

# **AGRICULTURAL MECHANICS**

## Curriculum Content Frameworks

**Please note: All assessment questions will be taken from the knowledge portion of these frameworks.**

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# Curriculum Content Frameworks

## Agricultural Mechanics

Grade Levels: 10, 11, 12 Course Code: 491390	Grade Levels:	Prerequisite: Agricultural Mechanics
Course Description: This course connects scientific principles with mechanical skills. The course will develop understanding and skills in the traditional areas of agricultural mechanics including the following: safety, metal technology, small engines, graphics, tool maintenance, woodworking, concrete and masonry, electricity, plumbing, and surveying. Supervised experience and FFA will be integrated, as appropriate throughout.		

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# Unit 1: Introduction to Agricultural Mechanics

## Hours: 5

Terminology: Agricultural mechanics, Agricultural power, Agricultural structures, Agricultural technology

<b>CAREER and TECHNICAL SKILLS</b>		<b>ACADEMIC and WORKPLACE SKILLS</b>			
What the Student Should be Able to Do		What the Instruction Should Reinforce			
Knowledge	Application	Skill Group	Skill	Description	
1.1 Define terminology	1.1.1 Prepare a list of terms with definitions	Foundation	Reading	Comprehends written information for main ideas [1.3.7]	
			Writing	Applies/Uses technical words and concepts [1.6.4]	
1.2 Examine the importance of agricultural mechanics	1.2.1 Use reference materials to locate information on agricultural mechanics	Foundation	Reading	Comprehends written information for main ideas [1.3.7]	
	1.2.2 Investigate and assess emerging agricultural technology and give an oral report in class		Speaking	Asks questions to clarify information [1.5.3] Asks questions to obtain information [1.5.4]	
		Personal Management	Organizational Effectiveness	Comprehends the organization's modes of operation [3.3.5]	
1.3 Identify careers in agricultural mechanics	1.3.1 Research a career in agricultural mechanics to determine educational requirements, working conditions, and salary	Foundation	Reading	Applies information to job performance [1.3.4]  Uses standard occupational resource materials [1.3.22]	
			Personal Management	Career Awareness, Development, and Mobility	Explores career opportunities [3.1.6]  Identifies continuing changes in male/female roles at home and work [3.1.7]  Identifies education and training needed to achieve goals [3.1.8]

<b>CAREER and TECHNICAL SKILLS</b>			<b>ACADEMIC and WORKPLACE SKILLS</b>		
What the Student Should be Able to Do			What the Instruction Should Reinforce		
<b>Knowledge</b>	<b>Application</b>		<b>Skill Group</b>	<b>Skill</b>	<b>Description</b>
1.4 Identify appropriate FFA activities and supervised experiences in agricultural mechanics	1.4.1	List FFA activities available in agricultural mechanics	Foundation	Arithmetic/ Mathematics	Applies computation skills to keeping records [1.1.5]
	1.4.2	Plan and/or expand supervised experiences in agricultural mechanics		Writing	Organizes information into an appropriate format [1.6.10]
	1.4.3	Keep records on FFA and supervised experience participation	Interpersonal	Teamwork	Comprehends ideas and concepts related to FFA activities [2.6.1]  Takes an interest in what others say and do [2.6.5]

## Unit 2: Safety with Agricultural Electricity

### Hours: 8

Terminology: Combustion, Decibel, Extinguish, Fire triangle, Personal Protective Equipment (PPE), Safety

<b>CAREER and TECHNICAL SKILLS</b>		<b>ACADEMIC and WORKPLACE SKILLS</b>				
What the Student Should be Able to Do		What the Instruction Should Reinforce				
Knowledge	Application	Skill Group	Skill	Description		
2.1 Define terminology	2.1.1 Prepare a list of terms with definitions	Foundation	Reading	Comprehends written information for main ideas [1.3.7]		
			Writing	Applies/Uses technical words and concepts [1.6.4]		
2.2 Discuss the meaning and importance of safety in agricultural mechanics work	2.2.1 Name examples of accidents and their causes that have occurred in the local community	Foundation	Listening	Comprehends ideas and concepts related to agricultural mechanics [1.2.1]		
	2.2.2 Identify the most frequent causes of accidents in an agricultural mechanics lab		Speaking	Communicates a thought, idea, or fact in spoken form [1.5.5]		
2.3 Identify practices that promote safety and minimize hazards in agricultural mechanics	2.3.1 List precautions that may be taken to prevent accidents in the lab	Foundation	Creative Thinking	Makes connections between seemingly unrelated ideas [4.1.6]		
			Thinking	Listening	Receives and interprets verbal messages [1.2.8]	
			Thinking	Decision Making	Considers risks when making a decision [4.2.3]	
2.4 Describe conditions for fire combustion and control	2.4.1 Identify the meaning and use of a fire triangle	Foundation	Knowing How to Learn	Processes new information as related to workplace [4.3.5]		
			Thinking	Science	Applies life-saving techniques [1.4.4]	
			Thinking	Knowing How to Learn	Applies new knowledge and skills to agricultural mechanics [4.3.1]	
	2.4.2 Explain how fire extinguishers are classified					
	2.4.3 extinguisher					

<b>CAREER and TECHNICAL SKILLS</b>		<b>ACADEMIC and WORKPLACE SKILLS</b>			
What the Student Should be Able to Do		What the Instruction Should Reinforce			
<b>Knowledge</b>	<b>Application</b>	<b>Skill Group</b>	<b>Skill</b>	<b>Description</b>	
2.5 Describe appropriate responses to accidents	2.5.1 Identify procedures with emergencies	Foundation	Science	Applies life-saving techniques [1.4.4]	
	2.5.2 Demonstrate basic first aid treatment for minor injuries	Personal Management	Responsibility	Observes health code/sanitation requirements [1.4.18] Pays close attention to details [3.4.8]	
2.6 Describe the importance of personal safety	2.6.1 Identify personal protective equipment (PPE) and demonstrate the appropriate use of each in agricultural mechanics	Foundation	Listening	Comprehends ideas and concepts related to personal safety [1.2.1]	
	2.6.2 Interpret posted safety and work regulations	Personal Management	Science Integrity/Honesty/ Work Ethic	Applies life-saving techniques [1.4.4] Complies with safety and health rules in a given work environment [3.2.2]	

## Unit 3: Arc Welding in Agriculture

### Hours: 15

Terminology: Alternating Current (AC), Arc welding, Bead, Direct Current (DC), Electrode, Flux, Fusion, Penetration, Slag, Weld, Welding helmet, Welding position

<b>CAREER and TECHNICAL SKILLS</b>		<b>ACADEMIC and WORKPLACE SKILLS</b>			
What the Student Should be Able to Do		What the Instruction Should Reinforce			
Knowledge	Application	Skill Group	Skill	Description	
3.1 Define terminology	3.1.1 Prepare a list of terms with definitions	Foundation	Reading	Comprehends written information for main ideas [1.3.7]	
			Writing	Applies/Uses technical words and concepts [1.6.4]	
3.2 Describe the shielded arc welding process	3.2.1 Identify the components of the shielded metal arc welding process	Foundation	Reading	Adjusts reading strategy to purpose and type of reading (skimming and scanning) [1.3.1]	
	3.2.2 Assess the quality of weld samples	Personal Management	Career Awareness, Development, and Mobility	Comprehends ideas and concepts related to arc welding [3.1.3]	
	3.2.3 Relate the welding process to different kinds and shapes of metals	Thinking	Reasoning	Sees relationship between two or more ideas, objects, or situations [4.5.5]	
3.3 Distinguish kinds and parts of metal arc welding equipment and supplies	3.3.1 List differences in AC and DC welders	Foundation	Reading	Comprehends written information for main ideas [1.3.7]	
	3.3.2 List the major parts of shielded arc welders	Thinking	Science	Applies scientific principles related to electricity for arc welding [1.4.5]	
	3.3.3 Identify and compare electrodes by use and metal to be welded		Problem Solving	Demonstrates logical reasoning in reaching a conclusion [4.4.2]  Draws conclusions from observations, evaluates conditions, and gives possible solutions [4.4.5]	

<b>CAREER and TECHNICAL SKILLS</b>		<b>ACADEMIC and WORKPLACE SKILLS</b>			
What the Student Should be Able to Do		What the Instruction Should Reinforce			
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3.4 Describe fire prevention and personal protection in welding	3.4.1 Identify fire protection equipment	Foundation	Science	Determines quantities/measurements in English and metric units [1.4.14]	
	3.4.2 Identify and properly use personal protection equipment in arc welding	Personal Management	Integrity/Honesty/Work Ethic	Complies with safety and health rules in a given work environment [3.2.2]	
	3.4.3 List the practices to follow to prevent accidents	Thinking	Knowing How to Learn	Locates appropriate learning resources to acquire or improve knowledge and skills [4.3.3]	
	3.4.4 List the actions to take in case of an accidental injury				
	3.4.5 Identify proper methods of handling hot metal				
3.5 Describe the process of striking an arc and running a bead	3.5.1 Demonstrate the ability to strike an arc following all safety procedures and appropriate techniques	Foundation	Listening	Listens to follow directions [1.2.6]	
	3.5.2 Demonstrate the ability to run a simple bead on mild steel	Personal Management	Writing	Summarizes written information [1.6.17]	
	3.5.3 Demonstrate the four basic welding positions		Integrity/Honesty/Work Ethic	Describes desirable worker characteristics [3.2.3]	
	3.5.4 Demonstrate welding joints		Responsibility	Exhibits enthusiasm in approaching and completing tasks [3.4.3]	

## Unit 4: Oxyacetylene Welding and Cutting in Agriculture

### Hours: 15

Terminology: Bleeding the lines, Brazing, Carbonizing flame, Cutting tip, Filler rod, Flammable, Fusion, Gauge, Neutral flame, Oxidizing flame, Regulator, Tip, Tip cleaner, Torch, Valve

CAREER and TECHNICAL SKILLS What the Student Should be Able to Do		ACADEMIC and WORKPLACE SKILLS What the Instruction Should Reinforce			
Knowledge	Application	Skill Group	Skill	Description	
4.1 Define terminology	4.1.1 Prepare a list of terms with definitions	Foundation	Reading	Comprehends written information for main ideas [1.3.7]	
			Writing	Applies/Uses technical words and concepts [1.6.4]	
4.2 Describe the oxyacetylene welding and cutting processes in agriculture	4.2.1 Identify uses of oxyacetylene welding and cutting in agriculture	Foundation	Speaking	Pronounces words correctly [1.5.9]	
	4.2.2 Relate welding and cutting processes to different kinds of metal	Thinking	Knowing How to Learn	Speaks effectively using appropriate eye contact, gestures, and posture [1.5.11]  Processes new information as related to workplace [4.3.5]	
4.3 Distinguish parts and functions of oxyacetylene welding and cutting equipment and supplies	4.3.1 Label the major parts of oxyacetylene welding and cutting equipment	Foundation	Listening	Listens for content [1.2.3]	
	4.3.2 Distinguish between welding and cutting components of oxyacetylene equipment		Reading	Comprehends written information and applies it to a task [1.3.8]	
	4.3.3 Identify, compare, and select filler rods by type and by metal to be welded		Science	Applies scientific principles related to oxyacetylene welding and cutting [1.4.5]	
		Personal Management	Responsibility	Maintains a high level of concentration in completion of a task [3.4.7]	

CAREER and TECHNICAL SKILLS What the Student Should be Able to Do		ACADEMIC and WORKPLACE SKILLS What the Instruction Should Reinforce			
Knowledge	Application	Skill Group	Skill	Description	
4.4 Describe safe practices in oxyacetylene welding and cutting	4.4.1 Identify potential fire hazards with oxyacetylene welding and cutting	Foundation   Personal Management	Listening	Comprehends ideas and concepts related to safety with oxyacetylene welding and cutting [1.2.1]	
	4.4.2 Identify and properly use personal protective equipment when using oxyacetylene equipment		Science	Follows safety guidelines [1.4.15]	
	4.4.3 List practices to follow to prevent accidental injury		Integrity/Honesty/Work Ethic	Complies with safety and health rules in a given work environment [3.2.2]	
	4.4.4 List actions to take in case of an accident		Responsibility	Maintains a high level of concentration in completion of a task [3.4.7]	
	4.4.5 Identify proper techniques of handling hot metal			Pays close attention to details [3.4.8]	
	4.4.6 Identify practices to follow in safely storing and using compressed gas				
4.5 Describe the process of using oxyacetylene welding and cutting equipment	4.5.1 Demonstrate the ability to setup, turn oxygen and acetylene on, and properly adjust valves	Foundation	Science	Applies knowledge to complete a practical task [1.4.3]	
	4.5.2 Demonstrate the ability to light and adjust torches to gain carbonizing, neutral, and oxidizing flames	Personal Management	Integrity/Honesty/Work Ethic	Follows established rules, regulations, and policies [3.2.5]	
	4.5.3 Demonstrate the ability to fuse mild steel with and without a filler rod		Responsibility	Maintains a high level of concentration in completion of a task [3.4.7]  Pays close attention to details [3.4.8]	
	4.5.4 Demonstrate the ability to cut mild steel using a cutting torch	Thinking	Seeing Things in the Mind's Eye	Visualizes a system's operation from schematics [4.6.3]	

## Unit 5: Metal Technology

### Hours: 8

Terminology: Die, Rivet, Solder, Soldering, Sweating, Tap, Tinning

CAREER and TECHNICAL SKILLS What the Student Should be Able to Do		ACADEMIC and WORKPLACE SKILLS What the Instruction Should Reinforce			
Knowledge	Application	Skill Group	Skill	Description	
5.1 Define terminology	5.1.1 Prepare a list of terms with definitions	Foundation	Reading	Comprehends written information for main ideas [1.3.7]	
			Writing	Applies/Uses technical words and concepts [1.6.4]	
5.2 Describe cold metal and sheet metal processes in agriculture	5.2.1 Identify uses of cold metal and sheet metal work	Foundation	Speaking	Asks questions to clarify information [1.5.3]	
	5.2.2 Relate cold metal and sheet metal work to different kinds of metal	Interpersonal	Teamwork	Contributes to group with ideas, suggestions, and effort [2.6.2]	
5.3 Discuss skills and processes used in cold metal and sheet metal work	5.3.1 Identify and safely use tools in cold metal and sheet metal work	Foundation	Arithmetic/ Mathematics	Applies addition, subtraction, and division to real-world situations [1.1.1]	
	5.3.2 Demonstrate measuring and marking metal materials			Makes precision measurements using cold metal and sheet metal devices [1.1.27]	
	5.3.3 Demonstrate cutting metal materials			Uses common measuring devices/tools to measure cold metal and sheet metal [1.1.37]	
	5.3.4 Demonstrate skills in bending and shaping metal			Science Follows safety guidelines [1.4.15]	
	5.3.5 Demonstrate how to tap a hole in flat mild steel	Personal Management	Responsibility	Maintains a high level of concentration in completion of a task [3.4.7]	
	5.3.6 Demonstrate skills to maintain tools and/or construct a simple project				
5.4 Describe fire prevention and personal protection with cold metal and sheet metal work	5.4.1 Identify fire protection equipment	Foundation	Science	Follows safety guidelines [1.4.15]	
	5.4.2 Identify and properly use personal protective equipment	Personal Management	Integrity/Honesty/ Work Ethic	Complies with safety and health rules in a given work environment [3.2.2]	
	5.4.3 List the practices to follow to prevent accidents				
	5.4.4 List the actions to take in case of an accident				

## Unit 6: Small Engines

### Hours: 10

Terminology: Four-stroke cycle engine, Internal combustion engine, Stroke, Top Dead Center (TDC), Two-stroke cycle engine

CAREER and TECHNICAL SKILLS What the Student Should be Able to Do		ACADEMIC and WORKPLACE SKILLS What the Instruction Should Reinforce			
Knowledge	Application	Skill Group	Skill	Description	
6.1 Define terminology	6.1.1 Prepare a list of terms with definitions	Foundation	Reading	Comprehends written information for main ideas [1.3.7]	
			Writing	Applies/Uses technical words and concepts [1.6.4]	
6.2 Describe the role and importance of small engines	6.2.1 List uses of small gas engines in agriculture and horticulture	Foundation	Reading	Comprehends written information for main ideas [1.3.7]	
	6.2.2 Indicate impact of using small engines on the environment				
6.3 Describe the kinds and sizes of small engines	6.3.1 Distinguish between two-stroke and four-stroke cycle engines	Foundation	Speaking	Applies/Uses technical terms as appropriate to audience [1.5.2]	
	6.3.2 Identify the major parts of an engine and describe the functions of the parts	Thinking	Reasoning	Sees relationship between two or more ideas, objects, or situations [4.5.5]	
6.4 Describe preventative maintenance (service) of small engines	6.4.1 Match tools used in working on small gas engines with their functions	Foundation	Reading	Locates pertinent information in documents such as manuals, graphs, and schedules to perform tasks [1.3.18]	
	6.4.2 Practice safety in using and servicing small engines, including the use of personal protective equipment and disposal of wastes from engines	Personal Management	Organizational Effectiveness	Applies knowledge to implement work-related system or practice [3.3.4]	
	6.4.3 Service the air filtration system on a small engine		Responsibility	Exhibits enthusiasm in approaching and completing tasks [3.4.3]	
	6.4.4 Service the lubrication system on a small engine	Thinking	Seeing Things in the Mind's Eye	Imagines the flow of work activities from narrative descriptions [4.6.1]	
	6.4.5 Service the ignition and fuel systems on a small engine				

## Unit 7: Agricultural Graphics

### Hours: 8

Terminology: Architect scale, Border line, Drawing, Pictorial drawing, Scale, Sketch, Title block, Triangle

<b>CAREER and TECHNICAL SKILLS</b>		<b>ACADEMIC and WORKPLACE SKILLS</b>			
What the Student Should be Able to Do		What the Instruction Should Reinforce			
Knowledge	Application	Skill Group	Skill	Description	
7.1 Define terminology	7.1.1 Prepare a list of terms with definitions	Foundation	Reading	Comprehends written information for main ideas [1.3.7]	
			Writing	Applies/Uses technical words and concepts [1.6.4]	
7.2 Discuss the meaning and application of agricultural graphics	7.2.1 Explain how sketches and drawings provide a representation of a project or item	Foundation	Listening	Listens for content [1.2.3]	
	7.2.2 Identify the importance of sketching and drawing in agricultural mechanics	Personal Management	Organizational Effectiveness	Listens to follow directions [1.2.6]	
	7.2.3 Indicate how sketches and drawings may be used in construction		Responsibility	Identifies characteristics desired by organization [3.3.6]	
7.3 Describe how a drawing is made	7.3.1 Identify tools used in sketching and drawing and how the tools are used	Foundation	Arithmetic/ Mathematics	Pays close attention to details [3.4.8]	
	7.3.2 Identify the elements of a plan			Draws to scale [1.1.20]	
	7.3.3 Demonstrate the correct use of an architect's scale		Reading	Makes precision measurements using an architect's scale [1.1.27]	
	7.3.4 Create a sheet layout and title block	Personal Management	Responsibility	Identifies relevant details, facts and specifications [1.3.16]	
	7.3.5 Construct orthographic, isometric, and oblique drawings			Maintains a high level of concentration in completion of a task [3.4.7]	
				Pays close attention to details [3.4.8]	

## Unit 8: Hand and Power Tool Use and Maintenance

### Hours: 8

Terminology: Cold chisel, Mushroomed, Temper, Whet

CAREER and TECHNICAL SKILLS What the Student Should be Able to Do		ACADEMIC and WORKPLACE SKILLS What the Instruction Should Reinforce			
Knowledge	Application	Skill Group	Skill	Description	
8.1 Define terminology	8.1.1 Prepare a list of terms with definitions	Foundation	Reading	Comprehends written information for main ideas [1.3.7]	
			Writing	Applies/Uses technical words and concepts [1.6.4]	
8.2 Discuss hand and power tools in agricultural mechanics	8.2.1 Identify common hand and power tools	Foundation	Reading	Applies information to new situations [1.3.5]	
	8.2.2 Practice safety when using hand and power tools, including the use of personal protective equipment	Personal Management	Responsibility	Maintains a high level of concentration in completion of a task [3.4.7]	
	8.2.3 Demonstrate the proper use of common hand and power tools	Thinking	Creative Thinking	Makes connections between seemingly unrelated ideas [4.1.6]	
8.3 Describe the meaning and practice of tool fitting and their functions	8.3.1 Identify tool conditions where fitting skills are needed	Foundation	Writing	Uses technical words and symbols [1.6.20]	
	8.3.2 Sharpen a cold chisel, twist drill, lawn mower blade, or other cutting tool	Personal Management	Responsibility	Applies knowledge to implement work-related system or practice [3.3.4]  Presents personal skills as benefits for company objective [3.3.7]	

## Unit 9: Plumbing

### Hours: 8

Terminology: Fitting, Flaring, Pipe, PVC, Reaming, Tubing, Valve

<b>CAREER and TECHNICAL SKILLS</b>		<b>ACADEMIC and WORKPLACE SKILLS</b>			
What the Student Should be Able to Do		What the Instruction Should Reinforce			
Knowledge	Application	Skill Group	Skill	Description	
9.1 Define terminology	9.1.1 Prepare a list of terms with definitions	Foundation	Reading	Comprehends written information for main ideas [1.3.7]	
			Writing	Applies/Uses technical words and concepts [1.6.4]	
9.2 Explain the meaning and importance of plumbing skills	9.2.1 Identify common plumbing applications used in agriculture, including water supply and wastewater management	Foundation	Writing	Organizes sentences into paragraphs [1.6.11]	
	9.2.2 List common practices in maintaining water systems	Thinking	Reasoning	Applies rules and principles to a new situation [4.5.1]	
9.3 Describe common plumbing practices	9.3.1 Identify tools used in plumbing and state their functions	Foundation	Speaking	Organizes ideas and communicates oral messages to listeners [1.5.7]	
	9.3.2 Identify common materials used in plumbing, including pipe/tubing and fittings	Thinking	Problem Solving	Identifies possible reasons for problem [4.4.6]	
	9.3.3 Demonstrate the process of measuring, cutting and joining plastic pipe			Interprets drawings to solve design problems [4.4.7]	
	9.3.4 Demonstrate measuring, cutting, and sweating copper tubing				
	9.3.5 Practice safety when performing plumbing jobs, including the use of personal protective equipment				

## Unit 10: Woodworking

### Hours: 10

Terminology: Crosscut, Grain, Hardwood, Kerf, Lumber, Plywood, Softwood

<b>CAREER and TECHNICAL SKILLS</b>		<b>ACADEMIC and WORKPLACE SKILLS</b>			
What the Student Should be Able to Do		What the Instruction Should Reinforce			
Knowledge	Application	Skill Group	Skill	Description	
10.1 Define terminology	10.1.1 Prepare a list of terms with definitions	Foundation	Reading	Comprehends written information for main ideas [1.3.7]	
			Writing	Applies/Uses technical words and concepts [1.6.4]	
10.2 Discuss the use and importance of woodworking in agriculture	10.2.1 Identify common structures made of wood	Foundation	Speaking	Communicates a thought, idea, or fact in spoken form [1.5.5]	
	10.2.2 List advantages and disadvantages of wood in agriculture			Speaks effectively using appropriate eye contact, gestures, and posture [1.5.11]	
10.3 Describe the kinds and uses of wood materials and fasteners	10.3.1 Identify common kinds and dimensions of wood materials, including lumber and plywood	Foundation	Arithmetic/ Mathematics	Applies mathematical principles related to woodworking [1.1.4]	
	10.3.2 Identify common kinds and sizes of fasteners used in woodworking		Science	Reads measurements from common measuring devices [1.4.20]	
10.4 Discuss and apply practices in working with wood in construction	10.4.1 Identify common tools used in working with wood	Personal Management	Integrity/Honesty/ Work Ethic	Complies with safety and health rules in a given work environment [3.2.2]	
	10.4.2 Demonstrate how tools are properly used in woodworking	Thinking	Responsibility	Pays close attention to details [3.4.8]	
	10.4.3 Follow safe practices in woodworking, including the use of personal protective equipment		Reasoning	Sees relationship between two or more ideas, objects, or situations [4.5.5]	
	10.4.4 Demonstrate the use of a claw hammer with fasteners				
	10.4.5 Demonstrate measuring and marking wood materials				
	10.4.6 Demonstrate the use of crosscut and rip saws in cutting wood materials				

## Unit 11: Electricity in Agriculture

### Hours: 12

Terminology: Ampere, Circuit, Circuit breaker, Conductor, Conduit, Electricity, Grounding, Insulator, Kilowatt hour, National Electrical Code®, Ohm, Resistance, Short circuit, Volt, Voltage drop, Watt

<b>CAREER and TECHNICAL SKILLS</b> What the Student Should be Able to Do		<b>ACADEMIC and WORKPLACE SKILLS</b> What the Instruction Should Reinforce		
Knowledge	Application	Skill Group	Skill	Description
11.1 Define terminology	11.1.1 Prepare a list of terms with definitions	Foundation	Reading  Writing	Comprehends written information for main ideas [1.3.7]  Applies/Uses technical words and concepts [1.6.4]
11.2 Describe the meaning and nature of electricity	11.2.1 Identify the principles of electricity, including amperes, volts, watts, and circuits  11.2.2 Explain the role of magnetism in electricity  11.2.3 Distinguish the roles of conductors and insulators, including the kinds of materials used for each  11.2.4 List and explain important practices in the safe use of electricity, including the use of a ground-fault circuit interrupter (GFCI)	Foundation   Personal Management	Science   Responsibility	Acquires and processes scientific data [1.4.1]  Applies knowledge to complete a practical task [1.4.3]  Describes/Explains scientific principles related to electricity and magnetism [1.4.13]  Pays close attention to details [3.4.8]
11.3 Discuss the importance of electricity in agriculture	11.3.1 Identify farm and non-farm uses of electricity  11.3.2 Identify practices to assure uninterrupted electrical service	Foundation  Personal Management	Listening  Responsibility	Listens for content [1.2.3]  Comprehends ideas and concepts related to electricity [3.4.2]

CAREER and TECHNICAL SKILLS What the Student Should be Able to Do		ACADEMIC and WORKPLACE SKILLS What the Instruction Should Reinforce		
Knowledge	Application	Skill Group	Skill	Description
11.4 Describe important electrical wiring practices in agriculture	11.4.1 Discuss the importance and meaning of the National Electrical Code®	Foundation	Arithmetic/ Mathematics	Makes rough measurements [1.1.28]
	11.4.2 Identify common materials used in electrical wiring			Performs basic computations [1.1.31]
	11.4.3 Identify common tools used in electrical wiring work and demonstrate their proper use	Personal Management	Responsibility	Listening
	11.4.4 Demonstrate measuring and cutting electrical wire			Listens to follow directions [1.2.6]
	11.4.5 Demonstrate splicing wire			Maintains a high level of concentration in completion of a task [3.4.7]
	11.4.6 Demonstrate installing a switch, outlet, or light			Pays close attention to details [3.4.8]
				Sets high standards for self in completion of a task [3.4.9]

## Unit 12: Concrete and Masonry

### Hours: 8

Terminology: Aggregate, Concrete, Cubic yard, Curing, Floating, Form, Masonry unit, Mortar, Portland cement, Reinforced concrete, Screeding, Trowel, Workable mix

CAREER and TECHNICAL SKILLS What the Student Should be Able to Do		ACADEMIC and WORKPLACE SKILLS What the Instruction Should Reinforce			
Knowledge	Application	Skill Group	Skill	Description	
12.1 Define terminology	12.1.1 Prepare a list of terms with definitions	Foundation	Reading	Comprehends written information for main ideas [1.3.7]	
			Writing	Applies/Uses technical words and concepts [1.6.4]	
12.2 Discuss the meaning and importance of concrete and masonry	12.2.1 Identify the meaning of concrete and masonry	Foundation	Arithmetic/ Mathematics	Applies computation skills to concrete and masonry [1.1.5]	
	12.2.2 List uses of concrete and masonry in agriculture and horticulture		Listening	Listens for content [1.2.3]	
	12.2.3 Calculate measurements of concrete and masonry units		Personal Management	Reading	Comprehends written information and applies it to a task [1.3.8]
	Responsibility	Exhibits enthusiasm in approaching and completing tasks [3.4.3]			
				Pays close attention to details [3.4.8]	
12.3 Describe the mixing, placement, and curing of concrete	12.3.1 Identify tools used in concrete work	Foundation	Arithmetic/ Mathematics	Applies a mathematical formula to solve a problem [1.1.3]	
	12.3.2 List ingredients and proportions used in making concrete			Calculates percentages, ratios, proportions, decimals and common fractions [1.1.10]	
	12.3.3 Prepare forms for placing concrete	Personal Management	Integrity/Honesty/ Work Ethic	Complies with safety and health rules in a given work environment [3.2.2]	
	12.3.4 Identify the importance of reinforcement, including wire, rods, and fiberglass			Thinking	Problem Solving
	12.3.5 Indicate the importance and procedures used to finish concrete				
	12.3.6 Indicate appropriate curing practices for concrete				
	12.3.7 Identify appropriate safety practices in concrete work				

<b>CAREER and TECHNICAL SKILLS</b> What the Student Should be Able to Do		<b>ACADEMIC and WORKPLACE SKILLS</b> What the Instruction Should Reinforce			
<b>Knowledge</b>	<b>Application</b>	<b>Skill Group</b>	<b>Skill</b>	<b>Description</b>	
12.4 Describe the use and placement of masonry units	12.4.1 Identify the tools used in concrete masonry work	Foundation	Reading	Identifies relevant details, facts and specifications [1.3.16]	
	12.4.2 List kinds and sizes of masonry units		Science	Applies knowledge to complete a practical task [1.4.3]	
	12.4.3 List ingredients used in mortar		Writing		Organizes information into an appropriate format [1.6.10]
	12.4.4 Identify procedures in laying masonry units				

## Unit 13: Surveying

### Hours: 5

Terminology: Back Sight (BS), Benchmark (BM), Chain, Contour line, Differential leveling, Foresight, Global Positioning System (GPS), Height of instrument, Turning point

<b>CAREER and TECHNICAL SKILLS</b>		<b>ACADEMIC and WORKPLACE SKILLS</b>		
What the Student Should be Able to Do		What the Instruction Should Reinforce		
Knowledge	Application	Skill Group	Skill	Description
13.1 Define terminology	13.1.1 Prepare a list of terms with definitions	Foundation	Reading	Comprehends written information for main ideas [1.3.7]
			Writing	Applies/Uses technical words and concepts [1.6.4]
13.2 Discuss the meaning and importance of surveying in agriculture	13.2.1 List and explain important kinds of surveying, including land and structural	Foundation	Writing	Uses technical words and symbols [1.6.20]
	13.2.2 Identify uses of surveying in agriculture and horticulture	Personal Management	Integrity/Honesty/Work Ethic	Follows established rules, regulations, and policies [3.2.5]
	13.2.3 Describe the nature of survey work		Responsibility	Pays close attention to details [3.4.8]
13.3 Discuss practices used in surveying	13.3.1 Identify equipment used in survey work, including remote sensing and global positioning systems	Foundation	Arithmetic/Mathematics	Calculates measurements taken from measuring devices [1.1.9]
	13.3.2 Explain the meaning and use of field notes			Creates tables, graphs, diagrams, and charts to convey quantitative information [1.1.18]
	13.3.3 Explain the measurements used with land, including linear, direction, elevation, and area measurements		Writing	Makes precision measurements using surveying equipment [1.1.27]
	13.3.4 Set up and use equipment for differential leveling	Interpersonal	Teamwork	Records data [1.6.16]
				Works effectively with others to reach a common goal [2.6.6]

## **Glossary**

### **Unit 1: Introduction to Agricultural Mechanics**

1. Agricultural mechanics – a broad area of knowledge and skills related to performing construction, operation, maintenance, and repair of machinery, equipment, and structures used in agricultural/horticultural work
2. Agricultural power – the use of engines, animals, and other sources of energy to operate equipment used in agriculture
3. Agricultural structures – those buildings, ponds, greenhouses, and other facilities designed specifically for agricultural use
4. Agricultural technology – the application of science and inventions in agricultural work; the use of science to develop new ways of doing things

## Unit 2: Safety with Agricultural Electricity

1. Combustion – the production of heat and/or light through a chemical process; burning
2. Decibel (dB) – a unit of sound measurement
3. Extinguish – to put out a fire by cooling, smothering, or removing fuel
4. Fire triangle – a three dimensional representation of requirements for fire to occur: fuel, heat, and oxygen
5. Personal Protective Equipment (PPE) – equipment that protects people from injury, including safety glasses, goggles, ear plugs or muffs, respirators, clothing, shoes or boots, and gloves
6. Safety – preventing loss or injury

## Unit 3: Arc Welding in Agriculture

1. Alternating Current (AC) – current that reverses its direction 60 times per second
2. Arc welding – using an electric arc to fuse metal
3. Bead – mix of base metal and filler rod that remains after welding
4. Direct Current (DC) – current that flows in one direction continuously
5. Electrode – a section of flux-coated wire used in welding
6. Flux – a substance used to remove the oxide on metal that is to be soldered or welded
7. Fusion – the union or blending of molten metal to form a strong bond
8. Penetration – distance in a weld from the original surface of the base metal to that depth or point at which fusion ceases
9. Slag – the product formed when burning steel combines with oxygen
10. Weld – joining two or more times by fusion
11. Welding helmet – a protective device worn on the head while arc welding to protect the eyes, skin, and other exposed parts from injury
12. Welding position – the location of a weld relative to the location of the welding equipment, such as flat, vertical, horizontal, or overhead

## Unit 4: Oxyacetylene Welding and Cutting in Agriculture

1. Bleeding the lines – removing gas pressure from all lines and equipment, as with oxyacetylene welding systems
2. Brazing – the process of joining metal with a filler rod that melts at a temperature below the metal being joined
3. Carbonizing flame – a flame with excess acetylene; adjustment is needed to achieve a neutral flame
4. Cutting tip – a special tip used in cutting metal with gas systems such as oxyacetylene
5. Filler rod – a long, thin metal rod used in welding to add to or fill joins when welding or brazing
6. Flammable – the quality of a substance that is capable of burning
7. Fusion – the process of joining by melting, as in fusion welding
8. Gauge – a device used to measure certain substances such as pressure in an oxyacetylene welding/cutting system
9. Neutral flame – an oxyacetylene flame with a balance of oxygen and acetylene
10. Oxidizing flame – an oxyacetylene flame with an excess of oxygen; adjustment is needed to achieve a neutral flame
11. Regulator – a device that controls the flow amount of a liquid or gas; with oxyacetylene welding systems, regulators control the flow of oxygen and acetylene
12. Tip – the part of a welding or cutting torch with holes to release fuel for combustion
13. Tip cleaner – small, round rod-like devices that remove dirt from the holes in welding and cutting torch tips
14. Torch – the assembly in an oxyacetylene system that mixes oxygen and acetylene to provide the desired flame
15. Valve – a device that controls the flow of gas in an oxyacetylene system

## Unit 5: Metal Technology

1. Die – a device or instrument used to cut threads on a rod or bolt
2. Rivet – a short rod-like fastening device made of soft metal that can be readily spread on each end
3. Solder – a mixture of tin and lead
4. Soldering – bonding metals and alloys that melt at temperatures below 840° F
5. Sweating – the process of soldering a piece of copper pipe into a fitting
6. Tap – a hardened and brittle fluted tool used to cut threads inside of metal
7. Tinning – the process of bonding filler material to a base metal

## Unit 6: Small Engines

1. Four-stroke cycle engine – an engine with four strokes per cycle
2. Internal combustion engine – a device that converts the energy in fuel into rotating power
3. Stroke – the movement of a piston from top to bottom or from bottom to top
4. Top Dead Center (TDC) – position of the piston at its highest point
5. Two-stroke cycle engine – an engine with two strokes per cycle

## Unit 7: Agricultural Graphics

1. Architect scale – a specialized ruler used in making or measuring reduced scale drawings; it is marked with a range of calibrated scales or ratios
2. Border line – heavy black line drawn close to the outer edge of paper used for drawing plans
3. Drawing – a likeness of an object, individual, or other subject made with a pencil, pen, or other instrument
4. Pictorial drawing – kinds of drawings that show an object in three dimensions; common types are isometric, oblique, and perspective
5. Scale – an instrument with all increments shortened in a consistent proportion
6. Sketch – a rough drawing of an idea, object, or procedure
7. Title block – the section of a drawing reserved for information about the drawing in general
8. Triangle – a drafting instrument shaped as a thin flat right-angled triangle with two other angles of  $45^\circ$  or other angles of  $30^\circ$  and  $60^\circ$ , respectively

## **Unit 8: Hand and Power Tool Use and Maintenance**

1. Cold chisel – a hand tool made of hardened steel for cutting metal by striking with a hammer
2. Mushroomed – a spread or pushed over condition caused by being struck repeatedly
3. Temper – to heat a piece of tool sheet followed by controlled cooling so as to control the degree of hardness
4. Whet – to sharpen by rubbing on a stone

## Unit 9: Plumbing

1. Fitting – a part used to connect pieces of pipe or to connect other objects to pipe
2. Flaring – the process of enlarging the opening of tubing in a bell shape
3. Pipe – rigid tube-like material often used in plumbing
4. PVC – a type of plastic pipe and fittings made of polyvinyl chloride; PVC is convenient, economical, and easy to use compared to other pipe materials
5. Reaming – the process of removing the bur from the inside end of steel pipe after it has been cut
6. Tubing – flexible pipe often made of copper or plastics
7. Valve – a device that controls the flow of water, gas, or other substance

## Unit 10: Woodworking

1. Crosscut – the process of cutting across the grain of wood
2. Grain – lines in lumber resulting from the annual growth rings of the tree from which the lumber was manufactured
3. Hardwood – wood with smaller grain that is denser and more difficult to cut; e.g., oak and maple
4. Kerf – the cutaway opening made when sawing or otherwise cutting materials
5. Lumber – wood products made by sawing logs
6. Plywood – wood products made by glueing thin sheets of wood together in layers
7. Softwood – wood with larger grain that is less dense and easier to cut; e.g., pine and fir

## Unit 11: Electricity in Agriculture

1. Ampere – a measure of the rate of flow of a current in a conductor
2. Circuit – an electrical source and wires connected to an electrical device
3. Circuit breaker – a switch that trips and breaks the circuit when more than a specified amount of current passes through it
4. Conductor – any material that will permit an electron to move through it
5. Conduit – protective tube with individual insulated wires running through it
6. Electricity – form of energy that can produce light, heat, magnetism, and chemical changes
7. Grounding – the process of making an electrical connection between a circuit, electricity-using device, or other electricity source to the earth to reduce the chance of shock and damage
8. Insulator – material that provides great resistance to the flow of electricity
9. Kilowatt hour – the use of 1000 watts per hour
10. National Electrical Code® – a standard for the safe installation of electrical wiring and equipment
11. Ohm – a measure of the resistance of a material to the flow of an electrical current
12. Resistance – any tendency of a material to prevent electrical flow
13. Short circuit – a condition that occurs when electricity flows back to its source to rapidly and trips fuses, burns wires, and drains batteries
14. Volt – a measure of electrical pressure
15. Voltage drop – loss of voltage as electricity travels through a wire
16. Watt – a measure of energy available or work that can be done using one ampere at one volt

## Unit 12: Concrete and Masonry

1. Aggregate – sand and gravel that comprise the bulk of concrete
2. Concrete – an artificial stone-like material formed by combining aggregate, Portland cement, and water
3. Cubic yard – a standard measure of concrete equal to 27 cubic feet
4. Curing – proper drying of concrete to assure maximum strength
5. Floating – smoothing the surface of newly placed concrete
6. Form – a frame or mold that holds newly placed concrete until it has been set
7. Masonry unit – anything constructed of brick, stone, tile, or concrete units held in place with Portland cement
8. Mortar – a mixture of fine aggregate (sand), mortar cement, and water that is used as bonding material in masonry work
9. Portland cement – dry powder made by burning limestone and clay followed by grinding and mixing; used to make concrete
10. Reinforced concrete – material placed in new concrete to increase strength; steel rods and wire are placed in forms before the concrete is placed while other reinforcement material (such as fiberglass) is added as the concrete is being mixed
11. Screeding – striking off excess concrete to create a smooth and level surface
12. Trowel – a hand tool used in concrete and masonry work
13. Workable mix – the consistency of wet concrete when the various ingredients are mixed together correctly

## Unit 13: Surveying

1. Back Sight (BS) – a rod reading taken on a point of known elevation
2. Benchmark (BM) – a permanent point of known or assumed elevation from which a survey started
3. Chain – a unit of measurement which equals 66 feet
4. Contour line – a line connecting points on the land surface which have the same elevation
5. Differential leveling – the process of determining the relative elevations of various points; determining elevation differences between points
6. Foresight – a rod reading taking place on a point of unknown elevation
7. Global Positioning System (GPS) – a satellite-based navigation system
8. Height of instrument – the elevation of the level line of sight of the crosshairs in the instrument with respect to the benchmark
9. Turning point – a temporary point for a transit while doing differential leveling