

**CURRICULUM MAPPING TEMPLATE**

**Program: Maintenance and Light Repair 47.0604**

Segment	CTE Segments/Performance Elements	CTE Concepts	Math Concepts	Common Core Math Standards Middle School	Common Core Math Standards High School
<b>1</b>	<b>ENGINE REPAIR</b>				
	<p><b>I. ENGINE REPAIR (TECHNICAL)</b></p> <p><b>A. General</b></p> <ol style="list-style-type: none"> <li>1. Research applicable vehicle and service information, vehicle service history, service precautions, and technical service bulletins.</li> <li>2. Verify operation of the instrument panel engine warning indicators.</li> <li>3. Inspect engine assembly for fuel, oil, coolant, and other leaks; determine necessary action.</li> <li>4. Install engine covers using gaskets, seals, and sealers as required.</li> <li>5. Remove and replace timing belt; verify correct camshaft timing.</li> <li>6. Perform common fastener and thread repair, to include: remove broken bolt, restore internal and external threads, and repair internal threads with thread insert.</li> <li>7. Identify hybrid vehicle internal combustion engine service precautions.</li> </ol> <p><b>B. Cylinder Head and Valve Train</b></p> <ol style="list-style-type: none"> <li>1. Adjust valves (mechanical or hydraulic lifters).</li> </ol> <p><b>C. Lubrication and Cooling Systems</b></p> <ol style="list-style-type: none"> <li>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 and galley plugs; determine necessary action.</li> <li>2. Inspect, replace, and adjust drive belts, tensioners, and pulleys; check pulley and belt alignment.</li> <li>3. Remove, inspect, and replace thermostat and gasket/seal.</li> <li>4. Inspect and test coolant; drain and recover coolant; flush and refill cooling system with recommended coolant; bleed air as required.</li> <li>5. Perform engine oil and filter change.</li> </ol>	<p>Measurement</p> <p>Calculate horse power</p> <p>Calculate displacement</p> <p>Rocker ratios</p> <p>RPM rotational ratios</p> <p>Engine Vacuum</p> <p>Compression Ratios</p> <p>Camshaft</p>	<p>Add &amp; subtract whole numbers and decimals</p> <p>Ratio</p> <p>Volume</p> <p>Variation</p> <p>Angle/height</p> <p>Problem solving</p>	<p>6.NS.2; 6.NS.3; 6.NS.5; 7.NS.1; 7.NS.2; 7.NS.3; 6.RP.1; 6.RP.2; 6.RP.3; 7.RP.1; 7.RP.2; 7.RP.3; 7.EE.3; 6.G.2; 6.G.3; 7.G.6; 8.G.9; 6.EE.2; 7.G.1; 7.G.5</p>	<p>A.APR.1; A.APR.7; N.RN.3; G.GMD.1; G.GMD.3; G.MG.2; G.CO.9; G.CO.12; G.CO.13; N.Q.1; N.Q.2; N.Q.3; S.ID.6;</p>

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<b>2</b>	<b>AUTOMATIC TRANSMISSION AND TRANSAXLE</b>				
	<b>II. AUTOMATIC TRANSMISSION AND TRANSAXLE (TECHNICAL)</b> <b>A. General</b> 1. Research applicable vehicle and service information, fluid type, vehicle service history, service precautions, and technical service bulletins. 2. Check fluid level in a transmission or a transaxle equipped with a dip-stick. 3. Check fluid level in a transmission or a transaxle not equipped with a dip-stick. 4. Check transmission fluid condition; check for leaks.  <b>B. In-Vehicle Transmission/Transaxle</b> 1. Inspect, adjust, and replace external manual valve shift linkage, transmission range sensor/switch, and park/neutral position switch. 2. Inspect for leakage at external seals, gaskets, and bushings. 3. Inspect replace and align power train mounts. 4. Drain and replace fluid and filter(s).  <b>C. Off-Vehicle Transmission and Transaxle</b> 1. Describe the operational characteristics of a continuously variable transmission (CVT). 2. Describe the operational characteristics of a hybrid vehicle drive train.	Ratio  Trans fluid Pressure  Size Measurement  Power Flow Chart	Direct & inverse variation  Logic  Ratios  Common formulas  Measurement  Problem solving and critical thinking skills  Use of complex numbers	6.RP.1; 6.RP.2; 6.RP.3; 7.RP.1; 7.RP.2; 7.RP.3; 7.EE.3; 6.NS.2; 6.NS.3; 7.NS.1; 7.EE.3; 6.EE.2; 7.EE.1; 7.EE.2;	G.MG.3; S.CP.1; N.Q.1; N.Q.2; N.Q.3; S.ID.6; N.CN.1; N.CN.2; N.CN.3; A.REI.1; A.REI.2; F.LE.4; N.CN.1; N.CN.2; N.CN.3
<b>3</b>	<b>MANUAL DRIVE TRAIN AND AXLES</b>				
	<b>III. MANUAL DRIVE TRAIN AND AXLES (TECHNICAL)</b> <b>A. General</b> 1. Research applicable vehicle and service information, fluid type, vehicle service history, service precautions, and technical service bulletins. 2. Drain and refill manual transmission/transaxle and final drive unit. 3. Check fluid condition; check for leaks.	Ratio  Measurement  Torque	Ratio  Measurement  Problem solving	6.RP.1; 6.RP.2; 6.RP.3; 7.RP.1; 7.RP.2; 7.RP.3; 7.EE.3; 6.NS.2; 6.NS.3; 7.NS.1;	G.MG.3; N.Q.1; N.Q.2; N.Q.3; S.ID.6; A.APR.1; A.APR.7; N.RN.3;

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	<p><b>B. Clutch</b> 1. Check and adjust clutch master cylinder fluid level. 2. Check for system leaks.</p> <p><b>C. Transmission/Transaxle</b> 1. Describe the operational characteristics of an electronically-controlled manual transmission/transaxle.</p> <p><b>D. Drive Shaft, Half Shafts, Universal and Constant-Velocity (CV) Joints</b> 1. Inspect, remove, and replace front wheel drive (FWD) bearings, hubs, and seals. 2. Inspect, service, and replace shafts, yokes, boots, and universal/CV joints.</p> <p><b>E. Differential Case Assembly</b> 1. Clean and inspect differential housing; check for leaks; inspect housing vent. 2. Check and adjust differential housing fluid level. 3. Drain and refill differential housing.</p> <p><b>F. Drive Axles</b> 1. Inspect and replace drive axle wheel studs.</p> <p><b>G. Four-wheel Drive/All-wheel Drive</b> 1. Inspect front-wheel bearings and locking hubs. 2. Check for leaks at drive assembly seals; check vents; check lube level.</p>	<p>Power flow chart</p> <p>Final drive ratios</p> <p>U-joints</p> <p>CV-joints</p> <p>Clutch pressure/leverage</p> <p>Drive Shaft</p>		7.EE.3	
<b>4</b>	<b>SUSPENSION AND STEERING SYSTEMS</b>				
	<p><b>IV. SUSPENSION AND STEERING SYSTEMS (TECHNICAL)</b></p> <p><b>A. General</b> 1. Research applicable vehicle and service information, vehicle service history, service precautions, and technical service bulletins. 2. Disable and enable supplemental restraint system (SRS).</p> <p><b>B. Related Suspension and Steering Service</b> 1. Inspect rack and pinion steering gear inner tie rod ends (sockets) and bellows boots. 2. Determine proper power steering fluid type; inspect fluid level and condition.</p>	<p>Tire Size</p> <p>Alignments Angle</p> <p>Suspension design</p> <p>Springs</p> <p>Tire pressure</p>	<p>Circumference, radius etc</p> <p>Measurement</p> <p>Reading gauges</p> <p>Problem solving</p>	<p>6.G.1; 6.RP.3; 7.RP.1; 6.EE.2; 6.EE.3; 6.SP.4; 6.SP.5; 7.SP.2; 7.SP.3; 7.SP.4; 8.SP.3; 8.SP.4; 6.NS.2; 6.NS.3; 7.NS.1; 6.EE.6;</p>	<p>G.GPE.7; S.IC.1; S.IC.2; S.IC.3; S.IC.4; S.IC.5; S.IC.6; S.ID.1; N.Q.1; N.Q.2; N.Q.3; S.ID.6; A.APR.1; A.APR.7; N.RN.3; N.Q.1; A.CED.1; A.CED.2; A.CED.3;</p>

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	<p>3. Flush, fill, and bleed power steering system.</p> <p>4. Inspect for power steering fluid leakage; determine necessary action.</p> <p>5. Remove, inspect, replace, and adjust power steering pump drive belt.</p> <p>6. Inspect and replace power steering hoses and fittings.</p> <p>7. Inspect pitman arm, relay (centerlink/intermediate) rod, idler arm and mountings, and steering linkage damper.</p> <p>8. Inspect tie rod ends (sockets), tie rod sleeves, and clamps.</p> <p>9. Inspect upper and lower control arms, bushings, and shafts.</p> <p>10. Inspect and replace rebound and jounce bumpers.</p> <p>11. Inspect track bar, strut rods/radius arms, and related mounts and bushings.</p> <p>12. Inspect upper and lower ball joints (with or without wear indicators).</p> <p>13. Inspect suspension system coil springs and spring insulators (silencers).</p> <p>14. Inspect suspension system torsion bars and mounts.</p> <p>15. Inspect and replace front stabilizer bar (sway bar) bushings, brackets, and links.</p> <p>16. Inspect strut cartridge or assembly.</p> <p>17. Inspect front strut bearing and mount.</p> <p>18. Inspect rear suspension system lateral links/arms (track bars), control (trailing) arms.</p> <p>19. Inspect rear suspension system leaf spring(s), spring insulators (silencers), shackles, brackets, bushings, center pins/bolts, and mounts.</p> <p>20. Inspect, remove, and replace shock absorbers; inspect mounts and bushings.</p> <p>21. Inspect electric power-assisted steering.</p> <p>22. Identify hybrid vehicle power steering system electrical circuits and safety precautions.</p> <p>23. Describe the function of the power steering pressure switch.</p> <p><b>C. Wheel Alignment</b></p> <p>1. Perform prealignment inspection and measure vehicle ride height; determine necessary action.</p> <p><b>D. Wheels and Tires</b></p> <p>1. Inspect tire condition; identify tire wear patterns; check for correct size and application (load and speed ratings) and adjust air pressure;</p>	Power steering	Solve equations	6.EE.7; 6.EE.8; 6.EE.9; 7.EE.1; 7.EE.2; 7.EE.3; 7.EE.4; 8.EE.7; 8.EE.8; 8.F.4	A.CED.4; A.REI.3; A.REI.4; A.REI.10; F.LE.1; F.LE.2; F.LE.5; F.IF.5; A.SSE.1; F.BF.1; F.IF.4

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	<p>determine necessary action.</p> <ol style="list-style-type: none"> <li>2. Rotate tires according to manufacturer's recommendations.</li> <li>3. Dismount, inspect, and remount tire on wheel; balance wheel and tire assembly (static and dynamic).</li> <li>4. Dismount, inspect, and remount tire on wheel equipped with tire pressure monitoring system sensor.</li> <li>5. Inspect tire and wheel assembly for air loss; perform necessary action.</li> <li>6. Repair tire using internal patch.</li> <li>7. Identify and test tire pressure monitoring systems (indirect and direct) for operation; verify operation of instrument panel lamps.</li> <li>8. Demonstrate knowledge of steps required to remove and replace sensors in a tire pressure monitoring system.</li> </ol>				
<b>5</b>	<b>BRAKES</b>				
	<p><b>V. BRAKES (TECHNICAL)</b></p> <p><b>A. General</b></p> <ol style="list-style-type: none"> <li>1. Research applicable vehicle and service information, vehicle service history, service precautions, and technical service bulletins.</li> <li>2. Describe procedure for performing a road test to check brake system operation, including an anti-lock brake system (ABS).</li> <li>3. Install wheel and torque lug nuts.</li> </ol> <p><b>B. Hydraulic System</b></p> <ol style="list-style-type: none"> <li>1. Measure brake pedal height, travel, and free play (as applicable); determine necessary action.</li> <li>2. Check master cylinder for external leaks and proper operation.</li> <li>3. Inspect brake lines, flexible hoses, and fittings for leaks, dents, kinks, rust, cracks, bulging, wear, loose fittings and supports; determine necessary action.</li> <li>4. Select, handle, store, and fill brake fluids to proper level.</li> <li>5. Identify components of brake warning light system.</li> <li>6. Bleed and/or flush brake system.</li> <li>7. Test brake fluid for contamination.</li> </ol> <p><b>C. Drum Brakes</b></p>	<p>Pascal's law</p> <p>Hydraulic system</p> <p>Measurement</p> <p>Torque</p> <p>Friction</p> <p>Hybrid braking systems</p>	<p>Measurement diameter</p> <p>Reading formulas</p> <p>Ratios</p> <p>Decimals</p> <p>Problem solving</p> <p>Equations</p>	<p>6.G.1; 7.G.4; 7.G.6; 8.F.3; 6.EE.2; 7.EE.3; 6.RP.1; 6.RP.2; 6.RP.3; 7.RP.1; 7.RP.2; 7.RP.3; 6.NS.2; 6.NS.3; 6.NS.5; 7.NS.1; 7.NS.2; 7.NS.3; 7.EE.1; 7.EE.2; 6.EE.6; 6.EE.7; 6.EE.8; 6.EE.9; 7.EE.1; 7.EE.3; 7.EE.4; 8.EE.7; 8.EE.8; 8.F.4</p>	<p>G.CO.5; G.GMD.1; G.MG.3; N.Q.1; N.Q.2; N.Q.3; S.ID.6; A.REI.1; A.REI.2; A.APR.1; A.APR.7; N.RN.3; N.Q.1; A.CED.1; A.CED.2; A.CED.3; A.CED.4; A.REI.3; A.REI.4; A.REI.10; F.LE.1; F.LE.2; F.LE.5; F.IF.5; A.SSE.1; F.BF.1; S.ID.6; F.IF.4; F.IF.6; S.ID.7</p>

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	<p>1. Remove, clean, inspect, and measure brake drum diameter; determine necessary action.</p> <p>2. Refinish brake drum and measure final drum diameter; compare with specifications.</p> <p>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>4. Inspect wheel cylinders for leaks and proper operation; remove and replace as needed.</p> <p>5. Pre-adjust brake shoes and parking brake; install brake drums or drum/hub assemblies and wheel bearings; make final checks and adjustments.</p> <p><b>D. Disc Brakes</b></p> <p>1. Remove and clean caliper assembly; inspect for leaks and damage/wear to caliper housing; determine necessary action.</p> <p>2. Clean and inspect caliper mounting and slides/pins for proper operation, wear, and damage; determine necessary action.</p> <p>3. Remove, inspect, and replace pads and retaining hardware; determine necessary action.</p> <p>4. Lubricate and reinstall caliper, pads, and related hardware; seat pads and inspect for leaks.</p> <p>5. Clean and inspect rotor, measure rotor thickness, thickness variation, and lateral runout; determine necessary action.</p> <p>6. Remove and reinstall rotor.</p> <p>7. Refinish rotor on vehicle; measure final rotor thickness and compare with specifications.</p> <p>8. Refinish rotor off vehicle; measure final rotor thickness and compare with specifications.</p> <p>9. Retract and re-adjust caliper piston on an integral parking brake system.</p> <p>10. Check brake pad wear indicator; determine necessary action.</p> <p>11. Describe importance of operating vehicle to burnish/break-in replacement brake pads according to manufacturer's recommendations.</p> <p><b>E. Power-Assist Units</b></p> <p>1. Check brake pedal travel with, and without, engine running to verify proper power booster operation.</p> <p>2. Check vacuum supply (manifold or auxiliary pump) to vacuum-type power booster.</p>				

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	<p><b>F. Miscellaneous (Wheel Bearings, Parking Brakes, Electrical, Etc.)</b></p> <ol style="list-style-type: none"> <li>1. Remove, clean, inspect, repack, and install wheel bearings; replace seals; install hub and adjust bearings.</li> <li>2. Check parking brake cables and components for wear, binding, and corrosion; clean, lubricate, adjust or replace as needed.</li> <li>3. Check parking brake operation and parking brake indicator light system operation; determine necessary action.</li> <li>4. Check operation of brake stop light system.</li> <li>5. Replace wheel bearing and race.</li> <li>6. Inspect and replace wheel studs.</li> </ol> <p><b>G. Electronic Brakes, and Traction and Stability Control Systems</b></p> <ol style="list-style-type: none"> <li>1. Identify traction control/vehicle stability control system components.</li> <li>2. Describe the operation of a regenerative braking system.</li> </ol>				
<b>6</b>	<b>ELECTRICAL/ELECTRONIC SYSTEMS</b>				
	<p><b>VI. ELECTRICAL/ELECTRONIC SYSTEMS (TECHNICAL)</b></p> <p><b>A.General</b></p> <ol style="list-style-type: none"> <li>1. Research applicable vehicle and service information, vehicle service history, service precautions, and technical service bulletins.</li> <li>2. Demonstrate knowledge of electrical/electronic series, parallel, and series-parallel circuits using principles of electricity (Ohm's Law).</li> <li>3. Use wiring diagrams to trace electrical/electronic circuits.</li> <li>4. Demonstrate proper use of a digital multimeter (DMM) when measuring source voltage, voltage drop (including grounds), current flow, and resistance.</li> <li>5. Demonstrate knowledge of the causes and effects from shorts, grounds, opens, and resistance problems in electrical/electronic circuits.</li> <li>6. Check operation of electrical circuits with a test light.</li> <li>7. Check operation of electrical circuits with fused jumper wires.</li> <li>8. Measure key-off battery drain (parasitic</li> </ol>	<p>Ohm's Law</p> <p>Magnetism</p>	<p>Equations</p> <p>Formulas</p> <p>Charts and tables</p> <p>Problem solving</p>	<p>6.EE.6; 6.EE.7; 6.EE.8; 6.EE.9; 7.EE.1; 7.EE.2; 7.EE.3; 7.EE.4; 8.EE.7; 8.EE.8; 8.F.4; 6.EE.2; 6.EE.3; 6.SP.4; 6.SP.5; 7.SP.2; 7.SP.3; 7.SP.4; 8.SP.3; 8.SP.4</p>	<p>A.CED.1; A.CED.2; A.CED.3; A.CED.4; A.REI.1; A.REI.2; A.REI.3; A.REI.4; A.REI.10; F.LE.1; F.LE.2; F.LE.5; F.IF.5; A.SSE.1; F.BF.1; S.ID.6; S.IC.1; S.IC.2; S.IC.3; S.IC.4; S.IC.5; S.IC.6; S.ID.1; N.Q.1; N.Q.2; N.Q.3</p>

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	<p>draw).</p> <p>9. Inspect and test fusible links, circuit breakers, and fuses; determine necessary action.</p> <p>10. Perform solder repair of electrical wiring.</p> <p>11. Replace electrical connectors and terminal ends.</p> <p><b>B. Battery Service</b></p> <p>1. Perform battery state-of-charge test; determine necessary action.</p> <p>2. Confirm proper battery capacity for vehicle application; perform battery capacity test; determine necessary action.</p> <p>3. Maintain or restore electronic memory functions.</p> <p>4. Inspect and clean battery; fill battery cells; check battery cables, connectors, clamps, and hold-downs.</p> <p>5. Perform slow/fast battery charge according to manufacturer's recommendations.</p> <p>6. Jump-start vehicle using jumper cables and a booster battery or an auxiliary power supply.</p> <p>7. Identify high-voltage circuits of electric or hybrid electric vehicle and related safety precautions.</p> <p>8. Identify electronic modules, security systems, radios, and other accessories that require reinitialization or code entry after reconnecting vehicle battery.</p> <p>9. Identify hybrid vehicle auxiliary (12v) battery service, repair, and test procedures.</p> <p><b>C. Starting System</b></p> <p>1. Perform starter current draw tests; determine necessary action.</p> <p>2. Perform starter circuit voltage drop tests; determine necessary action.</p> <p>3. Inspect and test starter relays and solenoids; determine necessary action.</p> <p>4. Remove and install starter in a vehicle.</p> <p>5. Inspect and test switches, connectors, and wires of starter control circuits; determine necessary action.</p> <p><b>D. Charging System</b></p> <p>1. Perform charging system output test; determine necessary action.</p> <p>2. Inspect, adjust, or replace generator (alternator) drive belts; check pulleys and tensioners for wear; check pulley and belt alignment.</p> <p>3. Remove, inspect, and re-install generator</p>				



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	<p>(alternator).</p> <p>4. Perform charging circuit voltage drop tests; determine necessary action.</p> <p><b>E. Lighting Systems Diagnosis and Repair</b></p> <p>1. Inspect interior and exterior lamps and sockets including headlights and auxiliary lights (fog lights/driving lights); replace as needed.</p> <p>2. Aim headlights.</p> <p>3. Identify system voltage and safety precautions associated with high-intensity discharge headlights.</p> <p><b>F. Accessories</b></p> <p>1. Disable and enable an airbag system for vehicle service; verify indicator lamp operation.</p> <p>2. Remove and reinstall door panel.</p> <p>3. Describe the operation of keyless entry/remote-start systems.</p> <p>4. Verify operation of instrument panel gauges and warning/indicator lights; reset maintenance indicators.</p> <p>5. Verify windshield wiper and washer operation, replace wiper blades.</p>				
7	<b>HEATING AND AIR CONDITIONING</b>				
	<p><b>VII. HEATING AND AIR CONDITIONING (TECHNICAL)</b></p> <p><b>A. General</b></p> <p>1. Research applicable vehicle and service information, vehicle service history, service precautions, and technical service bulletins.</p> <p><b>B. Refrigeration System Components</b></p> <p>1. Inspect and replace A/C compressor drive belts, pulleys, and tensioners; determine necessary action.</p> <p>2. Identify hybrid vehicle A/C system electrical circuits and the service/safety precautions.</p> <p>3. Inspect A/C condenser for airflow restrictions; determine necessary action.</p> <p><b>C. Heating, Ventilation, and Engine Cooling Systems</b></p> <p>1. Inspect engine cooling and heater systems hoses; perform necessary action.</p> <p><b>D. Operating Systems and Related Controls</b></p> <p>1. Inspect A/C-heater ducts, doors, hoses,</p>	<p>Temperature conversions</p> <p>Gas pressures</p> <p>ALC</p> <p>Coolant concentration</p>	<p>Conversion</p> <p>Ratios</p> <p>Problem solving</p>	<p>6.RP.1; 6.RP.2; 6.RP.3; 7.RP.1; 7.RP.2; 7.RP.3; 6.NS.2; 6.NS.3; 7.NS.1; 7.EE.3</p>	<p>G.MG.3; N.Q.1; N.Q.2; N.Q.3; S.ID.6; A.APR.1; A.APR.7; N.RN.3</p>

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	cabin filters, and outlets; perform necessary action. 2. Identify the source of A/C system odors.				
<b>8</b>	<b>ENGINE PERFORMANCE</b>				
	<p><b>VIII. ENGINE PERFORMANCE (TECHNICAL)</b></p> <p><b>A. General</b></p> <ol style="list-style-type: none"> <li>1. Research applicable vehicle and service information, vehicle service history, service precautions, and technical service bulletins.</li> <li>2. Perform engine absolute (vacuum/boost) manifold pressure tests; determine necessary action.</li> <li>3. Perform cylinder power balance test; determine necessary action.</li> <li>4. Perform cylinder cranking and running compression tests; determine necessary action.</li> <li>5. Perform cylinder leakage test; determine necessary action.</li> <li>6. Verify engine operating temperature.</li> <li>7. Remove and replace spark plugs; inspect secondary ignition components for wear and damage.</li> </ol> <p><b>B. Computerized Controls</b></p> <ol style="list-style-type: none"> <li>1. Retrieve and record diagnostic trouble codes, OBD monitor status, and freeze frame data; clear codes when applicable.</li> <li>2. Describe the importance of operating all OBDII monitors for repair verification.</li> </ol> <p><b>C. Fuel, Air Induction, and Exhaust Systems</b></p> <ol style="list-style-type: none"> <li>1. Replace fuel filter(s).</li> <li>2. Inspect, service, or replace air filters, filter housings, and intake duct work.</li> <li>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.</li> <li>4. Inspect condition of exhaust system hangers, brackets, clamps, and heat shields; repair or replace as needed.</li> <li>5. Check and refill diesel exhaust fluid (DEF).</li> </ol> <p><b>D. Emissions Control Systems</b></p> <ol style="list-style-type: none"> <li>1. Inspect, test, and service positive crankcase ventilation (PCV) filter/breather cap, valve,</li> </ol>	<p>Vacuum</p> <p>Fuel injector</p> <p>Flow rates</p> <p>Ignition timing curve</p> <p>MAF</p> <p>Volumetric efficiency</p>	<p>Rate of change/slope</p> <p>Problem solving</p> <p>charts</p>	<p>7.EE.1; 7.EE.2; 6.RP.3; 7.RP.1; 6.EE.2; 6.EE.3; 6.SP.4; 6.SP.5; 7.SP.2; 7.SP.3; 7.SP.4; 8.SP.3; 8.SP.4</p>	<p>A.REI.1; A.REI.2; F.IF.4; F.IF.6; S.ID.7; S.IC.1; S.IC.2; S.IC.3; S.IC.4; S.IC.5; S.IC.6; S.ID.1; N.Q.1; N.Q.2; N.Q.3; S.ID.6</p>

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	tubes, orifices, and hoses; perform necessary action.				
9	<b>REQUIRED SUPPLEMENTAL TASKS</b>				
	<p><b>IX. REQUIRED SUPPLEMENTAL TASKS (TECHNICAL)</b></p> <p><b>A. Shop and Personal Safety</b></p> <ol style="list-style-type: none"> <li>1. Identify general shop safety rules and procedures.</li> <li>2. Utilize safe procedures for handling of tools and equipment.</li> <li>3. Identify and use proper placement of floor jacks and jack stands.</li> <li>4. Identify and use proper procedures for safe lift operation.</li> <li>5. Utilize proper ventilation procedures for working within the lab/shop area.</li> <li>6. Identify marked safety areas.</li> <li>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.</li> <li>8. Identify the location and use of eye wash stations.</li> <li>9. Identify the location of the posted evacuation routes.</li> <li>10. Comply with the required use of safety glasses, ear protection, gloves, and shoes during lab/shop activities.</li> <li>11. Identify and wear appropriate clothing for lab/shop activities.</li> <li>12. Secure hair and jewelry for lab/shop activities.</li> <li>13. Demonstrate awareness of the safety aspects of supplemental restraint systems (SRS), electronic brake control systems, and hybrid vehicle high voltage circuits.</li> <li>14. Demonstrate awareness of the safety aspects of high voltage circuits (such as high intensity discharge (HID) lamps, ignition systems, injection systems, etc.).</li> <li>15. Locate and demonstrate knowledge of material safety data sheets (MSDS).</li> </ol> <p><b>B. Tools and Equipment</b></p> <ol style="list-style-type: none"> <li>1. Identify tools and their usage in automotive applications.</li> </ol>	Statistics of injuries	<p>Charts and tables</p> <p>Various measurement calculations</p> <p>Conversions (SAE to metric)</p> <p>Problem solving</p>	<p>6.EE.2; 6.EE.3; 6.SP.4; 6.SP.5; 7.SP.2; 7.SP.3; 7.SP.4; 8.SP.3; 8.SP.4; 6.G.1; 6.G.2; 6.G.3; 7.G.1; 7.G.4; 7.G.6; 6.NS.2; 6.NS.3; 7.NS.1; 7.EE.3</p>	<p>S.IC.1; S.IC.2; S.IC.3; S.IC.4; S.IC.5; S.IC.6; S.ID.1; G.GPE.7; G.MG.2; N.Q.1; N.Q.2; N.Q.3; S.ID.6; A.APR.1; A.APR.7; N.RN.3</p>

Segment	CTE Segments/Performance Elements	CTE Concepts	Math Concepts	Common Core Math Standards Middle School	Common Core Math Standards High School
	<p>2. Identify standard and metric designation.  3. Demonstrate safe handling and use of appropriate tools.  4. Demonstrate proper cleaning, storage, and maintenance of tools and equipment.  5. Demonstrate proper use of precision measuring tools (i.e. micrometer, dial-indicator, dial-caliper).</p> <p><b>C. Preparing Vehicle for Service</b>  1. Identify information needed and the service requested on a repair order.  2. Identify purpose and demonstrate proper use of fender covers, mats.  3. Demonstrate use of the three Cs (concern, cause, and correction).  4. Review vehicle service history.  5. Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction.</p> <p><b>D. Preparing Vehicle for Customer</b>  1. Ensure vehicle is prepared to return to customer per school/company policy (floor mats, steering wheel cover, etc.).</p>				
<b>10</b>	<b>FACILITY &amp; MOBILE EQUIPMENT MAINTENANCE</b>				
	<p><b>I. FACILITY &amp; MOBILE EQUIPMENT MAINTENANCE (PATHWAY)</b>  <b>A. Develop preventative maintenance plans and systems to keep facility and mobile equipment inventory in operation.</b>  1. Develop preventive maintenance plans and systems to meet business and equipment manufacturer requirements.  2. Apply strategies used to monitor and evaluate the performance of maintenance plans and systems.</p> <p><b>B. Design ways to improve facility and equipment system performance.</b>  1. Develop plans for improving facilities/equipment/system performance.  2. Execute repair plans for facilities and mobile equipment.  3. Develop and execute repair plans based upon an assessment of the facility/equipment inventory.</p>		Problem solving	N.Q.1; N.Q.2; N.Q.3; S.ID.6	

Segment	CTE Segments/Performance Elements	CTE Concepts	Math Concepts	Common Core Math Standards Middle School	Common Core Math Standards High School
11	<b>TRANSPORTATION, DISTRIBUTION &amp; LOGISTICS</b>				
	<p><b>I. TRANSPORTATION, DISTRIBUTION &amp; LOGISTICS (CLUSTER)</b></p> <p><b>A. Describe the nature and scope of the Transportation, Distribution &amp; Logistics Career Cluster™ and the role of transportation, distribution and logistics in society and the economy.</b></p> <ol style="list-style-type: none"> <li>1. Describe the various roles and major business functions of a TDL organization.</li> <li>2. Summarize trends and challenges faced by TDL organizations.</li> <li>3. Identify the major modes of transportation and their role in society.</li> <li>4. Describe how transportation systems and the infrastructure are provided.</li> </ol> <p><b>B. Describe the application and use of new and emerging advanced techniques to provide solutions for transportation, distribution and logistics problems.</b></p> <ol style="list-style-type: none"> <li>1. Execute the steps involved in the operation of a computer-driven machine to accomplish common work tasks.</li> <li>2. Interpret installation and operation manuals in order to install and operate a computer-driven machine/equipment.</li> <li>3. Troubleshoot computer-driven equipment and machines and access relevant support sources as needed.</li> <li>4. Execute procedures involved in using Geographic Information System/ Global Positions System (GIS/GPS) applications to perform various work functions.</li> <li>5. Demonstrate an understanding of transportation models for individuals and for optimizing distribution networks.</li> </ol> <p><b>C. Describe the key operational activities required of successful transportation, distribution and logistics facilities.</b></p> <ol style="list-style-type: none"> <li>1. Utilize financial data to determine profitability, cost reduction, and asset utilization.</li> <li>2. Evaluate risk management strategies to prevent and reduce various risks and exposures within a TDL organization.</li> <li>3. Manage ongoing customer relationships,</li> </ol>	Read and interpret manuals	<p>Problem solving</p> <p>Charts and tables</p> <p>Whole numbers and decimals</p>	<p>6.NS.2; 6.NS.3; 6.NS.5; 7.NS.1; 7.NS.2; 7.NS.3; 7.EE.3; 6.EE.2; 6.EE.3; 6.SP.4; 6.SP.5; 7.SP.2; 7.SP.3; 7.SP.4; 8.SP.3; 8.SP.4</p>	<p>N.Q.1; N.Q.2; N.Q.3; S.ID.6; A.APR.1; A.APR.7; N.RN.3;; S.IC.1; S.IC.2; S.IC.3; S.IC.4; S.IC.5; S.IC.6; S.ID.1</p>

Segment	CTE Segments/Performance Elements	CTE Concepts	Math Concepts	Common Core Math Standards Middle School	Common Core Math Standards High School
	<p>internally and externally, to maintain business.</p> <p>4. Develop and manage plans and budgets to accomplish TDL organizational goals and objectives.</p> <p>5. Evaluate and apply written organizational policies, rules, and procedures.</p> <p><b>D. Identify governmental policies and procedures for transportation, distribution and logistics facilities.</b></p> <p>1. Summarize the role government plays in regulating domestic transportation operations.</p> <p>2. Summarize various government policies created to regulate international transportation operations.</p> <p>3. Summarize the impact of government policy on public transportation infrastructure management.</p> <p>4. Summarize the impact of government policy on health, safety, and environmental management in an organization.</p> <p>5. Describe the importance of corporate policies regarding ethical and legal responsibilities for a TDL organization.</p> <p><b>E. Describe transportation, distribution and logistics employee rights and responsibilities and employers' obligations concerning occupational safety and health.</b></p> <p>1. Demonstrate knowledge and understanding of rules and laws designed to promote safety and health in the workplace.</p> <p>2. Assess workplace conditions through observations and experience.</p> <p>3. Execute health, safety, and environmental procedures in a TDL organization.</p> <p><b>F. Describe career opportunities and means to achieve those opportunities in each of the Transportation, Distribution &amp; Logistics Career Pathways.</b></p> <p>1. Research and match career opportunities based upon their fit with personal career goals.</p> <p>2. Match personal interests and aptitudes to careers when researching opportunities within the pathways.</p>				

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<b>12</b>	<b>CAREER READY PRACTICES</b>				
	<p><b>I. CAREER READY PRACTICES</b></p> <p><b>A. Career Ready Skills</b></p> <ol style="list-style-type: none"> <li>1. Act as a responsible and contributing citizen and employee.</li> <li>2. Apply appropriate academic and technical skills.</li> <li>3. Attend to personal health and financial well-being.</li> <li>4. Communicate clearly, effectively and with reason.</li> <li>5. Consider the environmental, social and economic impacts of decisions.</li> <li>6. Demonstrate creativity and innovation.</li> <li>7. Employ valid and reliable research strategies.</li> <li>8. Plan education and career path aligned to personal goals.</li> <li>9. Plan education and career path aligned to personal goals.</li> <li>10. Use technology to enhance productivity.</li> <li>11. Utilize critical thinking to make sense of problems and persevere in solving them.</li> <li>12. Work productively in teams while using cultural/global competence.</li> </ol>		<p>Problem Solving</p> <p>Critical thinking skills</p>	<p>6.EE.2; 6.EE.3; 6.SP.4; 6.SP.5; 7.SP.2; 7.SP.3; 7.SP.4; 8.SP.3; 8.SP.4</p>	<p>N.Q.1; N.Q.2; N.Q.3; S.ID.6; S.CP.2; S.CP.4; S.CP.5; S.CP.6; S.CP.7; S.CP.9; S.MD.1; S.MD.2; S.MD.3; S.MD.4; S.MD.5; S.MD.6; S.MD.7; S.IC.1; S.IC.2</p>