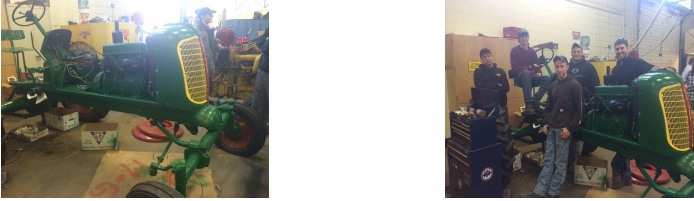
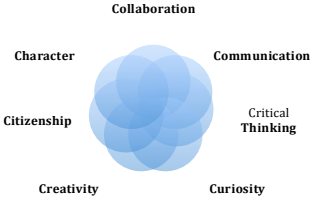


Content Area: Agriscience DRAFT	Agriscience Engineering	Level: A
		R14 The Seven Cs of Learning 
Unit Titles	Length of Unit	
<ul style="list-style-type: none"> • <i>Shop Maintenance and Safety</i> 	<i>2 weeks</i>	
<ul style="list-style-type: none"> • <i>Land Surveying</i> 	<i>6 weeks</i>	
<ul style="list-style-type: none"> • <i>Machinery Maintenance</i> 	<i>1 week</i>	
<ul style="list-style-type: none"> • <i>Small Engine Overhaul</i> 	<i>6 weeks</i>	
<ul style="list-style-type: none"> • <i>SAE Proficiencies</i> 	<i>3 weeks</i>	
<ul style="list-style-type: none"> • <i>Advanced Welding</i> 	<i>6 weeks</i>	
<ul style="list-style-type: none"> • <i>Building Construction</i> 	<i>6 weeks</i>	
<ul style="list-style-type: none"> • <i>Agricultural Machine Calibration</i> 	<i>3 weeks</i>	
<ul style="list-style-type: none"> • <i>Senior Project</i> 	<i>3 weeks</i>	



Strands	Course Level Expectations
Maintenance and Safety	Design, operate and maintain mechanical equipment, structures, biological systems, land treatment, power and technology
Land Surveying	Differential leveling allows us to ensure the same elevation around the perimeter of a building and allows us to install drainage systems to ensure that water flows properly.
Welding	Creating sketches and plans provides direction, minimizes the amount of waste produced and the formation of building materials needed to complete the desired product. The methods of proper welding techniques allows for a more esthetically pleasing, deeper penetrating and overall stronger weld.
Building Construction	Mathematical applications are used to calculate dimensions that will accurately construct an agricultural structure that will possess stability and architectural strength. Creating sketches and plans provides direction, minimizes the amount of waste produced and the formation of building materials needed to complete the desired product.

Unit Title	Shop Maintenance and Safety	Length of Unit	2 weeks
Inquiry Questions (Engaging & Debatable)	<ul style="list-style-type: none"> • Why is shop safety essential? • How does knowledge of science help us create a safe environment? • Why is shop maintenance and organization important? 		
Standards	<p>Power, Structural and Technical Systems Standards Pathway Content Standard: Use physical science principles and engineering applications with power, structural, and technical systems to solve problems and improve performance. Performance Element: PST.01- Use physical science principles and engineering applications with power, structural and technical systems to solve problems and improve performance. Performance Indicators: PST.01.0 – Apply physical science laws and principles to identify, classify, and use lubricants. Performance Element: PST.04- Follow architectural and mechanical plans to construct agricultural buildings and facilities. Performance Indicator: PST.04.04. Follow architectural and mechanical plans to construct and/or repair equipment, buildings and facilities.</p>		
Unit Strands & Concepts	Reviewing Shop Rules, Reviewing Safety Precautions, Shop Maintenance, Facility Review and Repair preventative moves, organization and reasoning, shop rules, identification processes, local, state and federal regulations, outbuilding repair		
Key Vocabulary	elevation, survey, angle, theory, leveling, foundation, stadia, outbuilding, regulation, longevity,		

Unit Title	Shop Maintenance and Safety	Length of Unit	2 weeks
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Critical Content: My students will Know ...	Key Skills: My students will be able to (Do) ...
<ul style="list-style-type: none"> • why a well run shop has rules for work and rules for safety. • ways to identify tools and equipment. • why cleaning and maintenance is important a high functioning work environment. • local, state and federal regulations regarding safety of a shop, materials and lubricants. 	<ul style="list-style-type: none"> • explain shop rules and safety precautions to another. • conduct a facility review and shop tour • identification of equipment and tools essential to task. • organize and cleaning of shop equipment and facility • paint or protect with coatings. • preform equipment preventative maintenance • select, use and dispose of lubricants according to local, state and federal regulations. • work on an outbuilding repair

Assessments:	<ul style="list-style-type: none"> • Summative Assessment: Terminology, content knowledge, diagrams, measurement. • Formative Assessments • Performance Assessment – Safety Mapping Project
Teacher Resources:	❖ Cooper, Elmer. <u>Agricultural Mechanics: Fundamental and Applications</u> . 2 nd edition. Delmar Publishers Inc. 1992

Unit Title	Land Surveying	Length of Unit	6 weeks
Inquiry Questions (Engaging Debatable):	<ul style="list-style-type: none"> • Why is good equipment important when surveying? • How does differential leveling ensure a sound structure? • Why is differential leveling essential for water management? 		
Standards	<p>Power, Structural and Technical Systems Standards Pathway Content Standard: Use physical science principles and engineering applications with power, structural, and technical systems to solve problems and improve performance. Performance Element: PST.01. Use physical science principles and engineering applications with power, structural and technical systems to solve problems and improve performance. Performance Indicator: PST.01.02. Identify and use hand and power tools and equipment for service, construction and fabrication. Performance Element: PST.02. Design, operate and maintain mechanical equipment, structures, biological systems, land treatment, power and technology. Performance Indicator: PST.02.02. Operate, service and diagnose the condition of power units and equipment. Performance Element: PST.04. Follow architectural and mechanical plans to construct agricultural buildings and facilities. Performance Indicator: PST.04.02. Apply structural plans, specifications and building codes.</p>		
Unit Strands & Concepts	Survey equipment and functions, Adjustment of equipment, Using math and data to compute and differentiate leveling, Meeting Codes and Regulations, surveying, height of instrument, Gunter's Chain, assessing performance, determining distance and slope, construction of a foundation, construction codes		
Key Vocabulary	transit, survey staff, plumb, bob, acre, benchmark, back sight, foresight, turning point, differential leveling, hectare, azimuth, bearing, declination, foundation,		

Unit Title	Land Surveying	Length of Unit	6 weeks
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Critical Content: My students will Know ...	Key Skills: My students will be able to (Do) ...
<ul style="list-style-type: none"> ways to identify survey equipment and functions local construction and safety codes how to create an accurate data log a process for keeping accurate data logs mathematical theories for leveling and angle generation. mathematical principles for determining distance and slope. 	<ul style="list-style-type: none"> adjust equipment for safe and efficient operation apply mathematical theory in order to compute differential leveling and angle generation keep an accurate data log based differential leveling accurately determine an elevation change down to one hundredths of an inch assess the performance of self and/or peers in use of surveying equipment to safely and efficiently service, construct and fabricate quality products use survey fundamentals to construct a building foundation layout determine distance with the survey equipment using stadia determine slope with mathematical principles and surveying equipment follow local construction and safety codes and specifications in agricultural construction

Assessments:	<ul style="list-style-type: none"> Formative Assessment (Terminology) Mathematical Calculation Formative Assessment Slope Calculation Project
Teacher Resources:	<ul style="list-style-type: none"> ❖ <i>Field, Harry. Landscape Surveying. Thomson Delmar Learning, 2004</i> ❖ <i>Brinker, Russell. Elementary Surveying. International Textbook Company, 1958</i>

Unit Title	Machinery Maintenance	Length of Unit	1-2 weeks
Inquiry Questions (Engaging Debatable):	<ul style="list-style-type: none"> • Why is preventative maintenance important? • How does preventative maintenance ensures equipment longevity, decreased cost over time, and protection of equipment during seasonal changes? 		
Standards	<p>Power, Structural and Technical Systems Standards Pathway Content Standard: Use physical science principles and engineering applications with power, structural, and technical systems to solve problems and improve performance. Performance Element: PST.01- Use physical science principles and engineering applications with power, structural and technical systems to solve problems and improve performance. Performance Indicators: PST.01.0 – Apply physical science laws and principles to identify, classify, and use lubricants. Performance Element: PST.02. Design, operate and maintain mechanical equipment, structures, biological systems, land treatment, power and technology. Performance Indicator: PST.02.02. Operate service and diagnose the condition of power units and equipment.</p>		
Unit Strands & Concepts	The design of an engine, Testing for viability, Understanding lubricants and longevity, Preparing for storage, engine design, winterization, lubrication, preventative, Engine Oil, Hydraulic Oil,		
Key Vocabulary	Radiator, Coolant, Hydraulic, Drain plug, Load tester, SMV, Zerk, Preoperational Check, Voltage Meter, Tachometer		

Unit Title	Machinery Maintenance	Length of Unit	1-2 weeks
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Critical Content: My students will Know ...	Key Skills: My students will be able to (Do) ...
<ul style="list-style-type: none"> ways to check on agricultural equipment what safety controls are present on agricultural equipment where the lubricant leveling equipment is on a tractor the antifreeze and coolant section of a tractor. a process for winterization 	<ul style="list-style-type: none"> complete a preoperational check on agricultural equipment identify test safety control test safety controls on equipment. check lubrication levels in tractors and add lubricant as necessary change lubricants in tractors test viability of antifreeze and coolant using proper testing equipment. winterize agricultural equipment.

Assessments:	<ul style="list-style-type: none"> 100- hour Factory Preventive Maintenance Check Sheet
Teacher Resources:	<ul style="list-style-type: none"> ❖ <i>Cooper, Elmer. <u>Agricultural Mechanics: Fundamental and Applications</u>. 2nd edition. Delmar Publishers Inc. 1992</i> ❖ <i>Field, Harry. <u>Landscape Surveying</u>. Thomson Delmar Learning, 2004</i> ❖ <i>Brinker, Russell. <u>Elementary Surveying</u>. International Textbook Company, 1958</i>

Unit Title	Small Engine Overhaul	Length of Unit	6 weeks
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Inquiry Questions (Engaging Debatable):	<ul style="list-style-type: none"> • Why is Engine Theory important to the overhaul process? • How does precise measurement lead to a more productive engine? • Why is economics important to the repair of an engine?
Standards	<p>Power, Structural and Technical Systems Standards</p> <p>Pathway Content Standard: Use physical science principles and engineering applications with power, structural, and technical systems to solve problems and improve performance.</p> <p>Performance Element: PST.01. Use physical science principles and engineering applications with power, structural and technical systems to solve problems and improve performance. Performance Indicator: PST.01.0. Apply physical science laws and principles to identify, classify, and use lubricants. Performance Indicator: PST.01.02. Identify and use hand and power tools and equipment for service, construction and fabrication.</p> <p>Performance Element: PST.02. Design, operate and maintain mechanical equipment, structures, biological systems, land treatment, power and technology. Performance Indicator: PST.02.02. Operate service and diagnose the condition of power units and equipment.</p> <p>Performance Element: PST.03. Service and repair agricultural, mechanical equipment and power systems. Performance Indicator: PST.03.01. Troubleshoot and repair internal combustion engines.</p>
Unit Strands & Concepts	<p>What is engine theory? Ways to Measure, Adjusting and Refining Engines</p> <p>Engine theory, measurement precision, overhauling</p>
Vocabulary	<p>End-Play, Honing, Reaming, Side Clearance, Taper, Valve lapper, Flywheel puller, Valve clearance, Stroke, Journal, Rocker arm, Over-head valve (OHV), Coil/Armature Gap, Wiper Ring, Compression Ring, Oil Ring</p>

Unit Title	Small Engine Overhaul	Length of Unit	6 weeks
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Critical Content: My students will Know...	Key Skills: My students will be able to (Do)...
<ul style="list-style-type: none"> • explain how engine theory relates to overhaul • operational theories of two and four stroke engines • engine parts and engines based on model identification systems • purpose of different lubricants according to local, state and federal regulations. • a disposal process for lubricants according to local, state and federal regulations. • a process to calculate journal sizes and determine replacement needs • the process for determining efficiency based on RPM (rotations per minute) • how to select small engines and equipment for operational efficiencies • how to identify part numbers • a process to understand safe and efficient operation of engines. 	<ul style="list-style-type: none"> • use precision measurement tools to accurately measure a distance or clearance to one-thousandth of an inch. • properly disassemble a small engine • overhaul spark and compression internal combustion engines • properly remove, lap, seat valves, adjust valve clearance, reseat valve heads and measure hone and replace valve bearings • properly set and adjust governors • adjust and calibrate fuel systems. • calculate crankshaft journal sizes and determine replacement needs • performance test internal combustion engines to determine service and repair needs • properly reassemble a small engine to working condition • using part numbers, calculate replacement costs and compile a cost effective decision regarding repair or replacement of an engine. • assess the performance of self and or peers in the use of small engines to safely and effectively service a quality product. • adjust equipment for safe and efficient operations

Assessments:	<ul style="list-style-type: none"> ● Performance Assessment – Small Engine Overhaul. (Rubric) ● Summative Assessment: Terminology, Content Knowledge, Diagrams, Trouble-Shooting.
Teacher Resources:	<ul style="list-style-type: none"> ❖ Briggs and Stratton- Single Cylinder OHV Repair Manual ❖ Radcliff. <u>Small Engines</u>. American Technical Publishers, Inc. 2004.

Unit Title	Advanced Welding	Length of Unit	6 weeks
Inquiry Questions (Engaging Debatable):	<ul style="list-style-type: none"> • How is understanding of safe protocols important when using welding equipment? • How do creating sketches and plans increase the quality of a welding fabrication? • How does methodology and technique increase the overall quality of a project? 		
Standards	<p>Power, Structural and Technical Systems Standards Pathway Content Standard: Use physical science principles and engineering applications with power, structural, and technical systems to solve problems and improve performance. Performance Element: PST.01. Use physical science principles and engineering applications with power, structural and technical systems to solve problems and improve performance. Performance Indicator: PST.01.02. Identify and use hand and power tools and equipment for service, construction and fabrication. Performance Element: PST.02. Design, operate and maintain mechanical equipment, structures, biological systems, land treatment, power and technology. Performance Indicator: PST.02.02. Operate service and diagnose the condition of power units and equipment. Performance Element: PST.05. Welding Performance Indicator: PST.05.01. Follow agricultural and mechanical plans to construct and/or repair equipment, buildings and facilities.</p>		
Unit Strands & Concepts	Safety, Sketching and Planning, Scale Measurement, Equipment maintenance		
Vocabulary	Molten puddle, Gas Shield, Reducing Flame, GMAW, FCAW, Acetylene, AC/DC, Distortion, Oxidation, TIG, Tungsten, Argon, Flash burn, Porosity, Tack welding, Welding tip, Wire shield		

Unit Title	Advanced Welding	Length of Unit	6 weeks
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Critical Content: My students will Know...	Key Skills: My students will be able to (Do)...
<ul style="list-style-type: none"> • proper safety procedures for using welding equipment • welding methods • a process for self evaluation and evaluation of peers as welders • Understand the steps involved in equipment maintenance 	<ul style="list-style-type: none"> • use proper welding methods • use welding procedures for ferrous and on-ferrous metals. • adjust equipment for safe and efficient operation. • use scale measurement and dimension to develop plans and sketches • Construct and/or repair metal equipment using welding fabrication procedures, including those associated with SMAW, GMAW, GTAW, Fuel-Oxygen and Plasma Arc Torch methods. • Perform equipment maintenance

Assessments:	<ul style="list-style-type: none"> • Performance Assessment – Final welding project. (rubric) • Performance Assessment: Demonstration of ability in Oxygen/Acetylene, SMAW, GMAW, FCAW, and TIG. • Performance Assessment: Demonstration of ability in vertical and overhead welding • Identifying tools and materials
Teacher Resources:	<ul style="list-style-type: none"> ❖ Jefferson, T.B. <u>Metals and How to Weld Them</u>. 2nd Edition. Welding Engineer Publications, Inc. 1990 ❖ Jeffus, Larry. <u>Metal Fabrication: Technology for Agriculture</u>. Delmar Publications. 2004. ❖ Videos: Distortion, Arc Welding II, TIG welding, Wall Mountain Company, Inc. 1998

Unit Title	Building Construction	Length of Unit	6 weeks
Inquiry Questions (Engaging Debatable):	<ul style="list-style-type: none"> • Why is safety during building construction important? • How is mathematical application important to the success of building a structure? • Why do we need to know so many words? • How do creating sketches and plans increase the quality of an agricultural structure? 		
Standards	<p>Power, Structural and Technical Systems Standards Pathway Content Standard: Use physical science principles and engineering applications with power, structural, and technical systems to solve problems and improve performance. Performance Element: PST.01. Use physical science principles and engineering applications with power, structural and technical systems to solve problems and improve performance. Performance Indicator: PST.01.02. Identify and use hand and power tools and equipment for service, construction and fabrication. Performance Element: PST.02. Design, operate and maintain mechanical equipment, structures, biological systems, land treatment, power and technology. Performance Indicator: PST.02.02. Operate service and diagnose the condition of power units and equipment. Performance Element: PST.04. Follow architectural and mechanical plans to construct agricultural buildings and facilities. Performance Indicator: PST.04.01. Create sketches and plans of agricultural structures. PST.04.02. Apply structural plans, specifications and building codes. PST.04.03. Examine structural requirements for materials and procedures and estimate construction cost. PST.04.04. Follow architectural and mechanical plans to construct and/or repair equipment, buildings and facilities.</p>		
Unit Strands & Concepts	<p>The Theory of Construction, Understanding Codes Applications and Regulations Codes in Construction, Construction math, agriculture construction, Permits, Functional design</p>		
Vocabulary	Sill, Joist, Stud, Rafter, Rafter plate, Frost wall, Floating pad, Gable roof, Pent roof, Hip roof, Salt box		

Unit Title	Building Construction	Length of Unit	6 weeks
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Critical Content: My students will Know...	Key Skills: My students will be able to (Do)...
<ul style="list-style-type: none"> ● the theory of construction ● ways to be safe during construction ● how to identify tools ● construction math ● local safety and construction codes and specifications ● elements of construction drawing ● ways to assess self and others as they use hand and power tools to safely and efficiently service, construct and fabricate quality products 	<ul style="list-style-type: none"> ● explain building and repair of concrete and masonry structures related to agriculture ● adjust equipment for safe and efficient operation ● follow local construction and safety codes and specifications in agricultural construction ● complete appropriate local permit applications for a construction project ● design functional and efficient facilities for agricultural use ● prepare a project cost estimate include materials, labor and management ● paint or protect with coatings ● locate, explain and apply elements of construction drawing

Assessments:	<ul style="list-style-type: none"> ● Performance Assessment: Final Building and Design Project.
Teacher Resources:	<ul style="list-style-type: none"> ❖ Cooper, Elmer. <u>Agricultural Mechanics: Fundamental and Applications</u>. 2nd edition. Delmar Publishers Inc. 1992

Unit Title	Agricultural Machine Calibration	Length of Unit	3 weeks
Inquiry Questions (Engaging Debatable):	<ul style="list-style-type: none"> • Why is solving algebraic formulas essential to field calibration? • Why is the proper amount of agricultural obligate important? 		
Standards	<p>Power, Structural and Technical Systems Standards Pathway Content Standard: Use physical science principles and engineering applications with power, structural, and technical systems to solve problems and improve performance. Performance Element: PST.01. Use physical science principles and engineering applications with power, structural and technical systems to solve problems and improve performance. Performance Indicator: PST.01.02. Identify and use hand and power tools and equipment for service, construction and fabrication. Performance Element: PST.02. Design, operate and maintain mechanical equipment, structures, biological systems, land treatment, power and technology. Performance Indicator: PST.02.02. Operate service and diagnose the condition of power units and equipment. Performance Element: PST.05. Welding Performance Indicator: PST.05.01. Follow agricultural and mechanical plans to construct and/or repair equipment, buildings and facilities.</p>		
Unit Strands & Concepts	Calibration, Operational efficiency, Applicators, Unit Conversions		
Key Vocabulary	Nozzle, GPM, PSI, Velocity, Pounds per Acre, Simplification Equation, Solution, Ration, Dilution, Average		

Unit Title	Agricultural Machine Calibration	Length of Unit	6 weeks
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Critical Content: My students will Know...	Key Skills: My students will be able to (Do)...
<ul style="list-style-type: none"> ● that there are different types of agricultural machinery serving different purposes ● a liquid sprayer has a variety of different parts ● a process for self evaluation ● a process for assessing the safe and efficient use of hand and power tools 	<ul style="list-style-type: none"> ● perform calibration on liquid and solid applicators ● select power units and equipment for operational efficiencies ● adjust equipment for safe and efficient operations

Assessments:	<ul style="list-style-type: none"> ● Performance Assessment – Sprayer Calibration Project. ● Unit Conversion Assessment
Teacher Resources:	<ul style="list-style-type: none"> ❖ Cooper, Elmer. <u>Agricultural Mechanics: Fundamental and Applications</u>. 2nd edition. Delmar Publishers Inc. 1992 ❖ Tee-Jet Catalog

Unit Title	Senior Project	Length of Unit	6 weeks
Inquiry Questions (Engaging Debatable):	<ul style="list-style-type: none"> • How do the essential concepts of this year apply to Agricultural Mechanics? • How do the concepts from this year apply directly to servicing, constructing and fabricating agricultural facilities and equipment? 		
Standards	<p>Power, Structural and Technical Systems Standards Pathway Content Standard: Use physical science principles and engineering applications with power, structural, and technical systems to solve problems and improve performance.</p> <p>Performance Element: PST.02. Design, operate and maintain mechanical equipment, structures, biological systems, land treatment, power and technology. Performance Indicator: PST.02.02. Operate service and diagnose the condition of power units and equipment.</p> <p>Performance Element: PST.04. Follow architectural and mechanical plans to construct agricultural buildings and facilities. Performance Indicator: PST.04.02. Apply structural plans, specifications and building codes. PST.04.03. Examine structural requirements for materials and procedures and estimate construction cost.</p>		
Unit Strands & Concepts	Summarizing Efficient and Safe Servicing and Operations, Project Cost Estimating, Transferring Knowledge to a Performance, Construction Drawing		
Vocabulary	fabricating, construction, servicing, estimation, efficient,		

Unit Title	Senior Project	Length of Unit	6 weeks
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Critical Content: My students will Know...	Key Skills: My students will be able to (Do)...
<ul style="list-style-type: none"> ● strategies to adjust and operate equipment ● elements of a construction drawing ● the parts of a construction project estimate ● ways to self assess their performance during a performance task ● ways to provide specific, effective feedback to peers during the development of a performance task 	<ul style="list-style-type: none"> ● Apply a learned concept to a performance based assessment ● Adjust equipment for safe and efficient operation ● Locate, explain and apply elements of construction drawing ● Prepare a project cost estimate, including materials, labor and management ● Assess the performance of self and/or peers in use of hand and power tools to safely and efficiently service, construct and fabricate quality products

Assessments:	<ul style="list-style-type: none"> ● Performance Assessment – Quality and completion of Final Upperclassman Project ● Written and Scaled Project Plan. ● Summative Assessment
Teacher Resources:	<ul style="list-style-type: none"> ❖ Cooper, Elmer. <u>Agricultural Mechanics: Fundamental and Applications</u>. 2nd edition. Delmar Publishers Inc. 1992