

Masonry

Instructional Framework

An instructional framework provides educators with a list of benchmark statements aligned to Common Core and national content area standards for a given course or program. The Missouri Masonry Instructional Framework lists a sequence of content for masonry, organized into distinct units of instruction with component evidence of mastery statements.

Masonry Instructional Framework

Introductory Craft Skills	Common Core Standards
<p>Module 28101-04 - Introduction To Masonry This module introduces the trainee to the historic and current methods and procedures used in the masonry trade. Brick and block manufacturing is explained, along with the types of brick and block that are currently used in various types of masonry construction. Knowledge, skill, and ability requirements of a mason are also described. An overview of the basic safety practices and requirements found in the masonry trade is also provided. The trainee is directed in the use of appropriate personal protective equipment, handling hazardous materials, and general work safety. Basic bricklaying techniques are also covered.</p>	
1. Discuss the history of masonry.	
2. Describe modern masonry materials and methods.	
3. Explain career ladders and advancement possibilities in masonry work.	
4. Describe the skills, attitudes, and abilities needed to work as a mason.	
5. State the safety precautions that must be practiced at a work site, including the following: <ul style="list-style-type: none"> • Safety practices • Fall-protection procedures • Forklift-safety operations 	WHST 11-12.2, L 11-12.1, L 11-12.2
6. Perform the following basic bricklaying procedures: <ul style="list-style-type: none"> • Mixing of mortar* • Laying a mortar bed • Laying bricks 	*N-Q 1, N-Q 2, N-Q 3, A-SSE 1, A-CED 1, A-CED 2, A-CED 4, A-REI 1, A-REI 2, A-REI 3, F-IF 4, F-BF 1, F-LE 1b, F-LE 5
7. Put on eye protection, respiratory protection, and a safety harness.	
8. Use the correct procedures for fueling and starting a gasoline-powered tool.	
Performance Tasks	
1. Put on eye protection, respiratory protection, and a safety harness.	
2. Demonstrate the ability to properly use a trowel to spread and furrow bed joints and butter head joints.	

Introductory Craft Skills	Common Core Standards
<p>Module 28102-04 - Masonry Tools and Equipment This module provides training in the types and applications of common tools and equipment found in the masonry trade. Trainees will learn how to operate and maintain basic masonry hand and power tools safely. Direction is also provided in the safe use of heavier equipment such as cranes and forklifts, as well as the construction and use of scaffolding. General work safety, wearing personal protective equipment, and safe handling of hazardous materials are emphasized throughout the module.</p>	RST 11-12.4
1. Identify and name the tools used in performing masonry work.	L 11-12.6
2. Identify and name the equipment used in performing masonry work.	L 11-12.6
3. Describe how each tool is used.	
4. Describe how the equipment is used.	S-ID 9
5. Associate trade terms with the appropriate tools and equipment.	
6. Demonstrate the correct procedures for assembling and disassembling scaffolding according to federal safety regulations, under the supervision of a competent person.	S-MD 7
Performance Tasks	
1. Identify masonry hand and power tools.	L 11-12.6
2. Assemble and disassemble scaffolding under the supervision of a competent person, according to federal safety regulations.	S-IC 6
<p>Module 28103-04 - Measurements, Drawings, and Specifications This module guides the trainee in the process of using mathematics to figure distances, areas, and volumes for masonry construction work; describes the information typically found on drawings and construction plans for residential construction; and addresses the specifications used in the construction process. A set of drawings is also included.</p>	RST 11-12.4
1. Work with denominate numbers.	N-Q 1, N-Q 2, N-Q 3
2. Read a mason's measure.	N-Q 1, N-Q 2, N-Q 3
3. Convert measurements in the U.S. Customary (English) system into their metric equivalents.	N-Q 1, N-Q 2, N-Q 3, F-IF 4, F-IF 8, F-BF 1, F-BF 3, F-LE 1b, A-SSE 3, A-CED 2, A-CED 4, A-REI 1, A-REI 2, A-REI 3
4. Recognize, identify, and calculate areas, circumferences, and volumes of basic geometric shapes.	G-GMD 3, G-MG 1, G-MG 2, G-MG 3
5. Identify the basic parts of a set of drawings.	G-GMD 4
6. Discuss the different types of specifications used in the building industry and the sections that pertain to masonry.	S-IC 6
Performance Tasks	
1. Use a mason's rule to measure a space and calculate its volume.	G-MG 3
2. Use a mason's rule to measure a space and estimate the number of bricks to build a wall across it.	G-MG 1, G-MG 2, G-MG 3
3. Interpret information on blueprints.	G-GMD 4

Introductory Craft Skills	Common Core Standards
Module 28104-04 - Mortar This module explains the properties of mortar and the components that make up the mixture; describes the chemical and physical properties of cement, sand, and various types of admixtures; and discusses procedures for storing materials and mixing mortar.	RST 11-12.3, SL 11-12.1
1. Name and describe the primary ingredients in mortar and their properties.	
2. Identify the various types of mortar used in masonry work.	
3. Describe the common admixtures and their uses.	
4. Identify the common problems found in mortar application and their solutions.	S-ID 9, S-IC 6, S-MD 7
5. Properly set up the mortar mixing area.	
6. Properly mix mortar by hand.	N-Q 1, N-Q 2, N-Q 3, A-SSE 1, A-CED 1, A-CED 2, A-CED 4, A-REI 1, A-REI 2, A-REI 3, F-IF 4, F-BF 1, F-LE 1b, F-LE 5
7. Properly mix mortar with a mechanical mixer.	
Performance Tasks	
1. Properly set up the mortar mixing area.	
2. Properly mix mortar by hand	
3. Properly mix mortar with a mechanical mixer.	
Module 28105-04 - Masonry Units and Installation Techniques This module introduces the methods and procedures used in masonry unit installation. Topics include basic techniques for laying brick and block, using mortar to bond masonry units, and patterns. Hands-on skill development in constructing wythes and courses is also emphasized.	RST 11-12.3, SL 11-12.1
1. Describe the most common types of masonry units.	
2. Describe and demonstrate how to set up a wall.	G-CO 12
3. Lay a dry bond.	G-CO 12
4. Spread and furrow a bed joint, and butter masonry units.	
5. Describe the different types of masonry bonds.	N-Q 1, N-Q 2, N-Q 3, A-SSE 1, G-MG 1, G-MG 2, G-MG 3
6. Cut brick and block accurately.	N-Q 1, N-Q 2, N-Q 3
7. Lay masonry units in a true course.	N-Q 1, N-Q 2, N-Q 3, G-CO 12
Performance Tasks	
1. Lay a dry bond.	
2. Accurately cut masonry units with a brick set and masonry hammer, a block set and mash, and a masonry hammer, power saw, and splitter.	N-Q 1, N-Q 2, N-Q 3
3. Spread, edge, and furrow bed joints.	

Introductory Craft Skills	Common Core Standards
4. Butter bricks and blocks and place them on a bed joint.	
5. Lay masonry units in courses that are true for height, level, plumb, and straightness.	N-Q 1, N-Q 2, N-Q 3, G-CO 12
6. Build a rackback corner lead.	G-CO 12
7. Lay masonry units to the line.	
Module 28201-05 - Residential Plans and Drawing Interpretation	
1. Explain the organization of residential plans and drawings.	
2. Interpret dimensions and scales on drawings.	F-LE 1b, N-Q 1
3. Interpret information on residential plans.	N-Q 1, G-GMD 4, G-MG 1, G-MG 3
4. Estimate material quantities from plans and drawings.	N-Q 1, N-Q 2, N-Q 3, G-GMD 4, G-MG 1, G-MG 2, G-MG 3
Performance Tasks	
1. From a plan, calculate the square footage of one elevation, including openings.	N-Q 1, N-Q 3, G-GPE 7, G-GMD 4, G-MG 1, G-MG 3
2. Estimate the amount of brick and mortar from that same elevation.	N-Q 1, N-Q 2, N-Q 3, G-GMD 4, G-MG 1, G-MG 2, G-MG 3, F-IF 4, F-IF 5
3. Estimate the size and number of lintel block for that same elevation.	N-Q 1, N-Q 2, N-Q 3, G-GMD 4, G-MG 1, G-MG 2, G-MG 3
Module 28202-05 - Residential Masonry	
2. Identify and explain the characteristics, uses, and installation techniques for brick pavers.	
3. Lay out and build steps, patios, and decks made from masonry units.	N-Q 1, N-Q 2, N-Q 3, G-GMD 4, G-MG 1, G-MG 2, G-MG 3
4. Lay out and build chimneys and fireplaces.	N-Q 1, N-Q 2, N-Q 3, G-GMD 4, G-MG 1, G-MG 2, G-MG 3
Module 28203-05 - Grout and Other Reinforcement	
1. Name and describe the primary ingredients in grout and their properties.	S-ID 9, S-IC 6
2. Identify the different types of grout used in masonry work.	S-ID 9, S-IC 6
3. Describe the common admixtures and their uses.	S-ID 9, S-IC 6
4. Describe the use of steel bar reinforcement in masonry construction.	S-ID 9, S-IC 6
5. Apply grout in low and high lifts using the proper techniques.	S-ID 9, S-IC 6, S-MD 7
6. Place grout in a hollow block wall and rod it into place.	

Introductory Craft Skills	Common Core Standards
Performance Tasks	
1. Place grout in a hollow block wall and rod in place.	
Module 28204-05 - Metal Work in Masonry	
1. Describe the uses and installation of vertical reinforcement.	S-ID 9, S-IC 6, S-MD 7
2. Describe the uses and installation of different types of horizontal joint reinforcements and ties.	S-ID 9, S-IC 6, S-MD 7
3. Describe the uses and installation of different anchors, fasteners, and embedded items.	S-ID 9, S-IC 6, S-MD 7
4. Install hollow metal frames.	
5. Describe the functions of sills and lintels.	S-ID 9, S-IC 6, S-MD 7
6. Install sills and lintels.	
7. Install metal hardware.	
Performance Tasks	
3. Lay one wythe of brick against one side of the frame.	
4. Install hardware cloth unit ties in every other course.	
Module 28205-05 - Advanced Laying Techniques	RST 11-12.3 SL 11-12.1
1. Recognize the structural principles and fundamental uses of basic types of walls.	S-ID 9, S-IC 6, S-MD 7
2. Recognize the requirement for, and function of, control joints and expansion joints.	S-ID 9, S-IC 6, S-MD 7
3. Build various types of walls using proper reinforcement, jointing, and bonding techniques.	
5. Identify and explain the different types of masonry arches used today.	
6. Lay out a semicircular arch and a jack arch.	G-CO 12, G-C 2, G-C 4, G-C 5, G-GMD 1, G-GMD 4, G-MG 1, G-MG 3
Performance Tasks	
1. Lay a wythe of brick against a block wythe or wood frame to make a composite wall. Use ties and a collar joint.	N-Q 1, N-Q 2, N-Q 3, G-CO 6, G-CO 12, G-GMD 4, G-MG 1, G-MG 2, G-MG 3
2. Lay out specialty structures and arches.	N-Q 1, N-Q 2, N-Q 3, G-CO 6, G-CO 12, G-C 2, G-C 4, G-C 5, G-GMD 1, G-GMD 4, G-MG 1, G-MG 2, G-MG 3

Introductory Craft Skills	Common Core Standards
Module 28206-05 - Construction Techniques and Moisture Control	
1. Explain and demonstrate techniques for constructing masonry around windows, doors, and other openings.	
2. Explain the requirements for wall bracing, and demonstrate the techniques used to construct pilasters and other types of bracing.	
3. Identify the various types of insulation used in conjunction with masonry construction, and explain installation techniques.	
4. Identify the need for moisture control in various types of masonry construction, and demonstrate the techniques used to eliminate moisture problems.	
5. Construct corbeling in a double-wythe wall.	
6. Join intersecting walls.	
7. Install flashing.	
Performance Tasks	
1. Construct a four-course corbel starting at the fifth course of a double-wythe wall.	
2. Construct an intersecting block wall joined with wire mesh or metal lath.	
3. Install a row of flashing in an anchored veneered wall.	
Module 28207-05 - Construction Inspection and Quality Control	SL 11-12.1
1. Describe industry standards for quality control.	S-ID 9, S-IC 6, S-MD 7
2. Describe how to build masonry sample panels and prisms.	
Module 28301-05 - Masonry in High-Rise Construction	
1. Recognize and explain the use of high-rise construction equipment.	
2. Identify construction sequence in high-rise construction.	
3. State the safety procedures in high-rise construction.	
5. Properly put on a safety harness, lanyard, and lifeline.	
Performance Tasks	
6. Demonstrate hand signals used for lifting materials.	
Module 28302-05 - Specialized Materials and Techniques	
1. Explain the various techniques used to provide adequate protection during hot- and cold-weather masonry construction.	S-ID 9, S-IC 6, S-MD 7
2. Describe all-weather construction techniques.	S-ID 9, S-IC 6, S-MD 7
3. Describe techniques for surface-bonding mortar.	S-ID 9, S-IC 6, S-MD 7
4. Demonstrate techniques for construction of stone walls and other stone building surfaces.	N-Q 1, N-Q 3
5. Demonstrate basic knowledge of various building materials such as glass block and refractory brick.	

Introductory Craft Skills	Common Core Standards
Module 28303-05 - Repair and Restoration	RST 11-12.3
1. Recognize signs of deterioration in masonry structures.	S-ID 9, S-IC 6, S-MD 7
2. Describe the causes of efflorescence, cracking, and faulty mortar joints.	S-ID 9, S-IC 6, S-MD 7
3. Describe the procedures for preventing and correcting efflorescence, cracking, and faulty mortar joints.	S-ID 9, S-IC 6, S-MD 7
4. Describe the procedures for preventing and correcting water damage in basements.	S-ID 9, S-IC 6, S-MD 7
5. Describe the procedures for rebuilding fireplaces.	S-ID 9, S-IC 6, S-MD 7
6. Replace a damaged brick in a wall.	
7. Repair mortar joints.	
Performance Tasks	
1. Replace a damaged brick in a wall.	
2. Repair mortar joints in a brick wall by tuckpointing.	
Module 28304-05 - Commercial Drawings	RST 11-12.4
1. Recognize the difference between commercial and residential construction drawings.	N-Q 1
2. Identify the basic keys, abbreviations, and other references contained in a set of commercial drawings.	N-Q 1
3. Accurately read a set of commercial drawings.	N-Q 1, G-GMD 4, G-MG 1, G-MG 3
4. Explain basic construction details and concepts employed in commercial construction.	G-GMD 4, G-MG 1, G-MG 3
Performance Tasks	
2. Calculate the floor area of each room in a floor plan.	N-Q 1, N-Q 3, G-GPE 7, G-GMD 4, G-MG 1, G-MG 3

Introductory Craft Skills	Common Core Standards
Module 28305-05 - Estimating	
1. Explain and apply basic materials estimating procedures for concrete block and brick construction.	N-Q 1, N-Q 2, N-Q 3, G-GMD 4, G-MG 1, G-MG 2, G-MG 3, F-IF 3, F-IF 4, F-IF 5, F-IF 8, F-BF 1, F-LE 1, F-LE 5
2. Explain and apply basic estimating procedures for reinforcements, ties, and other materials.	N-Q 1, N-Q 2, N-Q 3, G-GMD 4, G-MG 1, G-MG 2, G-MG 3, F-IF 3, F-IF 4, F-IF 5, F-IF 8, F-BF 1, F-LE 1, F-LE 5
3. Explain and apply procedures for estimating quantities of mortar and mortar materials.	N-Q 1, N-Q 2, N-Q 3, G-GMD 4, G-MG 1, G-MG 2, G-MG 3, F-IF 3, F-IF 4, F-IF 5, F-IF 8, F-BF 1, F-LE 1, F-LE 5
Performance Tasks	
2. Complete a set of estimating worksheets.	
Module 28306-05 - Site Layout—Distance Measurement and Leveling	
2. Convert measurements stated in feet and inches to equivalent measurements stated in decimal feet, and vice versa.	N-Q 1, N-Q 2, N-Q 3
6. Recognize, use, and properly care for tools and equipment associated with differential leveling.	
7. Use a builder's level or transit and differential leveling procedures to determine site and building elevations.	N-Q 1, N-Q 2, N-Q 3, G-CO 6, G-CO 12, G-GMD 4, G-MG 1, G-MG 2, G-MG 3
9. Check and/or establish 90-degree angles using the 3–4–5 rule.	N-Q 1, N-Q 2, N-Q 3, G-CO 5, G-CO 6, G-CO 12, G-SRT 5, G-SRT 8, G-GMD 4, G-MG 1, G-MG 3
Performance Tasks	
6. Use a builder's level, leveling rods, and differential leveling procedures to determine site and building elevations.	N-Q 1, N-Q 2, N-Q 3, G-CO 6, G-CO 12, G-GMD 4, G-MG 1, G-MG 2, G-MG 3
9. Check and/or establish 90-degree angles using the 3–4–5 rule.	N-Q 1, N-Q 2, N-Q 3, G-CO 5, G-CO 6, G-CO 12, G-SRT 5, G-SRT 8, G-GMD 4, G-MG 1, G-MG 3

Introductory Craft Skills	Common Core Standards
Module 28307-05 - Introductory Skills for the Crew Leader	
2. Understand and incorporate leadership skills into work habits, including communication, motivation, team building, problem solving, and decision-making skills.	SL 11-12.1
1. Discuss current issues and organizational structure in the construction industry today.	
3. Demonstrate an awareness of safety issues, including the cost of accidents and safety regulations.	W 11-12.3, W 11-12.4
5. Show a basic understanding of the planning process, scheduling, and cost and resource control.	A-CED 1, A-CED 2, A-CED 3, N-Q 1, N-Q 2, N-Q 3, F-IF 4, F-IF 5, F-IF 6, F-LE 1, S-IC 6

Codes for Common Core English Language Arts and Literacy are:

L = Language

SL = Speaking and Listening

RST = Reading for Literacy in
Science and Technical
Subjects

WHST = Writing for Literacy in
History/Social Studies,
Science, and Technical
Subjects

Codes for Common Core Mathematics are:

A-SSE = Algebra: Seeing
Structure in Expressions

G-CO = Geometry: Congruence

S-ID = Statistics and Probability:
Interpreting Categorical and
Quantitative Data

A-CED = Algebra: Creating
Equations

G-SRT = Similarity, right
Triangles, and
Trigonometry

S-IC = Statistics and Probability:
Making Inferences and
Justifying Conclusions

A-REI = Algebra: Reasoning with
Equations and Inequalities

G-C = Geometry: Circles

S-MD = Statistics and Probability:
Using Probability to Make
Decisions

F-IF = Functions: Interpreting
Functions

G-GMD = Geometry: Geometric
Measurement and
Dimension

F-BF = Functions: Building
Functions

G-MG = Geometry: Modeling with
Geometry

F-LE = Functions: Linear,
Quadratic, and Exponential
Models

N-Q = Number and Quantity:
Quantities