Massachusetts Career Technical Education

Cabinetmaking Framework

2014

DESE is in the process of updating all CTE Frameworks. This framework was adopted in 2014. More information about the process to update frameworks will be provided in DESE’s CCTE Newsletter.

# [Strand 2: Technical Knowledge and Skills](#_bookmark0)

##### Cabinetmaking Health and Safety Skills

* + 1. Complete safety training on all related equipment and materials.
			1. Describe and demonstrate cabinetmaking health practices.
			2. Demonstrate body mechanics for the work place including ergonomics according to OSHA standards.
			3. Explain various safety concerns and issues in the cabinetmaking field.
			4. Explain dangers associated with finishes and finishing operations.
			5. Describe and demonstrate cabinetmaking safety practices.
			6. Explain and discuss OSHA rules and regulations pertaining to the cabinetmaking field.
			7. Demonstrate first aid procedures according to policy and OSHA standards.
			8. Identify and apply OSHA and other health and safety regulations related to tasks and jobs in cabinetmaking.
		2. Performance Example:
			- Students will successfully complete OSHA 10-hour certification training.

##### Wood Technology

* + 1. Describe properties of wood.
			1. Identify wood species, growth, and characteristics.
			2. Discuss wood harvesting, drying, and defects.
			3. Define wood grading and ordering procedures.
		2. Performance Examples:
			- Identify unknown samples of various wood species.

##### Prints and Layout Projects

* + 1. Read and interpret working drawings.
			1. Determine true measurements from print using Architect’s Scale.
			2. Identify and define basic print terms.
			3. Read working, perspective, cabinet, and shop drawings.
		2. Performance Examples:
			- Draw a small cabinet project to scale.
			- Make a stock list from a working drawing.
		3. Layout a project.
			1. List woodwork components.
			2. Create a layout rod.
			3. Compile a material takeoff.
			4. Layout woodwork for fabrication.

2.C.02 Performance Example:

* The student will demonstrate the techniques used in developing the layout for a project using a materials list and the creation of a layout rod.
	+ 1. Demonstrate methods of measurement.
			1. Read a ruler in sixteenths of an inch.
			2. Identify and use layout, measuring, and checking devices.

2.C.03 Performance Example:

* The student will demonstrate the methods for measuring by preparing a project layout.

##### Hand Tools

* + 1. Demonstrate safe use of hand tools.
			1. Demonstrate use and maintenance of sharp edge tools (i.e. saws, chisels, and boring tools).
			2. Demonstrate use and maintenance of pounding and prying tools.
		2. Performance Example:
			- Fabricate small project using hand tools

##### Cabinetmaking Joinery Fabrication

* + 1. Layout and fabricate joinery.
			1. Layout and fabricate lap joints.
			2. Layout and fabricate dovetail.
			3. Layout and fabricate mortise and tenon joints.
			4. Layout and fabricate tongue and groove joints.
			5. Layout and fabricate miter joints.
			6. Layout and fabricate spline.
			7. Layout and fabricate bridle.
			8. Layout and fabricate dado joints.
			9. Layout and fabricate dowel joints.
			10. Layout and fabricate rabbet joints.
			11. Layout and fabricate cope and stick joints.
			12. Layout and fabricate scarf joints.
			13. Layout and fabricate biscuit joints.
			14. Layout and fabricate butt joints.
		2. Performance Examples:
			- Create a joint tree using various woodworking joints.
			- Identify and list various woodworking joints found throughout your home.

##### Hand Sanding

* + 1. Identify and demonstrate hand sanding equipment and procedures.
			1. Identify and select appropriate sandpaper for a specific application.
			2. Demonstrate flat sanding.
			3. Demonstrate curved sanding.
		2. Performance Example:
			- Sand project by hand using ascending grits.

##### Gluing and Clamping

* + 1. Describe and apply adhesives and demonstrate clamping procedures.
			1. Identify types and uses of glues.
			2. Identify types and uses of clamps.
			3. Demonstrate flat clamping procedures.
			4. Demonstrate curve clamping procedures.
		2. Performance Example:
			- Glue and clamp a panel.

##### Stationary Power Equipment

* + 1. Set up and operate a jointer.
			1. Demonstrate face jointing.
			2. Demonstrate edge jointing.
			3. Demonstrate tapering.
		2. Performance Examples:
			- Pass a written safety test with 100% accuracy.
			- Flatten a face of a board on the jointer.
		3. Operate a planer.
			1. Plane stock to specified thickness.
			2. Square stock using a planer.

2.H.02 Performance Example:

* The student will demonstrate the use of a planer according to industry and OSHA standards.
	+ 1. Operate a band saw.
			1. Change blade on a band saw.
			2. Cut curves.
			3. Rip using a fence.
			4. Re-saw stock.

2.H.03 Performance Example:

* The student will demonstrate the operation and use of a band saw.
	+ 1. Set up and operate a table saw.
			1. Change blade on a table saw.
			2. Perform ripping operation.
			3. Perform crosscut operation.
			4. Perform specialty cuts including dado, rabbet, groove, chamfer, and miter.

2.H.04 Performance Example:

* The student will demonstrate the setup and operation of a table saw using the crosscut and ripping techniques.
	+ 1. Set up and operate a drill press.
			1. Drill hole to given depth.
			2. Drill multiple holes using stops.
			3. Drill holes using jigs and fixtures.

2.H.05 Performance Example:

* The student will demonstrate the operation of a drill press using various drill jigs and fixtures according to industry and OSHA standards.
	+ 1. Set up and operate a grinder.
			1. Grind cutting tools including chisels and planes.

2.H.06 Performance Example:

* The student will demonstrate the techniques for operating a grinder for sharpening tool bits according to industry and OSHA standards.
	+ 1. Set up and operate a lathe.
			1. Perform spindle turning.
			2. Perform faceplate turning.
			3. Perform duplicate turning.

2.H.07 Performance Example:

* The student will demonstrate the use of wood turning using lathe equipment according to industry and OSHA standards.
	+ 1. Set up and operate a shaper.
			1. Identify and install shaper cutters.
			2. Perform straight edge shaping.
			3. Perform face shaping.

2.H.08 Performance Example:

* The student will demonstrate the operation of a shaper for edge and face shaping according to industry and OSHA standards
	+ 1. Set up and operate different types of sanders.
			1. Sand stock using wide belt sander.
			2. Sand stock using edge sander.
			3. Sand stock using spindle sander.

2.H.09 Performance Example:

* The student will demonstrate the operation of various types of sanding equipment both electrical and air operated according to industry and OSHA standards.
	+ 1. Identify and demonstrate the use of computer numerically controlled machines.
			1. Describe the basic fundamentals of design software.
			2. Produce a drawing using design software.
			3. Use CAD/CAM equipment to manufacture a product or component.

2.H.10 Performance Example:

* The student will demonstrate the operation of CNC equipment, according to industry and OSHA standards, produce a drawing using design software, and describe the fundamentals of design software.
	+ 1. Set up and operate an electric miter box saw.
			1. Perform crosscut, miter, and compound miter.
			2. Perform multiple cuts using stops.

2.H.11 Performance Example:

* The student will demonstrate the operation of an electric miter box using crosscut and compound miter techniques, according to industry and OSHA standards
	+ 1. Use production equipment.
			1. Demonstrate the use of a 32mm machine.
			2. Demonstrate the use of a horizontal boring machine.
			3. Demonstrate the use of an edge bander.
			4. Demonstrate the use of a power feeder.
			5. Demonstrate the use of a panel saw.
			6. Demonstrate the use of a radial arm saw.

2.H.12 Performance Example:

* The student will demonstrate the use of variety production equipment according to industry and OSHA standards. These may include a horizontal boring machine, and edge bander, power feeder and panel saw.

##### Portable Power Tools

* + 1. Demonstrate the ability to use a pistol drill.
			1. Identify correct drill bit.
			2. Drill holes to given dimension.
		2. Performance Examples:
			- Pass a written safety test with 100% accuracy.
			- Accurately bore a hole to a specified dimension.
		3. Identify the methods of using an oscillating sander.
			1. Identify sandpaper according to grit.
			2. Sand surfaces with an oscillating sander.

2.I.02 Performance Example:

* The student will demonstrate the use of an oscillating sander by sanding surfaces and identifying the various sanding grits used for each operation according to industry and OSHA standards.
	+ 1. Demonstrate the ability to use an electric router.
			1. Identify types of router bits.
			2. Rout edges.
			3. Demonstrate ability to make specialty cuts using guides and templates.

2.I.03 Performance Example:

* The student will demonstrate the operation of a router; identify the tooling and the techniques for various surfaces according to industry and OSHA standards.
	+ 1. Demonstrate the use of a belt sander.
			1. Change belt on a belt sander.
			2. Sand a surface using a belt sander.

2.I.04 Performance Example:

* The student will demonstrate the use and operation of a belt sander according to industry and OSHA standards
	+ 1. Demonstrate the use of a sabre saw.
			1. Change blade of a sabre saw.
			2. Cut curves and straight lines using a sabre saw.

2.I.05 Performance Example:

* The student will demonstrate the use of a sabre saw to cut curved and straight lines according to industry and OSHA standards.
	+ 1. Demonstrate the use of a circular saw.
			1. Use circular saw.

2.I.06 Performance Example:

* The student will demonstrate operation of a circular saw according to industry and OSHA standards.
	+ 1. Demonstrate the use of a biscuit joiner.
			1. Use biscuit joiner.

2.I.07 Performance Example:

* The student will demonstrate the operation of a biscuit joiner according to industry and OSHA standards.
	+ 1. Demonstrate how to use pneumatic fasteners.
			1. Use pneumatic fasteners.

2.I.08 Performance Example:

* The student will demonstrate the operation of pneumatic fasteners according to industry and OSHA standards

##### Woodwork Quality Standards

* + 1. Identify quality standards of woodworking materials.
			1. Identify Sheet goods.
			2. Identify Solid woods.
			3. Identify Mill work.
		2. Performance Example:
			- Differentiate between sheet goods.

##### Casework and Furniture Fabrication.

* + 1. Machine parts and assemble components.
			1. Describe and demonstrate planning, measuring, and layout of furniture/casework for a specified area.
			2. Layout, machine, and demonstrate assembly and installation of furniture/casework.
			3. Construct and install doors and drawers.
		2. Performance Example:
			- Cut parts and assemble a base cabinet.

##### Hardware/Fasteners

* + 1. Install hardware and fasteners.
			1. Identify types and describe uses of hardware and fasteners.
			2. Layout and Install hardware and fasteners.
		2. Performance Example:
			- Select and install hardware from a catalog for a project.

##### Architectural Millwork

* + 1. Fabricate and install architectural millwork.
			1. Identify and fabricate trim and molding.
			2. Install trim and molding.
		2. Performance Example:
			- Install base, chair rail, and crown molding on a wall.

##### Countertops

* + 1. Create template, fabricate, and install counters.
			1. Identify countertop materials.
			2. Create template and fabricate countertops.
			3. Install countertops.
		2. Performance Example:
			- Create template, fabricate, and install a countertop.

##### Finishing

* + 1. Select and apply finishes.
			1. Prepare surface for finishing.
			2. Identify and use appropriate methods of finishes.
			3. Identify and use stains, sealers, and top coats.
		2. Performance Examples:
			- Apply finish to a project using spray equipment.
			- Research the use of HVLP spray equipment and prepare a report to describe its applications.

# [Strand 3: Embedded Academics](#_bookmark0)

### [Embedded English Language Arts and Literacy](#_bookmark0)

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| CVTELearning Standard Number | Strand Coding Designation Grades ELAsLearning Standard Number | Text of English Language Arts Learning Standard |
| 2.B.012.C.012.F.012.G.012.H.082.J.012.L.012.K.012.M.012.N.012.O.01 | RST Grades 9-10 #4 | Determine the meaning of symbols, key terms, and other domain- specific words and phrases as they are used in a technical context relevant to grades 9-10 texts and topics.Performance Example:Students will select the proper hardware from a catalog for a project. |
| 2.C.022.H.10 | WHST Grades 9-10 #2(a, d) | Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.Performance Example:Students will make a stock list from a working drawing. |
| 2.B.012.G.012.J.012.L.012.K.012.M.012.O.01 | RST Grades 9-10 #5 | Analyze the structure of relationships among concepts in a text, including relationships among key terms.Performance Example:Students will pass a written safety test with 100% outcome. |
| 2.B.01 | SL Grades 9-10 #1 (a-d) | Initiate and participate effectively in a range of collaborative discussions with diverse partners on grades 9-10 topics, texts, and issues, building on others' ideas and expressing their own clearly andpersuasively.Performance Example:* Students will visit a lumber mill, where they will be encouraged to engage in discussions with diverse partners on topics including the properties, characteristics, and harvesting of various wood products and their uses.
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| 2.C.012.C.032.K.01 | RST Grades 9-10 #3 | Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in a text.Performance Example:Students will cut parts and assemble a base cabinet. |
| 2.C.012.H.10 | RST Grades 11-12 #7 | Translate quantitative or technical information expressed in wordsin a text into visual form and translate information expressed visually or mathematically into words.Performance Example:Students will lay out a project creating a layout rod/story pole, effectively translating text into a technical drawing/plan.  |
| 2.C.02 | W Pre-9th #2 | Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.Performance Example:Students will demonstrate the necessary techniques used in developing the layout for a project, develop a materials list, and create a layout rod/story pole. |

### [Embedded Mathematics](#_bookmark0)

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| CVTELearning Standard Number | Math Content Conceptual Category and Domain Code Learning Standard Number | Text of Mathematics Learning Standard |
| 2.C.01 | N-Q1G-SRT1 | Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.Verify experimentally the properties of dilations given by the center and a scale factor.Performance Examples:* Students will draw a polygon on a coordinate grid.
* Given different scale factors (larger and smaller), students will re-draw polygon.
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| 2.C.03 | N-Q3 MA.3.a | Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.Identify significant figures in recorded measures and computed values based on the context given and the precision of the tools usedto measure.Performance Examples:* Given a set of plans, students will estimate the cost of material, and then determine exact amount of material needed.
* Students will compare level of variance between methods and how it results in cost structure.
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| 2.E.01 | G-GPE6 | Find the point on a directed line segment between two given points that partitions the segment in a given ratio.Performance Examples:* Given a specific amount of cardboard, students will determine how different dimensions can change the volume and the cost to build a rectangular prism.
* Students will be asked to cite real-world examples (e.g. Dell Computer, Coca-Cola, etc.).
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| 2.H.02 | G-CO12 G-GPE5 | Make formal geometric constructions with a variety of tools and methods.Prove the slope criteria for parallel and perpendicular lines and use them to solve geometric problems.Performance Example:Students will determine the equations of parallel and perpendicular lines that pass through a given point on a coordinate plane. |
| 2.H.03 | G-C5 | Derive using similarity the fact that the length of the arc intercepted by an angle is proportional to the radius, and define the radian measure of the angle as the constant of proportionality; derive theformula for the area of the sector.Performance Example:Given the diameters, students will draw different size circles, determine circumferences, and cut different arc lengths. |
| 2.H.05 | G-C1 | Prove that all circles are similar.Performance Example:Students will compare different sized spheres. Using a compass, students will draw different sized circles and solve for area. |
| 2.H.08 | G-MG1 | Use geometric shapes, their measures, and their properties to describe objects.Performance Example:Students will draw a rectangle manually, and then redraw with a ruler. When complete, students will determine if any 90 degree angles were formed. |
| 2.H.12 | G-CO12 | Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software).Performance Example:Build a cardboard rectangular prism with given dimensions. Illustrate door opening, hinges, and fasteners. |
| 2.I.01 | G-MG3 MA.4 | Apply geometric shapes, their measures, and their properties to describe objects.Use dimensional analysis for unit conversions to confirm that expressions and equations make sense.Performance Examples:* Measure a rectangular prism with various units of measure (yards, feet, inches, meters, centimeters, millimeters).

Convert between the different units. |
| 2.J.01 | G-GPE6 | Find the point on a directed line segment between two given points that partitions the segment in a given ratio.Performance Example:Find the midpoint and distance of a line given the two end points. |

### [Embedded Science and Technology/Engineering](#_bookmark0)

#### [Earth and Space Science](#_bookmark0)

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| CVTELearning Standard Number | Subject Area, Topic Heading andLearning Standard Number | Text of Earth and Space Science Learning Standard |
| 2.J.01 | 3. Earth Processes and Cycles 3.6 | Describe the rock cycle, and the processes that are responsible for the formation of igneous, sedimentary, and metamorphic rocks.Compare the physical properties of these rock types and the physical properties of common rock-forming minerals.Performance Example:Students will identify countertop materials such as granite and marble, fabricate and install. |

#### [Life Science (Biology)](#_bookmark0)

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| CVTELearning Standard Number | Subject Area, Topic Heading andLearning Standard Number | Text of Biology Learning Standard |
| 2.B.01 | Life Science,Classification of Organisms 1 | Classify organisms into the currently recognized kingdoms according to characteristics that they share. Be familiar with organisms from each kingdom.Performance Example:Given samples of wood, students will identify various species, properties, and characteristics. |

#### [Physical Science (Chemistry)](#_bookmark0)

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| CVTELearning Standard Number | Subject Area, Topic Heading andLearning Standard Number | Text of Chemistry Learning Standard |
| 2.B.01 | 1. Properties of Matter 1.1 | Identify and explain physical properties (e.g., density, melting point, boiling point, conductivity, malleability) and chemical properties(e.g., the ability to form new substances). Distinguish between chemical and physical changes.Performance Example:Given samples of wood, students will identify various species, properties, and characteristics. |

#### [Physical Science (Physics)](#_bookmark0)

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| CVTELearning Standard Number | Subject Area, Topic Heading andLearning Standard Number | Text of Physics Learning Standard |
| 2.F.01 | 1. Motion and Forces 1.6 | Distinguish qualitatively between static and kinetic friction, and describe their effects of the motion of objects.Performance Example:Students will sand a project by hand, using ascending grits. |
| 2.F.012.H.012.H.12 | 1. Motion and Forces 1.8 | Describe conceptually the forces involved in circular motion.Performance Examples:* Students will sand a project, demonstrating an understanding of flat sanding vs. curved sanding.
* Students will demonstrate proper and safe power equipment operation.
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| 2.N.01 | 3. Heat and Heat Transfer 3.4 | Explain the relationships among temperature changes in a substance, the amount of heat transferred, the amount (mass) of the substance,and the specific heat of the substance.Performance Examples:* Students will template, fabricate, and install a countertop, selecting materials and substances that resist heat.
* Students will demonstrate the safe and proper operation of power equipment, explaining the relationship between heat transfer and friction (sanding of materials).
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#### [Technology/Engineering](#_bookmark0)

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| CVTELearning Standard Number | Subject Area, Topic Heading andLearning Standard Number | Text of Technology/Engineering Learning Standard |
| 2.B.012.C.02 | 1. Materials, Tools, and Machines 1.1 | Given a design task, identify appropriate materials (e.g., wood, paper, plastic, aggregates, ceramics, metals, solvents, adhesives) based onspecific properties and characteristics (e.g., strength, hardness, and flexibility).Performance Examples:* Given samples of wood, students will identify various species, properties, and characteristics.
* Students will demonstrate the necessary techniques used in developing the layout for a project, develop a materials list, and create a layout rod/story pole
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| 2.C.012.C.032.D.012.F.012.H.012.H.122.I.012.I.082.K.01 | 1. Materials, Tools, and Machines 1.2 | Identify and explain appropriate measuring tools, hand tools, and power tools used to hold, lift, carry, fasten, and separate, and explain their safe and proper use.Performance Example:Students will safely and properly use a variety of measuring, hand, and power tools, including the following: Architect’s scale, ruler, stationary power equipment, and portable power tools. |
| 2.C.012.C.032.D.012.F.012.H.012.H.122.I.012.I.082.K.01 | 1. Materials, Tools, and Machines 1.3 | Identify and explain the safe and proper use of measuring tools, hand tools, and machines (e.g., band saw, drill press, sander, hammer, screwdriver, pliers, tape measure, screws, nails, and other mechanical fasteners) needed to construct a prototype of an engineering design.Performance Example:Students will safely and properly use a variety of measuring, hand, and power tools, including the following: Architect’s scale, ruler, stationary power equipment, and portable power tools. |
| 2.H.102.K.012.M.012.N.01 | 2. Engineering Design 2.1 | Identify and explain the steps of the engineering design process, i.e., identify the need or problem, research the problem, develop possible solutions, select the best possible solution(s), construct a prototype,test and evaluate, communicate the solution(s), and redesign.Performance Examples:* Students will demonstrate the safe and proper use of CNC equipment, produce a drawing using design software, and describe the fundamentals of design software.
* Students will template, fabricate, and install a countertop.

Students will cut parts and assemble a base cabinet. |
| 2.C.012.C.022.H.102.K.01 | 2. Engineering Design 2.2 | Demonstrate methods of representing solutions to a design problem, e.g., sketches, orthographic projections, multi-view drawings.Performance Example:Students will demonstrate a fundamental understanding of design software, and will be able to produce a drawing/design used to manufacture a design solution. |
| 2.C.012.C.022.F.012.H.082.I.01 –2.I.032.J.01-2.O.01 | 2. Engineering Design 2.4 | Identify appropriate materials, tools, and machines needed to construct a prototype of a given engineering design.Performance Examples:* Given samples of wood, students will identify various species, properties, and characteristics, determining the most appropriate materials for a project.

Students will lay out a project creating a layout rod/story pole, effectively translating text into a technical drawing/plan. |
| 2.C.012.C.03 | 2. Engineering Design 2.5 | Explain how such design features as size, shape, weight, function, and cost limitations would affect the construction of a given prototype.Performance Example:Students will develop a stock list from a working drawing. |
| 2.C.01,2.C.02,2.H.10,2.I.012.I.082.J.01-2.O.01 | 3. CommunicationTechnologies 3.2 | Identify and explain the appropriate tools, machines, and electronic devices (e.g., drawing tools, computer-aided design, and cameras) used to produce and/or reproduce design solutions (e.g., engineering drawings, prototypes, and reports).Performance Example:Students will demonstrate the safe and proper use of CNC equipment, produce a drawing using design software, and describe the fundamentals of design software. |
| 2.C.01 | 3. CommunicationTechnologies 3.4 | Identify and explain how symbols and icons (e.g., international symbols and graphics) are used to communicate a message.Performance Example:Students will be able to accurately interpret working drawings, recognizing and identifying basic print terms. |
| 2.J.012.M.01 | 4. ManufacturingTechnologies 4.1 | Describe and explain the manufacturing systems of custom and mass production.Performance Example:Students will be able to determine a variety of quality standards of woodworking materials, and will be able to differentiate between sheet goods, solid works, and mill work. |
| 2.E – 2.O | 4. ManufacturingTechnologies 4.4 | Explain basic processes in manufacturing systems, e.g., cutting, shaping, assembling, joining, finishing, quality control, and safety.Performance Example:Students will understand basic processes in manufacturing systems, safely and properly using a variety of measuring, hand, and power tools. |
| 2.M.01 | 5. Construction Technologies5.1 | Describe and explain parts of a structure, e.g., foundation, flooring, decking, wall, roofing systems.Performance Example:After identifying and fabricating a variety of trims and moldings, the student will install base, chair rail, and crown molding on a wall. |
| 2.H.102.K.012.M.012.N.01 | 1. Engineering Design 1.1 | Identify and explain the steps of the engineering design process: identify the problem, research the problem, develop possible solutions, select the best possible solution(s), construct prototypes and/or models, test and evaluate, communicate the solutions, andredesign.Performance Examples:* Students will safely and properly use a variety of measuring, hand, and power tools, including the following: Architect’s scale, ruler, stationary power equipment, and portable power tools.
* Students will demonstrate the safe and proper use of CNC equipment, produce a drawing using design software, and describe the fundamentals of design software.

Students will template, fabricate, and install a countertop. Students will cut parts and assemble a base cabinet. |
| 2.C.012.C.022.H.102.K.01 | 1. Engineering Design 1.3 | Produce and analyze multi-view drawings (orthographic projections) and pictorial drawings (isometric, oblique, perspective), using various techniques.Performance Examples:Students will be able to accurately interpret a variety of working drawings, recognizing and identifying basic print terms. Students will demonstrate a fundamental understanding of design software, and will be able to produce a drawing/design used to manufacture a design solution. |
| 2.C.01 | 1. Engineering Design1.4 | Interpret and apply scale and proportion to orthographic projectionsand pictorial drawings (e.g., ¼" = 1'0", 1 cm = 1 m).Performance Example:After demonstrating an understanding of a variety of drawings and basic print terms, students will draw a small cabinet project to scale, incorporating the use of an Architect’s scale. |
| 2.C.012.C.022.H.102.K.01 | 1. Engineering Design 1.5 | Interpret plans, diagrams, and working drawings in the construction of prototypes or models.Performance Examples:* Students will be able to accurately interpret a variety of working drawings, recognizing and identifying basic print terms.
* Students will demonstrate a fundamental understanding of design software, and will be able to produce a drawing/design used to manufacture a design solution.

Students will template, fabricate, and install a countertop. Students will cut parts and assemble a base cabinet. |
| 2.C.032.D.012.F.012.H.012.H.092.H.11-2.H.122.I.01-2.I.08 | Technology/ Engineering, Construction Technologies 2.5 | Identify and demonstrate the safe and proper use of common hand tools, power tools, and measurement devices used in construction.Performance Examples:* Students will fabricate a small project using a hand tools (sharp edge, pounding, and prying), and will sand project by hand using ascending grits.

Students will set up and operate a wide variety of stationary power equipment, including: jointer, planer, band saw, table saw, drill press, grinder, lathe, shaper, and a variety of sanders. |
| 2.O.01 | 7. ManufacturingTechnologies 7.1 | Describe the manufacturing processes of casting and molding,forming, separating, conditioning, assembling, and finishing.Performance Example:Students will identify and use appropriate methods of finishes, including HVLP spray equipment. |
| 2.J.012.L.012.M.01 | 7. ManufacturingTechnologies 7.2 | Identify the criteria necessary to select safe tools and procedures fora manufacturing process (e.g., properties of materials, required tolerances, end-uses).Performance Examples:* Students will select the proper hardware from a catalog for a project.

After identifying and fabricating a variety of trims and moldings, students will install base, chair rail, and crown molding on a wall. |
| 2.C.012.C.032.D.012.F.012.H.012.H.122.I.01 2.I.082.J.012.O.01 | 7. ManufacturingTechnologies 7.3 | Identify the criteria necessary to select safe tools and procedures for a manufacturing process (e.g., properties of materials, required tolerances, end-uses).Performance Example:* Students will understand basic processes in manufacturing systems, safely and properly using a variety of measuring, hand, and power tools.
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[Industry Recognized Credentials](#_bookmark0) (Licenses and Certifications/Specialty Programs)

The United Brotherhood of Carpenters and Joiners of America Union, https:[//w](http://www.carpenters.org/Home.aspx)ww[.carpenters.org/Home.aspx](http://www.carpenters.org/Home.aspx)

WCA Woodwork Career Alliance of North America

P.O. Box 636

Nellysford, VA 22958-0636 <http://woodworkcareer.org/>

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