Building Trades I

8515 36 weeks / 140 hours

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Acknowledgments

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Course Description

Suggested Grade Level: 10 or 11

Building Trades I introduces students to skills in the four core areas of residential construction: masonry, carpentry, electricity, and plumbing. Students emphasize safety by earning the Occupational Safety and Health Administration (OSHA) 10 card as they build or repair residential structures, using a variety of materials and tools. Students will also learn current residential building codes associated with the trades.

Note: The Virginia Board for Contractors' Individual License and Certification Regulations addresses the requirements and standards of conduct for licenses issued to individuals, which includes tradesmen (i.e., electrical, plumbing, heating, ventilation, air-conditioning [HVAC], and gas fitting.) According to 18VAC 50-30-190 of the Virginia Board for Contractors' Individual License and Certification Regulations, a contractor (i.e., the licensed business) or tradesman (i.e., the licensed individual) cannot perform work outside the scope of their license.

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>Tasks/Competencies</th>
</tr>
</thead>
<tbody>
<tr>
<td>8515</td>
<td>CORE CONSTRUCTION SKILLS</td>
</tr>
<tr>
<td></td>
<td>Applying Basic Construction Safety Standards (Core Safety): Electricity I</td>
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<tr>
<td>Task Number</td>
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<td>51</td>
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</tr>
</tbody>
</table>

**Understanding Local, State, and Federal Regulations**

| 52          |      | Identify local, state, and federal regulations for a tradesman license. |
| 53          |      | Identify local, state, and federal regulations for operating a business. |

**Applying Fundamental Construction Skills**

<p>| 54          |      | Identify common hand and power tools. |
| 55          |      | Identify units of length, weight, volume, and temperature. |</p>
<table>
<thead>
<tr>
<th>Task Number</th>
<th>8515</th>
<th>Tasks/Competencies</th>
</tr>
</thead>
<tbody>
<tr>
<td>56</td>
<td></td>
<td>Read a ruler.</td>
</tr>
<tr>
<td>57</td>
<td></td>
<td>Demonstrate the use of instruments for measurement.</td>
</tr>
<tr>
<td>58</td>
<td></td>
<td>Identify various pipe dimensions.</td>
</tr>
<tr>
<td>59</td>
<td></td>
<td>Solve mathematical problems.</td>
</tr>
<tr>
<td>60</td>
<td></td>
<td>Convert decimals to percents and percents to decimals.</td>
</tr>
<tr>
<td>61</td>
<td></td>
<td>Convert fractions to decimals and decimals to fractions.</td>
</tr>
<tr>
<td>62</td>
<td></td>
<td>Identify the basic geometric formulas for shapes common in construction.</td>
</tr>
<tr>
<td>63</td>
<td></td>
<td>Identify basic blueprint terms, components, and symbols.</td>
</tr>
<tr>
<td>64</td>
<td></td>
<td>Identify classifications of drawings.</td>
</tr>
</tbody>
</table>

**MASONRY**

Using Masonry Skills

| 65          |      | Identify tools specific to masons. |
| 66          |      | Spread mortar. |
| 67          |      | Apply head joints. |
| 68          |      | Strike joints. |
| 69          |      | Identify types and sizes of brick. |

Laying Concrete Masonry Units

| 70          |      | Apply block head joints. |
| 71          |      | Identify types and sizes of block. |

Identifying and Mixing Masonry Cements
<table>
<thead>
<tr>
<th>Task Number</th>
<th>8515</th>
<th>Tasks/Competencies</th>
</tr>
</thead>
<tbody>
<tr>
<td>72</td>
<td></td>
<td>Mix masonry cements.</td>
</tr>
<tr>
<td>73</td>
<td></td>
<td>Select masonry cement based on a specific job.</td>
</tr>
</tbody>
</table>

**CARPENTRY**

**Using Basic Carpentry Skills**

<table>
<thead>
<tr>
<th>Task Number</th>
<th></th>
<th>Tasks/Competencies</th>
</tr>
</thead>
<tbody>
<tr>
<td>74</td>
<td></td>
<td>Identify tools specific to carpenters.</td>
</tr>
<tr>
<td>75</td>
<td></td>
<td>Check stock and/or assemblies for squareness.</td>
</tr>
<tr>
<td>76</td>
<td></td>
<td>Determine whether surfaces are level or plumb.</td>
</tr>
<tr>
<td>77</td>
<td></td>
<td>Handle and store materials.</td>
</tr>
<tr>
<td>78</td>
<td></td>
<td>Identify materials.</td>
</tr>
<tr>
<td>79</td>
<td></td>
<td>Maintain hand tools.</td>
</tr>
<tr>
<td>80</td>
<td></td>
<td>Cut stock.</td>
</tr>
</tbody>
</table>

**Framing a Floor**

<table>
<thead>
<tr>
<th>Task Number</th>
<th></th>
<th>Tasks/Competencies</th>
</tr>
</thead>
<tbody>
<tr>
<td>81</td>
<td></td>
<td>Identify the sill plate.</td>
</tr>
<tr>
<td>82</td>
<td></td>
<td>Identify the floor joists and crown.</td>
</tr>
</tbody>
</table>

**Framing Walls**

<table>
<thead>
<tr>
<th>Task Number</th>
<th></th>
<th>Tasks/Competencies</th>
</tr>
</thead>
<tbody>
<tr>
<td>83</td>
<td></td>
<td>Cut wall plates.</td>
</tr>
<tr>
<td>84</td>
<td></td>
<td>Identify studs, headers, jacks, rough sills, and cripples.</td>
</tr>
<tr>
<td>85</td>
<td></td>
<td>Identify the framing layout on wall plates.</td>
</tr>
<tr>
<td>86</td>
<td></td>
<td>Identify corner and tee posts.</td>
</tr>
<tr>
<td>87</td>
<td></td>
<td>Identify the parts of an exterior wall system.</td>
</tr>
<tr>
<td>Task Number</td>
<td>Tasks/Competencies</td>
<td></td>
</tr>
<tr>
<td>-------------</td>
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<td></td>
</tr>
<tr>
<td><strong>ELECTRICITY</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8515</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Applying Basics of Electricity</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>88</td>
<td>Describe basic electrical theory.</td>
<td></td>
</tr>
<tr>
<td>89</td>
<td>Identify tools specific to electricians.</td>
<td></td>
</tr>
<tr>
<td>90</td>
<td>Identify basic electrical wiring devices.</td>
<td></td>
</tr>
<tr>
<td>91</td>
<td>Describe installation procedures for GFCI and AFCI devices.</td>
<td></td>
</tr>
<tr>
<td>92</td>
<td>Identify a transformer.</td>
<td></td>
</tr>
<tr>
<td>93</td>
<td>Wire basic residential switching operations.</td>
<td></td>
</tr>
<tr>
<td>94</td>
<td>Wire duplex receptacles.</td>
<td></td>
</tr>
<tr>
<td>95</td>
<td>Wire GFCI receptacles.</td>
<td></td>
</tr>
<tr>
<td><strong>Selecting and Installing Conductors</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>96</td>
<td>Identify types of conductors.</td>
<td></td>
</tr>
<tr>
<td>97</td>
<td>Install conductors.</td>
<td></td>
</tr>
<tr>
<td>98</td>
<td>Make connections with lugs, connectors, and terminals.</td>
<td></td>
</tr>
<tr>
<td>99</td>
<td>Select conductors for specific applications.</td>
<td></td>
</tr>
<tr>
<td>100</td>
<td>Install nail plates to protect conductors.</td>
<td></td>
</tr>
<tr>
<td><strong>PLUMBING</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>101</td>
<td>Identify tools specific to plumbers.</td>
<td></td>
</tr>
<tr>
<td>102</td>
<td>Cut copper tubing.</td>
<td></td>
</tr>
<tr>
<td>Task Number</td>
<td>8515</td>
<td>Tasks/Competencies</td>
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<tr>
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<td>-------------------------------------------</td>
</tr>
<tr>
<td>103</td>
<td>+</td>
<td>Cut plastic pipe.</td>
</tr>
<tr>
<td>104</td>
<td>+</td>
<td>Construct copper tubing assembly, using solder joints.</td>
</tr>
<tr>
<td>105</td>
<td>+</td>
<td>Calculate fitting allowance.</td>
</tr>
<tr>
<td>106</td>
<td>+</td>
<td>Join plastic pipe (i.e., tubing) to fittings, using solvent.</td>
</tr>
<tr>
<td>107</td>
<td>+</td>
<td>Join cross-linked polyethylene (PEX) pipe (i.e., tubing), using crimp fittings.</td>
</tr>
</tbody>
</table>

Legend: ⬤Essential ☐Non-essential ☐Omitted

Curriculum Framework

CORE CONSTRUCTION SKILLS

Applying Basic Construction Safety Standards (Core Safety): Electricity I

Task Number 39

Comply with federal, state, and local safety legal requirements.

Definition

Compliance should include the identification of the Hazard Communication Standard (HazCom), the information included on safety data sheets (SDS), and the responsibilities of employers and employees under HazCom.
Compliance should also include requirements from Occupational Health and Safety Administration (OSHA), Virginia Occupational Safety and Health (VOSH), and Environmental Protection Agency (EPA).

**Process/Skill Questions**

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

**NCCER Standards**

**Core Curriculum: Introductory Craft Skills**

- 00101-04 Basic Safety

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**Task Number 40**

**Earn the OSHA 10-hour card.**

**Definition**

Earning an OSHA 10-hour card will

- recognize that one has acquired 10 hours of safety instruction
- help teach national standards for personal safety within a lab environment
- validate safety skills to the industry
- help workers become more safety-conscious and responsible.

**Process/Skill Questions**

- What are the benefits of earning the OSHA 10-hour card?
- What is OSHA, and how are its standards validated?
- Why was OSHA established, and how has it evolved?

**NCCER Standards**

**Core Curriculum: Introductory Craft Skills**

- 00101-04 Basic Safety
Task Number 41

Identify personal protective equipment (PPE) requirements.

Definition

Identification should include procedures for putting on, wearing, and removing PPE and inspecting PPE to determine whether it is safe to use. Appropriate PPE may include eye protection, respirator, hard hat, gloves, safety harness, hearing protection, and safety shoes.

Process/Skill Questions

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

NCCER Standards

Core Curriculum: Introductory Craft Skills

- 00101-04 Basic Safety

Task Number 42

Maintain a safe working environment.

Definition

Maintenance should include regular inspection of the working environment. Maintenance 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, these must be remedied by appropriate measures, and the working environment must comply with the school's and the instructor's 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?

**NCCER Standards**

*Core Curriculum: Introductory Craft Skills*

- 00101-04 Basic Safety

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**Task Number 43**

**Explain safe working practices around electrical hazards.**

**Definition**

Explanation should include

- identifying equipment used to test electrical circuits
- describing safe working conditions
- demonstrating safe work habits
- knowing how to administer cardiopulmonary resuscitation (CPR), if needed.

**Process/Skill Questions**

- What is the definition of *proximity work*?
- What are safe working clearances, according to National Electrical Code?
- What are considered safe working conditions and safe working habits?
- What is the unseen hazard with electrical work?

**NCCER Standards**

*Core Curriculum: Introductory Craft Skills*

- 00101-04 Basic Safety

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**Task Number 44**
Identify emergency first-aid procedures.

Definition

Identification should include standard first-aid procedures and school policies with regard to accidents involving

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

Process/Skill Questions

- What are the steps that should be followed in an accident?
- Why is knowing CPR an important skill in the construction trades?
- Why is it important to be certified to administer first aid?
- What are the different classifications (i.e., degrees) of electrical burns?

NCCER Standards

Core Curriculum: Introductory Craft Skills

- 00101-04 Basic Safety

Task Number 45

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

Definition

Identification should include the 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 are 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?

NCCER Standards

Core Curriculum: Introductory Craft Skills

o 00101-04 Basic Safety

Task Number 46

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

Definition

Inspection of power tools should include

• identifying the components of the machinery (e.g., guards, blades, moving parts, start/stop switches)
• identifying standard safety procedures (e.g., lab practices and manufacturer's 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 power circular saw?
• Why should a power tool always be grounded?

NCCER Standards

Core Curriculum: Introductory Craft Skills
Task Number 47

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 proper positioning affect proper technique?

NCCER Standards

Core Curriculum: Introductory Craft Skills

- 00101-04 Basic Safety

Task Number 48

Demonstrate safe laddering techniques.

Definition

Demonstration should involve using appropriate conduct and safety procedures while using aluminum ladders (e.g., three-point contact), while carrying ladders (e.g., two people at all times), and when erecting and setting ladders. Identification of additional ladder types may include
• wall (straight) ladder
• extension ladder
• roof ladder
• attic ladder
• special purpose ladders (e.g., "A" ladder, folding ladder, pompier ladder)
• solid beam ladder
• truss beam wood ladder
• aluminum ladder
• wood and aluminum truss ladder
• fiberglass ladder

and the parts and safety features of each.

Process/Skill Questions

• Why are ladders rated for certain weights?
• Why is the apex (highest point) of a stepladder not considered a step?

NCCER Standards

Core Curriculum: Introductory Craft Skills

 Task Number 49

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 and in what situations is scaffolding preferred or required?

NCCER Standards

Core Curriculum: Introductory Craft Skills
Task Number 50

Report personal injury, violations of environmental regulations, and equipment safety violations to the appropriate authority.

Definition

Report should include an oral or written statement identifying the violation and the date it was observed and should be given to the instructor, supervisor, or local OSHA inspector(s).

Process/Skill Questions

- What ethical considerations are involved when reporting coworkers?
- Why is it important to follow reporting procedures?
- What is liability?

NCCER Standards

Core Curriculum: Introductory Craft Skills

- 00101-04 Basic Safety
- 00107-04 Basic Communication Skills

Task Number 51

Pass the safety exam.

Definition
Passing the exam must result from participation in safety training programs, including attending safety meetings and completing periodic demonstration of 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?
- What is the relationship between insurance and establishing or validating a continual retraining program for safety?
- What is workers' compensation?

NCCER Standards

Core Curriculum: Introductory Craft Skills

- 00101-04 Basic Safety

Understanding Local, State, and Federal Regulations

Task Number 52

Identify local, state, and federal regulations for a tradesman license.

Definition

Identification should include the varying regulations within the local, state, and federal levels for a tradesman license.

*International Residential Code (IRC)*: Chapter 1, sections R101 thru R114, identifies the requirements and specifications for permit applications, required construction documents, and responsibilities of parties involved in residential construction.

Process/Skill Questions

- Who regulates tradesmen in Virginia?
- What are the specialty areas for a tradesman license in Virginia?
Task Number 53

Identify local, state, and federal regulations for operating a business.

Definition

Identification should include the varying regulations within the local, state, and federal levels for operating a business.

Process/Skill Questions

- What are the license classifications for a contractor’s license?
- What jurisdiction does the locality have over the regulation for operating a business?
- What jurisdiction does the state have over the regulation for operating a business?
- What jurisdiction does the federal government have over the regulation for operating a business?

Applying Fundamental Construction Skills

Task Number 54

Identify common hand and power tools.

Definition

Identification should include common tools used across construction trade areas.

Process/Skill Questions

- What tools might be kept in the tool belt vs. on the truck?
- How often should a tool be inspected?
- What is the difference between a two-wire and a three-wire cord on a power tool?

Task Number 55

Identify units of length, weight, volume, and temperature.

Definition
Identification should include

- basic types of U.S. Customary and metric measurements of distance and weight
- Fahrenheit and Celsius temperature scales
- formulas used to calculate for area and volume and when to use these measurements
- sizes of particular measurements relative to their basic units (e.g., deca-, hecto-, kilo-, mega-, deci-, centi-, milli-, and micro-)
- symbols associated with different measurements.

Process/Skill Questions

- What are the processes of converting U.S. Customary lengths to metric lengths and metric lengths to U.S. Customary lengths?
- What is the mathematical relationship among the units of length in the metric system? How does this simplify the calculations involved?

Task Number 56

Read a ruler.

Definition

Reading ruler measurements should include identifying the fractional parts of an inch, down to 1/16 inch.

Process/Skill Questions

- How many sixteenths are in an inch?
- What does the word increment mean?
- What advantages does a folding ruler have over a tape measure (i.e., a flexible device)?

Task Number 57

Demonstrate the use of instruments for measurement.

Definition

Demonstration could include

- tape measure
- folding rule
- flat rule
- framing square
- speed square.

Process/Skill Questions

- How can one tell what is the best tool for a measuring?
- What causes improper measurements?
- How does one start measuring?

Task Number 58

Identify various pipe dimensions.

Definition

Identification should include measurements of pipe

- end-to-end
- center-to-center
- face-to-face.

Process/Skill Questions

- How are pipes measured—by the inside or the outside diameters? Explain.
- What are the various standard wall thicknesses?
- Why are accurate measurements important?
- What is meant by nominal pipe diameter?

Task Number 59

Solve mathematical problems.

Definition

Solutions should include solving construction-related

- addition
- subtraction
• multiplication
• division problems, using fractions.

Solutions should also include construction-related problems, involving one-, two-, and three-digit whole numbers, with and without a calculator, and problems involving decimals down to the thousandths, with and without a calculator.

**Process/Skill Questions**

• What are some common tasks requiring the use of fractions in construction?
• When is a common denominator needed?
• Why should one be able to perform basic mathematical tasks without a calculator?
• What are some common situations in construction that require mathematics?
• What is the base-10 system? What is its probable origin?

---

**Task Number 60**

**Convert decimals to percents and percents to decimals.**

**Definition**

Conversion should include converting decimals to percents and percents to decimals.

**Process/Skill Questions**

• When are conversions commonly used?
• When might one need to convert a decimal to a percentage?

---

**Task Number 61**

**Convert fractions to decimals and decimals to fractions.**

**Definition**

Conversion should include converting fractions to decimals and decimals to fractions.

**Process/Skill Questions**

• When are conversions commonly used?
• When might one need to convert a fraction to a decimal or a decimal to a fraction?
- Why might it be easier to multiply a decimal rather than a fraction?

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**Task Number 62**

**Identify the basic geometric formulas for shapes common in construction.**

**Definition**

Identification should include formulas for

- calculating square footage (i.e., area) for rectangles, squares, triangles, and circles
- determining
  - perimeter
  - circumference
  - diameter
  - radius
  - volume
  - angle (i.e., slope, grade).

**Process/Skill Questions**

- What is the formula for the hypotenuse of a triangle?
- How many degrees are in each angle of an octagon?
- What is pi, and how is it used in construction? Why is pi a crucial mathematical constant?

---

**Task Number 63**

**Identify basic blueprint terms, components, and symbols.**

**Definition**

Identification should include

- components, including title block, border, drawing area, revision block, and legend
- scale
- lines of construction, including dimension lines, leaders and arrowheads, property lines, cut lines, section cuts, hidden lines, center lines, and object lines
- common abbreviations, symbols, and keynotes.
IRC: Section R106 identifies requirements for construction documents.

Process/Skill Questions

- What plans are needed to obtain a building permit?
- Why do construction workers need to understand symbols on building plans?

Task Number 64

Identify classifications of drawings.

Definition

Identification should include types of plans, including

- civil
- architectural
- structural
- mechanical
- plumbing.

Process/Skill Questions

- How would a drawing assist with window and door installation?
- Which drawing would one use to find the location of the house on the property?

MASONRY

Using Masonry Skills

Task Number 65

Identify tools specific to masons.

Definition

Identification should include

- mortar pans
- boards
- pails
- wheelbarrows
- hoes
- square-nosed, short-handled shovels
- resin paper or suitable area covering
- trowel
- levels (24" and 48")
- “S” jointer
- long jointer
- brick hammer
- folding rules (modular and standard)
- square brush
- brick chisel
- line and line blocks.

**Process/Skill Questions**

- What is a brick chisel, and when is it used?
- Why is it important for masons to have square-nosed shovels?
- When might a mason prefer to use a folding rule rather than a tape measure?

---

**Task Number 66**

**Spread mortar.**

**Definition**

Spreading should include

- cutting mortar from board
- loading the trowel
- furrowing mortar on the wall with uniform thickness and full coverage.

**IRC:** Chapter 4, sections R401 thru R408; Chapter 6, sections R606–R608; and Chapter 7, section R703, identify types and strength of various mortar required by code.

**Process/Skill Questions**

- Why should the mortar be furrowed?
- Why is efficient spreading important to good mortar work?
- Why is it important to string the mortar?

**NCCER Standards**
Task Number 67

Apply head joints.

Definition

Application of mortar should be made to either end of the brick to form a 3/8-inch-full head joint.

*IRC:* Chapters 4 and 6, section 606, outline types of joints and the joint-required thickness based on materials and structural code requirements.

Process/Skill Questions

- What is the function of a head joint?
- Why is it important to have full head joints?

NCCER Standards

Core Curriculum: Introductory Craft Skills

- 00101-04 Basic Safety

Masonry: Level One (L1NCCT28)

- 28105-04 Masonry Units and Installation Techniques
Task Number 68

Strike joints.

Definition

Striking should include using the proper techniques and tools to compact and finish the face of the following mortar joints:

- Concave
- Raked
- V
- Grapevine
- Weather
- Troweled

IRC: Chapter 6, section 606, covers the use of veneer joints in an array of masonry materials.

Process/Skill Questions

- What is the benefit of striking mortar joints?
- Why should mortar always be struck when it is at the same consistency?

NCCER Standards

Masonry: Level One (L1NCCT28)

- 28105-04 Masonry Units and Installation Techniques

Task Number 69

Identify types and sizes of brick.

Definition

Identification should include the following:

- Sizes—standard, modular standard, engineered, economy, utility, and specialty
- Types—common brick, face brick, and severe-weather brick
- Grades—residential and commercial

**IRC:** Chapter 4, section R404; chapter 6, section R606; and chapter 7, R703.8 – R703.8.6, identify the installation and structural design of all types of masonry products.

**Process/Skill Questions**

- What are the most common types of brick?
- Why are there different types of brick? What are the features of each?
- What are the advantages of using large brick?

**NCCER Standards**

Core Curriculum: Introductory Craft Skills

- 00101-04 Basic Safety

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**Laying Concrete Masonry Units**

**Task Number 70**

**Apply block head joints.**

**Definition**

Application of mortar should include

- spreading it on both sides of one end of the block
- maintaining a uniform thickness to form a 3/8-inch head joint.

**IRC:** Chapters 4 and 6 explain how to ensure mortar strength and joint applications comply with building codes, as related to various masonry products.

**Process/Skill Questions**

- What is a head joint, and what function does it serve?
- How wide should a head joint be?
Task Number 71

Identify types and sizes of block.

Definition

Identification must include the following (at a minimum):

- Nominal sizes—4, 6, 8, 10, 12 inches in width
- Special sizes and shapes
- Types—lightweight/cement

IRC: Chapters 4 and 6 explain structural components of masonry products allowed by code for residential construction along with the application and installation of approved products.

Process/Skill Questions

- What materials are used to make block?
- What factors limit the use of various sizes of block?

NCCER Standards

Identifying and Mixing Masonry Cements
Task Number 72

Mix masonry cements.

**Definition**

Mixing should include blending the ingredients in a predetermined proportion, and using a mortar hoe and power mixer, according to industry standards.

**IRC:** Chapter 4, section R404, and Chapter 6 explain mortar and cement contents and strength, based on use and application.

**Process/Skill Questions**

- Why should masonry cements be measured by volume?
- What is the ratio of masonry cement to sand?
- What is the importance of using the proper respirator while mixing cement?
- How many cubic feet are in one bag of masonry cement?

**NCCER Standards**

**Masonry: Level One (L1NCCT28)**

- 28104-04 Mortar

Task Number 73

Select masonry cement based on a specific job.

**Definition**

Selection should include considering tensile and compressive strength needed for a particular application, according to specifications of the architect, engineer, or local building codes.

**IRC:** Chapters 4 and 6 identify code requirements for various cement mixtures, including reinforcement for various applications. These chapters also include types of cement used for a multitude of applications.

**Process/Skill Questions**
• What factors should be taken into account when repointing masonry?
• What masonry cement is appropriate for foundations below grade?

NCCER Standards

Masonry: Level One (L1NCCT28)

  • 28104-04 Mortar

CARPENTRY

Using Basic Carpentry Skills

Task Number 74

Identify tools specific to carpenters.

Definition

Identification should include

- hand tools
  - sliding T-bevel
  - tape measure
  - combination square, framing square, and speed square
  - coping saw
  - keyhole saw
  - folding rule
  - hammer
  - punch
  - hand saw
  - nail set
  - wood chisel
  - carpenter's level
  - hand plane
- power tools
  - reciprocating saw (e.g., jig saw, sabre saw)
  - miter saw
  - hand drill
  - sander (e.g., belt, finish)
  - circular hand saw
• table saw
• hand plane
• hand router
• pneumatic nailer.

Process/Skill Questions

• What is a speed square, and when might a carpenter use it?
• What are the components of a nail set?
• What are the safety hazards when using a sabre saw?

NCCER Standards

Carpentry Fundamentals: Level 1

• 27103-06 Hand and Power Tools

Task Number 75

Check stock and/or assemblies for squareness.

Definition

Checking should include testing stock and/or assemblies for a variety of applications to detect deviation from a right angle, a straight line, or a plane surface.

Process/Skill Questions

• What tools should be used to check for squareness?
• What method should be used to determine whether a cabinet frame is square?

NCCER Standards

Carpentry Fundamentals: Level 1

• 27101-06 Orientation to the Trade
• 27104-06 Reading Plans and Elevations
Task Number 76

Determine whether surfaces are level or plumb.

Definition

Determination should include

- checking that horizontal surfaces are level
- checking that vertical surfaces are plumb
- reading a level.

IRC: Chapters 4, 5, 6, 7, 8, 9, and 10 (throughout the chapters) describe the materials used in residential construction. These chapters elaborate on tolerances and the importance of plumb and level for the material to meet or exceed the minimum code requirements.

Process/Skill Questions

- What is the difference between level and plumb?
- What are the different lengths of levels used?
- What are the possible consequences of failing to determine whether surfaces are level or plumb?

NCCER Standards

Carpentry Fundamentals: Level 1

- 27101-06 Orientation to the Trade
- 27104-06 Reading Plans and Elevations

Task Number 77

Handle and store materials.

Definition

Handling and storing includes
• demonstrating safe procedures in lifting, carrying, and stacking materials
• considering environmental factors such as humidity, light, and physical restrictions
• taking personal safety precautions.

Process/Skill Questions

• How is lumber affected by extended exposure to weather?
• Where should flammable materials be stored?

NCCER Standards

Carpentry Fundamentals: Level 1

- 27102-06 Building Materials, Fasteners, and Adhesives

Task Number 78

Identify materials.

Definition

Identification should include selecting materials relevant to the assigned job, including various

- plywood
- lumber
- fasteners
- adhesives
- millwork.

IRC: Chapters 3, 4, 5, 6, 7, 8, 9, and 10 specify lumber species, strength, span tables, lumber grade, and adhesives and mechanical fasteners based on lumber species.

Process/Skill Questions

• What is the purpose of the grade stamp on material?
• Why is 2x material actually 1 1/2-inches thick?

NCCER Standards

Carpentry Fundamentals: Level 1
Task Number 79
Maintain hand tools.

Definition

Maintenance should include

- making minor adjustments (e.g., saw blade adjustments, block plane knife/throat adjustment)
- informing instructor of tool problems and identifying when tool replacement is necessary.

Process/Skill Questions

- Why is it important to maintain a sharp edge on cutting tools?
- What are the expectations on job sites regarding tool ownership? How is this different from expectations at school?

NCCER Standards

Core Curriculum: Introductory Craft Skills

- 00103-04 Introduction to Hand Tools

Carpentry Fundamentals: Level 1

- 27103-06 Hand and Power Tools

Task Number 80
Cut stock.

Definition
Cutting stock includes shaping it and

- boring holes (with an accurate hole diameter according to specifications and correct location, within +/- 1/16 inch)
- squaring stock to 90 degrees (accurate to within +/- 1/16 inch)
- cutting a miter joint (joint must fit snugly and angle must be correct, according to specifications)
- avoiding chips and splinters.

IRC: Chapters 5, 6, 8, 9, and 10 explain and outline the notch and hole placement based on lumber size, in structural or non-bearing conditions, for floors, walls, rafters, and roof penetrations.

Process/Skill Questions

- What is the difference between rip and crosscut?
- What type of blade would be best to rip and crosscut stock? Why?
- What type of bit could be used to make a flat-bottom hole?
- What feature determines the size of a portable drill?
- What is the purpose of cutting stock to 90 degrees?
- What tools could be used to determine squareness?
- What degree cut is made for most miter joints?
- What tools should be used to cut miter joints?

NCCER Standards

Carpentry Fundamentals: Level 1

- 27102-06 Building Materials, Fasteners, and Adhesives

Carpentry: Level 3

- 27310-02 Interior Finish Three: Window, Door, Floor, and Ceiling Trim

Framing a Floor

Task Number 81

Identify the sill plate.
**Definition**

Identification should include the

- components of the sill plate
- function of the sill plate
- location of the sill plate, once it is installed
- building code reference for the sill plate's use or installation requirements.

**IRC:** Chapter 3, sections R317 and R318, and Chapter 5, section R504, highlight the use of decay-resistant wood and where such materials are required.

**Process/Skill Questions**

- What type of lumber should be used for the sill plate?
- What type of system should be used to secure a sill plate?

**NCCER Standards**

* Carpentry Fundamentals: Level 1
  
  - 27105-06 Floor Systems

**Task Number 82**

**Identify the floor joists and crown.**

**Definition**

Identification should include

- the components of floor joists
- the function of floor joists
- the location of floor joists, once they are installed
- a description of crowning
- the building code reference for the use or installation requirements of floor joists.

**IRC:** Chapter 5 covers all aspects of wood-floor framing, including treated wood locations, floor joist span tables, nailing, and anchoring requirements. It addresses exterior deck framing and required fasteners.
Process/Skill Questions

- What is a crown?
- What is the difference between a bow and a crown?
- What might be the consequences of improper installation?

NCCER Standards

Carpentry Fundamentals: Level 1

- 27105-06 Floor Systems

Framing Walls

Task Number 83

Cut wall plates.

Definition

The cutting process should ensure that

- wall plates are the proper length (to within +/- 1/16 inch)
- splices are on a stud center
- top and sole plates are identical in length.

IRC: Chapters 5, 6, and 8 cover notching and boring of lumber in sections R502.8, R802.7.1, R602.6, and R602.6.1.

Process/Skill Questions

- What are some consequences of cutting improperly?
- How is the appropriate length for a cut determined?

NCCER Standards

Carpentry Fundamentals: Level 1

- 27106-06 Wall and Ceiling Framing
Task Number 84

Identify studs, headers, jacks, rough sills, and cripples.

Definition

Identification should include

- describing their physical features
- describing their functions
- indicating their locations
- knowing the building code reference for the use or installation requirements of each.

IRC: Chapter 6 covers wall construction from material species, wall heights, stud sizing based on house size and floor loads, shear and braced walls, fasteners of the wall types, sheathing requirements, and nail placement.

Process/Skill Questions

- What should be done before cutting these parts?
- Where should one look to determine what size to make these components?

NCCER Standards

Carpentry Fundamentals: Level 1

- 27106-06 Wall and Ceiling Framing

Task Number 85

Identify the framing layout on wall plates.

Definition

Identification should include

- locating rough openings, corners, and wall tees
- ensuring that the stud layout is 16 inches or 24 inches on a center, as required by plans
• ensuring that door and window openings are of the proper width, within +/- 1/16 inch
• identifying wall-plate-layout marks
• stocking components.

**IRC:** Chapter 6 identifies

• stud placement based on building height, floor, roof loads, and design
• size and height of stud along with stud spacing, based on building design
• headers' size and jack placement
• number of jacks and studs required at openings, based on the opening, width, and load above the header.

**Process/Skill Questions**

• Why are all wall layouts 16 inches on center?
• What are special wall framing details?

**NCCER Standards**

**Carpentry Fundamentals: Level 1**

- 27106-06 Wall and Ceiling Framing

**Task Number 86**

**Identify corner and tee posts.**

**Definition**

Identification should include

• physical descriptions
• functions
• locations, once they are installed
• the building code reference for their use or installation requirements.

**IRC:** Chapter 6, section R602, identifies ways to install corner supports and attachments, including stud locations and sheathing placement, to strengthen the wall.

**Process/Skill Questions**
- What are the different ways to make corner and tee posts?
- What purposes do corner and tee posts serve?

NCCER Standards

Carpentry Fundamentals: Level 1

- 27106-06 Wall and Ceiling Framing

Task Number 87

Identify the parts of an exterior wall system.

Definition

Identification should include

- physical descriptions
- the function of the exterior wall sheathing
- the differences among types of exterior wall sheathing
- the building code reference for the use or installation requirements of exterior wall sheathing.

IRC: Chapters 6 and 7 extensively cover types of wall sheathing and weather-resistant wall coverings. The chapters cover the attachment of types of materials approved for use in these applications and elaborate on the structural design required by code.

Process/Skill Questions

- What types of sheathing are available?
- What types of sheathing should be used with specific exterior finishes?

NCCER Standards

Carpentry Fundamentals: Level 1

- 27106-06 Wall and Ceiling Framing
ELECTRICITY

Applying Basics of Electricity

Task Number 88

Describe basic electrical theory.

Definition

Description should include

- atomic structure, as it relates to electricity
- the law of charges
- the differences among conductors, insulators, and semiconductors
- current, including its unit of measure and symbol
- voltage, including its unit of measure and symbol
- resistance, including its unit of measure and symbol
- the interrelationship of current, voltage, and resistance
- potential and electromotive force
- Ohm's law
- Watt’s law.

IRC: Chapter 34 covers electrical code related to residential construction (throughout Chapters 34 to 43 and all aspects of voltage, ohms and watts, are discussed as they relate to aspects of residential electrical installation.

Process/Skill Questions

- Who is credited with discovering the law of charges?
- How should objects with similar charges behave, according to the law of charges?
- What letter symbol is used to represent current?
- What letter symbol is used to represent voltage?
- What letter symbol is used to represent resistance?
- How does resistance affect the movement of free electrons?
- What are the mathematical relationships of Ohm’s law?

NCCER Standards
Task Number 89

Identify tools specific to electricians.

Definition

Identification could include

- naming various hand tools
- stating the usage of hand tools
- citing the maintenance associated with each tool
- safely using tools in accordance with the manufacturer’s instructions, government regulations, and instructor's guidelines.

Process/Skill Questions

- Why might an electrician use a hacksaw?
- What is the function of conduit?
- Why is it important to keep an extra charged battery with a cordless drill?

NCCER Standards

Electrical

- 26106-02 Electrical Test Equipment

Task Number 90

Identify basic electrical wiring devices.

Definition
Identification could include

- single-pole switches
- duplex receptacles
- three-way switches
- ground-fault circuit interrupter (GFCI)/arc fault circuit interrupter (AFCI)
- lamp/lighting outlets
- photovoltaic switching.

**IRC:** Chapter 34 covers basic requirements. Chapter 39 covers power and lighting distribution, including the coverage of solar thermal energy in M2301.

**Process/Skill Questions**

- How many terminals does a single-pole switch have?
- What type of switch should be used to control outlets or lights from two locations?
- What is the difference between *line* and *load*?

**NCCER Standards**

**Electrical**

- 26103-02 Fasteners and Anchors
- 26108-02 Raceways, Boxes, and Fittings
- 26109-02 Conductors

**Task Number 91**

**Describe installation procedures for GFCI and AFCI devices.**

**Definition**

Description should include

- identifying a breaker-type and receptacle-type GFCI
- identifying a feed-through receptacle and end of line (EOL)-type receptacle GFCI
- connecting a GFCI breaker in single-phase service panel
• connecting a GFCI receptacle as feed-through, in-line, and EOL on specified circuits.

IRC: See Chapters 34, 36, and 39, section E3902.

Process/Skill Questions

• Where are GFCIs required?
• What is the function of a GFCI?
• How is a GFCI tested?
• What is the function of an arc fault?

Task Number 92

Identify a transformer.

Definition

Identification should include step-up and step-down. All connections must be made in accordance with NEC and manufacturer's recommendations.

Process/Skill Questions

• What is the process for increasing voltage?
• What is the process for decreasing voltage?

Task Number 93

Wire basic residential switching operations.

Definition

Wiring should include

• single-pole switch
• three-way switch
• four-way switch.

IRC: Chapters 37, 38, 39, and 40 cover code requirements for residential wiring and installation.

Process/Skill Questions

• What color is the neutral conductor?
• What is the purpose of the bare copper wire?
• What color is the switch leg on the single-pole switch?
• What are traveler wires?

Task Number 94

Wire duplex receptacles.

Definition

Wiring should include

• cutting wire
• stripping insulation
• installing conductors for correct polarity.

IRC: Chapters 37, 38, 39, and 40 cover code requirements for residential wiring and installation.

Process/Skill Questions

• What color is the neutral conductor?
• Which blade on the wire stripper is longer?
• What colors are the hot supply screws?

Task Number 95

Wire GFCI receptacles.

Definition

Wiring should include

• cutting wire
• stripping insulation
• connecting line and load
• installing conductors for the correct polarity.

IRC: See chapters 34, 36, and 39, section E3902.

Process/Skill Questions
• What is the purpose of the GFCI?
• Where are GFCIs located in a dwelling?
• What does line mean?

Selecting and Installing Conductors

Task Number 96

Identify types of conductors.

Definition

Identification should include the types of conductors (e.g., copper, aluminum, and copper-clad conductors), their sizes (determined by using wire strippers or the American wire gauge [AWG] system), and an application for each.

IRC: Chapters 34, 35, 36, and 37 cover types of conductors approved by code and installation.

Process/Skill Questions

• What is Romex?
• What is nonmetallic sheathed cable?
• Where is service entrance (SE) cable typically used?
• What does SE stand for?

NCCER Standards

Electrical

  o 26109-02 Conductors
  o 26111-02 Wiring: Commercial and Industrial
  o 26112-02 Wiring: Residential
Task Number 97

Install conductors.

Definition

Installation should include using various wiring methods and industry-accepted testing procedures in accordance with NEC standards.

IRC: Chapters 34, 35, 36, and 37 cover types of conductors approved by code and installation.

Process/Skill Questions

- What are the abbreviations for copper and aluminum?
- What is a bending radius?
- Why is it important to support a conductor properly?

NCCER Standards

Electrical

- 26103-02 Fasteners and Anchors
- 26109-02 Conductors
- 26111-02 Wiring: Commercial and Industrial
- 26112-02 Wiring: Residential

Task Number 98

Make connections with lugs, connectors, and terminals.

Definition

Making connections between components should include terminating conductors by stripping them and installing lugs, connectors, and terminals in accordance with instructor guidelines and manufacturer specifications.

IRC: Chapters 34, 35, 36, and 37 cover types of conductors approved by code and installation.
Process/Skill Questions

- What is a lug?
- Why is it important to torque terminations?
- What is the importance of termination ratings?
- Why is it important to avoid attaching a copper and aluminum wire?

NCCER Standards

**Electrical**

- 26103-02 Fasteners and Anchors
- 26109-02 Conductors
- 26111-02 Wiring: Commercial and Industrial
- 26112-02 Wiring: Residential

Task Number 99

Select conductors for specific applications.

Definition

Selection should include assessing the correct size and type of conductor needed for the assigned application, in accordance with NEC.

IRC: See Chapter 36.

Process/Skill Questions

- How does the size of the conductor relate to the resistance?
- What is the difference between a conductor and an insulator?

NCCER Standards

**Electrical**
Task Number 100

Install nail plates to protect conductors.

Definition

Installation should include

- determining the necessity and location of a nail plate
- determining the appropriate size of the plate
- using installation method and tools.

IRC: See Chapter 6, section R602.6.1.

Process/Skill Questions

- Nail plates are typically constructed from what types of materials?
- Where are nail plates typically installed?
- How are nail plates attached?

NCCER Standards

Electrical

- 26109-02 Conductors
- 26111-02 Wiring: Commercial and Industrial
- 26112-02 Wiring: Residential

PLUMBING
Performing Plumbing Basics

Task Number 101

Identify tools specific to plumbers.

Definition

Identification could include the following:

- **Cutter**
  - Copper tubing cutter with reamer
  - Cutters suitable for cast-iron soil pipe
  - Hacksaw
  - Saw or shear-to-cut PVC pipe
- **Striker**
- **Slip-joint pliers (channel-lock type)**
- **Adjustable wrench**
- **Torpedo level**
- **Claw hammer**
- **Plastic (PVC) pipe reamer**
- **Soldering torch**
- **Solder paste brush**
- **Copper cleaning tool (for the inside and outside of a pipe)**
- **Architect's scale**
- **Straightedge or drafting triangle**
- **Torque wrench for no-hub clamps**
- **Straight tin snips**
- **Nut driver**
- **Socket set**
- **Portable screw gun**
- **Plumb bob**

Process/Skill Questions

- How does an architect's scale differ from a regular scale?
- What is the function of a plumb bob? When might it be used?
- Why do residential plumbers need to maintain good driving records?
Task Number 102

Cut copper tubing.

Definition

Cutting should include

- cutting tubing to the correct length, +/- 1/16 inch
- deburring the copper with a tool.

Process/Skill Questions

- Why is it necessary to deburr copper tubing?
- What tools can be used to deburr copper tubing?

Task Number 103

Cut plastic pipe.

Definition

Cutting should include using a PVC/acrylonitrile butadiene styrene (ABS) saw or approved cutter, and with
• cutting pipe to the correct length, within +/- 1/8 inch
• cutting square
• deburring, as needed.

**Process/Skill Questions**

• What do the acronyms PVC/ABS stand for?
• Why is it necessary to make a straight cut on a plastic pipe?
• Why are there specialized saws in the plumbing trade?

**Task Number 104**

**Construct copper tubing assembly, using solder joints.**

**Definition**

Construction should include

• cleaning the pipe, using sandpaper or wire brush
• applying flux with a brush
• applying heat for the solder
• applying the solder
• testing assembly for leaks
• wiping excessive flux after assembly cools.

**IRC:** Chapters 25, 26, and 27 cover general plumbing requirements, fixture installation, workmanship, piping support, inspections, and testing. Chapter 29 covers water supply and distribution.

**Process/Skill Questions**

• What scientific principle allows molten solder to flow into a joint?
• What material must be absent from solder used in domestic water systems?
• Why is flux so important in soldering?

**Task Number 105**

**Calculate fitting allowance.**

**Definition**
Calculations should be accurate to within +/- 1/16 inch.

*IRC*: Chapter 27 covers fixture installations.

**Process/Skill Questions**

- Why is a fitting allowance necessary in a fitting project?
- How is takeoff calculated for a fitting allowance?
- How is a fitting allowance the same for all sizes of pipes? Explain.

**Task Number 106**

**Join plastic pipe (i.e., tubing) to fittings, using solvent.**

**Definition**

Joining pipe should include

- priming or cleaning material, as required
- applying cement to the pipe and fittings
- inserting the pipe and twisting a quarter turn
- holding the assembly in place for 15 seconds.

*IRC*: Chapter 29 covers water supply and distribution; and Chapter 30 covers sanitary drainage. Both chapters explain pipe material, sizing, and connections permitted by code.

**Process/Skill Questions**

- Are plastic cements interchangeable? Why or why not?
- How does weather affect solvents/cements?
- What type of pipe requires a primer before applying solvents?

**NCCER Standards**

- **Plumbing: Level 1**
  - 02106-05 Plastic Pipe and Fittings
Task Number 107

Join cross-linked polyethylene (PEX) pipe (i.e., tubing), using crimp fittings.

Definition

Joining should include

- using a PEX crimp tool, rings, and cutter with appropriate fittings
- using a sizing tool to check crimp diameter
- determining the proper location of the crimp ring
- adjusting the crimping tool and crimping.

IRC: Chapter 29 covers water supply and distribution, while section P2906 outlines materials, joints, and connections of types of code-approved materials for water service pipe.

Process/Skill Questions

- What are some advantages of PEX over copper or PVC?
- What does PEX stand for?
- What materials make up PEX fittings? Why is this important?

NCCER Standards

- Plumbing: Level 1
  - 02106-05 Plastic Pipe and Fittings

SOL Correlation by Task

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<td>40</td>
<td>Earn the OSHA 10-hour card.</td>
</tr>
</tbody>
</table>
| 41 | Identify personal protective equipment (PPE) requirements. | English: 11.5, 12.5  
History and Social Science: VUS.8, WHI.8 |
| 42 | Maintain a safe working environment.      | History and Social Science: VUS.8, WHI.8 |
| 43 | Explain safe working practices around electrical hazards. | English: 11.5, 12.5  
History and Social Science: VUS.8, WHI.8 |
| 44 | Identify emergency first-aid procedures.  | English: 11.5, 12.5 |
| 45 | Identify the types of fires and the methods used to extinguish them. | English: 11.5, 12.5  
Science: CH.1 |
| 46 | Inspect course-specific hand and power tools to identify defects. | English: 11.5, 12.5 |
| 47 | Demonstrate lifting and carrying techniques. |                                    |
| 48 | Demonstrate safe laddering techniques.    |                                         |
| 49 | Demonstrate safe scaffolding techniques.  |                                         |
| 50 | Report personal injury, violations of environmental regulations, and equipment safety violations to the appropriate authority. | English: 10.1, 10.5, 11.1, 11.5  
History and Social Science: GOVT.16 |
| 51 | Pass the safety exam.                     |                                         |
| 52 | Identify local, state, and federal regulations for a tradesman license. | English: 10.5, 11.5  
History and Social Science: VUS.13, VUS.14 |
| 53 | Identify local, state, and federal regulations for operating a business. | English: 10.5, 11.5  
History and Social Science: VUS.13, VUS.14 |
| 54 | Identify common hand and power tools.     |                                         |
| 55 | Identify units of length, weight, volume, and temperature. | History and Social Science: WHI.4, WHI.6, WHI.9  
Mathematics: A.1, A.4, G.3 |
<p>| 56 | Read a ruler.                            | English: 10.5, 11.5 |
| 57 | Demonstrate the use of instruments for measurement. |                                         |</p>
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>58</td>
<td>Identify various pipe dimensions.</td>
</tr>
<tr>
<td>59</td>
<td>Solve mathematical problems. History and Social Science: WHI.4, WHI.9</td>
</tr>
<tr>
<td>60</td>
<td>Convert decimals to percents and percents to decimals.</td>
</tr>
<tr>
<td>61</td>
<td>Convert fractions to decimals and decimals to fractions.</td>
</tr>
<tr>
<td>62</td>
<td>Identify the basic geometric formulas for shapes common in construction. History and Social Science: WHI.4, WHI.5, WHI.6, WHI.9 Mathematics: A.4, A.6</td>
</tr>
<tr>
<td>63</td>
<td>Identify basic blueprint terms, components, and symbols.</td>
</tr>
<tr>
<td>64</td>
<td>Identify classifications of drawings. English: 10.5, 11.5</td>
</tr>
<tr>
<td>65</td>
<td>Identify tools specific to masons.</td>
</tr>
<tr>
<td>66</td>
<td>Spread mortar.</td>
</tr>
<tr>
<td>67</td>
<td>Apply head joints.</td>
</tr>
<tr>
<td>68</td>
<td>Strike joints.</td>
</tr>
<tr>
<td>69</td>
<td>Identify types and sizes of brick.</td>
</tr>
<tr>
<td>70</td>
<td>Apply block head joints.</td>
</tr>
<tr>
<td>71</td>
<td>Identify types and sizes of block.</td>
</tr>
<tr>
<td>72</td>
<td>Mix masonry cements. English: 10.5, 11.5</td>
</tr>
<tr>
<td>73</td>
<td>Select masonry cement based on a specific job.</td>
</tr>
<tr>
<td>74</td>
<td>Identify tools specific to carpenters.</td>
</tr>
<tr>
<td>75</td>
<td>Check stock and/or assemblies for squareness.</td>
</tr>
<tr>
<td>76</td>
<td>Determine whether surfaces are level or plumb.</td>
</tr>
<tr>
<td>77</td>
<td>Handle and store materials. Science: BIO.1, CH.1</td>
</tr>
<tr>
<td>78</td>
<td>Identify materials.</td>
</tr>
<tr>
<td>79</td>
<td>Maintain hand tools.</td>
</tr>
<tr>
<td>80</td>
<td>Cut stock.</td>
</tr>
<tr>
<td>81</td>
<td>Identify the sill plate.</td>
</tr>
<tr>
<td>82</td>
<td>Identify the floor joists and crown.</td>
</tr>
<tr>
<td>83</td>
<td>Cut wall plates.</td>
</tr>
<tr>
<td>84</td>
<td>Identify studs, headers, jacks, rough sills, and cripples. English: 10.5, 11.5</td>
</tr>
<tr>
<td>85</td>
<td>Identify the framing layout on wall plates.</td>
</tr>
<tr>
<td>86</td>
<td>Identify corner and tee posts.</td>
</tr>
<tr>
<td>87</td>
<td>Identify the parts of an exterior wall system.</td>
</tr>
<tr>
<td></td>
<td>Task Description</td>
</tr>
<tr>
<td>---</td>
<td>------------------------------------------------------</td>
</tr>
</tbody>
</table>
| 88 | Describe basic electrical theory.                    | English: 10.5, 11.5
|   |                                                     | History and Social Science: WHII.8
|   |                                                     | Science: PH.11    |
| 89 | Identify tools specific to electricians.             | English: 10.5, 11.5|
| 90 | Identify basic electrical wiring devices.            |                   |
| 91 | Describe installation procedures for GFCI and AFCI devices. | English: 10.5, 11.5|
| 92 | Identify a transformer.                              |                   |
| 93 | Wire basic residential switching operations.         |                   |
| 94 | Wire duplex receptacles.                             |                   |
| 95 | Wire GFCI receptacles.                               |                   |
| 96 | Identify types of conductors.                       | English: 10.5, 11.5|
| 97 | Install conductors.                                 | English: 10.5, 11.5|
| 98 | Make connections with lugs, connectors, and terminals.| English: 10.5, 11.5|
| 99 | Select conductors for specific applications.        | English: 10.5, 11.5|
|100 | Install nail plates to protect conductors.          |                   |
|101 | Identify tools specific to plumbers.                |                   |
|102 | Cut copper tubing.                                  |                   |
|103 | Cut plastic pipe.                                   |                   |
|104 | Construct copper tubing assembly, using solder joints.|                   |
|105 | Calculate fitting allowance.                        |                   |
|106 | Join plastic pipe (i.e., tubing) to fittings, using solvent. |                   |
|107 | Join cross-linked polyethylene (PEX) pipe (i.e., tubing), using crimp fittings. |                   |

**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.
Appendix: Credentials, Course Sequences, and Career Cluster Information

Industry Credentials: Only apply to 36-week courses

- Building Construction Occupations Assessment
- Building Science Principles Examination
- Building Trades Maintenance Assessment
- Carpentry Level One Entry-Level Assessment
- College and Work Readiness Assessment (CWRA+)
- Construction Assessment
- Construction Technologist Entry-Level Assessment
- Core: Introductory Craft Skills Entry-Level Assessment
- Customer Service Examination
- Customer Service Specialist (CSS) Examination
- Design and Pre-Construction Assessment
- Electrical Construction Technology Assessment
- Electrical Occupations Assessment
- Electrician Level One Entry-Level Assessment
- Fundamentals of Construction Assessment
- HBI/NAHB Residential Construction Academy (RCA) Series Student Certification Assessments
- ICC Certificates of Completion Examinations
- International Code Council Residential Building Inspector (B1) Examination
- International Code Council Residential Electrical Inspector (E1) Examination
- International Code Council Residential Plumbing Inspector (P1) Examination
- Masonry Level One Entry-Level Assessment
- National Career Readiness Certificate Assessment
- Plumbing Assessment
- Plumbing Examination
- Plumbing Level One Entry-Level Assessment
- Plumbing-Heating-Cooling Contractors Educational Foundation Examinations
- Pre-Apprenticeship Certificate Training (PACT) Core Examinations
- Professional Communications Certification Examination
- Workplace Readiness Skills for the Commonwealth Examination

Concentration sequences: A combination of this course and those below, equivalent to two 36-week courses, is a concentration sequence. Students wishing to complete a specialization may take additional courses based on their career pathways. A program completer is a student who has met the requirements for a CTE concentration sequence and all other requirements for high school graduation or an approved alternative education program.

- Building Trades II (8516/36 weeks, 280 hours)
<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 Manager</td>
</tr>
<tr>
<td></td>
<td>Drywall Installer</td>
</tr>
<tr>
<td></td>
<td>Electrician</td>
</tr>
<tr>
<td></td>
<td>General Contractor</td>
</tr>
<tr>
<td></td>
<td>Mason</td>
</tr>
<tr>
<td></td>
<td>Plumber, Pipefitter</td>
</tr>
<tr>
<td></td>
<td>Tile Installer</td>
</tr>
<tr>
<td>Design/Pre-Construction</td>
<td>Building Code Inspector</td>
</tr>
<tr>
<td></td>
<td>Cost Estimator</td>
</tr>
</tbody>
</table>