Entry-Level Certification Program

TEST SPECIFICATIONS AND TASK LISTS

M/H TRUCK SERIES

(Effective July 1, 2024)

The task lists and test specifications for each of the five individual tests below are derived directly from the 2022 Instructional Standard for ASE program accreditation.

The task lists are simply listings of the tasks involved in servicing and repair of various vehicle systems. Each question in a test is keyed to one or more of these tasks. The task lists are organized into content categories, and these content categories, along with the number of questions included in each category, comprise the test specifications. Every exam form meets these specifications.

Tests may include additional non-scored questions for statistical evaluation. Extra questions will not count for or against the final score. However, since they are not identified, candidates should answer every question to the best of their ability.

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DIESEL ENGINES

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Required To Pass: 21 of 40	40

Notes:
This test may include additional questions for statistical evaluation. Extra questions will not count for or against the final score. Since the extra questions are not identified, test candidates should answer every question to the best of their ability.

A. General

1. Research vehicle service information, including fluid type, vehicle service history, service precautions, and technical service bulletins.
2. Inspect level and condition of fuel, oil, diesel exhaust fluid (DEF), and coolant.
3. Inspect engine assembly for fuel, oil, coolant, air, and other leaks; determine needed action.
4. Diagnose engine operation (starting and running) including: noise, vibration, smoke, etc.; determine needed action.
5. Use appropriate electronic service tool(s) and procedures to diagnose problems; check, record, and clear diagnostic codes; check and record trip/operational data; reset maintenance monitor (if applicable); interpret digital multimeter (DMM) readings.
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.
7. Diagnose engine no-crank, cranks but fails to start, hard starting, and starts but does not continue to run problems; determine needed action.
8. Diagnose engine surging, rough operation, misfiring, low power, slow deceleration, slow acceleration, and/or shut down problems; determine needed action.

B. Cylinder Head and Valve Train

1. Inspect electronic wiring harness and brackets for wear, bending, cracks, and proper securement; determine needed action.
2. Inspect cylinder head for cracks/damage; check mating surfaces for warpage; check condition of passages; inspect core/expansion and gallery plugs; determine needed action.
3. Inspect injector sleeves and seals; determine needed action.
4. Inspect valve train components; determine needed action.
5. Inspect, measure, and replace/reinstall camshaft; measure end play and backlash; determine needed action.
6. Adjust valve bridges (crossheads); adjust valve clearances and injector settings.
7. Disassemble cylinder head; inspect valves, guides, seats, springs, retainers, rotators, locks, and seals; determine needed action.

8. Measure valve head height relative to deck; measure valve face-to-seat contact; determine needed action.
9. Reassemble cylinder head.

C. Engine Block

1. Inspect crankshaft vibration damper; inspect engine mounts; determine needed action.
2. Remove, inspect, service, and install pans, covers, gaskets, seals, wear rings, and crankcase ventilation components; determine needed action.
3. Perform crankcase pressure test; determine needed action.
4. Install and align flywheel housing; inspect flywheel housing(s) to transmission housing/engine mating surface(s); and measure flywheel housing face and bore runout; determine needed action.
5. Inspect flywheel/flexplate (including ring gear) and mounting surfaces for cracks and wear; measure runout; determine needed action.
6. Disassemble and clean engine block; inspect engine block for cracks/damage; measure mating surfaces for warpage; check condition of passages, core/expansion plugs, and gallery plugs; inspect threaded holes, studs, dowel pins, and bolts for serviceability; determine needed action.
7. Inspect cylinder sleeve counter bore and lower bore; check bore distortion; determine needed action.
8. Clean, inspect, and measure cylinder walls or liners for wear and damage; determine needed action.
9. Replace/reinstall cylinder liners and seals; check and adjust liner height (protrusion).
10. Inspect camshaft bearings for wear and damage; determine needed action.
11. Inspect, measure, and replace/reinstall camshaft; measure end play and backlash; determine needed action.
12. Clean and inspect crankshaft for surface cracks and journal damage; check condition of oil passages; check passage plugs; measure journal diameter; determine needed action.
13. Inspect main bearings for wear patterns and damage; replace as needed; check bearing clearances; check and correct crankshaft end play.
14. Inspect, install, and time gear train; measure gear backlash; determine needed action.
15. Inspect connecting rod and bearings for wear patterns; measure pistons, pins, retainers, and bushings; determine needed action.
16. Determine piston-to-cylinder wall clearance; check ring-to-groove fit and end gap; install rings on pistons.
17. Assemble pistons and connecting rods; install in block; install rod bearings and check clearances.
18. Check condition of piston cooling jets (nozzles); determine needed action.

D. Lubrication Systems

1. Test engine oil pressure; check operation of pressure sensor, gauge, and/or sending unit; test engine oil temperature; check operation of temperature sensor; determine needed action.
2. Check engine oil level, condition, and consumption; take engine oil sample; determine needed action.
3. Determine proper lubricant; perform oil and filter service.
4. Inspect, clean, and test oil cooler and components; determine needed action.
5. Inspect turbocharger lubrication systems; determine needed action.
6. Inspect and measure oil pump, drives, inlet pipes, and pick-up screens; check drive gear clearances; determine needed action.

7. Inspect oil pressure regulator valve(s), by-pass and pressure relief valve(s), oil thermostat, and filters; determine needed action.

E. Cooling System

1. Check engine coolant type, level, and condition; test coolant for freeze protection and additive package concentration.
2. Test coolant temperature; test operation of temperature and level sensors, gauge, and/or sending unit; determine needed action.
3. Inspect and reinstall/replace pulleys, tensioners and drive belts; adjust drive belts and check alignment.
4. Recover coolant; flush and refill with recommended coolant/additive package; bleed cooling system.
5. Inspect coolant conditioner/filter assembly for leaks; inspect valves, lines, and fittings; replace as needed.
6. Inspect water pump, hoses, and clamps; determine needed action.
7. Inspect and pressure test cooling system(s); pressure test cap, tank(s), and recovery systems; inspect radiator and mountings; determine needed action.
8. Inspect, test, and repair thermostatic cooling fan system (hydraulic, pneumatic, and electronic) and fan shroud; determine needed action.
9. Test engine block heater(s); determine needed action.
10. Diagnose engine coolant consumption; determine needed action.
11. Inspect thermostat(s), by-passes, housing(s), and seals; replace as needed.
12. Inspect turbocharger cooling systems; determine needed action.

F. Air Induction, Exhaust Systems, and Engine Brakes

1. Inspect turbocharger(s), wastegate(s), and piping systems; determine needed action
2. Diagnose air induction system problems; inspect, clean, and/or replace cooler assembly, piping, hoses, clamps, and mountings; replace air filter as needed; reset restriction indicator (if applicable).
3. Inspect intake manifold, gaskets, and connections; determine needed action.
4. Inspect engine exhaust system, exhaust gas recirculation (EGR) system, and exhaust aftertreatment system for leaks, mounting, proper routing, and damaged or missing components; determine needed action.
5. Inspect crankcase ventilation system; service as needed.
6. Diagnose problems/faults in the exhaust gas recirculation (EGR) system including: EGR valve, cooler, piping, filter, electronic sensors, controls, and wiring; determine needed action.
7. Perform air intake system restriction and leakage tests; determine needed action.
8. Perform intake manifold pressure (boost) test; determine needed action.
9. Check exhaust back pressure; determine needed action.
10. Inspect variable ratio geometry turbocharger (VGT), controls, and actuators (pneumatic, hydraulic, and electronic); determine needed action.
11. Demonstrate knowledge of charge air cooler operation and testing.
12. Diagnose exhaust aftertreatment system performance problems; determine needed action.
13. Diagnose preheater/inlet air heater or glow plug system and controls: determine needed action.
14. Inspect engine compression and/or exhaust brake housing, valves, seals, lines, and fittings; determine needed action.
15. Inspect and adjust engine compression and/or exhaust brake systems; determine needed action.

16. Inspect, test, and adjust engine compression and/or exhaust brake control circuits, switches, and solenoids; determine needed action.

G. Fuel System

1. Check fuel level and condition; determine needed action.
2. Inspect fuel tanks, vents, caps, mounts, valves, screens, crossover system, hoses, lines, and fittings; determine needed action.
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); determine needed action.
4. Replace fuel filter; prime and bleed fuel system.
5. Inspect high pressure fuel system components (fuel pump, pump drives, hoses, injection lines, filters, hold-downs, fittings, seals, and mounting hardware).
6. Demonstrate knowledge and understanding of the different types of fuel systems.
7. Perform fuel supply and return system tests; determine needed action.
8. Perform cylinder contribution test using electronic service tool(s).
9. Demonstrate knowledge of how to set performance parameters using electronic service tools and service information system access.

ELECTRICAL/ELECTRONIC SYSTEMS

Content Area	Questions In Test
A. General	9
B. Battery System	4
C. Starting System	6
D. Charging System	5
E. Lighting Systems	5
F. Instrument Cluster and Driver Information Systems	4
G. Cab and Chassis Electrical Systems	7
Required To Pass: 21 of 40 TOTAL	40

Notes:
This test may include additional questions for statistical evaluation. Extra questions will not count for or against the final score. Since the extra questions are not identified, test candidates should answer every question to the best of their ability.

A. General

1. Research vehicle service information, including vehicle service history, service precautions, and technical service bulletins.
2. Demonstrate knowledge of electrical/electronic series, parallel, and series-parallel circuits using principles of electricity (Ohm's Law).
3. Demonstrate proper use of test equipment when measuring source voltage, voltage drop (including grounds), current flow, continuity, and resistance.
4. Demonstrate knowledge of the causes and effects of shorts, grounds, opens, and resistance problems in electrical/electronic circuits; identify and locate faults in electrical/electronic circuits.
5. Use wiring diagrams during the diagnosis (troubleshooting) of electrical/electronic circuit problems.
6. Measure parasitic (key-off) battery drain; determine needed action.
7. Demonstrate knowledge of the function, operation, and testing of fusible links, circuit breakers, relays, solenoids, diodes, and fuses; perform inspection and testing; determine needed action.
8. Inspect, test, repair (including solder repair), and/or replace components, connectors, seals, terminal ends, harnesses, and wiring; verify proper routing and securement; determine needed action.
9. Use appropriate electronic service tool(s) and procedures to diagnose problems; check, record, and clear diagnostic codes; interpret digital multimeter (DMM) readings.
10. Diagnose faults in the data bus communications network; determine needed action.
11. Identify electrical/electronic system components and configuration.
12. Check frequency, pulse width, and waveforms of electrical/electronic signals using appropriate test equipment; interpret readings; determine needed repairs.
13. Understand the process for software transfer, software updates, and/or reprogramming of electronic modules.

B. Battery System

1. Identify battery type and system configuration.
2. Confirm proper battery capacity for application; perform battery state-of-charge test; perform battery capacity test, determine needed action.
3. Inspect battery, battery cables, connectors, battery boxes, mounts, and hold-downs; determine needed action.
4. Charge battery using appropriate method for battery type.
5. Jump-start vehicle using a booster battery and jumper cables or using an appropriate auxiliary power supply.
6. Check low voltage disconnect (LVD) systems; determine needed action.
7. Inspect, clean, and service battery; replace as needed.
8. Inspect and clean battery boxes, mounts, and hold-downs; repair or replace as needed.
9. Test, and clean battery cables and connectors; repair or replace as needed.
10. Identify electrical/electronic modules, radios, and other accessories that require reinitialization or code entry after reconnecting vehicle battery.

C. Starting System

1. Demonstrate understanding of starter system operation.
2. Perform starter circuit cranking voltage and voltage drop tests; determine needed action.
3. Inspect and test starter control circuit switches (key switch, push button, and/or magnetic switch), relays, connectors, terminals, wires, and harnesses (including over-crank protection); determine needed action.
4. Diagnose causes of no-crank or slow crank condition; differentiate between electrical and engine mechanical problems; determine needed action.
5. Perform starter current draw tests; determine needed action.
6. Remove and replace starter; inspect flywheel ring gear or flex plate.

D. Charging System

1. Identify and understand operation of the generator (alternator).
2. Test instrument panel mounted voltmeters and/or indicator lamps; determine needed action.
3. Inspect, adjust, and/or replace generator (alternator) drive belt; check pulleys and tensioners for wear; check fans and mounting brackets; verify proper belt alignment; determine needed action.
4. Inspect cables, wires, and connectors in the charging circuit.
5. Perform charging system voltage and amperage output tests; perform AC ripple test; determine needed action.
6. Perform charging circuit voltage drop tests; determine needed action.
7. Remove, inspect, and/or replace generator (alternator).

E. Lighting Systems

1. Diagnose causes of brighter-than-normal, intermittent, dim, or no-light operation; determine needed action.
2. Test, replace, and aim headlights.
3. Inspect cables, wires, and connectors in the lighting systems.
4. Diagnose faults in tractor-to-trailer multi-wire connector(s), cables, and holders; determine needed action.
5. Diagnose faults in switches, relays, bulbs/LEDs, wires, terminals, connectors, sockets, and control components/modules of exterior lighting systems; determine needed action.

6. Diagnose faults in switches, relays, bulbs/LEDs, wires, terminals, connectors, sockets, and control components/modules of interior lighting systems; determine needed action.
7. Diagnose faults in switches, relays, bulbs/LEDs, wires, terminals, connectors, sockets, and control components/modules of auxiliary lighting circuits; determine needed action.

F. Instrument Cluster and Driver Information Systems

1. Check gauge and warning indicator operation.
2. Diagnose faults in the sensor/sending units, gauges, switches, relays, bulbs/LEDs, wires, terminals, connectors, sockets, printed circuits, and control components/modules of the instrument cluster, driver information systems, and warning systems; determine needed action.
3. Inspect, test, replace, and calibrate (if applicable) electronic speedometer, odometer, and tachometer systems.

G. Cab and Chassis Electrical Systems

1. Diagnose operation of horn(s), wiper/washer, and occupant restraint systems.
2. Understand operation of safety systems and related circuits (such as: speed control, collision avoidance, lane departure, and camera systems).
3. Understand operation of comfort and convenience systems and related circuits (such as: power windows, power seats, power locks, remote keyless entry, steering wheel controls, and cruise control).
4. Understand operation of entertainment systems and related circuits (such as: radio, DVD, navigation, speakers, antennas, and voice-activated accessories).
5. Understand the operation of power inverter, protection devices, connectors, terminals, wiring, and control components/modules of auxiliary power systems.
6. Understand operation of telematics systems.
7. Diagnose faults in engine block and engine oil heater(s); determine needed action.

BRAKES

Content Area	Questions In Test
A. Air Brakes	22
B. Hydraulic Brakes	9
C. Vehicle Dynamic Brake Systems (Air and Hydraulic): Antilock Brake System (ABS), Automatic Traction Control (ATC) System, and Electronic Stability Control (ESC) System	6
D. Wheel Bearings	3
Required To Pass: 20 of 40	40

Notes:
This test may include additional questions for statistical evaluation. Extra questions will not count for or against the final score. Since the extra questions are not identified, test candidates should answer every question to the best of their ability.

A. Air Brakes

1. General

1. Research vehicle service information, including fluid type, vehicle service history, service precautions, and technical service bulletins.
2. Identify brake system components and configurations (including parking brake, power assist, and vehicle dynamic brake systems).
3. Identify brake performance problems caused by the mechanical/foundation brake system (air).
4. Use appropriate electronic service tool(s) and procedures to diagnose problems; check, record, and clear diagnostic codes; interpret digital multimeter (DMM) readings.

2. Air Supply and Service Systems

1. Inspect, test, repair, and/or replace 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/modulator, pressure relief/safety); determine needed action.
2. Test gauge operation and readings; test 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; determine needed action.
3. Demonstrate knowledge and understanding of air supply and service system components and operations.
4. Inspect air compressor drive gear components (gears, belts, tensioners, and/or couplings); determine needed action.
5. Inspect air compressor inlet; inspect oil supply and coolant lines, fittings, and mounting brackets; repair or replace as needed.
6. Inspect and test air tank relief (safety) valves, one-way (single) check valves, two-way (double) check valves, manual and automatic drain valves; determine needed action.
7. Inspect and clean air drier systems, filters, valves, heaters, wiring, and connectors; determine needed action.
8. Inspect and test brake application (foot/treadle) valve, fittings, and mounts; check pedal operation; determine needed action.

3. Mechanical/Foundation Brake System

1. Inspect, test, repair, and/or replace service brake chambers, diaphragms, clamps, springs, pushrods, clevises, and mounting brackets; determine needed action.
2. Identify slack adjuster type; inspect slack adjusters; perform needed action.
3. Check camshafts (S-cam), tubes, rollers, bushings, seals, spacers, retainers, brake spiders, shields, anchor pins, and springs; perform needed action.
4. Inspect rotor and mounting surface; measure rotor thickness, thickness variation, and lateral runout; determine needed action.
5. Inspect, clean, and adjust air disc brake caliper assemblies; inspect and measure disc brake pads; inspect mounting hardware; perform needed action.
6. 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.
7. Diagnose concerns related to the mechanical/foundation brake system including poor stopping, brake noise, premature wear, pulling, grabbing, or dragging; determine needed action.

4. Parking Brake System

1. Inspect, test, and/or replace parking (spring) brake chamber.
2. Inspect, test, and/or replace parking (spring) brake check valves, lines, hoses, and fittings.
3. Inspect, test, and/or replace parking (spring) brake application and release valve.
4. Manually release (cage) and reset (uncage) parking (spring) brakes.
5. Identify and test anti-compounding brake function; determine needed action.

B. Hydraulic Brakes

1. General

1. Research vehicle service information, including fluid type, vehicle service history, service precautions, and technical service bulletins.
2. Identify brake system components and configurations (including parking brake, power assist, and vehicle dynamic brake systems).
3. Identify brake performance problems caused by the mechanical/foundation brake system (hydraulic).
4. Use appropriate electronic service tool(s) and procedures to diagnose problems; check, record, and clear diagnostic codes; interpret digital multimeter (DMM) readings.

2. Hydraulic System

1. Check master cylinder fluid level and condition; determine proper fluid type for application.
2. Inspect hydraulic brake system for leaks and damage; test, repair, and/or replace hydraulic brake system components.
3. Check hydraulic brake system operation including pedal travel, pedal effort, and pedal feel; determine needed action.
4. Diagnose poor stopping, premature wear, pulling, dragging, imbalance, or poor pedal feel caused by problems in the hydraulic system; determine needed action.
5. Test master cylinder for internal/external leaks and damage; replace as needed.
6. Test metering (hold-off), load sensing/proportioning, proportioning, and combination valves; determine needed action.
7. Test brake pressure differential valve; test warning light circuit switch, bulbs/LEDs, wiring, and connectors; determine needed action.
8. Bleed and/or flush hydraulic brake system.

3. Mechanical/Foundation Brake System

1. Clean and inspect rotor and mounting surface; measure rotor thickness, thickness variation, and lateral runout; determine necessary action.
2. Inspect and clean disc brake caliper assemblies; inspect and measure disc brake pads; inspect mounting hardware; perform needed action.
3. Remove, clean and inspect brake drums; measure brake drum diameter; measure brake lining thickness; inspect brake lining condition; inspect wheel cylinders; determine serviceability.
4. Check disc brake caliper assembly mountings and slides; replace as needed.
5. Check parking brake operation; inspect parking brake application and holding devices; adjust, repair, and/or replace as needed.

4. Power Assist Systems

1. Check brake assist/booster system (vacuum or hydraulic) hoses and control valves; check fluid level and condition (if applicable).
2. Check operation of emergency (back-up/reserve) brake assist system.
3. Identify concerns related to the power assist system (vacuum or hydraulic), including stopping problems caused by the brake assist (booster) system; determine needed action.
4. Inspect, test, repair, and/or replace hydraulic brake assist/booster systems, hoses, and control valves.

C. Vehicle Dynamic Brake Systems (Air and Hydraulic): Antilock Brake System (ABS), Automatic Traction Control (ATC) System, and Electronic Stability Control (ESC) System

1. Observe antilock brake system (ABS) warning light operation including trailer and dash mounted trailer ABS warning light; determine needed action.
2. Observe automatic traction control (ATC) and electronic stability control (ETC) warning light operation; determine needed action.
3. Identify stopping concerns related to the vehicle dynamic brake systems: ABS, ATC, and ESC; determine needed action.
4. Diagnose problems in the vehicle dynamic brake control systems; determine needed action.
5. Check and test operation of vehicle dynamic brake system (air and hydraulic) mechanical and electrical components; determine needed action.
6. Test vehicle/wheel speed sensors and circuits; adjust, repair, and/or replace as needed.
7. Bleed ABS hydraulic circuits.
8. Verify power line carrier (PLC) operation.

D. Wheel Bearings

1. Clean, inspect, lubricate, and/or replace wheel bearings and races/cups; replace seals and wear rings; inspect spindle/tube; inspect and replace retaining hardware; adjust wheel bearings; check hub assembly fluid level and condition; verify end play with dial indicator method.
2. Identify, inspect, and/or replace unitized/preset hub bearing assemblies.

SUSPENSION AND STEERING

Content Area	Questions In Test
A. Steering Systems	10
B. Suspension Systems	10
C. Wheel Alignment Diagnosis, Adjustment, and Repair	12
D. Wheel and Tires	5
E. Frame and Coupling Devices	3
Required To Pass: 20 of 40 TOTAL	40

Notes:
This test may include additional questions for statistical evaluation. Extra questions will not count for or against the final score. Since the extra questions are not identified, test candidates should answer every question to the best of their ability.

A. Steering Systems

1. General

1. Research vehicle service information, including fluid type, vehicle service history, service precautions, and technical service bulletins.
2. Disable and enable supplemental restraint system (SRS); verify indicator lamp operation.
3. Identify steering system components and configurations.
4. Use appropriate electronic service tool(s) and procedures to diagnose problems; check, record, and clear diagnostic codes; interpret digital multimeter (DMM) readings.

2. Steering Column

1. 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.
2. Diagnose causes of fixed and driver adjustable steering column and shaft noise, looseness, and binding problems.
3. Check cab mounting and adjust cab ride height.
4. Remove the steering wheel (includes steering wheels equipped with electrical/electronic controls and components); install and center the steering wheel.
5. Inspect, test, replace, and calibrate steering angle sensor.

3. Steering Pump and Gear Units

1. Check power steering pump and gear operation, mountings, lines, and hoses; check fluid level and condition; service filter; inspect system for leaks.
2. Flush and refill power steering system; purge air from system.
3. Diagnose causes of power steering system noise, binding, darting/oversteer, reduced wheel cut, steering wheel kick, pulling, non-recovery, turning effort, looseness, hard steering, overheating, fluid leakage, and fluid aeration problems.
4. Inspect, service, and/or replace power steering reservoir, seals, and gaskets.
5. Inspect and/or replace power steering system cooler, lines, hoses, clamps, mountings, and fittings.
6. Inspect and/or replace power steering gear(s) (single and/or dual) and mountings.

4. Steering Linkage

1. Inspect, service, repair, and/or replace tie rod ends, ball joints, kingpins, pitman arms, idler arms, and other steering linkage components.

B. Suspension Systems

1. Inspect, service, repair, and/or replace shock absorbers, bushings, brackets, and mounts.
2. Inspect, repair, and/or replace leaf springs, center bolts, clips, pins, bushings, shackles, U-bolts, insulators, brackets, and mounts.
3. Inspect, repair, and/or replace axle and axle aligning devices such as: radius rods, track bars, stabilizer bars, and torque arms; inspect related bushings, mounts, shims and attaching hardware; determine needed action.
4. Inspect, repair, and/or replace tandem suspension equalizer components; determine needed action.
5. Inspect, repair, and/or replace air springs, mounting plates, springs, suspension arms, and bushings.
6. Inspect, test, repair, and/or replace air suspension pressure regulator and height control valves, lines, hoses, dump valves, and fittings; check and record ride height.
7. Inspect and service kingpins, steering knuckle bushings, locks, bearings, seals, and covers.
8. Measure, record and adjust ride height; determine needed action.
9. Diagnose rough ride problems; determine needed action.
10. Identify suspension system components and configurations.

C. Wheel Alignment Diagnosis, Adjustment, and Repair

1. Demonstrate understanding of alignment angles.
2. Diagnose causes of vehicle wandering, pulling, shimmy, hard steering, and off-center steering wheel problems.
3. Check, record, and adjust camber.
4. Check, record, and adjust caster.
5. Check, record, and adjust toe settings.
6. Check rear axle(s) alignment (thrust line/centerline) and tracking.
7. Identify turning/Ackerman angle (toe-out-on-turns) problems.
8. Check front axle alignment (centerline).

D. Wheels and Tires

1. Inspect tire condition; identify tire wear patterns; measure tread depth; verify tire matching (diameter and tread); inspect valve stem and cap; set tire pressure; determine needed action.
2. Diagnose wheel/tire vibration, shimmy, pounding, and hop (tramp) problems; determine needed action.
3. Check wheel mounting hardware; check wheel condition; remove and install wheel/tire assemblies (steering and drive axle); torque fasteners to manufacturer's specification using torque wrench.
4. Inspect tire and wheel for proper application (size, load range, position, and tread design); determine needed action.

E. Frame and Coupling Devices

1. Inspect, service, and/or adjust fifth wheel, pivot pins, bushings, locking mechanisms, mounting hardware, air lines, and fittings.
2. Inspect frame and frame members for cracks, breaks, corrosion, distortion, elongated holes, looseness, and damage; determine needed action.
3. Inspect, install, and/or replace frame hangers, brackets, and cross members; determine needed action.
4. Inspect, repair, or replace pintle hooks and draw bars (if applicable).
5. Inspect, service, and/or adjust sliding fifth wheel, tracks, stops, locking systems, air cylinders, springs, lines, hoses, and controls.

INSPECTION, MAINTENANCE, AND MINOR REPAIR

Content Area	Questions In Test
A. Diesel Engines	10
B. Drive Train	8
C. Brakes	12
D. Suspension and Steering	8
E. Electrical/Electronic Systems	11
F. Heating, Ventilation, and Air Conditioning	6
G. Cab	5
Pass Score: 36 of 60	60

Notes:
This test may include additional questions for statistical evaluation. Extra questions will not count for or against the final score. Since the extra questions are not identified, test candidates should answer every question to the best of their ability.

A. DIESEL ENGINES (DE)

DE-A. General

1. Research vehicle service information, including fluid type, vehicle service history, service precautions, and technical service bulletins.
2. Inspect level and condition of fuel, oil, diesel exhaust fluid (DEF), and coolant.
3. Inspect engine assembly for fuel, oil, coolant, air, and other leaks.
4. Check engine operation (starting and running) including: noise, vibration, smoke, etc.
5. Use appropriate electronic service tool(s) and procedures to diagnose problems; check, record, and clear diagnostic codes; check and record trip/operational data; reset maintenance monitor (if applicable); interpret digital multimeter (DMM) readings.
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.

DE-B. Cylinder Head and Valve Train

1. Inspect electronic wiring harness and brackets for wear, bending, cracks, and looseness.

DE-C. Engine Block

1. Inspect crankshaft vibration damper; inspect engine mounts.

DE-D. Lubrication Systems

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.
2. Check engine oil level, condition, and consumption; take engine oil sample.
3. Determine proper lubricant; perform oil and filter service.

DE-E. Cooling System

1. Check engine coolant type, level, condition, and test coolant for freeze protection and additive package concentration.
2. Verify coolant temperature; check operation of temperature and level sensors, gauge, and/or sending unit.

3. Inspect and reinstall/replace pulleys, tensioners and drive belts; adjust drive belts and check alignment.
4. Recover coolant, flush, and refill with recommended coolant/additive package; bleed cooling system.
5. Inspect coolant conditioner/filter assembly for leaks; inspect valves, lines, and fittings; replace as needed.
6. Inspect water pump, hoses, and clamps.
7. Inspect, and pressure test cooling system(s); pressure test cap, tank(s), and recovery systems; inspect radiator and mountings.
8. Inspect thermostatic cooling fan system (hydraulic, pneumatic, and electronic) and fan shroud.
9. Identify engine block heater(s).

DE-F. Air Induction and Exhaust Systems

1. Inspect turbocharger(s), wastegate(s), and piping systems.
2. Check air induction system including: cooler assembly, piping, hoses, clamps, and mountings; replace air filter as needed; reset restriction indicator (if applicable).
3. Inspect intake manifold, gaskets, and connections.
4. Inspect engine exhaust system, exhaust gas recirculation (EGR) system, and exhaust aftertreatment system for leaks, mounting, proper routing, and damaged or missing components.
5. Inspect crankcase ventilation system; service as needed.

DE-G. Fuel System

1. Check fuel level and condition.
2. Inspect fuel tanks, vents, caps, mounts, valves, screens, crossover system, hoses, lines, and fittings.
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).
4. Replace fuel filter; prime and bleed fuel system.
5. Inspect high pressure fuel system components (fuel pump, pump drives, hoses, injection lines, filters, hold-downs, fittings, seals, and mounting hardware).

DE-H. Engine Brakes

1. Inspect engine compression and/or exhaust brake housing, valves, seals, lines, and fittings.

B. DRIVE TRAIN (DT)

DT-A. General

1. Research vehicle service information, including fluid type, vehicle service history, service precautions, and technical service bulletins.
2. Identify drive train components, transmission type, and configuration.

DT-B. Clutch

1. Inspect and adjust clutch, clutch brake, linkage, cables, levers, brackets, bushings, pivots, springs, and clutch safety switch (includes push-type and pull-type); check pedal height and travel; determine needed action.
2. Inspect clutch master cylinder fluid level; check clutch master cylinder, slave cylinder, lines, and hoses for leaks and damage; determine needed action.

DT-C. Transmission

1. Inspect transmission shifter and linkage; inspect transmission mounts, insulators, and mounting bolts.
2. Inspect transmission for leakage; determine needed action.
3. Replace transmission cover plates, gaskets, seals, and cap bolts; inspect seal surfaces and vents; determine needed action.
4. Check transmission fluid level and condition; determine needed action.
5. Inspect transmission breather; inspect transmission oil filters, coolers, and related components; determine needed action.
6. Inspect speedometer components.
7. Inspect and test function of REVERSE light, neutral start, and warning device circuits.

DT-D. Driveshaft and Universal Joints

1. Inspect, service, and/or replace driveshafts, slip joints, yokes, drive flanges, support bearings, universal joints, boots, seals, and retaining/mounting hardware; check phasing of all shafts.

DT-E. Drive Axles

1. Check for fluid leaks; inspect drive axle housing assembly, cover plates, gaskets, seals, vent/breather, and magnetic plugs.
2. Check drive axle fluid level and condition; check drive axle filter; determine needed action.
3. Inspect air-operated power divider (inter-axle differential) assembly including: diaphragms, seals, springs, yokes, pins, lines, hoses, fittings, and controls.
4. Inspect drive axle shafts; determine needed action.
5. Remove and replace wheel assembly; check rear wheel seal and axle flange for leaks; determine needed action.

C. BRAKES (TB)

TB-A. General

1. Research vehicle service information, including fluid type, vehicle service history, service precautions, and technical service bulletins.
2. Identify brake system components and configurations (including air and hydraulic systems, parking brake, power assist, and vehicle dynamic brake systems).
3. Identify brake performance problems caused by the mechanical/foundation brake system (air and hydraulic).

TB-B. Air Brakes: Air Supply and Service Systems

1. 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/modulator, pressure relief/safety).
2. 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.

TB-C. Air Brakes: Mechanical/Foundation Brake System

1. Inspect service brake chambers, diaphragms, clamps, springs, pushrods, clevises, and mounting brackets; determine needed action.
2. Identify slack adjuster type; inspect slack adjusters; determine needed action.
3. Check camshafts (S-cams), tubes, rollers, bushings, seals, spacers, retainers, brake spiders, shields, anchor pins, and springs; determine needed action.

4. Inspect rotor and mounting surface; measure rotor thickness, thickness variation, and lateral runout; determine needed action.
5. Inspect, clean, and adjust air disc brake caliper assemblies; inspect and measure disc brake pads; inspect mounting hardware; perform needed action.
6. 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.

TB-D. Air brakes: Parking Brake System

1. Inspect and check parking (spring) brake chamber for leaks; determine needed action.
2. Inspect and test parking (spring) brake check valves, lines, hoses, and fittings; determine needed action.
3. Inspect and test parking (spring) brake application and release valve; determine needed action.
4. Manually release (cage) and reset (uncage) parking (spring) brakes.

TB-E. Hydraulic Brakes: Hydraulic System

1. Check master cylinder fluid level and condition; determine proper fluid type for application.
2. Inspect hydraulic brake system components for leaks and damage.
3. Check hydraulic brake system operation including pedal travel, pedal effort, and pedal feel.

TB-F. Hydraulic Brakes: Mechanical/Foundation Brake System

1. Inspect rotor and mounting surface; measure rotor thickness, thickness variation, and lateral runout; determine needed action.
2. Inspect and clean disc brake caliper assemblies; inspect and measure disc brake pads; inspect mounting hardware; determine needed action.
3. 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.

TB-G. Hydraulic Brakes: Parking Brake System

1. Check parking brake operation; inspect parking brake application and holding devices.

TB-H. Power Assist Systems

1. Check brake assist/booster system (vacuum or hydraulic) hoses and control valves; check fluid level and condition (if applicable).
2. Check operation of emergency (back-up/reserve) brake assist system.

TB-I. Vehicle Dynamic Brake Systems (Air and Hydraulic): Antilock Brake System (ABS), Automatic Traction Control (ATC) System, and Electronic Stability Control (ESC) System

1. Observe antilock brake system (ABS) warning light operation including trailer and dash mounted trailer ABS warning light.
2. Observe automatic traction control (ATC) and electronic stability control (ESC) warning light operation.

TB-J. Wheel Bearings

1. Clean, inspect, lubricate, and/or replace wheel bearings and races/cups; replace seals and wear rings; inspect spindle/tube; inspect and replace retaining hardware; adjust wheel bearings; check hub assembly fluid level and condition; verify end play with dial indicator method.
2. Identify, inspect, and/or replace unitized/preset hub bearing assemblies.

D. SUSPENSION AND STEERING

TS-A. General

1. Research vehicle service information, including fluid type, vehicle service history, service precautions, and technical service bulletins.
2. Disable and enable supplemental restraint system (SRS); verify indicator lamp operation.
3. Identify suspension and steering system components and configurations.

TS-B. Steering Column

1. 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.
2. Check operation of tilt and telescoping steering column.
3. Check cab mounting.

TS-C. Steering Pump and Gear Units

1. Check power steering pump and gear operation, mountings, lines, and hoses; check fluid level and condition; service filter; inspect system for leaks.
2. Flush and refill power steering system; purge air from system.

TS-D. Steering Linkage

1. Inspect tie rod ends, ball joints, kingpins, pitman arms, idler arms, and other steering linkage components; lubricate as needed.

TS-E. Suspension Systems

1. Inspect shock absorbers, bushings, brackets, and mounts; determine needed action.
2. Inspect leaf springs, center bolts, clips, pins, bushings, shackles, U-bolts, insulators, brackets, and mounts; determine needed action.
3. Inspect axle and axle aligning devices such as: radius rods, track bars, stabilizer bars, and torque arms; inspect related bushings, mounts, and shims.
4. Inspect tandem suspension equalizer components.
5. Inspect and test air suspension pressure regulator and height control valves, lines, hoses, dump valves, and fittings; check and record ride height.
6. Inspect air springs, mounting plates, springs, suspension arms, and bushings.

TS-F. Wheel Alignment

1. Demonstrate understanding of alignment angles.

TS-G. Wheels and Tires

1. Inspect tire condition; identify tire wear patterns; measure tread depth; verify tire matching (diameter and tread); inspect valve stem and cap; set tire pressure.
2. Identify wheel/tire vibration, shimmy, pounding, and hop (tramp) problems.
3. Check wheel mounting hardware; check wheel condition; remove and install wheel/tire assemblies (steering and drive axle); torque fasteners to manufacturer's specification using torque wrench.

TS-H. Frame and Coupling Devices

1. Inspect, service, and/or adjust fifth wheel, pivot pins, bushings, locking mechanisms, mounting hardware, air lines, and fittings.
2. Inspect frame and frame members for cracks, breaks, corrosion, distortion, elongated holes, looseness, and damage.
3. Inspect frame hangers, brackets, and cross members.
4. Check pintle hook and mounting (if applicable).

E. ELECTRICAL/ELECTRONIC SYSTEMS (TE)

TE-A. General

1. Research vehicle service information, including vehicle service history, service precautions, and technical service bulletins.
2. Demonstrate knowledge of electrical/electronic series, parallel, and series-parallel circuits using principles of electricity (Ohm's Law).
3. Demonstrate proper use of test equipment when measuring source voltage, voltage drop (including grounds), current flow, continuity, and resistance.
4. Demonstrate knowledge of the causes and effects of shorts, grounds, opens, and resistance problems in electrical/electronic circuits.
5. Use wiring diagrams to trace electrical/electronic circuits.
6. Measure parasitic (key-off) battery drain.
7. Demonstrate knowledge of the function, operation, and testing of fusible links, circuit breakers, relays, solenoids, diodes, and fuses.
8. Inspect, repair (including solder repair), and/or replace connectors, seals, terminal ends, and wiring; verify proper routing and securement.
9. Use appropriate electronic service tool(s) and procedures to diagnose problems; check, record, and clear diagnostic codes; interpret digital multimeter (DMM) readings.
10. Check for malfunctions caused by faults in the data bus communications network.
11. Identify electrical/electronic system components and configuration.

TE-B. Battery System

1. Identify battery type and system configuration.
2. Confirm proper battery capacity for application; perform battery state-of-charge test; perform battery capacity test, determine needed action.
3. Inspect battery, battery cables, connectors, battery boxes, mounts, and hold-downs; determine needed action.
4. Charge battery using appropriate method for battery type.
5. Jump-start vehicle using a booster battery and jumper cables or using an appropriate auxiliary power supply.
6. Identify low voltage disconnect (LVD) systems.

TE-C. Starting System

1. Demonstrate understanding of starter system operation.
2. Perform starter circuit cranking voltage and voltage drop tests.
3. Inspect starter control circuit switches, relays, connectors, terminals, wires, and harnesses (including over-crank protection).

TE-D. Charging System

1. Identify and understand operation of the generator (alternator).
2. Check instrument panel mounted voltmeters and/or indicator lamps.
3. Inspect generator (alternator) drive belt condition; check pulleys and tensioners for wear; check fans and mounting brackets; verify proper belt alignment.
4. Inspect cables, wires, and connectors in the charging circuit.
5. Perform charging system voltage and amperage output tests; perform AC ripple test.

TE-E. Lighting Systems

1. Inspect for brighter-than-normal, intermittent, dim, or no-light operation; determine needed action.
2. Test, replace, and aim headlights.
3. Inspect cables, wires, and connectors in the lighting systems.
4. Inspect tractor-to-trailer multi-wire connectors, cables, and holders.

TE-F. Instrument Cluster and Driver Information Systems

1. Check gauge and warning indicator operation.
2. Identify the sensor/sending units, gauges, switches, relays, bulbs/LEDs, wires, terminals, connectors, sockets, printed circuits, and control components/modules of the instrument cluster, driver information system, and warning systems.

F. HEATING, VENTILATION, AND AIR CONDITIONING (CC)

CC-A. General

1. Research vehicle service information, including refrigerant/oil type, vehicle service history, service precautions, and technical service bulletins.
2. Identify heating, ventilation, and air conditioning (HVAC) components and configuration.
3. Use appropriate electronic service tool(s) and procedures to diagnose problems; check, record, and clear diagnostic codes; interpret digital multimeter (DMM) readings.

CC-B. Refrigeration System Components

1. Inspect A/C compressor drive belts, pulleys, and tensioners; verify proper belt alignment.
2. Check A/C system operation including system pressures; visually inspect A/C components for signs of leaks; check A/C monitoring system (if applicable).
3. Inspect A/C condenser for airflow restrictions; determine needed action.

CC-C. Heating, Ventilation, and Engine Cooling Systems

1. Inspect engine cooling system and heater system hoses and pipes; determine needed action.
2. Inspect HVAC system-heater ducts, doors, hoses, cabin filters, and outlets; determine needed action.
3. Identify the source of A/C system odors.

CC-D. Operating Systems and Related Controls

1. Verify blower motor operation; confirm proper air distribution; confirm proper temperature control; determine needed action.

G. CAB (TC)

TC-A. General

1. Research vehicle service information including, vehicle service history, service precautions, and technical service bulletins.
2. Use appropriate electronic service tool(s) and procedures to diagnose problems; check, record, and clear diagnostic codes; check and record trip/operational data; reset maintenance monitor (if applicable); interpret digital multimeter (DMM) readings.

TC-B. Instruments and Controls

1. Inspect mechanical key condition; check operation of ignition switch; check operation of indicator lights, warning lights and/or alarms; check instruments; record oil pressure and system voltage; check operation of electronic power take-off (PTO) and engine idle speed controls (if applicable).
2. Check operation of all accessories.
3. Understand operation of auxiliary power unit (APU)/electric power unit (EPU).

TC-C. Safety Equipment

1. Check operation of horns (electric and air); check warning device operation (reverse, air pressure, etc.); check condition of spare fuses, safety triangles, fire extinguisher, and all required decals; inspect seat belts and sleeper restraints; inspect condition of wiper blades and arms.

TC-D. Hardware

1. Check operation of wipers and washer; inspect windshield glass for cracks or discoloration; check sun visor; check seat condition, operation, and mounting; check door glass and window operation; verify operation of door and cab locks; inspect steps and grab handles; inspect mirrors, mountings, brackets, and glass.
2. Record all physical damage.
3. Lubricate all cab grease fittings; inspect and lubricate door and hood hinges, latches, strikers, lock cylinders, safety latches, linkages, and cables.
4. Inspect cab mountings, hinges, latches, linkages, and ride height.
5. Inspect quarter fender, mud flaps, and brackets.