WGSD Curriculum
Industrial Technology Department

Course: Power Technology
Grade Level: 11-12
LG 1 Shop Safety

<table>
<tr><th colspan="2">High Priority Standards

MoDese Performance Indicators for Small Engine Technician:
1. Basic Personal Safety
2. Lab and Tool Safety</th></tr>
<tr><th>Learning Goal</th><th>Proficiency Scale</th></tr>
<tr><td>Students will be able to keep themselves safe in a working shop environment.</td><td>Level 4: Student demonstrates an in-depth inference or advanced application or innovates with the learning goal.

Level 3: Student demonstrates mastery with the learning goal as evidenced by:
• Applying industry regulated safety processes in shop situations when working with tools, chemicals, and safety equipment.

Level 2: Student demonstrates he/she is nearing proficiency by:
• Recognizing and recalling specific vocabulary, such as: combination wrench, screwdriver, pliers, hammer, socket, ratchet, punch, chisel, fire extinguisher (A,B,C,D), drill motor, drill bit, grinder, safety glasses, lift, jack, jack stand, impact wrench, blowgun, hazards, solvent, flammable, goggles, earplugs, carbon monoxide, OSHA, vise micrometer.
• Performing processes such as:
o Identifying safe ways to use hand and power tools.
o Identifying and describing the situations that call for protective</td></tr>
</table>

<table>
<tr><td></td><td>equipment.
o Knowing that regulations from all levels of government exist for shop environments.
o Using personal protective equipment in the shop environment (i.e., clothing and safety glasses).
o Identifying and describing how fire protection equipment is used.
o Identifying chemicals used to clean and maintain automotive parts.

Level 1: Student demonstrates a limited understanding or skill with the learning goal.</td></tr>
<tr><td colspan="2">Learning Targets

The student knows how to:
• Demonstrate safe work habits.
• Demonstrate the safe handling of hazardous materials.
• Recognize industry accepted procedures for using proper safety devices such as lock out/tag and blocking devices.
• Use basic personal safety habits.
• Demonstrate proper lifting practices.
• Demonstrate safe use of lifting and hoisting devices.
• Maintain a clean and safe work area.
• Demonstrate the safe and proper use of hand tools.
• Demonstrate the safe and proper use of power tools.
• Identify the proper use of fire extinguishers.
• Recognize standard emergency evacuation procedures.
• Identify fire hazards.
• Identify spill containment.
• Demonstrate safe use of cleaning equipment and chemicals.</td></tr>
</table>

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Industrial Technology Department

Course: Power Technology
Grade Level: 11-12
LG 2 Diagnosing Issues

High Priority Standards

MoDese Performance Indicators for Small Engine Technician:

3. Lab procedures.
6. Engine/product identification.

Missouri Learning Standards

ELA: Reading in Science and Technical areas 11-12.4
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. (Finding and using vehicle service records and service manuals and bulletins).

Learning Goal	Proficiency Scale
The student will be able to diagnose and perform mechanical repairs.	Level 4: Student demonstrates an in-depth inference or advanced application or innovates with the learning goal. Level 3: Student demonstrates mastery with the learning goal as evidenced by: • Conducting specified research to locate vehicle and service information. • Interpreting parts and service manuals. • Interpreting and verifying the complaint. • Displaying the skills of teamwork, etiquette and courtesy in the shop environment. • Applying safety and emissions compliance standards to the shop environment. Level 2: Student demonstrates he/she is nearing proficiency by:

	● Recognizing and recalling specific vocabulary, such as: work order, service manual, make, model, serial number, type number, code number, CO, CO2, HC, NOx, parts manual, flywheel brake.
	● Performing processes such as:
	  o Identifying what vehicle and service information needs to be researched.
	  o Identifying name, manufacturer, model, serial number, and type of engines.
	  o Identifying problem areas for conditions such as; no start, engine noise, leaks, excessive oil consumption, and unusual exhaust conditions.
	  o Documenting work and supplies used on work orders.
	
	Level 1: Student demonstrates a limited understanding or skill with the learning goal.

Learning Targets

The student knows how to:

- Document service work and supplies on work orders.
- Read and interpret service and parts manuals.
- Use basic computer skills.
- Identify the name, manufacturer, model, serial number, and type of engines.
- Identify emission compliance engines.
- Identify safety compliance parts.

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Course: Power Technology
Grade Level: 11-12
LG 3 Tools and Fasteners

<table>
<tr><td colspan="2">High Priority Standards

MoDese Performance Indicators for Small Engine Technician:

4. Tools and equipment.
5. Fasteners.</td></tr>
<tr><td>Learning Goal

Students will be able to work with automotive tools and fasteners.</td><td>Proficiency Scale

Level 4: Student demonstrates an in-depth inference or advanced application or innovates with the learning goal.

Level 3: Student demonstrates mastery with the learning goal as evidenced by:
• Choosing the correct fasteners for a corresponding job based on industry standards.
• Using measuring and diagnostic tools to take accurate readings for repair work.
• Evaluating damaged bolt and screw thread and choosing the correct tools for repair.

Level 2: Student demonstrates he/she is nearing proficiency by:
• Recognizing and recalling specific vocabulary, such as: combination wrench, flare nut wrench, ratchet, socket, extension, universal, screwdrivers, hammers, pliers, torque wrench, snap ring pliers, punches, chisels, pullers, vise,</td></tr>
</table>

	micrometer, dial indicator, bore gauge, telescoping gauge, caliper, square, drill, impact wrench, grinder, tap, die, test light, DVOM, screw, bolt, nut, lock washer, flat washer, fastener grade, pitch, gasket, RTV, thread sealant. • Performing processes such as: o Identifying, sizing, and measuring metric and standard fasteners. o Identifying the different fasteners used for corresponding types of engine and repair work. Level 1: Student demonstrates a limited understanding or skill with the learning goal.

Learning Targets

The student knows how to:

- Identify industry-related hand tools.
- Demonstrate the proper use of hand tools.
- Identify precision measuring tools and equipment.
- Demonstrate the proper use and care of precision measuring tools and equipment.
- Identify industry-related power tools.
- Demonstrate the proper use and care of industry-related power tools.
- Identify and use tools to restore threads on fasteners.
- Identify diagnostic tools.
- Demonstrate the proper use and care of diagnostic tools.
- Identify and select industry-related fasteners.
- Measure bolts and threads (SAE grade and metric).
- Determine proper torque value for fasteners.
- Demonstrate proper torqueing technique for fasteners.
- Identify and select proper gaskets and sealants.

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Course: Power Technology
Grade Level: 11-12
LG 4 Engine Theory and Construction

<table>
<tr><th colspan="2">High Priority Standards

MoDese Performance Indicators for Small Engine Technician:
6. Four –Stroke Cycle Engines</th></tr>
<tr><th>Learning Goal</th><th>Proficiency Scale</th></tr>
<tr><td>Students will understand four-stroke cycle engine theory and construction.</td><td>Level 4: Student demonstrates an in-depth inference or advanced application or innovates with the learning goal.

Level 3: Student demonstrates mastery with the learning goal as evidenced by:
• Disassembling, inspecting and servicing, and reassembling a four-stroke cycle engine.
• Explaining the operating cycle of a four-stroke engine.

Level 2: Student demonstrates he/she is nearing proficiency by:
• Recognizing and recalling specific vocabulary, such as: four-stroke cycle, block, cylinder head, crankshaft, camshaft, connecting rod, piston, piston rings, piston (wrist) pin, lifters, valves, valve springs, valve spring retainer, crankcase cover, oil pump, flywheel, carburetor, muffler, air filter.
• Performing processes such as:
o Inspecting engine parts for possible repairs needed.
o Identifying how the engine operates.</td></tr>
</table>

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	Level 1: Student demonstrates a limited understanding or skill with the learning goal.

Learning Targets

The student knows how to:

- Describe the operating cycle of the four-stroke cycle engine.
- Disassemble a four-stroke cycle engine.
- Inspect and service a cylinder.
- Inspect and service the pistons, rings and connecting rods.
- Inspect and service a crankshaft assembly.
- Inspect and service a valve train assembly.
- Reassemble a four-stroke cycle engine
- Identify the difference between l-head and overhead valve trains.
- Test compression.

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Course: Power Technology
Grade Level: 11-12
LG 5 Troubleshooting

<table>
<tr><td colspan="2">High Priority Standards

MoDese Performance Indicators for Small Engine Technician:
10. Troubleshooting.
23. Failure analysis.</td></tr>
<tr><td>Learning Goal

Students will understand the process of troubleshooting as a systematic approach to identify failures.</td><td>Proficiency Scale

Level 4: Student demonstrates an in-depth inference or advanced application or innovates with the learning goal.

Level 3: Student demonstrates mastery with the learning goal as evidenced by:
• Conducting a planned and thorough sequence of tests and examinations to eliminate possible sources of trouble in an engine.
• Classifying symptoms and test results to determine operational problems.

Level 2: Student demonstrates he/she is nearing proficiency by:
● Recognizing and recalling specific vocabulary, such as: service manual, specifications, symptoms, systems, verify complaint, verify repairs, fuel, fuel system, ignition system, lubrication, contamination, spark plug, flywheel key, vacuum, abrasive, overheating, vibration.
• Performing processes such as:</td></tr>
</table>

	○ Identifying symptoms of engine failure. ○ Making repairs and retesting to determine success. Level 1: Student demonstrates a limited understanding or skill with the learning goal.

Learning Targets

The student knows how to:

- Identify the system and components.
- Recognize the sequences of events in a system.
- Access technical manuals to find information and specifications.
- Identify exact symptoms.
- Accurately separate systems.
- Make a complete physical examination.
- Replicate or simulate a given problem.
- Determine and classify all symptoms.
- Perform specific tests using tools to determine which components work correctly.
- Make repairs and retest to verify the repair.
- Identify the effects of abrasive ingestion on engine components.
- Identify the entrance path of abrasives on several engine failure examples.
- Identify the effects of overheating on engine component parts.
- Identify engine failure caused be lean mixture.
- Identify the effects of over speeding on engine component parts.
- Identify the signature break on a connected rod on several engine failure examples.

Identify the effects of excessive vibration on engine block and mounting base.

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Course: Power Technology
Grade Level: 11-12
LG 6 Carburetors

<table>
<tr><td colspan="2">High Priority Standards

MoDese Performance Indicators for Small Engine Technician:
11. Fuel Systems.
12. Governor System.</td></tr>
<tr><td>Learning Goal

Students will understand operation and components of carburetor fuel systems.</td><td>Proficiency Scale

Level 4: Student demonstrates an in-depth inference or advanced application or innovates with the learning goal.

Level 3: Student demonstrates mastery with the learning goal as evidenced by:
• Servicing all components of the fuel system to repair and or/maintain optimal running conditions.

Level 2: Student demonstrates he/she is nearing proficiency by:
• Recognizing and recalling specific vocabulary, such as: carburetor, fuel filter, fuel pump, fuel hose/pipe, fuel tank, air filter, gasoline, octane, diaphragm, gravity, governor, air vane, centrifugal force, RPM, rich fuel mixture, lean fuel mixture, CARB, EPA, idle, cold start, hot start, acceleration, vacuum, venture principle, choke, float, primer.
• Performing processes such as:
o Identifying systems such as fuel, air, venting, and governor.
o Servicing all filters and air cleaners found in typical engines.</td></tr>
</table>

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	Level 1: Student demonstrates a limited understanding or skill with the learning goal.

Learning Targets

The student knows how to:

- Test, repair, or replace diaphragm type carburetors.
- Test, repair, or replace fuel filters and strainers.
- Remove, clean, and replace fuel tank, shut-off valves, fuel lines, fuel hoses, and connections.
- Clean, rebuild, or replace diaphragm type carburetors.
- Clean, rebuild, or replace float type carburetors.
- Service oil-foam air cleaner.
- Service dry-element air cleaner.
- Properly dispose of contaminated fuel.
- Identify the types and grades of gasoline used in power equipment.
- Describe the use of a fuel additive for storage.
- Identify fuel venting systems.
- Troubleshoot a fuel system.
- Identify the purpose of the governor systems.
- Inspect, adjust, and repair air-vane governor systems.
- Inspect, adjust, and repair mechanical governor systems and linkages.
- Adjust engine RPMs to manufacturer’s specifications.
- Troubleshoot a governor system.

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Industrial Technology Department

Course: Power Technology
Grade Level: 11-12
LG 7 Electrical Systems

High Priority Standards

MoDese Performance Indicators for Small Engine Technician:
13. Electrical Systems

Learning Goal	**Proficiency Scale**
Students will understand components and operation of basic electrical and starting systems.	Level 4: Student demonstrates an in-depth inference or advanced application or innovates with the learning goal. Level 3: Student demonstrates mastery with the learning goal as evidenced by: • Explaining electrical theory as relates to small engine functions. • Explaining how batteries store energy. • Explaining different types of circuits and how they can malfunction. Level 2: Student demonstrates he/she is nearing proficiency by: • Recognizing and recalling specific vocabulary, such as: conductor, insulator, circuit, volts, ohms, coil, electrode, ignition, battery, transformer, magneto, gap, DVOM, fuse, fusible link, continuity, gauge, switch, alternator, continuity, gauge, switch, alternator, corrosion, resistance, plate, alternator, corrosion, resistance, plat, sulfating, sulfuric acid, hydrogen gas, multimeter, starter, solenoid, flywheel.

	• Performing processes such as:
	  o Identifying terminals, connectors, and electrical wire sizes.
	  o Checking continuity in circuits.
	  o Removing, cleaning, and replacing batteries.
	  o Inspecting, testing, and replacing fusible links, fuses, and circuit breakers.
	
	Level 1: Student demonstrates a limited understanding or skill with the learning goal.

Learning Targets

Students know how to:

- Demonstrate safe work habits when working with electrical systems.
- Explain basic electrical theory.
- Describe series circuit.
- Describe parallel circuit.
- Explain different types of circuit failures.
- Check continuity in circuits and electrical system components.
- Identify terminals and connectors used in electrical systems.
- Identify electrical wire sizes.
- Read and interpret electrical meters.
- Test, repair, and/or replace charging system components.
- Replace fuel system, lubrication, safety, and temperature sending units.
- Explain storage battery theory and operation.
- Remove, clean, and replace battery.
- Determine battery state of charge using DMM (Digital Multimeter)
- Troubleshoot an electrical system.