

# Instructional Framework

## Diesel Engine Repair

43.0202.00



This Instructional Framework identifies, explains, and expands the content of the standards/measurement criteria, and, as well, guides the development of multiple-choice items for the Technical Skills Assessment. This document corresponds with the Technical Standards endorsed in January 2024.

<b>Domain 1: Electrical and Electronics</b>	
<b>Instructional Time: 30 - 35%</b>	
<b>STANDARD 13.0 PERFORM GENERAL ELECTRICAL/ELECTRONIC SYSTEM DIAGNOSIS AND REPAIR</b>	
13.1 Research vehicle service information, including vehicle service history, service precautions, and technical service bulletins	<ul style="list-style-type: none"><li>● Vehicle service information</li><li>● Service history</li><li>● Work orders</li><li>● Required customer information</li><li>● Vehicle information online resources<ul style="list-style-type: none"><li>○ Service precaution</li><li>○ Technical service bulletin</li></ul></li></ul>
13.2 Demonstrate knowledge of electrical/electronic series, parallel, and series-parallel circuits using principles of electricity (Ohm's Law)	<ul style="list-style-type: none"><li>● Ohm's Law</li><li>● Circuit types<ul style="list-style-type: none"><li>○ Series</li><li>○ Parallel</li><li>○ Series parallel</li></ul></li></ul>
13.3 Demonstrate operation and proper use of digital multimeters and other test equipment when measuring source voltage, voltage drop (including grounds), current flow, continuity, and resistance	<ul style="list-style-type: none"><li>● Digital multimeters<ul style="list-style-type: none"><li>○ Open circuit voltage</li><li>○ Source voltage</li><li>○ Voltage drop</li><li>○ Ammeter</li><li>○ Continuity</li><li>○ Resistance</li></ul></li></ul>
13.4 Demonstrate the causes and effects of shorts, grounds, opens, and resistance problems in electrical/electronic circuits	<ul style="list-style-type: none"><li>● Effect on circuit caused by<ul style="list-style-type: none"><li>○ Open</li><li>○ Short to ground</li><li>○ Short to voltage</li><li>○ Excessive resistance</li></ul></li></ul>

	<ul style="list-style-type: none"> <li>○ Low resistance</li> </ul>
13.5 Use wiring diagrams to trace electrical/electronic circuits	<ul style="list-style-type: none"> <li>● Identify diagram types</li> <li>● Power condition</li> <li>● Always on voltage</li> <li>● Switched voltage <ul style="list-style-type: none"> <li>○ Power side switching</li> <li>○ Ground side switching</li> </ul> </li> </ul>
13.6 Measure parasitic (key-off) battery drain	<ul style="list-style-type: none"> <li>● Determine maximum parasitic draw</li> </ul>
13.7 Demonstrate the function, operation, and testing of fusible links, circuit breakers, relays, solenoids, actuators, diodes, and fuses	<ul style="list-style-type: none"> <li>● Circuit overcurrent hazards <ul style="list-style-type: none"> <li>○ Fusible links</li> <li>○ Circuit breakers</li> <li>○ Relays</li> <li>○ Solenoids</li> <li>○ Actuators</li> <li>○ Diodes</li> <li>○ Fuses</li> </ul> </li> </ul>
13.8 Inspect, repair (including solder repair, mechanical crimp repair, and sealed heat shrink), and/or replace connectors, seals, terminal ends, and wiring; verify proper routing and securement according to manufacturer recommendations	<ul style="list-style-type: none"> <li>● Inspect connectors, seals, terminal ends, and wiring <ul style="list-style-type: none"> <li>○ Moisture intrusion</li> <li>○ Connection</li> </ul> </li> <li>● Repair <ul style="list-style-type: none"> <li>○ Solder</li> <li>○ Mechanical crimp</li> <li>○ Sealed heat shrink</li> </ul> </li> </ul>
13.9 Use appropriate electronic service tool(s) and procedures to diagnose problems; check and record diagnostic codes; interpret digital multimeter (DMM) readings	<ul style="list-style-type: none"> <li>● Electronic service tool(s) <ul style="list-style-type: none"> <li>○ Scan tool usage</li> <li>○ Digital multimeter (DMM) usage</li> <li>○ Instrument cluster</li> </ul> </li> </ul>
13.10 Check for malfunctions caused by faults in the data bus communications network	<ul style="list-style-type: none"> <li>● Scan tool</li> <li>● Oscilloscope</li> </ul>
13.11 Identify electrical/electronic system components and configuration	<ul style="list-style-type: none"> <li>● Switches</li> <li>● Relays</li> <li>● Modules</li> <li>● Actuators</li> </ul>

**STANDARD 14.0 PERFORM BATTERY DIAGNOSIS AND REPAIR**

14.1 Identify battery type and system configuration

- Battery type and system configuration
  - Series
  - Parallel
  - Maintenance free batteries

14.2 Confirm proper battery capacity for application; perform battery state-of-charge test; perform battery capacity test, determine needed action

- Open circuit voltage test
- Load test

14.3 Inspect and clean battery, battery cables, connectors, battery boxes, mounts, and hold-downs; determine needed action

- Connections
- Corrosion
- Security

14.4 Charge battery using appropriate method for battery type

- Fast charge
- Slow charge
- Charge amperage

14.5 Jump-start vehicle using a booster battery and jumper cables or using an appropriate auxiliary power supply

- Jump start safety
- Jumper cable procedure
- Jump pack procedure

14.6 Identify low voltage disconnect (LVD) systems

- Battery isolator
- Low voltage switches and relays

**STANDARD 15.0 PERFORM STARTING SYSTEM DIAGNOSIS AND REPAIR**

15.1 Explain starter system operation

- Starter system operation
  - Cranking circuit
  - Solenoid
  - Motor
  - Pinion
  - Ring gear
  - Over-running clutch

15.2 Perform starter circuit cranking voltage and voltage drop tests

- Voltage test
- Voltage drop test

15.3 Inspect starter control circuit switches, relays, connectors, terminals, wires, and harnesses (including over-crank protection)

- Inspect
  - Ignition/start switches
  - Relays

	<ul style="list-style-type: none"> <li>○ Connectors</li> <li>○ Terminals</li> <li>○ Wires</li> <li>○ Harnesses</li> <li>○ Solenoid</li> <li>○ Over-crank thermal breaker</li> </ul>
<b>STANDARD 16.0 PERFORM CHARGING SYSTEM DIAGNOSIS AND REPAIR</b>	
16.1 Explain the operation of the alternator	<ul style="list-style-type: none"> <li>● Alternator operation <ul style="list-style-type: none"> <li>○ Induction principle</li> <li>○ Rectification</li> <li>○ Voltage regulator</li> </ul> </li> </ul>
16.2 Check instrument panel mounted gauges and/or indicator lamps	<ul style="list-style-type: none"> <li>● Instrument panel mounted gauges and/or indicator lamps <ul style="list-style-type: none"> <li>○ Voltmeters</li> <li>○ Check lamps</li> </ul> </li> </ul>
16.3 Inspect alternator drive belt condition; check pulleys and tensioners for wear; check fans and mounting brackets; verify proper belt alignment	<ul style="list-style-type: none"> <li>● Alternator drive belt <ul style="list-style-type: none"> <li>○ Belt type</li> <li>○ Condition</li> <li>○ Tensioner</li> <li>○ Types of belt wear</li> <li>○ Bearing</li> <li>○ Belt alignment</li> </ul> </li> </ul>
16.4 Inspect cables, wires, and connectors in the charging circuit, including remote sense circuit	<ul style="list-style-type: none"> <li>● Cables, wires, and connectors in the charging circuit <ul style="list-style-type: none"> <li>○ Corrosion</li> <li>○ Insulation</li> <li>○ Connections</li> <li>○ Check resistance</li> </ul> </li> </ul>
16.5 Perform charging system voltage and amperage output tests; perform AC ripple test	<ul style="list-style-type: none"> <li>● Perform <ul style="list-style-type: none"> <li>○ Voltage output test</li> <li>○ Current output test</li> <li>○ AC ripple test</li> </ul> </li> <li>● Determine needed action</li> </ul>
<b>STANDARD 17.0 PERFORM LIGHTING SYSTEM DIAGNOSIS AND REPAIR</b>	
17.1 Inspect for brighter-than-normal, intermittent, dim, or no-light operation; determine needed action	<ul style="list-style-type: none"> <li>● Lighting system inspection <ul style="list-style-type: none"> <li>○ Brighter than normal</li> </ul> </li> </ul>

	<ul style="list-style-type: none"> <li>○ Intermittent</li> <li>○ Dim</li> <li>○ No-light operation</li> <li>● Determine needed action</li> </ul>
17.2 Test, replace, and aim headlights	<ul style="list-style-type: none"> <li>● Headlights <ul style="list-style-type: none"> <li>○ Test</li> <li>○ Replace</li> <li>○ Aim</li> </ul> </li> </ul>
17.3 Inspect cables, wires, and connectors in the lighting systems	<ul style="list-style-type: none"> <li>● Lighting systems cables, wires, and connectors <ul style="list-style-type: none"> <li>○ Connection</li> <li>○ Cuts</li> <li>○ Abrasion</li> <li>○ Moisture intrusion</li> </ul> </li> </ul>
17.4 Inspect tractor-to-trailer multi-wire connectors, cables, and holders	<ul style="list-style-type: none"> <li>● Tractor-to-trailer multi-wire connectors, cables, and holders <ul style="list-style-type: none"> <li>○ Connection</li> <li>○ Cuts</li> <li>○ Abrasions</li> <li>○ Moisture intrusion</li> <li>○ Proper mounting</li> </ul> </li> </ul>

## Domain 2: Inspections

Instructional Time: 25 - 30%

### STANDARD 2.0 PERFORM PRE-TRIP INSPECTION

2.1 Research vehicle service information, including fluid type, vehicle service history, service precautions, and technical service bulletins	<ul style="list-style-type: none"> <li>● Vehicle service information</li> <li>● Service history</li> <li>● Work orders</li> <li>● Required customer information</li> <li>● Vehicle information online resources <ul style="list-style-type: none"> <li>○ Service information</li> </ul> </li> <li>● Fluid types</li> </ul>
2.2 Inspect level and condition of fuel, oil, diesel exhaust fluid (DEF), and coolant	<ul style="list-style-type: none"> <li>● Level and condition <ul style="list-style-type: none"> <li>○ Fuel</li> <li>○ Oil</li> <li>○ Diesel exhaust fluid (DEF)</li> </ul> </li> </ul>

	<ul style="list-style-type: none"> <li>○ Coolant</li> </ul>
2.3 Inspect engine assembly for fuel, oil, coolant, air, and other leaks	<ul style="list-style-type: none"> <li>● Identify leaks <ul style="list-style-type: none"> <li>○ Fuel</li> <li>○ Oil</li> <li>○ Coolant</li> <li>○ Air, etc.</li> </ul> </li> </ul>
2.4 Check engine operation (starting and running) including noise, vibration, smoke, etc.	<ul style="list-style-type: none"> <li>● Idle/governor speed</li> <li>● Abnormal noise</li> <li>● Check vibration damper</li> <li>● Black smoke</li> <li>● White smoke</li> <li>● Blue smoke</li> </ul>
2.5 Use appropriate electronic service tool(s) to check and record diagnostic codes; check and record trip/operational data; reset maintenance monitor (if applicable)	<ul style="list-style-type: none"> <li>● Scan tool usage</li> <li>● Digital multimeter (DMM) usage</li> <li>● Instrument cluster</li> </ul>
2.6 Identify system components, configurations, and types of the following: cylinder head(s), valve train, engine block, engine lubrication, engine cooling, air induction, exhaust, fuel, and engine braking	<ul style="list-style-type: none"> <li>● Engine configurations</li> <li>● Cylinder head configurations</li> <li>● Turbocharger configurations</li> <li>● Engine brake configurations</li> <li>● Intercooler identification</li> <li>● Exhaust after treatment system</li> </ul>
<b>STANDARD 3.0 PERFORM LUBRICATION SYSTEM PM</b>	
3.1 Test engine oil pressure and check operation of pressure sensor, gauge, and/or sending unit; test engine oil temperature and check operation of temperature sensor	<ul style="list-style-type: none"> <li>● Test and inspect oil pressure</li> <li>● Operation of temperature sensor</li> </ul>
3.2 Check engine oil level, condition, and consumption; take engine oil sample	<ul style="list-style-type: none"> <li>● Oil level and condition</li> <li>● Oil sample procedure</li> </ul>
3.3 Determine proper lubricant; perform oil and filter service	<ul style="list-style-type: none"> <li>● Oil and filter service and inspection</li> <li>● Lubricant identification</li> </ul>
<b>STANDARD 4.0 PERFORM COOLING SYSTEM PM</b>	
4.1 Check engine coolant type, level, condition, and test coolant for	<ul style="list-style-type: none"> <li>● Engine coolant <ul style="list-style-type: none"> <li>○ Proper coolant type</li> </ul> </li> </ul>

freeze protection and additive package concentration	<ul style="list-style-type: none"> <li>○ Inspect level</li> <li>○ Condition</li> <li>○ PH strips</li> <li>○ Refractometer</li> </ul>
4.2 Verify coolant temperature; check operation of temperature and level sensors, gauge, and/or sending unit	<ul style="list-style-type: none"> <li>● Verify proper coolant temperature</li> <li>● Verify operation of level sensor and sending unit</li> </ul>
4.3 Inspect and reinstall/replace pulleys, tensioners and drive belts; adjust drive belts and check alignment	<ul style="list-style-type: none"> <li>● Pulley, tensioner and belt inspection</li> <li>● Proper belt and pulley alignment</li> </ul>
4.4 Recover coolant, flush, and refill with recommended coolant/additive package; bleed cooling system	<ul style="list-style-type: none"> <li>● Cooling system flush</li> <li>● Refill with proper coolant</li> <li>● Coolant additive package</li> <li>● Bleed cooling system</li> </ul>
4.5 Inspect coolant conditioner/filter assembly for leaks; inspect valves, lines, and fittings; replace as needed	<ul style="list-style-type: none"> <li>● Verify coolant conditioner/filter is not leaking</li> <li>● Verify cooling system fittings and valves are not leaking</li> </ul>
4.6 Inspect water pump, hoses, and clamps	<ul style="list-style-type: none"> <li>● Visually inspect water pump for leaks</li> <li>● Visually inspect hoses and clamps for leaks</li> </ul>
4.7 Inspect and pressure test cooling system(s); pressure test cap, tank(s), and recovery systems; inspect radiator and mountings	<ul style="list-style-type: none"> <li>● Pressure test of the cooling system</li> <li>● Pressure test on cooling system cap</li> <li>● Visually inspect radiator mounts</li> </ul>
4.8 Inspect thermostatic cooling fan system (hydraulic, pneumatic, and electronic) and fan shroud	<ul style="list-style-type: none"> <li>● Verify proper function of cooling fans <ul style="list-style-type: none"> <li>○ Hydraulic</li> <li>○ Pneumatic</li> <li>○ Electronic</li> </ul> </li> <li>● Inspect fan shroud for cracks and function</li> </ul>
4.9 Identify engine block heater(s)	<ul style="list-style-type: none"> <li>● Verify the location of the block heater on the engine (if present)</li> </ul>
<b>STANDARD 5.0 PERFORM AIR INDUCTION AND EXHAUST SYSTEM PM</b>	
5.1 Inspect turbocharger(s), wastegate(s), and piping systems	<ul style="list-style-type: none"> <li>● Leaks <ul style="list-style-type: none"> <li>○ Exhaust</li> <li>○ Intake air</li> <li>○ Piping</li> <li>○ Lubrication</li> </ul> </li> <li>● Proper operation</li> </ul>

<p>5.2 Check air induction system including cooler assembly, piping, hoses, clamps, and mountings; replace air filter as needed; reset restriction indicator (if applicable)</p>	<ul style="list-style-type: none"> <li>● Intake air filter <ul style="list-style-type: none"> <li>○ Inspect <ul style="list-style-type: none"> <li>▪ Clamps</li> <li>▪ Hoses</li> <li>▪ Mounts</li> </ul> </li> <li>○ Replace</li> </ul> </li> <li>● Check air restriction</li> <li>● Reset restriction indicator</li> </ul>
<p>5.3 Inspect intake manifold, gaskets, and connections</p>	<ul style="list-style-type: none"> <li>● Inspect <ul style="list-style-type: none"> <li>○ Leaks</li> <li>○ Abrasions</li> <li>○ Cuts</li> </ul> </li> </ul>
<p>5.4 Inspect engine exhaust system, exhaust gas recirculation (EGR) system, and exhaust after treatment systems [e.g., Diesel Exhaust Fluid (DEF), Selective Catalyst Reduction (SCR), Diesel Particulate Filter (DPF)] for leaks, mounting, proper routing, and damaged or missing components</p>	<ul style="list-style-type: none"> <li>● Diesel Exhaust Fluid (DEF)</li> <li>● Selective Catalyst Reduction (SCR)</li> <li>● Diesel Particulate Filter (DPF)</li> <li>● Seventh injector</li> </ul>
<p>5.5 Inspect and maintain crankcase ventilation components</p>	<ul style="list-style-type: none"> <li>● Positive Crankcase Ventilation (PCV) valve</li> <li>● Crankcase breather</li> </ul>
<p>5.6 Inspect engine compression and/or exhaust brake operation</p>	<ul style="list-style-type: none"> <li>● Compression brake operation (if applicable)</li> <li>● Exhaust brake operation (if applicable)</li> </ul>
<p><b>STANDARD 6.0 PERFORM FUEL SYSTEM PM</b></p>	
<p>6.1 Check fuel level and condition</p>	<ul style="list-style-type: none"> <li>● Level of fuel</li> <li>● Fuel condition</li> </ul>
<p>6.2 Inspect fuel tanks, vents, caps, mounts, valves, screens, crossover system, hoses, lines, and fittings</p>	<ul style="list-style-type: none"> <li>● Condition of <ul style="list-style-type: none"> <li>○ Fuel tanks</li> <li>○ Vents</li> <li>○ Caps</li> <li>○ Mounts</li> <li>○ Valves</li> <li>○ Screens</li> <li>○ Crossover system</li> <li>○ Hoses</li> <li>○ Lines and fittings</li> </ul> </li> </ul>



<p>6.3 Inspect low pressure fuel system components (fuel pump, pump drives, screens, fuel/water separators/indicators, hoses, lines, filters, heaters, coolers, ECM cooling plates, check valves, pressure regulator valves, restrictive fittings, and mounting hardware)</p>	<ul style="list-style-type: none"> <li>● Operation of low pressure fuel system components <ul style="list-style-type: none"> <li>○ Fuel pump</li> <li>○ Pump drives</li> <li>○ Screens</li> <li>○ Fuel/water separators/indicators</li> <li>○ Hoses</li> <li>○ Lines</li> <li>○ Filters</li> <li>○ Heaters</li> <li>○ Coolers</li> <li>○ ECM cooling plates</li> <li>○ Check valves</li> <li>○ Pressure regulator valves</li> <li>○ Restrictive fittings</li> <li>○ Mounting hardware</li> </ul> </li> </ul>
<p>6.4 Replace fuel filter; prime and bleed fuel system</p>	<ul style="list-style-type: none"> <li>● Fuel filter replacement</li> <li>● Prime and bleed fuel system</li> </ul>
<p>6.5 Inspect high pressure fuel system components (fuel pump, pump drives, injection lines, filters, hold-downs, fittings, seals, and mounting hardware)</p>	<ul style="list-style-type: none"> <li>● Condition of high pressure fuel system components <ul style="list-style-type: none"> <li>○ Fuel pump</li> <li>○ Pump drives</li> <li>○ Injection lines</li> <li>○ Filters</li> <li>○ Hold-downs</li> <li>○ Fittings</li> <li>○ Seals</li> <li>○ Mounting hardware</li> </ul> </li> </ul>
<p><b>STANDARD 7.0 PERFORM DRIVE TRAIN PM</b></p>	
<p>7.1 Research vehicle service information, including fluid type, vehicle service history, service precautions, and technical service bulletins</p>	<ul style="list-style-type: none"> <li>● Use service information to verify <ul style="list-style-type: none"> <li>○ Fluid type</li> <li>○ Vehicle service history</li> <li>○ Service precautions</li> <li>○ Technical service bulletins</li> </ul> </li> </ul>
<p>7.2 Identify drive train components, transmission type, and configuration</p>	<ul style="list-style-type: none"> <li>● Vehicle drivetrain components</li> <li>● Transmission type</li> <li>● Configuration</li> </ul>
<p>7.3 Inspect and adjust clutch, clutch brake, linkage, cables, levers,</p>	<ul style="list-style-type: none"> <li>● Inspect for adjustment:</li> </ul>

brackets, bushings, pivots, springs, and clutch safety switch (includes push-type and pull-type); check pedal height and travel	<ul style="list-style-type: none"> <li>○ Clutch</li> <li>○ Clutch brake</li> <li>○ Linkage</li> <li>○ Cables</li> <li>○ Levers</li> <li>○ Brackets</li> <li>○ Bushings</li> <li>○ Pivots</li> <li>○ Springs</li> <li>○ Clutch safety switches (push- and pull- type)</li> <li>● Inspect pedal height and travel (if applicable)</li> </ul>
7.4 Inspect clutch master cylinder fluid level and condition; check clutch master cylinder, slave cylinder, lines, and hoses for leaks and damage	<ul style="list-style-type: none"> <li>● Inspect for leaks and damage <ul style="list-style-type: none"> <li>○ Master cylinder</li> <li>○ Slave cylinder</li> <li>○ Lines</li> <li>○ Hoses</li> </ul> </li> </ul>
7.5 Inspect transmission shifter and linkage; inspect transmission mounts, insulators, and mounting bolts	<ul style="list-style-type: none"> <li>● Verify condition and operation <ul style="list-style-type: none"> <li>○ Shifter and linkage</li> <li>○ Mounts</li> <li>○ Insulators</li> <li>○ Mounting bolts</li> </ul> </li> </ul>
7.6 Inspect transmission for leakage	<ul style="list-style-type: none"> <li>● Identify any leaks from transmission</li> </ul>
7.7 Inspect transmission cover plates, gaskets, seals, and cap bolts; inspect seal surfaces and vents	<ul style="list-style-type: none"> <li>● Inspect transmission <ul style="list-style-type: none"> <li>○ Cover plate</li> <li>○ Gaskets</li> <li>○ Seals</li> <li>○ Cap bolts</li> <li>○ Vents</li> </ul> </li> <li>● Identify power takeoff components (PTOs)</li> </ul>
7.8 Check transmission fluid level and condition; determine needed action	<ul style="list-style-type: none"> <li>● Verify proper oil level in transmission</li> </ul>
7.9 Inspect transmission oil filters, coolers and related components	<ul style="list-style-type: none"> <li>● Locate and inspect transmission breather</li> <li>● Locate and inspect transmission filter and cooler (if applicable)</li> </ul>
7.10 Inspect speedometer components	<ul style="list-style-type: none"> <li>● Gauge/digital display</li> <li>● Speed sensor</li> </ul>

<p>7.11 Inspect and test function of REVERSE light, neutral start, and warning device circuits</p>	<ul style="list-style-type: none"> <li>● Inspect and test <ul style="list-style-type: none"> <li>○ REVERSE lights</li> <li>○ Neutral start switch</li> <li>○ Warning device circuits</li> </ul> </li> </ul>
<p>7.12 Inspect and service if applicable driveshafts, slip joints, yokes, drive flanges, support bearings, universal joints, boots, seals, and retaining/mounting hardware; check phasing of all shafts</p>	<ul style="list-style-type: none"> <li>● Inspect and service <ul style="list-style-type: none"> <li>○ Driveshafts</li> <li>○ Slip joints</li> <li>○ Yokes</li> <li>○ Drive flanges</li> <li>○ Support bearings</li> <li>○ Universal joints</li> <li>○ Boots</li> <li>○ Seals</li> <li>○ Retaining/mounting hardware</li> </ul> </li> </ul>
<p>7.13 Check for fluid leaks; inspect drive axle housing assembly, cover plates, gaskets, seals, vent/breather, and magnetic plugs</p>	<ul style="list-style-type: none"> <li>● Visual inspection of drive axle for fluid leaks</li> <li>● Visual inspection of axle housing, cover plates, gaskets, seals, breathers, and magnetic drain plugs</li> </ul>
<p>7.14 Check drive axle fluid level and condition; check drive axle filter</p>	<ul style="list-style-type: none"> <li>● Inspect drive axle fluid level</li> <li>● Inspect drive axle filter (if applicable)</li> </ul>
<p>7.15 Inspect air-operated power divider (inter-axle differential) assembly</p>	<ul style="list-style-type: none"> <li>● Operation of air operated power divider</li> <li>● Inspect <ul style="list-style-type: none"> <li>○ Diagrams</li> <li>○ Seals</li> <li>○ Springs</li> <li>○ Yokes</li> <li>○ Pins</li> <li>○ Lines</li> <li>○ Hoses</li> <li>○ Fittings</li> <li>○ Controls</li> </ul> </li> </ul>
<p>7.16 Inspect drive axle shafts; determine needed action</p>	<ul style="list-style-type: none"> <li>● Visually inspect drive axle <ul style="list-style-type: none"> <li>○ Dents</li> <li>○ Missing weights and hardware</li> </ul> </li> </ul>
<p>7.17 Remove and replace wheel assembly; check rear wheel seal and axle flange for leaks; determine needed action</p>	<ul style="list-style-type: none"> <li>● Wheel assembly inspection and removal <ul style="list-style-type: none"> <li>○ Wheel seals</li> <li>○ Axle flange leakage</li> </ul> </li> </ul>

**STANDARD 12.0 PERFORM FRAME AND FIFTH WHEEL PM**

12.1 Inspect, service, and/or adjust fifth wheel, pivot pins, bushings, locking mechanisms, mounting hardware, air lines, and fittings

- Inspect, service, and/or adjust
  - Fifth wheel
  - Pivot pins
  - Bushings
  - Locking bar
  - Locking jaws
  - Mounting hardware
  - Air lines and fittings (if applicable)

12.2 Inspect frame and frame members for cracks, breaks, corrosion, distortion, elongated holes, looseness, and damage

- Inspect frame and frame members
  - Cracks
  - Breaks
  - Corrosion
  - Distortion
  - Elongated holes
  - Looseness
  - Damage
  - Welds

12.3 Inspect frame hangers, brackets, and cross members

- Inspect frame hangers, brackets, and cross members
  - Mounting
  - Security
  - Cracks

12.4 Check pintle hook and mounting (if applicable)

- Verify insert for pintle hook is free of corrosion or debris (if applicable)
- Verify the pintle hook moves freely (if applicable)

**Domain 3: Brakes****Instructional Time: 15 - 20%****STANDARD 8.0 PERFORM AIR BRAKE SYSTEM PM**

8.1 Research vehicle service information, including fluid type and air over hydraulic systems, vehicle service history, service precautions, and technical service bulletins

- Vehicle service information
- Service history
- Work orders
- Required customer information
- Vehicle information online resources

	<ul style="list-style-type: none"> <li>○ Service precaution</li> <li>○ Technical service bulletin</li> <li>● Fluid types (if applicable)</li> </ul>
8.2 Identify brake system components and configurations (including air and hydraulic systems, parking brake, power assist, and vehicle dynamic brake systems)	<ul style="list-style-type: none"> <li>● Brake system components and configurations <ul style="list-style-type: none"> <li>○ Air and hydraulic systems</li> <li>○ Parking brake</li> <li>○ Power assist</li> <li>○ Vehicle dynamic brake systems</li> </ul> </li> </ul>
8.3 Identify brake performance problems caused by the mechanical/foundation brake system (air and hydraulic)	<ul style="list-style-type: none"> <li>● Brake performance problems <ul style="list-style-type: none"> <li>○ Run-out condition (rotors and drums)</li> <li>○ Uneven friction surface wear</li> <li>○ Springs</li> <li>○ Caliper piston</li> <li>○ Drum brake cylinder</li> </ul> </li> </ul>
8.4 Inspect air supply system components such as compressor, governor, air drier, tanks, and lines; inspect service system components such as lines, fittings, mountings, and valves (hand brake/trailer control, brake relay, quick release, tractor protection, emergency/spring brake control, pressure relief/safety)	<ul style="list-style-type: none"> <li>● Inspect air supply system components <ul style="list-style-type: none"> <li>○ Compressor</li> <li>○ Governor</li> <li>○ Air drier</li> <li>○ Tanks, lines, and fittings</li> <li>○ Pressure relief valve</li> <li>○ Pressure safety valve</li> <li>○ Supply and wet tank</li> <li>○ Relay valves</li> <li>○ Quick release valve</li> <li>○ Tractor protection valve</li> <li>○ Emergency/spring brake control</li> <li>○ Glad hands</li> </ul> </li> </ul>
8.5 Verify proper gauge operation and readings; verify low pressure warning alarm operation; perform air supply system tests such as pressure build-up, governor settings, and leakage; drain air tanks and check for contamination	<ul style="list-style-type: none"> <li>● Gauge operation and readings</li> <li>● Low pressure warning alarm operation</li> <li>● Air supply system tests <ul style="list-style-type: none"> <li>○ Pressure build-up</li> <li>○ Governor settings</li> <li>○ Leakage</li> </ul> </li> <li>● Air tanks <ul style="list-style-type: none"> <li>○ Drain</li> <li>○ Check for contamination</li> </ul> </li> </ul>
8.6 Inspect service brake chambers, diaphragms, clamps, springs,	<ul style="list-style-type: none"> <li>● Inspect and determine needed action</li> </ul>

<p>pushrods, clevises, and mounting brackets; determine needed action</p>	<ul style="list-style-type: none"> <li>○ Service brake chambers</li> <li>○ Diaphragms</li> <li>○ Clamps</li> <li>○ Springs</li> <li>○ Pushrods</li> <li>○ Clevises</li> <li>○ Mounting brackets</li> </ul>
<p>8.7 Identify slack adjuster/brake adjuster type; check free stroke and applied stroke; inspect and lubricate slack adjusters/brake adjusters; determine needed action</p>	<ul style="list-style-type: none"> <li>● Inspect and determine needed action of slack adjuster type <ul style="list-style-type: none"> <li>○ Free stroke and applied stroke</li> <li>○ Inspect and lubricate slack adjusters/brake adjusters</li> </ul> </li> </ul>
<p>8.8 Inspect and lubricate camshafts (S-cams), tubes, rollers, bushings, seals, spacers, retainers, brake spiders, shields, anchor pins, and springs; determine needed action</p>	<ul style="list-style-type: none"> <li>● Camshafts (S-cams) <ul style="list-style-type: none"> <li>○ Inspection</li> <li>○ Determine needed action</li> </ul> </li> </ul>
<p>8.9 Inspect rotor and mounting surface; measure rotor thickness, thickness variation, and lateral runout; determine needed action</p>	<ul style="list-style-type: none"> <li>● Inspect and determine needed action of rotor mounting surface <ul style="list-style-type: none"> <li>○ Measure <ul style="list-style-type: none"> <li>▪ Rotor thickness</li> <li>▪ Thickness variation</li> <li>▪ Lateral runout</li> </ul> </li> </ul> </li> </ul>
<p>8.10 Inspect, clean, and adjust air disc brake caliper assemblies; inspect and measure disc brake pads; inspect mounting hardware; determine needed action</p>	<ul style="list-style-type: none"> <li>● Brake caliper assemblies <ul style="list-style-type: none"> <li>○ Clean and inspect <ul style="list-style-type: none"> <li>▪ Brake Pads</li> <li>▪ Mounting hardware</li> </ul> </li> <li>○ Measure <ul style="list-style-type: none"> <li>▪ Pad thickness</li> </ul> </li> </ul> </li> <li>● Determine needed action</li> </ul>
<p>8.11 Remove brake drum; clean and inspect brake drum and mounting surface; measure brake drum diameter; measure brake lining thickness; inspect brake lining condition; determine needed action</p>	<ul style="list-style-type: none"> <li>● Brake drum <ul style="list-style-type: none"> <li>○ Clean and inspect <ul style="list-style-type: none"> <li>▪ Drum</li> <li>▪ Mounting surface</li> <li>▪ Lining</li> </ul> </li> <li>○ Measure <ul style="list-style-type: none"> <li>▪ Diameter</li> <li>▪ Lining thickness</li> </ul> </li> </ul> </li> <li>● Determine needed action</li> </ul>
<p>8.12 Inspect and check parking (spring) brake chamber for leaks;</p>	<ul style="list-style-type: none"> <li>● Parking (spring) brake chamber</li> </ul>

determine needed action	<ul style="list-style-type: none"> <li>○ Inspect</li> <li>○ Check for leaks</li> <li>○ Determine needed action</li> </ul>
8.13 Inspect and test parking (spring) brake check valves, lines, hoses, and fittings; determine needed action	<ul style="list-style-type: none"> <li>● Parking (spring) brake <ul style="list-style-type: none"> <li>○ Inspect valves, lines, hoses, and fittings</li> <li>○ Determine needed action</li> </ul> </li> </ul>
8.14 Inspect and test parking (spring) brake application and release valve; determine needed action	<ul style="list-style-type: none"> <li>● Parking (spring) brake application and release valve <ul style="list-style-type: none"> <li>○ Inspect and test</li> <li>○ Determine needed action</li> </ul> </li> </ul>
8.15 Manually release (cage) and (uncage) parking (spring) brakes	<ul style="list-style-type: none"> <li>● Manually release (cage) and (uncage) parking (spring) brake <ul style="list-style-type: none"> <li>○ Safety</li> <li>○ Identify and use proper caging bolt</li> </ul> </li> </ul>
8.16 Observe antilock brake system (ABS) warning light operation including trailer and dash mounted trailer ABS warning light	<ul style="list-style-type: none"> <li>● Antilock brake system (ABS) warning light <ul style="list-style-type: none"> <li>○ Observe operation <ul style="list-style-type: none"> <li>▪ Trailer</li> <li>▪ Dash mounted trailer</li> </ul> </li> </ul> </li> </ul>
8.17 Observe automatic traction control (ATC) and electronic stability control (ESC) warning light operation	<ul style="list-style-type: none"> <li>● Observe warning light operation <ul style="list-style-type: none"> <li>○ Automatic traction control (ATC)</li> <li>○ Electronic stability control (ESC)</li> </ul> </li> <li>● Identify steering angle calibration</li> </ul>
<b>STANDARD 9.0 PERFORM HYDRAULIC BRAKE SYSTEM PM</b>	
9.1 Check master cylinder fluid level and condition; determine proper fluid type for application	<ul style="list-style-type: none"> <li>● Visually inspect master cylinder fluid level</li> <li>● Verify proper fluid type</li> </ul>
9.2 Inspect hydraulic brake system components for leaks and damage	<ul style="list-style-type: none"> <li>● Visually inspect hydraulic brake system for leaks and damage <ul style="list-style-type: none"> <li>○ Master cylinder</li> <li>○ Hydraulic lines</li> <li>○ Calipers</li> <li>○ Wheel cylinders</li> <li>○ Hoses</li> <li>○ Valves</li> </ul> </li> </ul>
9.3 Check hydraulic brake system operation including pedal travel, pedal effort, and pedal feel	<ul style="list-style-type: none"> <li>● Check operation <ul style="list-style-type: none"> <li>○ Pedal travel</li> <li>○ Pedal effort</li> </ul> </li> </ul>

	<ul style="list-style-type: none"> <li>○ Pedal feel</li> </ul>
9.4 Inspect rotor and mounting surface; measure rotor thickness, thickness variation, and lateral runout; determine needed action	<ul style="list-style-type: none"> <li>● Visually inspect brake rotor and mounting surface <ul style="list-style-type: none"> <li>○ Measure <ul style="list-style-type: none"> <li>▪ Rotor (pad) thickness</li> <li>▪ Thickness variation</li> <li>▪ Lateral runout</li> </ul> </li> </ul> </li> </ul>
9.5 Inspect and clean disc brake caliper assemblies; inspect and measure disc brake pads; inspect mounting hardware and slides; determine needed action	<ul style="list-style-type: none"> <li>● Brake caliper assemblies <ul style="list-style-type: none"> <li>○ Inspect and clean <ul style="list-style-type: none"> <li>▪ Brake pads</li> <li>▪ Mounting hardware</li> </ul> </li> <li>○ Measure <ul style="list-style-type: none"> <li>▪ Pad thickness</li> </ul> </li> </ul> </li> <li>● Perform needed action</li> </ul>
9.6 Remove brake drum; clean and inspect brake drum and mounting surface; measure brake drum diameter; measure brake lining thickness; inspect brake lining condition; inspect wheel cylinders; determine needed action	<ul style="list-style-type: none"> <li>● Brake drum <ul style="list-style-type: none"> <li>○ Clean and inspect <ul style="list-style-type: none"> <li>▪ Drum</li> <li>▪ Mounting surface</li> <li>▪ Lining</li> <li>▪ Wheel cylinders</li> </ul> </li> <li>○ Measure <ul style="list-style-type: none"> <li>▪ Diameter</li> <li>▪ Lining thickness</li> </ul> </li> </ul> </li> <li>● Determine needed action</li> </ul>
9.7 Check parking brake operation; inspect parking brake application and holding devices	<ul style="list-style-type: none"> <li>● Parking brake operation</li> <li>● Check application</li> <li>● Inspect <ul style="list-style-type: none"> <li>○ Mounting</li> <li>○ Brackets</li> <li>○ Cable</li> </ul> </li> </ul>
9.8 Check brake assist/booster system (vacuum or hydraulic) hoses, pump, switches, and control valves; check fluid level and condition (if applicable)	<ul style="list-style-type: none"> <li>● Brake assist/booster system <ul style="list-style-type: none"> <li>○ Hoses, pump, switches, control valves</li> </ul> </li> <li>● Inspect fluid condition and level (if applicable)</li> </ul>
9.9 Check operation of emergency (back-up/reserve) brake assist system	<ul style="list-style-type: none"> <li>● Emergency (back-up/reserve) brake assist system <ul style="list-style-type: none"> <li>○ Operation</li> </ul> </li> </ul>



9.10 Observe antilock brake system (ABS) warning light operation including trailer and dash mounted trailer ABS warning light	<ul style="list-style-type: none"> <li>● Warning light operation <ul style="list-style-type: none"> <li>○ Antilock brake system (ABS)</li> </ul> </li> </ul>
9.11 Observe automatic traction control (ATC) and electronic stability control (ESC) warning light operation	<ul style="list-style-type: none"> <li>● Warning light operation <ul style="list-style-type: none"> <li>○ Automatic traction control (ATC)</li> <li>○ Electronic stability control (ESC)</li> </ul> </li> <li>● Identify steering angle calibration</li> </ul>
<b>STANDARD 10.0 PERFORM SUSPENSION AND STEERING SYSTEMS PM</b>	
10.1 Research vehicle service information, including fluid type, vehicle service history, service precautions, technical service bulletins, special service message(s)	<ul style="list-style-type: none"> <li>● Vehicle service information</li> <li>● Fluid Types</li> <li>● Service history</li> <li>● Work orders</li> <li>● Required customer information</li> <li>● Vehicle information online resources <ul style="list-style-type: none"> <li>○ Service precaution</li> <li>○ Technical service bulletin</li> </ul> </li> </ul>
10.2 Disable and enable supplemental restraint system (SRS); verify indicator lamp operation	<ul style="list-style-type: none"> <li>● Disable Supplemental Restraint System (SRS)</li> <li>● Enable SRS system</li> <li>● Verify lamp indicator operation</li> </ul>
10.3 Identify suspension and steering system components and configurations	<ul style="list-style-type: none"> <li>● Identify suspension <ul style="list-style-type: none"> <li>○ Leaf spring</li> <li>○ Air bags</li> <li>○ Independent</li> </ul> </li> <li>● Identify steering <ul style="list-style-type: none"> <li>○ Three piece</li> <li>○ Rack and pinion</li> </ul> </li> </ul>
10.4 Check steering wheel for free play, binding, and proper centering; inspect and service steering shaft U-joint(s), slip joint(s), bearings, bushings, and seals; phase steering shaft	<ul style="list-style-type: none"> <li>● Inspect steering wheel and column <ul style="list-style-type: none"> <li>○ Free play</li> <li>○ Binding</li> <li>○ Proper centering</li> </ul> </li> <li>● Inspect steering shaft</li> </ul>
10.5 Check operation of tilt and telescoping steering column	<ul style="list-style-type: none"> <li>● Tilt and telescoping steering column (if applicable) <ul style="list-style-type: none"> <li>○ Check operation</li> <li>○ Inspect intermediate shaft</li> <li>○ Lubricate</li> </ul> </li> </ul>

10.6 Check cab mounts, suspension, and ride height	<ul style="list-style-type: none"> <li>● Inspect cab mounts, suspension, and ride height <ul style="list-style-type: none"> <li>○ Bolts</li> <li>○ Brackets</li> <li>○ Bushings</li> <li>○ Air bags</li> </ul> </li> </ul>
10.7 Check power steering pump and gear operation, mountings, lines, and hoses; check fluid level and condition; service filter; inspect system for leaks	<ul style="list-style-type: none"> <li>● Visually inspect power steering pump and gear operation <ul style="list-style-type: none"> <li>○ Mounting</li> <li>○ Lines</li> <li>○ Hoses</li> <li>○ Fluid level and condition</li> <li>○ Service filter (if applicable)</li> <li>○ Leaks</li> </ul> </li> </ul>
10.8 Flush and refill power steering system; purge air from system	<ul style="list-style-type: none"> <li>● Power steering system flush <ul style="list-style-type: none"> <li>○ Purge air from system</li> </ul> </li> </ul>
10.9 Inspect and lubricate tie rod ends, ball joints, kingpins, pitman arms, idler arms, and other steering linkage components	<ul style="list-style-type: none"> <li>● Visually inspect steering linkage components <ul style="list-style-type: none"> <li>○ Tie rod ends</li> <li>○ Ball joints</li> <li>○ Kingpins</li> <li>○ Pitman arms</li> <li>○ Idler arms</li> <li>○ Universal joints</li> <li>○ Intermediate steering shafts</li> </ul> </li> <li>● Lubricate moving joints (if applicable)</li> </ul>
10.10 Inspect shock absorbers, bushings, brackets, and mounts; determine needed action	<ul style="list-style-type: none"> <li>● Inspect shock absorbers <ul style="list-style-type: none"> <li>○ Mounting</li> <li>○ Leaks</li> </ul> </li> <li>● Bushings</li> <li>● Brackets</li> <li>● Mounts</li> <li>● Determine needed action</li> </ul>
10.11 Inspect leaf springs, center bolts, clips, pins, bushings, shackles, U-bolts, insulators, brackets, and mounts; determine needed action	<ul style="list-style-type: none"> <li>● Visually inspect leaf springs <ul style="list-style-type: none"> <li>○ Center bolts</li> <li>○ Clips</li> <li>○ Pins</li> <li>○ Bushings</li> <li>○ Shackles</li> <li>○ U-bolts</li> </ul> </li> </ul>

	<ul style="list-style-type: none"> <li>○ Insulators</li> <li>○ Brackets</li> <li>○ Mounts</li> </ul>
10.12 Inspect axle and axle aligning devices such as: radius rods, track bars, stabilizer bars, and torque arms; inspect related bushings, mounts, and shims	<ul style="list-style-type: none"> <li>● Visually inspect axle and axle aligning devices <ul style="list-style-type: none"> <li>○ Radius rods</li> <li>○ Track bars</li> <li>○ Stabilizer bars</li> <li>○ Torque arms</li> <li>○ Related bushings, mounts, and shims</li> </ul> </li> </ul>
10.13 Inspect tandem suspension equalizer components	<ul style="list-style-type: none"> <li>● Visually inspect tandem suspension equalizer components</li> </ul>
10.14 Inspect and test air suspension pressure regulator and height control valves, lines, hoses, dump valves, and fittings; measure ride height	<ul style="list-style-type: none"> <li>● Visually inspect and check operation of air suspension components <ul style="list-style-type: none"> <li>○ Pressure regulator</li> <li>○ Height control valves</li> <li>○ Lines</li> <li>○ Hoses</li> <li>○ Dump valves</li> <li>○ Fittings</li> </ul> </li> <li>● Measure ride height</li> </ul>
10.15 Inspect air springs, mounting plates, springs, suspension arms, and bushings	<ul style="list-style-type: none"> <li>● Visually inspect <ul style="list-style-type: none"> <li>○ Air springs</li> <li>○ Mounting plates</li> <li>○ Springs</li> <li>○ Suspension arms</li> <li>○ Bushings</li> </ul> </li> </ul>
<b>STANDARD 11.0 PERFORM TIRE AND WHEEL PM</b>	
11.1 Explain alignment angles and their influence on tire wear and vehicle tracking	<ul style="list-style-type: none"> <li>● Toe</li> <li>● Castor (if applicable per truck class)</li> <li>● Camber</li> <li>● Steering Axis Inclination (SAI)</li> </ul>
11.2 Inspect tire condition; identify tire wear patterns; measure tread depth; verify tire matching (diameter and tread); inspect valve stem and cap; set tire pressure; verify tire pressure monitoring system (TPMS) operation (if applicable)	<ul style="list-style-type: none"> <li>● Inspect tire condition</li> <li>● Identify wear patterns</li> <li>● Measure tread depth <ul style="list-style-type: none"> <li>○ At lowest point of the tire per Department of Transportation (DOT) regulations</li> </ul> </li> </ul>

	<ul style="list-style-type: none"> <li>● Verify tire matching <ul style="list-style-type: none"> <li>○ Diameter</li> <li>○ Tread type</li> </ul> </li> <li>● Inspect valve stem/cap</li> <li>● Tire pressure <ul style="list-style-type: none"> <li>○ Measure</li> </ul> </li> <li>● Inflate/Deflate to proper pressure</li> </ul>
11.3 Explain causes for wheel/tire vibration, shimmy, and road tramp problems	<ul style="list-style-type: none"> <li>● Identify wheel/tire vibration <ul style="list-style-type: none"> <li>○ Shimmy</li> <li>○ Road tramp</li> </ul> </li> </ul>
11.4 Check wheel mounting hardware; check wheel condition and runout; remove and install wheel/tire assemblies (steering and drive axle); torque fasteners to manufacturer's specification using torque wrench	<ul style="list-style-type: none"> <li>● Check wheel mounting hardware</li> <li>● Check wheel condition and runout</li> <li>● Remove and install wheel/tire assemblies (steering and drive axle)</li> <li>● Torque fasteners to manufacturer's specification using torque wrench</li> </ul>

## Domain 4: Safety

Instructional Time: 15 - 20%

### STANDARD 1 .0 PERFORM AUTOMOTIVE SHOP AND SAFETY TASKS

1.1 Identify general shop safety rules and procedures	<ul style="list-style-type: none"> <li>● General shop rules</li> <li>● General shop procedures</li> <li>● Types of hazards <ul style="list-style-type: none"> <li>○ Horseplay</li> <li>○ Slips/trips/falls protection</li> </ul> </li> </ul>
1.2 Utilize safe procedures for handling of tools and equipment	<ul style="list-style-type: none"> <li>● General tool safety</li> <li>● Safe procedures for handling of tools and equipment <ul style="list-style-type: none"> <li>○ Hand tools</li> <li>○ Electrical power tools</li> <li>○ Precision measurement tools</li> <li>○ Pneumatics</li> </ul> </li> </ul>
1.3 Identify and use proper placement of floor jacks and jack stands	<ul style="list-style-type: none"> <li>● Identify jack designs</li> <li>● Safe procedures for jacks</li> </ul>

	<ul style="list-style-type: none"> <li>● Wheel chocks</li> <li>● Proper use of jack stands</li> </ul>
1.4 Identify and use proper procedures for safe lift operation	<ul style="list-style-type: none"> <li>● Safe procedures for lift operations</li> <li>● Vehicle placement/weight distribution</li> <li>● Safe lift</li> <li>● Safety locks</li> </ul>
1.5 Utilize proper ventilation procedures for working within the lab/shop area	<ul style="list-style-type: none"> <li>● Safe procedures for proper ventilation within lab/shop areas</li> <li>● Carbon monoxide (CO)/exhaust hazards</li> <li>● Ventilation fan/system switch location</li> </ul>
1.6 Identify marked safety areas	<ul style="list-style-type: none"> <li>● Marked safety areas</li> <li>● OSHA color codes</li> <li>● Lockout tagout</li> </ul>
1.7 Identify the location and the types of fire extinguishers and other fire safety equipment	<ul style="list-style-type: none"> <li>● Fire extinguishers and other fire safety equipment <ul style="list-style-type: none"> <li>○ Location</li> <li>○ Types</li> </ul> </li> </ul>
1.8 Identify procedures for using fire extinguishers and other fire safety equipment	<ul style="list-style-type: none"> <li>● Correct procedure for using a fire extinguisher <ul style="list-style-type: none"> <li>○ PASS technique</li> </ul> </li> <li>● Classes of fire</li> </ul>
1.9 Identify the location and use of eye wash stations	<ul style="list-style-type: none"> <li>● Eye wash stations and showers <ul style="list-style-type: none"> <li>○ Location</li> <li>○ Use buddy system</li> </ul> </li> </ul>
1.10 Identify the location of the posted evacuation routes	<ul style="list-style-type: none"> <li>● Location of the posted evacuation routes</li> </ul>
1.11 Comply with the required use of safety glasses, ear protection, gloves, and shoes during lab/shop activities	<ul style="list-style-type: none"> <li>● Proper PPE <ul style="list-style-type: none"> <li>○ Safety glasses</li> <li>○ Ear protection</li> <li>○ Gloves</li> <li>○ Proper shoes</li> </ul> </li> </ul>
1.12 Identify and wear appropriate clothing for lab/shop activities	<ul style="list-style-type: none"> <li>● Proper PPE <ul style="list-style-type: none"> <li>○ Shirts</li> <li>○ Pants</li> </ul> </li> </ul>
1.13 Secure hair and jewelry for lab/shop activities	<ul style="list-style-type: none"> <li>● Secure hair</li> <li>● No jewelry</li> </ul>

<p>1.14 Explain the safety aspects of vehicle systems that can operate automatically when the vehicle is off (e.g., supplemental restraint systems (SRS), electronic brake control systems, and electrified vehicle systems)</p>	<ul style="list-style-type: none"> <li>● Supplemental restraint systems (SRS)</li> <li>● Electronic brake control systems</li> <li>● Electrified vehicle systems</li> <li>● Hybrid high voltage systems</li> <li>● High voltage protection</li> </ul>
<p>1.15 Explain the safety aspects of high voltage circuits (i.e., high-intensity discharge (HID) lamps, ignition systems, injection systems, electrified vehicle powertrain, etc.)</p>	<ul style="list-style-type: none"> <li>● High voltage safety procedures <ul style="list-style-type: none"> <li>○ High-intensity discharge (HID) lamps</li> <li>○ Ignition systems</li> <li>○ Injection systems</li> <li>○ Electrified vehicle powertrain, etc.</li> </ul> </li> </ul>
<p>1.16 Locate and demonstrate knowledge of safety data sheets (SDS)</p>	<ul style="list-style-type: none"> <li>● Safety Data Sheets (SDS) usage</li> <li>● Right to Know <ul style="list-style-type: none"> <li>○ Employer responsibilities</li> <li>○ Employee responsibilities</li> </ul> </li> </ul>
<p>1.17 Identify tools and their usage in medium/heavy truck applications</p>	<ul style="list-style-type: none"> <li>● Tool usage <ul style="list-style-type: none"> <li>○ Identify</li> <li>○ Hand tools</li> </ul> </li> </ul>
<p>1.18 Identify standard and metric designation</p>	<ul style="list-style-type: none"> <li>● Standard designation</li> <li>● Metric designation</li> <li>● Identify</li> <li>● Convert between standard and metric</li> </ul>
<p>1.19 Demonstrate safe handling and use of appropriate tools</p>	<ul style="list-style-type: none"> <li>● Tool usage</li> <li>● Safety handling</li> </ul>
<p>1.20 Demonstrate proper cleaning, storage, and maintenance of tools and equipment</p>	<ul style="list-style-type: none"> <li>● Tool maintenance</li> <li>● Proper cleaning and general care procedures</li> <li>● Storage/organization</li> <li>● Air tools</li> <li>● Power tools</li> </ul>
<p>1.21 Demonstrate proper use of precision measuring tools (i.e., micrometer, dial-indicator, dial-caliper, torque wrench, etc.)</p>	<ul style="list-style-type: none"> <li>● Proper use <ul style="list-style-type: none"> <li>○ Micrometer</li> <li>○ Dial-indicator</li> <li>○ Dial-caliper</li> <li>○ Torque wrench, etc.</li> </ul> </li> </ul>
<p>1.22 Identify information necessary and the service requested on a</p>	<ul style="list-style-type: none"> <li>● Service requests</li> </ul>

repair order

- Information on repair
- Vehicle Identification Number (VIN)
- Mileage/hours
- Complaint/Cause/Corrective action

