**

The National Fenestration Rating Council (NFRC). The nation's recognized authority for measuring and evaluating window energy performance. **www.nfrc.org.**

Window & Door magazine. An information source for manufacturers, distributors, and dealers of windows and doors. **www.windowanddoor.net.**

TEACHING TIME FOR THIS MODULE

An outline for use in developing your lesson plan is presented below. Note that each Roman numeral in the outline equates to one session of instruction. Each session has a suggested time period of 2½ hours. This includes 10 minutes at the beginning of each session for administrative tasks and one 10-minute break during the session. Approximately 12½ hours are suggested to cover *Windows and Exterior Doors*. You will need to adjust the time required for hands-on activity and testing based on your class size and resources. Because laboratories often correspond to Performance Tasks, the proficiency of the trainees may be noted during these exercises for Performance Testing purposes.

Topic	**Planned Time**
Session I. Introduction; Windows	
A. Introduction	_____
B. Windows	_____
1. Window Construction	_____
2. Types of Windows	_____
3. Types of Window Glass	_____
4. Window Installation	_____
5. Glass Blocks	_____
Session II. Laboratory	
A. Laboratory	_____
Hand out Job Sheet 27109-1. Under your supervision, have the trainees perform the tasks on the Job Sheet. This laboratory corresponds to Performance Task 1.	

Session III. Exterior Doors

A. Exterior Doors _____

1. Exterior Door Sizes _____
2. Thresholds _____
3. Weatherstripping _____

B. Laboratory _____

Hand out Job Sheets 27109-2 and 27109-3. Under your supervision, have the trainees perform the tasks on the Job Sheets. (This laboratory is optional based on available time and materials.)

Session IV. Installing an Exterior Pre-Hung Door

A. Installing an Exterior Pre-Hung Door _____

1. Locksets _____

B. Laboratory _____

Hand out Job Sheets 27109-4 and 27109-5. Under your supervision, have the trainees perform the tasks on the Job Sheets. This laboratory corresponds to Performance Tasks 2 and 3.

Session V. Laboratory; Review; Module Examination and Performance Testing

A. Laboratory _____

Hand out Job Sheet 27109-6. Under your supervision, have the trainees perform the tasks on the Job Sheet. (This laboratory is optional based on available time and materials.)

B. Review _____

C. Module Examination _____

1. Trainees must score 70 percent or higher to receive recognition from NCCER.
2. Record the testing results on Craft Training Report Form 200, and submit the results to the Training Program Sponsor.

D. Performance Testing _____

1. Trainees must perform each task to the satisfaction of the instructor to receive recognition from NCCER. If applicable, proficiency noted during laboratory exercises can be used to satisfy the Performance Testing requirements.
2. Record the testing results on Craft Training Report Form 200, and submit the results to the Training Program Sponsor.

Basic Stair Layout
Annotated Instructor's Guide

Module 27110-06

MODULE OVERVIEW

This module introduces the Carpentry trainee to the materials and methods used to construct interior and exterior wooden stairs.

PREREQUISITES

Prior to training with this module, it is recommended that the trainee shall have successfully completed *Core Curriculum*; and *Carpentry Fundamentals Level One*, Modules 27101-06 through 27109-06.

OBJECTIVES

Upon completion of this module, the trainee will be able to do the following:

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.

PERFORMANCE TASKS

Under the supervision of the instructor, the trainee should be able to do the following:

1. Lay out and build a small stair unit with a handrail to a given rise.

MATERIALS AND EQUIPMENT LIST

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 × 12s for stringers
2 × 12s for treads
1 × 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**

* Packaged with this Annotated Instructor's Guide.

**Single-module AIG purchases include the printed exam and performance task sheet. If you have purchased the perfect-bound version of this title, download these materials from the IRC using your access code.

SAFETY CONSIDERATIONS

Ensure that the trainees are equipped with appropriate personal protective equipment.

ADDITIONAL RESOURCES

This module is intended to present thorough resources for task training. The following reference works are suggested for both instructors and motivated trainees interested in further study. These are optional materials for continued education rather than for task training.

Basic Stairbuilding. Newton, CT: Taunton Press, Inc. (Book with companion video or DVD.)

Constructing Staircases, Balustrades & Landings. New York: Sterling Publishing Co., Inc.

For Pros By Pros: Building Stairs. Newton, CT: Taunton Press, Inc.

Framing Floors and Stairs. Berkeley, CA: Publishers Group West. (Book with companion video or DVD.)

A Simplified Guide to Custom Stairbuilding and Tangent Handrailing. Fresno, CA: Linden Publishing.

Stair Builders Handbook. Carlsbad, CA: Craftsman Book Company.

Staircases. New York: Watson-Guptill Publications.

Stair Layout. Homewood, IL: American Technical Publishers.

Stairs: Design and Construction. New York: Birkhauser.

Arcways, Inc. Builders of custom stairways. **www.arcways.com.**

Classic Stairworks, Ltd. Builders of classic custom staircases. **www.classicstairworks.com.**

Coffman Stairs, LLC. Hardwood stair parts manufacturer. **www.coffmanstairs.com.**

L.J. Smith Stair Systems. Manufacturer of stair products. **www.ljsmith.net.**

TEACHING TIME FOR THIS MODULE

An outline for use in developing your lesson plan is presented below. Note that each Roman numeral in the outline equates to one session of instruction. Each session has a suggested time period of 2½ hours. This includes 10 minutes at the beginning of each session for administrative tasks and one 10-minute break during the session. Approximately 12½ hours are suggested to cover *Basic Stair Layout.* You will need to adjust the time required for hands-on activity and testing based on your class size and resources. Because laboratories often correspond to Performance Tasks, the proficiency of the trainees may be noted during these exercises for Performance Testing purposes.

Topic	**Planned Time**
Session I. Introduction; Types of Stairs; Stairway Components and Typical Code Requirements	
A. Introduction	_____
B. Types of Stairs	_____
C. Stairway Components and Typical Code Requirements	_____
Session II. Stair Framing	
A. Stair Framing	_____
1. Headroom	_____
2. Stringers	_____
3. Treads and Risers	_____
4. Width Requirement	_____
5. Handrails	_____
6. Stairwells	_____
Session III. Stairway and Stairwell Design and Layout	
A. Stairway and Stairwell Design and Layout	_____
1. Stairway Design	_____
2. Stairwells	_____
3. Laying Out and Cutting a Stringer	_____
4. Reinforced Cutout Stringers	_____

Session IV. Laboratory

A. Laboratory _____

Hand out Job Sheet 27110-1. Under your supervision, have the trainees lay out and construct a stairway. This laboratory corresponds to Performance Task 1.

Session V. Forms for Concrete Stairs; Review; Module Examination and Performance Testing

A. Forms for Concrete Stairs _____

B. Review _____

C. Module Examination _____

1. Trainees must score 70 percent or higher to receive recognition from NCCER.
2. Record the testing results on Craft Training Report Form 200, and submit the results to the Training Program Sponsor.

D. Performance Testing _____

1. Trainees must perform each task to the satisfaction of the instructor to receive recognition from the NCCER. If applicable, proficiency noted during laboratory exercises can be used to satisfy the Performance Testing requirements.
2. Record the testing results on Craft Training Report Form 200, and submit the results to the Training Program Sponsor.