

RANKEN

TECHNICAL COLLEGE

COURSE INFORMATION

Course Number: AMT 1003

Course Name: Automotive Foundations

CREDIT-BY-ASSESSMENT (CBA) COMPETENCY LIST

WRITTEN ASSESSMENT COMPETENCY LIST

ELECTRICAL

- Describe the effects of temperature, length, and diameter on a conductor.
- Understand the difference between conventional and electron flow theory.
- Know Ohm's law and solve for missing elements of volts, ohms and amps.
- Identify series, parallel and series-parallel circuits.
- Describe and solve for voltage drop, total amps and total resistance in series, parallel and series-parallel circuits.
- Identify wiring diagram symbols and descriptions.
- Describe the process of testing a battery and the specifications of a pass/fail.
- Identify the 3 sections of a starting circuit.
- Describe the process of testing a starting circuit for amperage draw, voltage drop and visual problems.
- Read a wiring diagram, determine how a circuit functions and how it will be affected by a given fault.
- Know how to perform a parasitic drain test and the rule of thumb specs for a pass/fail.
- Diagnose the results of a battery load test.
- Diagnose the results of a starting circuit test.
- Describe the construction of an automotive battery.
- Understand the construction and function of an alternator and its components.
- Know the process of testing a vehicle charging system.
- Diagnose the results of a charging system test.

LIGHT MAINTENANCE

- Decipher tire size and load ratings from sidewall markings.
- Describe the process and tools required to test a vehicles cooling system.
- Understand battery types their maintenance procedures.
- Understand basic braking system function, brake fluid differences and diagnose brake system malfunctions.
- Describe the basic suspension angles and their effects on tire wear.
- List locations of the vehicle that have important maintenance and description

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information.

- Explain the different ways that transmission fluid level and condition can be checked.
- Understand drive belt construction, inspection, tension and common fault diagnosis.
- Label differences in operation between ABS and standard brakes.
- List all vehicle fluid and air filters and their common locations.
- Describe proper tire repair procedures to include acceptable and not acceptable repairs.
- Understand the process of removing and replacing a tire on a wheel.
- Describe tire rotation procedures and intervals.
- List basic suspension checks performed in a vehicle multipoint inspection.
- List the basic brake checks performed in a vehicle multipoint inspection.
- Determine non-alignment based tire wear.
- Understand the proper way to torque lug nuts.
- Understand TPMS systems and basic resetting procedures.
- List the types of fire extinguishers and their purposes.
- Describe material handling/spill/ingestion safety procedures (MSDS).
- Describe a vehicles VIN digit breakdown.

ENGINES

- Understand the four stroke cycle.
- List the different colors of smoke that an engine can emit and there possible causes.
- Describe the steps and interpret the results of a compression test.
- Describe the steps and interpret the results of a cylinder leakdown test.
- Describe the steps and interpret the results of a running compression test.
- Understand the reasons for oil pressure and diagnose oil pressure issues.
- List the ways to increase/decrease static compression.
- List engine bearing characteristics and construction.
- List piston ring types, locations and assembly.
- Understand how to read a metric/standard micrometer.
- Understand how to read a dial caliper.
- Understand how to read a dial indicator.
- Describe how to measure all crankshaft clearances.
- List the differences between metric/standard bolts and their characteristics.
- Understand pressure and vacuum and their conversions.
- Diagnose the causes of different engine noises.
- List the steps to checking a cylinder block.
- Describe the common block measurements.
- Describe the difference between internal and external balance.
- List valve spring dimensional checks.
- Calculate oil clearances.
- Describe camshaft attributes and list their order of occurrence.

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HANDS-ON ASSESSMENT COMPETENCY LIST

ELECTRICAL

- Research applicable vehicle and service information, vehicle service history, service precautions, and technical service bulletins. P-1
- Demonstrate knowledge of electrical/electronic series, parallel, and series-parallel circuits using principles of electricity (Ohm's Law). P-1
- Use wiring diagrams to trace electrical/electronic circuits. P-1
- Use wiring diagrams during the diagnosis (troubleshooting) of electrical/electronic circuit problems. P-1
- Diagnose (troubleshoot) the causes of brighter-than-normal, intermittent, dim, or no light operation; determine necessary action. P-1
- Demonstrate proper use of a digital multimeter (DMM) when measuring source voltage, voltage drop (including grounds), current flow, and resistance. P-1
- Demonstrate knowledge of the causes and effects from shorts, grounds, opens, and resistance problems in electrical/electronic circuits. P-2
- Inspect and test fusible links, circuit breakers, and fuses; determine necessary action. P-1
- Inspect interior and exterior lamps and sockets including headlights and auxiliary lights (fog lights/driving lights); replace as needed. P-1
- Check operation of electrical circuits with a test light. P-2
- Inspect and test switches, connectors, relays, solenoid solid state devices, and wires of electrical/electronic circuits; determine necessary action. P-1
- Utilize safe procedures for handling of tools and equipment.
- Comply with the required use of safety glasses, ear protection, gloves, and shoes during lab/shop activities.
- Identify general shop safety rules and procedures.
- Identify and use proper placement of floor jacks and jack stands.
- Identify and use proper procedures for safe lift operation.
- Identify purpose and demonstrate proper use of fender covers, mats.
- Demonstrate use of the three C's (concern, cause, and correction).
- Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction.

LIGHT MAINTENANCE

ENGINE

- Research applicable vehicle and service information, such as internal engine operation, vehicle service history, service precautions, and technical service bulletins. P-1
- Inspect engine assembly for fuel, oil, coolant, and other leaks; determine necessary action. P-1
- Inspect, replace, and adjust drive belts, tensioners, and pulleys; check pulley and belt

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alignment. P-1

- Inspect and test coolant; drain and recover coolant; flush and refill cooling system with recommended coolant; bleed air as required. P-1
- Inspect and test fan(s) (electrical or mechanical), fan clutch, fan shroud, and air dams. P-1
- Perform engine oil and filter change. P-1

TRANSMISSION/DIFFERENTIAL

- Research applicable vehicle and service information fluid type, vehicle service history, service precautions, and technical service bulletins. P-1
- Check fluid level in a transmission or a transaxle equipped with a dip-stick. P-1
- Check fluid level in a transmission or a transaxle not equipped with a dip-stick. P-1
- Check fluid condition (MANUAL TRANS); check for leaks; determine necessary action. P-1
- Clean and inspect differential housing; check for leaks; inspect housing vent. P-2
- Check and adjust differential housing fluid level. P-1
- Inspect and replace drive axle wheel studs. P-1
- Check for leaks at drive assembly seals; check vents; check lube level (4wd/awd). P-3

STEERING

- Inspect rack and pinion steering gear inner tie rod ends (sockets) and bellows boots; replace as needed. P-2
- Determine proper power steering fluid type; inspect fluid level and condition. P-1
- Inspect for power steering fluid leakage; determine necessary action. P-1
- Inspect, remove, and replace shock absorbers; inspect mounts and bushings. P-1

TIRES

- Inspect tire condition; identify tire wear patterns; check for correct tire size and application (load and speed ratings) and adjust air pressure; determine necessary action. P-1
- Rotate tires according to manufacturer's recommendations. P-1

BRAKES

- Inspect brake lines, flexible hoses, and fittings for leaks, dents, kinks, rust, cracks, bulging, and wear; check for loose fittings and supports; determine necessary action. P-1
- Select, handle, store, and fill brake fluids to proper level. P-1
- Test brake fluid for contamination. P-1
- Remove, clean, inspect, and measure brake drum diameter; determine necessary action. P-1

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- Inspect wheel cylinders for leaks and proper operation; remove and replace as needed. P-2
- Install wheel and torque lug nuts. P-1
- Check brake pad wear indicator; determine necessary action. P-2
- Clean and inspect rotor; measure rotor thickness, thickness variation, and lateral runout; determine necessary action. P-1
- Check parking brake operation and parking brake indicator light system operation; determine necessary action. P-1
- Check operation of brake stop light system. P-1

ELECTRICAL

- Inspect and clean battery; fill battery cells; check battery cables, connectors, clamps, and hold-downs. P-1
- Verify windshield wiper and washer operation, replace wiper blades. P-1
- Verify operation of instrument panel gauges and warning/indicator lights; reset maintenance indicators.

HVAC

- Performance test A/C system; identify problems. P-1
- Inspect engine cooling and heater systems hoses; perform necessary action. P-1

ENGINE PERFORMANCE

- Inspect, service, or replace air filters, filter housings, and intake duct work. P-1
- Inspect integrity of the exhaust manifold, exhaust pipes, muffler(s), catalytic converter(s), resonator(s), tail pipe(s), and heat shields; perform necessary action. P-1
- Inspect condition of exhaust system hangers, brackets, clamps, and heat shields; repair or replace as needed. P-1

SHOP AND PERSONAL SAFETY

- Identify general shop safety rules and procedures.
- Utilize safe procedures for handling of tools and equipment.
- Identify and use proper placement of floor jacks and jack stands.
- Identify and use proper procedures for safe lift operation.
- Utilize proper ventilation procedures for working within the lab/shop area.
- Comply with the required use of safety glasses, ear protection, gloves, and shoes during lab/shop activities.
- Identify and wear appropriate clothing for lab/shop activities.
- Secure hair and jewelry for lab/shop activities.

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TOOLS AND EQUIPMENT

- Identify tools and their usage in automotive applications.
- Identify standard and metric designation.
- Demonstrate safe handling and use of appropriate tools.
- Demonstrate proper cleaning, storage, and maintenance of tools and equipment.
- Demonstrate proper use of precision measuring tools (i.e. micrometer, dial-indicator, dial-caliper).

PREPARING VEHICLE FOR SERVICE

- Identify information needed and the service requested on a repair order.
- Identify purpose and demonstrate proper use of fender covers, mats.
- Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction.

ENGINES

- Research applicable vehicle and service information, such as internal engine operation, vehicle service history, service precautions, and technical service bulletins. P-1
- Clean and visually inspect a cylinder head for cracks; check gasket surface areas for warpage and surface finish; check passage condition. P-1
- Inspect and measure cylinder walls/sleeves for damage, wear, and ridges; determine necessary action. P-2
- Inspect crankshaft for straightness, journal damage, keyway damage, thrust flange and sealing surface condition, and visual surface cracks; check oil passage condition; measure end play and journal wear; check crankshaft position sensor reluctor ring (where applicable); determine necessary action. P-1
- Inspect and measure pistons skirts and ring lands; determine necessary action. P-2
- Inspect and/or measure camshaft for runout, journal wear and lobe wear. P-2
- Determine piston-to-bore clearance. P-2
- Inspect engine block for visible cracks, passage condition, core and gallery plug condition, and surface warpage; determine necessary action. P-2
- Inspect valve guides for wear; check valve stem-to-guide clearance; determine necessary action. P-3
- Check valve spring assembled height and valve stem height; determine necessary action. P-3
- Identify general shop safety rules and procedures.
- Utilize safe procedures for handling of tools and equipment.
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