



CUSTOMIZED TEACHER ASSESSMENT BLUEPRINT

AUTOMOTIVE MECHANICS TECHNOLOGY

Test Code: 5908

Version: 01

Specific competencies and skills tested in this assessment:

Orientation

Demonstrate the use of service information
Identify vehicle by: sight, V.I.N., and/or ID tag

Safety

Demonstrate the ability to secure vehicles on jack stands and hydraulic lifts
Demonstrate the ability to safely set-up/shut-down oxygen acetylene welding equipment
Identify chemical safety, "Right-To-Know Laws" and Materials Safety Data Sheets (MSDS)
Identify and demonstrate the safe use of hand tools
Identify and demonstrate the safe use of power tools
Identify and demonstrate the safe use of protective clothing and equipment
Identify and demonstrate the safe use of fire protection equipment
Identify and demonstrate the safe use of shop equipment
Explain EPA and OSHA regulations

Tools/Fasteners

Demonstrate the ability to correctly read and interpret automotive measuring tools

Suspension and Steering

Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction
Identify and interpret suspension and steering system concerns; determine necessary action
Research applicable vehicle and service information, such as suspension and steering system operation, vehicle service history, service precautions, and technical service bulletins
Disable and enable supplemental restraint system (SRS)
Remove and replace rack and pinion steering gear; inspect mounting bushings and brackets
Inspect and replace rack and pinion steering gear inner tie rod ends (sockets) and bellows boots
Determine proper power steering fluid type; inspect fluid level and condition
Flush, fill, and bleed power steering system
Remove, inspect, replace, and adjust power steering pump belt
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
Diagnose short and long arm suspension system noises, body sway, and uneven ride height concerns; determine necessary action
Diagnose strut suspension system noises, body sway, and uneven ride height concerns; determine necessary action
Remove, inspect, and install upper and/or lower ball joints

Automotive Mechanics Technology- Teacher (continued)

Suspension and Steering (continued)

Remove, inspect, and install stabilizer bar bushings, brackets, and links
Remove, inspect, and install strut cartridge or assembly, strut coil spring, insulators (silencers), and upper strut bearing mount
Inspect, remove, and replace shock absorbers
Remove, inspect, and service or replace front and rear wheel bearings
Lubricate suspension and steering systems
Diagnose vehicle wander, drift, pull, hard steering, bump steer, memory steer, torque steer, and steering return concerns; determine necessary action
Perform pre-alignment inspection and measure vehicle ride height; perform necessary action
Prepare vehicle for wheel alignment on the alignment machine; perform four-wheel alignment by checking and adjusting front and rear wheel caster, camber; and toe as required; center steering wheel
Inspect tire condition; identify tire wear patterns, check and adjust air pressure; determine necessary action
Diagnose wheel/tire vibration, shimmy, and noise; determine necessary action
Diagnose tire pull problems; determine necessary action

Brakes

Identify and interpret brake system concerns; determine necessary action
Research applicable vehicle and service information, such as brake system operation, vehicle service history, service precautions, and technical service bulletins
Measure brake pedal height, travel, and free play (as applicable); determine necessary action
Remove, bench bleed, and reinstall master cylinder
Inspect brake lines, flexible hoses, and fittings for leaks, dents, kinks, rust, cracks, bulging or wear; tighten loose fittings and supports; determine necessary action
Replace brake lines, hoses, fittings, and supports
Fabricate brake lines using proper material and flaring procedures (double flare and ISO types)
Select, handle, store, and fill brake fluids to proper level
Bleed and/or flush brake system
Test brake fluid for contamination
Diagnose poor stopping, noise, vibration, pulling, grabbing, dragging or pedal pulsation concerns; determine necessary action
Remove, clean, inspect, and measure brake drums; determine necessary action
Refinish brake drum; measure final drum diameter
Remove, clean, and inspect brake shoes, springs, pins, clips, levers, adjusters/self-adjusters, other related brake hardware, and backing support plates; lubricate and reassemble
Inspect and install wheel cylinders
Pre-adjust brake shoes and parking brake; install brake drums or drum/hub assemblies and wheel bearings
Clean and inspect caliper mounting and slides/pins for operation, wear, and damage; determine necessary action
Remove, inspect and replace pads and retaining hardware; determine necessary action
Clean, inspect, and measure rotor thickness, lateral runout, and thickness variation; determine necessary action
Refinish rotor off vehicle; measure final rotor thickness
Install wheel, torque lug nuts, and make final checks and adjustments
Inspect the vacuum-type power booster unit for leaks; inspect the check valve for proper operation; determine necessary action
Remove, clean, inspect, repack, and install wheel bearings and replace seals; install hub and adjust bearings
Identify and inspect electronic brake control system components; determine necessary action
Diagnose electronic brake control system electronic control(s) and components by retrieving diagnostic trouble codes, and/or using recommended test equipment; determine necessary action
Bleed the electronic brake control system hydraulic circuits
Test, diagnose, and service electronic brake control system speed sensors (digital and analog), toothed ring (tone wheel), and circuits using a graphing multimeter (GMM)/digital storage oscilloscope (DSO) (includes output signal, resistance, shorts to voltage/ground, and frequency data)
Identify traction control/vehicle stability control system components

Automotive Mechanics Technology- Teacher (continued)

Electrical/Electronic Systems

Identify and interpret electrical/electronic system concerns; determine necessary action
Research applicable vehicle and service information, such as electrical/electronic system operation, vehicle service history, service precautions, and technical service bulletins
Diagnose electrical/electronic integrity of series, parallel and series-parallel circuits using principles of electricity (Ohm's Law)
Use wiring diagrams during diagnosis of electrical circuit problems
Demonstrate the proper use of a digital multimeter (DMM) during diagnosis of electrical circuit problems, including: source voltage, voltage drop, current flow, and resistance
Check electrical circuits with a test light; determine necessary action
Locate shorts, grounds, opens, and resistance problems in electrical/electronic circuits; determine necessary action
Measure and diagnose the cause(s) of excessive parasitic draw; determine necessary action
Inspect and test fusible links, circuit breakers, and fuses; determine necessary action
Inspect and test switches, connectors, relays, solenoid solid state devices, and wires of electrical/electronic circuits; perform necessary action
Perform solder repair of electrical wiring
Identify location of hybrid vehicle high voltage circuit disconnect (service plug) and safety procedures
Perform battery state-of-charge test; determine necessary action
Perform battery capacity test; confirm proper battery capacity for vehicle application; determine necessary action
Maintain or restore electronic memory functions
Inspect, clean, fill, and/or replace battery, battery cables, connectors, clamps, and hold-downs
Perform battery charge
Start a vehicle using jumper cables or an auxiliary power supply
Perform starter current draw tests; determine necessary action
Perform starter circuit voltage drop tests; determine necessary action
Inspect and test starter relays and solenoids; determine necessary action
Differentiate between electrical and engine mechanical problems that cause a slow-crank or no-crank condition
Perform charging system output test; determine necessary action
Perform charging circuit voltage drop tests; determine necessary action
Diagnose the cause of brighter than normal, intermittent, dim, or no light operation; determine necessary action
Inspect, replace, and aim headlights and bulbs
Inspect and diagnose incorrect turn signal or hazard light operation; perform necessary action
Inspect and test gauges and gauge sending units for cause of abnormal gauge readings; determine necessary action
Diagnose incorrect horn operation; perform necessary action
Diagnose incorrect wiper operation; diagnose wiper speed control and park problems; perform necessary action
Diagnose incorrect washer operation; perform necessary action
Diagnose incorrect operation of motor-driven accessory circuits; determine necessary action

Engine Performance

Identify and interpret engine performance concern; determine necessary action
Research applicable vehicle and service information, such as engine management system operation, vehicle service history, service precautions, and technical service bulletins
Inspect engine assembly for fuel, oil, coolant, and other leaks; determine necessary action
Diagnose abnormal engine noise or vibration concerns; determine necessary action
Diagnose abnormal exhaust color, odor, and sound; determine necessary action
Perform engine absolute (vacuum/boost) manifold pressure tests; determine necessary action
Perform cylinder power balance test; determine necessary action
Perform cylinder cranking and running compression tests; determine necessary action
Perform cylinder leakage test; determine necessary action
Diagnose engine mechanical, electrical, electronic, fuel, and ignition concerns; determine necessary action
Verify engine operating temperature; determine necessary action

Automotive Mechanics Technology – Teacher (continued)

Engine Performance (continued)

Perform cooling system pressure tests; check coolant condition; inspect and test radiator, pressure cap, coolant recovery tank, and hoses; perform necessary action

Retrieve and record diagnostic trouble codes, OBD monitor status, and freeze frame data; clear codes when applicable

Diagnose the causes of emissions or drivability concerns with stored or active diagnostic trouble codes; obtain, graph, and interpret scan tool data

Diagnose emissions or drivability concerns without stored diagnostic trouble codes; determine necessary action

Inspect and test computerized engine control system sensors, powertrain/engine control module (PCM/ECM), actuators, and circuits using a graphing multimeter (GMM)/digital storage oscilloscope (DSO); perform necessary action

Access and use service information to perform step-by-step diagnosis

Perform active tests of actuators using a scan tool; determine necessary action

Describe the importance of running all OBDII monitors for repair verification

Diagnose ignition system related problems such as no-starting, hard starting, engine misfire, poor drivability, spark knock, power loss, poor mileage, and emissions concerns; determine necessary action

Inspect and test ignition primary and secondary circuit wiring and solid state components; test ignition coil(s); perform necessary action

Diagnose hot or cold no-starting, hard starting, poor drivability, incorrect idle speed, poor idle, flooding, hesitation, surging, engine misfire, power loss, stalling, poor mileage, dieseling, and emissions problems; determine necessary action

Inspect and test fuel pumps and pump control systems for pressure, regulation, and volume; perform necessary action

Inspect throttle body, air induction system, intake manifold and gaskets for vacuum leaks and/or unmetered air

Inspect and test fuel injectors

Perform exhaust system back-pressure test; determine necessary action

Diagnose oil leaks, emissions, and drivability concerns caused by the positive crankcase ventilation (PCV) system; determine necessary action

Diagnose emissions and drivability concerns caused by the exhaust gas recirculation (EGR) system; determine necessary action

Inspect and test catalytic converter efficiency

Diagnose emissions and drivability concerns caused by the evaporative emissions control system; determine necessary action

Inspect and test mechanical/electrical fans, fan clutch, fan shroud/ducting, air dams, and fan control devices; perform necessary action

Perform engine oil and filter change

Automotive Mechanics Technology – Teacher (continued)

Written Assessment:

Administration Time: 3 hours
Number of Questions: 196

Areas covered:

2%	Orientation
5%	Safety
2%	Tools/Fasteners
20%	Suspension and Steering
22%	Brakes
24%	Electrical/Electronic Systems
25%	Engine Performance

Sample Questions:

Where does a technician find wheel torque specifications?

- A. unit repair manual
- B. computerized service information system
- C. wheel weight chart
- D. decal under the hood

Acetylene gas becomes unstable above

- A. 4 psi
- B. 8 psi
- C. 12 psi
- D. 15 psi

When checking for parallelism on a disc brake rotor, the technician should use a

- A. protractor
- B. micrometer
- C. dial indicator
- D. linear caliper

When bench bleeding a master cylinder, the technician should bleed

- A. front or nose end outlet
- B. rear or pedal side outlet
- C. both outlets simultaneously
- D. crossbleed outlets

Which of the following circuits has two or more paths for the current to follow?

- A. series circuit
- B. parallel circuit
- C. open circuit
- D. split phase circuit

Automotive Mechanics Technology – Teacher (continued)

Performance Assessment:

Administration Time: 2 hours and 30 minutes

Number of Jobs: 6

Areas Covered:

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| 6% | <u>Identification of Parts</u>
<i>Identify suspension and steering parts, identify brake parts, identify electrical/electronic parts, identify engine performance parts, and time to complete Job 1.</i> |
| 24% | <u>Disc Brake Assembly Service</u>
<i>Remove caliper mounting bolts, replace brake pads in vehicle, record caliper mounting bolt torque specs, remount the torque caliper, measure and record rotor thickness, record manufacturer's discard specs, set up rotor on lathe and refinish surface, measure and record rotor thickness, post cut, determine usability of rotor, and time to complete Job 2.</i> |
| 12% | <u>Tire Service and Balance</u>
<i>Dismount the tire from the wheel, mount replacement tire on wheel, inflate tire to 28 psi, balance tire and wheel assembly, and time to complete Job 3.</i> |
| 18% | <u>Perform Fuel System Pressure Test</u>
<i>Look up and record fuel pressure specs, install fuel pressure tester, power up fuel pump, inspect for leaks, record fuel pressure, start engine, observe, record regulated pressure, compare regulated fuel pressure to specs, perform a leak down test, drain and disconnect test equipment, and time to complete Job 4.</i> |
| 27% | <u>Test and Diagnose Battery, Starting, and Charging System</u>
<i>Perform open circuit voltage test, look up and record battery load test specs, perform battery capacity test, record findings, look up and record starter draw specs, perform starter draw test, record findings, perform ground circuit voltage drop test, record findings, look up and record manufacturer's alternator output specs, perform alternator output test and record findings, record alternator recommendations, and time to complete Job 5.</i> |
| 13% | <u>Test Electronic Engine Control Components</u>
<i>Retrieve and document numerical trouble codes, use service manual to identify trouble code(s) set, identify and locate trouble code components, do not clear codes or repair, and time to complete Job 6.</i> |

Sample Job: Identification of Parts

Maximum Job Time: 20 minutes

Participant Activity: The participant will identify each part laid out on the workbench and write in the name of the part beside the corresponding number.