The Trainee Guide for *Carpentry Level One* is available as an NCCERconnect ebook. Contact your NCCER customer service representative at 1-888-622-3720 for more information.

**Module One (27101-13)** reviews the history of the carpentry trade, describes the apprentice program, identifies career opportunities for carpenters, explores the SkillsUSA program, and lists the responsibilities and characteristics a carpenter should possess.

### Objectives

**Learning Objective 1**
- Identify the career and entrepreneurial opportunities within the carpentry trade.
  - a. Identify the training opportunities within the carpentry trade.

**Learning Objective 2**
- Identify the skills, responsibilities, and characteristics needed to be a successful carpenter.
  - a. Identify the skills needed to be a successful carpenter.
  - b. Identify the responsibilities of a successful carpenter.
  - c. State the personal characteristics of a successful carpenter.

**Learning Objective 3**
- Summarize how to be connected to the industry through an organization like SkillsUSA.
  - a. Describe the program, curriculum, and SkillsUSA Championships.
  - b. State the benefits from being a SkillsUSA member.
  - c. List the seven goals of the SkillsUSA Program of Work.

**Learning Objective 4**
- Explain the importance of safety in the construction industry, and describe the obligations of the contractor, subcontractors, and you to ensure a safe work environment.
  - a. Describe the OSHA Outreach Training Program.
  - b. Explain hazard recognition and define your role in it.

### Performance Tasks
- This is a knowledge-based module; there are no Performance Tasks.

### Teaching Time: 2.5 hours

(One 2.5-Hour Classroom Session)

Session time may be adjusted to accommodate your class size, schedule, and teaching style.

### Prerequisites

*Core Curriculum*

### Before You Begin

As you prepare for each session, allow sufficient time to review the course objectives, content, visual aids (including the PowerPoint® presentation), and these lesson plans, and to gather the required equipment and materials. Consider time required for demonstrations, laboratories, field trips, and testing.

Using your access code, download the Module Examinations from [www.nccerirc.com](http://www.nccerirc.com). The passing score for submission into NCCER’s Registry is 70 percent or above for the Module Examination.
Safety Considerations

This module does not include Performance Tasks, and as such, no PPE is required for completion of this module. However, safety should be stressed at all times when discussing apprenticeship and on-the-job learning situations.

Classroom Equipment and Materials

- Whiteboard/Chalkboard
- Markers/Chalk
- Pencils and paper
- Carpentry Level One PowerPoint® Presentation Slides
- LCD projector and screen
- Computer
- Copies of the Module Examination
- Vendor-supplied videos/ DVDs showing SkillsUSA Championships (optional)
- TV/DVD player

Equipment and Materials for Laboratories and Performance Testing

- Blank job hazard analysis (JHA) forms

Additional Resources and References

SkillsUSA website, www.skillsusa.org
Build Your Future website, www.byf.org

There are a number of online resources available for trainees who would like more information on the carpentry trade. A search for additional information may be assigned as homework to interested trainees.
The lesson plan for this module consists of one 2.5-hour session. Each session includes 10 minutes for administrative tasks and one 10-minute break.

**SESSION ONE**

Session One reviews the history of carpentry, describes the apprentice program, identifies career opportunities for carpenters, explores the SkillsUSA program, and lists the responsibilities and characteristics a carpenter should possess.

1. Show Session One PowerPoint® presentation slides.
2. Have trainees describe the carpentry apprentice program.
3. Describe the SkillsUSA program and how trainees can benefit from the program.
4. Have trainees list and describe various responsibilities and characteristics a carpenter should possess.
5. Have trainees complete the Module Examination.
Lesson Plans for Module 27102-13
BUILDING MATERIALS, FASTENERS, AND ADHESIVES

The Trainee Guide for Carpentry Level One is available as an NCCERconnect ebook. Contact your NCCER customer service representative at 1-888-622-3720 for more information.

Module Two (27102-13) provides an overview of the building materials used by carpenters, including lumber, engineered wood products, concrete, and steel framing materials. The module also describes the various fasteners, anchors, and adhesives used in construction.

Objectives

Learning Objective 1
• Identify various types of building materials and describe their uses.
  a. State the uses of various types of hardwoods and softwoods.
  b. Describe common lumber defects.
  c. Identify the different grades of lumber and describe uses for each.
  d. Explain how treated lumber differs from nontreated lumber.
  e. Describe how plywood is manufactured and cite common applications for plywood on a construction project.
  f. Identify uses of hardboard.
  g. Identify uses of particleboard.
  h. Identify uses of high- and medium-density overlay plywood.
  i. Describe how oriented strand board differs from particleboard and cite common applications for OSB.
  j. Cite common applications for mineral fiberboard.
  k. State the uses of various types of engineered lumber.
  l. Identify applications for wood I-beams
  m. List advantages of glulam lumber over conventional solid lumber.
  n. Describe the composition of concrete and explain how hydration occurs.
  o. List uses of concrete masonry units for a construction project.
  p. Identify where metal framing members may be used in a structure.

Learning Objective 2
• List safety precautions associated with building materials.
  a. List general safety guidelines for working with building materials.
  b. Cite safety precautions for working with wood building materials.
  c. Cite safety precautions for working with concrete building materials.
  d. Cite safety precautions for working with metal building materials.

Learning Objective 3
• Describe the proper method of handling and storing building materials.
  a. List basic material-handling guidelines.
  b. Describe how to handle and store wood building materials.
  c. Describe how to handle and store concrete building materials.
  d. Describe how to handle and store metal building materials.

Learning Objective 4
• Explain how to calculate the quantities of lumber, panel, and concrete products using industry-standard methods.
  a. Calculate lumber quantities.
  b. Calculate panel quantities.
  c. Calculate the volume of concrete required for rectangular and cylindrical shapes.

Learning Objective 5
• Describe the fasteners, anchors, and adhesives used in construction and explain their uses.
  a. Identify various types of nails and cite uses for each.
  b. Identify applications for staples.
  c. Identify various types of screws and cite uses for each.
  d. Describe uses for hammer-driven pins and studs.
  e. Identify various types of bolts and cite uses for each.
  f. Identify various types of mechanical anchors and cite uses for each.
  g. Identify various types of bolt anchors and explain how each is installed.
  h. Identify various types of screw anchors and cite uses for each.
  i. Identify various types of hollow-wall anchors and cite uses for each.
  j. List the types of glues and adhesives used in construction.
Safety Considerations
This module requires that trainees demonstrate the safe and proper installation of drop-in anchors. Safety is paramount in the carpentry trade and safe habits and practices must be emphasized whenever possible. Performance Tasks must be completed under supervision. Each trainee must use required PPE and follow safe tool practices and procedures.
**Classroom Equipment and Materials**

- Whiteboard/Chalkboard
- Markers/Chalk
- Pencils and paper
- *Carpentry Level One* PowerPoint Presentation Slides
- LCD projector and screen
- Computer
- Copies of the Module Examination and Performance Profile Sheets
- Vendor-supplied videos/DVDs showing various building materials and fasteners (optional)
- TV/DVD player

**Equipment and Materials for Laboratories and Performance Testing**

- Personal protective equipment (PPE):
  - Hard hat
  - Safety glasses
  - Gloves
  - Hearing protection
  - Face shield
  - Respiratory protection
- Cut portion of a tree trunk
- Tape measure
- Samples of lumber with grade stamps, natural defects, and manufacturing defects
- Samples of panel products containing grade stamps, including plywood, OSB, particleboard, hardboard, and mineral fiberboard
- Drill and bits
- Handsaw
- Plywood Specification and Grade Guide
- Samples of engineered lumber products, including wood I-beams, glulam, LVL, and PSL
- Photos of commercial construction projects
- Samples of concrete masonry units
- Samples of steel framing members
- Bags of portland cement
- Sand
- Water
- Blank job hazard analysis (JHA) forms
- Small loads for lifting demonstration
- Wood materials
- Samples of boards that equal one board foot
- Calculator or smartphone calculator app
- Set of plans (optional)
- Scraps of wood, steel-metal framing, and concrete
- Hammer
- Assorted nails
- Manual stapler
- Assorted staples
- Standard screwdriver
- Wood screws
- Power screwdriver
- Sheet-metal screws
- Masonry bits
- Machine and lag screws
- Concrete/masonry and deck screws
- Drywall and drive screws
- Hammer-driven pins
- Assorted bolts and nuts
- Advertisements for anchors and adhesives
- Assorted anchors and adhesives
- Ventilation fan

**Additional Resources**

This module presents thorough resources for task training. The following resource materials are suggested for further study:


There are a number of online resources available for trainees who would like more information on building materials, fasteners, and adhesives. A search for additional information may be assigned as homework to interested trainees.
# Session Outline for 27102-13

## Session One

Session One reviews dimension lumber, plywood, and other panel products.

1. Show Session One PowerPoint® presentation slides.
2. Provide an overview of the module.
3. Discuss the various types of wood building materials, including plywood and other panel products.
4. Have trainees identify various wood building materials and note their applications.

## Session Two

Session Two introduces engineered lumber products, their manufacture, and their applications.

1. Show Session Two PowerPoint® presentation slides.
2. Discuss how engineered lumber has changed the way some buildings are constructed.
3. Have trainees identify engineered lumber products and their applications.

## Session Three

Session Three reviews concrete, concrete masonry construction, and steel framing materials.

1. Show Session Three PowerPoint® presentation slides.
2. Review the ingredients in concrete and explain that varying the amounts of these ingredients will impart different characteristics and properties to the concrete.
3. Explain the benefits of concrete masonry construction.
4. Discuss the applications of steel framing members in commercial construction.

## Session Four

Session Four discusses the proper and safe handling and storage of building materials.

1. Show Session Four PowerPoint® presentation slides.
2. Emphasize the importance of safety on the job site, including safety when handling and storing building materials.
3. Review job hazard analysis (JHA) and its importance.
4. Review general safety, followed by safety with wood, concrete, and steel building materials.
5. Discuss the safe handling and storage of building materials.

## Session Five

Session Five discusses the calculation of lumber, panel, and concrete quantities.

1. Show Session Five PowerPoint® presentation slides.
2. Explain board foot measurements, and describe how board feet are calculated.
3. Discuss area and how it is calculated. Explain that area is a very common construction calculation.
4. Discuss volume and how it is calculated. Describe applications for volume calculations.

## Session Six

Session Six reviews common fasteners used by carpenters.

1. Show Session Six PowerPoint® presentation slides.
2. Discuss nail types and nail sizes.
3. Discuss staples and their applications.
4. Discuss screw types and their applications.
5. Discuss bolts and their applications.
SESSION SEVEN

Session Seven introduces common anchors and adhesives used by carpenters.

1. Show Session Seven PowerPoint® presentation slides.
2. Discuss common anchors and adhesives used on construction projects.
3. Emphasize the importance of proper ventilation and PPE when applying some types of adhesives.

SESSION EIGHT

Session Eight is a review and testing session. Have trainees complete the module Review Questions and Trade Terms Quiz. (Alternatively, these may be assigned as homework at the end of Session Seven.) Answer any questions that trainees may have.

1. Have trainees complete the Module Examination. Any outstanding performance testing must be completed during this session.
2. Record the testing results on Training Report Form 200, and submit the report to your Training Program Sponsor.
### Materials Checklist for Module 27102-13, Building Materials, Fasteners, and Adhesives

<table>
<thead>
<tr>
<th>Equipment and Materials</th>
<th>Personal protective equipment:</th>
<th>Cut portion of a tree trunk</th>
<th>Tape measure</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hard hat</td>
<td>Drill and bits</td>
<td>Handsaw</td>
</tr>
<tr>
<td></td>
<td>Safety glasses</td>
<td>Sand</td>
<td>Bags of portland cement</td>
</tr>
<tr>
<td></td>
<td>Gloves</td>
<td>Water</td>
<td>Hammer</td>
</tr>
<tr>
<td></td>
<td>Hearing protection</td>
<td>Set of plans (optional)</td>
<td>Manual stapler</td>
</tr>
<tr>
<td></td>
<td>Face shield</td>
<td>Assorted nails</td>
<td>Assorted staples</td>
</tr>
<tr>
<td></td>
<td>Respiratory protection</td>
<td>Standard screwdriver</td>
<td>Wood screws</td>
</tr>
<tr>
<td></td>
<td>Whiteboard/Chalkboard</td>
<td>Power screwdriver</td>
<td>Sheet-metal screws</td>
</tr>
<tr>
<td></td>
<td>Markers/Chalk</td>
<td>Masonry bits</td>
<td>Machine and lag screws</td>
</tr>
<tr>
<td></td>
<td>Pencils and paper</td>
<td>Drywall and drive screws</td>
<td>Hammer-driven pins</td>
</tr>
<tr>
<td><strong>Carpentry Level One</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>PowerPoint® Presentation</strong></td>
<td>Slides</td>
<td>Samples of lumber with grade stamps, natural defects, and manufacturing defects</td>
<td>Samples of engineered lumber products, including wood I-beams, glulam, LVL, and PSL</td>
</tr>
<tr>
<td>LCD projector and screen</td>
<td>Assorted bolts and nuts</td>
<td>Ventilation fan</td>
<td></td>
</tr>
<tr>
<td>Computer</td>
<td></td>
<td>Wood materials</td>
<td>Samples of concrete masonry units</td>
</tr>
<tr>
<td>Copies of the Module Examination and Performance Profile Sheets</td>
<td>Photos of commercial construction projects</td>
<td>plywood Specification and Grade Guide</td>
<td></td>
</tr>
<tr>
<td>Vendor-supplied videos/DVDs showing various building materials and fasteners (optional)</td>
<td>Samples of panel products containing grade stamps, including plywood, OSB, particleboard, hardboard, and mineral fiberboard</td>
<td>Blank job hazard analysis (JHA) forms</td>
<td></td>
</tr>
<tr>
<td>TV/DVD player</td>
<td>Concrete/masonry and deck screws</td>
<td>Advertisements for anchors and adhesives</td>
<td></td>
</tr>
<tr>
<td>Calculator or smartphone calculator app</td>
<td>Assorted anchors and adhesives</td>
<td>Samples of boards that equal one board foot</td>
<td></td>
</tr>
<tr>
<td>Samples of steel framing members</td>
<td>Small loads for lifting demonstration</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

To the extent possible, and as required for performance testing, provide a selection of the tools listed for each session; alternatively, photos may be used to teach tool identification.
Lesson Plans for Module 27103-13

HAND AND POWER TOOLS

The Trainee Guide for Carpentry Level One is available as an NCCERconnect ebook. Contact your NCCER customer service representative at 1-888-622-3720 for more information.

Module Three (27103-13) provides detailed descriptions of the hand tools and portable power tools used by carpenters. Emphasis is on safe and proper operation of tools, as well as care and maintenance.

Objectives

Learning Objective 1
- Identify the hand tools commonly used by carpenters.
  a. Describe the safe use and maintenance of levels.
  b. Describe the safe use and maintenance of squares.
  c. Describe the safe use and maintenance of planes.
  d. Describe the safe use and maintenance of clamps.
  e. Describe the safe use and maintenance of hand saws.

Learning Objective 2
- Identify the power tools commonly used by carpenters.
  a. Describe the general safe use and maintenance of power tools.
  b. Describe the safe use of power saws.
  c. Describe the safe use of drill presses.
  d. Describe the safe use of routers and laminate trimmers.
  e. Describe the safe use of portable power planes.
  f. Describe the safe use of power metal shears.
  g. Describe the safe use of pneumatic and cordless nailers and staplers.

Performance Tasks

Performance Task 1 (Learning Objective 1)
Demonstrate the safe and proper use of the following hand tools:
- Level
- Square
- Clamp
- Saw

Performance Task 2 (Learning Objective 2)
Demonstrate or describe the safe and proper use of five of the following power tools:
- Circular saw
- Portable table saw
- Compound miter saw
- Drill press
- Router/laminate trimmer
- Portable power plane
- Power metal shears
- Pneumatic nailer/stapler

Teaching Time: 10 hours
(Four 2.5-Hour Classroom Sessions)
Session time may be adjusted to accommodate your class size, schedule, and teaching style.

Prerequisites
Core Curriculum

Before You Begin
As you prepare for each session, allow sufficient time to review the course objectives, content, visual aids (including the PowerPoint® presentation), and these lesson plans, and to gather the required equipment and materials. Consider time required for demonstrations, laboratories, field trips, and testing.

Using your access code, download the Module Examinations and Performance Profile Sheets from www.nccerirc.com. The passing score for submission into NCCER’s Registry is 70 percent or above for the Module Examination; performance testing is graded pass or fail.
**Safety Considerations**

This module requires that trainees demonstrate the safe use of hand and power tools. Safety is paramount in the carpentry trade and safe habits and practices must be emphasized whenever possible. Performance Tasks must be completed under your supervision. Each trainee must use required PPE and follow safe tool practices and procedures.

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**Classroom Equipment and Materials**

- Whiteboard/Chalkboard
- Markers/Chalk
- Pencils and paper
- **Carpentry Level One**
- PowerPoint® Presentation Slides
- LCD projector and screen
- Computer
- Copies of the Module Examination and Performance Profile Sheets
- Vendor-supplied videos/DVDs showing various hand and power tools (optional)
- TV/DVD player

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**Equipment and Materials for Laboratories and Performance Testing**

- Personal protective equipment (PPE):
  - Hard hat
  - Safety glasses
  - Gloves
  - Hearing protection
  - Face shield
  - Respiratory protection
- Levels: spirit, carpenter’s, line, water, builder’s, auto, transit, laser
- Squares: combination, miter, try, sliding T-bevel, drywall, framer, rafter, Speed Square™
- Planes: block, jack, smoothing, jointer
- Clamps: C-clamp, hand-screw, locking C-clamp, spring, quick, web, pipe
- Handsaws: rip, crosscut, hacksaw, backsaw, dovetail, compass, coping, drywall
- Copies of blank job hazard analysis (JHA) forms
- Portable circular saw
- Portable table saw
- Featherboards and pushsticks
- Power miter saw
- Compound miter saw
- Abrasive saws

- Assortment of power saw blades
- Assortment of clamps
- Extension cords
- GFCIs
- Chalkline
- Folding rule or tape measure
- Pieces of crown molding approximately 4’ in length
- 1 × 4 stock approximately 18” to 24” in length
- 2 × 4s approximately 18” to 24” in length
- 2 × 4s approximately 4’ in length
- 6” × 12” pieces of ¾” plywood
- 3-foot lengths of ½” rebar
- Drill press
- Router/laminate trimmer
- Portable power plane
- Power metal shears
- Pneumatic/cordless nailers and staplers
- Fasteners (nails and staples) designed for the pneumatic tools being used
- Angle iron, steel rebar, or pipe for cutting
- Laminate samples
- Scraps of wood

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**Additional Resources**

This module presents thorough resources for task training. The following resource material is suggested for further study:

- **Framing Floors, Walls and Ceilings**. Newtown, CT: Taunton Press.
- **Framing Walls** (DVD). Newtown, CT: Taunton Press.
- **Graphic Guide to Frame Construction**. Newtown, CT: Taunton Press.
- **International Code Council**. A membership organization dedicated to building safety and fire prevention through development of building codes, [http://www.iccsafe.org](http://www.iccsafe.org)
- **National Association of Home Builders**. A trade association whose mission is to enhance the climate for housing and the building industry, [http://www.nahb.org](http://www.nahb.org)
- **Precision Framing for Pros by Pros**. Newtown, CT: Taunton Press.

There are a number of online resources available for trainees who would like more information on carpentry hand and power tools. A search for additional information may be assigned as homework to interested trainees.
The lesson plan for this module is divided into four 2.5-hour sessions. Each session includes 10 minutes for administrative tasks and one 10-minute break.

**SESSION ONE**

Session One introduces hand tools commonly used by carpenters.

1. Show Session One PowerPoint® presentation slides.
2. Provide an overview of hand tools.
3. Emphasize general safety precautions when using hand tools.
4. Identify the various hand tools commonly used by carpenters and identify applications for each.

**SESSION TWO**

Session Two introduces power saws commonly used by carpenters.

1. Show Session Two PowerPoint® presentation slides.
2. Provide an overview of power tools.
3. Emphasize general safety precautions when using power saws.
4. Identify the various power saws used by carpenters and identify applications for each.

**SESSION THREE**

Session Three introduces other power tools commonly used by carpenters.

1. Show Session Three PowerPoint® presentation slides.
2. Emphasize general safety precautions when using power tools other than saws.
3. Identify the various power tools used by carpenters, other than saws, and identify applications for each.

**SESSION FOUR**

Session Four is a review and testing session. Have trainees complete the module Review Questions and Trade Terms Quiz. (Alternatively, these may be assigned as homework at the end of Session Three.) Answer any questions that trainees may have.

1. Have trainees complete the Module Examination. Any outstanding performance testing must be completed during this session.
2. Record the testing results on Training Report Form 200, and submit the report to your Training Program Sponsor.
### Materials Checklist for Module 27103-13, Hand and Power Tools,

<table>
<thead>
<tr>
<th>Equipment and Materials</th>
<th>Power miter saw</th>
<th>Portable table saw</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Personal protective equipment:</strong></td>
<td>Power miter saw</td>
<td>Portable table saw</td>
</tr>
<tr>
<td>Hard hat</td>
<td>Compound miter saw</td>
<td>Portable circular saw</td>
</tr>
<tr>
<td>Safety glasses</td>
<td>Abrasive saws</td>
<td>Assortment of clamps</td>
</tr>
<tr>
<td>Gloves</td>
<td>Extension cords</td>
<td>GFCIs</td>
</tr>
<tr>
<td>Hearing protection</td>
<td>Chalkline</td>
<td>Portable power plane</td>
</tr>
<tr>
<td>Respiratory protection</td>
<td>3-foot lengths of ⅜” rebar</td>
<td>Folding rule or tape measure</td>
</tr>
<tr>
<td>Face shield</td>
<td>Scraps of wood</td>
<td>Power metal shears</td>
</tr>
<tr>
<td>Whiteboard/Chalkboard</td>
<td>Drill press</td>
<td>Router/laminate trimmer</td>
</tr>
<tr>
<td>Markers/Chalk</td>
<td>Angle iron, steel rebar, or pipe for cutting</td>
<td>Laminate samples</td>
</tr>
<tr>
<td>Pencils and paper</td>
<td>Featherboards and pushsticks</td>
<td>6” x 12” pieces of ¾” plywood</td>
</tr>
<tr>
<td><strong>Carpentry Level One PowerPoint® Presentation Slides</strong></td>
<td>Levels: spirit, carpenter’s, line, water, builder’s, auto, transit, laser</td>
<td>Handsaws: rip, crosscut, hacksaw, backsaw, dovetail, compass, coping, drywall</td>
</tr>
<tr>
<td>LCD projector and screen</td>
<td>Assortment of power saw blades</td>
<td>Pneumatic/cordless nailers and staplers</td>
</tr>
<tr>
<td>TV/DVD player</td>
<td>Copies of blank job hazard analysis (JHA) forms</td>
<td>2 x 4s approximately 18” to 24” in length</td>
</tr>
<tr>
<td>Computer</td>
<td>2 x 4s approximately 4’ in length</td>
<td>1 x 4 stock approximately 18” to 24” in length</td>
</tr>
<tr>
<td>Copies of the Module Examination and Performance Profile Sheets</td>
<td>Squares: combination, miter, try, sliding T-bevel, drywall, framing, rafter, Speed Square™</td>
<td>Fasteners (nails and staples) designed for the pneumatic tools being used</td>
</tr>
<tr>
<td>Vendor-supplied videos/DVDs showing various hand and power tools (optional)</td>
<td>Pieces of crown molding approximately 4’ in length</td>
<td>Clamps: C-clamp, hand-screw, locking C-clamp, spring, quick, web, pipe</td>
</tr>
<tr>
<td>Planes: block, jack, smoothing, jointer</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

To the extent possible, and as required for performance testing, provide a selection of the tools listed for each session; alternatively, photos may be used to teach tool identification.
The Trainee Guide for *Carpentry Level One* is available as an NCCERconnect ebook. Contact your NCCER customer service representative at 1-888-622-3720 for more information.

**Module Four (27104-13)** describes the information contained in construction drawings, including foundation, floor, and other plan view drawings, as well as how to read them. It also describes how to interpret schedules and specifications, and how to use the 3-4-5 rule to square buildings.

### Objectives

#### Learning Objective 1
- Describe the types of drawings usually included in a set of plans and describe the information found on each type.
  a. Identify the different types of lines used on construction drawings.
  b. Identify selected architectural symbols commonly used to represent materials on plans.
  c. Identify selected electrical, mechanical, and plumbing symbols commonly used on plans.
  d. Identify selected abbreviations commonly used on plans.
  e. Describe the methods of dimensioning construction drawings.
  f. List the various types of construction drawings and describe each.

#### Learning Objective 2
- State the purpose of written specifications.
  a. Describe how specifications are organized.
  b. Explain the importance of building codes in construction.

#### Learning Objective 3
- Identify the methods of squaring a building.

### Performance Tasks

#### Performance Task 1 (Learning Objective 1)
- Read and interpret foundation, floor, and other plan view drawings.

#### Performance Task 2 (Learning Objective 1)
- Read and interpret elevation view drawings.

#### Performance Task 3 (Learning Objective 1)
- Read and interpret section and detail drawings.

#### Performance Task 4 (Learning Objective 1)
- Read and interpret schedules.

#### Performance Task 5 (Learning Objective 2)
- Read and interpret written specifications.

#### Performance Task 6 (Learning Objective 3)
- Establish 90-degree angles using the 3-4-5 rule.

### Teaching Time: 22.5 hours
(Nine 2.5-Hour Classroom Sessions)
Session time may be adjusted to accommodate your class size, schedule, and teaching style.

### Prerequisites

*Carpentry Core Curriculum*

### Before You Begin

As you prepare for each session, allow sufficient time to review the course objectives, content, visual aids (including the PowerPoint® presentation), and these lesson plans, and to gather the required equipment and materials. Consider time required for demonstrations, laboratories, field trips, and testing.

Using your access code, download the Module Examinations and Performance Profile Sheets from [www.nccerirc.com](http://www.nccerirc.com). The passing score for submission into NCCER’s Registry is 70 percent or above for the Module Examination; performance testing is graded pass or fail.
Safety Considerations
This module requires that trainees demonstrate the ability to read and interpret construction drawings, specifications, and schedules, and lay out a 90-degree angle. Safety is of paramount importance in carpentry and safe habits and practices must be emphasized whenever possible. Performance Tasks must be completed under your supervision. Each trainee must use required PPE and follow safe tool practices and procedures.

Classroom Equipment and Materials
Whiteboard/chalkboard
Markers/chalk
Pencils and paper
Carpentry Level One PowerPoint® Presentation Slides
LCD projector and screen
Computer
Copies of the Module Examination and Performance Profile Sheets
Vendor-supplied videos/DVDs showing various construction drawings (optional)
TV/DVD player (optional)

Equipment and Materials for Laboratories and Performance Testing
Section drawings
Detail drawings
Door, window, header, and/or finish schedules
Structural drawings
Plumbing, mechanical, and electrical plans
Drawing set that includes as-built drawings
Shop drawings
Copies of a complete set of construction drawings
Examples of specifications
CSI MasterFormat™ 2012
Residential building codes for various locales

Additional Resources
This module presents thorough resources for task training. The following resource material is suggested for further study:


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

*Code Check.* Newtown, CT: Taunton Press.


The Construction Specifications Institute. An organization that seeks to facilitate communication among all those involved in the building process, [http://www.csinet.org](http://www.csinet.org)

There are a number of online resources available for trainees who would like more information on construction drawings, specifications, and layout. A search for additional information may be assigned as homework to interested trainees.
The lesson plan for this module is divided into nine 2.5-hour sessions. Each session includes 10 minutes for administrative tasks and one 10-minute break.

**SESSION ONE**

Session One introduces lines, symbols, and abbreviations used on construction drawings.

1. Show Session One PowerPoint® presentation slides.
2. Provide an overview of construction drawings.
3. Discuss the different types of lines, symbols, and abbreviations on plan view drawings.

**SESSION TWO**

Session Two introduces types of dimensions used on plan view drawings.

1. Show Session Two PowerPoint® presentation slides.
2. Review common methods of indicating dimensions on drawings.
3. Have trainees determine actual dimensions from a scaled drawing.

**SESSION THREE**

Session Three introduces some of the documents commonly included in a set of construction drawings, including title sheets, site plans, foundation plans, floor plans, and roof plans.

1. Show Session Three PowerPoint® presentation slides.
2. Review the purpose and elements of title sheets, site plans, foundation plans, floor plans, and roof plans.
3. Have trainees indicate a change on a set of drawings.

**SESSION FOUR**

Session Four introduces elevation drawings.

1. Show Session Four PowerPoint® presentation slides.
2. Review the purpose and elements of elevation drawings.

**SESSION FIVE**

Session Five introduces section drawings, detail drawings, schedules, structural drawings, and mechanical, electrical, and plumbing plans.

1. Show Session Five PowerPoint® presentation slides.
2. Review the purpose and elements of section drawings, detail drawings, schedules, structural drawings, and MEP plans.

**SESSION SIX**

Session Six introduces shop drawings, as-built drawings, soil reports, and guidelines for reading a set of drawings.

1. Show Session Six PowerPoint® presentation slides.
2. Review the purpose and elements of shop drawing, as-built drawings, and soil reports.
3. Review the procedure for reading a set of drawings.
4. Have trainees read and interpret a set of drawings.
**Session Seven**

Session Seven introduces written specifications and building codes.

1. Show Session Seven PowerPoint® presentation slides.
2. Review typical specifications.
3. Discuss building codes.
4. Have trainees research residential building codes for various locales.

**Session Eight**

Session Eight covers the 3-4-5 rule for squaring a building.

1. Show Session Eight PowerPoint® presentation slides.
2. Explain the 3-4-5 rule.

**Session Nine**

Session Nine is a review and testing session. Have trainees complete the module Review Questions and Trade Terms Quiz. (Alternatively, these may be assigned as homework at the end of Session Eight.) Answer any questions that trainees may have.

1. Have trainees complete the Module Examination. Any outstanding performance testing must be completed during this session.
2. Record the testing results on Training Report Form 200, and submit the report to your Training Program Sponsor.
<table>
<thead>
<tr>
<th>Equipment and Materials</th>
<th>Architect’s scale</th>
<th>Calculator</th>
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</thead>
<tbody>
<tr>
<td>Personal protective equipment:</td>
<td>Floor and roof plans</td>
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<td>Section drawings</td>
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<td>Whiteboard/Chalkboard</td>
<td>Elevation drawings</td>
<td>Detail drawings</td>
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<td>Markers/Chalk</td>
<td>Examples of specifications</td>
<td>CSI MasterFormat™ 2012</td>
</tr>
<tr>
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<td>A complete set of construction drawings</td>
</tr>
<tr>
<td><strong>Carpentry Level One PowerPoint® Presentation Slides</strong></td>
<td>Site plans with and without topographical features</td>
<td>Copies of a complete set of construction drawings</td>
</tr>
<tr>
<td>LCD projector and screen</td>
<td>Set of construction drawings with revision blocks</td>
<td>Plumbing, mechanical, and electrical plans</td>
</tr>
<tr>
<td>Computer</td>
<td>Floor plan with corresponding elevation drawings</td>
<td>Door, window, header, and/or finish schedules</td>
</tr>
<tr>
<td>Copies of the Module Examination and Performance Profile Sheets</td>
<td>Presentation drawings and corresponding section drawings</td>
<td>Drawing set that includes as-built drawings</td>
</tr>
<tr>
<td>Vendor-supplied videos/DVDs showing various hand and power tools (optional)</td>
<td>Shop drawings</td>
<td>Structural drawings</td>
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<tr>
<td>TV/DVD player</td>
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<tr>
<td>Residential building codes for various locales</td>
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</tbody>
</table>

To the extent possible, and as required for performance testing, provide a selection of the tools listed for each session; alternatively, photos may be used to teach tool identification.
Module Five (27105-13) describes the layout and construction procedures for floor systems, including how to read and interpret construction drawings and specifications, and how to identify different types of framing systems, floor system components, and floor system materials. It also covers how to estimate the amount of materials needed for a floor assembly and on some common alternative floor systems.

**Objectives**

**Learning Objective 1**
- Read and interpret specifications and drawings to determine floor system requirements.
  - Explain the importance of specifications.
  - List items commonly shown on architectural drawings.
  - Describe information typically shown on structural drawings.
  - Explain the importance of referencing mechanical, electrical, and plumbing plans.
  - Describe the proper procedure for reading a set of prints.

**Learning Objective 2**
- Identify the different types of framing systems.
  - Describe the general components of a platform-framed structure.
  - List differences between platform framing and balloon framing.
  - Describe the characteristics of post-and-beam framing.

**Learning Objective 3**
- Identify floor system components.
  - Define *sill plate* and describe its role in floor framing.
  - List and recognize different types of beams and girders and supports.
  - List and recognize different types of floor joists.
  - List and recognize different types of bridging.
  - Explain the purposes of subfloor and underlayment.

**Learning Objective 4**
- Describe the construction methods for floor systems, and identify floor system materials.
  - Describe how to check a foundation for squareness.
  - Name the methods used to lay out and fasten sill plates to the foundation.
  - Describe the proper procedure for installing a beam or girder.
  - Describe how to lay out sill plates and girders for floor joists.
  - Describe how to lay out and install floor joists for partitions and floor openings.
  - Identify different types of bridging and describe how to properly install each type.
  - Describe how to properly install subfloor.
  - Explain how to install joists for projections or cantilevered floors.

**Learning Objective 5**
- Estimate the amount of material needed for a floor assembly.
  - Describe how to estimate the amount of sill plate, sill sealer, and termite shield.
  - Describe how to estimate the amount of beam or girder material.
  - Describe how to estimate the amount of lumber needed for joists and joist headers.
  - Describe how to estimate the amount of bridging required.
  - Describe how to estimate the amount of subfloor material required.

**Learning Objective 6**
- Identify some common alternative floor systems.

**Performance Tasks**

**Performance Task 1** *(Learning Objective 4)*
- Lay out and construct a floor assembly, including a rough opening and subfloor material.

**Performance Task 2** *(Learning Objective 5)*
- Estimate the amount of material to frame a floor assembly from a set of plans.

**Teaching Time: 25 hours**
*(Ten 2.5-Hour Classroom Sessions)*

Session time may be adjusted to accommodate your class size, schedule, and teaching style.
**Prerequisites**
*Core Curriculum*

**Before You Begin**
As you prepare for each session, allow sufficient time to review the course objectives, content, visual aids (including the PowerPoint® presentation), and these lesson plans, and to gather the required equipment and materials. Consider time required for demonstrations, laboratories, field trips, and testing.

Using your access code, download the Module Examinations and Performance Profile Sheets from [www.nccerirc.com](http://www.nccerirc.com). The passing score for submission into NCCER’s Registry is 70 percent or above for the Module Examination; performance testing is graded pass or fail.

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**Equipment and Materials for Laboratories and Performance Testing**

<table>
<thead>
<tr>
<th>Classroom Equipment and Materials</th>
<th>Personal protective equipment (PPE):</th>
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<tbody>
<tr>
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<td>Gloves</td>
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<td>Carpentry Level One PowerPoint®</td>
<td>Hearing protection</td>
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<tr>
<td>Presentation Slides</td>
<td>Foundation plans</td>
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<td>Sets of construction drawings</td>
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<td>Computer</td>
<td>Photographs of wood-framed buildings</td>
</tr>
<tr>
<td>Copies of the Module Examination</td>
<td>Photos of different types of girders</td>
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<td>and Performance Profile Sheets</td>
<td>Joist span tables</td>
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<td>Vendor-supplied videos/DVDs</td>
<td>Local building codes</td>
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<td>showing floor systems (optional)</td>
<td>Joist hangers</td>
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<td>TV/DVD player (optional)</td>
<td>2 x 8 or 2 x 10 floor joists</td>
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<td>Wood I-joists</td>
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<td>Manufacturers’ instructions for</td>
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<td>Calculator</td>
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<td>Photos of alternative floor systems</td>
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</table>

**Additional Resources**
There are a number of online resources available for trainees who would like more information on building materials, fasteners, and adhesives. A search for additional information may be assigned as homework to interested trainees.
The lesson plan for this module is divided into ten 2.5-hour sessions. Each session includes 10 minutes for administrative tasks and one 10-minute break.

**Session Outline for 27105-13**

**Floor Systems**

**Session One**

Session One covers reading specifications and drawings to determine floor system requirements.

1. Show Session One PowerPoint® presentation slides.
2. Discuss what is included in written specifications.
3. Explain and demonstrate how to interpret architectural drawings.
4. Demonstrate how to interpret a typical wall section.
5. Discuss the interpretation of structural drawings, MEP plans, and prints.

**Session Two**

Session Two introduces framing system terminology and different types of frames.

1. Show Session Two PowerPoint® presentation slides.
2. Discuss framing system terminology.
3. Discuss platform frames.
4. Discuss balloon frames.
5. Discuss fire stops.
6. Discuss post-and-beam frames.

**Session Three**

Session Three introduces some floor system components.

1. Show Session Three PowerPoint® presentation slides.
2. Discuss floor system component terminology, the purpose of floor systems, and information provided about them in prints and specifications.
3. Discuss the use and Installation of sill plates.
4. Identify the different types of girders and supports.
5. Discuss the spacing required between posts or columns, and discuss post caps and anchors.

**Session Four**

Session Four introduces floor joists, bridging, and subfloors.

1. Show Session Four PowerPoint® presentation slides.
2. Explain the purposes of and installation of floor joists.
3. Discuss the different kinds of joists.
4. Discuss floor trusses.
5. Explain the purpose and types of bridging.
6. Discuss the different types of subfloors and their uses.

**Session Five**

Session Five covers checking a foundation for squareness, and sill plate and girder installation.

1. Show Session Five PowerPoint® presentation slides.
2. Introduce the sequence of constructing a platform floor assembly.
3. Explain and demonstrate how to check a foundation for squareness.
4. Explain and demonstrate how to install a sill plate.
5. Explain and demonstrate how to install a girder.
Session Six covers laying out sill plates and girders, when additional joists are needed, installation of rim joists and floor joists, and framing floor openings.

1. Show Session Six PowerPoint® presentation slides.
2. Explain and demonstrate how to lay out sill plates and girders for joists.
3. Discuss additional joists needed to accommodate loadbearing partitions, floor openings, and so on.
4. Explain and demonstrate how to install rim joists and floor joists.
5. Review the procedure for framing an opening.

Session Seven covers installation of cross-bridging, solid bridging, subfloors, and joists for cantilevered floors.

1. Show Session Seven PowerPoint® presentation slides.
2. Discuss the installation of wood cross-bridging, metal cross-bridging, and solid bridging.
3. Explain how to install a subfloor.
4. Introduce the installation of joists for cantilevered floors.

Session Eight introduces estimating the amount of materials needed for a floor assembly.

1. Show Session Eight PowerPoint® presentation slides.
2. Discuss the items included in a material takeoff for a floor system.
3. Explain and demonstrate how to determine the amount of sill plate, sill sealer, and/or termite shield required.
4. Explain and demonstrate how to determine the quantity of girder material needed.
5. Explain and demonstrate how to determine the number of floor joists needed in a frame and the amount of material needed for the header joists.
6. Explain and demonstrate how to calculate the total amount of bridging needed.
7. Explain and demonstrate how to calculate the number of subfloor panels or boards needed.

Session Nine introduces some common alternative floor systems.

1. Show Session Nine PowerPoint® presentation slides.
2. Discuss some common alternative floor systems.
3. Discuss the method of casting and precasting concrete floors.
4. Discuss access floors.

Session Ten is a review and testing session. Have trainees complete the module Review Questions and Trade Terms Quiz. (Alternatively, these may be assigned as homework at the end of Session Nine.) Answer any questions that trainees may have.

1. Have trainees complete the Module Examination. Any outstanding performance testing must be completed during this session.
2. Record the testing results on Training Report Form 200, and submit the report to your Training Program Sponsor.
### Materials Checklist for Module 27105-13, Floor Systems,

<table>
<thead>
<tr>
<th>Equipment and Materials</th>
<th>Foundation plans</th>
<th>Joist span tables</th>
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</thead>
<tbody>
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<td>PowerPoint® Presentation</td>
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<td><strong>Copies of the Module Examination and Performance Profile Sheets</strong></td>
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<td>Pneumatic, ring shank, and screw nails</td>
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<td><strong>Vendor-supplied videos/DVDs showing floor systems (optional)</strong></td>
<td>Manufactured panels (OSB, waferboard, composite board, structural particleboard)</td>
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<tr>
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</tbody>
</table>

To the extent possible, and as required for performance testing, provide a selection of the tools listed for each session; alternatively, photos may be used to teach tool identification.
Objectives

Learning Objective 1
• Identify the components of a wall system.
  a. Identify methods used to construct corner posts.
  b. Describe how to frame partition intersections.
  c. Explain the purpose of headers and describe how they are constructed.
  d. Describe how metal-framed walls are constructed.

Learning Objective 2
• Describe the procedure for laying out a wood frame wall, including plates, corner posts, door and window openings, partition Ts, bracing, and fire-stops.
  a. Describe how to properly lay out a wood frame wall.
  b. Explain how to lay out wall openings.

Learning Objective 3
• Describe the correct procedure to assemble, erect, and brace exterior walls for a frame building.
  a. List the steps involved in assembling a wall.
  b. Identify where fire stops are to be installed and explain how they are installed.
  c. List the four steps involved in erecting a wall.

Learning Objective 4
• Describe wall framing techniques used in masonry construction.

Learning Objective 5
• Describe the correct procedure to estimate the materials required to frame walls.
  a. Explain how to estimate the amount of lumber required for soleplates and top plates.
  b. Describe how to estimate the number of studs required.
  c. Explain how to calculate the amount of material needed for a header.
  d. Describe how to estimate the amount of diagonal bracing required.

Learning Objective 6
• Identify alternative wall systems.
  a. Describe how concrete walls are constructed.
  b. Explain the difference between standard interior wall systems and alternative interior wall systems.

Performance Tasks

Performance Task 1 (Learning Objective 2)
• Lay out a wood frame wall, including plates, corner posts, door and window openings, partition Ts, bracing, and fire-stops.

Performance Task 2 (Learning Objective 3)
• Assemble and erect a wood frame wall, including plates, corner posts, door and window openings, partition Ts, bracing, and fire-stops.

Performance Task 3 (Learning Objective 3)
• Correctly install sheathing on a wall.

Performance Task 4 (Learning Objective 5)
• Estimate the materials required to frame walls.

Teaching Time: 10 hours
(Four 2.5-Hour Classroom Sessions)
Session time may be adjusted to accommodate your class size, schedule, and teaching style.

Prerequisites
Core Curriculum

Before You Begin
As you prepare for each session, allow sufficient time to review the course objectives, content, visual aids (including the PowerPoint® presentation), and these lesson plans, and to gather the required equipment and materials. Consider time required for demonstrations, laboratories, field trips, and testing.
Using your access code, download the Module Examinations and Performance Profile Sheets from www.nccerirc.com. The passing score for submission into NCCER’s Registry is 70 percent or above for the Module Examination; performance testing is graded pass or fail.

## Safety Considerations
This module requires trainees to demonstrate the safe framing of walls. Safety is paramount in the carpentry trade and safe habits and practices must be emphasized whenever possible. Performance Tasks must be completed under your supervision. Each trainee must use required PPE and follow safe tool practices and procedures.

### Classroom Equipment and Materials
- Whiteboard/Chalkboard
- Markers/Chalk
- Pencils and paper
- Carpentry Level One PowerPoint® Presentation Slides
- LCD projector and screen
- Computer
- Copies of the Module Examination and Performance Profile Sheets
- Vendor-supplied videos/DVDs showing wall framing systems (optional)
- TV/DVD player (optional)

### Equipment and Materials for Laboratories and Performance Testing
- Personal protective equipment (PPE):
  - Hard hat
  - Safety glasses
  - Gloves
  - Hearing protection
- Photographs or drawings that show specific types of building construction in various stages of completion
- Photographs of corner construction
- Set of prints with information pertinent to wall framing
- Residential construction drawings
- Stock for blocking
- 8d common nails
- 16d box nails
- $2 \times 4$ or $2 \times 6$ framing lumber for studs and joists
- $2 \times 12$ header material
- $\frac{1}{4}$" CD plywood for header spacers
- $\frac{1}{2}$" CD plywood
- 25’ tape measure
- Carpenter’s pencil
- Chalkline
- Framing hammer
- Pneumatic/cordless framing nailer
- Framing square or Speed Square™
- Circular saw
- Compound miter saw
- Extension cord
- Illustration of a wall cutaway or wall section from a set of construction drawings
- 4’ level
- Calculator or smartphone calculator app
- Copies of blank job hazard analysis (JHA) forms
- Banding or cleats
- 6’ stepladder
- Metal brace material
- Sheathing material

## Additional Resources
This module presents thorough resources for task training. The following resource material is suggested for further study:

- *Framing Floors, Walls and Ceilings*. Newtown, CT: Taunton Press.
- *Precision Framing for Pros by Pros*. Newtown, CT: Taunton Press.
- *National Association of Home Builders*. A trade association whose mission is to enhance the climate for housing and the building industry, [http://www.nahb.org](http://www.nahb.org)

There are a number of online resources available for trainees who would like more information on laying out and framing walls. A search for additional information may be assigned as homework to interested trainees.
The Lesson Plan for this module is divided into four 2.5-hour sessions. Each session includes 10 minutes for administrative tasks and one 10-minute break.

**Session One**

Session One introduces wall frame terminology and wall frame layout.
1. Show Session One PowerPoint® presentation slides.
2. Provide an overview of the module.
3. Discuss wall frame terminology.
4. Explain and demonstrate how to lay out a wood frame wall.

**Session Two**

Session Two covers the assembly, erection, and bracing of wood frame walls.
1. Show Session Two PowerPoint® presentation slides.
2. Discuss how to determine lengths of studs.
3. Review general safety and discuss safety pertinent to wall assembly.
4. Discuss and demonstrate how to assemble a wall frame.
5. Discuss and demonstrate how sheathing is fastened to wall frames.
6. Describe the methods of furring and framing for masonry walls.

**Session Three**

Session Three introduces estimating material quantities for wood frame walls.
1. Show Session Three PowerPoint® presentation slides.
2. Identify wall frame components that will be included in the estimate.
3. Discuss how to estimate each wall frame component.
4. Work in small groups to calculate estimates.

**Session Four**

Session Four is a review and testing session. Have trainees complete the module Review Questions and Trade Terms Quiz. (Alternatively, these may be assigned as homework at the end of Session Three.) Answer any questions that trainees may have.
1. Have trainees complete the Module Examination. Any outstanding performance testing must be completed during this session.
2. Record the testing results on Training Report Form 200, and submit the report to your Training Program Supervisor.
### Materials Checklist for Module 27111-13, Wall Systems,

| Personal protective equipment: | 4' level | ½" CD plywood |
| Hard hats | 25' tape measure | Stock for blocking |
| Safety glasses | Carpenter's pencil | 8d common nails |
| Gloves | Chalkline | Circular saw |
| Hearing protection | Framing hammer | Compound miter saw |
| Respiratory protection | Extension cord | 16d box nails |
| Whiteboard/Chalkboard | Banding or cleats | Metal brace material |
| LCD projector and screen | Sheathing material | 2 × 12 header material |
| Copies of the Module Examination and Performance Profile Sheets | Photographs or drawings that show specific types of building construction in various stages of completion | Illustration of a wall cutaway or wall section from a set of construction drawings |
| *Carpentry Level One* PowerPoint® Presentation Slides | Photographs of corner construction | Set of prints with information pertinent to wall framing |
| Computer | Pneumatic/cordless framing nailer | Framing square or Speed Square™ |
| Pencils and paper | ¼" CD plywood for header spacers | Calculator or smartphone calculator app |
| Vendor-supplied videos/DVDs showing wall framing systems (optional) | Copies of blank job hazard analysis (JHA) forms | Residential construction drawings |
| Markers/Chalk | 6' stepladder | 2 × 4 or 2 × 6 framing lumber for studs and joists |
| TV/DVD player | | |

To the extent possible, and as required for performance testing, provide a selection of the tools listed for each session; alternatively, photos may be used to teach tool identification.
Lesson Plans for Module 27112-13

CEILING AND ROOF FRAMING

The Trainee Guide for *Carpentry Level One* is available as an NCCERconnect ebook. Contact your NCCER customer service representative at 1-888-622-3720 for more information.

**Module Seven (27112-13)** provides an overview of ceiling and roof framing, including the components of ceiling and roof framing, the different types of roofs used in residential construction, and the use of trusses in basic roof framing. The methods for laying out rafters, erecting a gable roof, framing a basic gable end wall, and installing roof sheathing are introduced. It also provides instruction on how to estimate the amount of materials needed for a material takeoff for a roof.

### Objectives

**Learning Objective 1**
- Identify the components of ceiling framing.
  a. Describe the correct procedure for laying out ceiling joists.
  b. Describe how to cut and install ceiling joists on a wood frame building.
  c. Describe how to estimate the number of ceiling joists required for a building.

**Learning Objective 2**
- Identify common types of roofs used in residential construction.

**Learning Objective 3**
- Identify the components and define the terms associated with roof framing.
  a. Identify the two types of dormers.
  b. Describe how to use a framing square and a Speed Square™ for roof framing.

**Learning Objective 4**
- Describe the methods used to lay out a common rafter.
  a. Explain how to lay out rafter locations.
  b. Describe how to determine the length of a common rafter.
  c. Explain the correct procedure for laying out and cutting a common rafter.

**Learning Objective 5**
- Describe how to erect a gable roof.
  a. Describe how to install rafters.

**Learning Objective 6**
- Describe how to frame a basic gable end wall.
  a. Describe how to frame a gable overhang.
  b. Explain how to frame an opening in a roof.

**Learning Objective 7**
- Recognize the use of trusses in basic roof framing.
  a. Identify the various types and components of trusses.
  b. Identify the basics of truss installation.
  c. Identify the basics of truss bracing.

**Learning Objective 8**
- Describe the basics of roof sheathing installation.

**Learning Objective 9**
- Describe how to perform a material takeoff for a roof.
  a. Determine the materials needed for a gable roof.

### Performance Tasks

**Performance Task 1** (Learning Objective 1)
- Lay out ceiling joists.

**Performance Task 2** (Learning Objective 1)
- Cut and install ceiling joists for a wood frame building.

**Performance Task 3** (Learning Objective 1)
- Estimate the number of ceiling joists required for a building.

**Performance Task 4** (Learning Objective 4)
- Lay out common roof rafters.

**Performance Task 5** (Learning Objective 5)
- Cut and install roof rafters for a gable roof.

**Performance Task 6** (Learning Objective 6)
- Frame a gable end wall.

**Performance Task 7** (Learning Objective 7)
- Erect a gable roof using trusses.

**Performance Task 8** (Learning Objective 8)
- Sheath a gable roof with an opening.

**Performance Task 9** (Learning Objective 9)
- Perform a material takeoff for a roof.

### Teaching Time: 47.5 hours
(Nineteen 2.5-Hour Classroom Sessions)
Session time may be adjusted to accommodate your class size, schedule, and teaching style.
### Prerequisites

**Core Curriculum**

### Before You Begin

As you prepare for each session, allow sufficient time to review the course objectives, content, visual aids (including the PowerPoint® presentation), and these lesson plans, and to gather the required equipment and materials. Consider time required for demonstrations, laboratories, field trips, and testing.

Using your access code, download the Module Examinations and Performance Profile Sheets from www.nccerirc.com. The passing score for submission into NCCER’s Registry is 70 percent or above for the Module Examination; performance testing is graded pass or fail.

### Safety Considerations

This module requires that trainees demonstrate the safe framing of ceilings and roofs. Safety is paramount in the carpentry trade and safe habits and practices must be emphasized whenever possible. Performance Tasks must be completed under your supervision. Each trainee must use required PPE and follow safe tool practices and procedures.

### Classroom Equipment and Materials

- Whiteboard/Chalkboard
- Markers/Chalk
- Pencils and paper
- **Carpentry Level One PowerPoint® Presentation Slides**
- LCD projector and screen
- Computer
- Copies of the Module Examination and Performance Profile Sheets
- Vendor-supplied videos/DVDs showing ceiling and roof framing systems (optional)
- TV/DVD player (optional)

### Equipment and Materials for Laboratories and Performance Testing

**Personal protective equipment (PPE):**
- Hard hat
- Safety glasses
- Gloves
- Hearing protection
- Face shield
- Respiratory protection

- Photographs or drawings that show building construction in various stages of completion
- Calculator or smartphone calculator app
- 2 x 4, 2 x 6, or 2 x 8 framing lumber
- Carpenter’s pencil
- Measuring tape
- 4’ level
- Plywood
- 1x lumber
- Circular saw
- Compound miter saw
- 2 x 6 strongback or 1 x 4 ribband
- 8d common nails
- 16d box nails
- Framing hammer
- Pneumatic/cordless framing nailer
- Extension cord
- Photographs of different types of roofs
- Manufacturer’s instructions for the Speed Square™
- Rafter square
- **Speed Square™**
- Framing square
- Handsaw
- Sawhorses
- Scrap lumber (1 x 2 or 1 x 4)
- Photos or illustrations of intersecting roofs that include two gable sections and a gable and hip combination
- Four-wall, low wall assembly with double top plate (for use in constructing a gable roof)
- Roof plans requiring openings and corresponding engineer’s specifications
- Copies of blank job hazard analysis (JHA) forms
- Skylight or roof window
- Set of rafters for a small roof
- Fall protection equipment such as peak anchors and lifelines, lifts, scaffolds, and ladders
- Truss placement diagram
- Temporary roof braces for trusses
- Roof sheathing (OSB or plywood panels)
- H-clips
- Roof underlayment
- Drip edges
- Heavy felt
- Coated sheets
- Shims
- Roofing plan for a building
Additional Resources

This module presents thorough resources for task training. The following resource material is suggested for further study:


Cedar Shake and Shingle Bureau. A trade organization that promotes the common interests of members involved in quality cedar shake and shingle roofing, [http://www.cedarbureau.org](http://www.cedarbureau.org)

*Framing Roofs.* Newtown, CT: Taunton Press.


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


Western Wood Products Association. A trade association representing softwood lumber manufacturers in 12 western states and Alaska, [http://www2.wwpa.org](http://www2.wwpa.org)


There are a number of online resources available for trainees who would like more information on framing ceilings and roofs. A search for additional information may be assigned as homework to interested trainees.
The lesson plan for this module is divided into nineteen 2.5-hour sessions. Each session includes 10 minutes for administrative tasks and one 10-minute break.

**Session Outline for 27112-13**

**Ceiling Joist and Roof Framing**

**Session One**

Session One introduces ceiling components and laying out ceiling joists.
1. Show Session One PowerPoint® presentation slides.
2. Provide an overview of the module.
3. Discuss roof trusses.
4. Explain the purposes of ceiling joists.
5. Explain how to lay out and splice ceiling joists.

**Session Two**

Session Two introduces cutting, installing, and estimating ceiling joists.
1. Show Session Two PowerPoint® presentation slides.
2. Explain how to cut ceiling joists to the proper length.
3. Discuss and demonstrate ribbands and stongbacks.
4. Explain how to estimate the amount of lumber needed for ceiling joists.

**Session Three**

Session Three introduces types of roofs, roof framing components, and roof layout terminology.
1. Show Session Three PowerPoint® presentation slides.
2. Describe the most common types of roofs used for residential construction.
3. Identify and describe roof framing components.
4. Define terminology related to roof layout.
5. Discuss dormers.

**Session Four**

Session Four introduces rafter framing tools.
1. Show Session Four PowerPoint® presentation slides.
2. Describe a rafter square and how to use one.
3. Describe the Speed Square™ and how to use it.

**Session Five**

Session Five introduces laying out rafter locations and determining rafter lengths.
1. Show Session Five PowerPoint® presentation slides.
2. Demonstrate how to make tail cuts and plumb cuts on rafters.
3. Explain the steps of laying out rafter locations.
4. Explain the steps of determining the required length of a rafter.

**Session Six**

Session Six introduces two procedures for laying out and cutting common rafters.
1. Show Session Six PowerPoint® presentation slides.
2. Explain the rafter square method.
3. Explain the Speed Square™ method.
Session Seven
Session Seven introduces the procedure for laying out and erecting hips and valleys.

1. Show Session Seven PowerPoint® presentation slides.
2. Provide an overview for laying out and erecting hips and valleys.
3. Review the procedure for finding the length of a hip rafter using a rafter square.
4. Review the procedure for laying out a hip rafter.
5. Review the procedure for laying out a hip jack rafter using a rafter square.
6. Review the procedure for laying out a hip rafter using a Speed Square™.

3. Discuss the use of double headers and double trimmer rafters when framing an opening in a roof.

Session Eleven
Session Eleven introduces how to frame a gable end wall.

1. Show Session Eleven PowerPoint® presentation slides.
2. Review the necessity for venting when constructing attics.
3. Explain the method of framing a gable end opening.

Session Twelve
Session Twelve introduces the framing of a gable overhang.

1. Show Session Twelve PowerPoint® presentation slides.
2. Discuss gable overhangs.
3. Review the two methods for framing a gable overhang.

Session Thirteen
Session Thirteen introduces the use of trusses in roof framing.

1. Show Session Thirteen PowerPoint® presentation slides.
2. Present an overview of roof trusses.
3. Discuss the use of trusses in residential and commercial construction.
4. Discuss the advantages of prefabricated trusses.
5. Describe types of trusses.
6. Discuss the handling of trusses.
Session Fourteen introduces the installation of trusses.

1. Show Session Fourteen PowerPoint® presentation slides.
2. Discuss the safety issues associated with installing trusses.
3. Review the use of framing plans.
4. Discuss the purpose of girders.

Session Fifteen introduces the bracing of trusses.

1. Show Session Fifteen PowerPoint® presentation slides.
2. Discuss permanent and temporary truss bracing.
3. Discuss the use of prefabricated metal trusses.

Session Sixteen introduces the basics of roof sheathing installation.

1. Show Session Sixteen PowerPoint® presentation slides.
2. Provide an overview of sheathing, including purpose, common materials, and application process.
3. Discuss underlayments and metal drip edges.

Session Seventeen introduces roof sheathing.

1. Show Session Seventeen PowerPoint® presentation slides.
2. Discuss the importance of ensuring that the rafters are the same length before installing the sheathing.
3. Review all safety precautions required when installing sheathing on a sloping roof and when working around roof openings.
4. Discuss felt underlayment.

Session Eighteen covers estimating amounts of materials needed for a gable roof.

1. Show Session Eighteen PowerPoint® presentation slides.
2. Provide an overview of the estimating process.
3. Describe the components of a material takeoff.
4. Explain the steps of estimating the amount of lumber needed for rafters on a gable roof.
5. Explain the steps of estimating the amount of lumber needed for the ridgeboard on a gable roof.
6. Explain the steps of estimating the number of sheathing panels needed for a gable roof.

Session Nineteen is a review and testing session. Have trainees complete the module Review Questions and Trade Terms Quiz. (Alternatively, these may be assigned as homework at the end of Session Eighteen.) Answer any questions that trainees may have.

1. Have trainees complete the Module Examination. Any outstanding performance testing must be completed during this session.
2. Record the testing results on Training Report Form 200, and submit the report to your Training Program Sponsor.
Materials Checklist for Module 27112-13, Ceiling Joist and Roof Framing

<table>
<thead>
<tr>
<th>Equipment and Materials</th>
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</thead>
<tbody>
<tr>
<td><strong>Personal protective equipment:</strong></td>
</tr>
<tr>
<td>Safety glasses</td>
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<tr>
<td>Gloves</td>
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<tr>
<td>Hearing protection</td>
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<tr>
<td>Hard hats</td>
</tr>
<tr>
<td><strong>Copies of the Module Examination and Performance Profile Sheets</strong></td>
</tr>
<tr>
<td><strong>Carpentry Level One PowerPoint® Presentation Slides, DVD player</strong></td>
</tr>
<tr>
<td>Whiteboard/chalkboard</td>
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<tr>
<td>Markers/chalk</td>
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<tr>
<td>Pencils and paper</td>
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<tr>
<td><strong>Computer</strong></td>
</tr>
<tr>
<td><strong>TV/VCR (optional)</strong></td>
</tr>
<tr>
<td><strong>Photographs or drawings that show building construction in various stages of completion</strong></td>
</tr>
<tr>
<td><strong>2 × 4, 2 × 6, or 2 × 8 framing lumber</strong></td>
</tr>
<tr>
<td><strong>Temporary roof braces for trusses</strong></td>
</tr>
<tr>
<td><strong>Copies of blank job hazard analysis (JHA) forms</strong></td>
</tr>
<tr>
<td><strong>Drip edges</strong></td>
</tr>
<tr>
<td><strong>Roofing plan for a building</strong></td>
</tr>
</tbody>
</table>

To the extent possible, and as required for performance testing, provide a selection of the tools listed for each session; alternatively, photos may be used to teach tool identification.
Module Eight (27109-13) introduces the building envelope system and its components. The module describes the various types of windows, skylights, and exterior doors and provides instructions for installing them. It also includes instructions for installing weather stripping and locksets.

Objectives

Learning Objective 1
- Identify the components of the building envelope.
  a. Describe various ways that air infiltration can be minimized or prevented.
  b. Identify various types of fixed, sliding, and swinging windows.
  c. Identify the common types of exterior doors and explain how they are constructed

Learning Objective 2
- State the requirements for a proper window installation.
  a. Explain when jamb extensions are used.
  b. Identify common considerations when framing in glass blocks.

Learning Objective 3
- State the requirements for a proper door installation.
  a. Identify the differences between residential and commercial doors.

Learning Objective 4
- Identify the various types of locksets used on exterior doors and explain how they are installed.

Performance Tasks

Performance Task 1 (Learning Objective 2)
- Prepare a rough opening for proper window installation.

Performance Task 2 (Learning Objective 3)
- Prepare a rough opening for proper door installation.

Performance Task 3 (Learning Objective 4)
- Install a lockset.

Teaching Time: 12.5 hours
(Five 2.5-hour Classroom Sessions)
Session time may be adjusted to accommodate your class size, schedule, and teaching style.

Prerequisites

Core Curriculum

Before You Begin

As you prepare for each session, allow sufficient time to review the course objectives, content, visual aids (including the PowerPoint® presentation), and these lesson plans, and to gather the required equipment and materials. Consider time required for demonstrations, laboratories, field trips, and testing.

Using your access code, download the Module Examinations and Performance Profile Sheets from www.nccerirc.com. The passing score for submission into NCCER’s Registry is 70 percent or above for the Module Examination; performance testing is graded pass or fail.
Safety Considerations
This module requires that trainees demonstrate the safe installation of windows, doors, and locksets. Safety is paramount in the carpentry trade and safe habits and practices must be emphasized whenever possible. Performance Tasks must be completed under your supervision. Each trainee must use required PPE and follow safe tool practices and procedures.

Classroom Equipment and Materials
Whiteboard/Chalkboard
Markers/Chalk
Pencils and paper
Carpentry Level One PowerPoint® Presentation Slides
LCD projector and screen
Computer
Copies of the Module Examination and Performance Profile Sheets
Vendor-supplied videos/DVDs showing various windows, skylights, and exterior doors (optional)
TV/DVD player (optional)

Equipment and Materials for Laboratories and Performance Testing
Personal protective equipment (PPE):
- Hard hat
- Safety glasses
- Gloves
- Hearing protection
Photographs of older buildings
Building wrap
Small plywood panels with 10" x 18" openings
Nails with large heads, nails or screws with plastic washers or 1"-wide staples
Hammer
Stapler
Contractor’s tape or sealants
Utility knife
Tape measure
Photographs of buildings with a variety of window arrangements
Stock double-hung window
Manufacturers’ catalogs or photographs of local buildings with examples of bay windows or skylights
Manufacturers’ catalogs or photographs of local buildings with examples of doors
Weather stripping
Tin snips
Nail
Awl
Nail set
Screwdriver
Threshold
Drill and drill bits
Coping saw
Set of basic residential plans
Prehung window
Hand levels
Handsaw
Framing square
Combination square
Shims
Screws
Insulation and/or expanding foam
Manufacturers’ catalogs showing various types of windows
30" level
Caulking gun and sealer
Carpenter’s pencil
Door unit
16d finishing nails
Wood screws
Photographs of local residences
Boring jig and jig bit
Mortise marker
Lockset installation template
Lockset
Sandpaper
Chisel
Manufacturers’ catalogs showing various types of locksets

Additional Resources
This module presents thorough resources for task training. The following resource material is suggested for further study:


There are a number of online resources available for trainees who would like more information on the building envelope system and its components. A search for additional information may be assigned as homework to interested trainees.
Session Outline for 27109-13

INTRODUCTION TO BUILDING ENVELOPE SYSTEMS

The lesson plan for this module is divided into five 2.5-hour sessions. Each session includes 10 minutes for administrative tasks and one 10-minute break.

**SESSION ONE**

Session One introduces the building envelope and its components.
1. Show Session One PowerPoint® presentation slides.
2. Provide an overview of the module.
3. Discuss building envelope terminology.
4. Identify building envelope components.

**SESSION TWO**

Session Two introduces trainees to window installation.
1. Show Session Two PowerPoint® presentation slides.
2. Demonstrate the proper installation of a prehung window.
3. Discuss the use of glass block in a building.

**SESSION THREE**

Session Three introduces trainees to door installation.
1. Show Session Three PowerPoint® presentation slides.
2. Demonstrate the proper installation of prehung doors.

**SESSION FOUR**

Session Four introduces trainees to proper installation of locksets.
1. Show Session Four PowerPoint® presentation slides.
2. Demonstrate the proper installation of locksets.

**SESSION FIVE**

Session Five is a review and testing session. Have trainees complete the module Review Questions and Trade Terms Quiz. (Alternatively, these may be assigned as homework at the end of Session Four.) Answer any questions that trainees may have.

1. Have trainees complete the Module Examination. Any outstanding performance testing must be completed during this session.
2. Record the testing results on Training Report Form 200, and submit the report to your Training Program Supervisor.
### Materials Checklist for Module 27109-13, Introduction to Building Envelope Systems,

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<tr>
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<td>Drill and drill bits</td>
<td>Coping saw</td>
</tr>
<tr>
<td>Pencils and paper</td>
<td>Prehung window</td>
<td>Set of basic residential plans</td>
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<td><strong>Carpentry Level One</strong></td>
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<td><strong>Sandpaper</strong></td>
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To the extent possible, and as required for performance testing, provide a selection of the tools listed for each session; alternatively, photos may be used to teach tool identification.
Lesson Plans for Module 27110-13

BASIC STAIR LAYOUT

The Trainee Guide for Carpentry Level One is available as an NCCERconnect ebook. Contact your NCCER customer service representative at 1-888-622-3720 for more information.

Module Nine (27110-13) introduces the various types of stairs and the common building code requirements related to stairs. The module focuses on the techniques for measuring and calculating rise, run, and stairwell openings; laying out stringers; and fabricating basic stairways.

**Objectives**

**Learning Objective 1**
- Identify the types of stairways.
  - Identify how residential and commercial stairways differ.

**Learning Objective 2**
- Identify the various components associated with stairs.

**Learning Objective 3**
- Identify terms associated with stair framing.
  - Define **headroom**.
  - Define **stringer** and explain when more than two stringers are used.
  - Define **treads** and **risers** and explain the importance of uniform tread depths and riser heights.
  - List the minimum stairway width requirements for residential and commercial structures.
  - Describe the difference between handrails and guards.
  - Identify situations that carpenters may be confronted with when framing stairwells.

**Learning Objective 4**
- Describe the procedure used to determine the total rise, number and size of risers, and number and size of treads required for a stairway.
  - Explain how to calculate the riser height, tread depth, and total run for a stairway.
  - Describe how to calculate stairwell opening sizes.

**Learning Objective 5**
- Describe the procedure to lay out and cut stringers, risers, and treads.
  - Explain how to lay out and cut a stringer.
  - Describe how to properly reinforce a stringer.
  - Summarize how concrete stairways are formed.

**Performance Tasks**

**Performance Task 1** (Learning Objective 4)
- Calculate the total rise, number and size of risers, and number and size of treads required for a stairway.

**Performance Task 2** (Learning Objective 5)
- Lay out and cut a stringer.

**Teaching Time: 12.5 hours**

(Five 2.5-Hour Classroom Sessions)

Session time may be adjusted to accommodate your class size, schedule, and teaching style.

**Prerequisites**

**Core Curriculum**

**Before You Begin**

As you prepare for each session, allow sufficient time to review the course objectives, content, visual aids (including the PowerPoint® presentation), and these lesson plans, and to gather the required equipment and materials. Consider time required for demonstrations, laboratories, field trips, and testing.

Using your access code, download the Module Examinations and Performance Profile Sheets from www.nccerirc.com. The passing score for submission into NCCER’s Registry is 70 percent or above for the Module Examination; performance testing is graded pass or fail.
**Safety Considerations**

This module requires that trainees demonstrate the safe construction of stairways. Safety is paramount in the carpentry trade and safe habits and practices must be emphasized whenever possible. Performance Tasks must be completed under your supervision. Each trainee must use required PPE and follow safe tool practices and procedures.

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**Classroom Equipment and Materials**

- Whiteboard/Chalkboard
- Markers/Chalk
- Pencils and paper
- *Carpentry Level One PowerPoint® Presentation Slides*
- LCD projector and screen
- Computer
- Copies of the Module Examination and Performance Profile Sheets
- Vendor-supplied videos/DVDs showing basic stair framing (optional)
- TV/DVD player (optional)

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**Equipment and Materials for Laboratories and Performance Testing**

- Personal protective equipment (PPE):
  - Hard hat
  - Safety glasses
  - Gloves
  - Hearing protection
  - Fall protection, if required
- Photographs of ancient Mayan structures and stairways
- Photographs of traditional and ornate stairways
- *International Building Code®*
- *International Residential Code®*
- Tape measure
- Objects of varying heights
- Residential prints showing stairways
- Calculator
- Large strips of cardboard
- Blank job hazard analysis (JHA) forms
- Pitch board
- Framing square
- Stair gauges
- Carpenter’s pencil
- 2 × 12s for stringers
- 2 × 12s for treads
- 1 × 8s for risers
- Handrail and brackets
- 8d box nails
- 16d box nails
- 16d casing nails
- Nails for pneumatic/cordless nailer
- Stair plans
- Pneumatic/cordless nailer
- Sawhorses or work table
- Circular saw
- Handsaw
- Level
- Lumber for pitchboard construction
- Hammer

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**Additional Resources**

This module presents thorough resources for task training. The following resource material is suggested for further study:

- *Basic Stairbuilding*, Newtown, CT: Taunton Press, Inc. (Book with companion video or DVD.)
- *Framing Floors and Stairs*. Berkeley, CA: Publishers Group West. (Book with companion video or DVD.)
- WM Coffman Resources, LLC. Hardwood stair parts manufacturer, [http://www.wm-coffman.com](http://www.wm-coffman.com)

There are a number of online resources available for trainees who would like more information on basic stair layout. A search for additional information may be assigned as homework to interested trainees.
The lesson plan for this module is divided into five 2.5-hour sessions. Each session includes 10 minutes for administrative tasks and one 10-minute break.

**SESSION ONE**

Session One introduces stairways and stair components.
1. Show Session One PowerPoint® presentation slides.
2. Provide an overview of the module.
3. Identify types of stairways and their components.
4. Locate sections in the *International Building Code®* and *International Residential Code®* that pertain to stairs.

**SESSION TWO**

Session Two introduces stair framing terminology.
1. Show Session Two PowerPoint® presentation slides.
2. Discuss stair framing requirements for residential structures. Contrast the requirements to those for commercial construction.

**SESSION THREE**

Session Three introduces stair calculations.
1. Show Session Three PowerPoint® presentation slides.
2. Explain the mathematical relationship between the riser and tread dimensions. Discuss how a change in one of the dimensions will likely impact the other dimension.
3. Discuss how to determine riser height.
4. Discuss tread depth and total stair run and how these dimensions are determined.
5. Discuss preframed stairwells and explain how to determine their unit rise and run.

**SESSION FOUR**

Session Four introduces stair construction.
1. Show Session Four PowerPoint® presentation slides.
2. Discuss the importance of safety when constructing stairs. Craftworkers must work from heights, which introduces another safety hazard. Emphasize fall protection equipment that may be used when constructing stairs.
3. Explain how to lay out and cut a cutout stringer.

**SESSION FIVE**

Session Five is a review and testing session. Have trainees complete the module Review Questions and Trade Terms Quiz. (Alternatively, these may be assigned as homework at the end of Session Four.) Answer any questions that trainees may have.
1. Have trainees complete the Module Examination. Any outstanding performance testing must be completed during this session.
2. Record the testing results on Training Report Form 200, and submit the report to your Training Program Supervisor.
## Materials Checklist for Module 27110-13, Basic Stair Layout,

<table>
<thead>
<tr>
<th>Equipment and Materials</th>
<th>Calculator</th>
<th>Large strips of cardboard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personal protective equipment:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hard hat</td>
<td>Pitch board</td>
<td>Framing square</td>
</tr>
<tr>
<td>Safety glasses</td>
<td>Handrail and brackets</td>
<td>Stair gauges</td>
</tr>
<tr>
<td>Gloves</td>
<td>16d casing nails</td>
<td>Carpenter’s pencil</td>
</tr>
<tr>
<td>Hearing protection</td>
<td>8d box nails</td>
<td>2 × 12s for stringers</td>
</tr>
<tr>
<td>Respiratory protection</td>
<td>16d box nails</td>
<td>2 × 12s for treads</td>
</tr>
<tr>
<td>Whiteboard/Chalkboard</td>
<td>Stair plans</td>
<td>1 × 8s for risers</td>
</tr>
<tr>
<td>Markers/Chalk</td>
<td>Circular saw</td>
<td>Handsaw</td>
</tr>
<tr>
<td>Pencils and paper</td>
<td><em>International Building Code</em></td>
<td>Pneumatic/cordless nailer</td>
</tr>
<tr>
<td><em>Carpentry Level One PowerPoint® Presentation Slides</em></td>
<td>Nails for pneumatic/cordless nailer</td>
<td>Photographs of ancient Mayan structures and stairways</td>
</tr>
<tr>
<td>LCD projector and screen</td>
<td>Tape measure</td>
<td>Level</td>
</tr>
<tr>
<td>Computer</td>
<td>Objects of varying heights</td>
<td>Hammer</td>
</tr>
<tr>
<td>Copies of the Module Examination and Performance Profile Sheets</td>
<td>Residential prints showing stairways</td>
<td>Blank job hazard analysis (JHA) forms</td>
</tr>
<tr>
<td>Vendor-supplied videos/DVDs showing various hand and power tools (optional)</td>
<td>Photographs of traditional and ornate stairways</td>
<td>Lumber for pitchboard construction</td>
</tr>
<tr>
<td>TV/DVD player</td>
<td><em>International Residential Code</em></td>
<td>Sawhorses or work table</td>
</tr>
</tbody>
</table>

To the extent possible, and as required for performance testing, provide a selection of the tools listed for each session; alternatively, photos may be used to teach tool identification.