

Lesson Plans for Module 28101-13

INTRODUCTION TO MASONRY

Module One (28101-13) provides information about basic masonry materials, tools, techniques, and safety precautions; explains how to mix mortar by hand and lay masonry units; and describes the skills, attitudes, and abilities of successful masons.

Objectives

Learning Objective 1

- Describe modern masonry materials and techniques.
 - a. Explain how concrete masonry units (CMUs or block) are used in construction.
 - b. Explain how clay masonry units (brick) are used in construction.
 - c. Explain how stone is used in construction.
 - d. Describe how mortar and grout are used in masonry construction.
 - e. Describe how wall structures are created using masonry units.

Learning Objective 2

- Recognize the basic safety precautions when working with masonry materials.
 - a. List basic safety practices.
 - b. Describe personal protective equipment used in masonry.

Learning Objective 3

- Explain how to mix mortar and lay masonry units.
 - a. Explain how to mix mortar.
 - b. Describe how to lay masonry units.

Learning Objective 4

- Describe the skills, attitudes, and abilities needed to be a successful mason.
 - a. Identify the skills of a successful mason.
 - b. Identify the attitudes of a successful mason.
 - c. Identify the abilities of a successful mason.
 - d. Explore career ladders and advancement possibilities in masonry.

Learning Objective 5

- Summarize how to be connected to the industry through an organization like SkillsUSA.
 - a. Understand the program, curriculum, and SkillsUSA championships.
 - b. Understand SkillsUSA membership.
 - c. Understand the National Program of Work Standards.

Performance Tasks

Performance Task 1 (Learning Objective 2)

- Put on eye protection and respiratory protection.

Performance Task 2 (Learning Objective 3)

- Properly mix mortar by hand.

Performance Task 3 (Learning Objective 3)

- Properly spread mortar using a trowel.

Teaching Time: 12.5 hours

(Five 2.5-hour classroom sessions)

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

Before You Begin

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

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



Safety Considerations

This module requires that trainees demonstrate the ability to properly mix mortar by hand and lay masonry units. Safety is paramount in the masonry trade and safe habits and practices must be emphasized whenever possible. Performance Tasks must be completed under your supervision. Each trainee must use required PPE and follow safe tool practices and procedures.

Classroom Equipment and Materials

Whiteboard/chalkboard
Markers/chalk
Pencils and paper
Masonry Level One PowerPoint®
Presentation Slides
LCD projector and screen
Computer
Copies of the Module Examination and Performance Profile Sheets
Vendor-supplied videos/DVDs showing mortar mixing and spreading, and laying masonry units (optional)
TV/DVD player

Equipment and Materials for Laboratories and Performance Testing

A variety of commonly used sizes, shapes, and weights of concrete masonry units
A variety of concrete brick, a concrete pre-faced and precast unit, a concrete manhole and catch basin unit, insulated block, and a variety of architectural blocks
A variety of standard brick, hollow masonry units, and architectural units
Photos of buildings constructed of different types of stone and manufactured stone veneer
Copies of *CFR 1926.20*, *CFR 1926.21*, and *CFR 1926.32*
Several types of eye and face protection
Several types of respiratory protection
Gloves
Hard hats
Eye protection
Hearing protection
Safety shoes
Respiratory protection
Basic brick trowels
Sand
Cement, lime, or masonry cement and recipe
A supply of water
Mortar boxes
Shovels
Wheelbarrows
Mortarboards or mortar pans
Water hose with spray nozzle
Stiff brushes
2 × 4 boards
Cement blocks
Brick
Mason's level

Additional Resources and References

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

Bricklaying: Brick and Block Masonry. Reston, VA: Brick Industry Association.

Building Block Walls: A Basic Guide for Students in Masonry Vocational Training. 1988. Herndon, VA: National Concrete Masonry Association.

Concrete Masonry Handbook. Skokie, IL: Portland Cement Association.

Concrete Masonry Shapes and Sizes Manual CD-ROM. Herndon, VA: National Concrete Masonry Association.

Hot & Cold Weather Masonry Construction Manual. 1999. Herndon, VA: National Concrete Masonry Association.

Installation Guide for Adhered Concrete Masonry Veneer, Third Edition. 2012. Washington, DC: Masonry Veneer Manufacturers Association.

SkillsUSA Professional Development Resources. <http://www.skillsusa.org/store/curricula.html>

There are a number of online resources available for trainees who would like more information on materials, tools, and techniques used by masons, as well as basic safety precautions and the skills, attitudes, and abilities exhibited by successful masons. A search for additional information may be assigned as homework to interested trainees.

INTRODUCTION TO MASONRY

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

SESSION ONE

Session One introduces modern masonry materials.

1. Show Session One PowerPoint® presentation slides.
2. Provide an overview of different types of concrete masonry units, clay masonry units, and stone.
3. Describe cement-lime mortars, masonry cement, preblended mortars, and grout, as well as their properties, and uses.
4. Discuss the advantages of masonry walls.

SESSION TWO

Session Two introduces basic safety precautions and personal protective equipment used in masonry.

1. Show Session Two PowerPoint® presentation slides.
2. Explain basic safety precautions and PPE needed when working with masonry materials.
3. Set up stations with various types of eye and respiratory protection. Explain the features of each type of eye and respiratory protection and have trainees put on each one. Note the proficiency of each trainee. This laboratory corresponds to Performance Task 1.

SESSION THREE

Session Three introduces the basic elements of bricklaying.

1. Show Session Three PowerPoint® presentation slides.
2. Explain the personal relation between a mason and a masonry unit as being a craft. Describe tools and equipment used to mix and spread mortar, and lay brick.
3. Set up workstations with materials needed to mix mortar by hand. Under your supervision, have trainees mix mortar. Make sure the trainees wear appropriate personal protective equipment. Note the proficiency of each trainee. This laboratory corresponds with Performance Task 2.
4. Under your supervision, have trainees lay masonry units. Make sure the trainees wear appropriate personal protective equipment. Note the proficiency of each trainee. This laboratory corresponds with Performance Task 3.



INTRODUCTION TO MASONRY

SESSION FOUR

Session Four introduces trainees to the skills, attitudes, and abilities of a successful mason.

1. Show Session Four PowerPoint® presentation slides.
2. Describe the skills that a successful mason needs.
3. Have trainees discuss the features of a good attitude, including dependability, responsibility, adaptability, pride, and ethics. Also have trainees discuss the personal abilities that a mason must have.
4. Provide a brief overview of the stages of skill recognized by masons' organizations.
5. Explain the SkillsUSA program, curriculum, and championships. Define the National Program of Work Standards and how they assist in carrying out the plan of action for a SkillsUSA chapter.

SESSION FIVE

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

1. Have trainees complete the Module Examination. Any outstanding performance testing must be completed during this session.
2. Record the testing results on Training Report Form 200, and submit the report to your Training Program Sponsor.

Lesson Plans for Module 28106-13

MASONRY SAFETY

Module Two (28106-13) describes how to identify the common causes of accidents and the hazards associated with masonry tools, equipment, mortar, and concrete. This module also provides information about how to prevent accidents and hazards on the job site by using personal protective equipment, working safely from elevated surfaces, properly using masonry tools and equipment, and handling masonry materials safely.

Objectives

Learning Objective 1

- Understand the importance of safety on a job site.
 - a. Identify the costs of job accidents.
 - b. Identify the causes of accidents.
 - c. Recognize hazards.
 - d. Demonstrate proper housekeeping techniques.
 - e. Observe mortar and concrete safety.
 - f. Observe flammable liquid safety.

Learning Objective 2

- Recognize the proper use of personal protective equipment in masonry.
 - a. Describe how to use protective lenses and face shields.
 - b. Describe how to use hearing protection.
 - c. Describe how to use gloves.
 - d. Describe how to use respirators.

Learning Objective 3

- Work safely from elevated surfaces.
 - a. Explain fall protection procedures.
 - b. Describe personal fall arrest systems.
 - c. List basic scaffold safety guidelines.
 - d. Explain how to protect against falling objects.

Learning Objective 4

- Use tools and equipment safely.
 - a. Describe how to use hand tools safely.
 - b. Describe how to use saws safely.
 - c. Describe how to use mixers safely.
 - d. Describe how to use grinders safely.
 - e. Describe how to work safely around forklifts.
 - f. List basic electrical safety guidelines.
 - g. Describe how to use powder-actuated tools safely.

Learning Objective 5

- Handle materials properly.
 - a. Store and stockpile masonry materials.
 - b. Stack brick.

Performance Tasks

Performance Task 1 (Learning Objective 2)

- Properly use the following personal protective equipment:
 - a. Face shield
 - b. Protective lenses
 - c. Hearing protection
 - d. Respirator

Performance Task 2 (Learning Objective 3)

- Properly use the following personal protective equipment:
 - a. Safety harness
 - b. Connector
 - c. Anchorage device

Teaching Time: 15 hours

(Six 2.5-hour classroom sessions)

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

Prerequisites

Core Curriculum

Before You Begin

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

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



Safety Considerations

This module requires that trainees properly use personal protective equipment and work safely from elevated surfaces. Safety is paramount in the masonry trade and safe habits and practices must be emphasized whenever possible. Performance Tasks must be completed under your supervision. Each trainee must use required PPE and follow safe tool practices and procedures.

Classroom Equipment and Materials

Whiteboard/chalkboard
Markers/chalk
Pencils and paper
Masonry Level One PowerPoint®
Presentation Slides
LCD projector and screen
Computer
Copies of the Module Examination and Performance Profile Sheets
Vendor-supplied videos/DVDs showing safe masonry practices and procedures (optional)
TV/DVD player

Equipment and Materials for Laboratories and Performance Testing

A variety of informational, safety, caution, danger, and temporary warning signs
Nitrile gloves
Protective lenses
Face shields
Ear plugs
Reusable respirators
Safety goggles
Earmuffs
Hard hats
Safety boots
Full-body harness
Lanyard
Connectors

OSHA Safety and Health Standards for the Construction Industry (29 CFR Part 1926 Subpart I, *Hand and Power Tools*)
Handheld saw
Table-mounted masonry saw
Tuckpoint grinder
Powder-actuated fastening tool
OSHA Safety and Health Standards for the Construction Industry (19 CFR 1926.250(b), *Material Storage*)
Bagged masonry materials
Bundled brick
50 masonry units
100 brick

Additional Resources and References

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

Fall Protection and Scaffolding Safety: An Illustrated Guide. 2000. Grace Drennan Ganget. Government Institutes.

Forklift Safety: A Practical Guide to Preventing Powered Industrial Truck Incidents and Injuries, Second Edition. 1999. George Swartz. Government Institutes.

"The Sense of Safety." K. K. Snyder. *Masonry Magazine*, March 2008.
www.masonrymagazine.com/3-08/safety.html

"Using Masonry Saws." Norton Construction Products North America.
www.nortonconstructionproducts.com/solutions/masonry-saw.aspx

"Online Safety Library: Scaffold Safety." Oklahoma State University.
www.ehs.okstate.edu/links/scaffold.htm

OSHA website. www.osha.gov

Personal Protective and Life Saving Equipment. OSHA. 29 CFR 1926 Subpart E.
www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=10909

"Materials Handling and Storage." OSHA.
www.osha.gov/Publications/OSHA2236/osha2236.html

"Standards for Scaffold." OSHA. www.osha.gov/SLTC/scaffold/index.html

"What You Need to Know about Brick Table Saws." Tom Inglesby. *Masonry Magazine*, June 2002.
www.masonrymagazine.com/6-02/cover.html

WorkSAFE masonry safety resources. www.worksafecenter.com/safety/tutorial/masonry/step-1.page

There are a number of online resources available for trainees who would like more information on masonry safety. A search for additional information may be assigned as homework to interested trainees.

MASONRY SAFETY

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

SESSION ONE

Session One introduces the importance of job-site safety, including the costs of accidents on the job, identifying the causes of accidents, and recognizing hazards. Trainees will also learn about proper housekeeping techniques and safety precautions to follow when working with mortar and concrete.

1. Show Session One PowerPoint® presentation slides.
2. Identify the main causes and costs of accidents on the job.
3. Explain the meaning of informational, safety, caution, danger, and temporary warning signs and markings.
4. Discuss hazardous conditions at a typical job site. Emphasize that personal safety and that of fellow workers should be a primary consideration on the job.
5. Review proper housekeeping techniques.
6. Explain hazards encountered by masonry craftworkers from exposure to mortar and concrete, and by mixing mortar or concrete and laying masonry units. Discuss precautions to take to avoid injury, as well as additional precautions to take when working with flammable liquids.

SESSION TWO

Session Two covers personal protective equipment used in masonry, including protective lenses and face shields, hearing protection, gloves, and respirators.

1. Show Session Two PowerPoint® presentation slides.
2. Explain the proper safety precautions to take when dressing for masonry work.
3. Set up stations with nitrile gloves, safety goggles, protective lenses, face shields, earplugs, earmuffs, reusable full-facepiece and half-mask respirators, and dust masks. Discuss the importance of which items to use when working in specific conditions. Have trainees put on each one. This laboratory corresponds with Performance Task 1.

SESSION THREE

Session Three introduces working safely from elevated spaces. Trainees will learn about fall protection procedures, personal fall arrest systems, scaffold safety, and protection against falling objects.

1. Show Session Three PowerPoint® presentation slides.
2. Discuss the types of work areas that put a mason at risk and safe practices that can help prevent slips and falls.
3. Review terms used when describing personal fall arrest systems, and identify equipment used in personal fall arrest systems.
4. Demonstrate how to how to put on a full-body harness and how to connect the harness to the anchorage point. Under your supervision, have trainees also put on the equipment. This laboratory corresponds with Performance Task 2.
5. Summarize federal safety rules for workers when using scaffolds, including the requirement that workers who use scaffolds must be trained by a qualified person.
6. Discuss safety guidelines for protection against falling objects.



MASONRY SAFETY

SESSION FOUR

Session Four introduces trainees to four categories of tool and equipment safety: safe work practices and procedures, inspecting tools and equipment before use, using tools and equipment correctly, and keeping tools and equipment clean and properly maintained.

1. Show Session Four PowerPoint® presentation slides.
2. Explain the four categories of tool and equipment safety. Discuss rules for avoiding the misuse of tools and proper storage of tools.
3. Have trainees discuss tips for caring for hand tools, as well as guidelines for safely using saws, mortar mixers, and grinders.
4. Explain the risks of working around forklifts.
5. Describe different types of electrical accidents that can happen on a job site. Discuss procedures that will reduce the chances of an electrical accident.
6. Define a powder-actuated fastening tool and explain its color-coding system. Discuss safety rules for the safe operation of a powder-actuated fastening tool.

SESSION FIVE

Session Five provides information about the proper handling of materials, including storing and stockpiling masonry materials and stacking brick.

1. Show Session Five PowerPoint® presentation slides.
2. Discuss general guidelines to follow when handling or moving construction materials.
3. Review OSHA guidelines for stockpiling and handling brick stacks and masonry units.
4. Set up stations with bagged masonry materials, bundled brick, and about 50 masonry units and 100 brick. Under your supervision, have trainees stack the bagged materials and bundled brick.
5. Under your supervision, have trainees make a working stack of brick.

SESSION SIX

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

1. Have trainees complete the Module Examination. Any outstanding performance testing must be completed during this session.
2. Record the testing results on Training Report Form 200, and submit the report to your Training Program Sponsor.

Lesson Plans for Module 28102-13

MASONRY TOOLS AND EQUIPMENT

Module Three (28101-13) describes a variety of hand tools, measuring tools, mortar equipment, power tools and equipment, and lifting equipment that masons use on the job, and also explains how to use these tools correctly and safely. The module also provides instructions for assembling and disassembling scaffolds.

Objectives

Learning Objective 1

- Identify hand tools used in masonry.
 - a. Describe how to use trowels.
 - b. Describe how to use hammers and chisels.
 - c. Describe how to use jointers and brushes.
 - d. Describe how to use other masonry tools.

Learning Objective 2

- Identify measures and measuring tools used in masonry.
 - a. Describe how to use rules.
 - b. Describe how to use levels.
 - c. Describe how to use chalk boxes, squares, plumb bobs, and laser levels.
 - d. Describe how to use corner poles, lines, and fasteners.

Learning Objective 3

- Identify mortar equipment used in masonry.
 - a. Describe how to use mortar boxes.
 - b. Describe how to use mixing accessories.

Learning Objective 4

- Identify power tools used in masonry.
 - a. Describe how to use masonry saws.
 - b. Describe how to use splitters.
 - c. Describe how to use grinders.
 - d. Describe how to use power drills and powder-actuated tools.

Learning Objective 5

- Identify power equipment used in masonry.
 - a. Describe how to use a mortar mixer.
 - b. Describe how to use a masonry pump, vibrator, and hydraulic grout placer.
 - c. Describe how to use pressurized cleaning equipment.

Learning Objective 6

- Identify lifting equipment used in masonry.
 - a. Describe how to use mounted and portable hoists.
 - b. Describe how to use hydraulic-lift materials trucks.
 - c. Describe how to use forklifts and pallet jacks.

Learning Objective 7

- Recognize scaffolds used in masonry
 - a. Identify scaffold systems.
 - b. Assemble and disassemble tubular frame scaffold.

Performance Tasks

Performance Task 1 (Learning Objective 2)

- Demonstrate the proper use of a rule.

Performance Task 2 (Learning Objective 2)

- Demonstrate the proper use of a level.

Performance Task 3 (Learning Objective 5)

- Use the correct procedures for fueling and starting a mixer.

Performance Task 4 (Learning Objective 7)

- Assemble and disassemble tubular frame scaffold.

Teaching Time: 15 hours

(Six 2.5-hour classroom sessions)

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

Prerequisites

Core Curriculum

Before You Begin

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

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



Safety Considerations

This module requires that trainees demonstrate the ability to use a brick spacing rule and a modular spacing rule, use a level to check the plumb and level of individual masonry units and the lengths of walls, fuel and start a mixer, and assemble and disassemble tubular frame scaffold. Safety is paramount in the masonry trade and safe habits and practices must be emphasized whenever possible. Performance Tasks must be completed under your supervision. Each trainee must use required PPE and follow safe tool practices and procedures.

Classroom Equipment and Materials

Whiteboard/chalkboard
Markers/chalk
Pencils and paper
Masonry Level One PowerPoint®
Presentation Slides
LCD projector and screen
Computer
Copies of the Module Examination and Performance Profile Sheets
Vendor-supplied videos/DVDs showing the uses of masonry tools and equipment and the assembly and disassembly of scaffolds (optional)
TV/DVD player

Equipment and Materials for Laboratories and Performance Testing

Basic brick trowel
Pointing trowel
Margin trowel
Tuckpointer
Parging trowel
Duck bill trowel
Bucket trowel
Tile-setting trowel
Brick hammer
Tile hammer
Stonemason's hammer
Mason's mash
Maul
Rubber mallet
Mason's chisel (with and without a rubber grip)
Brick set chisel
Tooth chisel and pitching tool
Plugging chisel
Mason's tool bag
Brick spacing rules
Modular rules
Modular and nonmodular course of brick
Level and laser level
Chalk box
Framing square
Combination square
Plumb bob
Long-handed shovel
Square-end short-handled shovel
Mortar hoe
Water bucket
Standard contractor's wheelbarrow
Brick barrow
Tuckpoint grinder
Powered mortar mixer
Copies of OSHA's booklet, *A Guide to Scaffold Use in the Construction Industry*
Two sets of different manufacturer's instructions for the assembly of tubular frame scaffolds
Photographs of steel tower, swing stage, and powered scaffolds
Design configuration for a tubular frame scaffold
Components of a tubular frame scaffold



Additional Resources and References

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

Brick Industry Association YouTube Channel. www.youtube.com/user/BrickIndustry

Bricklaying: Brick and Block Masonry. Reston, VA: Brick Industry Association.

Building with Masonry: Brick, Block, and Concrete. Dick Kreh. Newtown, CT: Taunton Press.

Complete Masonry: Building Techniques, Decorative Concrete, Tools and Materials. Des Moines, IA: Oxmoor House.

Concrete Masonry Handbook. Skokie, IL: Portland Cement Association.

"Forklift Safety." 2009. EDG Safety Series. www.youtube.com/watch?v=yx67JVlc2Gw

Forklift Safety Guide, Publication F417-031-000 (04/07)". 2007. State of Washington Department of Labor and Industries. www.lni.wa.gov/IPUB/417-031-000.pdf

"Gilson Mortar Mixers by Cleform Tool." 2005. Construction Complete.

www.youtube.com/watch?v=ppMp8Upibz4

"Masonry Basics: The Tools You Need and How to Use Them." Masonry Guild of Arizona.

www.masonryforlife.com/howtobasics.htm

Masonry Construction. David L. Hunter, Sr. Upper Saddle River, NJ: Prentice-Hall.

"Standards for Scaffold." OSHA. www.osha.gov/SLTC/scaffold/index.html

"Pressure Washing Tips, Tricks And Techniques." 2011. PowerWash.com.

www.powerwash.com/articles/pressure-washing-tips-tricks-and-techniques-2.html

"Scaffold PowerPoint Presentation." OSHA. www.osha.gov/dte/library/scaffolds/scaffold/notes.pdf

"Tuckpointing and Repointing Tools: Specialized Tools for Removing and Replacing Mortar." Brett Martin.

Masonry Magazine, September 2008. www.masonrymagazine.com/9-08/tools.html

"Using Masonry Saws." Norton Construction Products North America.

www.nortonconstructionproducts.com/solutions/masonry-saw.aspx

There are a number of online resources available for trainees who would like more information on masonry tools and equipment. A search for additional information may be assigned as homework to interested trainees.





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

SESSION ONE

Session One identifies and explains the correct uses of various hand tools, including the following measuring tools: a brick spacing rule, a modular spacing rule, and a level.

1. Show Session One PowerPoint® presentation slides.
2. Review the proper care of tools.
3. Set up a station with the following tools: basic brick, pointing, margin, tuckpointer, parging, duck bill, bucket, and tile-setting trowels; brick hammer, tile hammer, stonemason's hammer, mason's mash, maul, and rubber mallet; mason's chisel (with and without a rubber grip), brick set chisel, tooth chisel and pitching tool, and a plugging chisel. After the discussion of each category of tools, have trainees examine and discuss, in turn, trowels, hammers, and chisels.
4. Explain that jointers are used to finish the surface of mortar joints before the mortar is set. Describe various shapes of jointers and the patterns they make. Also discuss the uses of brick tongs, bulk guns, grout bags, pinch bars, and bolt cutters.
5. Describe the measuring tools that masons use on the job and explain their uses. Cover rules and levels, chalk boxes, squares, plumb bobs, laser levels, corner poles, lines, and fasteners.
6. Demonstrate how to use a brick spacing rule and a modular spacing rule. Stress the importance of taking accurate measurements. This laboratory corresponds with Performance Task 1.
7. Have trainees explain the uses of a chalk box, framing square, combination square, plumb bob, and laser level. This laboratory corresponds with Performance Task 2.

SESSION TWO

Session Two introduces mortar equipment and provides information about the use of mortar boxes, mortar pans, and mortar accessories.

1. Show Session Two PowerPoint® presentation slides.
2. Discuss the features and uses of mortar boxes, mortar pans, mortarboards, and mortar accessories.
3. Set up a station with a long-handed shovel, a square-end short-handed shovel, a mortar hoe, a water bucket, a standard contractor's wheelbarrow, and a brick barrow for trainees to examine and discuss.

SESSION THREE

Session Three introduces trainees to working safety with tools and equipment.

1. Show Session Three PowerPoint® presentation slides.
2. Discuss the different types of masonry saws, including electrical masonry saws, masonry table saws, and handheld masonry saws.
3. Have trainees discuss the advantages of using a splitter to cut masonry units.
4. Show trainees how to start a tuckpoint grinder. Explain the importance of properly holding a grinder and positioning the body to prevent kickback. Discuss other safety precautions.
5. Explain the uses of power drills and powder-actuated tools. Stress the importance of safety when using these tools.
6. Review safety precautions that must be taken when using equipment powered by liquid fuels.
7. Set up a powered mortar mixer and show trainees how to fuel it and start it. Under your supervision, have trainees fuel and start the mixer. This laboratory corresponds with Performance Task 3.

Session Outline for 28102-13

Masonry Tools and Equipment

8. Explain the uses of a masonry pump, vibrator, and hydraulic grout placer.
9. Discuss how pressurized cleaning equipment is used in masonry.

SESSION FOUR

Session Four provides information about lifting equipment for material handling, including mounted and portable hoists, hydraulic-lift materials trucks, forklifts, and pallet jacks.

1. Show Session Four PowerPoint® presentation slides.
2. Have trainees to identify the general rules for moving bound, bundled, or palletized materials safely. Ensure trainees understand that they should never ride on a materials hoist.
3. Have trainees describe and compare the features of motorized hoist and a portable materials hoist.
4. Explain that the purpose of a hydraulic-lift materials truck is unloading masonry and other materials at the ground level.
5. Discuss the uses and features of reach-type forklifts, skid-steer forklifts, and straight-mast forklifts. Also discuss pallet jacks.

SESSION FIVE

Session Five provides information about the proper use of scaffolds.

1. Show Session Five PowerPoint® presentation slides.
2. Ask a trainee to identify when masons need to use scaffolds. Emphasize the importance of following safety guidelines, including federal regulations, when working on scaffolds and assembling them.
3. Have trainees identify the three broad categories of scaffolds, and describe and compare their features.
4. Create a design configuration for a tubular frame scaffold based on components from the manufacturer of your choice. Set up a station with the components and copies for each trainee of the manufacturer's instructions for assembly. Demonstrate how to assemble the components based on your design configuration and also how to disassemble the scaffold.
5. Under your supervision, have trainees assemble and then disassemble a tubular frame scaffold. This laboratory corresponds with Performance Task 4.

SESSION SIX

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

1. Have trainees complete the Module Examination. Any outstanding performance testing must be completed during this session.
2. Record the testing results on Training Report Form 200, and submit the report to your Training Program Sponsor.



Lesson Plans for Module 28103-13

MEASUREMENTS, DRAWINGS, AND SPECIFICATIONS

Module Four (28103-13) provides a review of the calculation of distances and areas common in masonry work, describes the information found on residential construction drawings, and reviews the role of specifications, standards, and codes.

Objectives

Learning Objective 1

- Recognize the mathematical concepts used in masonry.
 - a. Explain how to read a six-foot rule.
 - b. Explain how to read other measuring devices.
 - c. Explain how to read mason's rules.
 - d. Recognize modular increments.
 - e. Describe how to determine areas and circumferences.
 - f. Explain how to use the 3-4-5 ratio to square a corner.

Learning Objective 2

- Identify the basic parts of a set of drawings and list the information found on each type.
 - a. Identify lines, symbols, and abbreviations used on drawings.
 - b. Identify scales and dimensions used on drawings.
 - c. Identify types of construction drawings.

Learning Objective 3

- Identify the purpose of specifications, standards, and codes used in the building industry and the sections that pertain to masonry.
 - a. Explain the purpose of specifications, standards, and codes.
 - b. Describe the purpose of inspections and testing.

Performance Tasks

Performance Task 1 (Learning Objective 1)

- Use a mason's rule to measure a space and verify its squareness.

Performance Task 2 (Learning Objective 1)

- Use a rule to measure fractional dimensions.

Performance Task 3 (Learning Objective 2)

- Locate information on construction drawings.

Teaching Time: 10 hours

(Four 2.5-hour classroom sessions)

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

Prerequisites

Core Curriculum

Before You Begin

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

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



Safety Considerations

This module requires that trainees demonstrate the ability to use a mason's rule to measure a space and verify its squareness, use a rule to measure fractional dimensions, and locate information on construction drawings. Safety is paramount in the masonry trade and safe habits and practices must be emphasized whenever possible. Performance Tasks must be completed under your supervision. Each trainee must use required PPE and follow safe tool practices and procedures.

Classroom Equipment and Materials

Copies of the Module Examination and Performance Profile Sheets
Masonry Level One PowerPoint®
Presentation Slides, DVD player
Whiteboard/chalkboard
Markers/chalk
Pencils and paper
LCD projector and screen
Computer
Vendor-supplied videos/DVDs showing how to perform masonry math and how to use masonry drawings and standards (optional)
TV/VCR/DVD player (optional)

Equipment and Materials for Laboratories and Performance Testing

Measuring tapes of various lengths
Engineer's rules
Mason's rules
Chalk
Wood folding rules or tape measures
Several 2 × 4s
Rulers
Workstations with a variety of objects that have fractional dimensions
Workstations with complete sets of commercial construction drawings of different scales
Workstations with copies of, or extracts from, the applicable codes for your local jurisdiction

Several complete sets of commercial construction drawings of different scales that include:
Plot or site plans
Floor plans
Foundation plans
Elevation drawings
Schedules
Specialty plans
Copies of, or extracts from, several masonry-related specifications
Copies of, or extracts from, several masonry-related standards
Copies of the MasterFormat™ specification divisions for masonry
Copies of, or extracts from, several ASTM specifications related to testing
Copies of the local applicable building code

Additional Resources and References

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

- The ABCs of Concrete Masonry Construction*. Skokie, IL: Portland Cement Association (Video).
- Blueprint Reading for the Building Trades*. 1985. John E. Traister. Carlsbad, CA: Craftsman Book Company.
- Bricklaying: Brick and Block Masonry*. 1988. Reston, VA: The Brick Institute of America.
- Bricklaying Curriculum: Advanced Bricklaying Techniques*. 1992. Raymond J. Turcotte and Laborn J. Hendrix. Stillwater, OK: Oklahoma Department of Vocational and Technical Education.
- Building Block Walls: A Basic Guide for Students in Masonry Vocational Training*. 1988. Herndon, VA: National Concrete Masonry Association.
- A Manual of Construction Documentation: An Illustrated Guide to Preparing Construction Drawings*. 1989. Glenn E. Wiggins. New York: Whitney Library of Design.
- Masonry Design and Detailing For Architects, Engineers and Contractors*, Sixth Edition. 2012. Christine Beall. New York: McGraw-Hill.

There are a number of online resources available for trainees who would like more information on how to perform masonry math and how to use masonry drawings and standards. A search for additional information may be assigned as homework to interested trainees.



MEASUREMENTS, DRAWINGS, AND SPECIFICATIONS

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

SESSION ONE

Session One introduces trainees to the fundamentals of masonry math, including reading measuring devices such as six-foot rules, mason's rules, and engineer's rules. Trainees will learn how to calculate areas and circumferences, and use the 3-4-5 ratio to square corners.

1. Show Session One PowerPoint® presentation slides.
2. Review the types of masonry measurements that are made in the field, including inches, feet, pounds, gallons, cubic yards, and tons. Explain the importance of using conversion to change measurements from one form of measure to another in order to be able to perform mathematical calculations on them.
3. Set up workstations with a variety of objects that have fractional dimensions. Provide trainees with six-foot folding rules, wooden rules, or tape measures that include fractional measurements. Have them measure the objects and calculate their areas and volumes. This laboratory corresponds with Performance Task 2.
4. Using the workstations that had been set up with a variety of objects that have fractional dimensions, have trainees practice measuring them to verify the squareness or lack of squareness, of their corners. Review the results with trainees and answer any questions they may have. This laboratory corresponds with Performance Task 1.

SESSION TWO

Session Two reviews the basics of masonry drawings, including lines, symbols, abbreviations, scales, and dimensions commonly used on drawings. Trainees will also learn to identify the various types of construction drawings and the information they contain.

1. Show Session Two PowerPoint® presentation slides.
2. Explain how masons use the construction drawings that accompany a project's documentation. Discuss the importance of being able to read and understand the information on project drawings.
3. Set up workstations with complete sets of commercial construction drawings of different scales. Assign several trainees to each station. Call out various lines, symbols, and abbreviations commonly found on construction drawings, and have trainees identify them on individual drawings. Then call out various types of drawings, and have trainees identify them within the set of drawings. Have trainees find the legends, symbol lists, and title blocks on the drawings. Provide examples of various types of information contained on construction drawings, and ask trainees to identify the drawings on which they appear. Then rotate the trainees to another workstation and repeat the exercise. This laboratory corresponds with Performance Task 3.



MEASUREMENTS, DRAWINGS, AND SPECIFICATIONS

SESSION THREE

Session Three covers the various specifications, standards, and codes that masons must follow on the job, and explains how they are applied.

1. Show Session Three PowerPoint® presentation slides.
2. Review the importance of specifications, standards, and codes to masonry, and how they apply to masonry. Summarize how specifications, standards, and codes govern inspections and testing, and why they are important for ensuring that safe construction practices are followed.
3. Set up workstations with copies of, or extracts from, the applicable codes for your local jurisdiction. Have trainees take turns reviewing the standards for information that you specify. Ask trainees to identify the organizations that developed the model standards on which the standards in your local jurisdiction are based. Ask trainees to explain why it is important to ensure that your local jurisdiction uses the most current standard.

SESSION FOUR

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

1. Have trainees complete the Module Examination. Any outstanding performance testing must be completed during this session.
2. Record the testing results on Training Report Form 200, and submit the report to your Training Program Sponsor.

Lesson Plans for Module 28104-13

MORTAR

Module Five (28104-13) explains the types and properties of mortar and the materials used in the mixture, including admixtures; provides instructions for mixing mortar by machine; and describes how to properly apply and store mortar.

Objectives

Learning Objective 1

- Name and describe the ingredients and types of mortar.
 - Describe the use of portland cement, hydrated lime, and sand.
 - Describe masonry cement.
 - Describe preblended mortars.
 - Describe the use of water and admixtures.
 - Describe the types of masonry mortar.

Learning Objective 2

- Describe properties of plastic and hardened mortar.
 - Describe plastic mortar.
 - Describe hardened mortar.

Learning Objective 3

- Identify the common problems found in mortar application and their solutions.
 - Describe the effects of improper proportioning and poor-quality materials.
 - Explain the effects of extreme weather and tempering.
 - Describe efflorescence.

Learning Objective 4

- Explain how to properly set up, maintain, and dispose of mortar and use the mortar mixing area.
 - Describe how to set up the mixing area.
 - Describe how to maintain the mixing area.
 - Describe how to mix mortar with a power mixer.

Performance Tasks

Performance Task 1 (Learning Objective 4)

- Properly set up the mortar mixing area.

Performance Task 2 (Learning Objective 4)

- Properly mix mortar with a power mixer.

Teaching Time: 10 hours

(Four 2.5-hour classroom sessions)

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

Prerequisites

Core Curriculum

Before You Begin

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

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



Safety Considerations

This module requires that trainees demonstrate the ability to properly set up the mortar mixing area and properly mix mortar with a power mixer. Safety is paramount in the masonry trade and safe habits and practices must be emphasized whenever possible. Performance Tasks must be completed under your supervision. Each trainee must use required PPE and follow safe tool practices and procedures.

Classroom Equipment and Materials

Copies of the Module Examination and Performance Profile Sheets
Masonry Level One PowerPoint®
Presentation Slides, DVD player
Whiteboard/chalkboard
Markers/chalk
Pencils and paper
LCD projector and screen
Computer
Vendor-supplied videos/DVDs showing mortar materials, mixing, and storage (optional)
TV/VCR/DVD player (optional)

Equipment and Materials for Laboratories and Performance Testing

Samples of fresh wet mortar
Samples of lime
Samples of plain sand
A supply of water
Mixing sticks
Samples of various mortar materials that have become unusable through improper storage
Plastic traffic cones
A cubic-foot box for measuring sand
A mechanical mortar mixer, with operator's manual
Jars with alcohol
A laboratory burner
A laboratory oven
A No. 100 sieve
A laboratory scale
Workstations with 1-quart glass jars with caps, samples of assorted types of sand, and water

Workstations with mortar in need of tempering, water, and mixing tools
Workstations with an assortment of materials and equipment typically found in a mortar mixing area
Photographs of assorted types and degrees of efflorescence
Copies of, or extracts from, ASTM standards C150, C595, C5, C207, and C144
Copies of the SDS for hydrated lime
Copies of the SDS for dry cement dust
Pencils
Paper
Copies of Trainee Guide

Additional Resources and References

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

Concrete Masonry Handbook for Architects, Engineers, and Builders, Fifth Edition. 1991. William C. Panarese, Steven H. Kosmatka, and F. A. Randall, Jr. Skokie, IL: Portland Cement Association.

Masonry Cement Mortar: Its Proper Use in Construction. 1993. Pat Howley. Murray Hill, NJ: ESSROC Materials.

Masonry Construction, First Edition. 1996. David L. Hunter, Sr. Upper Saddle River, NJ: Prentice Hall.

Technical Note TN1, Cold and Hot Weather Construction. 2006. Reston, VA: The Brick Industry Association. www.gobrick.com/Portals/25/docs/Technical%20Notes/TN1.pdf

Technical Note TN8, Mortars for Brickwork. 2008. Reston, VA: The Brick Industry Association. www.gobrick.com/Portals/25/docs/Technical%20Notes/TN8.pdf

Technical Note TN8B, Mortars for Brickwork: Selection and Quality Assurance. 2006. Reston, VA: The Brick Industry Association. www.gobrick.com/Portals/25/docs/Technical%20Notes/TN8B.pdf

Technical Note TN20, Cleaning Brickwork. 2006. Reston, VA: The Brick Industry Association. www.gobrick.com/Portals/25/docs/Technical%20Notes/TN20.pdf

There are a number of online resources available for trainees who would like more information on mortar materials, mixing, application, and storage. A search for additional information may be assigned as homework to interested trainees.

MORTAR

The Lesson Plan for this module is divided into four 2.5-hour sessions. Each session includes 10 minutes for administrative tasks and one 10-minute break.

SESSION ONE

Session One reviews the different types of mortar and their ingredients.

1. Show Session One PowerPoint® presentation slides.
2. Provide PPE and other safety related items from the Equipment and Materials list for trainees to examine.
3. Ask a trainee to explain the purpose of mortar in masonry structures and what a mason needs to know about mortar.
4. Provide trainees with copies of the SDSs for hydrated lime and dry cement dust, and review them with the trainees. Discuss each section and its relevance to experiences that trainees are likely to have on a job site. Have trainees identify the appropriate personal protective equipment they should use when working with hydrated lime and dry cement.

SESSION TWO

Session Two provides trainees with an overview of the properties of plastic and hardened mortar.

1. Show Session Two PowerPoint® presentation slides.
2. Ensure that trainees are equipped with required PPE.
3. Provide a brief overview of the plastic and hardened properties of mortar. Explain why masons must be familiar with the properties of both plastic and hardened mortar.
4. Provide trainees with fresh wet mortar, plastic traffic cones, and mixing sticks. Have trainees demonstrate how to perform the slump test. Ask trainees to compare the effect of water content on mortar and concrete. Explain why good water retention is important to developing adhesion between the mortar and the masonry units.

SESSION THREE

Session Three introduces the common problems encountered when mixing and applying mortar and discusses their solutions, covers how to store mortar, set up and maintain the mortar mixing area, and explains how to mix mortar with a power mixer.

1. Show Session Three PowerPoint® presentation slides.
2. Ensure that trainees are equipped with required PPE.
3. Set up workstations with an assortment of materials and equipment typically found in a mortar mixing area. Under your supervision, have trainees set up the mortar mixing area. Make sure the trainees wear appropriate personal protective equipment. Note the proficiency of each trainee. This laboratory corresponds with Performance Task 1.
4. Under your supervision, have trainees mix mortar using a mechanical mortar mixer. Note the proficiency of each trainee. This laboratory corresponds with Performance Task 2.

SESSION FOUR

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

1. Have trainees complete the Module Examination. Any outstanding performance testing must be completed during this session.
2. Record the testing results on Training Report Form 200, and submit the report to your Training Program Sponsor.



MASONRY UNITS AND INSTALLATION TECHNIQUES

Module Six (28105-13) describes characteristics of block and brick; how to set up, lay out, and bond block and brick; how to cut block and brick; how to lay and tool block and brick; and how to clean block and brick once they have been laid. This module also provides information about masonry reinforcements and accessories that masons use on the job to lay block and brick professionally and safely.

Objectives

Learning Objective 1

- Describe how to install concrete masonry units.
 - a. Identify the characteristics of concrete masonry units.
 - b. Explain how to set up, lay out, and bond concrete masonry units.
 - c. Explain how to lay and tool concrete masonry units.
 - d. Explain how to clean concrete masonry units.

Learning Objective 2

- Describe how to install brick.
 - a. Identify the characteristics of brick.
 - b. Explain how to set up, lay out, and bond brick.
 - c. Explain how to lay and tool brick.
 - d. Explain how to clean brick.

Learning Objective 3

- Describe how to cut concrete masonry units and brick.
 - a. Explain how to cut with chisels and hammers.
 - b. Explain how to cut with masonry hammers.
 - c. Explain how to cut with saws and splitters.
 - d. Explain how to check units and cuts.

Learning Objective 4

- Describe how to install masonry reinforcement and accessories.
 - a. Describe how to install masonry reinforcements.
 - b. Describe how to install masonry accessories.

Performance Tasks

Performance Task 1 (Learning Objective 1)

- Lay a dry bond for block.

Performance Task 2 (Learning Objective 1)

- Tool a bed joint for block.

Performance Task 3 (Learning Objective 1)

- Lay block to the line in courses that are true for height, level, plumb, and range.

Performance Task 4 (Learning Objective 1)

- Build a block lead.

Performance Task 5 (Learning Objective 2)

- Lay a dry bond for brick.

Performance Task 6 (Learning Objective 2)

- Tool a bed joint for brick.

Performance Task 7 (Learning Objective 2)

- Lay brick to the line in courses that are true for height, level, plumb, and range.

Performance Task 8 (Learning Objective 2)

- Build a brick lead.

Performance Task 9 (Learning Objective 3)

- Accurately cut block using the following tools:
 - A masonry hammer
 - A brick set
 - A power saw
 - A splitter

Performance Task 10 (Learning Objective 3)

- Accurately cut brick using the following tools:
 - A masonry hammer
 - A brick set
 - A power saw
 - A splitter

Teaching Time: 60 hours

(Twenty-four 2.5-hour classroom sessions)

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

Prerequisites

Core Curriculum



Before You Begin

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

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

Safety Considerations

This module requires that trainees demonstrate the ability to install and cut masonry units. Safety is paramount in the masonry trade and safe habits and practices must be emphasized whenever possible. Performance Tasks must be completed under your supervision. Each trainee must use required PPE and follow safe tool practices and procedures.

Classroom Equipment and Materials

Whiteboard/chalkboard
Markers/chalk
Pencils and paper
Masonry Level One PowerPoint®
Presentation Slides
LCD projector and screen
Computer
Copies of the Module Examination and Performance Profile Sheets
Vendor-supplied videos/DVDs showing installation and cutting of masonry units (optional)
TV/DVD player

Equipment and Materials for Laboratories and Performance Testing

"The Basics of Brickwork Details"
A watch with a second hand
Bags of sand or boards
Bits of wood
Brick Industry Association's booklet, *Cleaning Brickwork*
Brick sets
Brick splitters
Bricks
Bucket
Chalklines
Chemical cleaning solution for brick
Chisel
Concrete blocks
Construction drawings for a simple structure
Copies of a set of construction drawings and specifications for a simple brick structure that includes an opening for a door and a window, the schedule, any referenced standards and codes, and an estimation of workers, materials, and equipment needed for the job
Copies of the National Concrete Masonry Association's booklet, *Cleaning Concrete Masonry*
Copies of the safety data sheet and the manufacturer's directions for mixing, using, and storing a chemical cleaning solution for brick
Corner poles
First course of concrete blocks, with a length greater than 4 feet, already in place
Framing squares
Grease pencils
Hammers
Hose
Jointers, including convex sled runners and rakers
Levels
Markers
Masonry hammers
Mason's chisels
Mason's lines
Materials and tools needed for hand-mixing mortar
Medicine droppers
Modular and standard course spacing rules
Mortar boxes
Mortar mixing materials
National Concrete Masonry Association's booklet, *Steel Reinforcement for Concrete Masonry*
Pencils
Personal protective equipment
Plans and specifications for a simple concrete structure that includes an opening for a door and a window
Portable masonry saws with operating instructions
Rules
Sets of drawing plans that include a detailed drawing of an unreinforced outside-corner lead in a half-lap running bond pattern and specifications
Squares
Stiff brush
String
Tables
Tools and equipment needed for hand-mixing mortar
Trowels
Various types of jointers, including runner jointers and rake-out jointers
Various types of line fasteners
Water
Wax markers
Wooden scraper



Additional Resources and References

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

The ABCs of Concrete Masonry Construction. Skokie, IL: Portland Cement Association (Video, 13:34).

ASTM C90, Standard Specification for Loadbearing Concrete Masonry Units. 2012. West Conshohocken, PA: ASTM International.

The Basics of Brickwork Details. 2006. Wyomissing, PA: Glen-Gery Corporation.

Bricklaying: Brick and Block Masonry. Reston, VA: Brick Institute of America.

Building Block Walls: A Basic Guide for Students in Masonry Vocational Training. 1988. Herndon, VA: National Concrete Masonry Association.

Concrete Masonry Handbook. Skokie, IL: Portland Cement Association.

Good Practice for Cleaning New Brickwork. 2003. Charlotte, NC: Brick SouthEast.

Steel Reinforcement for Concrete Masonry. 2006. Herndon, VA: National Concrete Masonry Association.

Technical Note TN3A, Brick Masonry Material Properties. 1992. Reston, VA: The Brick Industry Association.
www.gobrick.com/Portals/25/docs/Technical%20Notes/TN3A.pdf

Technical Note TN20, Cleaning Brickwork. 2006. Reston, VA: The Brick Industry Association.
www.gobrick.com/Portals/25/docs/Technical%20Notes/TN20.pdf

TEK 2-3A, Architectural Concrete Masonry Units. 2001. Herndon, VA: National Concrete Masonry Association.
secure.ncma.org/source/Orders/ProductDetail.cfm?pc=TEK02-03

TEK 8-4A, Cleaning Concrete Masonry. 2005. Herndon, VA: National Concrete Masonry Association.
www.ncma.org/etek/Pages/Manualviewer.aspx?filename=TEK%2008-04A.pdf

There are a number of online resources available for trainees who would like more information on masonry units and installation techniques. A search for additional information may be assigned as homework to interested trainees.



MASONRY UNITS AND INSTALLATION TECHNIQUES

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

SESSION ONE

Session One identifies and explains characteristics of various types, classes, and parts of concrete masonry units.

1. Show Session One PowerPoint® presentation slides.
2. Discuss the six types of concrete masonry units and the four classes of block.
3. Discuss the different parts of CMUs as well as the variety of CMUs that are available.
4. Describe various types of architectural block.

SESSION TWO

Session Two describes the steps of setting up a job and laying out a CMU structure.

1. Show Session Two PowerPoint® presentation slides.
2. Explain that a masonry contractor must prepare a checklist of preliminary procedures for setting up a job before any actual work can begin.
3. Discuss the steps involved in locating where the masonry work will go.
4. Show trainees how to dry-bond the door and window openings with block. Use a square and grease pencil to mark the exact location and angle of the corners. Under your supervision, have trainees practice dry bonding the first course of the structure based on the plans and specifications that you provide. This laboratory corresponds with Performance Task 1.

SESSION THREE

Session Three provides information about buttering block, the types of bed joints that a block can take, and common bond patterns for block walls.

1. Show Session Three PowerPoint® presentation slides.
2. Explain the process of buttering block.
3. Discuss the three types of bed joints that a block can take, depending on its purpose.
4. Discuss common bond patterns and variations in block walls.

SESSION FOUR

Session Four describes the steps for planning to lay masonry units, explains how to lay block, and explains how to place and adjust block.

1. Show Session Four PowerPoint® presentation slides.
2. Review the multistage process that precedes laying masonry units: reading the specifications, planning the layout of the job, locating and laying out walls, dry bonding, calculating the number of units to cut, and cutting them.
3. Introduce the process of laying out concrete masonry units by discussing with trainees the many creative aspects of masonry. Have trainees note such variations as color, size, texture, and positioning that can be used to create interesting visual effects.
4. Explain the procedures for laying block.
5. Demonstrate the procedures for placing blocks and adjusting them when necessary. Under your supervision, have trainees place and align blocks.
6. Demonstrate how to lay block to the line. This laboratory corresponds with Performance Task 3.



MASONRY UNITS AND INSTALLATION TECHNIQUES

SESSION FIVE

Session Five describes how to set up a mason's line using corner poles and various types of fasteners.

1. Show Session Five PowerPoint® presentation slides.
2. Explain that a line needs to be tied tautly with fasteners at a height that can be measured precisely.
3. Demonstrate how to securely brace corner poles and attach a line to them using hitch or half-hitch knots. Under your supervision, have trainees secure corner poles, attach a line to the poles, lay a course of block, and use a rule to check the line height. This laboratory corresponds with Performance Task 3.
4. Explain how to set up a line using line blocks, line pins, and trigs.

SESSION SIX

Session Six explains how to build a block lead and how to check its diagonal after it has been completed.

1. Show Session Six PowerPoint® presentation slides.
2. Explain that leads set the position, alignment, and elevation of walls by serving as guides for the courses that fill the spaces between them.
3. Discuss the importance of accurate leveling and plumbing to make sure that corners are true.
4. Demonstrate how to lay a block outside-corner lead. Emphasize the proper mortar-spreading technique. Under your supervision, have trainees lay a block outside-corner lead. This laboratory corresponds with Performance Task 5.

SESSION SEVEN

Session Seven explains tooling and finishing mortar.

1. Show Session Seven PowerPoint® presentation slides.
2. Review the use of jointers as tools designed to finish the surface of mortar joints.
3. Have trainees mix mortar and lay several courses of block. Have trainees periodically check the mortar throughout this session until the mortar is at the proper consistency to be tooled.
4. Discuss tooling and finishing mortar as the last step in making a mortar joint. This laboratory fulfills Performance Task 2.
5. Explain why mortar must be tested before joints are tooled. Point out that the best time for tooling joints varies, depending on weather.

SESSION EIGHT

Session Eight describes how to use various types of jointers to tool mortar.

1. Show Session Eight PowerPoint® presentation slides.
2. Explain that tooling is begun after the mortar has been tested and found to be ready to take impressions.
3. Discuss the proper technique for using a jointer.
4. Demonstrate and describe how to use the proper jointers for tooling various types of joints, including raked joints, troweled joints, and flush joints. Under your supervision, have trainees tool the types of joints that you demonstrated.

MASONRY UNITS AND INSTALLATION TECHNIQUES

SESSION NINE

Session Nine describes how to clean dried mortar, provides information about chemical cleaning solutions, and explains the process of washing block using high-pressure water.

1. Show Session Nine PowerPoint® presentation slides.
2. Point out that the hardest material to clean off masonry units is dried, smeared mortar that has worked its way into the surfaces of masonry units.
3. Discuss the importance of checking the manufacturer's safety data sheets for mixing, using, and storing recommended chemical cleaners, and explain cleaning procedures when further cleaning is needed for masonry.
4. Discuss the process of washing block with high-pressure water.

SESSION TEN

Session Ten provides information about the characteristics of various types of brick.

1. Show Session Ten PowerPoint® presentation slides.
2. Discuss the functions of the three general types of brick masonry units: cored and tile, uncored, and architectural terra-cotta.
3. Describe how the percentage of water present in brick affects the hardening of the mortar around the brick.
4. Have trainees perform the test used to measure the absorption rate of brick.
5. Review the most common structural bond patterns of brick.

SESSION ELEVEN

Session Eleven describes the preliminary steps for setting up a brick project and explains the procedures for laying a dry bond.

1. Show Session Eleven PowerPoint® presentation slides.
2. Explain that the procedures for setting up, laying out, and bonding brick are similar in most ways to the procedures for block.
3. Review the steps to follow when setting up a brick masonry project, with and without the use of a scaffold.
4. Demonstrate how to establish bond with bricks. Discuss the importance of dry-bonding brick across openings. Under your supervision, have trainees practice dry-bonding brick. This laboratory corresponds with Performance Task 1.

SESSION TWELVE

Session Twelve covers simple bonds, pattern bonds, structural bonds, and structural pattern bonds for brick, and explains how and why bricks are placed in different bond patterns.

1. Show Session Twelve PowerPoint® presentation slides.
2. Review the four types of bonds: simple bonds, pattern bonds, structural bonds, and structural pattern bonds.
3. Discuss the primary uses of stretchers, headers, soldiers, rowlocks, rowlock stretchers, and sailors.
4. Discuss other commonly used brick bonds.



MASONRY UNITS AND INSTALLATION TECHNIQUES

SESSION THIRTEEN

Session Thirteen explains the steps performed when laying brick, adjusting brick, and checking the height, plumb, level, and range of a course of brick.

1. Show Session Thirteen PowerPoint® presentation slides.
2. Explain the most efficient way to handle brick when laying it.
3. Demonstrate how to lay several courses of brick, and how to adjust units that have been placed. Under your supervision, have trainees place several courses of brick.
4. Discuss the steps to follow when measuring the height of a course and when checking for plumb and range.
5. Under your supervision, have trainees check the plumb, level, and range of bricks.

SESSION FOURTEEN

Session Fourteen explains the processes of laying the brick closure unit.

1. Show Session Fourteen PowerPoint® presentation slides.
2. Explain that the closure unit, being the last brick to be laid, must fit in the gap between the bricks that have already been laid.

SESSION FIFTEEN

Session Fifteen explains the processes of laying brick to the line.

1. Show Session Fifteen PowerPoint® presentation slides.
2. Discuss how to lay brick to the line, and explain why it is important not to disturb the line while doing so.
3. Demonstrate the proper way to hold the brick to avoid disturbing the line. Under your supervision, have trainees lay brick to the line. This laboratory corresponds with Performance Task 4.

SESSION SIXTEEN

Session Sixteen explains how to build a brick corner lead, and explains the importance of the lead in establishing the position, alignment, and elevation of the wall to be built.

1. Show Session Sixteen PowerPoint® presentation slides.
2. Explain that corner leads set the position, alignment, and elevation of walls by serving as guides for the courses that fill the spaces between them.
3. Discuss the purposes and methods of checking the level on the diagonal and using a framing square.
4. Demonstrate and describe each step in the process of building an unreinforced outside-corner lead in a half-lap running bond pattern. Under your supervision, have trainees build an unreinforced outside-corner lead in a half-lap running bond pattern. This laboratory corresponds with Performance Task 6.

SESSION SEVENTEEN

Session Seventeen describes the processes of cleaning brick by hand with a chemical solution and by using high-pressure water equipment.

1. Show Session Seventeen PowerPoint® presentation slides.
2. Discuss the importance of consulting the brick manufacturer's SDS for recommended chemical cleaning solutions. Review the SDS and manufacturer's instructions for mixing, using, and storing a chemical cleaning solution.
3. Arrange to visit a job site where brick walls have been constructed and the mortar has had time to cure and set. Demonstrate and describe how to dry-scrub a wall, mix the solution, and wash the wall by hand.
4. Discuss the necessity of consulting a brick manufacturer's guidelines to ensure that pressurized water cleaning is suitable for the type of brick being used.

MASONRY UNITS AND INSTALLATION TECHNIQUES

SESSION EIGHTEEN

Session Eighteen explains the procedure for smoothly cutting masonry units with a mason's chisel and a hammer, and the procedure for making clean cuts in brick with a brick set.

1. Show Session Eighteen PowerPoint® presentation slides.
2. Discuss situations when a mason needs to cut masonry units to fit a specific space.
3. Explain the standard ways of cutting block and the four types of cuts that are made in two-cell block.
4. Using a mason's chisel and a hammer, demonstrate and explain the steps to follow to smoothly cut a block. Also demonstrate how to use a brick set to make a clean cut in a brick. Under your supervision, have trainees choose the proper tools and follow the procedures to make smooth cuts in block and brick. This laboratory corresponds with Performance Task 9.
5. Demonstrate and describe how to cut brick with the chisel end of a masonry hammer, and how to use the striking end of the hammer to dress out any small, rough edges left by the cut. Under your supervision, have trainees use a masonry hammer to cut a brick. This laboratory corresponds with Performance Task 10.

SESSION NINETEEN

Session Nineteen describes the steps to follow to accurately cut block and brick with a power saw, as well as how to cut brick with a splitter.

1. Show Session Nineteen PowerPoint® presentation slides.
2. Discuss the uses and features of power masonry saws and brick splitters. Note the importance of being familiar with the operating instructions of these tools.
3. Demonstrate and describe how to use a masonry saw to cut a masonry unit. Also demonstrate how to cut a brick with a brick splitter. Under your supervision, have trainees use a masonry saw to cut a masonry unit and use a brick splitter to cut a brick. This laboratory corresponds with Performance Task 7.
4. Discuss the items that must be checked on masonry units after equipment, safety procedures, and operating procedures have been checked.

SESSION TWENTY

Session Twenty explains the requirements and uses of installing accessories when building masonry structures.

1. Show Session Twenty PowerPoint® presentation slides.
2. Explain that reinforcements make walls stronger, hold them in place, or handle moisture.
3. Discuss the features, uses, and placement of anchors and metal and veneer ties.



MASONRY UNITS AND INSTALLATION TECHNIQUES

SESSION TWENTY-ONE

Session Twenty-One explains the requirements and uses of reinforcement for masonry structures.

1. Show Session Twenty-One PowerPoint® presentation slides.
3. Discuss the features, uses, and placement of reinforcement bars and joint reinforcement ties.

SESSION TWENTY-TWO

Session Twenty-Two covers the installation of accessories commonly used in masonry, including flashing.

1. Show Session Twenty-Two PowerPoint® presentation slides.
2. Emphasize that the manufacturer's instructions must always be followed when installing accessories.
3. Discuss the applications of flashing, as well as the various materials that flashing can be made from.

SESSION TWENTY-THREE

Session Twenty-Three covers the installation of accessories commonly used in masonry, including joint fillers.

1. Show Session Twenty-Three PowerPoint® presentation slides.
2. Emphasize that the manufacturer's instructions must always be followed when installing accessories.
3. Explain how to control shrinkage by using reinforcement in combination with contraction or control joints.

SESSION TWENTY-FOUR

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

1. Have trainees complete the Module Examination. Any outstanding performance testing must be completed during this session.
2. Record the testing results on Training Report Form 200, and submit the report to your Training Program Sponsor.