



**MASSACHUSETTS**  
**DEPARTMENT of**  
**EDUCATION**

# **Vocational Technical Education Framework**

## **Construction Cluster**

### ***Carpentry***

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## **Strand 1: Safety and Health Knowledge and Skills**

### **1.A Define health and safety regulations.**

- 1.A.01a Identify and apply OSHA and other health and safety regulations that apply to specific tasks and jobs in the occupational area.
- 1.A.02a Identify and apply EPA and other environmental protection regulations that apply to specific tasks and jobs in the occupational area.
- 1.A.03a Identify and apply Right-To-Know (Hazard Communication Policy) and other communicative regulations that apply to specific tasks and jobs in the occupational area.
- 1.A.04a Explain procedures for documenting and reporting hazards to appropriate authorities.
- 1.A.05a List penalties for non-compliance with appropriate health and safety regulations.
- 1.A.06a Identify contact information for appropriate health and safety agencies and resources.
- 1.A.07c Describe the history, function and importance of the Occupational Safety and Health Administration (OSHA).

### **1.B Demonstrate health and safety practices.**

- 1.B.01a Identify, describe and demonstrate the effective use of Material Safety Data Sheets (MSDS).
- 1.B.02a Read chemical, product, and equipment labels to determine appropriate health and safety considerations .
- 1.B.03a Identify, describe and demonstrate personal, shop and job site safety practices and procedures.
- 1.B.04a Demonstrate safe dress and use of relevant safety gear and personal protective equipment (PPE), including wrist rests, adjustable workspaces and equipment, gloves, boots, earplugs, eye protection, and breathing apparatus.
- 1.B.05a Illustrate appropriate safe body mechanics, including proper lifting techniques and ergonomics.
- 1.B.06a Locate emergency equipment in your lab, shop, and classroom, including (where appropriate) eyewash stations, shower facilities, sinks, fire extinguishers, fire blankets, telephone, master power switches, and emergency exits.
- 1.B.07a Demonstrate the safe use, storage, and maintenance of every piece of equipment in the lab, shop, and classroom.
- 1.B.08a Describe safety practices and procedures to be followed when working with and around electricity.
- 1.B.09a Properly handle, store, dispose of, and recycle hazardous, flammable, and combustible materials.
- 1.B.10a Demonstrate proper workspace cleaning procedures.
- 1.B.11c Identify and describe ladder and scaffold safety practices and procedures.
- 1.B.12c Identify and describe mechanical platform lift and material handling equipment safety practices and procedures.
- 1.B.13c Use and maintain fall arrest systems.
- 1.B.14c Identify and describe standard precautions for blood borne pathogens and the procedures for responding to and reporting exposure.

**Performance Examples:**

1. Toolbox safety talks are part of the weekly or daily instructional routine.
2. Students research a hazardous chemical/material used in the trade and make recommendation regarding appropriate precautions and use.
3. Developing and implementing a "Health and Safety Awareness Campaign" is assigned as a class project with students and/or teams of students responsible for different aspects/components including research, posters and multi-media presentations.
4. Students plan and put on a skit that mimics hazardous and unsafe environments and situations that could be encountered on the job site.

**1.C Demonstrate responses to situations that threaten health and safety.**

- 1.C.01a Illustrate First Aid procedures for potential injuries and other health concerns in the occupational area.
- 1.C.02a Describe the importance of emergency preparedness and an emergency action plan.
- 1.C.03a Illustrate procedures used to handle emergency situations and accidents, including identification, reporting, response, evacuation plans, and follow-up procedures.
- 1.C.04a Identify practices used to avoid accidents.
- 1.C.05a Identify and describe fire protection, precautions and response procedures.
- 1.C.06a Discuss the role of the individual and the company/organization in ensuring workplace safety.
- 1.C.07a Discuss ways to identify and prevent workplace/school violence.

## **Strand 2: Technical Knowledge and Skills**

### **2.A Read and interpret prints.**

- 2.A.01c Explain the basic layout of a set of prints as well as the importance of the accompanying job specifications document.
- 2.A.02c Recognize and identify basic print terms, abbreviations, line types, symbols and notes.
- 2.A.03c Interpret and follow drawing dimensions.
- 2.A.04c Determine true measurements from a print using an Architect's scale.
- 2.A.05c Read and interpret plan, elevation, section and detail views and schedules.
- 2.A.06c Identify, develop and complete material quantity takeoff sheets.
- 2.A.07c Discuss how state and/or local code requirements apply to prints.

#### **Performance Examples:**

1. Perform shop/job site projects/work from appropriate sets of prints/drawings.
2. Draw appropriate cross sections and/or details.
3. Develop a material quantity takeoff for the project/job.
4. Prepare an application for an appropriate permit.

### **2.B Demonstrate the fundamentals of carpentry.**

- 2.B.01 Identify building materials and describe their applications.
- 2.B.02 Identify engineered building materials and describe their application.
- 2.B.03 Illustrate of pre-fabricated panelized construction systems and techniques.
- 2.B.04 Read and interpret construction blueprints, working drawings and building codes.
- 2.B.05 Estimate needs, costs, and quantity of building materials.
- 2.B.06 Apply basic carpentry math principles.
- 2.B.07 Demonstrate measuring and layout procedures and applications.
- 2.B.08 Explain proper storage methods for lumber.
- 2.B.09 Install batter boards.
- 2.B.10 Set ground and corner stakes.
- 2.B.11 Check materials for square, plumb, and level.

#### **Performance Example:**

1. Calculate the board feet in a piece of wood.

### **2.C Use hand tools.**

- 2.C.01 Demonstrate use and maintenance of layout, marking, and measuring tools.
- 2.C.02 Demonstrate use and maintenance of fastening, clamping and dismantling tools.
- 2.C.03 Demonstrate use and maintenance of sawing tools.
- 2.C.04 Demonstrate use and maintenance of drilling and boring tools.
- 2.C.05 Demonstrate use and maintenance of planing, smoothing and shaping tools.

#### **Performance Examples:**

1. Layout a rafter.
2. Construct a sawhorse.

## **2.D Operate power tools.**

- 2.D.01 Demonstrate use and maintenance of a portable circular saw.
- 2.D.02 Demonstrate use and maintenance of a portable table saw.
- 2.D.03 Demonstrate use and maintenance of reciprocating saws.
- 2.D.04 Demonstrate use and maintenance of portable drills.
- 2.D.05 Demonstrate use and maintenance of a portable router.
- 2.D.06 Demonstrate use and maintenance of a portable power miter box.
- 2.D.07 Demonstrate use and maintenance of portable sanders.
- 2.D.08 Demonstrate use and maintenance of a screw gun.
- 2.D.09 Demonstrate use and maintenance of pneumatic equipment.
- 2.D.10 Describe the operation of power fastening tools and systems.

### **Performance Example:**

1. Student demonstrates use of tools in a small bench project.

## **2.E Use and maintain ladders and scaffolds.**

- 2.E.01 Demonstrate use and maintenance of ladders.
- 2.E.02 Identify the safety hazards associated with the use of ladder brackets, and suggest alternatives.
- 2.E.03 Erect tubular pipe staging.
- 2.E.04 Erect light duty rolling scaffolds.
- 2.E.05 Erect pump jack staging.
- 2.E.06 Demonstrate use and maintenance of wall brackets.
- 2.E.07 Demonstrate use and maintenance of roof brackets.

### **Performance Example:**

1. Student sets up an extension ladder at the proper angle, etc.

## **2.F Frame floors.**

- 2.F.01 Install sills and girders.
- 2.F.02 Layout and install floor frame.
- 2.F.03 Install floor sheathing.
- 2.F.04 Layout and frame rough stairs

### **Performance Examples:**

1. Student installs a sill
2. Student will layout and cut a stair stringer.

## **2.G Frame walls**

- 2.G.01 Layout walls.
- 2.G.02 Frame walls.
- 2.G.03 Sheathe walls.
- 2.G.04 Erect walls.
- 2.G.05 Frame and sheathe gable ends.
- 2.G.06 Determine opening sizes and components for floors and walls.
- 2.G.07 Determine sizes for door headers.
- 2.G.08 Determine floor and wall framing members.

### **Performance Examples:**

1. Student lays out a wall section.
2. Assemble corner post.

## **2.H Frame ceilings and roofs**

- 2.H.01 Layout ceiling and roof frame.
- 2.H.02 Frame ceiling.
- 2.H.03 Layout common rafter.
- 2.H.04 Frame and sheathe gable roof.
- 2.H.05 Layout and install strapping.
- 2.H.06 Explain hip and valley roof construction.
- 2.H.07 Explain roof truss systems.

### **Performance Examples:**

1. Layout common rafter.
2. Identify common roof types.
3. Identify parts of common rafter.

## **2.I Finish the exterior**

- 2.I.01 Install roof trim.
- 2.I.02 Install roofing materials.
- 2.I.03 Install gutters.
- 2.I.04 Install windows and exterior doors.
- 2.I.05 Apply siding and finish trim.
- 2.I.06 Construct porches and decks.
- 2.I.07 Apply caulking and weatherization materials.

### **Performance Examples:**

1. Install horizontal wood siding.
2. Install a window.
3. Install exterior doors.

## **2.J Finish the interior**

- 2.J.01 Install insulation material and vapor barrier.
- 2.J.02 Install interior wall board products.
- 2.J.03 Install door and window trim.
- 2.J.04 Install interior doors .
- 2.J.05 Install underlayment.
- 2.J.06 Install baseboard trim.
- 2.J.07 Install closet interiors.
- 2.J.08 Install stair trim.
- 2.J.09 Install kitchen and bath cabinets and counter tops.
- 2.J.10 Apply plastic laminates.
- 2.J.11 Explain solid surface counter top options and installation procedures.

### **Performance Examples:**

1. Install interior door.
2. Install interior wall board products.

## **2.K Demonstrate commercial carpentry tasks.**

- 2.K.01 Frame metal stud partitions and exterior walls.
- 2.K.02 Install suspended ceiling systems.
- 2.K.03 Level materials using appropriate leveling instruments.
- 2.K.04 Identify basic concrete formwork principles and applications.
- 2.K.05 Construct forms.

**Performance Examples:**

1. Frame metal stud walls.
2. Set up and adjust a builder's level.

## **Strand 3: Embedded Academic Knowledge and Skills**

### **3.A English Language Arts**

<b>VTE #</b>	<b>Acad #</b>	<b>Standard</b>	<b>Grade</b>	<b>Topic</b>
3.A.01c	19.21	For informational/expository writing: Write reports based on research that include quotations, footnotes or endnotes, and a bibliography.	Pre-9	Composition
3.A.02c	24.4	Apply steps for obtaining information from a variety of sources, organizing information, documenting sources, and presenting research in individual projects.	Pre-9th	Composition
3.A.03c	13.19	Identify and use knowledge of common graphic features (charts, maps, diagrams).	Pre-9th	Reading
3.A.04c	2.4	Integrate relevant information gathered from group discussions and interviews for reports.	Pre-9th	Language
3.A.05c	3.17	Deliver formal presentations for particular audiences using clear enunciation and appropriate organization, gestures, tone, and vocabulary.	11/12	Language
3.A.06c	4.27	Use general dictionaries, specialized dictionaries, thesauruses, histories of language, books of quotations, and other related references as needed.	11/12	Language
3.A.07c	19.27	For informational/expository writing: Write well-organized research papers that prove a thesis statement using logical organization, effective supporting evidence, and variety in sentence structure.	11/12	Composition
3.A.08c		Follow correct procedures for technical documentation.		Voc
3.A.09c		Read technical manuals, guides, resource books and technical literature to gain information and solve problems.		Voc
3.A.10c		Read, comprehend, and follow written technical directions for repairs, procedures and processes.		Voc

**3.B Mathematics**

<b>VTE #</b>	<b>Acad #</b>	<b>Standard</b>	<b>Grade</b>	<b>Topic</b>
3.B.01c	7.G.5	Use a ruler, protractor, and compass to draw polygons and circles.	Pre-9th	Geometry
3.B.02c	7.M.2	Given the formulas, convert from one system of measurement to another. Use technology as appropriate.	Pre-9th	Measurement
3.B.03c	7.P.4	Solve linear equations using tables, graphs, models, and algebraic methods.	Pre-9th	Patterns, relations, algebra
3.B.04c	8.N.1	Compare, order, estimate, and translate among integers, fractions and mixed numbers (i.e., rational numbers), decimals, and percents.	Pre-9th	Numbers
3.B.05c	10.G.3	Recognize and solve problems involving angles formed by transversals of coplanar lines. Identify and determine the measure of central and inscribed angles and their associated minor and major arcs. Recognize and solve problems associated with radii, chords, and arcs within or on the same circle.	9/10	Geometry
3.B.06c	10.G.8	Find linear equations that represent lines either perpendicular or parallel to a given line and through a point, e.g., by using the "point-slope" form of the equation.	9/10	Geometry
3.B.07c	10.G.10	Demonstrate the ability to visualize solid objects and recognize their projections and cross sections.	9/10	Geometry
3.B.08c	10.M.1	Calculate perimeter, circumference, and area of common geometric figures such as parallelograms, trapezoids, circles, and triangles.	9/10	Measurement
3.B.09c	10.P.8	Solve everyday problems that can be modeled using systems of linear equations or inequalities. Apply algebraic and graphical methods to the solution. Use technology when appropriate. Include mixture, rate, and work problems.	9/10	Patterns, relations, algebra

3.B.10c	12.G.5	Apply properties of angles, parallel lines, arcs, radii, chords, tangents, and secants to solve problems.	9/10	Geometry
3.B.11c	12.M.2	Use dimensional analysis for unit conversion and to confirm that expressions and equations make sense.	11/12	Measurement
3.B.12	10.N.4	Use estimation to judge the reasonableness of results of computations and of solutions to problems involving real numbers.	9/10	Numbers
3.B.13	10.P.2	Demonstrate an understanding of the relationship between various representations of a line. Determine a line's slope and x- and y-intercepts from its graph or from a linear equation that represents the line. Find a linear equation describing a line from a graph or a geometric description of the line, e.g., by using the "point-slope" or "slope y-intercept" formulas. Explain the significance of a positive, negative, zero, or undefined slope.	9/10	Patterns, relations, algebra
3.B.14	10.G.1	Identify figures using properties of sides, angles, and diagonals. Identify the figures' type(s) of symmetry.	9/10	Geometry
3.B.15	10.G.2	Draw congruent and similar figures using a compass, straightedge, protractor, and other tools such as computer software. Make conjectures about methods of construction. Justify the conjectures by logical arguments.	9/10	Geometry
3.B.16	12.P.8	Solve a variety of equations and inequalities using algebraic, graphical, and numerical methods, including the quadratic formula; use technology where appropriate. Include polynomial, exponential, logarithmic, and trigonometric functions; expressions involving absolute values; trigonometric relations; and simple rational expressions.	11/12	Patterns, relations, algebra
3.B.17	12.P.9	Use matrices to solve systems of linear equations. Apply to the solution of everyday problems.	11/12	Patterns, relations, algebra

### 3.C Science and Engineering/Technology

VTE #	Acad #	Standard	Grade	Topic
3.C.01c	1	Differentiate between weight and mass, recognizing that weight is the amount of gravitational pull on an object.	Pre-9th	Physics/Chem
3.C.02c	3	Recognize that the measurement of volume and mass requires understanding of the sensitivity of measurement tools (e.g., rulers, graduated cylinders, balances) and knowledge and appropriate use of significant digits.	Pre-9th	Physics/Chem
3.C.03c	9.3	Identify the factors that affect the rate of a chemical reaction (temperature, concentration) and the factors that can cause a shift in equilibrium (concentration, pressure, volume, temperature).		Chemistry
3.C.04c	11.1	Describe the chemical processes known as oxidation and reduction.		Chemistry
3.C.05c	1.3	Describe the characteristics of waves (wavelength, frequency, velocity, amplitude).		Earth/Space
3.C.06c	1.1	Identify and explain the steps of the engineering design process, i.e., identify the 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.		Eng/Tech
3.C.07c	2.1	Distinguish among tension, compression, shear, and torsion, and explain how they relate to the selection of materials in structures.		Eng/Tech
3.C.08c	2.2	Identify and explain the purposes of common tools and measurement devices used in construction, e.g., spirit level, transit, framing square, plumb bob, spring scale, tape measure, strain gauge, venturi meter, pitot tube.		Eng/Tech
3.C.09c	2.3	Describe how structures are constructed using a variety of processes and procedures, e.g., welds, bolts, and rivets are used to assemble metal framing materials.		Eng/Tech
3.C.10c	2.4	Identify and explain the engineering properties of materials used in structures, e.g., elasticity, plasticity, thermal conductivity, and density.		Eng/Tech

3.C.11c	2.5	Differentiate the factors that affect the design and building of structures, such as zoning laws, building codes, and professional standards.		Eng/Tech
3.C.12c	2.6	Calculate quantitatively the resultant forces for live loads and dead loads.		Eng/Tech
3.C.13c	4.1	Differentiate among conduction, convection, and radiation in a thermal system, e.g., heating and cooling a house, cooking.		Eng/Tech
3.C.14c	4.2	Give examples of how conduction, convection, and radiation are used in the selection of materials, e.g., home and vehicle thermostat designs, circuit breakers.		Eng/Tech
3.C.15c	5.3	Explain the relationship between resistance, voltage, and current (Ohm's Law).		Eng/Tech
3.C.16c	5.5	Identify appropriate units of measurement for current, voltage, and resistance, and explain how they are measured.		Eng/Tech
3.C.17c	5.6	Analyze circuits (find the current at any point and the potential difference between any two points in the circuit) using Kirchoff and Ohm's laws.		Eng/Tech
3.C.18c	1.1	Distinguish between vector quantities (velocity, acceleration, and force) and scalar quantities (speed and mass).		Physics
3.C.19c	1.3	Distinguish between, and solve problems involving, velocity, speed, and constant acceleration.		Physics
3.C.20c	1.4	Create and interpret graphs of motion (position vs. time, speed vs. time, velocity vs. time, constant acceleration vs. time).		Physics
3.C.21c	1.5	Explain the relationship between mass and inertia.		Physics
3.C.22c	1.7	Interpret and apply Newton's second law of motion to show how an object's motion will change only when a net force is applied.		Physics
3.C.23c	2.3	Apply quantitatively the law of conservation of mechanical energy to simple systems.		Physics
3.C.24c	2.4	Describe the relationship among energy, work, and power both conceptually and quantitatively.		Physics

3.C.25c	2.6	Identify appropriate standard international units of measurement for energy, work, power, and momentum.		Physics
3.C.26c		Calculate heat load, using K, R and U factors.		Voc
3.C.27c		Explain the concept of BTU.		Voc
3.C.28c		Define and interpret elevation and topography components in drawings and technical documents.		Voc
3.C.29	1.2	Demonstrate knowledge of pictorial and multi-view drawings (e.g., orthographic projection, isometric, oblique, perspective) using proper techniques.		Eng/Tech
3.C.30	1.3	Demonstrate the use of drafting techniques with paper and pencil or computer-aided design (CAD) systems when available.		Eng/Tech
3.C.31	1.4	Apply scale and proportion to drawings, e.g., 1/4" = 1'0".		Eng/Tech
3.C.32	1.5	Interpret plans, diagrams, and working drawings in the construction of a prototype.		Eng/Tech
3.C.33	3.1	Differentiate between open (e.g., irrigation, forced hot air system) and closed (e.g., forced hot water system, hydroponics) fluid systems and their components such as valves, controlling devices, and metering devices.		Eng/Tech
3.C.34	3.2	Identify and explain sources of resistance (e.g., 45deg. elbow, 90deg. elbow, type of pipes, changes in diameter) for water moving through a pipe.		Eng/Tech
3.C.35	3.5	Explain the relationship between velocity and cross-sectional areas in the movement of a fluid.		Eng/Tech
3.C.36	2.1	Interpret and provide examples that illustrate the law of conservation of energy.		Physics
3.C.37	3.2	Differentiate between specific heat and heat capacity.		Physics
3.C.38	5.4	Develop a qualitative and quantitative understanding of current, voltage, resistance, and the connection between them.		Physics

3.C.39	3.7	Compare and contrast the processes of the hydrologic cycle including evaporation, condensation, precipitation, surface runoff and groundwater percolation, infiltration, and transpiration.		Earth
3.C.40	3.3	Explain the relationship among temperature change in a substance for a given amount of heat transferred, the amount (mass) of the substance, and the specific heat of the substance.		Physics
3.C.41	2.3	Apply quantitatively the law of conservation of mechanical energy to simple systems.		Physics
3.C.42	2.4	Describe the relationship among energy, work, and power both conceptually and quantitatively.		Physics
3.C.43	2.6	Calculate quantitatively the resultant forces for live loads and dead loads.		Physics

## **Strand 4: Employability Knowledge and Skills**

### **4.A Develop employability skills to secure and keep employment in chosen field.**

- 4.A.01a Evaluate industries, organizations, and careers based on multiple sources of research and information.
- 4.A.02a Assess interest areas to determine potential career pathways, including career ladders.
- 4.A.03a Develop a career plan with alternatives.
- 4.A.04a Complete job applications and related employment documents (e.g. W-4).
- 4.A.05a Create professional cover letters, resumes, and portfolios in a variety of formats (print and electronic).
- 4.A.06a Apply job search skills to seek, evaluate, apply for, and accept employment.
- 4.A.07a Demonstrate good interviewing skills.
- 4.A.08a Demonstrate employability skills needed to get and keep a job.
- 4.A.09a Assess alternative occupational choices (e.g. working conditions, benefits, and opportunities to change).

#### **Performance Examples:**

1. Research positions open within a variety of companies and compare/contrast their descriptions, duties, and expectations.
2. Prepare responses to standard interview questions.
3. Participate in a mock-interview with industry professionals.

### **4.B Communicate in multiple modes to address needs within the career and technical field.**

- 4.B.01a Apply strategies to enhance effectiveness of all types of communications in the workplace.
- 4.B.02a Apply reading skills and strategies to work-related documents.
- 4.B.03a Locate information from books, journals, magazines, and the Internet.
- 4.B.04a Apply basic writing skills to work-related communication.
- 4.B.05a Write work-related materials.
- 4.B.06a Explain information presented graphically.
- 4.B.07a Use writing/publishing/presentation applications.
- 4.B.08a Apply basic skills for work-related oral communication.
- 4.B.09a Explain proper telephone etiquette and skills.
- 4.B.10a Lead formal and informal group discussions.
- 4.B.11a Demonstrate effective negotiation and conflict management.
- 4.B.12a Apply active listening skills to obtain and clarify information.
- 4.B.13a Communicate with others in a diverse workforce.

#### **Performance Examples:**

1. Review a professional journal; choose one article to summarize.
2. Call the publisher for free products in journal.
3. Develop an oral presentation regarding an article in a journal.
4. Summarize trends presented in a graph.

### **4.C Solve problems using critical thinking.**

- 4.C.01a Demonstrate skills used to define and analyze a given problem.

- 4.C.02a Explain the importance and dynamics of individual and teamwork approaches of problem solving.
- 4.C.03a Describe methods of researching and validating reliable information relevant to the problem.
- 4.C.04a Explain strategies used to formulate ideas, proposals and solutions to problems.
- 4.C.05a Select potential solutions based on reasoned criteria.
- 4.C.06a Implement and evaluate solution(s).

**4.D Demonstrate positive work behaviors.**

- 4.D.01a Identify time management and task prioritization skills.
- 4.D.02a Explain the importance of following workplace etiquette/protocol.
- 4.D.03a Demonstrate willingness to learn and further develop skills.
- 4.D.04a Demonstrate self-management skills.
- 4.D.05a List causes of stress and effective stress management techniques.
- 4.D.06a Describe the importance of having a positive attitude and techniques that boost morale.
- 4.D.07a Show initiative by coming up with unique solutions and taking on extra responsibilities.
- 4.D.08a Explain the importance of setting goals and demonstrate the ability to set, reach, and evaluate goals.
- 4.D.09a Explain the importance of taking pride in work accomplished and extrinsic and intrinsic motivators that can be used to increase pride.
- 4.D.10a Value the importance of professionalism, including reliability, honesty, responsibility, and ethics.
- 4.D.11a Demonstrate a respect for diversity and its benefit to the workplace.

## **Strand 5: Management and Entrepreneurship Knowledge and Skills**

### **5.A Analyze basic business practices required to start and run a company/organization.**

- 5.A.01a Define entrepreneurship.
- 5.A.02a Describe the relationship between suppliers, producers, and consumers.
- 5.A.03a Compare and contrast types of businesses, including sole proprietorships, small businesses, companies, corporations, governmental agencies, and non-profit organizations.
- 5.A.04a Describe practices that ensure quality customer service.
- 5.A.05a Explain the value of competition in business/field.

#### **Performance Examples:**

1. Prepare a business plan for a new company in your community.
2. Participate in a discussion with members of a local small-business incubator or chamber of commerce, identifying opportunities and summarizing best practices of new companies.
3. Create an equipment list, with costs, of equipment required for doing specific tasks.
4. Identify local zoning and environmental laws that apply to businesses in your industry.

### **5.B Manage all resources related to a business/organization.**

- 5.B.01a Identify a company's/organization's chain of command and organizational structure.
- 5.B.02a Define and demonstrate leadership and teamwork skills.
- 5.B.03a Explain ways a company or organization can market itself, including choosing a name, designing logos and promotional materials, advertising, and the importance of word-of-mouth.
- 5.B.04a Identify methods to track inventory, productivity, income, expenses, and personnel .
- 5.B.05a Explain the importance of written operating procedures and policies.
- 5.B.06a Identify professional organizations and their benefits.
- 5.B.07a Explain methods to effectively run a meeting.
- 5.B.08 Explain and demonstrate one of the many methods used when estimating a price for a project.
- 5.B.09 Explain and demonstrate the proper procedure for submitting a bid proposal.
- 5.B.10 Explain why change orders are necessary and how they are used.
- 5.B.11 Complete a punch list and obtain all final inspections.

#### **Performance Examples:**

1. Create a plan to keep track of tools and supplies in your classroom/shop.
2. Work as a team to complete a project, including running and participating in problem-solving meetings.
3. Contact a relevant professional organization and request information about its benefits, membership requirements, and costs.
4. Clip print advertisements from local companies, identifying common themes and contrasting different styles.

**5.C Describe methods for managing, organizing, retrieving and reporting financial data.**

- 5.C.01a Explain the role of small businesses in the economy.
- 5.C.02a Extract and extrapolate data from financial documents, such as a pay-stub, budget, tax statement, and financial report.
- 5.C.03 Describe how paycheck deductions affect a worker and the company.
- 5.C.04 Describe the importance of cost containment in the company.

**Performance Examples:**

1. Create and follow a budget for an in-class project.
2. Identify equipment in your shop/lab that are considered as capital.
3. From a pay-stub, determine gross salary, deductions, and net pay for a calendar year.
4. Create a rate card or other list of standardized costs for services provided, based on research of local rates and practices.

**5.D Apply labor and civil rights law and guidelines to business practice and decisions.**

- 5.D.01a List federal and state mandated employee rights.
- 5.D.02a Describe proper working conditions for your industry.
- 5.D.03a Explain the role of labor organizations.
- 5.D.04a Discuss the importance of diversity and list methods of encouraging diversity in the workplace.
- 5.D.05a Describe standard forms of employment contracts applicable to your industry.
- 5.D.06a State the current minimum wage, as well as wages for common jobs found within the field.
- 5.D.07a List opportunities for continual professional development.

**Performance Examples:**

1. Participate in and summarize a discussion with a member of a labor organization.
2. Participate in and summarize a discussion with a member of a civil rights organization.
3. While participating in a group project, write and follow job descriptions for each member of the team.
4. Evaluate a shop/lab in terms of safety, ergonomics, and workflow.

**5.E Evaluate the effects of community relations on companies and the industry.**

- 5.E.01a Describe the role that the industry/organization plays in different communities.
- 5.E.02a Describe the role that community interests play in a company's/organization's decision-making process.
- 5.E.03 Describe the importance of recognizing why a worker should contribute special skills through volunteer work.
- 5.E.04 Identify an impact of buying outside the community.
- 5.E.05 Describe the importance of protecting the natural environment.
- 5.E.06 Describe the importance of environmentally friendly materials and the use of recyclable products.

**Performance Example:**

1. Participate in a service project or community-centered event.

**5.F Apply legal requirements and ethical considerations to business practice and decisions.**

- 5.F.01a Identify laws that regulate businesses/organizations in your field.
- 5.F.02a Define the requirements for and protections given by copyright and trademark law.
- 5.F.03a Define the impact of the Americans with Disabilities Act and other civil rights legislation on your business/organization, employees, and customers.
- 5.F.04a Define ethical business practices for your field.
- 5.F.05a Identify trade-specific practices that support clean energy technologies and encourage environmental sustainability.
- 5.F.06 List ways to comply with local, state and federal agencies and model code setting organizations.
- 5.F.07 Read and explain the various aspects of service contracts to ensure compliance.
- 5.F.08 Explain the importance of fulfilling contractual roles and responsibilities.
- 5.F.09 Describe issues relating to any potential conflicts of interest.
- 5.F.10 Describe liability responsibilities.

**Performance Examples:**

1. Research the ethical guidelines set forth by a professional organization related to your industry and participate in a debate over how to apply these guidelines to a variety of situations.
2. Create a portfolio of a variety of completed contracts and their uses.
3. Participate in and summarize a discussion with a lawyer, consumer advocate, or other legal professional.
4. Create a quick reference outline listing legal topics and related resources.

## **Strand 6: Technological Knowledge and Skills**

### **6.A Demonstrate proficiency in the use of computers and applications as well as an understanding of concepts underlying hardware, software, and connectivity.**

- 6.A.01a Select and utilize the appropriate technology to solve a problem or complete a task.
- 6.A.02a Demonstrate file management skills (e.g., install new software, compress and expand files as needed, download files as appropriate).
- 6.A.03a Differentiate between different operating systems and demonstrate use of at least one to open and switch between programs and files.
- 6.A.04a Identify and demonstrate resolutions to simple hardware and software problems as they occur (e.g., frozen screen, disk error, printing problems).
- 6.A.05a Save, retrieve, load, format, and import data into, and export a variety of electronic documents (word processing, spreadsheet, database, AND desktop publishing).
- 6.A.06a Demonstrate the proper use of a variety of external peripherals and how they connect to a computer.
- 6.A.07a Illustrate methods of selecting and using search engines.
- 6.A.08a Send, receive, and manage electronic correspondence and files, in accordance with school policy.
- 6.A.09a Demonstrate proper use of electronic proofreading tools and explain reasons why these shouldn't be relied upon solely.
- 6.A.10c Operate computer-driven equipment and machines.
- 6.A.11c Use installation and operation manuals.
- 6.A.12c Troubleshoot equipment and machines and access support as needed.

#### **Performance Example:**

1. In the development of work-based projects, students demonstrate computer skills inherent in the word processing techniques used, the organization of data, use of photographic representation, research projects, and other relevant project based activities.

### **6.B Demonstrate responsible use of technology and an understanding of ethics and safety issues in using electronic media.**

- 6.B.01a Identify ways in which technology is used in the workplace and in society.
- 6.B.02a Summarize the rights and responsibilities of the school's Acceptable Use Policy.
- 6.B.03a Explain laws restricting use of copyrighted materials on the Internet.
- 6.B.04a Discuss the concerns about electronic communications, privacy and security, including protection from spyware and viruses.

#### **Performance Example:**

1. Describe how computers are used to increase efficiency, accuracy, and professionalism in the industry.

**6.C Demonstrate ability to use technology for research, problem solving, and communication.**

- 6.C.01a Locate, evaluate, collect, and process information from a variety of electronic sources.
- 6.C.02a Demonstrate the use of telecommunications and other media to interact or collaborate with peers, experts, and other audiences.
- 6.C.03a Demonstrate the use of appropriate electronic sources to conduct research (e.g., Web sites, online periodical databases, and online catalogs).
- 6.C.04a Demonstrate proper style (with correct citations) when integrating electronic research results into a research project.
- 6.C.05a Collect, organize, analyze, and graphically present data using the most appropriate tools.
- 6.C.06a Present information, ideas, and results of work using any of a variety of communications technologies (e.g., multimedia presentations, Web pages, videotapes, desktop-published documents).
- 6.C.07a Identify capabilities of technology resources and describe how they can be used for lifelong learning.
- 6.C.08a Demonstrate the proper use of electronic tools and office communications equipment (telephone, fax, copier, etc).
- 6.C.09c Demonstrate the use a variety of industry specific software.
- 6.C.10c Facilitate group work through management of shared schedule and contact information.

**Performance Example:**

1. Student is able to effectively use various technologies in the workplace.