Carpentry III

8603 36 weeks / 280 hours

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Acknowledgments

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Office of Career, Technical, and Adult Education
Virginia Department of Education

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Course Description

Suggested Grade Level: 12
Prerequisites: 8602
Carpentry III is an advanced course that allows students to gain in-depth knowledge and hands-on experience in construction skills. Students explore specialized areas in carpentry, such as building decks and porches, alternative framing, interior finishes, drywall installation and finishing, as well as energy efficiency and green technology. Exploration of licensure requirements and entrepreneurial opportunities are emphasized.

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

**Task Essentials List**

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

<table>
<thead>
<tr>
<th>Task Number</th>
<th>8603</th>
<th>Tasks/Competencies</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Applying Basic Construction Safety Standards (Core Safety)</strong></td>
<td></td>
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</tr>
<tr>
<td>39</td>
<td>⊕</td>
<td>Comply with federal, state, and local safety requirements.</td>
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<td>40</td>
<td>⊕</td>
<td>Identify personal protective equipment (PPE) requirements.</td>
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<td>41</td>
<td>⊕</td>
<td>Maintain a safe working environment.</td>
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<td>42</td>
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<td>Explain safe working practices around electrical hazards.</td>
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<td>43</td>
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<td>Identify emergency first-aid procedures.</td>
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<td>44</td>
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<td>Identify the types of fires and the methods used to extinguish them.</td>
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<td>⊕</td>
<td>Inspect course-specific hand and power tools to visually identify defects.</td>
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<td>46</td>
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<td>Demonstrate lifting and carrying techniques.</td>
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<td>47</td>
<td>⊕</td>
<td>Demonstrate safe laddering techniques.</td>
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<tr>
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<td>Demonstrate safe scaffolding techniques.</td>
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<tr>
<td>49</td>
<td></td>
<td>Report personal injuries and environmental and equipment safety violations to the appropriate authority.</td>
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<td>Pass a safety exam for lab/site safety and the use of tools and equipment specific to the construction industry.</td>
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**Focusing on the Carpentry Profession**

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<tbody>
<tr>
<td>51</td>
<td></td>
<td>Identify carpentry licensure opportunities and requirements.</td>
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<td>52</td>
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<td>Compare business structures.</td>
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**Demonstrating Basic Rigging**

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<td>53</td>
<td></td>
<td>Demonstrate the use of slings and common rigging hardware.</td>
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<td>54</td>
<td></td>
<td>Demonstrate the basic inspection techniques and rejection criteria used for slings and hardware.</td>
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<td>55</td>
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<td>Demonstrate basic hitch configurations and their proper connections.</td>
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<tr>
<td>56</td>
<td></td>
<td>Demonstrate basic load-handling safety practices.</td>
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**Framing a Roof**

<table>
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</thead>
<tbody>
<tr>
<td>57</td>
<td></td>
<td>Frame the roof opening.</td>
</tr>
<tr>
<td>58</td>
<td></td>
<td>Frame a blind valley (i.e., overlay valley).</td>
</tr>
<tr>
<td>59</td>
<td></td>
<td>Frame a gable dormer.</td>
</tr>
<tr>
<td>60</td>
<td></td>
<td>Frame a shed dormer.</td>
</tr>
<tr>
<td>61</td>
<td></td>
<td>Install purlins.</td>
</tr>
<tr>
<td>62</td>
<td></td>
<td>Frame a chimney saddle (i.e., cricket).</td>
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</tbody>
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**Installing Trusses**
<table>
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<tr>
<th>Task Number</th>
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<tbody>
<tr>
<td>63</td>
<td>Lay out a truss installation.</td>
<td></td>
</tr>
<tr>
<td>64</td>
<td>Demonstrate the safe setting and anchoring of trusses by hand or by crane.</td>
<td></td>
</tr>
<tr>
<td>65</td>
<td>Brace the roof assembly.</td>
<td></td>
</tr>
<tr>
<td>66</td>
<td>Frame an opening in the roof assembly.</td>
<td></td>
</tr>
</tbody>
</table>

### Installing Roofing

| 67 | Install valley flashing. |
| 68 | Install asphalt roof shingles in a valley. |
| 69 | Install asphalt roof shingles around a roof opening. |

### Installing Exterior Doors and Windows

| 70 | Install prehung exterior door units. |
| 71 | Install a garage door jamb. |

### Finishing and Installing Drywall

| 72 | Identify the components of drywall assembly. |
| 73 | Describe the installation of drywall. |
| 74 | Install drywall. |

### Framing Decks and Porches

<p>| 75 | Install footings. |
| 76 | Identify the superstructure of attachment. |
| 77 | Install ledger board, fasteners, and flashing. |
| 78 | Install posts. |</p>
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<tr>
<td>79</td>
<td></td>
<td>Install a wood beam/girder.</td>
</tr>
<tr>
<td>80</td>
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<td>Install a deck joist.</td>
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<tr>
<td>81</td>
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<td>Identify types of decking materials.</td>
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<tr>
<td>82</td>
<td></td>
<td>Install decking material.</td>
</tr>
<tr>
<td>83</td>
<td></td>
<td>Install railings.</td>
</tr>
</tbody>
</table>

**Exploring Energy Efficiency and Green Technology**

| 84          |      | Describe the various types of insulation. |
| 85          |      | Describe the various installation methods for insulation. |
| 86          |      | Research a building performance analysis. |

**Installing Interior Finishes**

| 87          |      | Install paneling and trim.                |
| 88          |      | Install shelving.                         |
| 89          |      | Install baseboard.                        |
| 90          |      | Install ceiling molding.                  |
| 91          |      | Case an interior opening.                 |
| 92          |      | Install an interior door jamb.            |
| 93          |      | Install a prehung interior door unit.     |
| 94          |      | Install a sliding, bi-fold, swinging, or pocket door. |
| 95          |      | Install a cylinder lockset.               |
| 96          |      | Install weather stripping.                |
Task Number | 8603 | Tasks/Competencies
--- | --- | ---
97 | ✦ | Construct open shelving.

Legend: ✦ Essential ✖ Non-essential ☐ Omitted

Curriculum Framework

Applying Basic Construction Safety Standards (Core Safety)

Task Number 39

Comply with federal, state, and local safety requirements.

Definition

Compliance should include

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

Process/Skill Questions

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

NCCER Carpentry Standards

Level One, Module One (27101-13): Orientation to the Trade

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.
Task Number 40

Identify personal protective equipment (PPE) requirements.

Definition

Identification could include procedures for inspecting, wearing, and removing

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

Identification should also include explaining when particular PPE is required.

Process/Skill Questions

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

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how to properly inspect and use safety equipment. Trainees will be able to describe the safety practices associated with elevated work; energy release; and various hazards encountered on job sites.

Task Number 41

Maintain a safe working environment.

Definition

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

Process/Skill Questions

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

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NCCER Core Curriculum: Introductory Craft Skills, 2015

00101-15 Basic Safety
Module One (00101-15) explains the importance of safety in the construction and industrial crafts. Trainees will learn how to identify and follow safe work practices and procedures and how to properly inspect and use safety equipment. Trainees will be able to describe the safety practices associated with elevated work; energy release; and various hazards encountered on job sites.

Task Number 42

Explain safe working practices around electrical hazards.
Definition

Explanation should include

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

Process/Skill Questions

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

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Task Number 43

Identify emergency first-aid procedures.

Definition

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

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

Process/Skill Questions

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

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Task Number 44

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

Definition

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

Process/Skill Questions

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

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Task Number 45

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

Definition

Inspection of tools should include

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

Process/Skill Questions

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

NCCER Carpentry Standards

Level One, Module Three (27103-13): Hand and Power Tools
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.
NCCER Core Curriculum: Introductory Craft Skills, 2015

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00103-15 Introduction to Hand Tools
Module Three (00103-15) instructs trainees in the identification, use, and care of hand tools. Developing the knowledge to properly choose and safely use hand tools is an essential part of the construction industry.

00104-15 Introduction to Power Tools
Module Four (00104-15) identifies and describes some of the power tools used by construction workers. The construction of each tool is discussed, along with information regarding the safe usage and typical maintenance requirements of power tools.

Task Number 46

Demonstrate lifting and carrying techniques.

Definition

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

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

Process/Skill Questions

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

NCCER Core Curriculum: Introductory Craft Skills, 2015

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Task Number 47

Demonstrate safe laddering techniques.

Definition

Demonstration should involve using appropriate conduct and safety procedures while

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

Process/Skill Questions

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

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Task Number 48

Demonstrate safe scaffolding techniques.

Definition

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

Process/Skill Questions

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

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Task Number 49

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

Definition

Report should include

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

Process/Skill Questions

• What ethical considerations might be involved when reporting coworkers?
• Why is it important to follow reporting procedures?
• What is liability?

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Task Number 50
Pass a safety exam for lab/site safety and the use of tools and equipment specific to the construction industry.

Definition

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

Process/Skill Questions

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

NCCER Core Curriculum: Introductory Craft Skills, 2015

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Focusing on the Carpentry Profession

Task Number 51

Identify carpentry licensure opportunities and requirements.

Definition

Identification should include

- Class C
- Class B
- Class A
- Class A (BDL).

Process/Skill Questions

- What license will you be qualified to acquire first? Why?
• What are the maximum contract amounts you can earn with a Class B license? Per contract? Per year?
• What is the main difference between a Class A license and a Class A (BDL) license?

**NCCER Carpentry Standards**

**Level One, Module One (27101-13): Orientation to the Trade**
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.

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

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**00108-15 Basic Employability Skills**
Module Eight (00108-15) provides trainees with guidance related to finding and securing a position in the construction trades. In addition, guidance in the areas of problem-solving and effective interaction with others is offered to help ensure their success in the construction trades.

---

**Task Number 52**

**Compare business structures.**

**Definition**

Comparison should include

- general partnership
- limited partnership
- limited liability partnership (LLP)
- limited liability company (LLC)
- sole proprietorship
- corporation.

**Process/Skill Questions**

- What is the easiest business structure to use when starting a business?
- Which business structure exposes you to the least amount of personal liability? What are the benefits and drawbacks of this type of arrangement?
• How are these businesses started? Why is it important to establish and declare a particular structure?

NCCER Core Curriculum: Introductory Craft Skills, 2015

00108-15 Basic Employability Skills
Module Eight (00108-15) provides trainees with guidance related to finding and securing a position in the construction trades. In addition, guidance in the areas of problem-solving and effective interaction with others is offered to help ensure their success in the construction trades.

Demonstrating Basic Rigging

Task Number 53

Demonstrate the use of slings and common rigging hardware.

Definition

Demonstration should include

• slings (e.g., synthetic web sling, alloy steel chain sling, wire rope sling)
• rigging hardware (e.g., shackles, eye bolts, lifting clamps, rigging hooks).

Process/Skill Questions

• What is an eye bolt?
• Why are slings made from such a variety of materials?

NCCER Core Curriculum: Introductory Craft Skills, 2015

00106-15 Basic Rigging
Module Six (00106-15) identifies different types of rigging slings and hardware and describes how those items are used. It explains how to properly inspect slings and hardware items. It also examines different types of hoists used in rigging, and it describes common rigging hitches and how to make the Emergency Stop hand signal.

Task Number 54

Demonstrate the basic inspection techniques and rejection criteria used for slings and hardware.
**Definition**

Demonstration should include

- visual and manual inspections
- rejection criteria for types of damage (e.g., abrasion, cuts, missing tags, corrosion).

**Process/Skill Questions**

- What factors would cause the rejection of rigging?
- What are consequences of not routinely inspecting rigging hardware?

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

**00106-15 Basic Rigging**

Module Six (00106-15) identifies different types of rigging slings and hardware and describes how those items are used. It explains how to properly inspect slings and hardware items. It also examines different types of hoists used in rigging, and it describes common rigging hitches and how to make the Emergency Stop hand signal.

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**Task Number 55**

**Demonstrate basic hitch configurations and their proper connections.**

**Definition**

Demonstration should include

- vertical hitches and connections
- choker hitches and connections
- basket hitches and connections.

**Process/Skill Questions**

- What are the consequences of making improper connections?
- Why are different hitch configurations needed?

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

**00106-15 Basic Rigging**

Module Six (00106-15) identifies different types of rigging slings and hardware and describes how those items are used. It explains how to properly inspect slings and hardware items. It also
examines different types of hoists used in rigging, and it describes common rigging hitches and how to make the Emergency Stop hand signal.

Task Number 56

Demonstrate basic load-handling safety practices.

Definition

Demonstration should include

- swing-path awareness
- landing-zone designation
- blocking and cribbing procedures
- load positioning for landing techniques that should be avoided (e.g., manhandling loads onto cribbing).

Process/Skill Questions

- What are some of the basic load-handling practices?
- What is the purpose of a tag line?

NCCER Core Curriculum: Introductory Craft Skills, 2015

00106-15 Basic Rigging
Module Six (00106-15) identifies different types of rigging slings and hardware and describes how those items are used. It explains how to properly inspect slings and hardware items. It also examines different types of hoists used in rigging, and it describes common rigging hitches and how to make the Emergency Stop hand signal.

Framing a Roof

Task Number 57

Frame the roof opening.

Definition

Framing should be performed according to specifications for the following components:

- Chimney—Headers must be set plumb, header top must be beveled for slope, and frame must clear chimney by two inches.
• Dormer—Lower header must be set plumb and upper header must be set at right angles to the roof slope.

Process/Skill Questions

• Which set of plans contains details on framing a roof opening?
• What are the special considerations when framing roof openings?
• According to the building code, what tolerance is allowed when framing roof openings?

NCCER Carpentry Standards

Level One, Module Seven (27112-13): Ceiling and Roof Framing
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.

Task Number 58

Frame a blind valley (i.e., overlay valley).

Definition

Framing should include constructing, according to specifications, with the joining surface on side cuts made to within +/- 1/16 inch.

Process/Skill Questions

• What special cuts are made to rafters to frame a blind valley?
• What are the structural considerations when framing a blind valley?

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Task Number 59

Frame a gable dormer.

Definition

Framing should include constructing the dormer to blueprint specifications.

Process/Skill Questions

- Which set of plans includes framing dimensions for gable dormers?
- Should gable dormers be framed before or after installation of sheathing? Explain.
- How does window elevation affect the framing of gable dormers?

NCCER Carpentry Standards

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Task Number 60

Frame a shed dormer.

Definition

Framing should include constructing the dormer to blueprint specifications.

Process/Skill Questions

- What are the differences between gable and shed dormers?
- What is the relationship between the pitch of the dormer roof and the pitch of the main house roof?

NCCER Carpentry Standards

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**Task Number 61**

**Install purlins.**

**Definition**

Installation should include

- positioning the purlin as specified in the plans to within +/- 1/8 inch
- positioning the purlin plate over a load-bearing partition
- cutting to the correct length to within +/- 1/16 inch
- cutting to the correct angle to within +/- 1 degree.

**Process/Skill Questions**

- What are the building codes associated with purlins?
- Why are purlins necessary?

**NCCER Carpentry Standards**

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**Task Number 62**

**Frame a chimney saddle (i.e., cricket).**

**Definition**

Framing should include
• following plans and leaving no protrusions
• nailing the chimney saddle into the roof rafters.

Process/Skill Questions

• When is a chimney saddle necessary?
• What is the function of a chimney saddle?

NCCER Carpentry Standards

Level One, Module Seven (27112-13): Ceiling and Roof Framing
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Installing Trusses

Task Number 63

Lay out a truss installation.

Definition

Layout should include

• identifying the truss detail from the plans
• identifying the nail pattern
• determining the position of the centers, accurate to within +/- 1/16 inch (e.g., 12-inch, 16-inch, 19.2-inch, 24-inch centers).

Process/Skill Questions

• What is the most common spacing of trusses? Why?
• What factors influence the spacing of trusses?

NCCER Carpentry Standards

Level Two, Module Five (27202-13): Roofing Applications
Module Five (27202-13) describes how to properly prepare the roof deck and install roofing for residential and commercial buildings.
Task Number 64

Demonstrate the safe setting and anchoring of trusses by hand or by crane.

Definition

Description should include

- selecting the truss
- using safe lifting techniques
- positioning the truss, according to the layout on the double-top plate
- anchoring with the appropriate fasteners
- maintaining centers
- bracing temporarily to prepare for sheathing.

Process/Skill Questions

- What safety concerns are associated with setting trusses?
- What things can a worker do to protect himself/herself when setting trusses?

NCCER Carpentry Standards

Level Two, Module Five (27202-13): Roofing Applications
Module Five (27202-13) describes how to properly prepare the roof deck and install roofing for residential and commercial buildings.

Task Number 65

Brace the roof assembly.

Definition

Bracing should include

- cutting the brace
- installing the brace, according to manufacturer specifications
- using the appropriate fasteners and materials (e.g., 2 x 4, 2 x 6).

Process/Skill Questions

- What is the purpose of bracing?
• What are the possible consequences of improper bracing?

NCCER Carpentry Standards

Level Two, Module Five (27202-13): Roofing Applications
Module Five (27202-13) describes how to properly prepare the roof deck and install roofing for residential and commercial buildings.

Task Number 66

Frame an opening in the roof assembly.

Definition

Framing should include

• cutting the opening
• installing the framing members to frame the roof opening
• following dimension specifications
• allowing for the clearance requirement, according to national and local building codes.

Process/Skill Questions

• What factors determine clearances in frame openings?
• What calculations are critical in framing roof openings?

NCCER Carpentry Standards

Level Two, Module Five (27202-13): Roofing Applications
Module Five (27202-13) describes how to properly prepare the roof deck and install roofing for residential and commercial buildings.

Installing Roofing

Task Number 67

Install valley flashing.

Definition

Installation should include
• following blueprints
• keeping installation flush to the surface
• avoiding nail holes and ensuring the surface is smooth.

Process/Skill Questions

• What problem(s) can nail holes in flashing cause?

NCCER Carpentry Standards

Level Two, Module Five (27202-13): Roofing Applications
Module Five (27202-13) describes how to properly prepare the roof deck and install roofing for residential and commercial buildings.

Task Number 68

Install asphalt roof shingles in a valley.

Definition

Installation should include

• following the shingle manufacturer specifications
• ensuring that the shingle line is straight, even, and parallel to the valley
• nailing shingles, according to specifications, without nailing the flashing.

Process/Skill Questions

• What are two common methods of installing asphalt roof shingles in a valley?
• What is the purpose of underlayment in a valley?

NCCER Carpentry Standards

Level Two, Module Five (27202-13): Roofing Applications
Module Five (27202-13) describes how to properly prepare the roof deck and install roofing for residential and commercial buildings.

Task Number 69

Install asphalt roof shingles around a roof opening.
Definition
Installation should include keeping shingles tight to the roof opening, with no leakage, without nailing the flashing.

Process/Skill Questions
- What types of flashing methods would be applied when installing asphalt roof shingles around roof openings?
- What is the installation procedure for a pipe collar?

NCCER Carpentry Standards
Level Two, Module Five (27202-13): Roofing Applications
Module Five (27202-13) describes how to properly prepare the roof deck and install roofing for residential and commercial buildings.

Installing Exterior Doors and Windows
Task Number 70
Install prehung exterior door units.

Definition
Installation should include

- hanging the door square, level, and plumb, with side jambs straight-edged
- applying shims at each hinge and at three locations on the lock side of the jamb
- ensuring that the door contacts its stops
- ensuring that the clearance margin between door and jamb is consistently to within +/- 1/16 inch.

Process/Skill Questions
- How can an out-of-level head jamb affect the operation of a door?
- What are the most critical fastening points on jamb installation?

NCCER Carpentry Standards
Level Two, Module Six (27208-13): Doors and Door Hardware
Module Six (27208-13) describes the installation of metal doors and related hardware in steel-framed, woodframed, and masonry walls, along with their related hardware, such as locksets and...
Task Number 71

Install a garage door jamb.

Definition

Installation should include

- constructing and installing the jamb, according to specifications
- keeping the jamb level, plumb, and straight.

Process/Skill Questions

- What is the allowance when framing the rough opening for a garage door?
- What are some materials used in constructing a garage door jamb?

NCCER Carpentry Standards

Level Two, Module Six (27208-13): Doors and Door Hardware

Module Six (27208-13) describes the installation of metal doors and related hardware in steel-framed, woodframed, and masonry walls, along with their related hardware, such as locksets and door closers. A discussion on the installation of wood doors, folding doors, and pocket doors is also presented.

Finishing and Installing Drywall

Task Number 72

Identify the components of drywall assembly.

Definition

Identification should include

- types of gypsum products
- fasteners
- accessories.

Process/Skill Questions
• What is the purpose of J-channel?
• What is a corner bead?

NCCER Carpentry Standards

Level Two, Module Eight (27207-13): Drywall Finishing
Module Eight (27207-13) describes the materials, tools, and methods used to finish and patch gypsum drywall. A discussion of both automatic and manual taping and finishing tools is presented.

Level Two, Module Seven (27206-13): Drywall Installation
Module Seven (27206-13) describes the various types of gypsum drywall, their uses, and the fastening devices and methods used to install them. The module also contains detailed instructions for installing drywall on walls and ceilings using nails, drywall screws, and adhesives. A discussion of fire- and sound-rated walls is also presented.

Task Number 73

Describe the installation of drywall.

Definition

Description should include

• purpose of a finish schedule
• tools used for drywall application
• methods of sound-isolation construction
• procedure for drywall construction
• special applications for drywall.

Process/Skill Questions

• How is drywall cut?
• What is fire taping?

NCCER Carpentry Standards

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**Task Number 74**

**Install drywall.**

**Definition**

Installation should include

- following the manufacturer specifications
- fastening according to local building code.

**Process/Skill Questions**

- What are the benefits of drywall?
- What is the difference between wall and ceiling fastening?

**NCCER Carpentry Standards**

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**Framing Decks and Porches**

**Task Number 75**

**Install footings.**

**Definition**

Installation should include

- adhering to local building code
• complying with compaction/footing size, as necessary for location.

Process/Skill Questions

• What factors should affect the size of a deck footing?
• What are the options for installing deck footings?

Task Number 76

Identify the superstructure of attachment.

Definition

Identification should include

• framing members
• attachment method
• fasteners.

Process/Skill Questions

• What are the key factors in attachment?
• What are the consequences of making poor attachments?

Task Number 77

Install ledger board, fasteners, and flashing.

Definition

Installation should include

• cutting the ledger board to the correct length and height, according to given dimensions
• keeping the ledger board level during installation.

Process/Skill Questions

• What type of fastener is used with a ledger board?
• What are the local and state building codes concerning these fasteners?
NCCER Carpentry Standards

Level One, Module Two (27102-13): Building Materials, Fasteners, and Adhesives
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.

Task Number 78

Install posts.

Definition

Installation should include

- locating the posts, according to plans
- bracing the posts
- keeping the posts plumb.

Process/Skill Questions

- What post-size limitations must be considered?
- How do building codes affect the installation of posts?

Task Number 79

Install a wood beam/girder.

Definition

Installation should ensure that the beam/girder is

- plumb
- straight
- level
- located correctly, at the proper elevation, using appropriate fasteners.

Process/Skill Questions

- What is the function of the wood beam or girder?
- How does this beam differ from a typical beam under a house?
Task Number 80

Install a deck joist.

Definition

Installation should include

- cutting and installing the deck joist, using proper spacing and fasteners
- recognizing the crown
- turning the crown to the top.

Process/Skill Questions

- How is the load on a deck floor calculated?
- What is the crown?

Task Number 81

Identify types of decking materials.

Definition

Identification should include

- wood
- composite
- plastic
- fastening systems.

Process/Skill Questions

- What are the most cost-effective deck materials?
- What type of deck material is easiest to maintain?
- What is an example of a sustainable material?
- What are the types of fasteners used for each type of material?

NCCER Carpentry Standards

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**Task Number 82**

**Install decking material.**

**Definition**

Installation should be made at the correct deck joist location, using fasteners.

**Process/Skill Questions**

- What are the new choices in decking material? What are their drawbacks and benefits?
- What options are available in fasteners?

**Task Number 83**

**Install railings.**

**Definition**

Installation should include

- installing the railing to the correct height, according to local building code requirements
- using proper fasteners and fastening technique
- installing the balusters
- spacing the balusters, according to building code.

**Process/Skill Questions**

- How do building codes affect railing height?
- What other building codes apply to railings?

**Exploring Energy Efficiency and Green Technology**
Task Number 84

Describe the various types of insulation.

Definition

Description should include

- materials
  - fiberglass
  - foam (e.g., open- and closed-cell)
  - cellulose
- types
  - rigid or semirigid
  - flexible
  - loose-fill.

Process/Skill Questions

- How is the R-value determined?
- What are the benefits of each different type of insulation?

Task Number 85

Describe the various installation methods for insulation.

Definition

Description should include

- blown
- sprayed
- mechanically attached.

Process/Skill Questions

- What PPE should one wear when installing insulation?
- Which installation technique is used for which insulation type?
Task Number 86

Research a building performance analysis.

Definition

Research should include

- blower door test
- duct blasting
- infrared imaging.

Process/Skill Questions

- What is a pascal unit?
- What is the purpose of a building performance analysis?

Installing Interior Finishes

Task Number 87

Install paneling and trim.

Definition

Installation should include following manufacturer specifications.

Process/Skill Questions

- What type of backing should be installed before installing paneling?
- What are the different types of trim that can be used?
- When should you use adhesive to install paneling?

NCCER Carpentry Standards

Level Two, Module Ten (27210-13): Window, Door, Floor, and Ceiling Trim
Module Ten (27210-13) describes the different types of trim used in finish work and focuses on the proper methods for selecting, cutting, and fastening trim to provide a professional finished appearance.

Task Number 88
Install shelving.

Definition

Installation should include

- following plans
- keeping the shelves plumb and level
- avoiding end gaps to within +/- 1/16 inch.

Process/Skill Questions

- What are the current popular shelving options?
- How do mounting techniques vary among different types of shelving?

Task Number 89

Install baseboard.

Definition

Installation should include

- following plans
- ensuring that the baseboard butts tightly where the wall and floor intersect
- ensuring that all copes and miters fit with no gaps
- nailing the baseboard to the stud and bottom plate with all nails set.

Process/Skill Questions

- What methods could be used to cut baseboards on inside corners?
- How do installation methods differ among various types of baseboards?

Task Number 90

Install ceiling molding.

Definition
Installation should include

- coping the inside corners
- mitering the outside corners to fit with no gaps
- ensuring that all nails are set.

Process/Skill Questions

- What are the different types of ceiling molding?
- What is the procedure to cope the inside corners of ceiling molding?
- What are the differences between mitering and coping the inside corners of ceiling molding?

NCCER Carpentry Standards

Level Two, Module Ten (27210-13): Window, Door, Floor, and Ceiling Trim
Module Ten (27210-13) describes the different types of trim used in finish work and focuses on the proper methods for selecting, cutting, and fastening trim to provide a professional finished appearance.

Task Number 91

Case an interior opening.

Definition

Casing should include

- keeping the bottom ends of the sides square and resting on the floor
- keeping a margin around the jamb edge
- fitting miters, with no gaps
- ensuring that all nails are set without splitting the trim.

Process/Skill Questions

- What is a cased interior opening?
- What is the relationship of the floor covering to cased openings?
- What is the significance of the margin casing for the door jamb?

Task Number 92
Install an interior door jamb.

Definition

Installation should include keeping the jamb square, level, straight, and flush with the wall surface.

Process/Skill Questions

- What are the key fastening points when fastening the jamb to the rough opening?
- Why is it important for the head jamb to be level?

NCCER Carpentry Standards

Level Two, Module Six (27208-13): Doors and Door Hardware

Module Six (27208-13) describes the installation of metal doors and related hardware in steel-framed, woodframed, and masonry walls, along with their related hardware, such as locksets and door closers. A discussion on the installation of wood doors, folding doors, and pocket doors is also presented.

Task Number 93

Install a prehung interior door unit.

Definition

Installation should include

- hanging the door square, level, and plumb, with side jambs straight-edged
- applying adequate shims on all jambs
- ensuring that the door makes contact with the stops
- ensuring that the clearance margin between the door and the jamb is consistent.

Process/Skill Questions

- What determines a right-hand or a left-hand door?
- What are examples of prehung units?
- What are the key fastening points for prehung interior door units?

NCCER Carpentry Standards

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Task Number 94

Install a sliding, bi-fold, swinging, or pocket door.

Definition

Installation should include

- following manufacturer specifications
- keeping the door plumb
- ensuring the door fits against the jamb and operates smoothly.

Process/Skill Questions

- Where on the plans does it describe the type of and precise location for the door to be installed?
- What are the advantages and disadvantages of sliding, bi-fold, swinging, and pocket doors?

Task Number 95

Install a cylinder lockset.

Definition

Installation should include ensuring that the door closes freely and the lock holds firmly.

Process/Skill Questions

- What are the various back sets for lock sets?
- What is the difference between single- and dual-cylinder dead bolts?
- How does egress affect the selection of the lock set type?
Task Number 96

Install weather stripping.

Definition

Installation should include

- following manufacturer specifications
- allowing the door to close while sealing out air around the door edges.

Process/Skill Questions

- What are the advantages of installing weather stripping?
- What are the common types of weather strips?

Task Number 97

Construct open shelving.

Definition

Construction should include accurate length of openings for cut shelves to within +/- 1/8 inch.

Process/Skill Questions

- What are two commonly used types of open shelves? How do they differ?
- Which fastening methods are used for the different types of open shelving?

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<tr>
<td>82</td>
<td>Install decking material.</td>
</tr>
<tr>
<td>83</td>
<td>Install railings.</td>
</tr>
<tr>
<td>84</td>
<td>Describe the various types of insulation.</td>
</tr>
<tr>
<td>85</td>
<td>Describe the various installation methods for insulation.</td>
</tr>
<tr>
<td>86</td>
<td>Research a building performance analysis.</td>
</tr>
<tr>
<td>87</td>
<td>Install paneling and trim.</td>
</tr>
<tr>
<td>88</td>
<td>Install shelving.</td>
</tr>
<tr>
<td>89</td>
<td>Install baseboard.</td>
</tr>
<tr>
<td>90</td>
<td>Install ceiling molding.</td>
</tr>
<tr>
<td>91</td>
<td>Case an interior opening.</td>
</tr>
<tr>
<td>92</td>
<td>Install an interior door jamb.</td>
</tr>
<tr>
<td>93</td>
<td>Install a prehung interior door unit.</td>
</tr>
<tr>
<td>94</td>
<td>Install a sliding, bi-fold, swinging, or pocket door.</td>
</tr>
<tr>
<td>95</td>
<td>Install a cylinder lockset.</td>
</tr>
<tr>
<td>96</td>
<td>Install weather stripping.</td>
</tr>
<tr>
<td>97</td>
<td>Construct open shelving.</td>
</tr>
</tbody>
</table>
Green Building Infusion Units

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

Entrepreneurship Infusion Units

Entrepreneurship Infusion Units may be used to help students achieve additional, focused competencies and enhance the validated tasks/competencies related to identifying and starting a new business venture. Because the unit is a complement to certain designated courses and is not mandatory, all tasks/competencies are marked “optional.” Teachers can find the infusion/unit in the course listing.

Teacher Resources

The National Center for Construction Education and Research (NCCER) provides competencies and objectives as well as modules and lesson plans. Refer to the carpentry craft page on the NCCER website and access those resources on the right hand side under "Course Planning Tools."
Appendix: Credentials and Career Cluster Information

Industry Credentials: Only apply to 36-week courses

- Carpentry Assessment
- Carpentry Examination
- Carpentry Level One Entry-Level Assessment
- College and Work Readiness Assessment (CWRA+)
- Construction Technologist Entry-Level Assessment
- Core: Introductory Craft Skills Entry-Level Assessment
- Customer Service Examination
- Customer Service Specialist (CSS) Examination
- HBI/NAHB Residential Construction Academy (RCA) Series Student Certification Assessments
- ICC Certificates of Completion Examinations
- National Career Readiness Certificate Assessment
- Pre-Apprenticeship Certificate Training (PACT) Core Examinations
- Professional Communications Certification Examination
- Workplace Readiness Skills for the Commonwealth Examination

Career Cluster: Architecture and Construction

<table>
<thead>
<tr>
<th>Pathway</th>
<th>Occupations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction</td>
<td>Carpenter</td>
</tr>
<tr>
<td></td>
<td>Construction and Building Inspector</td>
</tr>
<tr>
<td></td>
<td>Construction Manager</td>
</tr>
<tr>
<td></td>
<td>Drywall Installer</td>
</tr>
<tr>
<td></td>
<td>General Contractor</td>
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<tr>
<td></td>
<td>Project Manager</td>
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<tr>
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<td>Roofer</td>
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<tr>
<td>Design/Pre-Construction</td>
<td>Building Code Inspector</td>
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<tr>
<td></td>
<td>Cost Estimator</td>
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<tr>
<td>Maintenance and</td>
<td>Carpenter</td>
</tr>
<tr>
<td>Operations</td>
<td>Construction and Building Inspector</td>
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<td></td>
<td>Construction Manager</td>
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<td>Drywall Installer</td>
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<tr>
<td></td>
<td>General Contractor</td>
</tr>
<tr>
<td></td>
<td>Project Manager</td>
</tr>
<tr>
<td></td>
<td>Restoration Technician</td>
</tr>
</tbody>
</table>