

# Masonry Blueprint

This Blueprint contains the subject matter content of this Skill Connect Assessment. This Blueprint does **NOT** contain the information one would need to fully prepare for a SkillsUSA Championships contest. Please refer to the *SkillsUSA Championships Technical Standards* CD-ROM for the current year or purchase and download the relevant "Contest Singles." Both are available through [www.skillsusa.org](http://www.skillsusa.org) > Shop > Educational Materials Catalog.

## Standards and Competencies

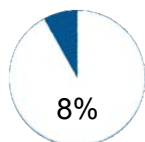
Competencies are weighted throughout the assessment. The percent shown is the weight of the competency. There are 50 questions per assessment.

\* Considered essential competencies

\*\* Should be mastered at the journeyman level

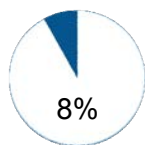
All other items are considered supplemental

### Practice safe brick and masonry techniques according to industry standards



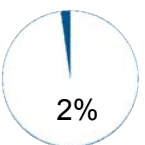
- \*Choose proper tools and materials
- \*Perform work in a reasonable amount of time as determined by the instructor and/or industry standards
- \*\*Lay up masonry products in an accurate and professional manner
- \*Load and unload materials as directed
- \*Clean up work areas properly and thoroughly

### Model safety standards according to and following OSHA regulations



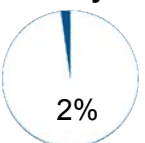
- \*Demonstrate appropriate safety precautions when performing all tasks
- \*Demonstrate awareness of potential hazards when performing all tasks
- \*Accept responsibility for the safety of other workers
- \*Keep work areas neat and organized
- \*Wear proper safety equipment and clothing
- Follow prescribed OSHA standards

### Utilize hand tools and equipment according to industry standards



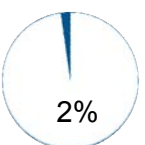
- \*Cut masonry safely around others
- \*Place mortar cautiously in the mortar pan or on the mortar board
- \*Keep tools out of the paths of other people working on the job
- \*Handle tools properly

### \*Identify and utilize basic hand tools used in brick masonry according to industry standards



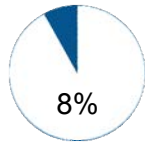
- \*Demonstrate an understanding of the specific uses of each hand tool
- \*Practice the safety rules for each hand tool
- \*Identify quality tools
- \*Store and care for hand tools

### Utilize measuring tools according to industry standards



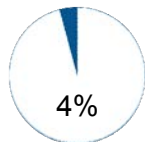
- Use and maintain a modular ruler and a spacing ruler
- Set and use a story pole
- Power tool identification and usage

**Identify and use masonry power tools according to industry standards as set forth by the SkillsUSA technical committee**



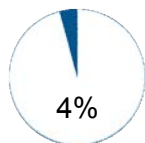
- \*Demonstrate the specific uses of each power tool
- \*Practice the safety rules for each power tool
- Maintain power tools
- \*Set up power tools correctly

**Use equipment according to industry standards as set forth by the SkillsUSA Technical Committee**



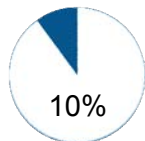
- \*Identify equipment generally used in brick masonry
- Correctly use each piece of equipment
- Store, maintain and repair all equipment
- Inspect, assemble and disassemble rigging and scaffolding properly

**Use masonry levels according to industry standards as set forth by the SkillsUSA technical committee**



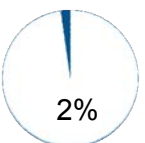
- \*\*Use a 24" and 48" level for plumbing and leveling
- \*Care for and maintain a level

**Possess an appropriate knowledge of the fundamental theories in brick masonry**



- Demonstrate knowledge of trade terminology
  - \*\*Identify terms used in brick masonry
  - \*\*Incorporate trade terminology into oral communication relating to masonry tasks
- Demonstrate knowledge of basic math
  - \*Add, subtract, multiply and divide with whole numbers, decimals and fractions
  - \*Figure proportions to mix masonry materials according to specifications
  - \*Compute percentages to estimate and determine material requirements, work performed, schedules and costs
  - \*Express answers relative to the trade
- Read blueprints
  - \*Read basic drawings and sketches and understand the information contained in them
  - \*Know the meanings of basic architectural symbols and abbreviations
  - \*Use a builder's level relative to a benchmark

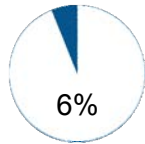
**Use materials and methods according to industry standards as set forth by the SkillsUSA technical committee**



- Use brick masonry materials with accuracy
  - \*Arrange masonry materials for efficient use
  - \*Place mortar pans properly
  - \*Temper or shake-up mortar with proper shovels
- Utilize hod-carrying
  - \*Arrange masonry materials for efficient use
  - \*Place mortar pans properly
  - \*Temper or shake-up mortar with proper shovels

- Use trowels properly
  - \*\*Manipulate a trowel properly
  - \*\*Cut and roll, and cut and cup mortar to load trowel properly
  - \*\*Spread and furrow mortar properly

**Prepare mortar according to industry standards as set forth by the SkillsUSA technical committee**



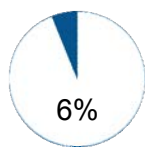
- Follow correct safety practices when mixing mortar
- \*Proportion mortar ingredients for specific mixes
- \*Mix mortar manually with hoe and mortar box
- \*Mix mortar with a mortar mixer

**Demonstrate bonding methods according to industry standards as set forth by the SkillsUSA technical committee**



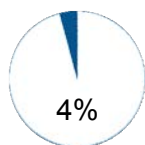
- \*Possess knowledge of different types of bonding used in masonry construction
- \*\*Lay out bond
- \*\*Determine coursing

**Utilize tool and point joints according to industry standards as set forth by the SkillsUSA technical committee**



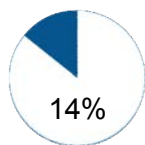
- \*\*Use tool concave joints
- Use a tool rake, weather, V-jointer, grapevine and struck joints
- Perform cut/rough joints
- \*Tuck-point a wall properly
- \*\*Brush and touch up a wall

**Clean masonry and structural tile according to industry standards as set forth by the SkillsUSA technical committee**



- \*Follow correct procedures for keeping masonry work clean
- \*Follow correct procedures in cleaning brick and structural tile
- \*Follow correct procedures for rubbing and tuck pointing concrete block and slag block
- Clean and tuck-point stonework

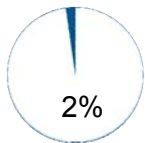
**Lay brick and blocks according to industry standards as set forth by the SkillsUSA technical committee**



- Lay straight brick wall
  - \*Lay brick at the rate of 75-100 bricks per hour
  - \*\*Attach a line block and line pins to a wall
  - \*\*Set a trig
  - \*\*Lay brick to a line while holding bond
  - \*\*Throw a full head joint
- Lay straight block wall
  - \*Spread bed joints and throw on full head joints for block units
  - \*Lay block units to the line
- Build the brick corner
  - \*Lay out a wall in preparation for building a brick corner
  - \*Construct a rack-back lead
  - \*Construct an outside and inside corner lead (+ or – 1 1/16")
- Lay the block corner
  - \*Lay out a wall in preparation for building a block corner

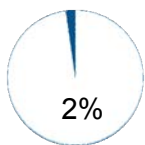
- \*Install wire reinforcements in bed joints
- \*Build a block corner to a specified height
- Lay brick veneer wall
  - Determine type of brick to be used
  - \*Bond the wall
  - \*Scale each course
  - \*Lay brick in mortar to scale
  - \*Secure wall with ties at desired intervals
  - \*Point and joint the wall
- Lay brick masonry cavity wall
  - \*Determine width of cavity and type of brick to be used
  - \*Construct components of the wall in the proper sequence
  - \*Spread mortar to achieve the required bond without getting mortar into the cavity
  - \*\*Install wall ties that join the exterior and interior wythes together into a single cavity wall
  - \*\*Install flashings and construct weep holes in a manner that permits effective drainage of moisture from cavity
  - \*\*Construct and maintain the cavity during construction so that the air space provides insulation
- Lay single Wythe brick (load-bearing wall using units that are a minimum of 5" wide)
  - Determine type of brick to be used
  - \*Bond the wall
  - \*Scale each course
  - \*Lay brick in mortar to scale
  - \*\*Secure wall with ties at desired intervals
  - \*Point and joint the wall
- Lay a brick and block composite wall
  - Determine type of brick and block to be used
  - \*Bond the wall
  - \*Scale each course
  - \*Lay brick and block in mortar to scale
  - \*Secure wall with ties at desired intervals
  - \*Point and joint the wall

**Construct fireplaces and chimneys according to industry standards as set forth by the SkillsUSA technical committee**



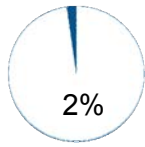
- Identify various components of a fireplace
- Build a fireplace according to plans
- Identify various components of a chimney
- Build a one-flue chimney from given plans

**Construct arches, columns and piers according to industry standards as set forth by the SkillsUSA technical committee**



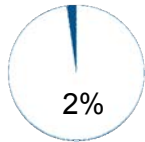
- Demonstrate knowledge of architectural features including aesthetic trims, course designs, period and antique applications
- Construct an arch using given plans
- Construct a column using given plans
- Construct a pier using given plans

### **Lay floors, pavers and stairs according to industry standards as set forth by the SkillsUSA technical committee**



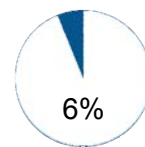
- Lay floors according to given plans
- Lay pavers according to given plans
- Lay stairs according to given plans
- Concrete work

### **Prepare footers according to industry standards as set forth by the SkillsUSA technical committee**



- Lay out footings properly
- Place rebar properly
- Place and rough finish concrete properly

### **Lay out and establish foundations according to industry standards as set forth by the SkillsUSA technical committee**



- Lay out and establish grades for foundation
- \*Establish corners and lay out concrete block according to a specific bonding plan
- Lay foundation wall to joist and brick shelf height
- Waterproof foundation wall
- \*Install flashing, anchor bolts, termite shield and weep holes

### **Committee Identified Academic Skills**

The SkillsUSA national technical committee has identified that the following academic skills are embedded in the masonry training program and assessment:

#### **Math Skills**

- Use fractions to solve practical problems
- Use proportions and ratios to solve practical problems
- Simplify numerical expressions
- Solve practical problems involving percents
- Measure angles
- Find surface area and perimeter of two-dimensional objects
- Find volume and surface area of three-dimensional objects
- Make predictions using knowledge of probability
- Make comparisons, predictions, and inferences using graphs and charts
- Solve problems using proportions, formulas and functions
- Find slope of a line
- Find arc length and the area of a sector

#### **Science Skills**

None Identified

#### **Language Arts Skills**

- Provide information in conversations and in group discussions

### **Connections to National Standards**

State-level academic curriculum specialists identified the following connections to national academic standards.

#### **Math Standards**

- Numbers and operations

- Algebra
- Geometry
- Measurement
- Problem solving
- Communication
- Connections
- Representation

**Source:** NCTM Principles and Standards for School Mathematics. To view high school standards, visit: <http://www.nctm.org/standards/content.aspx?id=16909>.

### **Science Standards**

- Understands the structure and properties of matter
- Understands the sources and properties of energy
- Understands forces and motion
- Understands the nature of scientific inquiry

**Source:** McREL compendium of national science standards. To view and search the compendium, visit: [www.mcrel.org/standards-benchmarks/](http://www.mcrel.org/standards-benchmarks/).

### **Language Arts Standards**

- Students apply a wide range of strategies to comprehend, interpret, evaluate and appreciate texts. They draw on their prior experience, their interactions with other readers and writers, their knowledge of word meaning and of other texts, their word identification strategies, and their understanding of textual features (e.g., sound-letter correspondence, sentence structure, context, graphics)
- Students adjust their use of spoken, written and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes
- Students use a variety of technological and information resources (e.g., libraries, databases, computer networks, video) to gather and synthesize information and to create and communicate knowledge
- Students use spoken, written, and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion, and the exchange of information)

**Source:** IRA/NCTE Standards for the English Language Arts. To view the standards, visit: [www.readwritethink.org/standards/index.html](http://www.readwritethink.org/standards/index.html).