

Module Overview

This module explains the role of safety in the construction crafts. Trainees will learn how to identify and follow safe work practices and procedures as well as how to properly inspect and use safety equipment. Trainees will be able to describe safe work procedures for lifting heavy objects, fighting fires, and working around electrical hazards.

Prerequisites

There are no prerequisites for this module.

Objectives

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

1. Explain the idea of a safety culture and its importance in the construction crafts.
2. Identify causes of accidents and the impact of accident costs.
3. Explain the role of OSHA in job-site safety.
4. Explain OSHA's *General Duty Clause* and *1926 CFR Subpart C*.
5. Recognize hazard recognition and risk assessment techniques.
6. Explain fall protection, ladder, stair, and scaffold procedures and requirements.
7. Identify struck-by hazards and demonstrate safe working procedures and requirements.
8. Identify caught-in-between hazards and demonstrate safe working procedures and requirements.
9. Define safe work procedures to use around electrical hazards.
10. Demonstrate the use and care of appropriate personal protective equipment (PPE).
11. Explain the importance of hazard communications (HazCom) and material safety data sheets (MSDSs).
12. Identify other construction hazards on your job site, including hazardous material exposures, environmental elements, welding and cutting hazards, confined spaces, and fires.

Performance Tasks

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

1. Inspect PPE to determine if it is safe to use (PPE should include safety goggles, hard hat, gloves, safety harness, and safety shoes).
2. Properly don and remove PPE (safety goggles, hard hat, and personal fall protection).
3. Demonstrate safe lifting procedures.
4. Set up an extension ladder properly.
5. Demonstrate three-point contact on a ladder.

Materials and Equipment List

Multimedia projector and screen
Core Curriculum PowerPoint® Presentation Slides
(ISBN 0-13-609080-X)
Desktop or laptop computer
Whiteboard/chalkboard
Markers/chalk
Pencils and scratch paper
Copies of your local code
Variety of personal protective equipment, including:
Hard hats
Safety glasses, goggles, and face shields
Safety harness

Gloves
Safety shoes
Hearing protection
Respiratory protection
Variety of fire extinguishers
Variety of communication tags and signs
Materials to create hypothetical fire hazards
Variety of safety tags, including:
Scaffold tags
Lockout/tagout tag
Fire extinguisher tag
Copies of your company's fall protection plan

Variety of ladders, including:
Straight ladder
Extension ladder
Stepladder

Trade Terms Quiz*
Module Examination**
Performance Profile Sheets**

* Located in the back of the Trainee Guide module

** Available only through the Instructor Resource Center using the access code bound with this book.

Safety Considerations

Ensure that the trainees are equipped with appropriate personal protective equipment. Always work in a clean, well-lit, appropriate work area.

Additional Resources

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

- Construction Back Safety*. Videocassette. 10 minutes. Coastal Training Technologies Corp. Virginia Beach, VA.
- Construction Confined Space Entry*. Videocassette. 10 minutes. Coastal Training Technologies Corp. Virginia Beach, VA.
- Construction Electrical Safety*. Videocassette. 10 minutes. Coastal Training Technologies Corp. Virginia Beach, VA.
- Construction Fall Protection: Get Arrested!* Videocassette. 11 minutes. Coastal Training Technologies Corp. Virginia Beach, VA.
- Construction Lockout/Tagout*. Videocassette. 10 minutes. Coastal Training Technologies Corp. Virginia Beach, VA.
- Construction Safety*. Jimmie Hinze. Englewood Cliffs, NJ: Prentice Hall.
- Construction Safety Council Home Page, <http://buildsafe.org>.
- Construction Stairways and Ladders*. Videocassette. 10 minutes. Coastal Training Technologies Corp. Virginia Beach, VA.
- Construction Welding Safety*. Videocassette. 10 minutes. Coastal Training Technologies Corp. Virginia Beach, VA.
- Field Safety*, 2003. NCCER. Upper Saddle River, NJ: Prentice Hall.
- Handbook of OSHA Construction Safety and Health*. James V. Eidson, et al. Boca Raton, FL: Lewis Publishers, Inc.
- HazCom for Construction*. Videocassette. 11 minutes. Coastal Training Technologies Corp. Virginia Beach, VA.
- NAHB-OSHA Jobsite Safety Handbook*. Washington, DC: Home Builder Press. Available online at www.osha.gov.
- Occupational Safety and Health Standards for the Construction Industry*, latest edition. Washington, DC: Occupational Safety and Health Administration, U.S. Department of Labor, U.S. Government Printing Office.
- Safety Orientation*, 2003. NCCER. Upper Saddle River, NJ: Prentice Hall.
- Safety Technology*, 2003. NCCER. Upper Saddle River, NJ: Prentice Hall.
- United States Department of Labor, Occupational Safety and Health Administration Home Page, www.osha.gov.

Teaching Time for this Module

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

Topic	Planned Time
Session I. Introduction to Safety and Accidents	
A. Importance of Safety	_____
B. Accidents: Causes and Results	_____
C. Company Safety Policies and OSHA Regulations	_____
D. Hazard Recognition, Evaluation, and Control	_____
Session II. Working from Elevations	
A. Elevated Work and Fall Protection	_____
B. Ladders and Stairs	_____
C. Laboratory Trainees practice setting up and using ladders. This laboratory corresponds to Performance Tasks 4 and 5.	_____
D. Scaffolds	_____
Session III. Job-Site Hazards	
A. Struck-by Hazards	_____
B. Caught-in-Between Hazards	_____
C. Electrical Hazards	_____
Session IV. Safety Precautions and Job-Site Hazards	
A. Personal Protective Equipment	_____
B. Laboratory Trainees practice inspecting and donning PPE. This laboratory corresponds to Performance Tasks 1 and 2.	_____
C. Hazard Communication Standard	_____
D. Other Job-Site Hazards	_____
E. Laboratory Trainees practice safe lifting techniques. This laboratory corresponds to Performance Task 3.	_____
Session V. Review and Testing	
A. Review	_____
B. Module Examination	_____
1. Trainees must score 70 percent or higher to receive recognition from the NCCER.	
2. Record the testing results on Craft Training Report Form 200, and submit the results to the Training Program Sponsor.	
C. Performance Testing	_____
1. Trainees must perform each task to the satisfaction of the instructor to receive recognition from NCCER. If applicable, proficiency noted during laboratory exercises can be used to satisfy the Performance Testing requirements.	
2. Record the testing results on Craft Training Report Form 200, and submit the results to the Training Program Sponsor.	

Module Overview

This module introduces mathematical operations commonly used in construction, and explains how the metric system and geometry are used in the trade. Trainees will learn how to add, subtract, multiply, and divide whole numbers, fractions, and decimals, as well as how to convert decimals, fractions, and percentages.

Prerequisites

Prior to training with this module, it is recommended that the trainee shall have successfully completed the following: *Core Curriculum: Introductory Craft Skills*, Module 00101-09.

Objectives

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

1. Add, subtract, multiply, and divide whole numbers, with and without a calculator.
2. Use a standard ruler, a metric ruler, and a measuring tape to measure.
3. Add, subtract, multiply, and divide fractions.
4. Add, subtract, multiply, and divide decimals, with and without a calculator.
5. Convert decimals to percentages and percentages to decimals.
6. Convert fractions to decimals and decimals to fractions.
7. Explain what the metric system is and how it is important in the construction trade.
8. Recognize and use metric units of length, weight, volume, and temperature.
9. Recognize some of the basic shapes used in the construction industry and apply basic geometry to measure them.

Performance Tasks

This is a knowledge-based module. There are no performance tasks.

Materials and Equipment List

Multimedia projector and screen	Standard ruler (with $\frac{1}{16}$ -inch markings)
Core Curriculum PowerPoint® Presentation Slides (ISBN 0-13-609080-X)	Metric ruler (with centimeters [cm] and millimeters [mm])
Desktop or laptop computer	Tape measure
Whiteboard/chalkboard	Architect's scale
Markers/chalk	Metric scale
Pencils and paper	Engineer's scale
Copies of your local code	Set of construction drawings
Sample work orders that require mathematical functions	Protractors
Calculator	Trade Terms Quiz*
	Module Examinations**

* Located in the back of the Trainee Guide module

**Available only through the Instructor Resource Center using the access code bound with this book.

Additional Resources

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

All the Math You'll Ever Need, 1999. Stephen Slavin. New York, NY: John Wiley & Sons.

Applied Construction Math: A Novel Approach, 2006. National Center for Construction Education and Research. Upper Saddle River, NJ: Prentice Hall.

Basic Construction Math Review: A Manual of Basic Construction Mathematics for Contractor and Tradesman License Exams. Printcorp Business Printing. Construction Books Express.

Math for the Building Trades. Homewood, IL: American Technical Publishers (ATP).

Math to Build On: A Book for Those Who Build, 1997. Johnny and Margaret Hamilton. Clinton, NC: Construction Trades Press.

Teaching Time for this Module

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

Topic	Planned Time
Session I. Whole Numbers and Measurements	
A. Whole Numbers	_____
B. Working with Length Measurements	_____
C. Other Types of Scales	_____
D. Laboratory	_____
Have trainees practice taking measurements using scales.	
Session II. Fractions and Decimals	
A. Reducing and Comparing Fractions	_____
B. Adding and Subtracting Fractions	_____
C. Multiplying and Dividing Fractions	_____
D. Comparing Decimals	_____
E. Adding and Subtracting Decimals	_____
F. Multiplying and Dividing Decimals	_____
Session III. Conversion and Geometry	
A. Converting Fractions and Decimals	_____
B. Converting Inches and Decimals	_____
C. Introduction to Construction Geometry	_____
D. Area of Shapes	_____
E. Volume of Shapes	_____
Session IV. Review and Testing	
A. Review	_____
B. Module Examination	_____
1. Trainees must score 70 percent or higher to receive recognition from the NCCER.	
2. Record the testing results on Craft Training Report Form 200, and submit the results to the Training Program Sponsor.	

Module Overview

This module explains how to inspect and properly use hand tools. Trainees will learn how to identify and take care of basic hand tools.

Prerequisites

Prior to training with this module, it is recommended that the trainee shall have successfully completed the following: *Core Curriculum: Introductory Craft Skills*, Modules 00101-09 and 00102-09.

Objectives

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

1. Recognize and identify some of the basic hand tools and their proper uses in the construction trade.
2. Visually inspect hand tools to determine if they are safe to use.
3. Safely use hand tools.

Performance Tasks

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

1. Visually inspect the following tools to determine if they are safe to use:
 - Hammer
 - Screwdriver
 - Saw
2. Make a straight square cut using a crosscut saw.
3. Safely and properly use a minimum of three of the following tools:
 - Hammer and cat's paw (to drive and pull nails)
 - Screwdriver (slotted or Phillips)
 - Adjustable wrench
 - CHANNELLOCK® pliers
 - Spirit level
 - Carpenter's square and steel tape
 - Saw

Materials and Equipment List

Multimedia projector and screen	Sledgehammer
Core Curriculum PowerPoint® Presentation Slides (ISBN 0-13-609080-X)	Stake
Desktop or laptop computer	Ripping bar
Whiteboard/chalkboard	Nail pullers, including:
Markers/chalk	Cat's paw
Pencils and scratch paper	Chisel bar
Copies of your local code	Flat bar
Appropriate personal protective equipment	Wood boards with nails to practice using nail pullers
Claw hammer	Pliers, including:
Wood board with nails to practice using hammers	Slip-joint
Ball peen hammer	Long-nose
Screwdrivers, including:	Lineman
Slotted	Tongue-and-groove
Phillips	CHANNELLOCK® pliers
Wood board with screws to practice using screw- drivers	Boards with wire and soft metals to practice using pliers

Measuring tools, including:

- Steel rule
- Measuring tape
- Wooden folding rule
- Laser measuring tool

Spirit level

Squares, including:

- Carpenter's square
- Combination square
- Try square

Square wood frames to practice using the measuring tools

Plumb bob

Self-chalker

Clamps, including:

- C-clamp
- Locking C-clamp
- Spring clamp
- Bar clamp
- Pipe clamp
- Hand-screw clamp
- Quick Grip[®]
- Web clamp

Crosscut saw

Sections of wood suitable for sawing

Files and rasps, including:

- Veneer knife file

Square file

Triangle file

Flat file

Rat-tail file

Rasp

File card

Materials to be filed

Wood chisel

Cold chisel

Wood and metal to practice using chisels

Punches

Wrenches, including:

- Nonadjustable wrench

- Adjustable wrench

- Torque wrench

Sockets and ratchets

Utility knife

Cardboard box to practice cutting with a utility knife

Shovels

Pick

Trade Terms Quiz*

Module Examinations**

Performance Profile Sheets**

* Located in the back of the Trainee Guide module

** Available only through the Instructor Resource Center using the access code bound with this book.

Safety Considerations

Ensure that the trainees are equipped with appropriate personal protective equipment. Always work in a clean, well-lit, appropriate work area.

Additional Resources

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

Field Safety, 2003. NCCER. Upper Saddle River, NJ: Prentice Hall.

Hand Tools & Techniques, 1999. Minneapolis, MN: Handyman Club of America.

The Long and Short of It: How to Take Measurements. Video. Charleston, WV: Cambridge Vocational & Technical, 800-468-4227.

National Institute for Occupational Safety and Health (NIOSH), DHHS Publication No. 2004-164, "Easy Ergonomics: A Guide to Selecting Non-Powered Hand Tools." <http://www.cdc.gov/niosh/docs/2004-164/pdfs/2004-164.pdf>

Reader's Digest Book of Skills and Tools, 1993. Pleasantville, NY: Reader's Digest.

Teaching Time for this Module

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

Topic	Planned Time
Session I. Hand Tools, Part One	
A. Hammers	_____
B. Laboratory	_____
Trainees practice inspecting and using a hammer. This laboratory corresponds to Performance Tasks 1 and 3.	
C. Ripping Bars and Nail Pullers	_____
D. Laboratory	_____
Trainees practice using nail pullers. This laboratory corresponds to Performance Task 3.	
E. Chisels and Punches	_____
F. Laboratory	_____
Trainees practice using chisels and punches.	
G. Screwdrivers	_____
H. Laboratory	_____
Trainees practice inspecting and using screwdrivers. This laboratory corresponds to Performance Tasks 1 and 3.	
Session II. Hand Tools, Part Two	
A. Pliers and Wire Cutters	_____
B. Laboratory	_____
Trainees practice using CHANNELLOCK® and other pliers. This laboratory corresponds to Performance Task 3.	
C. Wrenches	_____
D. Laboratory	_____
Trainees practice using adjustable wrenches. This laboratory corresponds to Performance Task 3.	
E. Sockets and Ratchets	_____
F. Torque Wrenches	_____
G. Rules and Other Measuring Tools	_____
H. Laboratory	_____
Trainees practice using rules and other measuring tools. This laboratory corresponds to Performance Task 3.	
I. Levels	_____
J. Laboratory	_____
Trainees practice using spirit levels. This laboratory corresponds to Performance Task 3.	

Session III. Hand Tools, Part Three

- A. Squares _____
- B. Laboratory _____
Trainees practice using a carpenter’s square. This laboratory corresponds to Performance Task 3.
- C. Plumb Bob _____
- D. Chalk Lines _____
- E. Utility Knives _____
- F. Saws _____
- G. Laboratory _____
Trainees practice inspecting saws and using a crosscut saw to make cuts. This laboratory corresponds to Performance Tasks 1, 2, and 3.
- H. Files and Rasps _____
- I. Laboratory _____
Trainees practice using files and file cards.
- J. Clamps _____
- K. Performance Testing _____
Trainees practice working with various hand tools necessary to complete the requirements for Performance Task 3.

Session IV. Hand Tools, Part Four; Review and Testing

- A. Chain Falls and Come-Alongs _____
- B. Shovels _____
- C. Picks _____
- D. Review _____
- E. Module Examination _____
 - 1. Trainees must score 70 percent or higher to receive recognition from the NCCER.
 - 2. Record the testing results on Craft Training Report Form 200, and submit the results to the Training Program Sponsor.
- F. Performance Testing _____
 - 1. Trainees must perform each task to the satisfaction of the instructor to receive recognition from NCCER. If applicable, proficiency noted during laboratory exercises can be used to satisfy the Performance Testing requirements.
 - 2. Record the testing results on Craft Training Report Form 200, and submit the results to the Training Program Sponsor.

Module Overview

This module introduces power tools commonly used in the construction trade. Trainees will learn how to safely use and properly maintain a variety of power tools.

Prerequisites

Prior to training with this module, it is recommended that the trainee shall have successfully completed the following: *Core Curriculum: Introductory Craft Skills*, Modules 00101-09 through 00103-09.

Objectives

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

1. Identify power tools commonly used in the construction trades.
2. Use power tools safely.
3. Explain how to maintain power tools properly.

Performance Tasks

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

1. Safely and properly use three of the following tools:
 - Safely and properly operate an electric drill.
 - Safely and properly operate a circular saw.
 - Safely and properly operate a SawZall®.
 - Safely and properly operate a pneumatic power nailer.

Materials and Equipment List

Multimedia projector and screen	Variety of saw blades
Core Curriculum PowerPoint® Presentation Slides (ISBN 0-13-609080-X)	Changeable blades for saber saws
Desktop or laptop computer	Boards to practice cutting
Whiteboard/chalkboard	Handheld grinders, including:
Markers/chalk	Angle grinder
Pencils and scratch paper	End grinder
Copies of your local codes	Detail grinder
Appropriate personal protective equipment	Miscellaneous power tools, including:
Power drills, including:	Pneumatically powered nailer (nail gun)
Electric drill	Powder-actuated fastening system
Cordless drill	Air impact wrench
Hammer drill	Pavement breaker
Electromagnetic drill	Hydraulic jack
Pneumatic drill (air hammer)	Porta-Power®
Electric screwdriver	Nails
Variety of drill bits	Air compressor
Saws, including:	Nuts and bolts to practice using an air impact wrench
Circular saw (Skillsaw®)	Trade Terms Quiz*
Saber saw	Module Examinations**
Reciprocating saw (SawZall®)	Performance Profile Sheets**
Portable handheld bandsaw	
Power miter saw	

* Located in the back of the Trainee Guide module

**Available only through the Instructor Resource Center using the access code bound with this book.

Safety Considerations

Ensure that the trainees are equipped with appropriate personal protective equipment. Always work in a clean, well-lit, appropriate work area.

Additional Resources

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

- 29 CFR 1926, OSHA Construction Industry Regulations*, latest edition. Washington, DC: Occupational Safety and Health Administration, U.S. Department of Labor, U.S. Government Printing Office.
- All About Power Tools*, 2002. Des Moines, IA: Meredith Books.
- Hand and Power Tool Training*. Video. All About OSHA. Surprise, AZ.
- Power Tools*, 1997. Minnetonka, MN: Handyman Club of America.
- Powered Hand Tool Safety: Handle with Care*. Video. 20 minutes. Coastal Training Technologies Corp. Virginia Beach, VA.
- Reader's Digest Book of Skills and Tools*, 1993. Pleasantville, NY: Reader's Digest.

Teaching Time for this Module

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

Topic	Planned Time
Session I. Power Tools, Part One	
A. Electric, Pneumatic, and Hydraulic Tools	_____
B. Power Drill	_____
C. Laboratory	_____
Trainees practice using power drills. This laboratory corresponds to Performance Task 1.	
D. Cordless Drills	_____
E. Hammer Drills	_____
F. Electromagnetic Drills	_____
G. Pneumatic Drills	_____
Session II. Power Tools, Part Two	
A. Circular Saws	_____
B. Laboratory	_____
Trainees practice using circular saws. This laboratory corresponds to Performance Task 2.	
C. Saber Saws	_____
D. Reciprocating Saws (SawZalls®)	_____
E. Laboratory	_____
Trainees practice using SawZalls®. This laboratory corresponds to Performance Task 3.	
F. Portable Handheld Bandsaw	_____
G. Power Miter Saw	_____
H. Abrasive Cutoff Saw	_____

Session III. Power Tools, Part Three

A. Grinders and Sanders _____

B. Laboratory _____

Trainees practice using handheld grinders.

C. Pneumatically Powered Nailers _____

D. Laboratory _____

Trainees practice using a pneumatic power nailer. This laboratory corresponds to Performance Task 4.

E. Powder-Actuated Fastening Systems _____

F. Air Impact Wrench _____

G. Laboratory _____

Trainees practice using an air impact wrench.

H. Pavement Breaker _____

I. Hydraulic Jack _____

J. Laboratory _____

Trainees practice using hydraulic jacks and Porta-Powers®.

Session IV. Review and Testing

A. Review _____

B. Module Examination _____

1. Trainees must score 70 percent or higher to receive recognition from the NCCER.

2. Record the testing results on Craft Training Report Form 200, and submit the results to the Training Program Sponsor.

C. Performance Testing _____

1. Trainees must perform each task to the satisfaction of the instructor to receive recognition from NCCER. If applicable, proficiency noted during laboratory exercises can be used to satisfy the Performance Testing requirements.

2. Record the testing results on Craft Training Report Form 200, and submit the results to the Training Program Sponsor.

Module Overview

This module discusses construction drawing terms, components, and symbols. Trainees will learn how to interpret construction drawings, recognize classifications of drawings, and use drawing dimensions.

Prerequisites

Prior to training with this module, it is recommended that the trainee shall have successfully completed the following: *Core Curriculum: Introductory Craft Skills*, Modules 00101-09 through 00104-09. Module 00106-09 is an elective and is not a requirement for completion of this course.

Objectives

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

1. Recognize and identify basic construction drawing terms, components, and symbols.
2. Relate information on construction drawings to actual locations on the print.
3. Recognize different classifications of construction drawings.
4. Interpret and use drawing dimensions.

Performance Tasks

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

1. Using the floor plan supplied with this module:
 - Locate the wall common to both interview rooms.
 - Determine the overall width of the structure studio.
 - Find the distance from the outside east wall to the center of the beam in the structure studio.
 - Find the elevation of the slab.

Materials and Equipment List

Multimedia projector and screen	Structural
Core Curriculum PowerPoint® Presentation Slides (ISBN 0-13-609080-X)	Mechanical
Desktop or laptop computer	Plumbing
Whiteboard/chalkboard	Electrical
Markers/chalk	Specifications
Pencils and scratch paper	Construction drawings with title block
Copies of your local code	Construction drawings with a legend
Door, window, and hardware schedules	Construction drawings with a gridline system
A complete set of plans, including:	Construction drawings with interior and exterior measurements
Civil	Trade Terms Quiz*
Architectural	Module Examinations**
Fire Protection	Performance Profile Sheets**

* Located in the back of the Trainee Guide module

** Available only through the Instructor Resource Center using the access code bound with this book.

Additional Resources

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

Blueprint Reading for the Building Trades, 1989. John Traister. Carlsbad, CA: Craftsman Book Co.

Blueprint Reading for Construction, Second Edition. 2003. James Fatzinger. Upper Saddle River, NJ: Prentice Hall.

Blueprint Reading for the Construction Trades, Second Edition. 2005. Peter A. Mann. Micro-press.com.

Construction Blueprint Reading, 1985. Robert Putnam. Englewood Cliffs, NJ: Prentice Hall.

Reading Architectural Plans for Residential and Commercial Construction, 2001. Ernest R. Weidhaas. Upper Saddle River, NJ: Prentice Hall.

Teaching Time for this Module

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

Topic	Planned Time
Session I. The Drawing Set and Types of Construction Drawings, Part One	
A. Basic Components of Construction Drawings	_____
B. Civil Plans	_____
C. Architectural Plans	_____
D. Laboratory	_____
Trainees practice using a floor plan. This laboratory corresponds to Performance Tasks 1 and 4.	
Session II. Types of Construction Drawings, Part Two	
A. Structural Plans	_____
B. Mechanical Plans	_____
C. Plumbing/Piping Plans	_____
D. Electrical Plans	_____
E. Fire Protection Plans	_____
F. Specifications	_____
G. Request for Information	_____
Session III. Construction Drawings	
A. Scale	_____
B. Lines of Construction	_____
C. Abbreviations, Symbols, and Keynotes	_____
D. Using Gridlines to Identify Plan Locations	_____
E. Dimensions	_____
F. Laboratory	_____
Trainees practice using a floor plan. This laboratory corresponds to Performance Tasks 2 and 3.	

Session IV. Review and Testing

A. Review

B. Module Examination

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

C. Performance Testing

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

Module Overview

This module introduces the uses of slings and common rigging hardware. Trainees will learn basic inspection techniques, hitch configurations, and load-handling safety practices, as well as how to use American National Standards Institute hand signals.

Prerequisites

Prior to training with this module, it is recommended that the trainee shall have successfully completed the following: *Core Curriculum: Introductory Craft Skills*, Modules 00101-09 through 00105-09. This module is an elective and is not a requirement for completion of this course. Trainees can obtain further training and a rigging completion certificate from the Contren® Learning Series *Rigging* curriculum.

Objectives

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

1. Identify and describe the use of slings and common rigging hardware.
2. Describe basic inspection techniques and rejection criteria used for slings and hardware.
3. Describe basic hitch configurations and their proper connections.
4. Describe basic load-handling safety practices.
5. Demonstrate proper use of American National Standards Institute (ANSI) hand signals.

Performance Tasks

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

1. Select and inspect appropriate slings for a lift.
2. Given various loads, determine the proper hitch to be used.
3. Select and inspect appropriate hardware and/or lifting equipment.
4. Demonstrate and/or simulate the proper techniques for connecting hitches.
5. Demonstrate the proper use of all hand signals according to *ANSI B30.2* and *B30.5*.
6. Describe or demonstrate pre-lift safety checks.
7. Demonstrate and/or simulate how to lift the load level.
8. Describe and/or demonstrate safety precautions for attaching and disconnecting a load.

Materials and Equipment List

Multimedia projector and screen	Various types of pins, including:
Core Curriculum PowerPoint® Presentation Slides (ISBN 0-13-609080-X)	Screw pin shackle
Desktop or laptop computer	Round pin or straight pin shackle
Whiteboard/chalkboard	Safety shackle
Markers/chalk	Damaged shackles and pins
Pencils and scratch paper	Damaged and undamaged eyebolts
Copies of your local code	Undamaged lifting clamps
Appropriate personal protective equipment	Rusty or corroded lifting clamps
Identification tags for slings	Damaged and undamaged rigging hooks
Copies of <i>Figure 16</i> with labels covered	Trade Terms Quiz*
Damaged slings or photos of damaged slings	Module Examinations**
Anchor shackles and chain shackles	Performance Profile Sheets**

* Located in the back of the Trainee Guide module

**Available only through the Instructor Resource Center using the access code bound with this book.

Safety Considerations

Ensure that the trainees are equipped with appropriate personal protective equipment. Always work in a clean, well-lit, and appropriate work area.

Note

Due to liability issues, trainees under the age of 18 should not perform hoisting maneuvers; therefore, trainees under 18 should not perform the demonstration aspect of Performance Task numbers 4, 7, and 8. The instructor may choose to have trainees simulate the concepts underlying the tasks by using alternative methods.

If you do not have access to rigging hardware or equipment, there are many resources available to you including local contractors, rigging equipment manufacturers, or even your local Training Program.

Additional Resources

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

Bob's Rigging and Crane Handbook, Latest Edition. Bob DeBenedictis. Leawood, KS: Pellow Engineering Services, Inc.

High Performance Slings and Fittings for the New Millennium, 1999 Edition. Dennis St. Germain. Aston, PA: I & I Sling, Inc.

Mobile Crane Manual, 1999. Donald E. Dickie, D. H. Campbell. Toronto, Ontario, Canada: Construction Safety Association of Ontario.

Rigging Manual, 1997. Toronto, Ontario, Canada: Construction Safety Association of Ontario.

Teaching Time for this Module

An outline for use in developing your lesson plan is presented below. Note that each Roman numeral in the outline equates to one session of instruction. Each session has a suggested time period of 2½ hours. This includes 10 minutes at the beginning of each session for administrative tasks and one 10-minute break during the session. Approximately 15 hours are suggested to cover *Basic Rigging*. You will need to adjust the time required for hands-on activity and testing based on your class size and resources. Because laboratories often correspond to Performance Tasks, the proficiency of the trainees may be noted during these exercises for Performance Testing purposes.

Topic	Planned Time
Session I. Introduction and Slings	
A. Introduction	_____
B. Tagging Requirements	_____
C. Synthetic Slings	_____
D. Alloy Steel Chain Slings	_____
E. Wire Rope Slings	_____
F. Laboratory	_____
Have trainees practice selecting and inspecting slings for a lift. This laboratory corresponds to Performance Task 1.	
Session II. Hitches	
A. Vertical Hitch	_____
B. Choker Hitch	_____
C. Basket Hitch	_____
D. Laboratory	_____
Have trainees practice selecting appropriate hitches for loads. This laboratory corresponds to Performance Task 2.	

Session III. Rigging Hardware

- A. Shackles
- B. Eyebolts
- C. Lifting Clamps
- D. Rigging Hooks
- E. Laboratory

Have trainees practice selecting and inspecting appropriate hardware and/or lifting equipment. This laboratory corresponds to Performance Task 3.

Session IV. Sling Stress and Hoists

- A. Sling Stress
- B. Operation of Chain Hoists
- C. Hoist Safety and Maintenance

Session V. Rigging Operations and Practices

- A. Rated Capacity
- B. Sling Attachment
- C. Hardware Attachment
- D. Load Control
- E. Laboratory

Have trainees practice demonstrating proper use of all hand signals and completing pre-lift safety checks. These laboratories correspond to Performance Tasks 5 and 6.

Session VI. Review and Testing

- A. Review
- B. Module Examination
- C. Performance Testing

1. Trainees must score 70 percent or higher to receive recognition from the NCCER.
 2. Record the testing results on Craft Training Report Form 200, and submit the results to the Training Program Sponsor.
1. Trainees must perform each task to the satisfaction of the instructor to receive recognition from NCCER. If applicable, proficiency noted during laboratory exercises can be used to satisfy the Performance Testing requirements.
 2. Record the testing results on Craft Training Report Form 200, and submit the results to the Training Program Sponsor.

Module Overview

This module reviews basic communication skills. Trainees will learn how to interpret information in written and verbal form and how to communicate effectively using written and verbal skills, as well as using electronic communication devices.

Prerequisites

Prior to training with this module, it is recommended that the trainee shall have successfully completed the following: *Core Curriculum: Introductory Craft Skills*, Modules 00101-09 through 00105-09. Module 00106-09 is an elective and is not a requirement for completion of this course.

Objectives

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

1. Interpret information and instructions presented in both verbal and written form.
2. Communicate effectively in on-the-job situations using verbal and written skills.
3. Communicate effectively on the job using electronic communication devices.

Performance Tasks

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

1. Fill out a work-related form supplied by your instructor.
2. Read instructions for how to properly don a safety harness, and orally instruct another person to don the apparatus.
3. Perform a given task after listening to oral instructions.

Materials and Equipment List

Multimedia projector and screen	Work orders and schedules
Core Curriculum PowerPoint® Presentation Slides (ISBN 0-13-609080-X)	Specifications
Desktop or laptop computer	Change orders
Whiteboard/markers	Company memos and newsletters
Copies of your local code	Trade manuals
Fall protection harness	Work-related forms, including:
Instructions for donning a safety harness	Accident reports
Examples of written materials commonly used on the job, including:	Time and materials reports
Safety procedures	Training reports
Construction drawings	Time sheets
Manufacturer's manuals	RFIs
Materials lists	Copies of the Teaching Tips handouts*
Punch lists	Module Examinations**
	Performance Profile Sheets**

* Located in the back of the Trainee Guide module

** Available only through the Instructor Resource Center using the access code bound with this book.

Additional Resources

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

Communication at Work. Tony Alessandra and Phil Hunsaker. New York, NY: Simon and Schuster.

Communicating in the Real World: Developing Communication Skills for Business and the Professions. Terrence G. Wiley and Heide Spruck Wrigley. Englewood Cliffs, NJ: Pearson.

Communication Skills for Business and Professions. Paul R. Timm and James A. Atead. Upper Saddle River, NJ: Pearson.

Elements of Business Writing. Gary Blake and Robert W. Bly. New York, NY: Collier.

Improving Business Communication Skills. Deborah Britt Roebuck. Upper Saddle River, NJ: Pearson.

Teaching Time for this Module

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

Topic	Planned Time
Session I. The Communication Process; Listening and Speaking Skills	
A. The Communication Process	_____
B. Active Listening on the Job	_____
C. Laboratory	_____
Trainees practice following verbal instructions, including those for donning a safety harness. This laboratory corresponds to Performance Tasks 2 and 3.	
D. Speaking on the Job	_____
Session II. Reading and Writing Skills	
A. Reading on the Job	_____
B. Writing on the Job	_____
C. Laboratory	_____
Trainees practice accurately completing work-related forms. This laboratory corresponds to Performance Task 1.	
Session III. Review and Testing	
A. Review	_____
B. Module Examination	_____
1. Trainees must score 70 percent or higher to receive recognition from the NCCER.	
2. Record the testing results on Craft Training Report Form 200, and submit the results to the Training Program Sponsor.	
C. Performance Testing	_____
1. Trainees must perform each task to the satisfaction of the instructor to receive recognition from NCCER. If applicable, proficiency noted during laboratory exercises can be used to satisfy the Performance Testing requirements.	
2. Record the testing results on Craft Training Report Form 200, and submit the results to the Training Program Sponsor.	

Module Overview

This module discusses basic employability skills. Trainees will learn how to effectively use critical thinking, computer, and relationship skills in the construction industry. This module will also include trainee awareness of such workplace issues as sexual harassment, stress, and substance abuse.

Prerequisites

Prior to training with this module, it is recommended that the trainee shall have successfully completed the following: *Core Curriculum: Introductory Craft Skills*, Modules 00101-09 through 00107-09. Module 00106-09 is an elective and is not a requirement for completion of this course.

Objectives

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

1. Explain your role as an employee in the construction industry.
2. Demonstrate critical thinking skills and the ability to solve problems using those skills.
3. Demonstrate knowledge of computer systems and explain common uses for computers in the construction industry.
4. Define effective relationship skills.
5. Recognize workplace issues such as sexual harassment, stress, and substance abuse.

Performance Tasks

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

1. Demonstrate the ability to access, retrieve, and print from the following basic software programs:
 - Email
 - Databases
 - Internet

Materials and Equipment List

Multimedia projector and screen	News articles highlighting workplace incidents,
Core Curriculum PowerPoint® Presentation Slides (ISBN 0-13-609080-X)	including:
Desktop or laptop computer	Harassment
Whiteboard/chalkboard	Stress
Markers/chalk	Drug and alcohol abuse
Pencils and scratch paper	Copies of the Handouts for the Teaching Tips
Copies of your local code	Trade Terms Quiz*
Various mission statements	Module Examinations**
Variety of job listings	Performance Profile Sheets**
Excerpts from federal laws prohibiting job discrimination	

* Located in the back of the Trainee Guide module

** Available only through the Instructor Resource Center using the access code bound with this book.

Additional Resources

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

- Art and Science of Leadership*. Afsaneh Nahavandi. Upper Saddle River, NJ: Prentice Hall.
- Computer Numerical Control*. John S. Stenerson. Upper Saddle River, NJ: Prentice Hall.
- Introduction to Computer Numerical Control*. James Valentino. Upper Saddle River, NJ: Prentice Hall.
- Tools for Teams: Building Effective Teams in the Workplace*. Craig Swenson, ed. Leigh Thompson, Eileen Aranda, Stephen P. Robbins. Boston, MA: Pearson Custom Publishing.
- Your Attitude Is Showing*. Elwood M. Chapman. Upper Saddle River, NJ: Prentice Hall.

Teaching Time for this Module

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

Topic	Planned Time
Session I. Employability Skills, Part One	
A. The Construction Business	_____
B. Critical Thinking Skills	_____
C. Laboratory	_____
Trainees practice solving problems. This laboratory corresponds to Performance Task 2.	
Session II. Employability Skills, Part Two	
A. Computer Skills	_____
B. Laboratory	_____
Trainees practice computer skills. This laboratory corresponds to Performance Task 1.	
C. Relationship Skills	_____
D. Workplace Issues	_____
Session III. Review and Testing	
A. Review	_____
B. Module Examination	_____
1. Trainees must score 70 percent or higher to receive recognition from the NCCER.	
2. Record the testing results on Craft Training Report Form 200, and submit the results to the Training Program Sponsor.	
C. Performance Testing	_____
1. Trainees must perform each task to the satisfaction of the instructor to receive recognition from NCCER. If applicable, proficiency noted during laboratory exercises can be used to satisfy the Performance Testing requirements.	
2. Record the testing results on Craft Training Report Form 200, and submit the results to the Training Program Sponsor.	

Module Overview

This module will introduce the concept of materials handling. Trainees will learn how to properly handle materials and move them around the job site, as well as how to choose the appropriate materials-handling equipment, recognize hazards, and follow materials-handling safety procedures.

Prerequisites

Prior to training with this module, it is recommended that the trainee shall have successfully completed the following: *Core Curriculum: Introductory Craft Skills*, Modules 00101-09 through 00108-09. Module 00106-09 is an elective and is not a requirement for completion of this course.

Objectives

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

1. Define a load.
2. Establish a pre-task plan prior to moving a load.
3. Use proper materials-handling techniques.
4. Choose appropriate materials-handling equipment for the task.
5. Recognize hazards and follow safety procedures required for materials handling.

Performance Tasks

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

1. Demonstrate proper materials-handling techniques.

Materials and Equipment List

Multimedia projector and screen	Material cart
Core Curriculum PowerPoint® Presentation Slides (ISBN 0-13-609080-X)	Hand truck
Desktop or laptop computer	Roller skids
Copies of your local code	Wheelbarrow
Appropriate personal protective equipment	Pipe mule
Materials to be moved, including:	Jack
Pipes	Pallet jack
Pallets	Powered wheelbarrow
Stacks of boxes	Concrete mule
Sheets of plywood	Trade Terms Quiz*
Various objects to be lifted	Module Examinations**
	Performance Profile Sheets**

* Located in the back of the Trainee Guide module

**Available only through the Instructor Resource Center using the access code bound with this book.

Safety Considerations

Ensure that the trainees are equipped with appropriate personal protective equipment. Always work in a clean, well-lit, appropriate work area.

Additional Resources

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

Make More Money with Construction Machine Control—A How To-Manual for Site-Prep Contractors. First Edition. 2008. TrenchSafety. Little Rock, AK: TrenchSafety.

Teaching Time for this Module

An outline for use in developing your lesson plan is presented below. Note that each Roman numeral in the outline equates to one session of instruction. Each session has a suggested time period of 2½ hours. This includes 10 minutes at the beginning of each session for administrative tasks and one 10-minute break during the session. Approximately 5 hours are suggested to cover *Introduction to Materials Handling*. You will need to adjust the time required for hands-on activity and testing based on your class size and resources. Because laboratories often correspond to Performance Tasks, the proficiency of the trainees may be noted during these exercises for Performance Testing purposes.

Topic	Planned Time
Session I. Materials-Handling Basics, Safety, and Equipment	
A. Materials-Handling Basics	_____
B. Laboratory Trainees practice proper lifting procedures. This laboratory corresponds to Performance Task 1.	_____
C. Materials-Handling Safety	_____
D. Non-Motorized and Motorized Equipment	_____
E. Laboratory Trainees practice using non-motorized and motorized materials-handling equipment. This laboratory corresponds to Performance Task 1.	_____
Session II. Hand Signals; Review and Testing	
A. Hand Signals	_____
B. Review	_____
C. Module Examination	_____
1. Trainees must score 70 percent or higher to receive recognition from the NCCER.	
2. Record the testing results on Craft Training Report Form 200, and submit the results to the Training Program Sponsor.	
D. Performance Testing	_____
1. Trainees must perform each task to the satisfaction of the instructor to receive recognition from NCCER. If applicable, proficiency noted during laboratory exercises can be used to satisfy the Performance Testing requirements.	
2. Record the testing results on Craft Training Report Form 200, and submit the results to the Training Program Sponsor.	

MODULE OVERVIEW

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

PREREQUISITES

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

OBJECTIVES

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

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

PERFORMANCE TASKS

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

MATERIALS AND EQUIPMENT LIST

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

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

TEACHING TIME FOR THIS MODULE

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

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

- 5. What You Should Expect from a Training Program _____
- 6. What You Should Expect from the Apprenticeship Committee _____
- E. Human Relations _____
 - 1. Making Human Relations Work _____
 - 2. Human Relations and Productivity _____
 - 3. Attitude _____
 - 4. Maintaining a Positive Attitude _____
- F. Employer and Employee Safety Obligations _____
- G. Review _____
- H. Module Examination _____
 - 1. Trainees must score 70 percent or higher to receive recognition from NCCER.
 - 2. Record the testing results on Craft Training Report Form 200, and submit the results to the Training Program Sponsor.

MODULE OVERVIEW

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

PREREQUISITES

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

OBJECTIVES

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

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

PERFORMANCE TASKS

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

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

MATERIALS AND EQUIPMENT LIST

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

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

SAFETY CONSIDERATIONS

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

ADDITIONAL RESOURCES

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

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

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

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

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

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

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

TEACHING TIME FOR THIS MODULE

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

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

- B. Engineered Wood Products
 - 1. Laminated Veneer Lumber (LVL) _____
 - 2. Parallel Strand Lumber (PSL) _____
 - 3. Laminated Strand Lumber (LSL) _____
 - 4. Wood I-Beams _____
 - 5. Glue-Laminated Lumber (Glulam) _____

C. Pressure-Treated Lumber _____

D. Calculating Lumber Quantities _____

E. Laboratory _____

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

F. Concrete Block Construction _____

G. Commercial Construction Methods _____

- 1. Floors _____
- 2. Exterior Walls _____
- 3. Interior Walls and Partitions _____
- 4. Metal Framing Materials _____

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

A. Nails _____

B. Staples _____

C. Screws _____

- 1. Wood Screws _____
- 2. Sheet Metal Screws _____
- 3. Machine Screws _____
- 4. Lag Screws and Shields _____
- 5. Concrete/Masonry Screws _____
- 6. Deck Screws _____
- 7. Drywall Screws _____
- 8. Drive Screws _____
- 9. Hammer-Driven Pins and Studs _____

D. Bolts _____

- 1. Stove Bolts _____
- 2. Machine Bolts _____
- 3. Carriage Bolts _____

E. Mechanical Anchors _____

- 1. Anchor Bolts _____
- 2. One-Step Anchors _____
- 3. Bolt Anchors _____
- 4. Screw Anchors _____
- 5. Self-Drilling Anchors _____
- 6. Guidelines for Drilling Anchor Holes in Hardened Concrete or Masonry _____
- 7. Hollow-Wall Anchors _____

F. Epoxy Anchoring Systems

G. Adhesives

1. Glues

2. Construction Adhesives

3. Mastics

4. Shelf Life

H. Laboratory

Have the trainees identify and state the use of various building materials.

This laboratory corresponds to Performance Task 2.

I. Review

J. Module Examination

1. Trainees must score 70 percent or higher to receive recognition from NCCER.

2. Record the testing results on Craft Training Report Form 200, and submit the results to the Training Program Sponsor.

K. Performance Testing

1. Trainees must perform each task to the satisfaction of the instructor to receive recognition from NCCER. If applicable, proficiency noted during laboratory exercises can be used to satisfy the Performance Testing requirements.

2. Record the testing results on Craft Training Report Form 200, and submit the results to the Training Program Sponsor.

MODULE OVERVIEW

This module introduces trainees to the principles, equipment, and methods used to perform the site layout tasks of distance measurement and differential leveling. It also covers the site layout responsibilities of individuals on site, understanding and using site plan drawings, and methods of job site communications.

PREREQUISITES

Prior to training with this module, it is recommended that the trainee shall have successfully completed *Core Curriculum; Carpentry Level One; Carpentry Level Two; and Carpentry Level Three.*

OBJECTIVES

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

1. Describe the major responsibilities of the carpenter relative to site layout.
2. Convert measurements stated in feet and inches to equivalent measurements stated in decimal feet, and vice versa.
3. Use and properly maintain tools and equipment associated with taping.
4. Use manual or electronic equipment and procedures to make distant measurements and perform site layout tasks.
5. Determine approximate distances by pacing.
6. Recognize, use, and properly care for tools and equipment associated with differential leveling.
7. Use a builder's level and differential leveling procedures to determine site and building elevations.
8. Record site layout data and information in field notes using accepted practices.
9. Check and/or establish 90-degree angles using the 3-4-5 rule.

PERFORMANCE TASKS

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

1. Interpret a construction site/plot drawing and relate the man-made and topographical features and other project information to the layout and topography on the actual site.
2. Convert measurements given in feet and inches to equivalent decimal measurements stated in feet, tenths, and hundredths, and vice versa.
3. Properly use taping equipment and procedures to make distance and site layout measurements.
4. Determine the approximate distances by pacing.
5. Set up, adjust, and field test leveling instruments.
6. Use a builder's level, leveling rods, and differential leveling procedures to determine site and building elevations.
7. Record differential leveling data in field notes in accordance with accepted procedures.
8. Use differential leveling and distance measurement procedures to transfer elevations up a structure.
9. Check and/or establish 90-degree angles using the 3-4-5 rule.

MATERIALS AND EQUIPMENT LIST

Overhead projector and screen
Transparencies
Blank acetate sheets
Transparency pens
Whiteboard/chalkboard

Markers/chalk
Pencils and scratch paper
Appropriate personal protective equipment
Site plot plans for selected construction sites
Assortment of hubs, stakes, and laths

continued

Assortment of different colored flagging tape
 Permanent markers for marking stakes
 Field notebooks for recording data
 2" × 4" or 2" × 6" ledger boards
 2" × 4" batter boards
 Nylon string
 Calculator
 100 foot steel tape
 Range poles
 Plumb bobs/gammon reels
 Hand sight levels

Tension spring
 Chaining pins
 Builder's level
 Transit level
 Tripods
 Laser level
 Assortment of leveling rods and accessories
 Quick Quizzes*
 Module Examinations**
 Performance Profile Sheets**

* Located in the back of this module

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

SAFETY CONSIDERATIONS

Ensure that the trainees are equipped with appropriate personal protective equipment and know how to use it properly. This module requires trainees to use differential leveling equipment. Ensure that all trainees are briefed on field safety procedures. This module may require that the trainees visit job sites. Ensure that trainees are briefed on site safety policies prior to any site visits. This module may require trainees use laser equipment. Ensure all trainees are briefed on laser safety before using laser equipment.

ADDITIONAL RESOURCES

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

Construction Surveying and Layout: A Step-by-Step Engineering Methods Manual, Wesley G. Crawford. West Lafayette, IN: Creative Construction Publishing, 1995.

Surveying, Jack McCormac. New York, NY: John Wiley & Sons, 1999.

TEACHING TIME FOR THIS MODULE

An outline for use in developing your lesson plan is presented below. Note that each Roman numeral in the outline equates to one session of instruction. Each session has a suggested time period of 2½ hours. This includes 10 minutes at the beginning of each session for administrative tasks and one 10-minute break during the session. Approximately 22½ hours are suggested to cover *Site Layout I: Distance Measurement and Leveling*. You will need to adjust the time required for hands-on activity and testing based on your class size and resources. Because laboratories often correspond to Performance Tasks, the proficiency of the trainees may be noted during these exercises for Performance Testing purposes.

Topic	Planned Time
Session I. Introduction to Site Layout	
A. Introduction	_____
B. Building Plan Drawings	_____
C. Characteristics of Contour Lines	_____
D. Laboratory	_____
Trainees practice interpreting a site/plot drawing. This laboratory corresponds to Performance Task 1.	
Session II. Site Control Points and Hand Signals	
A. Site Control Points	_____
B. Communicating with Hand Signals	_____

Sessions III and IV. Distance Measurements

- A. Distance Measurement Tools and Equipment _____
- B. Measuring Distance by Taping _____
- C. Laboratory _____
Trainees practice making measurements by taping. This laboratory corresponds to Performance Task 3.
- D. Converting Distances _____
- E. Laboratory _____
Trainees practice converting measurements. This laboratory corresponds to Performance Task 2.
- F. Estimating Distances by Pacing _____
- G. Laboratory _____
Trainees practice estimating distances by pacing. This laboratory corresponds to Performance Task 4.

Session V. Differential Leveling Equipment

- A. Differential Leveling Tools and Equipment _____
- B. Laboratory _____
Trainees practice setting up, adjusting, and field testing a leveling instrument. This laboratory corresponds to Performance Task 5.

Sessions VI and VII. Basics of Differential Leveling

- A. Basics of Differential Leveling _____
- B. Laboratory _____
Trainees practice using leveling equipment to determine site elevations. This laboratory corresponds to Performance Task 6.
- C. Field Notes _____
- D. Laboratory _____
Trainees practice recording differential leveling data in field notes. This laboratory corresponds to Performance Task 7.

Session VIII. Leveling Applications

- A. Leveling Applications _____
- B. Laboratory _____
Trainees practice using leveling procedures to transfer elevations. This laboratory corresponds to Performance Task 8.
- C. Batter Boards _____
- D. 3-4-5 Rule _____
- E. Laboratory _____
Trainees practice checking or establishing 90-degree angles using the 3-4-5 rule. This laboratory corresponds to Performance Task 9.

Session IX. Review and Testing

- A. Review _____
- B. Module Examination _____
 - 1. Trainees must score 70% or higher to receive recognition from NCCER.
 - 2. Record the testing results on Craft Training Report Form 200, and submit the results to the Training Program Sponsor.
- C. Performance Testing _____
 - 1. Trainees must perform each task to the satisfaction of the instructor to receive recognition from NCCER. If applicable, proficiency noted during laboratory exercises can be used to satisfy the Performance Testing requirements.
 - 2. Record the testing results on Craft Training Report Form 200, and submit the results to the Training Program Sponsor.

MODULE OVERVIEW

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

PREREQUISITES

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

OBJECTIVES

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

1. Identify the properties of cement.
2. Describe the composition of concrete.
3. Perform volume estimates for concrete quantity requirements.
4. Identify types of concrete reinforcement materials and describe their uses.
5. Identify various types of footings and explain their uses.
6. Identify the parts of various types of forms.
7. Explain the safety procedures associated with the construction and use of concrete forms.
8. Erect, plumb, and brace a simple concrete form with reinforcement.

PERFORMANCE TASKS

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

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

MATERIALS AND EQUIPMENT LIST

Transparencies	Various mechanical splices for reinforcement steel
Markers/chalk	Various sizes, types, and grades of reinforcement materials
Blank acetate sheets	Samples of various types and sizes of wire fabric
Transparency pens	Exterior plywood or plyform
Pencils and scratch paper	Steel tape or rule
Overhead projector and screen	Basic carpenter's toolbox
Whiteboard/chalkboard	Level
Appropriate personal protective equipment	Plumb bob
Hand calculator	String line
Concrete calculator	Duplex nails
Copies of a concrete table	Plan for simple form
Form boards, stakes, braces, ties, and spreaders	Circular saw and extension cord
16-gauge tying wire	Copies of Worksheet 1*
Samples of various aggregates	Module Examinations**
Samples of concrete mix	Performance Profile Sheets**
Various bar supports and accessories	

* Packaged with this Annotated Instructor's Guide.

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SAFETY CONSIDERATIONS

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

ADDITIONAL RESOURCES

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

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

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

TEACHING TIME FOR THIS MODULE

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

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

Session III. Concrete Forms

A. Concrete Forms

- 1. Form Safety
- 2. Footings
- 3. Wall Forms
- 4. Edge Forms
- 5. Removing Forms

B. Laboratory

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

Session IV. Review; Module Examination and Performance Testing

A. Review

B. Module Examination

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

C. Performance Testing

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

MODULE OVERVIEW

This module covers basic site layout tools and methods; layout and construction of deep and shallow foundations; layout and forming of slabs-on-grade; and forms used for curbing and paving.

PREREQUISITES

Please refer to the Course Map in the Trainee Module. Prior to training with this module, it is recommended that the trainee shall have successfully completed the following: *Core Curriculum*; *Carpentry Level One*; *Carpentry Level Two*; and *Carpentry Level Three*, Modules 27301-07 through 27306-07.

OBJECTIVES

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

1. Establish elevations.
2. Identify various types of footings and foundations.
3. Select the appropriate footing for a foundation.
4. Lay out and construct a selected footing and foundation using an established gridline.
5. Install templates, keyways, and embedments.
6. Form and strip pier foundation forms and prepare for resetting at another location.
7. Identify the different classes of slabs-on-grade.
8. Identify edge forms and explain their purpose.
9. Construct and disassemble edge forms.
10. Install vapor barrier, reinforcement, and control joints.
11. Establish finish grade and fill requirements.

PERFORMANCE TASKS

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

1. Establish elevations.
2. Lay out and construct a selected footing and foundation using an established gridline.
3. Install templates, keyways, and embedments.
4. Form and strip pier foundation forms and prepare for resetting at another location.
5. Construct and disassemble edge forms.
6. Install vapor barrier, reinforcement, and control joints.

MATERIALS AND EQUIPMENT LIST

Overhead projector and screen	Batter boards
Transparencies	Hub stakes
Blank acetate sheets	Marker stakes
Transparency pens	Color-coded stakes or markers
Whiteboard/chalkboard	Markers/chalk
Plumb bob and line	Pencils and scratch paper
Leveling rods and accessories	Appropriate personal protective equipment
Direct elevation rod	Steel tape (100')
Project plans	Gammon reel
Automatic leveling instruments	Field notebook
Builder's level	Transit level
Tripod	2' or 4' level
Laser level	String line

Samples of rebar and WWR
 Pier foundation forms
 Manufacturer’s literature on wall forms
 Manufacturer’s literature on leave-in-place forms

Edge forms
 Copies of Quick Quiz*
 Module Examinations**
 Performance Profile Sheet**

*Located in the back of this module.

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

SAFETY CONSIDERATIONS

Ensure that the trainees are equipped with appropriate personal protective equipment and know how to use it properly. Emphasize basic site safety. This module may require trainees to visit job sites. Make sure that all trainees are briefed on site safety procedures. This module requires that trainees work with concrete forms.

ADDITIONAL RESOURCES

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

American Concrete Institute, www.aci-int.org

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

The Concrete Network, www.concretenetwork.com

TEACHING TIME FOR THIS MODULE

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

Topic	Planned Time
Session I. Sitework	
A. Introduction	_____
B. Sitework	_____
C. Establishing Formwork Locations and Elevations	_____
D. Laboratory	_____
Trainees practice establishing elevations. This laboratory corresponds to Performance Task 1.	
Sessions II and III. Job Site Layout	
A. Establishing Building Location	_____
B. Batter Boards	_____
C. Excavation and Trenching	_____
D. Laying Out Forms	_____
E. Laboratory	_____
Trainees practice laying out and constructing a selected footing and foundation using an established gridline. This laboratory corresponds to Performance Task 2.	
F. Templates	_____
G. Laboratory	_____
Trainees practice installing templates, keyways, and embedments. This laboratory corresponds to Performance Task 3.	

MODULE OVERVIEW

This module describes and defines reinforcement materials used in concrete, such as reinforcement bars, bar supports, and welded-wire fabric. It explains the selection and uses of different types of reinforcing materials. It also describes general requirements for cutting, bending, splicing, and tying reinforcing steel, as well as placement of the steel in various types of footings, columns, walls, and slabs.

PREREQUISITES

Please refer to the Course Map in the Trainee Module. Prior to training with this module, it is recommended that the trainee shall have successfully completed the following: *Core Curriculum*; *Carpentry Level One*; *Carpentry Level Two*; and *Carpentry Level Three*, Modules 27301-07 through 27303-07.

OBJECTIVES

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

1. Describe the applications of reinforcing bars, the uses of reinforced structural concrete, and the basic processes involved in placing reinforcing bars.
2. Recognize and identify the bar bends standardized by the American Concrete Institute (ACI).
3. Read and interpret bar lists and describe the information found on a bar list.
4. List the types of ties used in securing reinforcing bars.
5. State the tolerances allowed in the fabrication of reinforcing bars.
6. Demonstrate the proper use of common ties for reinforcing bars.
7. Describe methods by which reinforcing bars may be cut and bent in the field.
8. Use the tools and equipment needed for installing reinforcing bars.
9. Safely use selected tools and equipment to cut, bend, and install reinforcing materials.
10. Explain the necessity of concrete cover in placing reinforcing bars.
11. Explain and demonstrate how to place bars in walls, columns, beams, girders, joists, and slabs.
12. Identify lapped splices.

PERFORMANCE TASKS

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

1. Use appropriate tools to cut and bend reinforcing bars.
2. Demonstrate five types of ties for reinforcing bars.
3. Demonstrate proper lap splicing of reinforcing bars using wire ties.
4. Demonstrate the proper placement, spacing, tying, and support for reinforcing bars.

MATERIALS AND EQUIPMENT LIST

Overhead projector and screen	Bar lists
Transparencies	Hooks and spirals
Blank acetate sheets	Steel wire bar supports
Transparency pens	Precast concrete bar supports
Whiteboard/chalkboard	Plastic bar supports
Markers/chalk	Standees
Pencils and scratch paper	Welded-wire fabric
Appropriate personal protective equipment	Deformed welded-wire fabric
Pieces of marked rebar	ACI standards for concrete coverage
Copies of ASTM standards	Bolt cutters
Bent bars	Electric shears

Hickey bar and jigs
Tie wire
Pliers
Spliced rebar

Mechanically spliced rebar
Copies of Quick Quiz*
Module Examinations**
Performance Profile Sheet**

*Located in the back of this module.

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

SAFETY CONSIDERATIONS

Ensure that the trainees are equipped with appropriate personal protective equipment and know how to use it properly. Emphasize basic site safety. This module may require trainees to visit job sites. Make sure that all trainees are briefed on site safety procedures. This module requires that trainees cut and work with rebar. Ensure that all trainees are properly briefed before working with rebar.

ADDITIONAL RESOURCES

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

Placing Reinforcing Bars, 2005. Concrete Reinforcing Steel Institute (CRI).

Manual of Standard Practice, Latest Edition. Concrete Reinforcing Steel Institute (CRI).

TEACHING TIME FOR THIS MODULE

An outline for use in developing your lesson plan is presented below. Note that each Roman numeral in the outline equates to one session of instruction. Each session has a suggested time period of 2½ hours. This includes 10 minutes at the beginning of each session for administrative tasks and one 10-minute break during the session. Approximately 15 hours are suggested to cover *Reinforcing Concrete*. You will need to adjust the time required for hands-on activity and testing based on your class size and resources. Because laboratories often correspond to Performance Tasks, the proficiency of the trainees may be noted during these exercises for Performance Testing purposes.

Topic	Planned Time
Session I. Overview and Identification of Reinforcing Bars	
A. Introduction	_____
B. Overview of Reinforced Concrete	_____
C. Identification of Reinforcing Bars	_____
D. Fabrication	_____
E. Bar Supports	_____
F. Welded-Wire Fabric	_____
Session II. Safety and Cutting and Bending Reinforcing Bar	
A. General Safety Precautions	_____
B. Cutting	_____
C. Bending	_____
D. Laboratory	_____
Trainees practice cutting and bending reinforcing bar. This laboratory corresponds to Performance Task 1.	

Sessions III and IV. Tying and Splicing Reinforcing Bar

A. Tying and Splicing Reinforcing Bar

B. Tying Tips

C. Laboratory

Trainees practice various types of ties. This laboratory corresponds to Performance Task 2.

D. Splicing Reinforcing Bar

E. Laboratory

Trainees practice proper lap splicing of reinforcing bars. This laboratory corresponds to Performance Task 3.

Session V. Placing Reinforcing Steel and Post-Tensioned Concrete

A. Placing Bars in Footings

B. Column Dowels

C. Placing Bars in Walls

D. Wall Mat Supports

E. Placing Bars in Columns

F. Placing Bars in Beams and Girders

G. Laboratory

Trainees practice placing, spacing, tying, and supporting reinforcing bar. This laboratory corresponds to Performance Task 4.

H. Post-Tensioned Concrete

Session VI. Review and Testing

A. Module Review

B. Module Examination

1. Trainees must score 70% or higher to receive recognition from NCCER.

2. Record the testing results on Craft Training Report Form 200, and submit the results to the Training Program Sponsor.

C. Performance Testing

1. Trainees must perform each task to the satisfaction of the instructor to receive recognition from NCCER. If applicable, proficiency noted during laboratory exercises can be used to satisfy the Performance Testing requirements.

2. Record the testing results on Craft Training Report Form 200, and submit the results to the Training Program Sponsor.

MODULE OVERVIEW

This module covers the tools, equipment, and procedures for handling, placing, and finishing concrete. It also covers the joints made in concrete structures, the use of joint sealants, and form removal procedures. It emphasizes safety procedures for handling, placing, and finishing concrete.

PREREQUISITES

Please refer to the Course Map in the Trainee Module. Prior to training with this module, it is recommended that the trainee shall have successfully completed the following: *Core Curriculum; Carpentry Level One; Carpentry Level Two; and Carpentry Level Three, Modules 27301-07 through 27304-07.*

OBJECTIVES

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

1. Recognize the various equipment used to transport and place concrete.
2. Describe the factors that contribute to the quality of concrete placement.
3. Demonstrate the correct methods for placing and consolidating concrete into forms.
4. Demonstrate how to use a screed to strike off and level concrete to the proper grade in a form.
5. Demonstrate how to use tools for placing, floating, and finishing concrete.
6. Determine when conditions permit the concrete finishing operation to start.
7. Name the factors that affect the curing of concrete and describe the methods used to achieve proper curing.
8. Properly care for and safely use hand and power tools used when working with concrete.

PERFORMANCE TASKS

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

1. Properly handle, place, and consolidate concrete in selected concrete forms.
2. Use a screed to strike off and level a concrete surface.
3. Use a bullfloat and/or darby to level and smooth a concrete surface.
4. Use an edger to form a radius at the edges of a concrete pad, slab, etc.
5. Use a jointer to make control joints in a concrete surface.
6. Use a hand float and finishing trowel to level high spots, remove imperfections, and smooth a concrete surface.

MATERIALS AND EQUIPMENT LIST

Overhead projector and screen
Transparencies
Blank acetate sheets
Transparency pens
Whiteboard/chalkboard
Markers/chalk
Pencils and scratch paper
Appropriate personal protective equipment
Equipment for moving, placing, and consolidating concrete, including:
Moveable chutes (such as used with mixer trucks)
Drop chutes
Elephant trunk
Wheelbarrow
Power buggy and/or carts
Crane and bucket

Belt conveyor
Concrete pump
Pneumatic gun
Internal vibrator
Rollerbug tamper
Equipment for screeding, leveling, and finishing concrete, including:
Manual/power screeds
Knee boards
Darby floats/bullfloats
Pointed trowels
Edgers
Jointers (groovers)
Power saws
Hand floats
Hand trowels
Finishing machines

Brooms
 Assortment of combination tools
 Pointing and margin trowels
 Cement hammers
 Carborundum rubbing stones
 Sprayers
 Power grinders
 Properly-constructed concrete formworks

Sand
 Boxes to contain wet sand
 Copies of Quick Quiz*
 Module Examinations**
 Performance Profile Sheet**

*Located in the back of this module.

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SAFETY CONSIDERATIONS

Ensure that the trainees are equipped with appropriate personal protective equipment and know how to use it properly. Concrete dust and its components are caustic; brief trainees on the hazards posed by dry and wet concrete and respiratory and skin protection needed. This module may require that the trainees visit job sites. Ensure that trainees are briefed on site safety policies prior to any site visits.

ADDITIONAL RESOURCES

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

American Concrete Institute. www.concrete.org
Cement Association of Canada. www.cement.ca
Portland Cement Association. www.cement.org

TEACHING TIME FOR THIS MODULE

An outline for use in developing your lesson plan is presented below. Note that each Roman numeral in the outline equates to one session of instruction. Each session has a suggested time period of 2½ hours. This includes 10 minutes at the beginning of each session for administrative tasks and one 10-minute break during the session. Approximately 22½ hours are suggested to cover *Handling and Placing Concrete*. You will need to adjust the time required for hands-on activity and testing based on your class size and resources. Because laboratories often correspond to Performance Tasks, the proficiency of the trainees may be noted during these exercises for Performance Testing purposes.

Topic	Planned Time
Session I. Overview and Joints in Concrete Structures	
A. Introduction	_____
B. Joints in Concrete Structures	_____
Session II. Moving and Handling Concrete	
A. Off-Site Equipment for Mixing and Conveying Concrete	_____
B. On-Site Equipment for Mixing and Conveying Concrete	_____
Sessions III and IV. Placing and Consolidating Concrete in Forms	
A. Placing Concrete in Forms	_____
B. Consolidating Concrete	_____
C. Laboratory	_____
Trainees practice placing, handling, and consolidating concrete in selected concrete forms. This laboratory corresponds to Performance Task 1.	

Session V. Finishing I

A. Screeding

B. Laboratory

Trainees practice using a screed to strike off and level a concrete surface. This laboratory corresponds to Performance Task 2.

C. Leveling Concrete

D. Laboratory

Trainees practice using a bullfloat and/or darby to level and smooth a concrete surface. This laboratory corresponds to Performance Task 3.

Session VI. Finishing II

A. Edging

B. Laboratory

Trainees practice using an edger to form a radius at the edges of a concrete pad or slab. This laboratory corresponds to Performance Task 4.

C. Jointing

D. Laboratory

Trainees practice using a jointer to make control joints in a concrete surface. This laboratory corresponds to Performance Task 5.

E. Floating and Troweling

F. Laboratory

Trainees practice using a hand float and finishing trowel to level high spots, remove imperfections, and smooth a concrete surface. This laboratory corresponds to Performance Task 6.

Session VII.

A. Curing Concrete

B. Joint Sealants

C. Removing Forms

Session VIII. Tools and Safety

A. Other Hand and Power Tools Used When Working with Concrete

B. Safety Precautions

Session IX. Module Testing

A. Module Review

B. Module Examination

1. Trainees must score 70% or higher to receive recognition from NCCER.

2. Record the testing results on Craft Training Report Form 200, and submit the results to the Training Program Sponsor.

C. Performance Testing

1. Trainees must perform each task to the satisfaction of the instructor to receive recognition from NCCER. If applicable, proficiency noted during laboratory exercises can be used to satisfy the Performance Testing requirements.

2. Record the testing results on Craft Training Report Form 200, and submit the results to the Training Program Sponsor.