ASE School Bus Tests

National Institute for
AUTOMOTIVE
SERVICE
EXCELLENCE

ASE School Bus Tests

Contents

School Bus Types Found on ASE Certification Tests

The Type A school bus is a conversion or body constructed upon a van-type or cutaway front-section vehicle with a left-side driver's door, designed for carrying more than 10 persons with a gross vehicle weight rating (GVWR) of 10,000 pounds or less.

The Type B school bus is a conversion or body constructed and installed upon a front-section vehicle chassis or stripped chassis,with a gross vehicle weight rating (GVWR) of more than 10,000 pounds, designed for carrying more than 10 persons. Part of the engine is beneath and/or behind the windshield and beside the driver's seat. The entrance door is behind the front wheels.

The Type C school bus is a body installed upon a flat-back cowl chassis with a gross vehicle weight rating (GVWR) of more than 10,000 pounds, designed for carrying more than 10 persons. The entire engine is in front of the windshield and the entrance door is behind the front wheels.

The Type D transit-style school bus (flat front) is a body installed upon a stripped chassis, with the engine mounted in the front, midship, or rear with a gross vehicle weight rating (GVWR) of more than 10,000 pounds, and designed for carrying more than 10 persons. The engine may be behind the windshield and beside the driver's seat; it may be at the rear of the bus, behind the rear wheels. The entrance door is ahead of the front wheels.

Introduction

Use this *Official ASE Study Guide* to prepare for the ASE certification tests in the School Bus (S1-S7) series. This document contains general information, Test Specifications, Task Lists, sample questions, and test preparation resources for these ASE tests.

The following tests are covered by this guide:

- Body Systems & Special Equipment (S1)
- Diesel Engines (S2)*
- Drive Train (S3)*
- Brakes (S4)*
- Suspension and Steering (S5)*
- Electrical/Electronic Systems (S6)*
- Air Conditioning Systems and Controls (S7)

**required to be recognized as an ASE Certified Master School Bus Technician*

The Test Specifications in this study guide are determined by working professionals and technical experts and list the main content covered by the test and the number of test questions devoted to each topic.

The Task List for each test is developed by working professionals and technical experts, and it spells out the technical knowledge and skills required for success on this test. The Task List provides a valuable checklist of what you should know. Every question on the test represents one or more of these tasks, although some tasks may not appear on the version of the test that you see. To improve chances of success, use the Task List to identify weak areas and to select learning resources.

The sample questions show the several types of multiple-choice question formats used on an actual ASE test. Some questions have special instructions; those same instructions will appear with similar questions on the ASE tests. If you are a native Spanish speaker, be aware that all ASE tests have a pop-up English-to-Spanish glossary.

ASE certification requires successful completion of the test and documentation of relevant work experience. Appropriate vocational training may count toward the work experience requirement. Visit workexp.ase.com/FormInstr.aspx for more details.

For more information about ASE tests in general and the ASE Certification process, download *ASE Certification: Need to Know* at www.ase.com/ase-study-guides.

How Long are the Tests?

School Bus Tests		Certification Tests		Recertification Tests	
	Name	**Number of questions**	**Testing time**	**Number of questions**	**Testing time**
S1	Body Systems & Special Equipment	60 total/50 scored*	75 mins	25	30 mins
S2	Diesel Engines	65 total/55 scored*	90 mins	28	45 mins
S3	Drive Train	50 total/40 scored*	60 mins	20	30 mins
S4	Brakes	60 total/50 scored*	75 mins	25	30 mins
S5	Suspension and Steering	60 total/50 scored*	75 mins	25	30 mins
S6	Electrical/Electronic Systems	55 total/45 scored*	90 mins	23	45 mins
S7	Air Conditioning Systems & Controls	50 total/40 scored*	60 mins	20	30 mins

***** To gather the performance statistics required for use in the scored section of future tests, each CERTIFICATION test contains 10 questions that are not counted for score. Since you don't know which questions those are, you need to answer every question. You must have passed the corresponding CERTIFICATION once to be eligible for the shorter RECERTIFICATION test.

Test Specifications and Task List
Body Systems and Special Equipment (Test S1)

	Content Area	Questions in Test	Percentage of Test
A.	Safety and Emergency Equipment Systems Diagnosis and Repair	10	20%
B.	Body and Interior Maintenance	14	28%
C.	Installed Special Equipment Diagnosis and Repair	10	20%
D.	Heating Systems Diagnosis and Repair	16	32%
	Total	50	100%

A. Safety and Emergency Equipment Systems Diagnosis and Repair (10 questions)

1. Inspect safety equipment condition and securement; service or replace as required (fire extinguisher, first aid kit, body fluid clean-up kit, reflective triangles, seatbelt cutter, etc.).
2. Check condition and operation of seatbelts/tether belts, retractor, latch and driver/passenger restraint systems including integrated child seats and atached belts; adjust or replace as required.
3. Inspect, adjust, lubricate, repair, or replace emergency exit doors, windows, hatches, latches, hold-open devices, hinges, handles, vandal locks, decals and seals.
4. Check operation of stop arm(s) and crossing gate (air-operated or electric), warning lights, strobe lights, and warning devices; service, adjust or replace as needed.
5. Inspect, test, adjust, repair, or replace electrical components in the emergency exit warning systems (roof hatches, push-out windows, doors, etc.).
6. Inspect and replace reflectors, reflective materials, lettering, and operational decals (interior/exterior).
7. Inspect, test, repair, or replace post-trip inspection systems (child reminder, child check, sleeping child systems, motion detection/theft-lock, etc.)
8. Inspect, test, repair, or replace vehicle monitoring systems (GPS, routing, student tracking, video monitoring, stop arm cameras, 360° cameras, intercoms, and radios).

B. Body and Interior Maintenance (14 questions)

1. Inspect upholstery, foam, seat frame, and mounting hardware of passenger seats (including track, flip, child seats, etc.); repair or replace as required.
2. Inspect, diagnose, test, adjust, repair, or replace driver's seat upholstery, foam, seat frame, suspensions, mounting hardware, seat adjustment, and controls (air, manual or electric).
3. Inspect floor, floor covering, step well, step well treads, tread heaters, wheel well moldings, trim, and hardware; verify integrity and repair or replace as needed.
4. Inspect, adjust, repair, or replace entry doors, side doors, and handrails.
5. Check mirrors (including internal and external, manual, and power adjustable) for clarity, heater operation, operation of adjustment, mounting security, condition, and operation; repair or replace as required.
6. Inspect, adjust, repair, or replace body mounts, hardware, clips (tie downs), outriggers (welds), shear bolts, crossmembers (floor sills), cowl mounts, and accessory compartment/mountings (battery, luggage, storage) in accordance with manufacturer's recommended procedures.
7. Inspect and adjust accessory compartments and access panels (doors, seals, hinges, latches, battery, luggage, fuel, wiper doors, coolant door, etc.); repair or replace as necessary.

S1 Task List (continued)

8. Inspect, adjust, and repair engine hood, handles, latches, hinges, cables, springs, torsion bars, and hold-open devices. Check alignment, security, and mounting integrity of engine cover, inner fenders, and seals; adjust, service, or replace as required.
9. Inspect, test, adjust, repair, or replace manual, electric, or air-operated entry door controls (including the emergency release systems).
10. Inspect windshield(s), window and door glass, seals, frame/sashes, latches, and controls for condition and operation. Adjust, repair, or replace as necessary.
11. Diagnose, inspect, test, repair, or replace wipers, wiper motor(s), controls, modules, wiper transmission linkage, resistors, park switch, relays, switches, connectors, and wiring.
12. Diagnose, inspect, test, repair, or replace windshield washer pump, reservoir, washer nozzles, hoses, controls, modules, relays, switches, connectors, and wiring.

C. Installed Special Equipment Diagnosis and Repair (10 questions)

1. Check operation of wheelchair lift and backup systems; determine needed repairs (electrical and/or hydraulic systems).
2. Test, diagnose, repair, adjust, or replace wheelchair lift operational and safety controls (electrical and/or hydraulic systems)..
3. Inspect structural integrity of wheelchair lift, lift platform, lift component welds, mounting hardware, handrails, lift-mounted safety belts, and safety barriers; repair or replace according to manufacturer's recommendations.
4. Inspect condition and security of wheelchair track, track-mounted seating, and hardware.
5. Inspect, test, repair, or replace wheelchair lift door, holdbacks, switches, lamps, vehicle interlocks and related indicators.
6. Inspect, test, repair, or replace accessory mounting devices and related hardware (oxygen tanks, bags, etc.).
7. Verify placement and legibility of all lift operational and safety decals.

D. Heating Systems Diagnosis and Repair (16 questions)

1. Diagnose the cause of temperature control problems in the heating/ventilating/defrosting system; determine needed repairs.
2. Diagnose window fogging problems; determine needed repairs.
3. Perform cooling system tests, including freeze protection and contamination. Pressure test the cooling system cap. Pressure test the system for leaks; determine needed repairs.
4. Inspect, test, and replace heater coolant control valve(s) (manual, vacuum, and electric/electronic types).
5. Inspect, flush, and replace heater core, hoses, clamps, and covers; bleed the system.
6. Perform heating system tests to include correct flow, booster pump operation, and restrictor operation.
7. Check condition of heater filters, cabin filter, and exterior of heater core; clean or replace according to manufacturer's recommendations.
8. Inspect, diagnose, test, repair, or replace heater/defroster blowers and fans, resistors, switches, relays/modules, sensors, wiring, connectors, and circuit protection devices.
9. Inspect, diagnose, test, service, or replace heating, ventilating and defrosting control panel assemblies, cables, linkages, actuator switches, wiring, and connectors.
10. Inspect, diagnose, test, and replace heating, ventilating, and defrosting system vacuum control switches and hoses, diaphragms, vacuum pumps, vacuum reservoir, check valves, and drive belts.
11. Inspect, test, adjust, repair, or replace heating/ventilating/defrosting ducts, mode/blend doors, hoses, outlets and diffusers. Perform temperature and blend door motor recalibrations as needed.
12. Recover, refill, and bleed cooling system(s) per manufacturer's specifications.
13. Diagnose and repair fuel-fired, electric, and high-voltage (battery-electric bus) supplemental coolant heating systems. □

Sample Questions
Body Systems and Special Equipment (Test S1)

1. An air-operated stop arm will not fully extend. Which of these could be the cause?

   * (A) Low air pressure
   (B) Binding hinge pivots
   (C) A sticking solenoid valve
   (D) A broken return spring pivot

2. A replacement student window side glass should:

   (A) be tempered.
   * (B) meet FMVSS requirements.
   (C) be laminated.
   (D) be replaced by a glass company.

3. Which of these is the best location for a school bus first aid kit?

   (A) The floor by the stepwell
   (B) On the rear emergency door
   (C) In the tool box
   * (D) In the driver's area

4. Technician A says that the pH level should be checked during a coolant test.
   Technician B says that the freeze point should be checked during a coolant test.
   Who is right?

   (A) A only
   (B) B only
   * (C) Both A and B
   (D) Neither A nor B

5. After a broken heater hose is repaired, the right side of the windshield will not defrost. Which of these could be the cause?

   (A) The system was overfilled.
   * (B) Air is trapped in the system.
   (C) The replacement coolant was improperly mixed.
   (D) The heater filter was installed backwards.

S1 Sample Questions (continued)

6. On a Type C school bus, the defroster blower works on low and medium speed, but not on high speed. This could be caused by a:

   (A) failed circuit breaker.
   * (B) failed control switch.
   (C) loose ground.
   (D) clogged heater filter.

This question contains the word EXCEPT. Read the question carefully before choosing your answer.

7. A wheelchair lift has a drifting/leakdown problem. Any of these could be the cause EXCEPT:

   (A) an open manual valve.
   * (B) low fluid level.
   (C) a failed seal.
   (D) a failed hydraulic pump.

Test Specifications and Task List
Diesel Engines (Test S2)

	Content Area	Questions in Test	Percentage of Test
A.	General Engine Diagnosis	15	27%
B.	In-Chassis Engine Inspection and Repair	6	11%
C.	Lubrication and Cooling Systems Diagnosis and Repair	7	13%
D.	Air Induction and Exhaust Systems Diagnosis and Repair	9	16%
E.	Fuel System Diagnosis and Repair	15	27%
F.	Starting System Diagnosis and Repair	3	6%
	Total	55	100%

A. General Engine Diagnosis (15 questions)

1. Verify the complaint and road test vehicle; review the driver report and past maintenance documents (if available). Determine needed action.
2. Identify engine model and serial number or EPA (Environmental Protection Agency) certification level to research applicable vehicle and service information, service precautions, service procedures, and technical service bulletins; determine needed actions.
3. Inspect engine assembly and compartment for fuel, oil, coolant, exhaust, diesel exhaust fluid (DEF), and other leaks; determine needed action.
4. Inspect engine compartment wiring harness, connectors, seals, and locks; check for proper routing and condition; determine needed action.
5. Isolate and diagnose engine noises and/or vibrations; determine needed action.
6. Check engine exhaust for odor, smoke color, volume, and opacity; determine needed action.
7. Perform fuel supply and return system tests; check fuel for contamination, quality, and consumption; determine needed action.
8. Perform air intake system restriction and leakage tests; determine needed action.
9. Perform intake manifold and system pressure tests; determine needed action.
10. Perform exhaust back pressure and temperature tests; check soot level and ash load; determine needed action.
11. Perform crankcase pressure test, including open and closed sytems; determine needed action.
12. Diagnose no-cranking, cranks but fails to start, hard starting (hot and cold), and starts but does not continue to run problems; determine needed action.
13. Diagnose surging, rough operation, misfiring, low power, slow deceleration, slow acceleration, and engine shutdown problems; determine needed action.
14. Check cooling system for coolant type, coolant level, freeze point, clarity/contamination, temperature, pressure, circulation, conditioner concentration, coolant filter, fan, and shutter operation; determine needed action.
15. Check lubrication system for contamination, oil level, temperature, pressure, filtration, and oil consumption; interpret oil analysis information; determine needed action. Change engine oil and filters. Verify proper type and quantity of engine oil for the application.

S2 Task List (continued)

16. Connect diagnostic tool to vehicle/engine and verify software calibration. Check for technical service bulletins (TSBs). Check and record electronic diagnostic codes (DTCs) and trip/operational data; monitor electronic data. Verify the repair and clear DTC's. Verify vehicle programmable parameters; road test/ retest to verify the repair; determine if further diagnosis is needed.
17. Check diesel exhaust fluid (DEF) system for quality, freeze point, level, contamination, temperature, pressure, circulation, and filtration; determine needed action.
18. Perform visual inspection for physical damage and missing, modified, or tampered with components; determine needed action.

B. In-Chassis Engine Inspection and Repair (6 questions)

1. Remove, clean, inspect, and reinstall cylinder head(s) assembly.
2. Inspect threaded holes, studs, and bolts for serviceability; determine needed actions.
3. Measure cylinder head deck-to-deck thickness and mating surface areas for warpage; inspect for cracks/ damage; check condition of passages; inspect core and gallery plugs; determine serviceability and needed action.
4. Inspect injector bore; replace injector sleeves and seals/O-rings where specified by manufacturer.
5. Inspect valves, springs, retainers, valve seats, valve guides, and/or rotators, locks and seals, determine needed action.
6. Inspect pushrods/ push tubes, rocker arms, valve bridges, rocker arm shafts, electronic wiring harness, and brackets for wear, bending, cracks, looseness, and blocked oil passages; repair/replace/adjust as needed.
7. Inspect, measure, and replace camshaft, bearings, and cam followers or lifters (tappets); measure/adjust endplay; measure lobes for lift.
8. Inspect, replace, and time the engine gear train including checking gear wear and backlash of camshaft, studs and shafts, engine position/speed indicator components, and auxiliary and idler gears.
9. Adjust valve clearance and injector settings (if required).
10. Inspect, service, and install pans, covers, vents, engine driven accessories, mounts and supports, gaskets, seals, and wear rings.
11. Clean and inspect engine block assembly for cracks and mating surface areas for damage or warpage; check condition of passages, core, block heater, and gallery plugs; inspect threaded holes, studs, dowel pins, and bolts for serviceability and contamination; service/replace as needed.
12. Inspect and measure liner height (protrusion) and counterbore depth; determine needed action.
13. Inspect and measure crankshaft vibration damper; replace as needed.
14. Inspect flywheel/flexplate (including ring gear) and housing mounting surfaces for cracks, wear, and runout; determine needed action.
15. Inspect cylinder walls or liners for cavitation and wear; inspect connecting rods, wrist pins, pistons, and rings for wear and damage; determine needed action.
16. Measure and inspect crankshaft and journals for wear, surface cracks and damage; check condition of oil passages, piston cooling nozzles, and passage plugs; measure crankshaft endplay; measure journal diameter and clearances; check mounting surfaces; determine needed action.

C. Lubrication and Cooling Systems Diagnosis and Repair (7 questions)

1. Verify engine oil pressure and check operation of pressure sensor/switch, connectors, pins, terminals, and pressure gauge; verify engine oil temperature and check operation of temperature sensor and warning devices.
2. Inspect, measure, and repair/replace oil pump, housing, drives, pipes, and screens. Adjust drive gear clearance (if applicable).
3. Inspect and repair/replace oil pressure regulator valve(s), bypass valve(s), and filters.
4. Inspect, clean, test, and reinstall/replace oil cooler; test, bypass valve, oil thermostat, lines, and hoses.
5. Inspect turbocharger lubrication and cooling systems; determine needed action.
6. Inspect and reinstall/replace pulleys, tensioners, and drive belts; adjust drive belts and check alignment.
7. Verify coolant temperature and check operation of temperature and level sensors/switches, connectors, pins, terminals, and warning devices.

S2 Task List (continued)

8. Inspect and replace coolant thermostat(s), bypasses, housing(s), seals, and coolant restrictors.
9. Flush and refill cooling system with recommended coolant type per application; bleed air from system using OEM procedure; recover/recycle coolant.
10. Inspect and repair/replace coolant conditioner/filter, valves, lines, fittings, and housing (if applicable).
11. Inspect and repair/replace coolant/water pump(s), housing, hoses, and idler pulley or drive gear.
12. Inspect and pressure test the coolant system, pressure cap(s), and tank(s); confirm proper cap pressure rating; determine needed action.
13. Perform visual inspection of cooling package for proper airflow. Inspect and repair/replace fan, fan hub, fan clutch, fan controls, fan thermostat, and fan shroud.
14. Inspect and repair/replace radiator coverings including shutter assembly, controls, and winter fronts.
15. Inspect, test, and repair/replace components of engine block heater and auxiliary coolant heating systems.

D. Air Induction and Exhaust Systems Diagnosis and Repair (9 questions)

1. Inspect and service/replace air induction piping, air cleaner, air filter restriction indicator, and element; check for inlet air restriction and service housing drain valve.
2. Inspect, test, and repair/replace fixed and variable turbocharger(s), pneumatic, hydraulic, and electronic controls and actuators; inspect, test, and replace wastegate and wastegate actuators, wiring, and hoses. Calibrate as required.
3. Inspect and repair/replace intake manifold, gaskets, temperature and pressure sensors, pins, terminals, and connectors.
4. Inspect, test, clean, or replace charge air cooler, hoses, piping, clamps, and gaskets.
5. Inspect and repair/replace exhaust manifolds, gaskets, piping, mufflers, clamps, and mounting hardware.
6. Inspect, test, and repair/replace grid heater/inlet air heater or glow plug system and controls.
7. Inspect, test, service, or replace exhaust aftertreatment system components, controls, and sensors of the hydrocarbon doser system, diesel oxidation catalyst (DOC) system, diesel particulate filter (DPF) system, diesel exhaust fluid (DEF) system, selective catalytic reduction (SCR) system, gaskets, clamps, piping, heat shields, and diffuser; check regeneration system operation.
8. Inspect, test, service, and replace exhaust gas recirculation (EGR) system components, including EGR valve, cooler, piping, crossover tube, sensors, controls, EGR differential pressure sensors, ports/orifices, wiring, connectors, pins, and terminals.

E. Fuel System Diagnosis and Repair (15 questions)

1. Inspect and repair/replace fuel tank, vent, cap, mounts, tank protection (cages), valves, supply lines, return lines, fittings, and seals.
2. Inspect, clean, test, and repair/replace fuel transfer (supply) pump, pump drives, strainers and fuel/water separators, sensors, filters, filters, heaters, coolers, ECM cooling plates, and mounting hardware.
3. Check fuel supply system for leaks, aeration, and contamination; determine needed repairs; prime and bleed fuel system; check and repair/replace primer pump.
4. Inspect, test, and repair/replace low-pressure regulator systems (check valves, pressure regulator valves, and restrictive fittings).
5. Inspect high-pressure injection lines, fittings, transfer tubes, seals, and mounting hardware; determine needed action.
6. Perform on-engine inspections and tests, and replace high-pressure common rail (HPCR) fuel system components and electronic controls; determine needed action.
7. Perform on-engine inspections and tests on hydraulic electronic unit injectors (HEUI) fuel systems and electronic controls (rail pressure control); determine needed action.
8. Perform on-engine inspections, tests, and adjustments on electronic unit injectors (EUI) fuel systems and electronic controls; determine needed action.
9. Inspect, test, and repair/replace throttle controls including manual, electronic, and air systems.
10. Inspect, test, and repair/replace engine protection and shutdown/derate system components.

S2 Task List (continued)

11. Inspect, test, and repair/replace electrical connector terminals, pins, wiring harnesses, seals, and locks.
12. Connect diagnostic scan tool to vehicle/engine; access, verify, and/or update software calibration settings, injector calibration codes, and programmable parameters; perform module re-learn procedures as applicable; determine needed action.
13. Connect diagnostic scan tool to vehicle; inspect and test electronic engine control system, sensors, actuators, electronic control modules, and circuits; determine needed actions.
14. Measure and interpret voltage, voltage drop, amperage, and resistance readings using a digital multimeter (DMM), oscilloscope, or appropriate test equipment.

F. Starting System Diagnosis and Repair (3 questions)

1. Identify battery type; perform battery state-of-charge test, load test, and capacity test; determine needed action.
2. Charge battery(s) using correct method for application.
3. Start vehicle using jumper cables, booster battery, or auxiliary power supply.
4. Inspect, clean and repair/replace batteries, battery cables, and terminal connections; perform battery cable voltage drop test.
5. Inspect, test, and reinstall/replace starter, relays, safety switch(s), interlock and/or vandal lock system, and solenoids.
6. Perform starter current draw test(S); determine needed action.
7. Perform starter circuit voltage drop test(s); determine needed action. □

Sample Questions
Diesel Engines (Test S2)

1. A school bus has a misfire during warm-up. The technician has found that the issue is isolated to only the #3 cylinder. Which of these could be the cause?

   (A) Corroded battery connections
   (B) An overcharging alternator
   (C) Loose starter ground cable
   * (D) A corroded pin at the ECM connector

2. The driver complains that the school bus will not crank. This could be caused by:

   (A) loose starter bolts.
   * (B) an open vandal lock circuit.
   (C) a shorted starter ground cable.
   (D) the gear selector left in neutral.

3. A school bus engine repeatedly throws off the engine accessory drive belts. Which of these could be the cause?

   (A) Worn pulley grooves
   (B) An over-tightened drive belt
   (C) Loose driveline yokes
   * (D) An out-of-balance crankshaft vibration damper

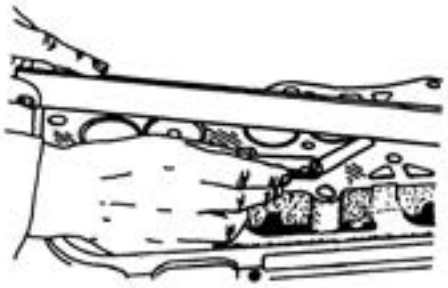
4. An in-line six-cylinder diesel engine has a blown head gasket.
   Technician A says that the cylinder head should be checked for cracks.
   Technician B says that cylinder liner protrusion should be checked.
   Who is right?

   (A) A only
   (B) B only
   * (C) Both A and B
   (D) Neither A nor B

5. During a cold weather start-up, the oil filter ruptures, causing an oil leak. This could be caused by:

   * (A) a stuck-closed oil filter bypass valve.
   (B) a stuck-open oil pressure regulator valve.
   (C) use of a high-viscosity motor oil.
   (D) excessive engine rpm at start-up.

S2 Sample Questions (continued)



6. What is the technician checking in the illustration shown?

   (A) Valve protrusion
   (B) Valve recession
   (C) Coolant nozzle recession
   * (D) Cylinder head warpage

7. During a diesel engine overhaul, the cylinder liners are found to have excessive external cavitation erosion.

   Technician A says that improperly treated coolant could be the cause.

   Technician B says that an improper antifreeze to water mix (ratio) could be the cause.

   Who is right?

   (A) A only
   (B) B only
   * (C) Both A and B
   (D) Neither A nor B

8. A HEUI engine runs poorly and misfires. While performing an engine running injector test, a fault code is set for poor #3 cylinder contribution.

   Technician A says that a failed injector on cylinder #3 could be the cause.

   Technician B says that a bent push rod on cylinder #3 could be the cause.

   Who is right?

   (A) A only
   (B) B only
   * (C) Both A and B
   (D) Neither A nor B

9. The cause of a logged fault code in an electronic diesel engine has just been repaired.

   Technician A says that the codes should be cleared before releasing the vehicle.

   Technician B says that the customer's password should be reset before releasing the vehicle.

   Who is right?

   * (A) A only
   (B) B only
   (C) Both A and B
   (D) Neither A nor B

S2 Sample Questions (continued)

This question contains the word EXCEPT. Read the question carefully before choosing your answer.

10. A Type D school bus has excessive engine oil consumption and an oil film on the back of the bus. Any of these could be the cause EXCEPT:

    (A) failed turbocharger seals.
    * (B) a cracked cylinder liner.
    (C) worn piston rings.
    (D) worn valve guide seals.

Test Specifications and Task List
Drive Train (Test S3)

	Content Area	Questions in Test	Percentage of Test
A.	Automatic Transmission Diagnosis and Repair	28	70%
B.	Drive Shaft and Universal Joint Diagnosis and Repair	5	13%
C.	Drive Axle Diagnosis and Repair	7	17%
	Total	40	100%

A. Automatic Transmission Diagnosis and Repair (28 questions)

1. Diagnose noise, vibration, and shifting problems; determine needed repairs.
2. Diagnose fluid usage and condition; determine needed service.
3. Perform pressure tests; determine needed repairs.
4. Road test the vehicle to verify mechanical/hydraulic system problems based on driver's concern; research vehicle service history; determine necessary action.
5. Perform lock-up converter system tests; determine needed repairs.
6. Diagnose mechanically and electrically controlled systems; determine needed repairs.
7. Inspect, adjust, and replace manual valve shift linkage and cables.
8. Replace fluid and filter(s); check fluid level and dipstick calibration. Reset service indicators as necessary.
9. Inspect and replace external seals and gaskets.
10. Inspect, test, flush, and/or replace cooler(s), lines, filters and fittings
11. Inspect, test, or replace speed sensor(s); check tone/exciter ring(s).
12. Inspect, test operation, and adjust and repair or replace electronic shift controls, indicators, speed sensors, temperature sensors, electronic transmission control module (TCM), neutral/in gear and reverse switches, warning devices, and wiring harnesses.
13. Inspect, test operation, and repair or replace electronic shift selectors (driver controls), switches, displays, indicators, and wiring harnesses.
14. Use appropriate diagnostic tools and software, procedures, and service information/flow charts to diagnose automatic transmission problems; check and record diagnostic codes, clear codes, and determine needed repairs.
15. Diagnose automatic transmission problems caused by data link/bus interfaces with related electronic control systems.
16. Inspect, replace, and align transmission mounts.
17. Remove and replace transmission; inspect flex plate.
18. Remove, inspect, and replace engine-to-transmission coupling device (torque converter or dual-clutch transmission damper).
19. Inspect engine block, flywheel housing, transmission mating surfaces, and engine-to-transmission mounting adapters; determine needed repairs.
20. Perform adaptive memory reset procedure(s).
21. Identify transmission type including torque converter automatic and dual-clutch automatic (DCT). Research applicable vehicle and service information, vehicle service history, service precautions, technical service bulletins, and service campaigns/recalls.

S3 Task List (continued)

B. Drive Shaft and Universal Joint Diagnosis and Repair (5 questions)

1. Diagnose drive shaft and universal joint noise and vibration problems; determine needed repairs.
2. Inspect, service, or replace drive shaft, slip joints, yokes, drive flanges, universal joints, and vibration dampers; determine drive shaft phasing.
3. Inspect, repair, and replace drive shaft center support bearings, safety loops, and mounts.
4. Measure loaded and unloaded driveline angles; determine needed repairs.
5. Inspect, adjust, and repair or replace driveline parking brake system components.

C. Drive Axle Diagnosis and Repair (7 questions)

1. Diagnose rear axle drive unit noise, vibration, and overheating problems; determine needed repairs.
2. Check and repair fluid leaks; inspect and replace rear axle drive unit cover, gaskets, vents, magnetic plugs, and pinion seal.
3. Check rear axle drive unit fluid level and condition; determine needed service and add proper type of lubricant.
4. Remove, inspect, and replace differential carrier assembly.
5. Inspect rear axle housing mating surfaces; determine needed repairs.
6. Remove, inspect, and replace axle shafts.
7. Remove, inspect, and replace rear wheel hub assembly; determine needed repairs.
8. Diagnose wheel/hub bearing noises and damage; determine needed repairs.
9. Clean, inspect, lubricate, and replace wheel/hub bearing cones and races; clean and inspect locking plates and nuts, replace seals, wear rings, and axle flange gasket; adjust rear wheel/hub bearings.
10. Check, adjust, and replace wheel speed sensor(s); inspect and replace tone/exciter ring. □

Sample Questions
Drive Train (Test S3)

1. A Type A school bus with an overdrive transmission and a computer controlled lock-up converter has shifts that are early and very soft. This could be caused by:

* (A) an improperly adjusted throttle valve (TV) cable.
(B) a slipping converter clutch.
(C) a worn governor gear.
(D) a shorted converter clutch solenoid.

2. Technician A says that a vibration in the driveline could be caused by excessive universal joint movement.

Technician B says that a vibration in the driveline could be caused by an incorrect universal joint operating angle.

Who is right?

(A) A only
(B) B only
* (C) Both A and B
(D) Neither A nor B

3. The automatic transmission fluid of a school bus is discolored and has an unusual odor. This could be caused by:

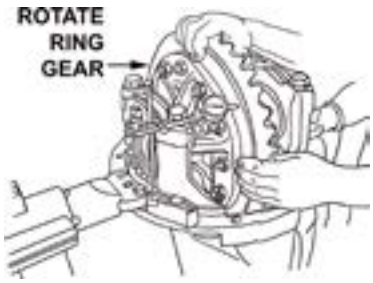
(A) overrunning the engine governor.
* (B) overheating the transmission.
(C) a dragging spring (parking) brake.
(D) improper gear selection.

4. The fluid level in a school bus automatic transmission should be checked with the:

(A) engine shut off at normal operating temperatures.
(B) engine shut off and the transmission in NEUTRAL.
(C) engine running and the transmission in DRIVE, at normal operating temperatures.
* (D) engine running and the transmission in PARK, at normal operating temperatures.

S3 Sample Questions (continued)

5. What operation is being perfomed in the setup show in the illustration?



(A) Adjusting tooth contact
* (B) Checking ring gear runout
(C) Checking ring gear backlash
(D) Setting differential bearing preload

6. The rear axle in a Type C school bus is noisy on deceleration. Which of these could be the cause?

(A) A worn ring and pinion
(B) A worn carrier bearing
* (C) A failed front pinion bearing
(D) A failed rear pinion bearing

7. A computer-controlled transmission starts off in high gear. Which of these could be the cause?

* (A) A failed transmission control module
(B) A failed coolant temperature sensor
(C) A low transmission fluid level
(D) A stuck one-way clutch

This question contains the word EXCEPT. Read the question carefully before choosing your answer.

8. A driver complains of a roaring noise at the rear of a Type C school bus, and says that the noise gets louder as vehicle speed increases. Any of these could be the cause EXCEPT:

(A) center bearing.
(B) pinion bearing.
(C) pilot bearing.
* (D) carrier bearing.

Test Specifications and Task List
Brakes (Test S4)

	Content Area	Questions in Test	Percentage of Test
A.	Air Brakes Diagnosis and Repair	34	68%
	1. Air Supply and Service Systems (16)		
	2. Mechanical/Foundation (13)		
	3. Parking Brakes (5)		
B.	Hydraulic Brakes Diagnosis and Repair	10	20%
	1. Hydraulic System (4)		
	2. Mechanical System (4)		
	3. Power Assist Units and Misc. (2)		
C.	Antilock Brake System (ABS), Automatic Traction Control (ATC), Electronic Stability Control (ESC), and Collision Warning/ Avoidance System Diagnosis and Repair	6	12%
	Total	50	100%

A. Air Brakes Diagnosis and Repair (34 questions)

1. Air Supply and Service Systems (16 questions)

1. Review driver/vehicle inspection report (DVIR); verify the complaint and road test vehicle; review driver/customer interview and past maintenance documents (if available); determine further diagnosis.
2. Diagnose poor stopping, air leaks, pulling, grabbing, or dragging complaints caused by supply and service system problems; determine needed repairs.
3. Check air system build-up and recovery time; determine needed repairs.
4. Drain air reservoir tanks; check for oil, water, and foreign material; determine needed repairs.
5. Inspect, adjust, align, or replace air compressor drive belts, pulleys, tensioners, idlers, drive gears, and couplings.
6. Inspect, repair, or replace air compressor, air intake system, and oil and coolant lines and fittings.
7. Inspect, test, adjust, or replace system pressure controls (governor/relief valve), unloader assembly valves, pressure protection valves, and filters.
8. Inspect, repair, or replace air system lines, hoses, fittings, and couplings; check for proper routing and securement.
9. Inspect, test, clean, or replace air tank relief (pop-off) valves, one-way and double check valves, drain valves, automatic drain (spitter) valves, heaters, wiring, and connectors.
10. Inspect, clean, repair, or replace air drier systems, filters, valves, heaters, wiring, and connectors.
11. Inspect, test, adjust, repair, or replace brake application (foot/treadle) valve, fittings, and mounts; check brake pedal components for proper operation.
12. Inspect, test, or replace two-way (double) check valves and anti-compounding valves.
13. Inspect, test, repair, or replace stop and parking brake light circuit switches, wiring, and connectors.

S4 Task List (continued)

14. Inspect, test, repair, or replace brake relay valve, quick-release valves, and anticompounding circuits
15. Inspect, test, and replace inversion and emergency (spring) brake control valve(s).
16. Inspect, test, repair, or replace low pressure warning devices.
17. Inspect, test, repair, or replace air pressure gauges, in-cab lines, hoses, fittings, and pressure sensors (transducers).

2. Mechanical/Foundation (13 questions)

1. Diagnose poor stopping, premature wear, brake noise, pulling, grabbing, dragging or brake pedal feel concerns by foundation brake components; determine needed repairs.
2. Inspect, test, adjust, repair, or replace service brake chambers, diaphragm, clamp,spring, pushrod, clevis/pins, and mounting brackets.
3. Inspect, test, adjust, repair, or replace automatic slack adjusters.
4. Inspect or replace S-cams, brake rollers, camshafts, bushings, seals, spacers, retainers, brake spiders, shields, anchors, and springs.
5. Inspect, adjust, clean, repair or replace air disc brake caliper assemblies.
6. Inspect brake shoes or pads; determine needed repairs.
7. Replace brake shoes or pads; determine correct replacement lining/pad for application.
8. Inspect, measure, or replace brake drums or rotors as needed.
9. Remove and replace axle hub and wheel assembly.
10. Clean, inspect, lubricate, or replace wheel bearing assemblies; replace seals and wear rings (if applicable).
11. Inspect and adjust axle wheel bearings in accordance with manufacturers' procedures and specifications.
12. Inspect and replace preset and unitized hub bearing assemblies; perform initial installation and maintenance procedures to manufacturers' specifications.

3. Parking Brakes (5 questions)

1. Inspect and test parking (spring) brake chamber operation; replace parking (spring) brake chamber; dispose of removed chambers in accordance with local regulations.
2. Inspect, test, or replace parking (spring) brake relay and control valves, lines, hoses, and fittings.
3. Manually release (cage) and reset (uncage) parking (spring) brakes.
4. Inspect and test parking brake interlock system; replace parking break interlock valve, modules, switches, indicators, wiring, and connectors.
5. Inspect and test electronic parking brake application system(s); replace parking brake valve(s), modules, switches, indicators, wiring, and connectors.

B. Hydraulic Brakes Diagnosis and Repair (10 questions)

1. Hydraulic System (4 questions)

1. Diagnose poor stopping, brake noise, premature wear, pulling, grabbing, dragging, or brake pedal feel concerns caused by hydraulic system components; determine needed repairs.
2. Inspect hydraulic brake system for leaks; determine needed action.
3. Check brake pedal operation and adjust free play.
4. Inspect, test, and replace master cylinder; bench bleed master cylinder as required.
5. Inspect and replace brake lines, flexible hoses, and fittings; check for proper routing and securement.
6. Inspect, test, and replace metering (hold-off), proportioning, and combination valves.
7. Inspect, test, repair, or replace brake pressure differential valve and warning light circuit switch, bulbs, wiring, and connectors.
8. Inspect, and replace wheel cylinders.
9. Remove, inspect, clean, service, and replace disc brake calipers and bracket assemblies.
10. Inspect/test brake fluid; bleed and/or flush hydraulic system; use diagnostic scan tool with appropriate software for bleeding procedure if required; determine proper fluid type for application.
11. Inspect and test parking brake interlock system; replace parking brake interlock valves, modules, switches, indicators, wiring, and connectors.

S4 Task List (continued)

2. Mechanical System (4 questions)

1. Diagnose poor stopping, noise, premature wear, pulling, grabbing, dragging, or brake pedal feel concerns caused by drum and disc brake mechanical components; determine needed repairs.
2. Inspect, measure, and/or replace brake drums or rotors.
3. Inspect, adjust, or replace drum brake shoes, mounting hardware, adjuster mechanisms, and backing plates.
4. Inspect, service, and replace disc brake pads, hardware, and mounts.
5. Remove, inspect, clean, service, and replace disc brake calipers and bracket assemblies.
6. Inspect, adjust, and repair or replace in-wheel mechanical and hydraulic parking brake systems.
7. Inspect, adjust, or replace driveline parking system components including brake drums, rotors, springs, bands, shoes, mounting hardware, switches, wiring, motors, and adjusters.
8. Inspect, adjust, or replace mechanical or electronic parking brake application systems; including pedal, actuators, cables, linkage, levers, pivots, springs, switches, wiring, motors, bearings, and seals.
9. Remove and replace axle hub and wheel assembly.
10. Clean, inspect, lubricate, or replace wheel bearing assemblies; replace seals and wear rings (if applicable).
11. Inspect and adjust axle wheel bearings in accordance with manufacturers' procedures and specifications.
12. Inspect and replace preset and unitized hub bearing assemblies; perform initial installation and maintenance procedures to manufacturers' specifications.

3. Power Assist Units and Miscellaneous (2 questions)

1. Diagnose poor stopping complaints caused by power brake booster problems; determine needed repairs (includes hydraulic and hydraulic/electric assist systems).
2. Inspect, test, repair, or replace power brake assist (booster) hoses and controls, including components of the hydraulic brake back-up system (control valves, filters, etc.); determine proper fluid type for application.
3. Test, adjust, and/or replace brake stop light switch(s), bulbs, wiring, connectors, modules, and warning devices.
4. Test, adjust, repair, or replace parking brake indicator light, switch, bulbs, wiring, and connectors.

C. Antilock Brake System (ABS), Automatic Traction Control (ATC), Electronic Stability Control (ESC), and Collision Warning/Avoidance System Diagnosis and Repair (6 questions)

1. Observe antilock brake system (ABS) operation, self-test operation, and warning light operation; determine if further diagnosis is needed.
2. Diagnose antilock brake system (ABS) electronic controls and components using self-diagnosis (blink codes) and/or specified test equipment (scan tool with appropriate software); determine needed repairs.
3. Diagnose poor stopping, wheel lock-up, false activation, pedal feel, pedal travel, pedal pulsation, and noise concerns caused by the antilock brake system (ABS); determine needed repairs.
4. Inspect, test, and replace antilock brake system (ABS) air, hydraulic, electrical, and mechanical components.
5. Diagnose automatic traction control (ATC) and/or electronic stability control (ESC) electronic control(s) and components using self-diagnosis (blink codes) and/or specified test equipment (scan tool with appropriate software); determine needed repairs.
6. Test, diagnose, calibrate, and service electronic brake/stability control system sensors (speed, yaw, steering angle, brake pedal position, etc.) and circuits following manufacturers' recommended procedures (including output signal, resistance, amperage, shorts to voltage/ground, frequency data, etc.).
7. Diagnose electronic brake/stability and collision warning/avoidance control system braking concerns caused by vehicle modifications (mechanical, electrical, communication, security, radio, etc.).
8. Diagnose electronic collision warning/avoidance control systems and components using self-diagnosis and/or specified test equipment (scan tool with appropriate software). Confirm proper operation of system and warning indicators; determine needed repairs.

S4 Task List (continued)

9. Remove and install electronic collision warning/avoidance system components (radar, forward camera, etc.) following manufacturers' procedures and specifications; perform system calibrations and module programming/initialization.
10. Repair wiring harness and connectors following manufacturers' procedures.
11. Diagnose brake problems resulting from failures of interrelated systems (electronic stability control, antilock brake, traction control, collision warning/avoidance, etc.).
12. Clear diagnostic trouble codes (DTCs) and verify the repair. □

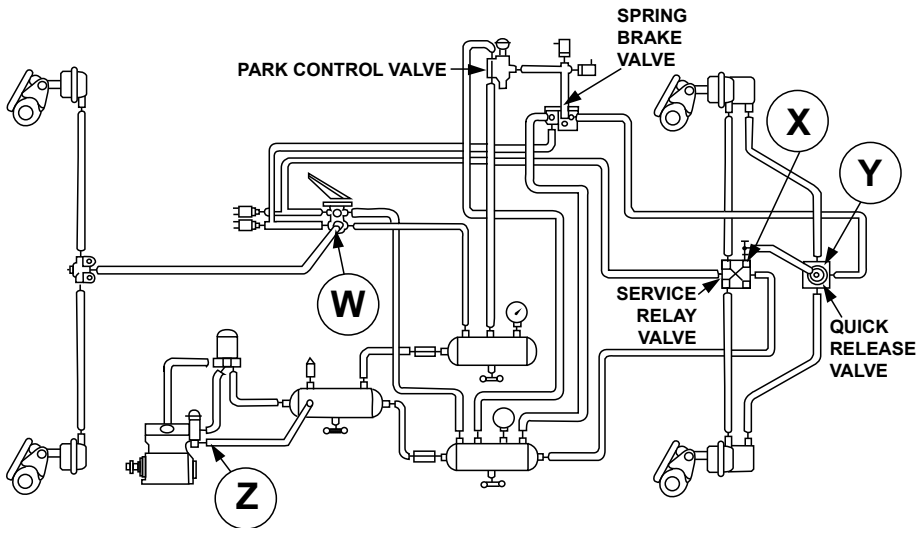
Sample Questions
Brakes (Test S4)

1. The parking brakes fail to apply on a school bus with air brakes.
   Technician A says that low air pressure in the spring brake chamber could be the cause.
   Technician B says that a ruptured spring brake diaphragm could be the cause.
   Who is right?

   (A) A only
   (B) B only
   (C) Both A and B
   * (D) Neither A nor B

2. A school bus has an uneven braking problem. Which of these could be the cause?

   (A) A binding treadle (foot) valve
   (B) Low brake line air pressure
   * (C) A grease soaked brake drum
   (D) A failed governor



3. The air brake system shown has 120 psi, but the park brake will not release. This could be caused by a leak at:

   (A) W.
   (B) X.
   * (C) Y.
   (D) Z.

4. All of the brakes drag on a school bus with hydraulic brakes. This could be caused by:

   (A) air in the hydraulic system.
   (B) excessive vacuum supply to the power brake booster.
   (C) a leaking secondary cup in the master cylinder.
   * (D) no brake pedal free travel.

S4 Sample Questions (continued)

5. Technician A says that the low air pressure warning system must provide a signal that the driver can hear.

   Technician B says that the low air pressure warning system must provide a signal that the driver can see.

   Who is right?

   (A) A only
   (B) B only
   * (C) Both A and B
   (D) Neither A nor B

6. No air pressure will build in the secondary air reservoir tank. This could be caused by:

   (A) an improperly adjusted air governor.
   * (B) a plugged one-way check valve.
   (C) a weak pressure relief valve.
   (D) a restricted compressor main discharge line.

These questions contains the word EXCEPT. Read the questions carefully before choosing your answer.

7. The driver of a school bus with air brakes says that it has poor stopping power. Any of these could be the cause EXCEPT the:

   * (A) quick-release valve exhaust port is plugged.
   (B) air pressure is too low.
   (C) application line is restricted.
   (D) brakes are adjusted wrong.

8. The low air pressure indicator stays on when the air pressure gauge shows 100 psi. All of these could be the cause EXCEPT:

   (A) burned contact points in the pressure switch.
   * (B) low battery voltage at the pressure switch.
   (C) a plugged air inlet to the pressure switch.
   (D) a blown diaphragm in the pressure switch.

Test Specifications and Task List
Suspension and Steering (Test S5)

	Content Area	Questions in Test	Percentage of Test
A.	Steering System Diagnosis and Repair	18	36%
B.	Suspension Systems Diagnosis and Repair	18	36%
	1. Independent Front Suspensions (5)		
	2. Straight/I-Beam Axle Diagnosis and Repair (6)		
	3. Rear Suspensions (7)		
C.	Wheel Alignment Diagnosis, Adjustment, and Repair	8	16%
D.	Wheels and Tires Diagnosis and Repair	6	12%
	Total	50	100%

A. Steering System Diagnosis and Repair (18 questions)

1. Diagnose steering column (including manual, electronic tilt, telescoping, and fixed) for noise, looseness, and binding problems; determine needed repairs.
2. Inspect, repair, or replace steering column, steering shaft U-joint(s), flexible coupling(s), collapsible columns, intermediate shafts, and steering wheel assembly (including steering wheels and columns equipped with airbags and/or other steering wheel/column-mounted controls, sensors, and components). Phase shaft U-joints.
3. Diagnose power steering system noise, steering binding, darting/oversteer, reduced wheel cut, steering wheel kick, pulling, non-recovery, turning effort, looseness, hard steering, overheating, fluid leakage, and fluid contamination and/or aeration problems; determine needed repairs.
4. Diagnose, inspect, adjust, repair, or replace components (including motors, sensors, switches, actuators, harnesses, and control units) of steering column-mounted, electronically controlled, hydraulically and/or electrically assisted steering systems; calibrate and/or initialize systems as required.
5. Inspect power steering fluid level and condition; determine needed service; determine correct fluid type.
6. Purge air from the power steering system.
7. Perform power steering system pressure, temperature, and flow tests; determine needed repairs.
8. Inspect, service, or replace power steering reservoir including hoses, filter, seals and gaskets.
9. Inspect and reinstall/replace power steering pump drive belts, pulleys, and tensioners; verify tension, adjust drive belts, and check alignment.
10. Inspect, adjust, or replace power steering pump, drive gears/shafts, coupling, mountings, and brackets.
11. Inspect and replace power steering system cooler, lines, hoses, clamps/mountings, and fittings; check for proper hose routing.
12. Inspect, adjust or replace power steering gear.
13. Inspect, align, and replace pitman arm.
14. Remove and replace rack and pinion steering gear; inspect mounting surfaces; inspect and replace mounting bushings and brackets.

S5 Task List (continued)

15. Inspect, adjust or replace drag link/center link, tie rods, and ends; position adjusting sleeves, clamps and retainers.
16. Inspect and/or replace idler arm(s).
17. Inspect and replace steering arms.
18. Check and adjust wheel/axle stops.
19. Check and adjust steering gear poppets/relief valves.
20. Disarm, enable, and properly handle airbag/SRS system components during vehicle service following manufacturer's procedures.

B. Suspension Systems Diagnosis and Repair (18 Questions)

1. Independent Front Suspensions (5 questions)

1. Diagnose front suspension system noises, looseness, body sway, body lean and rough ride; determine needed repairs.
2. Inspect and replace upper and lower control arms, strut rods/radius arms, bushings, shafts, rebound/jounce bumpers and fasteners.
3. Inspect and replace upper and lower ball joints.
4. Inspect and replace steering knuckle and/or spindle assemblies.
5. Measure and correct independent suspension ride height as required.
6. Inspect and replace front suspension system coil springs and spring insulators/silencers.
7. Inspect and replace stabilizer bar (sway bar) bushings, brackets, and links.
8. Inspect and replace shock absorbers, bushings, brackets, mounts and fasteners.

2. Straight/I-Beam Axle Diagnosis and Repair (6 questions)

1. Diagnose front suspension system noises, looseness, body sway, body lean, and rough ride; determine needed repairs.
2. Inspect and replace front axle, U-bolts, and nuts. Torque components to manufacturer's specifications.
3. Inspect, service or replace kingpin, steering knuckle bushings, locks, bearings, shims, seals, and covers.
4. Inspect and replace shock absorbers, bushings, brackets, mounts and fasteners.
5. Inspect, repair, or replace leaf springs, shims/wedges, center bolts, clips, bushings, shackles, pins, insulators, brackets, mounts and fasteners.
6. Measure vehicle ride height; determine needed adjustments or repairs.
7. Inspect, test, adjust, repair, or replace air suspension pressure protection valve(s), ride height control valve(s), links, lines, hoses, and fittings.
8. Inspect, test, repair, or replace air springs and supporting components (shims, mounting plates, suspension arms, bushings, pins and hardware).

3. Rear Suspensions (7 questions)

1. Diagnose suspension system noises, looseness, rough ride, body sway and body lean problems; verify proper U-bolt and axle positioning: determine needed repairs.
2. Inspect and replace rear axle housing assembly, U-bolts, and hardware.
3. Inspect and replace shock absorbers, bushings, brackets, mounts and fasteners.
4. Measure vehicle ride height; determine needed adjustments or repairs.
5. Inspect and replace leaf springs, center bolts, clips, fasteners, bushings, shackles,pins, insulators, brackets, shims/wedges, and mounts (pads and saddles).
6. Inspect and replace torque arms (rods), pins, bushings, mounts and fasteners.
7. Inspect, test, adjust, repair, or replace air suspension pressure protection valve(s), height control valve(s), links, lines, hoses, and fittings.
8. Inspect, test, repair, or replace air springs, shims, mounting plates and supporting components.

S5 Task List (continued)

C. Wheel Alignment Diagnosis, Adjustment, and Repair (8 Questions)

1. Diagnose vehicle wandering, pulling, shimmy, darting, and steering effort problems; determine needed adjustments or repairs.
2. Check and adjust camber and caster; determine needed repairs.
3. Check SAI (steering axis inclination)/KPI (kingpin inclination) and included angle; determine needed repairs.
4. Check and adjust toe.
5. Check turning/Ackerman angle (toe out on turns) and maximum turning radius (wheel cut); determine needed repairs.
6. Check rear axle alignment (thrust line/centerline) and tracking; adjust or determine needed repairs.
7. Check and adjust steering and/or drive axle wheel bearings.
8. Perform electronic control module or steering sensor replacement and calibration; perform initialization or relearn procedure as required.

D. Wheels and Tires Diagnosis and Repair (6 questions)

1. Diagnose tire wear patterns; determine needed repairs.
2. Inspect and measure tire condition, date codes, tread depth, tire diameter and circumference, and valve stems and caps; match tires and rims; adjust air pressure. Verify proper application, speed rating, and load range.
3. Diagnose wheel end vibration, wheel hop, and shimmy problems; determine needed repairs.
4. Inspect and replace wheels, mounting hardware, studs, and fasteners.
5. Measure wheel and tire radial and lateral runout; determine needed repairs or adjustments.
6. Balance wheel and tire assembly.
7. Remove and reinstall wheel assemblies to manufacturer's specifications. □

Sample Questions
Suspension and Steering (Test S5)

1. Which of these could cause the front tires of a school bus to show a feathered edge wear pattern?

* (A) An incorrect toe setting
(B) An incorrect camber setting
(C) An incorrect caster setting
(D) Incorrect tire pressures

2. Excessive steering wheel freeplay may be an indication of:

(A) a loose power steering pump drive belt.
(B) improperly adjusted axle stops.
(C) contaminated power steering fluid.
* (D) loose steering sector-to-frame mounting bolts.

3. A school bus has a history of springs breaking at the center bolt holes.
Technician A says that loose u-bolts could be the cause.
Technician B says that loose spring shackles could be the cause.
Who is right?

* (A) A only
(B) B only
(C) Both A and B
(D) Neither A nor B

4. A school bus has a greater turning radius in one direction than in the other. This could be caused by:

(A) overtightened wheel bearing adjustment.
(B) air in the hydraulic system.
(C) incorrect power steering fluid.
* (D) incorrect axle stop adjustment.

5. A technician finds low pump pressure during a power steering pressure test. Which of these could be the cause?

(A) Excessive hose back-pressure
(B) A worn steering gear
(C) A high fluid level
* (D) A worn power steering pump

S5 Sample Questions (continued)

6. A school bus driver reports that the front end starts to shimmy at 40 mph (64 kph) and stops at 45 mph (72 kph). This could be caused by a:

* (A) missing wheel weight.
(B) worn sway bar bushing.
(C) broken spring leaf.
(D) dry kingpin bushing.

7. A school bus leans to one side. This could be caused by:

(A) a loose spring U-bolt.
* (B) a broken leaf spring.
(C) failed shock absorbers
(D) loose spring shackles.

This question contains the word EXCEPT. Read the question carefully before choosing your answer.

8. All of these must be checked before aligning the front wheels on a school bus EXCEPT:

(A) tire pressure.
(B) trim height.
(C) wheel bearing adjustment.
* (D) tire balance.

Test Specifications and Task List
Electrical/Electronic Systems (Test S6)

	Content Area	Questions in Test	Percentage of Test
A.	General Electrical/Electronic System Diagnosis	6	13%
B.	Low-Voltage Battery Diagnosis and Service	4	9%
C.	Starting System Diagnosis and Repair	6	13%
D.	Low-Voltage Charging System Diagnosis and Repair	7	16%
E.	Lighting Systems Diagnosis and Repair	12	27%
	► Headlights, Daytime Running Lights, Fog Lights, Parking, Clearance, Taillights, and Strobe Lights		
	► Stoplights, Turn Signals, Hazard Lights, Backup Lights/ Alarms, and 8-Lamp Warning Systems		
	► Dome Lights, Dash Lights, and Stepwell Lights		
F.	Gauges and Instrument Warning Devices Diagnosis and Repair	4	9%
G.	Miscellaneous	6	13%
	Total	50	100%

A. General Electrical/Electronic System Diagnosis (6 questions)

1. Identify vehicles as gasoline, diesel, alternative fuels, or high-voltage electric powered. Verify proper safety protocols and procedures are followed as per manufacturer's procedures for a safe working environment with appropriate personal protective equipment (PPE).
2. Check source voltage, applied voltages, circuit voltages, and voltage drops in electrical/electronic circuits using digital multimeter (DMM) or appropriate test equipment.
3. Check current flow in electrical/electronic circuits and components using digital multimeter (DMM), clamp-on ammeter, or appropriate test equipment.
4. Check continuity and resistance in electrical/electronic circuits and components using digital multimeter (DMM) or appropriate test equipment.
5. Locate open, shorted, and high resistance concerns in electrical/electronic systems. Determine needed actions.
6. Diagnose key-off battery drain (parasitic draw) problems; determine needed actions.
7. Inspect and test fusible links, circuit breakers (including resettable), fuses, and other circuit protection devices. Determine needed actions.
8. Inspect, test, and replace relays, solenoids, resistors and diodes (including solide state devices).
9. Read and interpret electrical schematic diagrams and symbols.
10. Diagnose failures in multiplexed data communications bus networks; determine needed actions.
11. Diagnose vehicle electronic control systems using appropriate diagnostic tools, software, and service information; check and record diagnostic codes; access and verify parameters and calibration settings; determine needed actions.
12. Check electronic circuit waveforms using an oscilloscope or appropriate test equipment; interpret readings and determine necessary actions.

S6 Task List (continued)

B. Low-Voltage Battery Diagnosis and Service (4 questions)

1. Determine battery types (absorbed glass mat (AGM), flooded cell, lithium ion, etc.) and determine state-of-charge by measuring terminal post voltage using a digital multimeter (DMM) or appropriate test equipment.
2. Perform battery test based on battery type/chemistry; determine needed action.
3. Inspect, clean, service, or replace batteries, cables, and terminal connections.
4. Inspect, clean, repair, and replace battery boxes, covers, grommets, trays, mounts, and hold-downs.
5. Charge battery using appropriate method for battery type/chemistry.
6. Jump-start vehicle using jumper cables or appropriate auxiliary power supply (jump pack, super capacitor, etc.).
7. Diagnose low-voltage disconnect (LVD) systems; determine needed actions.

C. Starting System Diagnosis and Repair (6 questions)

1. Perform starter current draw test; determine needed actions.
2. Perform starter circuit voltage drop tests; determine needed actions.
3. Inspect, test, clean, and/or replace components and wiring in the starter control/interrupt circuit (including over-crank protection).
4. Verify starter operation; remove and replace starter as needed; inspect flywheel ring gear or flex plate.
5. Inspect, test, and replace starter relays and solenoids/switches including integrated magnetic switch (IMS).

D. Low-Voltage Charging System Diagnosis and Repair (7 questions)

1. Diagnose dash-mounted charge meters and/or indicator lights that show a no-charge, low charge, or overcharge condition; determine needed actions.
2. Diagnose the cause of a no-charge, low charge, or overcharge condition; determine needed actions
3. Inspect, adjust, and replace alternator, drive belts/gears, pulleys, fans, mounting brackets, and tensioners; adjust belts and check alignment.
4. Test charging system voltage (AC and DC) and amperage output tests; determine needed actions.
5. Perform charging circuit voltage drop tests; determine needed actions.
6. Inspect, repair, or replace charging circuit connectors, terminals, and wires.
7. Inspect and test generator (alternator) control components; determine needed actions.

E. Lighting Systems Diagnosis and Repair (12 questions)

►Headlights, Daytime Running Lights, Fog Lights, Parking, Clearance, Taillights, and Strobe Lights

1. Diagnose the cause of brighter-than-normal, intermittent, dim, or no headlight operation, including daytime running lights (DRL); determine needed actions.
2. Inspect, test, replace, and aim/adjust headlights and auxiliary lights.
3. Inspect, test, repair, or replace headlight and high/low dimmer switches, multifunction switches, relays, control modules, solenoids, wiring, connectors, and sockets.
4. Inspect, test, repair, or replace switches, control modules, relays, solenoids, bulbs, LEDs, sockets, connectors, terminals, and wiring of fog light, parking, clearance, strobe light, and taillight circuits.

►Stoplights, Turn Signals, Hazard Lights, Backup Lights/Alarms, and 4-Lamp and 8-Lamp Warning Systems

5. Inspect, test, adjust, repair, or replace stoplight circuit switches, electronic control components, relays, bulbs, LEDs, sockets, connectors, terminals, and wires.
6. Inspect, test, repair, or replace turn signal and hazard circuit flashers or electronic control components, switches, relays, bulbs, LEDs, sockets, connectors, terminals, and wires.
7. Inspect, test, adjust, repair, or replace backup lights, backup cameras, alarm and warning device circuit switches, relays, bulbs, LEDs, sockets, horns, buzzers, connectors, and wiring.
8. Inspect, test, repair, or replace 8-lamp warning systems (electronic, sequential, and non-sequential), stop arm lights, switches, relays, diodes, control/flasher units, and actuators.

S6 Task List (continued)

9. Inspect, test, and repair override circuits for 8-lamp warning light systems.
10. Inspect, test, adjust, repair, or replace stop arm and crossing gate switches, relays, motors, solenoids, terminals, connectors, and wiring.

►Dome Lights, Dash Lights, and Stepwell Lights

11. Inspect, test, repair, or replace dome light circuit switches, relays, control modules, bulbs, LEDs, sockets, connectors, and wiring.
12. Inspect, test, repair, or replace dash light circuit switches, bulbs, LEDs, sockets, connectors, control modules, wiring, printed circuits, and instrument panel warning lights.
13. Inspect, test, repair, or replace stepwell circuit switches, relays, control modules, bulbs, LEDs, sockets, connectors, and wiring.

F. Gauges and Instrument Warning Devices Diagnosis and Repair (4 questions)

1. Diagnose the cause of intermittent, inaccurate, or no gauge readings; determine needed actions.
2. Inspect, test, adjust, repair, or replace gauge circuit sending units/sensors, gauges, control modules, connectors, and wiring.
3. Inspect, test, repair, or replace warning devices (lights and audible) circuit sending units, sensors, circuit boards/control modules, bulbs, audible components, sockets, connectors, terminals, and wires.
4. Inspect, test, repair, or replace electronic instrumentation systems; verify proper calibration for vehicle application.

G. Miscellaneous (6 questions)

1. Inspect, test, repair, or replace horn circuit relays, horns, switches, connectors, control modules, and wiring.
2. Inspect, test, repair, or replace SRS system components, sensors, circuits, clock spring, switches, connectors, terminals, and wires.
3. Inspect, test, repair, or replace wiper motor, intermittent (delay) module, wiper transmission linkage, resistors, relays, switches, connectors, control modules, and wiring.
4. Inspect, test, repair, or replace windshield washer motor, pump/relay assembly, switches, relays, connectors, control modules, and wiring.
5. Inspect, test, repair, or replace mirror heater circuit grids, motors, relays, switches, connectors, terminals, and wires.
6. Inspect, test, repair, or replace heater electrical components including blower motors, booster pumps, resistors, relays, switches, connectors, control modules, and wiring.
7. Inspect, test, repair, or replace 12V accessory power outlets, integral fuses, circuit, connectors, and wiring.
8. Inspect, test, adjust, repair, or replace starter interlock system switches, actuators, relays, solenoids, alarms, connectors, control modules, and wiring.
9. Inspect, test, adjust, and repair electrically actuated door opening devices, switches, relays, solenoids, control modules, connectors, terminals, and wiring (air and electric entrance doors).
10. Inspect and diagnose the cause of slow, intermittent, or no power window operation; inspect, test, repair, or replace power window motors, switches, relays, connectors; determine needed actions.
11. Diagnose the cause of poor, intermittent, or no operation of electric door locks; inspect, test, repair, or replace electric door lock circuit switches, relays, controllers, actuators/solenoids, connectors, terminals, and wires.
12. Inspect, test, and replace cruise control electrical components and controls.
13. Diagnose operation of vehicle safety systems and related circuits for advanced driver assistance systems (ADAS); determine needed actions. □

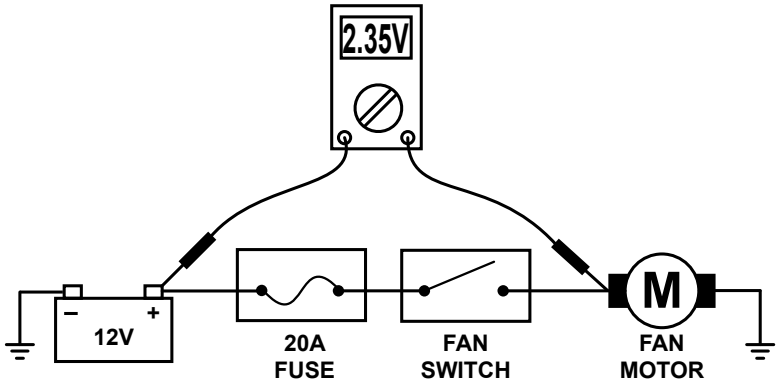
Sample Questions
Electrical/Electronic Systems (Test S6)

1. The instrument panel volt gauge reads 11.5 volts all of the time during a school bus route. During diagnosis, the technician finds that the alternator output is 13.9 volts. Which of these could be the cause?

   (A) A loose alternator belt
   (B) A weak cell in the battery
   * (C) High voltage drop in the volt gauge circuit
   (D) Low resistance in the positive battery cable

2. Both headlights on a school bus are dim on high beam, and normal on low beam.
   Technician A says that a poor headlight ground could be the cause.
   Technician B says that a shorted headlight switch could be the cause.
   Who is right?

   (A) A only
   (B) B only
   (C) Both A and B
   * (D) Neither A nor B



3. The dash blower fan blows slowly on a Type C school bus. During diagnosis, the digital multimeter (DMM) measurement shown was observed with the fan switch in the ON position. This could be caused by:

   (A) an open fan motor ground.
   (B) an open fan circuit 20A fuse.
   (C) high resistance in the fan motor.
   * (D) high resistance in the fan switch.

S6 Sample Questions (continued)

4. When the door is opened and the amber lights cancel, the red lights do not illuminate on a school bus with an electronic 8-lamp warning system.

   Technician A says that a failed relay could be the cause.

   Technician B says that a failed master switch could be the cause.

   Who is right?

   * (A) A only
   (B) B only
   (C) Both A and B
   (D) Neither A nor B

5. The windshield wipers on a school bus will not park. Which of these could be the cause?

   (A) An out-of-adjustment worm gear
   * (B) A failed parking switch assembly
   (C) A binding wiper transmission
   (D) A poor ground at the wiper motor

6. Which of these could cause the driver's heater blower motor to operate at low speed only?

   (A) An open ground
   * (B) A failed heater switch
   (C) A binding blower cage
   (D) A wiring short to the heater

These questions contains the words EXCEPT. Read the questions carefully before choosing your answer.

7. Any of these could cause high starter current draw EXCEPT:

   (A) worn starter bushings
   * (B) a failed starter relay
   (C) grounded field coils
   (D) a grounded armature

8. School buses which are not operated during the summer for more than 30 days should have all of these done to the batteries EXCEPT:

   (A) removed and stored.
   (B) periodically tested and charged.
   (C) disconnect the negative cable.
   * (D) replace the electrolyte.

Test Specifications and Task List
Air Conditioning Systems and Controls (Test S7)

Note: ASE HVAC certifications (A7, T7, H7 or S7) do not provide the necessary credentials to satisfy EPA requirements for Section 609 refrigerant management. The ASE Refrigerant Recovery and Recycling Review and Quiz program meets Section 609 requirements and can be taken online and in print. Details are at www.ase.com/cfc.

	Content Area	Questions in Test	Percentage of Test
A.	A/C System Diagnosis and Repair	16	40%
B.	A/C System Component Diagnosis and Repair	14	35%
	1. Compressor and Clutch (6)		
	2. Evaporator, Condenser, and Related Components (8)		
C.	Operating Systems and Related Controls Diagnosis and Repair	10	25%
	Total	40	100%

A. A/C System Diagnosis and Repair (16 questions)

1. Diagnose the cause of unusual operating noises of the A/C system; determine needed repairs.
2. Identify system type and conduct performance test on the A/C system; determine needed repairs.
3. Diagnose A/C system problems indicated by refrigerant flow past the sight glass (for systems using a sight glass); determine needed repairs.
4. Diagnose A/C system problems indicated by pressure gauge readings; determine needed repairs.
5. Diagnose A/C system problems indicated by visual and touch procedures; determine needed repairs.
6. Leak test A/C system; determine needed repairs.
7. Identify type of refrigerant; perform A/C system recovery procedure and recycle refrigerant.
8. Evacuate A/C system.
9. Internally clean (flush) A/C system components and hoses.
10. Charge A/C system with refrigerant (liquid or vapor).

B. A/C System Component Diagnosis and Repair (14 questions)

1. Compressor and Clutch (6 questions)

1. Diagnose A/C system problems that cause the pressure protection devices to interrupt system operation; determine needed repairs.
2. Test and replace A/C system pressure protection devices.
3. Inspect, adjust, and replace A/C compressor drive belts, pulleys, and idlers check operation of tensioner(s); check pulley alignment.
4. Inspect, test, and service, or replace A/C compressor clutch components or assembly.
5. Identify oil type; inspect and correct oil level in A/C compressor.
6. Inspect, test, and replace A/C compressor.
7. Inspect, and repair or replace A/C compressor mountings.

S7 Task List (continued)

2. Evaporator, Condenser, and Related Components (8 questions)

1. Inspect and repair or replace A/C system mufflers, hoses, lines, in-line filters, fittings, and seals.
2. Inspect A/C condenser for air flow; clean and straighten fins.
3. Inspect and repair or replace A/C system condenser coil, condenser chassis, and mountings.
4. Remove and replace receiver/drier.
5. Remove and replace accumulator/drier.
6. Inspect and test expansion valve(s); replace as necessary.
7. Inspect and test orifice tube; replace as necessary.
8. Inspect and clean or replace evaporator; determine needed repairs.
9. Inspect A/C evaporator for airflow; determine needed repairs.
10. Inspect, clean, and repair evaporator housing and water drain.
11. Identify and inspect A/C system service ports (gauge connections); replace as necessary.

C. Operating Systems and Related Controls Diagnosis and Repair (10 questions)

1. Diagnose failures in the control system of heating, ventilating, and A/C systems; determine needed repairs.
2. Inspect, test and repair, or replace evaporator blower motors, resistors, switches, relay/modules, wiring, and protection devices and electrically-operated mode/blend doors.
3. Inspect, test, and repair or replace A/C compressor clutch coil, relay/modules, wiring, sensors, switches, diodes and protection devices.
4. Diagnose A/C problems related to engine idle speed control systems.
5. Inspect, test, and repair or replace condenser fan motors, relays/modules, switches, sensors, wiring, and protection devices.
6. Inspect, test, adjust, and repair or replace evaporator temperature switches, sensors, and wiring.
7. Inspect, test, adjust, and repair or replace electrical power supply charging system components.
8. Inspect, test, adjust, and repair or replace heating, ventilating, and A/C ducts, doors, hoses, and outlets.
9. Inspect, test, and replace mechanical heater-control valves and manual shut-off valves. □

Sample Questions
Air Conditioning Systems and Controls (Test S7)

1. The A/C system on a Type A school bus is blowing cool, but not cold, air from the dash ducts. The system has the correct charge and the pressure gauge readings are normal. Which of these could be the cause?

   (A) The air recirculation door is stuck closed.
   (B) The heater valve is stuck closed.
   (C) The source of vacuum has been lost.
   * (D) The blend door is out of adjustment.

2. A high pitched noise comes from one of the evaporators while the A/C system is running.

   Technician A says that the noise could be caused by the A/C system equalizing.

   Technician B says that the noise could be caused by a partially restricted expansion valve.

   Who is right?

   (A) A only
   * (B) B only
   (C) Both A and B
   (D) Neither A nor B

3. An A/C system has a low discharge pressure. Which of these could be the cause?

   * (A) A failed internal compressor seal
   (B) A restricted refrigerant flow in the condenser
   (C) A restriced air flow over the condenser
   (D) A compressor clutch that will not disengage

4. The high-side pressure reaches 300 psi within 15 seconds when the compressor on an A/C system is engaged.

   Technician A says that a failed compressor could be the cause.

   Technician B says that a restriction in the evaporator could be the cause.

   Who is right?

   (A) A only
   (B) B only
   (C) Both A and B
   * (D) Neither A nor B

5. Which of these components should be replaced when an A/C system is found to have excessive moisture?

   (A) Compressor
   (B) Thermostat
   * (C) Receiver/drier
   (D) Evaporator

S7 Sample Questions (continued)

6. The accumulator/drier is warm on an A/C system that has been operating (compressor engaged) for 20 minutes. Which of these could be the cause?

   (A) Too little clutch air gap
   * (B) A refrigerant undercharge
   (C) A refrigerant overcharge
   (D) An open in the pressure switch

7. An A/C system with a new compressor and receiver/drier is not cooling properly and the compressor is cold and sweating.

   Technician A says that a stuck-open expansion valve could be the cause.

   Technician B says that an overcharged system could be the cause.

   Who is right?

   (A) A only
   (B) B only
   * (C) Both A and B
   (D) Neither A nor B

8. After replacing a condenser and charging a school bus A/C system, there is a loss of refrigerant. This could be caused by:

   (A) bent condenser fins.
   * (B) damaged O-rings.
   (C) excessive refrigerant oil.
   (D) a low refrigerant charge.

This question contains the word EXCEPT. Read the question carefully before choosing your answer.

9. The driver of a Type D school bus complains that there is no hot air when the blend valve control is moved from COLD to HOT. Any of these could be the cause EXCEPT:

   * (A) open manual shutoff valves.
   (B) low coolant level.
   (C) clogged heater core filters.
   (D) misadjusted control cable.

Test Prep & Training Resources

Taking an ASE certification test doesn't have to be a high stress challenge. The ASE website contains test preparation and training information tailored to your specific needs. Visit www.ase.com and use the "Test Prep & Training" tab. We've loaded this section of our website with plenty of information to help boost both your knowledge and your confidence—two of your most important tools as a test-taker.

Official ASE Practice Tests
The easy way to try your hand at taking ASE-style certification exams, without the stress and high stakes of the real thing. www.ase.com/official-ase-practice-test-program.

Study Guides
Free, step-by-step guides to help you understand what's involved in each test—including sample questions and suggestions for further preparation. www.ase.com/ase-study-guides.

ASE Testing Demo
Are you new to ASE testing or has it been a few years? The demonstration at www.ase.com/free-test-drive will show you how the test platform works, so you'll feel right at home with the testing format.

Community Colleges and Technical Training Schools
Get instructor-led, hands-on training at schools accredited by the ASE Education Foundation. https://www.aseeducationfoundation.org/find-a-program.

ATMC for more training options
The ASE Training Managers Council is a professional organization of individuals responsible for the development and delivery of training in the auto and truck industries. The ATMC administers the ASE Accredited Training Provider of Continuing Automotive Service Education program. A list of ASE accredited training providers can be found at www.atmc.org.

Other test prep and training programs
Many test-takers have used aftermarket test prep and training programs and found them helpful. Please note that ASE has neither reviewed nor approved the content of these programs and providers.