

Power, Structural, and Technical Systems	Scope and Sequence
Unit Lesson	Objectives
IMPORTANCE OF POWER, STRUCTURAL, AND TECHNICAL SYSTEMS	
Investigating Power, Structural, and Technical Systems Present in Agricultural Systems	
	Outline the general development of agriculture in the United States.
	Summarize the importance of technological advancements in the industry.
	Identify and compare three major categories of change in agriculture over the centuries.
	Identify and discuss five sources of power for agriculture.
Project: Agriculture through the Ages	
Understanding Skills Needed for Professionals in the Power, Structural, and Technical Systems	
	Identify all eight pathways of agricultural education, describe each of the eight pathways, and give an example of a profession involved in each.
	Compare different SAE viscosities and explain why the different types are important.
	Teach others about the importance of oil and lubrication in engines.
	Follow the appropriate process for disposal of used oil.
Scientific Principles Associated with Agricultural Power, Structural, and Technical Systems	
	List and describe basic equipment used for agronomic, horticulture, and forest applications.
	Select three methods of tillage, and compare the pros and cons of each with respect to protecting the environment.
	Plan out a cycle of planting that includes four seasons of activity.
	Discuss how power is used in agriculture.
Project: Organic, No-Till, and Conventional Tillage in Farming	

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	Identification of Tools and Equipment Used in Power, Structural, and Technical Systems	<p>Organize a toolbox for general agricultural mechanics using 20 basic tools.</p> <p>Describe the correct use of each tool in the toolbox.</p> <p>Summarize safety rules when using hand tools.</p> <p>Describe the use of three different types of wrenches and identify what work is done with each.</p>
	Project: Design Your Toolbox	
	Measuring and Layout of Projects	<p>Measure within $\frac{1}{16}$ of an inch accurately and consistently.</p> <p>Use tools to lay out a small project accurately on paper.</p> <p>Develop a bill of materials for a project.</p> <p>Explain why careful measurement is critical for a project.</p>
	Safety and Associated Practices in Power, Structural, and Mechanical Systems	<p>Explain the use of the OSHA shop safety colors.</p> <p>Summarize shop safety rules.</p> <p>Identify 10 tractor operation rules to maintain safety for all involved.</p>
	Project: Farm Safety Rules	
	Test	
OPERATION AND MAINTENANCE OF EQUIPMENT AND POWER SYSTEMS		
	Importance of Maintenance in Power Equipment	<p>List five portable power tools used in the agricultural shop and describe their functions.</p> <p>List two large power tools, and describe their functions.</p>

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		Discuss the reasoning behind nine rules of the agricultural shop and explain why they are important.
	Project: Visit a Mechanic	
	Principles of Operation in Engines and Motors	
		List and explain the four strokes in a four-stroke gasoline engine.
		List and explain the piston operation of a two-stroke engine.
		Understand the importance of other engine systems such as cooling and ignition in the operation of a standard engine.
		Outline the factors influencing the dust bowl.
	Project: Dust Bowl Argument	
	Tractor Safety and Maintenance	
		Outline proper maintenance schedule for tractors.
		Outline tractor driving safety procedures.
		Discuss why safety is important.
		Explain the daily safety inspection of a tractor.
	Importance of Maintenance in Small Power Equipment	
		Summarize appropriate tool safety procedures.
		Describe proper maintenance of hand tools in the shop.
		Recognize different hand tools and their uses.
		Identify different means of power used in tools.
	Project: Visit a Shop for Job-Shadowing	
	Transmitting Power and Energy Produced into Usable Outputs	
		Compare the differences and similarities between hydraulic and pneumatic systems.

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		Demonstrate the difference between spark plugs and glow plugs and how they are used.
		List and describe the parts of a powertrain.
	Project: Job-shadowing in a Large-Engine Repair Shop	
	Understanding Regulations of Materials and Safe Handling	
		Identify characteristics of organic farming.
		Summarize rules for handling chemicals safely.
		Explain integrated pest management.
		Identify characteristics of cultural control when referring to pest management.
	Test	
SOURCES OF POWER AND ENGINES AND EQUIPMENT EFFICIENCY AND POWERTRAIN		
	Selecting Power Sources	
		Understand differentiated power sources used in power, structural, and technical systems.
		Identify power sources for farm use.
		Compare each type of power source.
		Summarize the development of electricity for farm use.
		Interpret the idea of greenhouse gases and the relationship to agriculture.
	Project: Greenhouse Gases Project	
	Evaluating Resources	
		Select factors that influence selection of farm products.
		Understand the various resources available on a farm and how to evaluate them.
		Summarize the process of entering an agricultural venture.
		Plan for changing an agricultural venture.

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	Theory of How Power Is Produced by Engines and Motors	<p>Compare primary and backup power sources.</p> <p>Explain and define combustion.</p> <p>Explain how all engines are powered by combustion.</p> <p>Explain the difference between a motor and an engine.</p> <p>Explain and demonstrate knowledge of engine and motors part features.</p> <p>Identify engine angled valves and how they allow for combustion.</p> <p>Explain thermal efficiency.</p>
	Project: Interview an Engine Repair Person	
	Transferring Power to Work	<p>Explain energy in relation to an engine's power production.</p> <p>Explain how power is transferred to a two-wheel drive vehicle.</p> <p>Explain how power is transferred to a four-wheel drive vehicle.</p> <p>Outline how an engine uses the energy in fuel to produce power.</p>
	Identifying Power Transmissions and How They Work	<p>Explain how basic transmissions work.</p> <p>Outline how transmissions transfer power from engines to wheels.</p> <p>Evaluate the utility and function of various types of transmissions in tractor use.</p>
	Project: How Gears Work	
	Evaluation of Engine Power and Efficiency	<p>Describe tractor efficiency.</p> <p>Devise a system for recording routine maintenance on a standard garden tractor.</p>

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Objectives

Summarize tasks an owner should perform on a routine basis to boost tractor efficiency.

Project: Purchasing a New Tractor

Test

DESIGNING, CONSTRUCTING, AND MAINTAINING STRUCTURAL SYSTEMS

Designing Structures for Different Uses

Identify ways that buildings are used on the farm.

Describe the five types of buildings, and list three examples of these buildings in your community.

Compare the five different types of buildings.

Describe how a foundation is essential to a building's success.

Project: Comparison Shopping for Tools

Designing Structures for Different Animals and Uses

Identify ways that buildings are used on the farm.

Describe how barns have evolved over the years.

Describe 10 ways that structures are important to animal production operations.

Comment on how farm structures keep animals healthy and strong.

Be familiar with the ways that modern barns are constructed.

Basic Construction Techniques and Evaluating Structural Systems

Understand how various types of blueprints are used in the design of a structure.

Describe the advantages of constructing simple temporary shelters like pole barns on a farm.

Evaluate the factors involved in site selection for a building.

Be familiar with roof and door options for agricultural structures and know which type is

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	Project: Internship with a Shed Company	most appropriate for which purpose.
	Using Construction Equipment	Compare building techniques of ancient civilizations.
		Analyze the importance that farming has played as civilizations have developed.
		Explain how the construction industry helps the greater community in times of need.
		Identify the skills necessary for operating a piece of large power equipment.
		Outline how a student can become a construction worker.
	Project: Construction Job Research	
	Safety Practices Associated with Construction Equipment	List and describe safety procedures around both heavy equipment and hand tools.
		Discuss PPE and what that means to an equipment operator.
		Paraphrase the importance of safety responsibility.
		Outline the future of the industry for employees in the next ten years.
	Common Structural Techniques Used to Design and Build Greenhouses	Explain how greenhouse production is an essential part of agriculture.
		Comment on the history of greenhouses as a part of agriculture.
		List and describe concerns of a greenhouse grower.
		Compare different styles of greenhouse structures.
		Summarize how technology can assist a grower in maintaining greenhouse controls.
	Project: Purchase a Greenhouse	
	Test	

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IMPACT AND USE OF TECHNOLOGIES IN POWER AND STRUCTURAL SYSTEMS		
	Computers and Their Role in Agricultural Power, Structural, and Technical Systems	<p>Identify ways that computers work on the farm.</p> <p>Explain what sustainable farming is and how it benefits the farmer.</p> <p>Summarize the idea of collaboration for farmers using the Internet.</p> <p>Analyze how farmers incorporate computers and technology into their businesses.</p> <p>Evaluate the future of farming through advances in research and technology.</p>
	Data Management and Use in Agricultural Production	<p>Recognize valid online databases.</p> <p>Evaluate database information for accuracy.</p> <p>Identify database sources for farmer use.</p> <p>Recognize factors that slow down the adoption and use of online data management for farmers.</p>
	Project: Summary of Growing Conditions	
	Evaluating Technical Systems	<p>Identify considerations for purchasing new technology.</p> <p>Explain the process of adopting new software for a farm or business.</p> <p>Create a template of criteria for adopting new hardware for a farm business.</p> <p>Compare technology to determine which would be the best to purchase.</p>
	Project: Fantasy Farm Spreadsheet	
	Advanced Technology in Agricultural Power and Production Systems	<p>Understand the need for changing agriculture technology.</p>

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		Recognize developing technologies for agriculture.
		Comment on the future of agriculture and the world population.
		Interpret the way a three-dimensional printer creates copies.
		Outline ways that crops are changing to feed the world's population.
	Project: Design a New Plant	
	Biotechnology Impact in Agricultural Power and Production Systems	
		Explain how biotechnology has changed agriculture.
		List and describe 10 specific biotechnology products.
		Recognize biotechnology methods and products.
		Summarize historical benefits that biotechnology has given to agriculture and livestock production.
	Project: Agriculture of the Future	
	Precision Technology Use in Power and Technical Systems	
		List techniques involved in precision agriculture.
		Understand why farmers need to utilize precision agriculture techniques.
		Discuss how farming uses satellite-based guidance systems.
		Recognize methods of irrigation.
	Test	
COURSE PROJECT, REVIEW, AND EXAM		
	Review	
	Exam	