Arkansas CTE

Automotive Engine Performance: Grades 9, 10, 11, 12

Adopted 2013

Identify and demonstrate workplace safety

1.1 Students will be able to identify and demonstrate safe work practices.

1. Identify general shop safety rules and procedures. 1.1.1
2. Utilize safe procedures for handling of tools and equipment. 1.1.2
3. Identify and use proper placement of floor jacks and jack stands. 1.1.3
4. Identify and use proper procedures for safe lift operation. 1.1.4
5. Utilize proper ventilation procedures for working within the lab/shop area. 1.1.5
6. Identify marked safety areas. 1.1.6
7. Identify the location and the types of fire extinguishers and other fire safety equipment; demonstrate knowledge of the procedures for using fire extinguishers and other fire safety equipment. 1.1.7

1.2 Students will be able to practice personal safety.

1. Identify the location and use of eye wash stations. 1.2.1
2. Identify the location of the posted evacuation routes. 1.2.2
3. Comply with the required use of safety glasses, ear protection, gloves, and shoes during lab/shop activities. 1.2.3
4. Identify and wear appropriate clothing for lab/shop activities. 1.2.4
5. Secure hair and jewelry for lab/shop activities. 1.2.5
6. Demonstrate awareness of the safety aspects of supplemental restraint systems (SRS), electronic brake control systems, and hybrid vehicle high voltage circuits. 1.2.6
7. Demonstrate awareness of the safety aspects of high voltage circuits (such as high intensity discharge (HID) lamps, ignition systems, injection systems, etc.). 1.2.7
8. Locate and demonstrate knowledge of material safety data sheets (MSDS). 1.2.8

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Student will demonstrate knowledge of shop tools and equipment.

1. Identify tools and their usage in automotive applications. 2.1.1

2. Identify standard and metric designation. 2.1.2
3. Demonstrate safe handling and use of appropriate tools. 2.1.3
4. Demonstrate proper cleaning, storage, and maintenance of tools and equipment. 2.1.4
5. Demonstrate proper use of precision measuring tools (i.e. micrometer, dial-indicator, dial-caliper). 2.1.5

Develop employability/leadership skills

3.1 Student will demonstrate employability skills.

1. Demonstrate a good work ethic (i.e., relations with other, dependability, attitude, and personal hygiene). 3.1.1
2. Demonstrate teamwork. 3.1.2
3. Demonstrate job-seeking techniques (i.e., write a resume, search for a job, arrange references, and apply interview techniques) 3.1.3
4. Describe legal issues of sexual harassment in the workplace. 3.1.4
5. Identify employment eligibility requirements (e.g. valid driver's license, background check etc.) 3.1.5

3.2 Student will demonstrate leadership skills.

1. Perform basic parliamentary procedures in a group meeting. 3.2.1
2. Demonstrate an understanding of one's personal values, interpersonal skills, etiquette, effectiveness in oral and written communication and courtesy. Develop and maintain a code of professional ethics. 3.2.2
3. Maintain a good professional appearance. 3.2.3
4. Perform basic tasks related to securing and terminating employees. 3.2.4

Diagnose and repair engine performance

4.1 Student will demonstrate initial diagnostic and repair of Engine Performance procedures.

1. Research applicable vehicle and service information, vehicle service history, service precautions, and technical service bulletins. 4.1.1
2. Perform engine absolute (vacuum/boost) manifold pressure tests; determine necessary action. 4.1.2
3. Perform cylinder power balance test; determine necessary action. 4.1.3
4. Perform cylinder cranking and running compression tests; determine necessary action. 4.1.4
5. Perform cylinder leakage test; determine necessary action. 4.1.5
6. Verify engine operating temperature. 4.1.6
7. Remove and replace spark plugs; inspect secondary ignition components for wear and damage. 4.1.7

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4.2 Student will demonstrate applicable knowledge of Computerized Engine Controls.

1. Retrieve and record diagnostic trouble codes, OBD monitor status, and freeze frame data; clear codes when applicable. 4.2.1
2. Describe the importance of operating all OBDII monitors for repair verification. 4.2.2

Diagnose and repair fuel, air induction, and exhaust system

5.1 Student will demonstrate initial diagnostic procedures.

1. Replace fuel filter(s). 5.1.1
2. Inspect, service, or replace air filters, filter housings, and intake duct work. 5.1.2
3. Inspect integrity of the exhaust manifold, exhaust pipes, muffler(s), catalytic converter(s), resonator(s), tail pipe(s), and heat shields; determine necessary action. 5.1.3
4. Inspect condition of exhaust system hangers, brackets, clamps, and heat shields; repair or replace as needed. 5.1.4
5. Check and refill diesel exhaust fluid (DEF). 5.1.5

Diagnose and repair emissions control systems

6.1 Student will demonstrate initial diagnostic and repair procedures for Emissions Control Systems.

1. Inspect, test, and service positive crankcase ventilation (PCV) filter/breather cap, valve, tubes, orifices, and hoses; perform necessary action. 6.1.1

Diagnose and repair general engine

7.1 Student will demonstrate initial engine repair diagnostic procedures.

1. Research applicable vehicle and service information, vehicle service history, service precautions, and technical service bulletins. 7.1.1
2. Verify operation of the instrument panel engine warning indicators. 7.1.2
3. Inspect engine assembly for fuel, oil, coolant, and other leaks; determine necessary action. 7.1.3
4. Install engine covers using gaskets, seals, and sealers as required. 7.1.4
5. Remove and replace timing belt; verify correct camshaft timing. 7.1.5
6. Perform common fastener and thread repair, to include: remove broken bolt, restore internal and external threads, and repair internal threads with thread insert. 7.1.6
7. Identify hybrid vehicle internal combustion engine service precautions. 7.1.7

7.2 Student will demonstrate ability to repair Cylinder Head and Valve Train.

1. Adjust valves (mechanical or hydraulic lifters). 7.2.1

Student will demonstrate ability to repair Lubrication and Cooling Systems.

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1. Perform cooling system pressure and dye tests to identify leaks; check coolant condition and level; inspect and test radiator, pressure cap, coolant recovery tank, and heater core; determine necessary action. 7.3.1
2. Inspect, replace, and adjust drive belts, tensioners, and pulleys; check pulley and belt alignment. 7.3.2
3. Remove, inspect, and replace thermostat and gasket/seal. 7.3.3
4. Inspect and test coolant; drain and recover coolant; flush and refill cooling system with recommended coolant; bleed air as required. 7.3.4
5. Perform engine oil and filter change. 7.3.5

Prepare vehicle for service

8.1 Student will be able to prepare vehicle for service.

1. Identify information needed and the service requested on a repair order. 8.1.1
2. Identify purpose and demonstrate proper use of fender covers, mats. 8.1.2
3. Demonstrate use of the three C's (concern, cause, and correction). 8.1.3
4. Review vehicle service history. 8.1.4
5. Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction. 8.1.5

8.2 Student will be able to prepare vehicle for customer.

1. Ensure vehicle is prepared to return to customer per school or company policy (floor mats, steering wheel cover, etc.). 8.2.1