Small Gas Engine

Grades 9-12

Unit 1

Course/Subject:	Grade:		Suggested Timeline:
Small Gas Engine	9-12		3-4 weeks

Grade Level Summary	Small Gas Engine Repair instructs students with theory and hands-on instruction in small gas engines. This course includes instruction on small engines, (2 cycle and 4 cycle) gasoline and diesels along with hands-on overhaul and repair instructions. Students electing this course will be instructed in overhaul procedures, engine testing and ordering of engine parts.
Grade Level Units	In this course we will cover a Unit on Shop Equipment, Supplies, and Safety. Unit on Basics of Engine operation. Unit on Engine systems. Unit on Engine Service. And a Unit on Applications and Careers

Unit Title	Unit 1 Shop equipment, supplies, and safety
Unit Summary	Students will learn about the safety in the shop setting. Safety in the shop includes personal protection safety, safety of equipment, and safety features of the shop. They will also learn about the tools and measuring instruments in the shop to work on small gas engines. These tools will be properly identified and their proper uses. Students will look at the different types of fasteners, sealants and gaskets they will encounter while working will small engines. This unit will also introduce the fundamentals of electricity, magnetism, and electronics for small gas engines.

Unit Essential Questions:	**Key Understandings:**
• How do I ensure that both I and my classmates are using safety precautions and practices while working in the shop? • Why is important to know the proper names of tools in a shop and their proper uses?	• Safety practices within a shop setting. • Tool identification and use • Measuring instruments • Different types of fasteners used on small gas engines. • Importance and use of sealants and gaskets • Fundamentals of electricity, magnetism, and electronics

Focus Standards Addressed in the Unit:	
Standard Number	***Standard Description***
PST.02.02.02.b	Apply safety principles and applicable regulations to operate equipment, machinery, and power units used in AFNR power, structural and technology systems.
PST.02.02.02.c	Adjust equipment, machinery and power units for safe and efficient operation in AFNR power, structural and technical systems.
PST.03.02.01a	Compare and contrast the basic units of electricity and the principles that describe their relationship.
CS.03.04.	Use appropriate protective equipment and demonstrate safe and proper use of AFNR tools and equipment.
CS.03.01.	Identify and explain the implications of required regulations to maintain and improve safety, health, and environmental management systems.
CS.03.03.	Apply health and safety practices to AFNR workplaces.

Important Standards Addressed in the Unit:	
CC.3.5.9-10.D	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics.
CC.3.5.9-10.C.	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.
CC.3.6.9-10.F	Conduct short as well as more sustained research projects to answer a question (including a self generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation
CC.2.1.HS.F.2	Apply properties of rational and irrational numbers to solve real world or mathematical problems.
CC.1.2.9–10.J	Acquire and use accurately general academic and domain specific words and phrases, sufficient for reading, writing, speaking, and listening at the college- and career-readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression.
CC.1.2.9–10.L	Read and comprehend literary nonfiction and informational text on grade level, reading independently and proficiently.

Misconceptions:	**Proper Conceptions:**
• Safety glasses are only needed if you are the one working. • Long sleeves can be used for personal gear protection against flames, welding, or sparks. • There is only one type of threads on bolts and nuts.	• Safety glasses are needed as long as you are in the shop and working is being performed by anyone. • Flame retardant clothing must be worn while welding, grinding or using a torch. • There are different size taps and dies for making threads and there are coarse and fine threads for each of those sizes.

Knowledge & Concepts	Skills & Competencies	Dispositions & Practices
• dangers in an agricultural mechanics shop and work place. • safety colors used on signs and icons in the agriculture industry • safety rules and regulations • first aid methods and procedures using supplies in a first aid kit • various gauges and testers used in agricultural power equipment • maintain and safely use electrical powered shop equipment. • proper and safe use of air operated equipment • Identify specialized tools for small engines such as wheel pullers, cylinder honing tools and micrometers.	• List safety procedures that promote avoidance of shop hazards and accident reduction. • Identify and demonstrate wearing of personal protective equipment • Identify and use proper firefighting equipment • Demonstrate positive safety attitudes and responsibilities • Describe regulations, safety and consumer protection • Identify, select, adjust, maintain and safely use common hand tools and power tools. • Demonstrate accurate use of measurement devices and techniques for calculating measurement including the metric system • Demonstrate the use of specialized tools for small engines such as wheel pullers, cylinder honing tools and micrometers	• Self-control • Ethical behavior

Academic Vocabulary:

• Carbon Monoxide • Dead man switch • Earplugs • Eyewash station • Face shield • Fire extinguisher • Flashpoint • Hazardous wastes • Headphone-type protectors • Hydrogen gas • Occupational Safety and Health Administration (OHSA) • Respirators • Safety data sheets • Safety glasses • Safety goggles • Safety shoes • Ring compressor • Ring expander • Ring spreader • Safe files • Socket sets • Spark tester • Tachometer • Torque	• Box-end wrench • Combination slip-joint pliers • Combination wrench • Compression testers • Cylinder hones • Diagonal side cutting pliers • Drift punch • Feeler gauge • Files • Glaze breakers • Hacksaw • Lapping sticks • Needle nose pliers • Offset screwdriver • Open end wrench • Phillips screwdriver • Pin punch • Reamer • Ridge reamer • Tapping • Tensile strength • Thread • Thread length • Thread pitch • Through hole	• Antiseize compounds • Bolt grades • Bolt head size • Bolt length • Bolts • Bolt size • Cap screw • Castle nut • Die stock • Flat washers • Form-in place sealant • Gaskets • Hexagon nuts • Jam nut • Kantlink washer • Keys • Lock nuts • Machine screws • Metric series • Pins • Retaining rings • Room temperature vulcanizing sealant • Screws • Self tapping screws

- Torque wrench
- Tubing wrench
- Valve spring compressor
- Vise-grips
- Alternating current
- Ammeters
- Ampere
- Atom
- Base
- Bound electrons
- Circuit breakers
- Collector
- Conductor
- Direct current
- Semiconductor material
- Series circuit
- Series-parallel circuits
- Silicon-controlled rectifier
- Solenoid
- Solid state
- Adjustable wrench
- Allen wrench
- Toothed washers
- Unified national coarse (UNC) series
- Unified National Fine (UNF) series
- Wide bearing lock washers
- Wing nut
- Neutrons
- Ohmmeter
- Ohms
- Ohm's law
- Parallel circuits
- Peak inverse voltage
- Protons
- Relay
- Reverse biased
- Semiconductor diode
- Switch
- Test light
- Transformer
- Acorn nuts
- Anaerobic sealants
- Set screws
- Square nut
- Taper tap
- Domains
- Electronics
- Electrons
- Emitter
- Forward biased
- Free electrons
- Fuses
- Fusible links
- Insulator
- Jumper wires
- Magnetic field
- Multimeter
- Transistor
- voltmeters
- volts

Assessments:

- Quizzes
- Test
- Projects
- Class participation and practices

Differentiation:

- Book work
- Lecture
- Demonstrations
- Video clips
- Hands on learning
- IEP accommodations

Interdisciplinary Connections:

- This unit connects to math and science course when measurements and fractions are talked about. Students use fractions and decimals to measure. They use science when talking about the electricity and magnetism. This unit is also a unit that could be utilized in the real world when talking about safety and using safe practices with tools and equipment. Students will need to problem solve to determine the best tool for the job after knowing what its uses are.

Additional Resources:

- Video clips
- Articles
- Personal Accounts
- OSHA data sheets
- MSDS
- Small Gas Engines text book and work book

Created By:

Troy Summey

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Grades 9-12

Unit 2

Course/Subject:	Grade:		Suggested Timeline:
Small Gas Engine	9-12		2-3 weeks

Grade Level Summary	Small Gas Engine Repair instructs students with theory and hands-on instruction in small gas engines. This course includes instruction on small engines, (2 cycle and 4 cycle) gasoline and diesels along with hands-on overhaul and repair instructions. Students electing this course will be instructed in overhaul procedures, engine testing and ordering of engine parts.
Grade Level Units	In this course we will cover a Unit on Shop Equipment, Supplies, and Safety. Unit on Basics of Engine operation. Unit on Engine systems. Unit on Engine Service. And a Unit on Applications and Careers.

Unit Title	Unit 2 Basics of Engine Operation
Unit Summary	The unit looks that difference between 2 stroke and 4 stroke engines. It breaks down the engine operation and all the components of the engine. This unit will also look at measuring an engines performance.

Unit Essential Questions:	**Key Understandings:**
• What are several advantages and disadvantages of both 4 stroke and 2 stroke engines?	• Components of an engine • Measuring engine performance • Principles of engine operation, two and four-stroke engines

Focus Standards Addressed in the Unit:

Standard Number	***Standard Description***
PST.03.01.01.a	Identify and classify components of internal combustion engines used in AFNR power, structural and technical systems
PST.03.01.01.b	Analyze and explain how the components of internal combustion engines interrelate during operation
PST.03.01.02.a	Distinguish the characteristics of spark-and-compression internal combustion engines used in AFNR power, structural and technical systems.

Important Standards Addressed in the Unit:

CC.1.2.9–10.L	Read and comprehend literary nonfiction and informational text on grade level, reading independently and proficiently.
CC.1.2.9–10.J	Acquire and use accurately general academic and domain specific words and phrases, sufficient for reading, writing, speaking, and listening at the college- and career-readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression.

CC.3.5.9-10.C	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text
CC.3.5.9-10.D.	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics
CC.3.6.9-10.B.	Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.

Misconceptions:	**Proper Conceptions:**
• All small gas engines are 2 strokes. • Students will struggle with the formulas and plugging numbers in the correct spot in the formula.	• Many small gas engines are 2 stroke, however in recent years 4 strokes have become more prevalent and have better emissions.

Knowledge & Concepts	Skills & Competencies	Dispositions & Practices
● mechanical power, work, torque, and horsepower. ● the purpose of gears, bearings and seals ● the operation of two-and four-stroke engines ● operation for spark and compression ignition engines ● the components and function of engine parts	● Demonstrate accurate use of measurement devices and techniques for calculating measurement including the metric system ● Demonstrate the use of measuring and calibration devices ● List and identify the components and function of engine parts	● Curiosity ● Learning to learn

Academic Vocabulary:

● tomization	● Flywheel	● Brake horsepower
● Bottom dead center	● Friction bearings	● Corrected horsepower
● Compression ratio	● Lands	● Crank offset
● Compression stroke	● Oil control rings	● Dynamometer
● Four-stroke engine	● Overhead cam	● Engine bore
● Intake stroke	● Overhead valve	● Frictional horsepower
● Internal combustion engine	● Pin boss	● Horsepower
● Power stroke	● Pinned rings	● Indicated horsepower
● Scavenge loss	● Piston	● Mean effective pressure
● Stroke	● Piston rings	● Mechanical efficiency
● Top dead center	● Piston pin	● Over square
● Two-stroke engine	● Piston skirt	● Performance
● Valve overlap	● Poppet valve	● Power
● Antifriction bearings	● Pushrod	● Practical efficiency
● Automatic compression release	● Rewind starter assembly	● Pressure
● Camshaft	● Ring tension	● Prony brake
● Compression rings	● Rocker arms	● Rated horsepower
● Connecting rod	● Side clearance	● Square
● Cooling fins	● Slap	● Tensile stress
● Crankcase	● Snap rings	● Thermal efficiency
● Crankcase seals	● Sump	● Under square
● Crankshaft	● Thrust surfaces	
● Crankshaft throw	● Valve guide	
● Cylinder block	● Valve lifter	

● Engine block ● Floating rings ● Wrist pin	● Valve spring ● Valve train ● Valve in block	

Assessments:

- Quizzes
- Test
- Participation

Differentiation:

- Book work
- Lecture
- Demonstrations
- Video clips
- Hands on learning
- IEP accommodations

Interdisciplinary Connections:

Additional Resources:

- Video clips
- Articles
- Personal Accounts
- OSHA data sheets
- MSDS
- Small Gas Engines text book and work book

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Unit 3

Course/Subject:	Grade:		Suggested Timeline:
Small Gas Engine	9-12		4-5 weeks

Grade Level Summary	Small Gas Engine Repair instructs students with theory and hands-on instruction in small gas engines. This course includes instruction on small engines, (2 cycle and 4 cycle) gasoline and diesels along with hands-on overhaul and repair instructions. Students electing this course will be instructed in overhaul procedures, engine testing and ordering of engine parts.
Grade Level Units	In this course we will cover a Unit on Shop Equipment, Supplies, and Safety. Unit on Basics of Engine operation. Unit on Engine systems. Unit on Engine Service. And a Unit on Applications and Careers.

Unit Title	Unit 3 Engine Systems
Unit Summary	The Engine Systems Unit deals with all the systems on an engine that make it operate. Such systems include the fuel supply, air induction and emissions, ignition, and lubrications systems. Each component has its own system to combine with the entire engine to make it run.

Unit Essential Questions:	**Key Understandings:**
• What is the purpose of each system on an engine(fuel, air, ignition, lubrication, cooling)? If one system fails does it cause the entire engine system to fail?	• Fuel supply, air induction, and emissions • Carburetion and fuel injection • Ignition systems • Lubrication systems • Cooling systems

Focus Standards Addressed in the Unit:

Standard Number	***Standard Description***
PST.02.01.02.a	Examine operator's manuals to determine recommendations for servicing filtration systems and maintaining fluid levels on equipment, machinery and power units used in AFNR power, structural and technical systems.
PST.2.01.02.b	Service filtration systems and maintain fluid levels on equipment, machinery and power units in accordance with operator's manuals.

Important Standards Addressed in the Unit:

CC.3.6.9-10.B.	Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.
CC.3.6.9-10.H	Draw evidence from informational texts to support analysis, reflection, and research
CC.3.5.9-10.C.	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.

CC.1.2.9–10.J	Acquire and use accurately general academic and domain specific words and phrases, sufficient for reading, writing, speaking, and listening at the college- and career-readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression
CC.1.2.9–10.L	Read and comprehend literary nonfiction and informational text on grade level, reading independently and proficiently

Misconceptions:	**Proper Conceptions:**
• Heat and cooling shrouds are not important to the engine. • Any oil can be put in an engine.	• Shrouds play important roles on the engine to direct air in or out of the engine. • Engines are designed to run with oils of certain viscosities so the oil lubricates properly.

Knowledge & Concepts	**Skills & Competencies**	**Dispositions & Practices**
● operation for spark and compression ignition engines ● engine coolants, lubricants, fuels, engine additives, electrical components and drive systems needed for various applications ● Identify and understand how the ignition, lubrication, and cooling systems work ● Identify various types of carburetion and fuel systems	● Identify the components and describe their function in a small gas engine ● Identify components of each system ● Diagnose issues within the systems ● Maintenance the various systems within a small gas engine	● Learning to learn ● Problem solving

Academic Vocabulary:

● Diesel fuel	● Absolute vacuum	● API engine oil service classification symbol
● Dry-type air cleaners	● Acceleration well	● API engine oil service classification system
● Dual-element air cleaners	● Air-fuel mixture	● Babbitt
● Environmental Protection Agency (EPA)	● Air vane governors	● Barrel pump system
● Fuel pick up line	● Anti-afterfire solenoid	● Boundary lubrication
● Fuel pump	● Atmospheric pressure	● Bypass filter system
● Muffler	● Bernoulli principle	● Constant level splash system
● Octane number	● Carburetor	● Detergent/dispersant additives
● Oil-wetted air cleaner	● Centrifugal governor	● Dipper
● Oxygenates	● Choke	● Ejection pump system
● Phase separation	● Closed-loop EFI system	● Full-flow filter system
● Alnico	● Downdraft carburetors	● Hydrodynamic lubrication
● Capacitive discharge ignition system	● Dry bulb primers	● Low-oil warning devices
● Center electrode	● Economizer circuit	● Lubrication
● Condenser	● Electronic fuel injection	● Multigrade oil
● Dry-charge batteries	● Electronic governor	● Multiviscosity oil
● Dwell	● Engine control unit	● Oil slinger
● Electronic switching devices	● Flash	● Positive displacement oil pumps
● Flashover	● Fuel injector	● Pressurized lubrication system
● Heat ranges	● Hunting	● Shunt filter system
● Ignition advance system	● Idling circuit	● Splash lubrication system
● Ignition coil	● Load adjusting needle	● Viscosity
● Insulator	● Natural draft carburetor	● Viscosity index
	● Open loop EFI system	
	● Sensitivity	

● Magneto systems ● Mechanical breaker point ignition system ● Mechanical break points ● Reach ● Spark plug ● Spark plug wire ● Transistor-controlled ignition switch ● Rotor-type pump ● Sliding vane pump ● Thermostat ● Vari-volume pumps	● Stability ● Throttle ● Updraft carburetors ● Vacuum ● Vacuum carburetors ● Venture ● Wet bulb primers ● Radiator cap ● Radiator core ● Water jackets ● Water pump ● Tungsten ● Wet-charged batteries	● Centrifugal force ● Conduction ● Convection ● Coolant ● Cooling fins ● Plunger pump ● Pressure-vacuum water flow system ● Pressurized cooling system ● radiator

Assessments:

- Hands on assembly and disassembly
- Quizzes
- Participation
- Test

Differentiation:

- Book work
- Lecture
- Demonstrations
- Video clips
- Hands on learning
- IEP accommodations

Interdisciplinary Connections:

- This unit talks about systems and how they work. In Technology Education and Science course processes are used. There is an input, work and an output. Students can use this to understand how proper steps must be followed to make something work in a process.

Additional Resources:

- Video clips
- Articles
- Personal Accounts
- OSHA data sheets
- MSDS
- Small Gas Engines text book and work book

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Grades 9-12

Unit 4

Course/Subject:	Grade:		Suggested Timeline:
Small Gas Engine	9-12		4-5 weeks

Grade Level Summary	Small Gas Engine Repair instructs students with theory and hands-on instruction in small gas engines. This course includes instruction on small engines, (2 cycle and 4 cycle) gasoline and diesels along with hands-on overhaul and repair instructions. Students electing this course will be instructed in overhaul procedures, engine testing and ordering of engine parts.
Grade Level Units	In this course we will cover a Unit on Shop Equipment, Supplies, and Safety. Unit on Basics of Engine operation. Unit on Engine systems. Unit on Engine Service. And a Unit on Applications and Careers.

Unit Title	Unit 4 Engine Service
Unit Summary	In this Unit students will maintain and trouble shoot small gas engines. They will use knowledge from previous units to diagnose problems that causing engine failure. Students will disassemble and reassemble engines to examine all components.

Unit Essential Questions:	**Key Understandings:**
• How does knowing how a system works, help you in diagnosing and repairing the engine? • Why is it best to start with the easiest systems and diagnostics first? What would those systems and diagnostics be in order?	• Customer service • Maintain repair records • Preventative maintenance and troubleshooting • Fuel system service • Ignition and electrical system service • Engine disassembly and inspection • Cylinder, crankshaft, and piston service • Camshaft and valve train service • Engine reassembly and break in

Focus Standards Addressed in the Unit:	
Standard Number	***Standard Description***
PST.03.01.01.c	Evaluate service and repair needs for internal combustion engines using a variety of performance tests
PST.03.01.02.b	Utilize technical manuals and diagnostic tools to determine service and repair needs of spark-and-compression internal combustion engines used in AFNR power, structural and technical systems.

Important Standards Addressed in the Unit:	
CC.3.6.9-10.B.	Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.
CC.3.6.9-10.H	Draw evidence from informational texts to support analysis, reflection, and research

CC.3.5.9-10.C.	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.
CC.1.2.9–10.J	Acquire and use accurately general academic and domain specific words and phrases, sufficient for reading, writing, speaking, and listening at the college- and career-readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression
CC.1.2.9–10.L	Read and comprehend literary nonfiction and informational text on grade level, reading independently and proficiently

Misconceptions:	**Proper Conceptions:**
• Only a professional can work on small gas engine. • Parts and their clearances only need to be close.	• Anyone can work on a small gas engine and make repairs to it as needed. • Parts are designed to fit to within a specific tolerance. Failure to meet the tolerances can cause malfunctions.

Knowledge & Concepts	Skills & Competencies	Dispositions & Practices
● Identify the components of a diesel engine ● List the engine diesel systems and their components ● specialized tools for small engines such as wheel pullers, cylinder honing tools and micrometers. ● Customer service ● Business operations	● Read work order, instructions, formulas or processing charts ● Maintain repair records ● Record details of repairs made and parts used ● Calculate bills according to record of repairs made, labor time and parts used ● Disassemble and reassemble an engine using all diagnostic tools ● Troubleshoot an engine and return it to working order ● Disassemble and reassemble a diesel engine ● Use computers to enter, access or retrieve data ● Prepare a technical report ● Use telephone communication techniques ● Fill out business or government forms	● Problem solving ● Critical thinking

Academic Vocabulary:

● Carburetor kits	● Compression gauge	● Diode
● Diagnostic trouble code	● Compression test	● Gapping tool
● Flooded engine	● Coolant hydrometer	● Hydrogen
● Lean mixture	● Differential pressure test	● Hydrometer
● Overhaul	● Digital tachometer	● Leaf-type feeler guage
● Rich mixture	● Filler plug	● Open-circuit voltage
● Vapor lock	● Hot spots	● Overcharging
● Vented	● Loaded oil	● oxygen
● Welch plugs	● Optical tachometer	● spark test
● Preignition	● Owner's manual	● spark tester
● Service manual	● Preventive maintenance	● specific gravity
● Starter clutch wrench	● Reverse flushing	● specific gravity tests

● Boring machine ● Cylinder taper ● Inside micrometer ● Out-of-roundness ● Reboring ● Telescoping gauge ● Bearing spread	● Service manual ● Systematic troubleshooting ● Thread chaser ● Interference angle ● Peening ● Poppet valves ● Bearing crush	● stator assembly ● undercharging ● wire-type feeler gauges ● valve seat width ● break in ● dampening coils ● assembly lube

Assessments:

- Worksheets
- Participation
- Bench marks

Differentiation:

- Book work
- Lecture
- Demonstrations
- Video clips
- Hands on learning
- IEP accommodations

Interdisciplinary Connections:

Additional Resources:

- Video clips
- Articles
- Personal Accounts
- OSHA data sheets
- MSDS
- Small Gas Engines text book and work book

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Grades 9-12

Unit 5

Course/Subject:	Grade:		Suggested Timeline:
Small Gas Engine	9-12		2-3 weeks

Grade Level Summary	Small Gas Engine Repair instructs students with theory and hands-on instruction in small gas engines. This course includes instruction on small engines, (2 cycle and 4 cycle) gasoline and diesels along with hands-on overhaul and repair instructions. Students electing this course will be instructed in overhaul procedures, engine testing and ordering of engine parts.
Grade Level Units	In this course we will cover a Unit on Shop Equipment, Supplies, and Safety. Unit on Basics of Engine operation. Unit on Engine systems. Unit on Engine Service. And a Unit on Applications and Careers

Unit Title	Unit 5 Applications and Careers
Unit Summary	This unit will look the different uses for small gas engines and their capabilities. Such equipment would include landscape equipment, snow throwers, and personal transportation vehicles. This unit will also look into the career opportunities and certifications that are available to someone interested in the world of small gas engines.

Unit Essential Questions:	**Key Understandings:**
• How do small gas engines affect your everyday life? From those affects, why would it be important to know how to service small gas engines for your personal use?	• Lawn and brush equipment • Lawn and Garden tractors • Snow throwers • personal watercraft • Career opportunities and Certifications

Focus Standards Addressed in the Unit:

Standard Number	***Standard Description***
PST.02.01	Perform preventative maintenance and scheduled service to maintain equipment, machinery and power units used in AFNR settings
PST.02.02	Operate machinery and equipment while observing all safety precautions in AFNR settings.
CRP.10.01	Identify career opportunities within a career cluster that match personal interests, talents, goals and preferences.
CRP.10.02	Examine career advancement requirements and create goals for continuous growth in a chosen career.

Important Standards Addressed in the Unit:	
CC.1.2.9–10.L	Read and comprehend literary nonfiction and informational text on grade level, reading independently and proficiently.
CC.1.2.9–10.J	Acquire and use accurately general academic and domain specific words and phrases, sufficient for reading, writing, speaking, and listening at the college- and career-readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression.
CC.1.4.9–10.A	Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately.
CC.3.5.9-10.A.	Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.
CC.3.6.9-10.B.	Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.
CC.3.6.9-10.C.	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
CC.3.6.9-10.E.	Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically

Misconceptions:	Proper Conceptions:
• Landscape equipment can just be put away and pulled out when needed. • Safety equipment is not needed if the job does not seem dangerous. • All resumes are the same • Career certifications do not mean anything.	• Landscape equipment must be maintained and serviced. • Safety equipment must be worn and in place before operating any piece of equipment. • Resumes can be made different to stand out in a job application. • Career certifications can set you apart from others in job interviews and earn you more money.

Knowledge & Concepts	Skills & Competencies	Dispositions & Practices
● Customer and sales trends ● Conduct training in product use ● Provide Customer service needs ● emerging technologies and their potential impact ● methods of changing appropriate technology for various applications ● Product familiarity (i.e.; lawn tractors, push mowers, garden tillers, etc.) ● Career opportunities ● Certifications	● Analyze sales activities or trends ● Prepare a list of prospective customers ● Use product knowledge and customer's need to solicit an order from established or new customers ● Access media advertising services ● Conduct a sales presentation ● Demonstrate goods or services ● Use sales techniques based on the customer ● Compute financial data ● Identify steps to arrange for trial installations of equipment. ● Negotiate terms of sale or services with customer ● Identify steps to arrange a delivery schedule ● Job applications ● Interview processes ● Tech certifications	● Problem solving skills ● Communication skills

Academic Vocabulary:

- Bail
- Blade guard
- Brushcutters
- Chain guard
- Electric starter
- Extended rope starter
- Discharge chute
- Kickback
- Pushmower
- Reel-type mower
- Rotary mower
- Self-propelled mower
- Spark arrestor
- String trimmer
- Auger
- Fuel stabilizer
- Operation presence controls
- Rubber tracks
- Scraper bar
- Shear bolt
- Shear pin
- Skid shoes
- Bilage
- Bow line
- Drain plug
- Fuel vent check valve
- Identification numbers
- Jet pump
- Jet pump intake grate
- Jet pump outlet nozzle
- American National Standards Institute
- Ball piston pump
- Cavitation
- Chassis
- Compost
- Differential gears
- Four-wheel steering
- Grease fittings
- Movable sheave
- Mulching
- Multitester
- Operator presence switch
- Power-take-off
- Reservoir
- Reverse safety switch
- Single stage snow thrower
- Speed ranges
- Spontaneous combustion
- Spring loaded deck valves
- Swash plate
- Tranaxles
- Two stage snow blower
- Personal watercraft
- Pitch
- Pop-off pressure
- Reverse bucket
- Ride plate
- Sediment bowl
- Stator vanes
- Water inlet screen
- Abilities
- Apprenticeship
- Aptitude
- Critical thinking skills
- Engine service technician
- Engineer
- Entrepreneurs
- Equipment and engine training council
- Ethical behavior
- General manager
- Internship
- Job application form
- Job interview
- Job shadowing
- Leadership
- Letter of application
- Letter of recommendation
- Lifelong learner
- Manufacturer's technicians
- Mentor
- Networking
- Reference
- Resume
- Sales manager
- Service manager
- Service representative
- Transferable skills

Assessments:

- Projects
- Quizzes
- Progress check offs
- Participation

Differentiation:

- Book work
- Lecture
- Demonstrations
- Video clips
- Hands on learning
- IEP accommodations

Interdisciplinary Connections:

- This Unit on Applications and Careers can be used for everyday life and other courses. The applications part of this unit teaches students to be problem solvers and following steps. Outside of school students will likely use different pieces of landscape equipment to maintain their own properties. The Career portion of this unit encompasses many aspects of English and Business courses. Students will use writing skills to write resumes and speaking skills during job interviews. Students will use the business skills to help land jobs or run their own business.

Additional Resources:

- Video clips
- Articles
- Personal Accounts
- OSHA data sheets
- MSDS
- Small Gas Engines text book and work book

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