

Content and Performance Standards
Safety

Content Standard 1.0: Student shall demonstrate safe work practices while performing operations in the automotive technology lab.

Performance Standard 1.1 The student will demonstrate adherence to general shop safety rules including but not limited to those listed in the following performance indicators.	
EXCEEDS STANDARDS	<ul style="list-style-type: none"> ◆ Design a general shop safety improvement plan.
MEETS STANDARDS	<ul style="list-style-type: none"> 1.1.1 Demonstrate proper use of safety apparel at all times, including but not limited to eye protection, hearing protection, skin protection and protection from airborne particulate matter. 1.1.2 Demonstrate the safe use and proper care of hand tools. 1.1.3 Demonstrate the safe use and proper care of portable power tools. 1.1.4 Demonstrate the safe use and proper care of heavy equipment. 1.1.5 Demonstrate the safe handling, storage, and disposal of chemicals/materials in accordance with local, state, and federal safety and environmental regulations. 1.1.6 Always maintain hands, long hair, and tools a safe distance from any rotating parts such as fan blades. 1.1.7 Properly exhaust running engines, using an exhaust hose or other apparatus. 1.1.8 Demonstrate safe use and maintenance of high pressure hoses and air guns. 1.1.9 Always clean asbestos-laden components with an OSHA-approved parts washer. 1.1.10 Always ensure a vehicle is properly stationed prior servicing (i.e., application of the parking brake). 1.1.11 Demonstrate proper use of safety stands when working under vehicle. 1.1.12 Always use OSHA-approved trouble lights. 1.1.13 Always operates OSHA-approved equipment according to the manufacturers recommended procedure. 1.1.14 Demonstrate knowledge of general shop fire safety procedures and regulations.
APPROACHES STANDARD	<ul style="list-style-type: none"> 1.1.15 Identify potential general shop safety hazards.

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Safety

Performance Standard 1.2	
EXCEEDS STANDARDS	<p>The student will demonstrate adherence to specific shop fire safety rules and procedures including but not limited to those listed in the following performance indicators.</p> <ul style="list-style-type: none"> ◆ Design a fire safety improvement plan.
MEETS STANDARDS	<ul style="list-style-type: none"> 1.2.1 Demonstrate proper use of fire extinguishers. 1.2.2 Demonstrate knowledge of facility fire evacuation plan. 1.2.3 Collect and store oil, fuel, brake fluid and other hazardous liquids in OSHA-approved safety containers. 1.2.4 Use only approved cleaning fluids and equipment to clean components. 1.2.5 Store all combustible materials in approved safety containers. 1.2.6 Never allow sparks or flames near batteries. 1.2.7 Demonstrates knowledge of all combustible liquids and gasses (i.e., fuels, solvents, batteries). 1.2.8 Demonstrate the safe handling, storage, and disposal of chemicals/materials in accordance with local, state, and federal safety and environmental regulations.
APPROACHES STANDARD	<ul style="list-style-type: none"> 1.2.9 Identify potential fire safety hazards.

Content and Performance Standards
Engine Repair

Content Standard 2.0: Student shall understand automotive service requirements for engine repair, to include general diagnosis; engine removal and reinstallation; cylinder head and valve trains; engine blocks; lubrication and cooling systems

Safety Requirements: Comply with personal and environmental safety practices associated with clothing; eye protection; hand tools; power equipment; proper ventilation; and the handling, storage, and disposal of chemicals/materials in accordance with local, state, and federal safety and environmental regulations.

Performance Standard 2.1	
The student shall perform general engine diagnosis; removal and reinstallation (R & R)	
EXCEEDS STANDARDS	<ul style="list-style-type: none"> ◆ Diagnose engine noises and vibrations; determine necessary action. ◆ Diagnose the cause of excessive oil consumption, unusual engine exhaust color, odor, and sound; determine necessary action. ◆ Remove engine (front-wheel drive); prepare for disassembly. ◆ Reinstall engine (front-wheel drive). ◆ Remove engine (rear-wheel drive); prepare for disassembly. ◆ Reinstall engine (rear-wheel drive).
MEETS STANDARDS	<p>2.1.1 Perform engine vacuum tests; determine necessary action.</p> <p>2.1.2 Perform cylinder power balance tests; determine necessary action.</p> <p>2.1.3 Perform cylinder compression tests; determine necessary action.</p> <p>2.1.4 Perform cylinder leakage tests; determine necessary action.</p>
APPROACHES STANDARD	<p>2.1.5 Verify and interpret engine concern; determine necessary action.</p> <p>2.1.6 Inspect engine assembly for fuel, oil, coolant, and other leaks; determine necessary action.</p>

Content and Performance Standards
Engine Repair

Performance Standard 2.2		The student shall perform cylinder head and valve train diagnosis and repair
EXCEEDS STANDARDS	<ul style="list-style-type: none"> ◆ Remove cylinder head(s); visually inspect cylinder head(s) for cracks; check gasket surface areas for warpage and leakage; check passage condition. ◆ Inspect valve guides for wear; check valve guide height and stem-to-guide clearance; recondition or replace as needed. ◆ Check valve spring assembled height and valve stem height; service valve and spring assemblies as needed. ◆ Inspect and measure camshaft bearings for wear, damage, out-of-round, and alignment; determine necessary action. ◆ Resurface valves; perform necessary action. ◆ Resurface valve seats; perform necessary action. ◆ Check valve face-to-seat contact and valve seat concentricity (runout); service seats and valves as needed. 	
MEETS STANDARDS	<p>2.2.1 Inspect and tests valve springs for squareness, pressure, and free height comparison; replace as needed.</p> <p>2.2.2 Inspect valve spring retainers, locks, and valve grooves.</p> <p>2.2.3 Replace valve stem seals.</p> <p>2.2.4 Inspect pushrods, rocker arms, rocker arm pivots and shafts for wear, bending, cracks, looseness, and blocked oil passages (orifices); perform necessary action.</p> <p>2.2.5 Inspect hydraulic or mechanical lifters; replace as needed.</p> <p>2.2.6 Inspect and replace timing belt(s), overhead camdrive sprockets, and tensioners; check belt tension; adjust as necessary.</p> <p>2.2.7 Inspect and replace timing belt(s), overhead camdrive sprockets, and tensioners; check belt tension; adjust as necessary.</p> <p>2.2.8 Inspect camshaft for runout, journal wear and lobe wear.</p> <p>2.2.9 Install cylinder heads and gaskets; tighten according to manufacturer’s specifications and procedures.</p>	
APPROACHES STANDARD	<p>2.2.10 Adjust valves (mechanical or hydraulic lifters).</p> <p>2.2.11 Verify camshaft(s) timing according to manufacturer’s specifications and procedure.</p>	

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Engine Repair

Performance Standard 2.3	
The student will perform engine block assembly diagnosis and repair	
EXCEEDS STANDARDS	<ul style="list-style-type: none"> ◆ Inspect engine block for visible cracks, passage condition, core and gallery plug condition, and surface warpage; determine necessary action. ◆ Inspect and measure camshaft bearings for wear, damage, out-of-round, and alignment; determine necessary action. ◆ Inspect and measure main and connecting rod bearings for damage, clearance, and end play; determine necessary action (includes the proper selection of bearings). ◆ Identify piston and bearing wear patterns that indicate connecting rod alignment and main bearing bore problems; inspect rod alignment and bearing bore condition. ◆ Inspect, measure, and service pistons and pins; determine necessary action. ◆ Inspect auxiliary (balance, intermediate, idler, counterbalance or silencer) shaft(s); inspect shaft(s) and support bearings for damage and wear; determine necessary action; reinstall and time.
MEETS STANDARDS	<p>2.3.1 Inspect and replace pans, covers, gaskets, and seals.</p> <p>2.3.2 Remove cylinder wall ridges.</p> <p>2.3.3 Inspect and measure cylinder walls for damage and wear; determine necessary action.</p> <p>2.3.4 Inspect crankshaft for surface cracks and journal damage; check oil passage condition; measure journal wear; determine necessary action.</p> <p>2.3.5 Inspect, repair or replace crankshaft vibration damper (harmonic balancer).</p> <p>2.3.6 Reassemble engine components using correct gaskets and sealants.</p>
APPROACHES STANDARD	<p>2.3.7 Inspect internal and external threads; restore as needed (includes installing thread inserts).</p> <p>2.3.8 Deglaze and clean cylinder walls.</p> <p>2.3.9 Inspect, measure, and install piston rings.</p> <p>2.3.10 Prime engine lubrication system.</p>

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Engine Repair

Performance Standard 2.4	
The student will perform lubrication and cooling systems diagnosis and repair	
EXCEEDS STANDARDS	<ul style="list-style-type: none"> ◆ Inspect, and tests fans(s) (electrical or mechanical), fan clutch, fan shroud, and air dams.
MEETS STANDARDS	<p>2.4.1 Inspect oil pump gears or rotors, housing, pressure relief devices, and pump drive; perform necessary action.</p> <p>2.4.2 Test coolant; drains and recovers coolant; flush and refill cooling system with recommended coolant; bleed air as required.</p> <p>2.4.3 Inspect, test, remove, and replace water pump.</p> <p>2.4.4 Remove and replace radiator.</p> <p>2.4.5 Inspect auxiliary oil coolers; replace as needed.</p> <p>2.4.6 Inspect, test, and replace oil temperature and pressure switches and sensors.</p> <p>2.4.7 Perform oil pressure tests; determine necessary action.</p> <p>2.4.8 Perform cooling system, cap, and recovery system tests (pressure, combustion leakage, and temperature); determines necessary action.</p>
APPROACHES STANDARD	<p>2.4.9 Inspect, replace, and adjust drive belts, tensioners, and pulleys.</p> <p>2.4.10 Inspect and replace engine cooling and heater system hoses.</p> <p>2.4.11 Inspect, test, and replace thermostat and housing.</p> <p>2.4.12 Perform oil and filter change.</p>

Content and Performance Standards
Automatic Transmission and Transaxle

Content Standard 3.0: **The student shall understand automotive service requirements for automatic transmission and transaxle to include general transmission and transaxle diagnosis, maintenance and adjustment, and in-vehicle and off-vehicle transmission and transaxle repair.**

Safety Requirements: Comply with personal and environmental safety practices associated with clothing; eye protection; hand tools; power equipment; proper ventilation; and the handling, storage, and disposal of chemicals/materials in accordance with local, state, and federal safety and environmental regulations.

Performance Standard 3.1	The student will perform general transmission and transaxle diagnosis
EXCEEDS STANDARDS	<ul style="list-style-type: none"> ◆ Perform pressure tests; determine necessary action. ◆ Perform lock-up converter system tests; determine necessary action. ◆ Diagnose electronic, mechanical, hydraulic, vacuum control system concerns; determine necessary action. ◆ Diagnose noise and vibration concerns; determine necessary action.
MEETS STANDARDS	<p>3.1.1 Diagnose unusual fluid usage.</p> <p>3.1.2 Identify and interpret fluid level and condition concerns; determine necessary action.</p>
APPROACHES STANDARD	<p>3.1.3 Identify and interpret transmission concern; assure proper engine operation; determine necessary action.</p>

Content and Performance Standards
Automatic Transmission and Transaxle

Performance Standard 3.2 The student will perform transmission and transaxle maintenance and adjustment	
EXCEEDS STANDARDS	
MEETS STANDARDS	3.2.1 Inspect, adjust or replace throttle (TV) linkages or cables, check gear select indicator (as applicable). 3.2.2 Service transmission; perform visual inspection; replace fluids and filters.
APPROACHES STANDARD	

Content and Performance Standards
Automatic Transmission and Transaxle

Performance Standard 3.3 The student will perform in-vehicle transmission and transaxle repair	
EXCEEDS STANDARDS	<ul style="list-style-type: none"> ◆ Inspect, leak test, flush, and replace cooler, lines, and fittings. ◆ Inspect and replace speedometer drive gear, driven gear, vehicle speed sensor (VSS), and retainers. ◆ Inspect and test, adjust, repair or replace transmission related electrical and electronic components (includes computers, solenoids, sensors, relays, switches, and harnesses). ◆ Inspect, repair, and replace governor assembly. ◆ Inspect, adjust or replace (as applicable) vacuum modulator; inspect and repair or replace lines and hoses.
MEETS STANDARDS	<p>3.3.1 Inspect and replace external seals and gaskets.</p> <p>3.3.2 Inspect extension housing, bushings and seals; perform necessary action.</p>
APPROACHES STANDARD	<p>3.3.3 Inspect, replace, and align powertrain mounts.</p>

Content and Performance Standards
Automatic Transmission and Transaxle

Performance Standard 3.4	
The student will perform off-vehicle transmission and transaxle repair	
EXCEEDS STANDARDS	<ul style="list-style-type: none"> ◆ Remove and reinstall transaxle and torque converter. ◆ Disassemble, clean, and inspect transmission/ transaxle. ◆ Inspect, measure, clean, and replace valve body (includes surfaces and bores, springs, valves, sleeves, retainers, brackets, check-balls, screens, spacers, and gaskets), and torque valve body bolts. ◆ Inspect servo bore, piston, seals, pin, spring, and retainers; determine necessary action. ◆ Inspect accumulator bore, piston, seals, spring, and retainer; determine necessary action. ◆ Assemble transmission/transaxle. ◆ Measure torque converter endplay and check for interference; check stator clutch. ◆ Inspect, measure, and replace oil pump assembly and components. ◆ Measure endplay or preload; determine necessary action. ◆ Inspect, measure, and replace thrust washers and bearings. ◆ Inspect oil delivery seal rings, ring grooves, and sealing surface areas. ◆ Inspect bushings; replace as needed. ◆ Inspect and measure planetary gear assembly(includes sun, ring gear, thrust washers, planetary gears, and carrier assembly); replace as needed. ◆ Inspect case bores, passages, bushings, vents, and mating surfaces; determine necessary action. ◆ Inspect transaxle drive, link chains, sprockets, gears, bearings, and bushings; performs necessary action. ◆ Inspect, measure, repair, adjust or replace transaxle final drive components. ◆ Inspect and reinstall parking pawl, shaft, spring, and retainer; determine necessary action. ◆ Inspect clutch drum, piston, check-balls, springs, retainers, seals, and friction and pressure plates; replace as needed. ◆ Measure clutch pack clearance; adjust as needed. ◆ Air test operation of clutch and servo assemblies. ◆ Inspect roller and sprag clutch, races, rollers, sprags, springs, cages, and retainers; replace as needed. ◆ Inspect bands and drums; adjust or replace as needed.
MEETS STANDARDS	<p>3.4.1 Inspect converter flex plate, attaching parts, pilot, pump drive, and seal areas.</p> <p>3.4.2 Remove and reinstall transmission and torque converter (rear-wheel drive).</p> <p>3.4.3 Check torque converter and transmission cooling system for contamination.</p>
APPROACHES STANDARD	

Content and Performance Standards
Manual Drive Train and Axles

Content Standard 4.0: Students shall understand automotive service requirements for manual drive train and axles to include clutch, transmission and transaxle, drive shaft and half shaft, universal and constant-velocity (CV) joint, drive axle, and four-wheel and all-wheel drive component diagnosis and repair.

Safety Requirements: Comply with personal and environmental safety practices associated with clothing; eye protection; hand tools; power equipment; proper ventilation; and the handling, storage, and disposal of chemicals/materials in accordance with local, state, and federal safety and environmental regulations.

Performance Standard 4.1 The student will perform clutch diagnosis and repair on RWD vehicles	
EXCEEDS STANDARDS	<ul style="list-style-type: none"> ◆ Diagnose clutch noise, binding, slippage, pulsation, and chatter; determine necessary action.
MEETS STANDARDS	4.1.1 Inspect clutch pedal linkage, cables, automatic adjuster mechanisms, brackets, bushings, pivots, and springs; perform necessary action. 4.1.2 Remove and replace RWD transmission. 4.1.3 Inspect release (throw-out) bearing, lever, and pivot; perform necessary action. 4.1.4 Inspect and replace clutch pressure plate assembly and clutch disc. 4.1.5 Inspect, remove or replace crankshaft pilot bearing or bushing (as applicable). 4.1.6 Inspect engine block, clutch (bell) housing, and transmission case mating surfaces; determine necessary action. 4.1.7 Measure flywheel-to-block runout and crankshaft endplay; determine necessary action. 4.1.8 Inspect flywheel and ring gear for wear and cracks, measures runout; determine necessary action.
APPROACHES STANDARD	4.1.9 Inspect hydraulic clutch slave and master cylinders, lines, and hoses; perform necessary action.

Content and Performance Standards
Manual Drive Train and Axles

Performance Standard 4.2		The student will perform transmission/transaxle diagnosis and repair
EXCEEDS STANDARDS	<ul style="list-style-type: none"> ◆ Disassemble, clean, and reassemble transmission/ transaxle components. ◆ Inspect transmission/transaxle case, extension housing, case mating surfaces, bores, bushings, and vents; perform necessary action. ◆ Diagnose noise, hard shifting, jumping out of gear, and fluid leakage concerns; determine necessary action. ◆ Inspect, adjust, and reinstall shift linkages, brackets, bushings, cables, pivots, and levers. ◆ Inspect and replace gaskets, seals, and sealants; inspect sealing surfaces. ◆ Remove and replace transaxle final drive. ◆ Inspect, adjust, and reinstall shift cover, forks, levers, grommets, shafts, sleeves, detent mechanism, interlocks, and springs. ◆ Measure endplay or preload (shim or spacer selection procedure) on transmission/transaxle shafts; perform necessary action. ◆ Inspect and reinstall synchronizer hub, sleeve, keys (inserts), springs, and blocking rings. ◆ Inspect and reinstall speedometer drive gear, driven gear, vehicle speed sensor (VSS), and retainers. ◆ Diagnose transaxle final drive assembly noise and vibration concerns; determine necessary action. ◆ Remove, inspect, measure, adjust, and reinstall transaxle final drive pinion gears (spiders), shaft, side gears, side bearings, thrust washers, and case assembly. ◆ Inspect lubrication devices (oil pump or slingers); perform necessary action. ◆ Inspect, test, and replace transmission/transaxle sensors and switches. 	
MEETS STANDARDS	<p>4.2.1 Remove and reinstall transmission/transaxle.</p> <p>4.2.2 Inspect and reinstall powertrain mounts.</p> <p>4.2.3 Calculate under drive, direct drive and overdrive gear ratios.</p>	
APPROACHES STANDARD	<p>4.2.4 Identify under drive, direct drive and overdrive gear ratios.</p>	

Content and Performance Standards
Manual Drive Train and Axles

Performance Standard 4.3	
The student will perform drive-shaft and half-shaft, universal and constant velocity (CV) joint diagnosis and repair	
EXCEEDS STANDARDS	<ul style="list-style-type: none"> ◆ Replace front wheel drive (FWD) front wheel bearing. ◆ Check shaft balance; measure shaft runout; measure and adjust driveline angles.
MEETS STANDARDS	<p>4.3.1 Diagnose constant-velocity (CV) joint noise and vibration concerns; determine necessary action.</p> <p>4.3.2 Diagnose universal joint noise and vibration concerns; perform necessary action.</p> <p>4.3.3 Inspect, service, and replace shafts, yokes, boots, and CV joints.</p> <p>4.3.4 Inspect, service, and replace shaft center support bearings.</p>
APPROACHES STANDARD	

Content and Performance Standards
Manual Drive Train and Axles

Performance Standard 4.4		The student will perform drive axle diagnosis and repair
EXCEEDS STANDARDS	<ul style="list-style-type: none"> ◆ Diagnose differential noise, vibration, slippage and chatter concerns; determine necessary action. ◆ Inspect and replace companion flange and pinion seal; measure companion flange runout. ◆ Inspect ring gear and measure runout; determine necessary action. ◆ Remove, inspect, and reinstall drive pinion and ring gear, spacers, sleeves, and bearings. ◆ Measure and adjust drive pinion depth. ◆ Measure and adjust drive pinion bearing preload. ◆ Measure and adjust side bearing preload and ring and pinion gear total backlash and backlash variation on a differential carrier assembly (threaded cup or shim types). ◆ Check ring and pinion tooth contact patterns; perform necessary action. ◆ Disassemble, inspect, measure, and adjust or replace differential pinion gears (spiders), shaft, side gears, side bearings, thrust washers, and case. ◆ Reassemble and reinstall differential case assembly; measure runout; determine necessary action. ◆ Diagnose differential noise, vibration, slippage, and chatter concerns; determine necessary action. Inspect and reinstall clutch (cone or plate) components. ◆ Measure rotating torque; determine necessary action. ◆ Diagnose drive axle shafts, bearings, and seals for noise, vibration, and fluid leakage concerns; determine necessary action. 	
MEETS STANDARDS	<p>4.4.1 Inspect and replace drive axle shaft wheel studs.</p> <p>4.4.2 Inspect and replace drive axle shaft seals, bearings, and retainers.</p> <p>4.4.3 Measure drive axle flange runout and shaft endplay; determine necessary action.</p> <p>4.4.4 Remove and replace drive axle shafts.</p>	
APPROACHES STANDARD	<p>4.4.5 Diagnose fluid leakage concerns; determine necessary action.</p> <p>4.4.6 Inspect and flush differential housing; refill with correct lubricant.</p>	

Content and Performance Standards
Manual Drive Train and Axles

Performance Standard 4.5	
The student will perform four-wheel drive/all-wheel drive component diagnosis and repair	
EXCEEDS STANDARDS	<ul style="list-style-type: none"> ◆ Diagnose noise, vibration, and unusual steering concerns; determine necessary action. ◆ Inspect, adjust, and repair shifting controls (mechanical, electrical, and vacuum), bushings, mounts, levers, and brackets. ◆ Disassemble, service, and reassemble transfer case and components. ◆ Diagnose, test, adjust, and replace electrical/ electronic components of four-wheel drive systems.
MEETS STANDARDS	<p>4.5.1 Remove and reinstall transfer case.</p> <p>4.5.2 Inspect front-wheel bearings and locking hubs; perform necessary action.</p>
APPROACHES STANDARD	<p>4.5.3 Check drive assembly seals and vents; check lube level.</p>

Content and Performance Standards
Suspension and Steering

Content Standard 5.0: Students shall understand automotive service requirements for suspension and steering to include steering systems, suspension systems, and wheel and tire diagnosis and repair, and wheel alignment diagnosis, adjustment and repair.

Safety Requirements: Comply with personal and environmental safety practices associated with clothing; eye protection; hand tools; power equipment; proper ventilation; and the handling, storage, and disposal of chemicals/materials in accordance with local, state, and federal safety and environmental regulations.

Performance Standard 5.1		The student will perform steering systems diagnosis and repair
EXCEEDS STANDARDS		<ul style="list-style-type: none"> ◆ Diagnose steering column noises, looseness, and binding concerns (including tilt mechanisms); determine necessary action. ◆ Diagnose power steering gear (non-rack and pinion) binding, uneven turning effort, looseness, hard steering, and fluid leakage concerns; determine necessary action. ◆ Diagnose power steering gear (rack and pinion) binding, uneven turning effort, looseness, hard steering, and fluid leakage concerns; determine necessary action. ◆ Remove and replace manual or power rack and pinion steering gear; inspect mounting bushings and brackets. ◆ Disassemble, inspect, perform necessary action and reassembles rack and pinion steering gear. ◆ Adjust manual or power rack and pinion steering gear. ◆ Diagnose and adjust components of electronically controlled steering systems; determine necessary action.
MEETS STANDARDS	5.1.1 5.1.2 5.1.3 5.1.4 5.1.5 5.1.6 5.1.7 5.1.8 5.1.9 5.1.10 5.1.11	Disable and enable supplemental restraint system (SRS) in accordance with manufacturer's procedures. Remove and replace steering wheel; center/time supplemental restraint system (SRS) coil in accordance with manufacturer's procedures. Inspect steering shaft universal-joint(s), flexible coupling(s), collapsible column, lock cylinder mechanism, and steering wheel; perform necessary action. Adjust manual or power non-rack and pinion worm bearing preload and sector lash. Inspect and replace manual or power rack and pinion steering gear inner tie rod ends (sockets) and bellows boots. Flush, fill, and bleed power steering system. Remove, inspect, and replace power steering pump, mounts, seals, and gaskets. Remove, inspect, and replace power steering pump pulley; check alignment. Inspect and replace power steering hoses and fittings. Inspect and replace pitman arm, relay (centerlink/intermediate) rod, idler arm and mountings, and steering linkage damper. Inspect, replace, and adjust tie rod ends (sockets), tie rod sleeves, and clamps.
APPROACHES STANDARD	5.1.12 5.1.13 5.1.14	Inspect power steering fluid levels and condition. Diagnose power steering fluid leakage; determine necessary action. Remove, inspect, replace, and adjust power steering pump belt.

Content and Performance Standards
Suspension and Steering

Performance Standard 5.2	
The student will perform suspension system diagnosis and repair	
EXCEEDS STANDARDS	<ul style="list-style-type: none"> ◆ Diagnose, inspect, adjust, repair or replace components of electronically controlled suspension systems. ◆ Diagnose short and long arm suspension system noises, body sway, and uneven riding height concerns; determine necessary action. ◆ Diagnose MacPherson strut suspension system noises, body sway, and uneven riding height concerns; determine necessary action.
MEETS STANDARDS	<p>5.2.1 Remove, inspect, and install upper and lower control arms, bushings, shafts, and rebound bumpers.</p> <p>5.2.2 Remove, inspect, install, and adjust strut (compression/tension) rods and bushings.</p> <p>5.2.3 Remove, inspect, and install upper and lower ball joints on short and long arm suspension systems.</p> <p>5.2.4 Remove, inspect, and install steering knuckle assemblies.</p> <p>5.2.5 Remove, inspect, and install short and long arm suspension system coil springs and spring insulators.</p> <p>5.2.6 Remove, inspect, install, and adjust suspension system torsion bars; inspect mounts.</p> <p>5.2.7 Remove, inspect, and install stabilizer bar bushings, brackets, and links.</p> <p>5.2.8 Remove, inspect, and install MacPherson strut cartridge or assembly, strut coil spring, insulators (silencers), and upper strut bearing mount.</p> <p>5.2.9 Remove, inspect, and install coil springs and spring insulators.</p> <p>5.2.10 Remove, inspect, and install traverse links, control arms, bushings, and mounts.</p> <p>5.2.11 Remove, inspect, and install leaf springs, leaf spring insulators (silencers), shackles, bracelets, bushings, and mounts.</p> <p>5.2.12 Remove, inspect, and install MacPherson strut cartridge or assembly, strut coil spring, and insulators (silencers).</p>
APPROACHES STANDARD	<p>5.2.13 Lubricate suspension and steering systems.</p> <p>5.2.14 Inspect, remove, and replace shock absorbers.</p> <p>5.2.15 Remove, inspect, and service or replace front and rear wheel taper bearings.</p>

Content and Performance Standards
Suspension and Steering

Performance Standard 5.3		The student will perform wheel alignment diagnosis, adjustment, and repair
EXCEEDS STANDARDS	<ul style="list-style-type: none"> ◆ Diagnose vehicle wander, drift, pull, hard steering, bump steer, memory steer, torque steer, and steering return concerns; determine necessary action. ◆ Check and adjust front and rear wheel camber; perform necessary action. ◆ Check and adjust caster; perform necessary action. ◆ Check toe-out-on-turns (turning radius); determine necessary action. ◆ Check SAI (steering axis inclination) and included angle; determine necessary action. ◆ Check and adjust rear wheel toe. ◆ Check rear wheel thrust angle; determine necessary action. ◆ Check for front wheel setback; determine necessary action. ◆ Check front cradle (subframe) alignment; determine necessary action. 	
MEETS STANDARDS	<p>5.3.1 Check and adjust front wheel toe; adjust as needed.</p> <p>5.3.2 Center steering wheel.</p>	
APPROACHES STANDARD	<p>5.3.3 Perform prealignment inspection; perform necessary action.</p> <p>5.3.4 Measure vehicle riding height; determine necessary action.</p>	

Content and Performance Standards
Suspension and Steering

Performance Standard 5.4		The student will perform wheel and tire diagnosis and repair	
EXCEEDS STANDARDS			
MEETS STANDARDS	5.4.1	Diagnose wheel/tire vibration, shimmy, and noise; determine necessary action.	
	5.4.2	Measure wheel, tire, axle, and hub run out; determine necessary action.	
	5.4.3	Diagnose tire pull (lead) problem; determine necessary action.	
APPROACHES STANDARD	5.4.4	Diagnose tire wear patterns; determine necessary action.	
	5.4.5	Inspect tires, check and adjust air pressure.	
	5.4.6	Rotate tires according to manufacturer's recommendations.	
	5.4.7	Balance wheel and tire assembly (static and dynamic).	
	5.4.8	Dismount, inspect, repair, and remount tire on wheel.	
	5.4.9	Reinstall wheel; torque lug nuts.	

Content and Performance Standards

Brakes

Content Standard 6.0: Student shall understand automotive service requirements for brakes to include hydraulic systems, drum brakes, disc brakes, power assist units, anti-lock brake systems, and miscellaneous (wheel bearings, parking brakes, electrical, etc.) diagnosis and repair.

Safety Requirements: Comply with personal and environmental safety practices associated with clothing; eye protection; hand tools; power equipment; proper ventilation; and the handling, storage, and disposal of chemicals/materials in accordance with local, state, and federal safety and environmental regulations.

Performance Standard 6.1		The student will perform hydraulic system diagnosis and repair
EXCEEDS STANDARDS		<ul style="list-style-type: none"> ◆ Diagnose poor stopping, pulling or dragging concerns caused by problems in the hydraulic system; determine necessary action. ◆ Inspect, test, and replace metering (hold-off), proportioning (balance), pressure differential, and combination valves. ◆ Inspect, test, replace, and adjust height (load) sensing proportioning valve. ◆ Inspect, test, and replace components of brake warning light system.
MEETS STANDARDS	6.1.1 6.1.2 6.1.3 6.1.4	6.1.1 Measure and adjust pedal height. 6.1.2 Check master cylinder for internal and external leaks and proper operation; determine necessary action. 6.1.3 Remove, bench bleeds, and reinstall master cylinder. 6.1.4 Fabricate and install brake lines (double flare and ISO types); replace hoses, fittings, and supports as needed.
APPROACHES STANDARD	6.1.5 6.1.6 6.1.7 6.1.8	6.1.5 Inspect brake lines, flexible hoses, and fittings for leaks, dents, kinks, rust, cracks, bulging or wear; tighten loose fittings and supports; determine necessary action. 6.1.6 Select, handle, store, and install brake fluids to proper level. 6.1.7 Bleed (manual, pressure, vacuum or surge) brake system. 6.1.8 Flush hydraulic system.

Content and Performance Standards
Brakes

Performance Standard 6.2 The student will perform drum brake diagnosis and repair	
EXCEEDS STANDARDS	<ul style="list-style-type: none"> ◆ Diagnose poor stopping, noise, pulling, grabbing, dragging or pedal pulsation concerns; determine necessary action.
MEETS STANDARDS	<p>6.2.1 Remove, clean (using proper safety procedures), inspect, and measure brake drums; service or replace as needed.</p> <p>6.2.2 Mount brake drum on lathe; machine braking surface.</p> <p>6.2.3 Remove, clean, and inspect brake shoes, springs, pins, clips, levers, adjusters/self-adjusters, other related brake hardware, and backing support plates; lubricate and reassemble.</p> <p>6.2.4 Remove, inspect, and install wheel cylinders.</p> <p>6.2.5 Pre-adjust brake shoes and parking brake before installing brake drums or drum/hub assemblies and wheel bearings.</p>
APPROACHES STANDARD	<p>6.2.6 Install wheel, torque lug nuts, and make final checks and adjustments.</p>

Content and Performance Standards
Brakes

Performance Standard 6.3		The student will perform disc brake diagnosis and repair
EXCEEDS STANDARDS	♦	Diagnose poor stopping, noise, pulling, grabbing, dragging or pedal pulsation concerns; determine necessary action.
MEETS STANDARDS	6.3.1 6.3.2 6.3.3 6.3.4 6.3.5 6.3.6 6.3.7	6.3.1 Remove caliper assembly from mountings; clean and inspect for leaks and damage to caliper housing; determine necessary action. 6.3.2 Clean and inspect caliper mounting and slides for wear and damage; determine necessary action. 6.3.3 Remove, clean, and inspect pads and retaining hardware; determine necessary action. 6.3.4 Disassemble and clean caliper assembly; inspect parts for wear, rust, scoring, and damage; replace seal, boot, and damaged or worn parts. 6.3.5 Reassemble, lubricate, and reinstall caliper, pads, and related hardware; seat pads, and inspect for leaks. 6.3.6 Clean, inspect, and measure rotor with a dial indicator and a micrometer; follow manufacturer's recommendations in determining need to machine or replace. 6.3.7 Refinish rotor according to manufacturer's recommendations. Adjust calipers with integrated parking brake system.
APPROACHES STANDARD	6.3.8 6.3.9	6.3.8 Install wheel, torque lug nuts, and make final checks and adjustments. 6.3.9 Remove and replace rotor.

Content and Performance Standards
Brakes

Performance Standard 6.4		The student will perform power assist units diagnosis and repair	
EXCEEDS STANDARDS		♦	Inspect and test hydro-boost system and accumulator for leaks and proper operation; determine necessary action.
MEETS STANDARDS	6.4.1		Test pedal free travel with and without engine running; check power assist operation.
	6.4.2		Check vacuum supply (manifold or auxiliary pump) to vacuum-type power booster.
	6.4.3		Inspect the vacuum-type power booster unit for vacuum leaks; inspect the check valve for proper operation; determine necessary action.
APPROACHES STANDARD			

Content and Performance Standards
Brakes

Performance Standard 6.5	
The student will perform miscellaneous (wheel bearings, parking brakes, electrical, etc.) diagnosis and repair	
EXCEEDS STANDARDS	
MEETS STANDARDS	<p>6.5.1 Diagnose wheel bearing noises, wheel shimmy, and vibration concerns; determine necessary action.</p> <p>6.5.2 Remove, clean, inspect, repack, and install wheel bearings and replace seals; install hub and adjusts wheel bearings.</p> <p>6.5.3 Check parking brake cables and components for wear, rusting, binding, and corrosion; clean, lubricate, and replace as needed.</p> <p>6.5.4 Replace wheel bearing and race.</p>
APPROACHES STANDARD	<p>6.5.5 Check parking brake operation; adjust as needed.</p> <p>6.5.6 Check operation of parking brake indicator light system.</p> <p>6.5.7 Check operation of brake stop light system; adjust and service as needed.</p>

Content and Performance Standards
Brakes

Performance Standard 6.6		The student will perform anti-lock brake system diagnosis and repair	
EXCEEDS STANDARDS			<ul style="list-style-type: none"> ◆ Inspect and test anti-lock brake system (ABS) components; determine necessary action. ◆ Diagnose poor stopping, wheel lock-up, abnormal pedal feel or pulsation, and noise concerns caused by the anti-lock brake system (ABS); determine necessary action. ◆ Diagnose anti-lock brake system (ABS) electronic control(s) and components using self-diagnosis and/or recommended test equipment; determine necessary action. ◆ Remove and install anti-lock brake system (ABS) electrical/electronic and hydraulic components. ◆ Service, test, and adjust anti-lock brake system (ABS) speed sensors. ◆ Diagnose anti-lock brake system (ABS) braking concerns caused by vehicle modifications (tire size, curb height, final drive ratio, etc.).
MEETS STANDARDS		6.6.1	Depressurize high-pressure components of the anti-lock brake system (ABS).
		6.6.2	Bleed the anti-lock brake system's (ABS) front and rear hydraulic circuits.
APPROACHES STANDARD			

Content and Performance Standards
Electrical/Electronic Systems

Content Standard 7.0: Students shall understand automotive service requirements for electrical/electronic systems to include general electrical system diagnosis, battery diagnosis and service, starting system, charging system, lighting systems, horn/wiper/washer, accessories, and gauges, warning devices, and driver information systems diagnosis and repair.

Safety Requirements: Comply with personal and environmental safety practices associated with clothing; eye protection; hand tools; power equipment; proper ventilation; and the handling, storage, and disposal of chemicals/materials in accordance with local, state, and federal safety and environmental regulations.

Performance Standard 7.1		The student will perform general electrical system diagnosis
EXCEEDS STANDARDS	<ul style="list-style-type: none"> ◆ Locate shorts, grounds, opens, and resistance problems in electrical/electronic circuits; determine necessary action. ◆ Measure and diagnose the cause(s) of abnormal key-off battery drain; determine necessary action. ◆ Inspect and test switches, connectors, relays, and wires of electrical/electronic circuits; perform necessary action. 	
MEETS STANDARDS	<p>7.1.1 Use wiring diagrams during diagnosis of electrical circuit problems.</p> <p>7.1.2 Check electrical circuits with a test light; determine necessary action.</p> <p>7.1.3 Check voltage and voltage drop in electrical/electronic circuits using a digital multimeter (DMM); determine necessary action.</p> <p>7.1.4 Check current flow in electrical/electronic circuits and components using an ammeter; determine necessary action.</p> <p>7.1.5 Check continuity and resistances in electrical/electronic circuits and components with an ohmmeter; determine necessary action.</p> <p>7.1.6 Check electrical circuits using jumper wires; determine necessary action.</p> <p>7.1.7 Inspect and test fusible links, circuit breakers, and fuses; determine necessary action.</p>	
APPROACHES STANDARD	<p>7.1.8 Repair wiring harnesses and connectors.</p> <p>7.1.9 Perform solder repair of electrical wiring.</p>	

Content and Performance Standards
Electrical/Electronic Systems

Performance Standard 7.2		The student will perform battery diagnosis and repair	
EXCEEDS STANDARDS			
MEETS STANDARDS	7.2.1 Perform battery capacity test; determine needed service. 7.2.2 Maintain or restore electronic memory functions. 7.2.3 Inspect and clean battery cables, connectors, clamps, and hold-downs; repair or replace as needed. 7.2.4 Start a vehicle using jumper cables and a battery or auxiliary power supply according to manufacturers recommended specifications.		
APPROACHES STANDARD	7.2.5 Perform battery state-of-charge test; determines needed service. 7.2.6 Inspect, clean, fill, and replace battery. 7.2.7 Perform slow/fast battery charge.		

Content and Performance Standards
Electrical/Electronic Systems

Performance Standard 7.3		The student will perform starting system diagnosis and repair	
EXCEEDS STANDARDS			
MEETS STANDARDS	7.3.1 Perform starter current draw tests; determine necessary action. 7.3.2 Perform starter circuit voltage drop tests; determine necessary action. 7.3.3 Inspect and test starter relays and solenoids; replace as needed. 7.3.4 Perform starter bench tests; determine necessary action. 7.3.5 Inspect and test switches, connectors, and wires of starter control circuits; perform necessary action. 7.3.6 Disassemble, clean, inspect, and test starter components; replace as needed.		
APPROACHES STANDARD	7.3.7 Remove and install starter.		

Content and Performance Standards
Electrical/Electronic Systems

Performance Standard 7.4		The student will perform charging system diagnosis and repair	
EXCEEDS STANDARDS		◆	Disassemble generator (alternator), clean, inspect, and test components; determine necessary action.
MEETS STANDARDS	7.4.1		Perform charging system output test; determine necessary action.
	7.4.2		Diagnose charging system for the cause of undercharge, no-charge, and overcharge conditions.
	7.4.3		Inspect and test voltage regulator/regulating circuit; perform necessary action.
	7.4.4		Perform charging circuit voltage drop tests; determine necessary action.
APPROACHES STANDARD	7.4.5		Inspect and adjust generator (alternator) drive belts; replace as needed.
	7.4.6		Remove, inspect, and install generator (alternator).

Content and Performance Standards
Electrical/Electronic Systems

Performance Standard 7.5 The student will perform lighting system diagnosis and repair	
EXCEEDS STANDARDS	<ul style="list-style-type: none"> ◆ Diagnose the cause of brighter than normal, intermittent, dim, or no light operation; determine necessary action. ◆ Inspect and diagnose incorrect turn signal or hazard light operation; perform necessary action.
MEETS STANDARDS	7.5.1 Inspect, replace, and aim headlights and bulbs.
APPROACHES STANDARD	

Content and Performance Standards
Electrical/Electronic Systems

Performance Standard 7.6	
Performance Standard 7.6	The student will perform gauges, warning devices, and driver information systems diagnosis and repair
EXCEEDS STANDARDS	<ul style="list-style-type: none"> ◆ Inspect and test gauges and gauge sending units for cause of intermittent, high, low, or no gauge readings; determine necessary action. ◆ Inspect and test connectors, wires, and printed circuit boards of gauge circuits; determine necessary action. ◆ Diagnose the cause of incorrect operation of warning devices and other driver information systems; determine necessary action. ◆ Inspect and test sensors, connectors, and wires of electronic instrument circuits; determine necessary action.
MEETS STANDARDS	
APPROACHES STANDARD	

Content and Performance Standards
Electrical/Electronic Systems

Performance Standard 7.7		The student will perform horn and wiper/washer diagnosis and repair	
EXCEEDS STANDARDS		◆	Diagnose incorrect wiper operation; diagnose wiper speed control and park problems; perform necessary action.
MEETS STANDARDS	7.7.1 7.7.2		Diagnose incorrect horn operation; perform necessary action. Diagnose incorrect windshield washer operation; perform necessary action.
APPROACHES STANDARD			

Content and Performance Standards
Electrical/Electronic Systems

Performance Standard 7.8 The student shall perform accessories diagnosis and repair	
EXCEEDS STANDARDS	<ul style="list-style-type: none"> ◆ Diagnose incorrect operation of motor-driven accessory circuits; determine necessary action. ◆ Diagnose incorrect heated glass operation; determine necessary action. ◆ Diagnose incorrect electric lock operation; determine necessary action. ◆ Diagnose incorrect operation of cruise control systems; repair as needed. ◆ Diagnose supplemental restraint system (SRS) concerns; determines necessary action. (Note: Follows manufacturer’s safety procedures to prevent accidental deployment.) ◆ Diagnose radio static and weak, intermittent, or no radio reception; determine necessary action.
MEETS STANDARDS	
APPROACHES STANDARD	

Content and Performance Standards
Heating and Air Conditioning

Content Standard 8.0: Student shall understand automotive service requirements for heating and air conditioning to include A/C System, refrigeration system component, evaporator, condenser and related components, heating, ventilation, and engine cooling systems, operating systems and related controls diagnostic and repair, and refrigerant recovery, recycling and handling.

Safety Requirements: Comply with personal and environmental safety practices associated with clothing; eye protection; hand tools; power equipment; proper ventilation; and the handling, storage, and disposal of chemicals/materials in accordance with local, state, and federal safety and environmental regulations.

Performance Standard 8.1 The student shall perform A/C system diagnosis and repair	
EXCEEDS STANDARDS	<ul style="list-style-type: none"> ◆ Diagnose unusual operating noises in the A/C system; determine necessary action. ◆ Inspect the condition of discharged oil; determine necessary action.
MEETS STANDARDS	<p>8.1.1 Identify refrigerant type; conduct a performance test of the A/C system; determine necessary action.</p> <p>8.1.2 Leak test A/C system; determine necessary action. Select oil type; measure, and add oil to the A/C system as needed.</p>
APPROACHES STANDARD	

Content and Performance Standards
Heating and Air Conditioning

Performance Standard 8.2		The student shall perform refrigeration system component diagnosis and repair	
EXCEEDS STANDARDS		◆	Diagnose A/C system conditions that cause the protection devices (pressure, thermal, and PCM) to interrupt system operation; determine necessary action.
MEETS STANDARDS	8.2.1		Inspect, test, and replace A/C compressor clutch components or assembly.
	8.2.2		Remove and replace A/C compressor and mountings.
	8.2.3		Determine need for A/C system filter; perform necessary action.
	8.2.4		Remove and inspect A/C system mufflers, hoses, lines, fittings, o-rings, seals, and service valves; perform necessary action.
	8.2.5		Remove and install receiver/drier or accumulator/ drier.
	8.2.6		Remove and install expansion valve or orifice (expansion) tube.
APPROACHES STANDARD	8.2.7		Inspect A/C compressor drive belts; replace and adjust as needed.
	8.2.8		Inspect A/C condenser for airflow restrictions; perform necessary action.
	8.2.9		Inspect evaporator housing water drain; perform necessary action.

Content and Performance Standards
Heating and Air Conditioning

Performance Standard 8.3	
The student shall perform heating, ventilation, and engine cooling systems diagnosis and repair	
EXCEEDS STANDARDS	<ul style="list-style-type: none"> ◆ Diagnose temperature control problems in the heater/ventilation system; determine necessary action. ◆ Inspect and test fan, fan clutch (electrical and mechanical), fan shroud, and air dams; perform necessary action.
MEETS STANDARDS	<p>8.3.1 Inspect and test electrical fan control system and circuits.</p> <p>8.3.2 Flush system; refill system with recommended coolant; bleed system.</p> <p>8.3.3 Inspect and test heater control valve(s); perform necessary action.</p>
APPROACHES STANDARD	<p>8.3.4 Perform cooling system, cap, and recovery system tests (pressure, combustion leakage, and temperature); determine necessary action.</p> <p>8.3.5 Inspect engine cooling and heater system hoses and belts; perform necessary action.</p> <p>8.3.6 Inspect, test, and replace thermostat and housing.</p> <p>8.3.7 Determine coolant condition; drain and recover coolant.</p>

Content and Performance Standards
Heating and Air Conditioning

Performance Standard 8.4	
Performance Standard 8.4	The student shall perform operating systems and related controls diagnosis and repair
EXCEEDS STANDARDS	<ul style="list-style-type: none"> ◆ Diagnose failures in the electrical controls of heating, ventilation, and A/C (HVAC) systems; determine necessary action. ◆ Inspect and test A/C-heater blower, motors, resistors, switches, relays, wiring, and protection devices; perform necessary action. ◆ Test A/C compressor load cut-off systems; determine necessary action. ◆ Diagnose failures in the vacuum and mechanical components and controls of the heating, ventilation, and A/C (HVAC) system; determine necessary action. ◆ Inspect and test A/C-heater control panel assembly; determine necessary action. ◆ Check operation of automatic and semi-automatic heating, ventilation, and air-conditioning (HVAC) control systems; determine necessary action.
MEETS STANDARDS	<p>8.4.1 Inspect and test A/C-heater control cables and linkages; perform necessary action.</p> <p>8.4.2 Inspect and test A/C-heater ducts, doors, hoses, and outlets; perform necessary action.</p>
APPROACHES STANDARD	

Content and Performance Standards
Heating and Air Conditioning

Performance Standard 8.5		The student shall perform refrigerant recovery, recycling, and handling	
EXCEEDS STANDARDS			
MEETS STANDARDS	8.5.1 Verify correct operation and maintenance of refrigerant handling equipment. 8.5.2 Identify (by label application or use of a refrigerant identifier) and recover A/C system refrigerant. 8.5.3 Recycle refrigerant. 8.5.4 Test recycled refrigerant for non-condensable gases. 8.5.5 Evacuate and charge A/C system.		
APPROACHES STANDARD	8.5.6 Label and store refrigerant.		

Content and Performance Standards
Engine Performance

Content Standard 9.0: Student shall demonstrate understanding of general engine diagnosis; computerized engine controls diagnosis and repair; ignition system diagnosis and repair; fuel, air induction and exhaust systems diagnosis and repair; emissions control systems diagnosis and repair; and engine-related service.

Safety Requirements: Comply with personal and environmental safety practices associated with clothing; eye protection; hand tools; power equipment; proper ventilation; and the handling, storage, and disposal of chemicals/materials in accordance with local, state, and federal safety and environmental regulations.

Performance Standard 9.1 The student shall perform general engine diagnosis	
EXCEEDS STANDARDS	<ul style="list-style-type: none"> ◆ Diagnose unusual exhaust color, odor, and sound; determine necessary action. ◆ Diagnose unusual engine noise or vibration concerns; determine necessary action. ◆ Diagnose engine mechanical, electrical, electronic, fuel, and ignition concerns with an oscilloscope and engine diagnostic equipment; determine necessary action.
MEETS STANDARDS	<p>9.1.1 Perform engine absolute (vacuum/boost) manifold pressure tests; determine necessary action.</p> <p>9.1.2 Perform cylinder power balance test; determine necessary action.</p> <p>9.1.3 Perform cylinder compression test; determine necessary action.</p> <p>9.1.4 Perform cylinder leakage test; determine necessary action.</p> <p>9.1.5 Prepare 4 or 5 gas analyzer; inspect and prepare vehicle for test, and obtain exhaust readings; interpret readings, and determine necessary action.</p>
APPROACHES STANDARD	<p>9.1.6 Interpret and verify concern; determine necessary action.</p> <p>9.1.7 Inspect engine assembly for fuel, oil, coolant, and other leaks; determine necessary action.</p>

Content and Performance Standards
Engine Performance

Performance Standard 9.2		The student shall perform computerized engine controls diagnosis and repair
EXCEEDS STANDARDS	<ul style="list-style-type: none"> ◆ Diagnose the causes of emissions or driveability concerns resulting from failure of computerized engine controls with stored diagnostic trouble codes. ◆ Diagnose emissions or driveability concerns resulting from failure of computerized engine controls with no stored diagnostic trouble codes; determine necessary action. ◆ Inspect and test computerized engine control system sensors, powertrain control module (PCM), actuators, and circuits; perform necessary action. ◆ Diagnose driveability and emissions problems resulting from failures of interrelated systems (cruise control, security alarms, suspension controls, traction controls, A/C, automatic transmissions, non-OEM-installed accessories, and similar systems); determine necessary action. 	
MEETS STANDARDS	<p>9.2.1 Retrieve and record stored diagnostic trouble codes; clear codes.</p> <p>9.2.2 Obtain and interpret digital multimeter (DMM) readings.</p> <p>9.2.3 Access and use electronic service information (ESI).</p> <p>9.2.4 Inspect and test power and ground circuits and connections; service or replace as needed.</p>	
APPROACHES STANDARD	<p>9.2.5 Locate and interpret vehicle and major component identification numbers (VIN, vehicle certification labels, and calibration decals).</p> <p>9.2.6 Practice recommended precautions when handling static sensitive devices.</p>	

Content and Performance Standards
Engine Performance

Performance Standard 9.3		The student shall perform ignition system diagnosis and repair	
EXCEEDS STANDARDS		<ul style="list-style-type: none"> ◆ Diagnose no-starting, driveability, and emissions concerns on vehicles with electronic ignition (EI/DIS) (distributorless) systems; determine necessary action. ◆ Diagnoses no-starting, driveability, and emissions concerns on vehicles with distributor ignition (DI) systems; determine necessary action. 	
MEETS STANDARDS	9.3.1 9.3.2 9.3.3 9.3.4 9.3.5 9.3.6	Inspect and test ignition primary circuit wiring and components; perform necessary action. Inspect and test distributor; perform necessary action. Inspect and test ignition system secondary circuit wiring and components; perform necessary action. Inspect and test ignition coil(s); perform necessary action. Inspect and test ignition system pick-up sensor or triggering devices; perform necessary action. Inspect and test ignition control module; perform necessary action.	
APPROACHES STANDARD	9.3.7	Check and adjust (where applicable) ignition system timing and timing advance/retard.	

Content and Performance Standards
Engine Performance

Performance Standard 9.4	
The student shall perform fuel, air induction, and exhaust systems diagnosis and repair	
EXCEEDS STANDARDS	<ul style="list-style-type: none"> ◆ Diagnose hot or cold no-starting, hard starting, poor driveability, incorrect idle speed, poor idle, flooding, hesitation, surging, engine misfire, power loss, stalling, poor mileage, dieseling, and emissions problems on vehicles with carburetor-type fuel systems; determine necessary action. ◆ Diagnose hot or cold no-starting, hard starting, poor driveability, incorrect idle speed, poor idle, flooding, hesitation, surging, engine misfire, power loss, stalling, poor mileage, dieseling, and emissions problems on vehicles with injection-type fuel systems; determine necessary action. ◆ Check fuel for contaminants and quality; determine necessary action. ◆ Inspect and test cold enrichment system and components; perform necessary action. ◆ Inspect, test, and clean fuel injectors. ◆ Remove, inspect, and test vacuum and electrical circuits, components and connections of fuel system; perform necessary action. ◆ Test the operation of turbocharger/supercharger systems; determine necessary action.
MEETS STANDARDS	<p>9.4.1 Inspect and test mechanical and electrical fuel pumps and pump control systems; perform necessary action.</p> <p>9.4.2 Replace fuel filters.</p> <p>9.4.3 Inspect and test fuel pressure regulation system and components of injection-type fuel systems; perform necessary action.</p> <p>9.4.4 Remove, service, and install throttle body; adjust related linkages.</p> <p>9.4.5 Inspect throttle body mounting plates, air induction and filtration system, intake manifold, and gaskets; perform necessary action.</p> <p>9.4.6 Check idle speed and fuel mixture.</p> <p>9.4.7 Adjust idle speed and fuel mixture.</p> <p>9.4.8 Inspect exhaust manifold, exhaust pipes, muffler(s), catalytic converter(s), resonator(s), tail pipe(s), and heat shield(s); perform necessary action.</p> <p>9.4.9 Perform exhaust system back-pressure test; determine necessary action.</p>
APPROACHES STANDARD	<p>9.4.10 Inspect fuel tank and fuel cap, fuel lines, fittings, and hoses; perform necessary action.</p>

Content and Performance Standards
Engine Performance

Performance Standard 9.5		The student shall perform emissions control systems diagnosis and repair	
EXCEEDS STANDARDS			<ul style="list-style-type: none"> ◆ Diagnose oil leaks, emissions, and driveability problems resulting from failure of the positive crankcase ventilation (PCV) system; determine necessary action. ◆ Diagnose emissions and driveability problems caused by failure of the exhaust gas recirculation (EGR) system; determine necessary action. ◆ Inspect and test electrical/electronic sensors, controls, and wiring of exhaust gas recirculation (EGR) systems; perform necessary action. ◆ Diagnose emissions and driveability problems resulting from failure of the secondary air injection and catalytic converter systems; determine necessary action. ◆ Inspect and test mechanical components of secondary air injection systems; perform necessary action. ◆ Inspect and test electrical/electronically-operated components and circuits of air injection systems; perform necessary action. ◆ Diagnose emissions and driveability problems resulting from failure of the intake air temperature control system; determine necessary action. ◆ Inspect and test components of intake air temperature control system; perform necessary action. ◆ Diagnose emissions and driveability problems resulting from failure of early fuel evaporation control system; determine necessary action. ◆ Inspect and test components of early fuel evaporation control system; perform necessary action. ◆ Diagnose emissions and driveability problems resulting from failure of evaporative emissions control system; determine necessary action. ◆ Inspect and test components and hoses of evaporative emissions control system; perform necessary action.
MEETS STANDARDS	9.5.1		Inspect and test positive crankcase ventilation (PCV) filter/breather cap, valve, tubes, orifices, and hoses; perform necessary action.
	9.5.2		Inspect and test valve, valve manifold, and exhaust passages of exhaust gas recirculation (EGR) systems; perform necessary action.
	9.5.3		Inspect and test vacuum/pressure controls, filters, and hoses of exhaust gas recirculation (EGR) systems; perform necessary action.
	9.5.4		Inspect and test components of catalytic converter systems; perform necessary action.

Content and Performance Standards
Engine Performance

Performance Standard 9.6	
The student shall perform engine related service.	
EXCEEDS STANDARDS	<ul style="list-style-type: none"> ◆ Inspect and test mechanical/electrical fans, fan clutch, fan shroud/ducting, air dams, and fan control devices; perform necessary action.
MEETS STANDARDS	<p>9.6.1 Inspect and test thermostat, by-pass, and housing; perform necessary action.</p> <p>9.6.2 Perform cooling system pressure tests; check coolant condition; inspect and test radiator, pressure cap, coolant recovery tank, and hoses; perform necessary action.</p>
APPROACHES STANDARD	<p>9.6.3 Adjust valves on engines with mechanical or hydraulic lifters.</p> <p>9.6.4 Verify correct camshaft timing; determine necessary action.</p> <p>9.6.5 Verify engine operating temperature; determine necessary action.</p>

Content and Performance Standards
Employability Skills

Content Standard 10.0: Student shall achieve competence in workplace readiness, career development, and lifelong learning.

Performance Standard 10.1 Student shall demonstrate problem solving skills	
EXCEEDS STANDARDS	<ul style="list-style-type: none"> ◆ Develop a flowchart using appropriate symbols and terminology to solve a problem. ◆ Define and develop a problem solving process to be used to inspect, diagnose and repair a vehicle. ◆ Interpret computer-generated data to troubleshoot a problem. ◆ Evaluate the benefits of solving a work-related problem.
MEETS STANDARDS	<p>10.1.1 Solve an automotive troubleshooting problem using the appropriate steps in the problem solving process.</p> <p>10.1.2 Demonstrate brainstorming techniques.</p> <p>10.1.3 Examine and explain the advantages and disadvantages of alternative solutions to one or more problems.</p> <p>10.1.4 Create an action plan based upon a solution to a work-related problem.</p> <p>10.1.5 Identify the benefits of solving a work-related problem.</p> <p>10.1.6 Use a detailed flowchart to complete a work order, task, or other related work.</p> <p>10.1.7 Utilize computers and other forms of information. technology to access data to solve problems.</p>
APPROACHES STANDARD	<p>10.1.8 Identify a problem-solving process to be used in varied automotive contexts (such as troubleshooting).</p> <p>10.1.9 Identify and demonstrate knowledge of a common flowchart and its components.</p> <p>10.1.10 Identify various automotive data-collection systems.</p>

Content and Performance Standards
Employability Skills

Performance Standard 10.2		Student shall demonstrate critical thinking skills
EXCEEDS STANDARDS	<ul style="list-style-type: none"> ◆ Analyze how critical thinking skills affect work performance. ◆ Collect sufficient factual or textual evidence; analyzes evidence objectively and thoroughly; makes careful inferences and creates a tenable argument to support a position or viewpoint. 	
MEETS STANDARDS	<p>10.2.1 Identify and explain the essential elements of the critical thinking process.</p> <p>10.2.2 Demonstrate critical thinking skills necessary for the workplace.</p> <p>10.2.3 Explain how emotional thinking and logical thinking affect decision making in the workplace.</p> <p>10.2.4 Explain the difference between reliable and unreliable observations and statements of facts.</p> <p>10.2.5 Recognize patterns or relationships through observation and discovery.</p>	
APPROACHES STANDARD	<p>10.2.6 Define critical thinking.</p> <p>10.2.7 Identify the essential steps of critical thinking.</p> <p>10.2.8 Define emotional and logical thinking.</p> <p>10.2.9 Identify the difference between opinions and statements of fact.</p>	

Content and Performance Standards
Employability Skills

Performance Standard 10.3		Student shall demonstrate the ability to speak, write and listen effectively
EXCEEDS STANDARDS	<ul style="list-style-type: none"> ◆ Communicate thoughts, ideas, and information in writing using graphs, flow charts, reports, letters and other written communications. ◆ Interprets and responds to complex verbal and non-verbal messages. ◆ Demonstrates exemplary customer service skills. ◆ Determines and demonstrates knowledge of audience's level of comprehension. 	
MEETS STANDARDS	<p>10.3.1 Explain the benefits of effective communication in the workplace.</p> <p>10.3.2 Identify common communication barriers and methods for improving communication</p> <p>10.3.3 Communicate thoughts, ideas, and information in writing such as required for warranty and repair orders.</p> <p>10.3.4 Effectively interpret and respond to verbal and nonverbal messages.</p> <p>10.3.5 Organize ideas and communicates orally; effectively demonstrate job skills to others.</p> <p>10.3.6 Locates, understands, and interprets written information in documents such as manuals, graphs, and schedules.</p> <p>10.3.7 Demonstrate proper telephone etiquette.</p> <p>10.3.8 Select and utilize an appropriate medium for conveying messages with dignity and respect.</p> <p>10.3.9 Organize information into appropriate format in accordance with standard practices, which includes prewriting, drafting, proofreading, editing/revising, and preparing final copy.</p> <p>10.3.10 Demonstrates reflective listening skills.</p>	
APPROACHES STANDARD	<p>10.3.11 Communicate thoughts, ideas, and information in writing such as letters, reports, and journals.</p> <p>10.3.12 Listen attentively.</p> <p>10.3.13 Communicate thoughts, ideas and information verbally such as asking appropriate questions using automotive terminology.</p> <p>10.3.14 Identify an appropriate medium for conveying messages</p>	

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Performance Standard 10.4 Student shall demonstrate the ability to select, apply, and maintain appropriate technology	
EXCEEDS STANDARDS	<ul style="list-style-type: none"> ◆ Diagnose and make necessary corrections or improvements to an automotive technical system in a business, industry, or simulated workplace setting. ◆ Critique the use, benefits and cost of technologically advanced diagnostic tools and equipment. ◆ Analyze the impact of technological changes on one or more aspects of the automotive industry by researching current literature.
MEETS STANDARDS	<p>10.4.1 Demonstrate basic keyboarding techniques.</p> <p>10.4.2 Demonstrate the ability to use other computer input devices.</p> <p>10.4.3 Demonstrate the ability to use various electronic research methods/tools.</p> <p>10.4.4 Explain the use of the basic technology systems currently available, such as diagnostic tools and equipment.</p> <p>10.4.5 Identify specific technological changes in the automotive industry found in current literature.</p> <p>10.4.6 Utilize appropriate technology to diagnose and repair an automotive system.</p> <p>10.4.7 Demonstrate routine maintenance/repair of common technological equipment.</p> <p>10.4.8 Using correct terminology, clarify the technical aspects of the issue or problem to be solved.</p>
APPROACHES STANDARD	<p>10.4.4 Identify appropriate technology for diagnosing and repairing automotive systems.</p> <p>10.4.5 Describe the technical systems related to career interest areas.</p> <p>10.4.6 List the type of basic technology systems currently available such as diagnostic tools and equipment.</p> <p>10.4.8 Recognize the impact of essential technological changes on the automotive industry as reported in current literature.</p>

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Performance Standard 10.5	
Student shall demonstrate leadership and teamwork skills	
EXCEEDS STANDARDS	<ul style="list-style-type: none"> ◆ Demonstrates leadership ability within a group or a team. ◆ Acknowledges and utilizes the skills, abilities, and input of all members of the team. ◆ Demonstrates leadership by listening to others and asking appropriate questions to clarify a problem or issue. ◆ Compromises and/or builds consensus within a group and summarize the decision of the group while maintaining respect for diverse viewpoints.
MEETS STANDARDS	<p>10.5.1 Works cooperatively with others when given an automotive-related group project.</p> <p>10.5.2 Explain the traits necessary to effectively lead and influence individuals and groups.</p> <p>10.5.3 Demonstrates appropriate attitudes and behaviors for effective leadership.</p> <p>10.5.4 Demonstrates respect for team members, team processes, and team goals.</p> <p>10.5.5 Participate in the implementation of a group’s decision and evaluates the results.</p> <p>10.5.6 Demonstrate the qualities of an effective team member.</p> <p>10.5.7 Provides effective leadership to a group or team.</p> <p>10.5.8 Works effectively with culturally diverse individuals or groups.</p> <p>10.5.9 Establish credibility through competence and integrity.</p> <p>10.5.10 Describe the importance of company dress codes.</p>
APPROACHES STANDARD	<p>10.5.11 Identify essential leadership qualities.</p> <p>10.5.12 Identify team member roles and responsibilities.</p> <p>10.5.13 Recognize the interpersonal skills necessary to build teamwork.</p> <p>10.5.14 Recognize diverse viewpoints.</p> <p>10.5.15 Identify team processes and team goals.</p>

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Performance Standard 10.6 Student shall demonstrate sound workplace ethics	
EXCEEDS STANDARDS	<ul style="list-style-type: none"> ◆ Assume responsibility for decisions and actions. ◆ Practice time-management and cost-effectiveness.
MEETS STANDARDS	<p>10.6.1 Develop personal work ethics through work experience.</p> <p>10.6.2 Describe the importance of ethics practiced in the workplace.</p> <p>10.6.3 Demonstrate regular attendance, promptness, and the ability to complete assigned tasks.</p> <p>10.6.4 Demonstrate desirable personal and professional attitudes and behaviors.</p> <p>10.6.5 Maintain a safe, clean and organized work area.</p> <p>10.6.6 Demonstrate awareness of legal responsibilities related to individual performance, safety and customer satisfaction.</p> <p>10.6.7 Follow conservative/environmental practices, procedures, and policies related to the automotive industry.</p> <p>10.6.8 Demonstrate knowledge of various types of harassment.</p> <p>10.6.9 Perform responsibilities of job assignments/positions.</p>
APPROACHES STANDARD	<p>10.6.10 Identify established rules, regulations and attendance policies.</p> <p>10.6.11 Comply with all safety and health rules and procedures.</p> <p>10.6.12 Identify hazardous substances in the workplace.</p> <p>10.6.13 Properly use and maintain tools and equipment.</p> <p>10.6.14 Understand and follow emergency procedures.</p> <p>10.6.15 Identify appropriate responses to unethical actions of individuals in automotive workplace.</p>

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Performance Standard 10.7	
Student shall demonstrate the ability to effectively manage resources in high-performance workplaces	
EXCEEDS STANDARDS	<ul style="list-style-type: none"> ◆ Demonstrate knowledge of compensation practices and financial management, and explain how financial resources can be used effectively and efficiently. ◆ Recognize the individual roles of team members, delegate tasks, and provide feedback on performance. ◆ Acknowledge and utilize the skills, abilities, and input of all members of a team. ◆ Develop an action plan to accomplish tasks within a given time frame.
MEETS STANDARDS	<p>10.7.1 Identify and organize the human resources needed to complete a job assignment.</p> <p>10.7.2 Organize and prepare the material resources and space requirements needed to complete a job assignment.</p> <p>10.7.3 Effectively use technology at its highest level to complete a job assignment.</p> <p>10.7.4 Demonstrate cooperation and leadership in a team in a school or workplace setting.</p> <p>10.7.5 Demonstrate time management skills using an established model.</p> <p>10.7.6 Demonstrate knowledge of management skills in the workplace related to stress, anger management, and substance abuse.</p> <p>10.7.7 Estimate costs and prepare a detailed work order.</p> <p>10.7.8 Develop a time schedule and prioritized task list to complete a job assignment.</p> <p>10.7.9 Calculate actual expenses of a detailed work order.</p> <p>10.7.10 Follows time charts and work schedules and perform tasks within the constraints of school and/or the workplace.</p>
APPROACHES STANDARD	<p>10.7.11 Read and interpret time charts and work schedules.</p> <p>10.7.12 Utilize materials, tools and processes to complete a task related to a career selection.</p> <p>10.7.13 Read and follow instructions from manuals on the use and care of materials, tools, and equipment.</p> <p>10.7.14 Maintain a clean, organized and safe workstation.</p> <p>10.7.15 Identify traits needed for cooperation and leadership in a team at school or in a workplace setting.</p> <p>10.7.16 Identify the material resources and space requirements needed to complete a job assignment.</p>

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Performance Standard 10.8	
Student shall demonstrate career planning and development skills	
EXCEEDS STANDARDS	<ul style="list-style-type: none"> ◆ Develop an education/training plan to fulfill long-term career goals. ◆ Define advantages and disadvantages of self-employment or working for various sizes and types of businesses. ◆ Critique results of a job interview. ◆ Develop a proposal for an organized community-service project.
MEETS STANDARDS	<p>10.8.1 Prepare a job application.</p> <p>10.8.2 Prepare a personal résumé.</p> <p>10.8.3 Participate in a job interview.</p> <p>10.8.4 Establish short-term career goals.</p> <p>10.8.5 Establish long-term career goals.</p> <p>10.8.6 Use the Nevada Career Information System (CIS) or a similar computer system to research automotive careers.</p> <p>10.8.7 Participate in an organized job-shadowing activity.</p> <p>10.8.8 Participate in an organized community service project.</p> <p>10.8.9 Match interest and abilities to automotive careers.</p> <p>10.8.10 Construct a career portfolio.</p> <p>10.8.11 Demonstrate health and safety practices and drug-free behavior; relate their importance to an efficient workplace environment.</p> <p>10.8.12 Adhere to workplace requirements, policies and procedures.</p>
APPROACHES STANDARD	<p>10.8.13 Locate employment opportunities.</p> <p>10.8.14 Identify job requirements for entry-level positions in the automotive industry.</p> <p>10.8.15 Identify general conditions for employment.</p> <p>10.8.16 Identify educational/training requirements for related automotive field.</p> <p>10.8.17 Complete a personal aptitude and interest inventory.</p> <p>10.8.18 Identify the elements of goals setting.</p> <p>10.8.19 Identify automotive-related careers.</p> <p>10.8.20 Identify job interview skills.</p> <p>10.8.21 Identify the components of a career portfolio.</p>

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Performance Standard 10.9 Student shall demonstrate job retention and lifelong-learning skills	
EXCEEDS STANDARDS	<ul style="list-style-type: none"> ◆ Analyze how work life is affected by families and how families are affected by work life. ◆ Re-evaluate career goals and refine long-term goals. ◆ Evaluate your employment portfolio. ◆ Adapt new knowledge and skills in changing situations.
MEETS STANDARDS	<p>10.9.1 Maintain an employment/career portfolio.</p> <p>10.9.2 Identify strategies for balancing work and family roles.</p> <p>10.9.3 Demonstrate understanding of the need for lifelong learning in a rapidly changing job market.</p> <p>10.9.4 Identify strategies to maintain employment in the face of job reductions.</p> <p>10.9.5 Develop long-term career-planning strategies.</p> <p>10.9.6 Identify various educational options needed for job advancement.</p> <p>10.9.7 Demonstrate interpersonal skills needed for job advancement.</p> <p>10.9.8 Identify and model sound workplace ethics, such as loyalty, punctuality, and initiative needed for job retention and advancement.</p> <p>10.9.9 Research availability of educational programs, financial requirements, and resources and complete an application process as appropriate for career goals.</p> <p>10.9.10 Complete a self-assessment and identify individual learning styles.</p>
APPROACHES STANDARD	<p>10.9.11 Demonstrate understanding of the need for lifelong learning in a rapidly changing job market.</p> <p>10.9.12 Recognize learning techniques.</p> <p>10.9.13 Identify options for training and advancement in the automotive industry.</p>