



MASSACHUSETTS
DEPARTMENT of
EDUCATION

**Vocational Technical Education
Framework**

**Agriculture and Natural Resources
Cluster**

Agricultural Mechanics

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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.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 Demonstrate proper spacing distance from others when using tools.
- 1.B.12 Demonstrate industry safety standards for oxy-fuels.
- 1.B.13 Demonstrate industry standards for arc welding.
- 1.B.14 Demonstrate the safe use of electric, air, and hydraulic power.
- 1.B.15 Demonstrate proper safety procedures while working with batteries.
- 1.B.16 Demonstrate precautions that should be observed when operating tractors, trucks and other agricultural equipment.

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.

Performance Examples:

1. Describe a safety plan, including factors related to protecting the environment, for employees under your supervision in the work place or at a job site.
2. Given a specific task, describe or demonstrate proper safety procedures/methods.
3. When presented with a hazardous situation that could develop in shop, the student will evaluate the situation and suggest procedures and/or practices that would resolve the hazardous situation.

Strand 2: Technical Knowledge and Skills

2.A Select and use the appropriate tool to perform a given task.

- 2.A.01c Select tools and equipment.
- 2.A.02c Identify standard tools, equipment, and safety procedures.
- 2.A.03c Follow operating instructions.
- 2.A.04c Set up/adjust tools and equipment.
- 2.A.05c Demonstrate proper maintenance of all tools.
- 2.A.06c Store tools properly.

Performance Example:

1. Demonstrate operation of a specific tool or piece of equipment. Given a specific task, describe the tool/equipment required, the safety issues and training required, how to operate, and basic maintenance functions to be performed by the operator.

2.B Properly use tractor and engine power/agricultural machinery and equipment.

- 2.B.01 Identify safe tractor, machinery and equipment operation practices for field and road conditions.
- 2.B.02 Make hitch and PTO adjustments.
- 2.B.03 Demonstrate proper methods of starting, stopping, and operating a tractor.
- 2.B.04 Complete and interpret pre-delivery and delivery instructions.
- 2.B.05 Identify, interpret and demonstrate recommended service operations and maintenance schedules from an operator's manual.
- 2.B.06 Select fuels, coolants, lubricants and hydraulic fluids for tractors, machinery and equipment.
- 2.B.07 Select repair parts using manufacturer's catalogs, microforms, microfiche or computers.
- 2.B.08 Explain operating principles of two-stroke and four-stroke cycle, spark and compression ignition engines.
- 2.B.09 Demonstrate ASAE hand signals for operating tractors, machinery and equipment.
- 2.B.10 Test and measure materials using tools and test instruments such as thickness and telescoping gauges, dial indicator, compression tester, leak down tester, torque wrench, VOA(volt-ohm-amp) meter, DDM(digital multi-meter), timing devices and tachometers.
- 2.B.11 Identify the parts and functions of electrical, hydraulic, lubrication, cooling, governor, fuel, exhaust and induction systems.
- 2.B.12 Conduct a pre-operation inspection of a tractor and/or equipment.
- 2.B.13 Remove, service and replace electrical components.
- 2.B.14 Test and service batteries, charging, lighting, warning and starting systems.
- 2.B.15 Test and service cooling systems.
- 2.B.16 Test, troubleshoot and service hydraulic systems.
- 2.B.17 Adjust wheel tread spacing.
- 2.B.18 Establish ballast and tire pressures.
- 2.B.19 Adjust steering linkage.
- 2.B.20 Prepare tractor or equipment for storage.
- 2.B.21 Check and adjust drive line components.
- 2.B.22 Install, adjust and service belt and chain drives.

- 2.B.23 Select appropriate tools and equipment to complete specific tasks.

Performance Example:

1. Student will perform a recommended periodic service job (as found in the operator's/maintenance manual).

2.C Properly use and maintain small engines.

- 2.C.01 Identify operating principles of two-stroke and four-stroke spark or compression ignition engines.
- 2.C.02 Select engine repair parts using manufactures' catalogs, microfiche or computers.
- 2.C.03 Interpret and follow recommended service and maintenance schedules.
- 2.C.04 Explain the functions and operating principles of fuel, lubrication, governor, cooling and electrical systems.
- 2.C.05 Service and maintain fuel, air intake and exhaust, cooling and lubrication systems.
- 2.C.06 Identify the use and function of basic small engine repair tools, including valve, cylinder, piston, seal and bearing tools.
- 2.C.07 Test and measure materials using measuring tools and test instruments such as micrometer, thickness gauge, telescoping and small hole gauge, dial indicator, compression tester, leak down gauge, torque wrench, tachometer, coil-condenser tester, VOA (volt-ohm-amp) meter, or DMM (digital multi-meter).
- 2.C.08 Select small engine fuels and lubricants.
- 2.C.09 Identify practices and procedures for storing an engine.
- 2.C.10 Locate adjustment data and specifications in operator and repair manuals.
- 2.C.11 Evaluate engine parts for replacement or servicing.
- 2.C.12 Troubleshoot, evaluate and replace valves, electrical, governor and carburetion parts.
- 2.C.13 Identify and properly apply fasteners, including screws, bolts, nuts and washers.

Performance Example:

1. When supplied with an equipment-mounted engine, student will operate and adjust or check ignition timing, engine speed and carburetor adjustments.

2.D Demonstrate skills used in building construction/concrete and masonry

- 2.D.01 Identify, use and maintain hand, electric and pneumatic tools and shop equipment for building construction.
- 2.D.02 Identify, select and apply construction fasteners.
- 2.D.03 Interpret plans and working drawings.
- 2.D.04 Identify structural components of buildings.
- 2.D.05 Lay out and cut structural components.
- 2.D.06 Determine quantity and cost for building materials.
- 2.D.07 Place, finish and cure concrete.
- 2.D.08 Mix concrete or mortar on the job site.
- 2.D.09 Identify and maintain concrete finishing tools and equipment.
- 2.D.10 Finish concrete using appropriate finishing tools and equipment.
- 2.D.11 Apply paint and other finishing materials.

Performance Example:

1. When given a plan and appropriate tools and materials, the student will construct a concrete form.

2.E Demonstrate skills used with electrical power, circuits, controls, and sensing devices.

- 2.E.01 Identify jobs requiring a licensed electrician.
- 2.E.02 Identify common electrical tools.
- 2.E.03 Measure voltage using a multimeter
- 2.E.04 Demonstrate best practices used when testing of fuses
- 2.E.05 Analyze system testing for electrical malfunctions
- 2.E.06 Service and lubricate an electric motor.
- 2.E.07 Mount an electric motor on a machine.
- 2.E.08 Check the running amperage and voltage of a motor.
- 2.E.09 Identify and describe basic principles of controls including thermostats, photoelectric, magnetic relays, timers, and pressure, motion and limit switches.

Performance Example:

1. The student will properly install an electric cord attachment plug.

2.F Demonstrate skills used in Arc SMAW, GMAW, GTAW and FCAW welding.

- 2.F.01 Demonstrate methods used to prepare materials and equipment for arc welding.
- 2.F.02 Identify safety practices in arc welding.
- 2.F.03 Lay out and prepare metal for arc welding.
- 2.F.04 Select arc welding machines and accessories for specific jobs.
- 2.F.05 Demonstrate methods used to start up, shut down and secure equipment.
- 2.F.06 Identify different metals.
- 2.F.07 Demonstrate techniques used to control distortion in arc welding.
- 2.F.08 Select appropriate electrodes and wires.
- 2.F.09 Weld basic joints using SMAW, GMAW, GTAW and FCAW.

Performance Example:

1. When given a plan and the appropriate equipment and materials, the student will weld basic joints (butt, corner, lap, etc.) in the flat position.

2.G Demonstrate skills used in plasma arc welding and cutting

- 2.G.01 Identify safety practices in gas and plasma arc welding and cutting.
- 2.G.02 Select gas welding plasma arc and cutting equipment and supplies.
- 2.G.03 Assemble gas welding and cutting equipment.
- 2.G.04 Check gas equipment for leaks.
- 2.G.05 Select welding rods and fluxes.
- 2.G.06 Demonstrate methods used to start up, shut down and secure the equipment.
- 2.G.07 Lay out and prepare metal for welding or cutting.
- 2.G.08 Fusion and braze weld basic joints.
- 2.G.09 Cut mild steel, including pipe.

Performance Example:

1. The student will properly light and adjust the torch flame for a specific welding or cutting operation.

2.H Demonstrate procedures used to maintain tools and equipment.

- 2.H.01 Identify appropriate shapes of tool and equipment cutting edges.
- 2.H.02 Prepare grinding and sharpening equipment.
- 2.H.03 Grind and sharpen tools and equipment.
- 2.H.04 Select abrasives for grinding and sharpening.
- 2.H.05 Recondition hand tools such as twist drills, chisels, punches and screw drivers.

Performance Example:

1. The student will safely and appropriately use a bench grinder to recondition a cold chisel.

2.I Safely and properly manipulate hot and cold metal.

- 2.I.01 Identify various types and shapes of metal.
- 2.I.02 Identify hand metal working tools.
- 2.I.03 Select files and saw blades.
- 2.I.04 Select soldering equipment and supplies.
- 2.I.05 Prepare and solder copper joints.
- 2.I.06 Prepare and solder electrical connections.
- 2.I.07 Join metals with appropriate fasteners.
- 2.I.08 Safely operate power tools such as nibblers, drills, and saws to accomplish specified tasks within given specifications.
- 2.I.09 Safely operate hand tools such as saws and files to accomplish specified tasks within given specifications.
- 2.I.10 Determine tap and drill sizes.
- 2.I.11 Cut threads with taps and dies, to meet given specifications.
- 2.I.12 Lay out and drill holes with a twist drill.
- 2.I.13 Repair damaged threads.

Performance Example:

1. When given a plan and the appropriate tools and materials, the student will properly drill and tap a piece of mild steel.

2.J Demonstrate plumbing skills for irrigation systems.

- 2.J.01 Identify jobs requiring a licensed plumber.
- 2.J.02 Identify pipe, fittings by type.
- 2.J.03 Select appropriate pipe threading and cutting tools.
- 2.J.04 Cut and assemble plastic pipe to given specifications.
- 2.J.05 Cut and assemble steel pipe to given specifications.
- 2.J.06 Connect flare and compression fittings.
- 2.J.07 Solder copper fittings.

Performance Example:

1. When given a plan and the appropriate tools and materials, the student will properly measure, cut, assemble and solder joints of a project made from 1/2" rigid copper tubing.

2.K Demonstrate skills used in conservation planning, land use, measurement, and leveling.

- 2.K.01 Determine land areas.
- 2.K.02 Determine percent of slope or grade.
- 2.K.03 Measure distances with a tape measure.
- 2.K.04 Identify the parts of a leveling instruments.
- 2.K.05 Set up and level a level instrument.

- 2.K.06 Take rod readings.
- 2.K.07 Determine direction by use of a compass.
- 2.K.08 Determine the difference in elevation of two or more points.
- 2.K.09 Determine that a material is level by setting up and using a laser level.

Performance Example:

1. When provided with a leveling instrument, the student will level the instrument and take rod readings at two given points and determine their difference in elevation.

2.L Demonstrate effective agribusiness and retail practices.

- 2.L.01 Describe the scope and effect of agribusiness in the local economy.
- 2.L.02 Identify factors affecting prices and pricing strategies.
- 2.L.03 Compute and estimate fixed and variable expenses.
- 2.L.04 Compare and contrast methods of inventory control.
- 2.L.05 Create a plan to market goods and services (including promotional materials and displays).
- 2.L.06 Illustrate how different seasons affect products and services offered.
- 2.L.07 Identify markets, customers, and distribution channels.
- 2.L.08 Describe ways to inform customers of products and services, including supplying information, making recommendations, and demonstrating use.
- 2.L.09 Demonstrate the ability to process sales and taxes using a variety of tender.
- 2.L.10 Demonstrate procedures used to receive and handle merchandise.
- 2.L.11 Demonstrate procedures used to ship and deliver merchandise.

Strand 3: Embedded Academic Knowledge and Skills

3.A English Language Arts

VTE #	Acad #	Standard	Grade	Topic
3.A.01c	2.4	Integrate relevant information gathered from group discussions and interviews for reports.	Pre-9	Language
3.A.02c	13.19	Identify and use knowledge of common graphic features (charts, maps, diagrams).	Pre-9	Reading
3.A.03c	19.21	Write reports based on research that includes quotations, footnotes or endnotes, and a bibliography.	Pre-9	Composition
3.A.04c	24.4	Apply steps for obtaining information from a variety of sources, organizing information, documenting sources, and presenting research in individual projects.	Pre-9	Composition
3.A.05c	24.5	Formulate open-ended research questions and apply steps for obtaining and evaluating information from a variety of sources, organizing information, documenting sources in a consistent and standard format, and presenting research.	9/10	Composition
3.A.06c	3.17	Deliver formal presentations for particular audiences using clear enunciation and appropriate organization, gestures, tone, and vocabulary.	11/12	Language
3.A.07c	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.08c	19.27	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.09c	24.6	Formulate original, open-ended questions to explore a topic of interest, design and carry out research, and evaluate the quality of the research paper in terms of the adequacy of its questions, materials, approach, and documentation of sources.	11/12	Composition
3.A.10c		Read technical manuals, guides, resource books and technical literature to gain information and solve problems (Operator's manual, service manuals and databases etc).		Voc

3.A.11c		Read, comprehend, and follow written technical directions for repairs, procedures and processes.		Voc
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3.B Mathematics

VTE #	Acad #	Standard	Grade	Topic
3.B.01c	7.M.2	Given the formulas, convert from one system of measurement to another. Use technology as appropriate.	Pre-9	Measurement
3.B.02c	7.P.4	Solve linear equations using tables, graphs, models, and algebraic methods.	Pre-9	Patterns, relations, algebra
3.B.03c	7.P.6	Use linear equations to model and analyze problems involving proportional relationships. Use technology as appropriate.	Pre-9	Patterns, relations, algebra
3.B.04c	8.M.2	Given the formulas, convert from one system of measurement to another. Use technology as appropriate.	Pre-9	Measurement
3.B.05c	8.N.1	Compare, order, estimate, and translate among integers, fractions and mixed numbers (i.e., rational numbers), decimals, and percents.	Pre-9	Numbers
3.B.06c	10.D.1	Select, create, and interpret an appropriate graphical representation (e.g., scatterplot, table, stem-and-leaf plots, box-and-whisker plots, circle graph, line graph, and line plot) for a set of data and use appropriate statistics (e.g., mean, median, range, and mode) to communicate information about the data. Use these notions to compare different sets of data.	9/10	Data Analysis, Probability and Statistics
3.B.07c	10.M.4	Describe the effects of approximate error in measurement and rounding on measurements and on computed values from measurements.	9/10	Measurement
3.B.08c	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.C Science and Engineering/Technology

VTE #	Acad #	Standard	Grade	Topic
3.C.01c	2	Recognize that all organisms are composed of cells, and that many organisms are single-celled (unicellular), e.g., bacteria, yeast. In these single-celled organisms, one cell must carry out all of the basic functions of life.	Pre-9	Life Science
3.C.02c	3	Compare and contrast plant and animal cells, including major organelles (cell membrane, cell wall, nucleus, cytoplasm, chloroplasts, mitochondria, vacuoles).	Pre-9	Life Science
3.C.03c	4	Recognize that within cells, many of the basic functions of organisms (e.g., extracting energy from food and getting rid of waste) are carried out. The way in which cells function is similar in all living organisms.	Pre-9	Life Science
3.C.04c	10	Give examples of ways in which genetic variation and environmental factors are causes of evolution and the diversity of organisms.	Pre-9	Life Science
3.C.05c	2.3	Distinguish between plant and animal cells.		Biology
3.C.06c	2.4	Describe how cells function in a narrow range of physical conditions, such as temperature and pH, to perform life functions that help to maintain homeostasis.		Biology
3.C.07c	2.7	Provide evidence that the organic compounds produced by plants are the primary source of energy and nutrients for most living things.		Biology
3.C.08c	1.1	Identify the earth's principal sources of internal and external energy, e.g., radioactive decay, gravity, solar energy.		Earth Science
3.C.09c	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.10c	1.5	Interpret plans, diagrams, and working drawings in the construction of a prototype.		Eng/Tech
3.C.11c	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.12c	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.		Eng/Tech
3.C.13c	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.14c	4.3	Identify the differences between open and closed thermal systems, e.g., humidity control systems, heating systems, cooling systems.		Eng/Tech
3.C.15c	4.4	Explain how environmental conditions influence heating and cooling of buildings and automobiles.		Eng/Tech
3.C.16c	4.5	Identify and explain the tools, controls, and properties of materials used in a thermal system, e.g., thermostats, R Values, thermal conductivity, temperature sensors.		Eng/Tech
3.C.17c	5.3	Explain the relationship between resistance, voltage, and current (Ohm's Law).		Eng/Tech
3.C.18c	2.4	Describe the relationship among energy, work, and power both conceptually and quantitatively.		Physics
3.C.19c	2.6	Identify appropriate standard international units of measurement for energy, work, power, and momentum.		Physics
3.C.20c	5.4	Develop a qualitative and quantitative understanding of current, voltage, resistance, and the connection between them.		Physics
3.C.21c	5.5	Identify appropriate units of measurement for current, voltage, and resistance, and explain how they are measured.		Physics
3.C.22	1.2	Describe the components of the electromagnetic spectrum and give examples of its impact on our lives.		Earth/Space
3.C.23	1.2	Demonstrate knowledge of pictorial and multi-view drawings (e.g., orthographic projection, isometric, oblique, perspective) using proper techniques.		Eng/Tech
3.C.24	1.3	Demonstrate the use of drafting techniques with paper and pencil or computer-aided design (CAD) systems when available.		Eng/Tech
3.C.25	1.4	Apply scale and proportion to drawings, e.g., 1/4" = 1'0".		Eng/Tech

3.C.26	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.27	3.4	Differentiate between hydraulic and pneumatic systems and provide examples of appropriate applications of each as they relate to manufacturing and transportation systems.		Eng/Tech
3.C.28	4.1	Differentiate among conduction, convection, and radiation in a thermal system, e.g., heating and cooling a house, cooking.		Eng/Tech
3.C.29	5.2	Identify and explain the components of a circuit including a source, conductor, load, and controllers (controllers are switches, relays, diodes, transistors, integrated circuits).		Eng/Tech
3.C.30	5.4	Determine the voltages and currents in a series circuit and a parallel circuit.		Eng/Tech
3.C.31	5.5	Explain how to measure voltage, resistance, and current in electrical systems.		Eng/Tech
3.C.32	5.6	Describe the differences between Alternating Current (AC) and Direct Current (DC).		Eng/Tech
3.C.33	6.2	Explain how information travels through different media, e.g., electrical wire, optical fiber, air, space.		Eng/Tech
3.C.34	7.1	Explain the manufacturing processes of casting and molding, forming, separating, conditioning, assembling, and finishing.		Eng/Tech
3.C.35	7.2	Differentiate the selection of tools and procedures used in the safe production of products in the manufacturing process, e.g., hand tools, power tools, computer-aided manufacturing, three-dimensional modeling.		Eng/Tech
3.C.36	1.1	Distinguish between vector quantities (velocity, acceleration, and force) and scalar quantities (speed and mass).		Physics
3.C.37	1.3	Distinguish between and solve problems involving, velocity, speed, and constant acceleration.		Physics
3.C.38	1.6	Interpret and apply Newton's first law of motion.		Physics
3.C.39	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.40	1.9	Qualitatively distinguish between static and kinetic friction, what they depend on and their effects on the motion of objects.		Physics

3.C.41	1.12	Identify appropriate standard international units of measurement for force, mass, distance, speed, acceleration, and time, and explain how they are measured.		Physics
3.C.42	2.3	Apply quantitatively the law of conservation of mechanical energy to simple systems.		Physics
3.C.43	3.2	Differentiate between specific heat and heat capacity.		Physics
3.C.44	5.1	Recognize the characteristics of static charge, and explain how a static charge is generated.		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.
- 4.D.12c Meet company attendance punctuality expectations.
- 4.D.13c Demonstrate effective negotiation skills.
- 4.D.14c Demonstrate conflict management with management/co-workers/others.
- 4.D.15c List the characteristics of a rational / responsible employee.

4.E Identify the standards and qualifications that must be met to pursue careers in Agriculture and Natural Resources.

- 4.E.01c Explain what types of skills or knowledge are necessary to work in a specific field of study.
- 4.E.02c Describe what type of degree or certification is required to enter a desired job/career.

Performance Example:

1. Student describes a career path progression including educational training, necessary work experience, and knowledge attainment to pursue careers within the Agriculture and Natural Resources Cluster. Include the major career areas and examples of post-secondary opportunities.

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.

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.

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.

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.

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.
5. Given a scenario involving the illegal or unethical activity of a co-worker or the employer, describe what steps would be taken to effectively remedy the situation.

5.G Demonstrate knowledge of ethical and legal issues as they related to the stewardship of natural resources.

- 5.G.01c Explain how personal responsibility and choices are related to natural resource sustainability.
- 5.G.02c Explain how personal workplace actions can affect the resource.
- 5.G.03c Identify sources for regulatory information.

Performance Example:

1. Describe examples of environmental impact by agricultural mechanics activities and the responsibility we have to minimize the impact.

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 Perform efficient keyboarding techniques.
- 6.A.11c Demonstrate the use of formulas in a spreadsheet application.

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.
2. Look-up parts using a service look-up system (CD-ROM) and/or complete an OEM warranty form on-line.

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).

Performance Example:

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