

# Lesson Plans for Module 27101

## ORIENTATION TO CARPENTRY

**Orientation to Carpentry (Module 27101)** 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 training opportunities within the carpentry trade.

- a. Describe craft training opportunities within the carpentry trade.

#### Learning Objective 2

Explain the importance of safety in carpentry, and how it impacts contractors and craft professionals on the jobsite.

- a. Describe the OSHA Outreach Training Program and contents of a site-specific safety plan (SSSP).

#### Learning Objective 3

Identify skills and attributes of successful carpenters.

- a. List the skills and responsibilities of professional carpenters.
- b. Summarize the traits and standards followed by professional carpenters.

#### Learning Objective 4

Explain how organizations like SkillsUSA help you connect with construction craft professionals.

- a. Describe SkillsUSA programs/competitions and the value they offer to the carpentry trainees and participating organizations.
- b. List the seven goals of the SkillsUSA Program of Work.

#### Performance Tasks

This is a knowledge-based module. There are no Performance Tasks.

**Recommended Teaching Time: 2.5 hours**

### Prerequisites

*Core*

### Before You Begin

As you prepare for each section, allow sufficient time to review the course objectives, content, visual aids (including the *Carpentry* PowerPoint® Presentations and/or Dynamic Lecture Presentations), 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 PowerPoint® Presentations and Performance Sheets for this module from NCCER's Instructor Resource Center at [www.nccer.org/irc](http://www.nccer.org/irc).

# Lesson Plans for Module 27102

## BUILDING MATERIAL AND FASTENERS

**Building Materials and Fasteners (Module 27102)** 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 safety hazards and precautions associated with wood, concrete, steel, and composite building materials.

- Describe the focus four and explain how to reduce hazards associated with handling carpentry materials.
- Explain the benefits of a job hazard analysis.

#### Learning Objective 2

Identify different types of building materials and calculate needed quantities.

- Summarize the types of lumber, their characteristics, and how lumber is graded.
- Describe the types of treated lumber.
- Identify engineered wood products and their applications.
- Distinguish between the types of concrete construction materials.
- Describe the types of steel framing and their applications.
- Summarize how to calculate lumber, panel, and concrete quantities.

#### Learning Objective 3

Explain how to properly handle and store building materials.

- Describe how to safely handle and store wood, concrete, and steel building materials.

#### Learning Objective 4

Identify fasteners, anchors, and adhesives used in construction.

- Describe different types of nails, screws, bolts, and staples.
- Summarize the categories of mechanical anchors.
- List adhesives used in construction and identify their applications.

### Performance Tasks

#### Performance Task 1 (Learning Objective 2)

Given a selection of building materials, identify a particular material and state its use.

#### Performance Task 2 (Learning Objective 2)

Calculate building material quantities using the described methods.

#### Performance Task 3 (Learning Objective 4)

Demonstrate safe and proper installation of various types of fasteners, anchors, and adhesives.

**Recommended Teaching Time: 20 hours**

### Prerequisites

*Core*

### Before You Begin

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## Lesson Plans for Module 27113

# CONSTRUCTION PLANS AND DOCUMENTS

**Construction Plans and Documents (Module 27113)** includes important design and layout information for all types of buildings. In addition to showing carpenters where to build living spaces, construction drawings show carpenters where to build spaces used by electricians, plumbers, and HVAC installers. To ensure these spaces are accurately built, carpenters must be able read and interpret a variety of construction drawings.

### Objectives

#### Learning Objective 1

List drawings included in a set of construction plans and explain how to read them.

- Describe the purpose of each type of drawing in a set of plans.
- Identify selected lines, architectural symbols, and abbreviations used on plans.
- Describe the methods of dimensioning construction drawings.

#### Learning Objective 2

Describe the purpose of written specifications.

- Summarize how specifications are organized.
- Explain the importance of construction building codes.

### Performance Tasks

**Performance Task 1** (Learning Objective 1)  
Read and interpret construction plan drawings.

**Performance Task 2** (Learning Objective 1)  
Read and interpret schedules.

**Performance Task 3** (Learning Objective 2)  
Read and interpret written specifications.

**Recommended Teaching Time: 20 hours**

### Prerequisites

*Core*

### Before You Begin

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# Lesson Plans for Module 27114

## PRINCIPLES OF SITE AND BUILDING LAYOUT

**Principles of Site and Building Layout (Module 27114)** introduces trainees to the basics of site and building layout. It starts by introducing trainees to the primary construction drawings used in site and building layout, then describes the math, tools, and methods required for performing basic site layout tasks.

### Objectives

#### Learning Objective 1

Explain how construction drawings are used in site and building layout.

- Summarize tasks performed during site and building layout.
- Describe the types of construction drawings used to lay out a building site.

#### Learning Objective 2

Understand fundamental construction math concepts and right triangle calculations used in site layout.

- Explain how angles, shapes, and the Pythagorean Theorem are used in site and building layout.

#### Learning Objective 3

Describe measuring and leveling tools used in performing site and building layout.

- Identify measuring tools and their applications.
- Describe leveling tools and their applications.
- Describe site layout instruments and equipment.

#### Learning Objective 4

Explain how to measure horizontal and vertical distances, establish building lines, and verify corners are square.

- Describe how to measure horizontal and vertical distances.
- Summarize how to establish building lines with batter boards and verify corners are square.

### Performance Tasks

#### Performance Task 1 (Learning Objective 3)

Demonstrate the ability to use common measuring and leveling tools.

#### Performance Task 2 (Learning Objective 3)

Use a water level, builder's level, laser level, or transit level to determine elevations and angles.

#### Performance Task 3 (Learning Objective 4)

Use the 3-4-5 rule or Pythagorean Theorem to verify that intersecting walls are square.

**Recommended Teaching Time: 20 hours**

### Prerequisites

*Core*

### Before You Begin

As you prepare for each section, allow sufficient time to review the course objectives, content, visual aids (including the *Carpentry* PowerPoint® Presentations and/or Dynamic Lecture Presentations), and these lesson plans, and to gather the required equipment and materials. Consider time required for demonstrations, laboratories, field trips, and testing.

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## Lesson Plans for Module 27105

# FLOOR SYSTEMS

**Floor Systems (Module 27105)** 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.

### Objectives

#### Learning Objective 1

Describe specifications and construction drawings that specify floor system requirements.

- a. Summarize how specifications and architectural drawings are used in the construction of a floor.

#### Learning Objective 2

Identify the types of floor framing systems.

- a. Describe the types of wood-frame flooring systems.
- b. List alternative flooring systems.

#### Learning Objective 3

Identify floor system components and required material quantities.

- a. Define *sill plate* and describe its role in floor framing.
- b. List and recognize different types of girders and supports.
- c. Describe different types of floor joists.
- d. Explain the purposes of subfloor and underlayment.
- e. Estimate the amount of material needed for a floor assembly.

#### Learning Objective 4

Describe how to construct a platform floor assembly.

- a. List the steps used to build a floor assembly.

### Performance Tasks

#### Performance Task 1 (Learning Objective 3)

Estimate the amount of material needed to frame a floor assembly from a set of plans.

#### Performance Task 2 (Learning Objective 4)

Lay out and construct a floor assembly, including a rough opening and subfloor material.

**Recommended Teaching Time: 25 hours**

### Prerequisites

*Core*

### Before You Begin

As you prepare for each section, allow sufficient time to review the course objectives, content, visual aids (including the *Carpentry* PowerPoint® Presentations and/or Dynamic Study Modules), and these lesson plans, and to gather the required equipment and materials. Consider time required for demonstrations, laboratories, field trips, and testing.

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## Lesson Plans for Module 27111

# WALL SYSTEMS

**Wall Systems (Module 27111)** describes the procedures for laying out and framing walls, including roughing-in door and window openings, constructing corners and partition Ts, bracing walls, and applying sheathing. The module also includes estimating materials required to frame walls.

### Objectives

#### Learning Objective 1

Identify the components of a wall system and describe how to estimate needed framing materials.

- a. List wall system components.
- b. Explain how to estimate quantities of materials required to frame walls.

#### Learning Objective 2

Summarize the steps for laying out and framing walls.

- a. Describe how to lay out wood frame walls.
- b. Describe how to lay out steel frame walls.

#### Learning Objective 3

Summarize the procedures for assembling and erecting wall systems.

- a. Describe the steps used to assemble a wall.
- b. List the four steps used to erect a wall.

### Performance Tasks

#### Performance Task 1 (Learning Objective 1)

Estimate materials required to frame walls.

#### Performance Task 2 (Learning Objective 2)

Lay out a wood frame wall, including plates, corner assemblies, door and window openings, partition Ts, bracing, and fireblocking.

#### Performance Task 3 (Learning Objective 3)

Assemble and erect a wood frame wall, including plates, corner assemblies, door and window openings, partition Ts, bracing, and fireblocking.

#### Performance Task 4 (Learning Objective 3)

Correctly install sheathing on a wall.

**Recommended Teaching Time: 10 hours**

### Prerequisites

*Core*

### Before You Begin

As you prepare for each section, allow sufficient time to review the course objectives, content, visual aids (including the *Carpentry* PowerPoint® Presentations and/or Dynamic Lecture Presentations), and these lesson plans, and to gather the required equipment and materials. Consider time required for demonstrations, laboratories, field trips, and testing.

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## Lesson Plans for Module 27112

# ROOF FRAMING

**Roof Framing (Module 27112)** 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. This module also provides instruction on how to estimate the amount of materials needed for a material takeoff for a roof.

### Objectives

#### Learning Objective 1

Identify and install ceiling frame components.

- Describe how to lay out, cut, and install ceiling joists.
- Explain how to estimate the number of ceiling joists needed for a building.

#### Learning Objective 2

Identify common residential roof types and related components.

- Describe residential roof types.
- List the main components of a roof.

#### Learning Objective 3

Describe the methods used to lay out and cut common rafters.

- Explain how to lay out rafters and cut them to the proper length.

#### Learning Objective 4

Explain how to erect and sheath a gable roof.

- Describe how to erect a gable roof and frame gable ends.
- Summarize how to install sheathing on the roof.
- Explain how to estimate the rafters, ridgeboard, and sheathing needed for a material takeoff.

#### Learning Objective 5

Recognize the use of trusses in basic roof framing.

- Describe trusses and explain how they are installed.

### Performance Tasks

#### Performance Task 1 (Learning Objective 1)

Lay out ceiling joists.

#### Performance Task 2 (Learning Objective 1)

Estimate the number of ceiling joists required for a building.

#### Performance Task 3 (Learning Objective 3)

Lay out common roof rafters.

#### Performance Task 4 (Learning Objective 4)

Cut and install roof rafters for a gable roof.

#### Performance Task 5 (Learning Objective 4)

Frame a gable end wall.

#### Performance Task 6 (Learning Objective 4)

Erect a gable roof using trusses.

#### Performance Task 7 (Learning Objective 4)

Sheath a gable roof with an opening.

**Recommended Teaching Time: 47.5 hours**

### Prerequisites

*Core*

### Before You Begin

As you prepare for each section, allow sufficient time to review the course objectives, content, visual aids (including the *Carpentry* PowerPoint® Presentations and/or Dynamic Lecture Presentations), and these lesson plans, and to gather the required equipment and materials. Consider time required for demonstrations, laboratories, field trips, and testing.

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## Lesson Plans for Module 27110

# BASIC STAIR LAYOUT

**Basic Stair Layout (Module 27110)** 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 stairway components and related requirements.

- a. Define key stairway terms and building require.
- b. Describe the types of stairways.

#### Learning Objective 2

Describe how to determine the total rise, number and size of risers, and number and size of treads needed for a stairway.

- a. Summarize how to calculate the riser height, tread depth, and total run for a stairway.
- b. Describe how to calculate stairwell opening sizes.

#### Learning Objective 3

Restate the procedure for constructing stairs.

- a. Explain how to lay out, cut, and build stringers and concentrate forms.

### Performance Tasks

#### Performance Task 1 (Learning Objective 2)

Calculate the total rise, number and size of risers, and number and size of treads required for a stairway.

#### Performance Task 2 (Learning Objective 3)

Lay out and cut a stringer.

**Recommended Teaching Time: 12.5 hours**

### Prerequisites

*Core*

### Before You Begin

As you prepare for each section, allow sufficient time to review the course objectives, content, visual aids (including the *Carpentry* PowerPoint® Presentations and/or Dynamic Lecture Presentations), and these lesson plans, and to gather the required equipment and materials. Consider time required for demonstrations, laboratories, field trips, and testing.

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# Lesson Plans for Module 27109

## BUILDING ENVELOPE SYSTEMS

**Building Envelope Systems (Module 27109)** 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

Describe the purpose and components of a building envelope system.

- a. Identify ways to minimize air and moisture infiltration in buildings.

#### Learning Objective 2

Describe window types and installation requirements.

- a. Identify window types, applications, and installation steps.

#### Learning Objective 3

Describe door types, applications, and installation requirements.

- a. Identify residential and non-residential doors and explain installation steps.

### 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.

**Recommended Teaching Time: 12.5 hours**

### Prerequisites

*Core*

### Before You Begin

As you prepare for each section, allow sufficient time to review the course objectives, content, visual aids (including the *Carpentry* PowerPoint® Presentations and/or Dynamic Lecture Presentations), and these lesson plans, and to gather the required equipment and materials. Consider time required for demonstrations, laboratories, field trips, and testing.

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