

THE OFFICIAL ASE STUDY GUIDE

# ASE School Bus Tests



National Institute for  
**AUTOMOTIVE  
SERVICE  
EXCELLENCE**

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# ASE SCHOOL BUS TESTS

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# OVERVIEW

## **Introduction**

The *Official ASE Study Guide for the School Bus Tests* is designed to help technicians study for the ASE certification tests. It includes detailed information about the technical knowledge covered in the School Bus series. And if needed, you should find it easier to select additional reference material that will help you prepare for your test(s).

ASE voluntary certification helps technicians prove their abilities to themselves, to their employers, and to their customers. By passing ASE tests you will earn the most valuable credential available to school bus technicians. Because the tests are tough, you'll have the satisfaction of proving to yourself that you are among the elite in your profession. What's more, these credentials are recognized throughout the U.S.

Certified technicians promote customer trust and improve the image of the industry. And trust and professionalism are the first steps to a better, more prosperous business.

ASE encourages you to take the tests and to join the proven pros who wear the ASE Blue Seal of Excellence®.

## **How Do I Become Certified?**

There are seven tests in the School Bus Technician certification series. If you pass at least one test, and have at least two years of hands-on working experience in school bus repair, then you will become certified as an ASE School Bus Technician. (Appropriate vocational training may be substituted for up to one year of work experience.)

If you pass tests S1 through S6, and meet the experience requirement, you will earn the certificate of Master School Bus Technician.

If you are currently certified in Diesel Engines (A9, H2, S2, or T2) and Electrical/Electronic Systems (A6, H6, S6, or T6), you are eligible to take the L2 Electronic Diesel Engine Diagnosis Specialist test.

Your test results will be emailed to you immediately following your testing appointment. Results will not be given over the phone nor will they be released to anyone without your written permission. If you fail a test, you must wait 30 days from the test date before you can purchase it again.

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## OVERVIEW (CONTINUED)

Certification credentials are valid for five years. This ensures that certified technicians are recognized as being up-to-date in their profession. If it has been almost five years since you passed a test, it is time to register for the corresponding recertification test. Most recertification tests are about half the length of the regular tests.

### **School Bus Tests**

This *Study Guide* contains Test Specifications, task lists, and sample questions for the following ASE tests:

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

ASE offers certification in areas including Automobile/Light Truck, Medium/Heavy Truck, Truck Equipment, Collision Repair/Refinish, Transit Bus, Parts and Advanced Level specialties. Separate *Study Guides* are available for each test series.

For full information on ASE testing as well as downloadable *Study Guides* and other test preparation resources, visit [www.ase.com](http://www.ase.com).

### **Who Writes the Questions?**

The questions, written by service industry experts familiar with all aspects of school bus repair, are entirely job-related. They are designed to test knowledge of the skills that you need in servicing school buses; theoretical knowledge is not covered.

Each question has its roots in an ASE “item-writing” workshop where service representatives from school bus manufacturers, aftermarket parts and equipment manufacturers, working technicians and technical educators meet to share ideas and translate them into test questions. Each test question must survive review by all members of the group. The questions are written to deal with practical problems of diagnosis and repair experienced by technicians in their day-to-day work.

Next, all questions are pre-tested and quality-checked on a national sample of technicians. Those questions that meet ASE standards of quality and accuracy are included in the scored sections of the tests; the “rejects” are sent back to the drawing board or discarded altogether.

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## OVERVIEW (CONTINUED)

### **How Long are the Tests?**

School Bus Tests 2019		Certification Tests		Recertification Tests	
Test	Name	Number of questions*	Testing time	Number of questions	Testing time
S1	Body Systems & Special Equipment	60*	1¼ hrs.	25	30 min.
S2	Diesel Engines	65*	1½ hrs.	28	45 min.
S3	Drive Train	50*	1 hr.	20	30 min.
S4	Brakes	60*	1¼ hrs.	25	30 min.
S5	Suspension and Steering	60*	1¼ hrs.	25	30 min.
S6	Electrical / Electronic Systems	55*	1½ hrs.	23	45 min.
S7	A/C Systems and Controls	50*	1 hr.	20	30 min.

\* ASE certification tests include 10 research questions that are not counted for score. You will not be told which questions these are, so you should answer every question. No research questions are added to recertification tests. You are eligible to take the recertification test only after you have previously passed the corresponding certification test.

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### **How Do I Prepare for the ASE Tests?**

Become familiar with test content and question formats.

The Test Specifications in this booklet contain a description of the content covered by each test. The Task Lists describe the actual work performed by technicians in each specialty area. Together, these form a “blueprint” for writing and assembling the ASE tests.

Please note that each question on the test is related to a particular task or set of tasks in the task list. Therefore, review the task list, thinking about whether you know how to perform each task listed.

All questions are multiple-choice. The sample questions in this *Study Guide* are examples of the five types of questions on the test. Note that some types of questions have extra instructions that you should follow.

Be sure to read each question carefully, so that you understand exactly what is being asked. *Each question tests a specific diagnostic or repair problem and has only **one** correct answer.*

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## OVERVIEW (CONTINUED)

To summarize, we suggest the following steps be taken:

**Step 1.** Carefully read the content list for each test you will attempt.

**Step 2.** Study the task list for each area.

**Step 3.** Go over the sample questions to become familiar with each question type. *This is very important!*

**Step 4.** Review steps 1 through 3 and identify the skill area(s) where you need additional study.

### Getting Started

Registration information is available on the ASE website at [www.ase.com](http://www.ase.com). This site will provide you with the locations that testing is available and other important information, including an electronic version of this and all other ASE *Study Guides*

While on the ASE website, take the time to create your own **myASE account** (if you do not already have one), which will allow you to register for tests, make your own test appointments, and have direct access to all your personal ASE certification information. And as always, if you have questions that [www.ase.com](http://www.ase.com) does not answer, contact our helpful customer service staff at [contactus@ase.com](mailto:contactus@ase.com) or 1-800-390-6789.

### At the Test Center—Some Tips

Try to be well rested on exam day. Arrive early enough to park and find the Test Center office. Late arrivals may be turned away by Test Center staff. If you cannot take a test because you are late, you will forfeit your test fees.

Bring your Admission Ticket and government-issued photo ID with you. Books, calculators, and other reference materials will not be permitted in the test room. You will be assigned a locker to store all your personal items. No electronic devices (including cell phones) are allowed in the test room. Most test centers have airport-level security procedures for all candidates, so be prepared for “wandering” or other security checks.

You will receive scratch paper and pencils, and if you are taking an Advanced Level L1 or L2 test, a Composite Vehicle Reference booklet. Each test appointment begins with a short tutorial on the operation of the testing platform. You can also preview the system online at [www.ase.com/asedemo](http://www.ase.com/asedemo) before you arrive at the Test Center.

#### Bring--

- ✓ Admission Ticket
- ✓ Current Gov't Issued Photo ID

#### Leave in locker--

- ✓ Books
- ✓ Calculator
- ✓ Coat
- ✓ Cell Phone
- ✓ Wallet
- ✓ Keys

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## OVERVIEW (CONTINUED)

Each test has a specific time limit (listed in the chart on page 5). As you take each test, the computer screen will continuously display the amount of time left. If you finish early, you may either review your answers or end the test and continue to the next test (if your appointment includes multiple tests). Once you submit a test for scoring, you cannot go back and review it. If you are taking several tests and need a short break, take it after you have completed a test, when you reach the screen that asks if you are taking additional tests. Do not take a break during your test as the test clock will continue to run.

If a question is difficult, mark the answer that you think is correct and flag the question using the on-screen button. Then go on to the next question. When you have finished the test, you may have time to go back to the flagged questions. Your score is based on the number of correct answers that you give, so you should try to answer every question.

When you finish your last test, you will be given a short customer satisfaction survey. After you complete the survey, inform the staff and leave. When you check your email, your test results will be waiting for you! If you need a paper copy right away, ask the staff to print your results before you leave the test center.

### **Test Content and Sample Questions**

The following material is designed to help technicians prepare for the ASE certification tests.

Each section begins with the Test Specifications, which will list the main categories covered and the number of test questions, as well as percentage of the test devoted to each topic.

The Task List describes the work activities a technician should be able to perform. This list was developed by working technicians and technical experts from across the country and will provide a valuable checklist telling you what to study for the test.

Note that the number of tasks in the list does not equal the number of questions on the test. Some tasks are complex and broad in scope and may be covered by several questions. Other tasks are simple and narrow in scope and one question may cover several tasks. The main goal in listing the tasks is to describe accurately what is done on the job, not to match each task to a particular test question. In other words, every question will relate to at least one task, but not every task will be covered on the test.

Sample questions follow the task list. Although these questions will not appear on tests, they are in the same format as actual test questions. Different types of multiple-choice questions are used on the ASE tests. Note the different instructions for some questions.

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## OVERVIEW (CONTINUED)

### **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** school bus is a body installed upon a 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. ■

# 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%
<b>Total</b>	<b>50</b>	<b>100%</b>

#### 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; repair 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 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, and lettering (interior/exterior).
7. Inspect, test, repair or replace post-trip inspection systems (child reminder, child check, sleeping child systems, etc.)
8. Inspect, test, repair or replace vehicle monitoring systems (GPS, routing, student tracking, video monitoring, stop arm 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 upholstery, foam, seat frame (air, manual or electric), seat adjustment controls and mounting hardware for driver's seat.
3. Inspect floor, floor covering, step well, wheel well and moldings; repair or replace as needed.
4. Inspect, adjust, repair or replace entry doors, side doors, and hand rails.
5. Check mirrors (including remote/heated) for clarity, mounting security, condition and operation; repair or replace as required.

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## S1 TASK LIST (CONTINUED)

6. Inspect, adjust, repair or replace body mounting bolts, clips (tie downs), outriggers, shear bolts, crossmembers (floor sills), cowl mounts, and accessory compartment/mountings (battery, luggage, storage) in accordance with manufacturers' recommended procedures.
7. Inspect and adjust accessory compartments (doors, seals, hinges and latches, battery, luggage, fuel, accessory panel, wiper doors, coolant door, etc); repair or replace as necessary.
8. Check and adjust engine hood, latches, hinges, cables, springs, torsion bars and hold-open devices. Check alignment and security of engine cover and seals; adjust, service, repair 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, window glass, frame/sash, and latches; repair or replace as necessary.
11. Diagnose, inspect, test, repair or replace wipers, wiper motor, intermittent (delay) module, wiper transmission linkage, resistors, park switch, relays, switches, connectors, and wiring.
12. Inspect, test, repair, or replace windshield washer motor, washer nozzle, hoses, pump/relay assemblies, switches, connectors, and wiring.

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

1. Check operation of wheelchair lift (electric or hydraulic) and backup systems; determine needed repairs.
2. Test, diagnose, repair or replace wheelchair lift operational and safety controls.
3. Inspect structural integrity of wheelchair lift platform, mounting devices, hand rails, and safety barriers; repair or replace according to manufacturers' recommendations.
4. Inspect condition and security of wheelchair track and tie downs, wheelchair passenger seatbelt (restraint) systems and passenger accessory securement.
5. Inspect, test, repair or replace wheelchair lift door, vehicle interlocks and related indicators.

### 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, pH level, nitrates and pressure testing for leaks; determine needed repairs.
4. Inspect, test and replace heater coolant control valve (manual, vacuum, and electric 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.
12. Recover, refill and bleed cooling system. ■

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# 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

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## S1 SAMPLE QUESTIONS (CONTINUED)

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.
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.
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.

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# 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%
<b>Total</b>	<b>55</b>	<b>100%</b>

### A. General Engine Diagnosis (15 questions)

1. Verify the complaint and road test vehicle; review past maintenance documents (if available).
2. Inspect engine assembly and compartment for fuel, oil, coolant, and other leaks; determine needed repairs.
3. Isolate and diagnose engine noises; determine needed repairs.
4. Check engine exhaust odor and smoke color, density (opacity), and quantity; determine needed repairs.
5. Perform fuel system tests (fuel pressure, volume, fuel return rate, fuel level, quality, contamination); determine needed repairs.
6. Perform air intake system restriction and leakage test; determine needed repairs.
7. Perform intake manifold boost pressure test; determine needed repairs.
8. Perform exhaust back pressure tests; determine needed repairs.
9. Perform crankcase pressure test, including open and closed systems; determine needed repairs.
10. Diagnose no cranking, cranks but fails to start, hard starting, and starts but does not continue to run problems; determine needed repairs.
11. Diagnose surging, rough operation, misfiring, low power, slow deceleration, slow acceleration, and engine shutoff problems; determine needed repairs.
12. Isolate and diagnose engine related vibration problems; determine needed repairs.
13. Check cooling system for coolant type, coolant level, freeze point, boiling point, contamination, temperature, pressure, conditioner concentration (supplemental coolant additive), filtration, and fan operation; determine needed repairs.

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## S2 TASK LIST (CONTINUED)

14. Check lubrication system for contamination, oil level, oil type, temperature, pressure, filtration, and oil consumption; determine needed repairs. Change engine oil and filters.
15. Connect diagnostic tool to vehicle/engine and verify software calibration. Check, record, and clear active and inactive diagnostic trouble codes (DTCs); monitor electronic engine data. Check for technical service bulletins (TSBs).

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

1. Remove, clean, inspect, and reinstall cylinder head(s) assembly.
2. Inspect cylinder head threaded holes, studs, and bolts for serviceability; service/replace as needed.
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; service as needed.
4. Inspect injector bore; replace injector sleeves and seals/O-rings where specified by manufacturer.
5. Inspect valve springs, retainers, and/or rotators, locks and seals, determine needed repairs.
6. Inspect pushrods, rocker arms, rocker arm shafts, and brackets for wear, bending, cracks, looseness, and blocked oil passages; repair/replace as needed.
7. Inspect, measure and replace camshaft and cam followers; measure/adjust endplay; measure lobe for lift.
8. Inspect, replace, and time the engine gear train including checking gear wear and backlash of camshaft, 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, and gallery plugs; inspect threaded holes, studs, dowel pins and bolts for serviceability; service/replace as needed.
12. Measure liner height (protrusion) and counterbore depth; determine needed repairs.
13. Inspect, measure, and service or replace crankshaft vibration damper and flywheel/flexplate.
14. Inspect, install and align flywheel housing.
15. Inspect cylinder walls or liners for cavitation and wear; inspect pistons and rings for wear and damage; determine needed service.
16. Clean and inspect crankshaft and journals for surface cracks and damage; check condition of oil passages; check passage plugs; measure journal diameters; check mounting surfaces; determine needed service.

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

1. Verify engine oil pressure and check pressure gauge, sending unit, and warning devices.
2. Inspect, measure, and repair/replace oil pump, drives, inlet pipes, and screens.
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, reinstall/replace bypass valve and oil thermostat valve; inspect and repair/replace lines and hoses.

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## S2 TASK LIST (CONTINUED)

5. Inspect and clean turbocharger lubrication system; replace as needed.
6. Inspect and reinstall/replace drive belts, pulleys, idler pulleys, and automatic tensioners; check alignment and adjust drive belts.
7. Verify coolant temperature and check temperature gauge, sending unit, and warning devices.
8. Inspect and replace coolant thermostat(s), bypasses, housing(s), and seals.
9. Flush and refill cooling system with correct coolant type; bleed air from system.
10. Inspect and repair/replace coolant conditioner (supplemental coolant additive) filter, check valves, lines, and fittings.
11. Inspect and repair/replace water pump and hoses.
12. Inspect and clean radiator, pressure cap, and tank(s); determine needed service.
13. 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 systems.

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

1. Inspect and service/replace air induction piping, air cleaner, and element; check for air restriction; check operation of air restriction indicator and housing drain valve.
2. Inspect, test, and repair/replace turbocharger(s) (including variable ratio/geometry VGT), pneumatic, hydraulic, electronic controls, and actuators; inspect, test, and replace wastegate and wastegate controls.
3. Inspect and repair/replace intake manifold, gaskets, temperature and pressure sensors, and connections.
4. Inspect, test, clean, and replace charge air cooler and piping system.
5. Inspect and repair/replace exhaust manifolds, gaskets, piping, mufflers, and hangers.
6. Inspect, test, and repair/replace preheater/inlet air heater, or glow plug system and controls.
7. Inspect, test, and replace exhaust aftertreatment regeneration systems and controls, including 3-way oxidation catalysts, selective catalysts reduction (SCR) systems, diesel particulate filters (DPF), and diesel exhaust fluid (DEF).
8. Inspect, test, service, and replace EGR system components including EGR valve, cooler, piping, sensors, controls, and wiring.

### 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 (lift) pump, pump drives, screens, fuel/water separators/indicators, filters, heaters, and associated mounting hardware.
3. Check fuel system for restrictions; determine needed repairs.
4. Check fuel system for presence of air; prime and bleed fuel system; check and repair/replace primer pump.
5. Perform on-engine inspections, tests, and adjustments; time or replace rotary-type and inline injection pumps.
6. Perform on-engine inspections, tests, and adjustments, or replace fuel injectors; calibrate fuel injector if necessary.

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## S2 TASK LIST (CONTINUED)

7. Inspect and test air/fuel ratio controls and timing advance mechanisms; determine needed repairs.
8. Inspect and reinstall/replace high-pressure injection lines, fittings, and seals.
9. Inspect, test and adjust, repair/replace engine fuel shutoff devices and controls.
10. Use a scan tool, digital multimeter (DMM), and/or PC-based diagnostic tool to inspect or test electronic engine control system sensors, actuators, circuits, harnesses, and electronic control module (ECM); determine needed repairs.
11. Inspect, adjust and repair/replace throttle controls including manual, electronic, and air.
12. Perform on-engine inspections and tests on hydraulic electronic unit injector (HEUI) fuel systems and electronic controls.
13. Perform on-engine inspections and tests on electronic unit injector (EUI) fuel systems and electronic controls.
14. Perform on-engine inspections and tests on high-pressure common rail (HPCR) fuel systems and electronic controls.
15. Inspect, test, and replace electrical connector terminals, pins, harnesses, seals, and locks.

### F. Starting System Diagnosis and Repair (3 questions)

1. Perform battery state-of-charge test, load test, capacity test; determine needed service; charge battery(s) as needed.
2. Start vehicle using jumper cables, booster battery, or auxiliary power supply.
3. Inspect and clean battery cables and terminals; perform battery cable voltage drop test.
4. Inspect, test, and reinstall/replace starter relays, safety switch(s), vandal lock system, and solenoids.
5. Perform starter current draw test; determine needed repairs.
6. Perform starter circuit voltage drop tests; determine needed repairs.
7. Remove and replace starter assembly. ■

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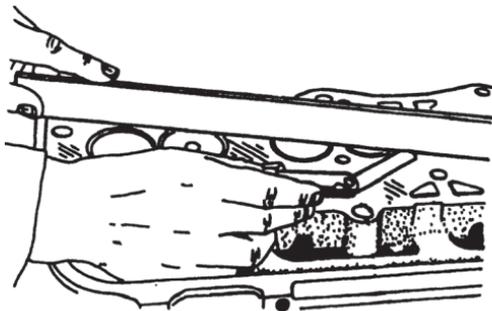
## SAMPLE QUESTIONS DIESEL ENGINES (TEST S2)

1. A driver complains that a Type C school bus has excessive black smoke when started in the morning. Which of these could be the cause?  
\* (A) A failed fuel injection nozzle  
(B) A restricted fuel filter  
(C) A blocked fuel tank vent  
(D) A leaking fuel return line
  
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

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## S2 SAMPLE QUESTIONS (CONTINUED)

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.



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

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## S2 SAMPLE QUESTIONS (CONTINUED)

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

***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.

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# TEST SPECIFICATIONS AND TASK LIST

## DRIVE TRAIN TEST (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	18%
<b>Total</b>	<b>40</b>	<b>100%</b>

### 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. Perform stall tests; determine needed repairs.
5. Perform lock-up converter system tests; determine needed repairs.
6. Diagnose mechanical and electrically-controlled systems; determine needed repairs.
7. Inspect, adjust, and replace manual valve shift linkage and cables.
8. Inspect, adjust, and replace cables, linkages or lines for throttle valve (modulator), kickdown, and accelerator pedal.
9. Replace fluid and filter(s); check fluid level and dipstick calibration.
10. Inspect, test and/or replace governor, governor cover, and gasket.
11. Inspect and replace external seals and gaskets.
12. Inspect, test, flush, and replace cooler, lines, filters and fittings.
13. Inspect, test, or replace vehicle speed sensor; check tone/exciter ring.
14. 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.
15. Inspect, test operation, and repair or replace electronic shift selectors (driver controls), switches, displays, indicators, and wiring harnesses.
16. 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 interpret digital multimeter (DMM) readings, determine needed repairs.

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## S3 TASK LIST (CONTINUED)

17. Diagnose automatic transmission problems caused by data link/bus interfaces with related electronic control systems; perform relearn/fast-adapt procedure if necessary.
18. Inspect, replace, and align transmission mounts.
19. Remove and replace transmission; inspect flex plate.
20. Remove, inspect, and replace torque converter.
21. Inspect engine block, flywheel housing, transmission mating surfaces, and engine-to-transmission mounting adapters; determine needed repairs.

### **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 and overheating problems; determine needed repairs.
2. Check and repair fluid leaks; inspect and replace rear axle drive unit cover plates, gaskets, vents, magnetic plugs, and pinion seals.
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 bearing noises and damage; determine needed repairs.
9. Clean, inspect, lubricate, and replace wheel bearing cones and races; clean and inspect locking plates and nuts, replace seals, wear rings, and axle flange gasket; adjust rear wheel bearings.
10. Check, adjust, and replace wheel speed sensor(s); inspect and replace tone/exciter ring. ■

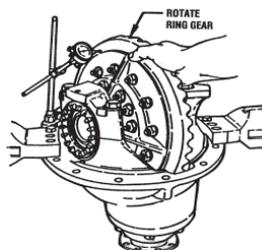
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## SAMPLE QUESTIONS DRIVE TRAIN (TEST S3)

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.

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### S3 SAMPLE QUESTIONS (CONTINUED)



5. What operation is being performed 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.

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# 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	12	24%
1. Hydraulic System (5)		
2. Mechanical System (5)		
3. Power Assist Units and Misc. (2)		
C. Wheel Bearings Diagnosis and Repair	4	8%
<b>Total</b>	<b>50</b>	<b>100%</b>

### A. Air Brakes Diagnosis and Repair (34 questions)

#### 1. Air Supply and Service Systems (16 questions)

1. Diagnose poor stopping, air leaks, pulling, grabbing, or dragging complaints caused by supply and service system problems; determine needed repairs.
2. Check air system build-up and recovery time; determine needed repairs.
3. Drain air reservoir tanks; check for oil, water, and foreign material; determine needed repairs.
4. Inspect, adjust, align, or replace air compressor drive belts, pulleys, tensioners, drive gears, and couplings.
5. Inspect, repair, or replace air compressor, air cleaner, oil and water lines and fittings.
6. Inspect, test, adjust, or replace system pressure controls (governor/relief valve), unloader assembly valves, pressure protection valves, and filters.
7. Inspect, repair, or replace air system lines, hoses, fittings, and couplings.
8. Inspect, test, clean, or replace air tank relief (pop-off) valves, one-way check valves, drain cocks, automatic drain (spitter) valves, heaters, wiring, and connectors.
9. Inspect, clean, repair, or replace air drier systems, filters, valves, heaters, wiring, and connectors.
10. Inspect, test, adjust, repair, or replace brake application (foot/treadle) valve, fittings, and mounts; check brake pedal free play.
11. Inspect, test, or replace two-way (double) check valves and anti-compounding valves.
12. Inspect, test, repair, or replace stop and parking brake light circuit switches, wiring, and connectors.
13. Inspect, test, repair, or replace brake relay valve, quick-release valves, and limiting quick-release valves.

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## S4 TASK LIST (CONTINUED)

14. Inspect, test, and replace inversion and emergency (spring) brake control valve(s).
15. Inspect, test, repair, or replace low pressure warning devices.
16. Inspect, test, and replace air pressure gauges, lines, and fittings.
17. Perform antilock brake system (ABS) warning lamp start-up test; determine needed repairs; diagnose hard fault codes/diagnostic trouble codes (DTCs) using a scan tool, PC computer, or LEDs; determine needed repairs.
18. Diagnose activation problems (none, erratic, false) on antilock brake systems (ABS); determine needed repairs.
19. Test, adjust, or replace antilock brake system (ABS) wheel speed sensors and tone/exciter rings.
20. Test and replace antilock brake system (ABS) electronic control units (ECU) and modulator valves; test, repair, and replace wiring and connectors.

### 2. Mechanical/Foundation (13 questions)

1. Diagnose poor stopping, brake noise, pulling, grabbing, or dragging problems caused by foundation brake, slack adjuster, and brake chamber problems; 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, anchor springs, and springs.
5. Inspect, clean, rebuild or replace, and adjust air disc brake caliper assemblies.
6. Inspect and replace brake shoes or pads.
7. Inspect, measure, or replace brake drums or rotors.

### 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 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 brake interlock valve, modules, switches, wiring, and connectors.

## B. Hydraulic Brakes Diagnosis and Repair (12 questions)

### 1. Hydraulic System (5 questions)

1. Diagnose poor stopping, pulling, dragging, or brake feel complaints caused by hydraulic system problems; determine needed repairs.
2. Inspect hydraulic system for leaks.
3. Check brake pedal free play.
4. Inspect, test, or replace master cylinder.
5. Inspect, test, or replace brake lines, flexible hoses, and fittings.
6. Inspect, test, and replace metering (hold-off), proportioning, and combination valves.
7. Inspect, test, or replace brake pressure differential valve and warning light circuit switch, bulbs, wiring, and connectors.
8. Inspect, and replace wheel cylinders.

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## S4 TASK LIST (CONTINUED)

9. Remove, inspect, clean, and replace disc brake caliper assemblies.
10. Inspect/test brake fluid; bleed and/or flush hydraulic system.
11. Perform antilock brake system (ABS) warning lamp start-up test; determine needed repairs; diagnose hard fault codes/diagnostic trouble codes (DTCs) using scan tool, PC computer, or LEDs; determine needed repairs.
12. Diagnose activation problems (none, erratic, false) on antilock brake systems (ABS); determine needed repairs.
13. Test, adjust, or replace antilock brake system (ABS) wheel speed sensors and tone/exciter rings.
14. Test and replace antilock brake system (ABS), electronic control units (ECU), and modulator valves; test, repair, and replace wiring and connectors.
15. Inspect and test parking brake interlock system; replace parking brake interlock valves, modules, switches, wiring, and connectors.

### 2. Mechanical System (5 questions)

1. Diagnose poor stopping, noise, pulling, grabbing, dragging, or pedal pulsation complaints caused by drum and disc brake mechanical assembly problems; 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 or replace disc brake pads and mounting hardware; inspect or replace anchor plate and mounting hardware.
5. Inspect, adjust, and repair or replace in-wheel mechanical and hydraulic parking brake systems.
6. Inspect, adjust, or replace driveline parking brake drums, rotors, bands, shoes, mounting hardware, and adjusters.
7. Inspect, adjust, or replace parking brake application systems, including pedal, actuators, cables, linkage, levers, pivots, springs, bearings, and seals.

### 3. Power Assist Units and Miscellaneous (2 questions)

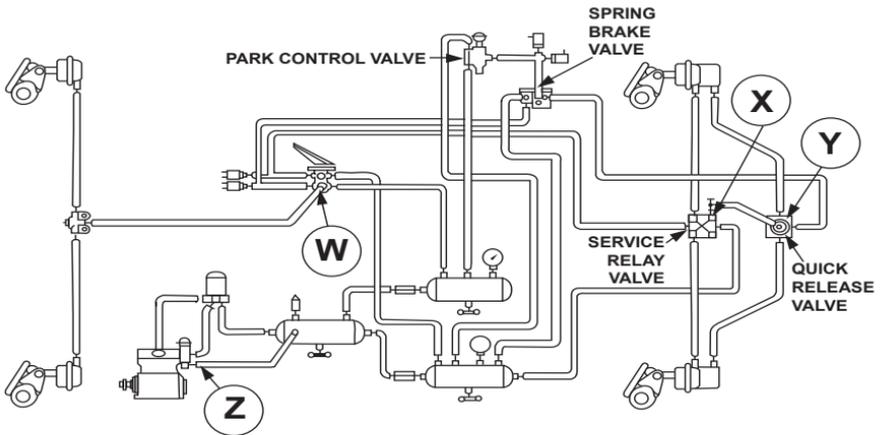
1. Diagnose poor stopping complaints caused by power brake booster problems; determine needed repairs.
2. Inspect, test, repair, or replace power brake booster hoses and controls, including components of the hydraulic brake back-up system.
3. Test, adjust, and replace brake stop light switch, bulbs, wiring, connectors, modules, and warning devices.

### C. Wheel Bearings Diagnosis and Repair (4 questions)

1. Remove and replace axle hub and wheel assembly.
2. Clean, inspect, lubricate, or replace wheel bearing assemblies; replace seals and wear rings (if applicable).
3. Adjust axle wheel bearings in accordance with manufacturers' procedures and specifications. ■

# 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.

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## S4 SAMPLE QUESTIONS (CONTINUED)

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.
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:
- \* (A) the quick-release valve exhaust port is plugged.
  - (B) the air pressure is too low.
  - (C) the application line is restricted.
  - (D) the 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.

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# 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%
<b>Total</b>	<b>50</b>	<b>100%</b>

## A. Steering System Diagnosis and Repair (18 questions)

1. Diagnose steering column (tilt, telescoping, and fixed) shaft noise, looseness, and binding problems; determine needed repairs.
2. Inspect, service and replace steering shaft U-joint(s), slip joints, bearings, bushings, and seals; phase shaft U-joints (including steering columns equipped with an airbag/SRS systems).
3. Diagnose power steering system noises, steering binding, uneven turning effort, looseness, hard steering, overheating, fluid leakage, and fluid aeration problems; determine needed repairs.
4. Inspect power steering fluid level and condition; determine needed service; determine correct fluid type.
5. Purge air from the power steering system.
6. Perform power steering system pressure and flow tests; determine needed repairs.
7. Inspect, service, or replace power steering reservoir including hoses, filter, seals and gaskets.
8. Inspect, adjust, align or replace power steering pump belt(s), pulley(s), and tensioners.
9. Inspect power steering pump drive gear and coupling; replace as required.
10. Inspect, adjust, repair or replace power steering pump, mountings, and brackets.
11. Inspect, test or replace power steering pump internal/external pressure regulator valve(s).
12. Inspect and replace power steering system lines, hoses, cooler and fittings.
13. Inspect, adjust or replace integral-type power steering gear.
14. Inspect and replace pitman arm.

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## 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 and Ackerman (tie rod) arms.
18. Check and adjust steering linkage or wheel stops (axle stops).
19. Check and adjust steering gear poppets/relief valves.
20. Disarm, enable, and properly handle airbags/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, and 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 ride height as required.
6. Inspect and replace front suspension system coil springs and spring insulators (silencers); measure ride height.
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.
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), 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 bolts).

#### **3. Rear Suspensions (7 questions)**

1. Diagnose suspension system noises, looseness, rough ride, body sway and body lean problems; determine needed repairs.
2. Inspect and replace rear axle housing, U-bolts, and nuts.
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).

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## S5 TASK LIST (CONTINUED)

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.

### 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. Diagnose toe-out-on-turn (Ackerman angle) problems; determine needed repairs.
6. Check rear axle alignment (thrustline/centerline) and tracking; adjust or determine needed repairs.
7. Check and adjust steering and/or drive axle wheel bearings.

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

1. Diagnose tire wear patterns; determine needed repairs.
2. Inspect, repair or replace tires; check air pressure; valve stems, and caps.
3. Diagnose wheel/tire vibration, wheel hop, and shimmy problems; determine needed repairs.
4. Inspect and replace wheels/rims, wheel spacers, clamps, studs, and nuts.
5. Measure wheel and tire radial and lateral runout; determine needed repairs.
6. Balance wheel and tire assembly.
7. Inspect and measure tire condition, tread depth, tire diameter and circumference; match tires and rims. Verify application (load and speed rating). ■

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# 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.

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## S5 SAMPLE QUESTIONS (CONTINUED)

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
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.

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# TEST SPECIFICATIONS AND TASK LISTS ELECTRICAL/ELECTRONIC SYSTEMS (TEST S6)

Content Area	Questions in Test	Percentage of Test
A. General Electrical/Electronic System Diagnosis	6	13%
B. Battery Diagnosis and Service	4	9%
C. Starting System Diagnosis and Repair	6	13%
D. Charging System Diagnosis and Repair	7	16%
E. Lighting Systems Diagnosis and Repair	12	27%
F. Gauges and Instrument Warning Devices Diagnosis and Repair	4	9%
G. Miscellaneous	6	13%
<b>Total</b>	<b>45</b>	<b>100%</b>

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

1. Check continuity and resistance in electrical/electronic circuits and components using appropriate test equipment.
2. Check source voltage, applied voltages, circuit voltages, and voltage drops in electrical/electronic circuits using a digital multimeter (DMM).
3. Inspect and test fusible links, circuit breakers, fuses, and other circuit protection devices; include reset when required.
4. Locate open, shorted, and grounded circuits in electrical/electronic systems.
5. Diagnose key-off battery drain problems (chassis or body).
6. Inspect, test, and replace fusible links, circuit breakers, and fuses.
7. Inspect, test, and replace relays, solenoids, resistors and diodes.
8. Diagnose and repair multiplex systems, wiring and control modules including input/output processing and electronic circuit protection.
9. 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 repairs.

## B. Battery Diagnosis and Service (4 questions)

1. Perform battery test(load and capacitance/conductance); determine needed service.
2. Determine battery state-of-charge by measuring terminal post voltage using a digital multimeter (DMM).
3. Inspect, clean, service, or replace batteries.
4. Inspect, clean, repair, and replace battery boxes, mounts, and hold-downs.
5. Charge battery using appropriate method for battery type.
6. Inspect, clean, repair, and replace battery cables and connectors.
7. Jump-start a vehicle using jumper cables and a booster battery or auxiliary power supply.

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## S6 TASK LIST (CONTINUED)

### C. Starting System Diagnosis and Repair (6 questions)

1. Perform starter current draw test; determine needed repairs.
2. Perform starter circuit voltage drop tests; determine needed repairs.
3. Inspect, test, and replace components and wiring in the starter control/ interrupt circuit.
4. Inspect, remove, and replace starter.
5. Inspect, test, and replace starter relays and solenoids/switches.

### D. 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 repair.
2. Diagnose the cause of a no-charge, low charge, or overcharge condition; determine needed repair.
3. Inspect, reinstall and/or replace pulleys, tensioners and drive belts; adjust belts and check alignment.
4. Perform charging system output test; determine needed repairs.
5. Perform charging circuit voltage drop tests; determine needed repairs.
6. Inspect, remove, and replace alternator.
7. Inspect, repair, or replace connectors and wiring in the charging circuit.

### E. Lighting Systems Diagnosis and Repair (12 questions)

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

1. Diagnose the cause of brighter-than-normal, intermittent, dim, or no headlight operation.
2. Inspect, test, aim, and replace headlights.
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, and wiring of fog light, parking, clearance, strobe light, and taillight circuits.

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

5. Inspect, test, adjust, repair, or replace stoplight circuit switches, control modules, relays, solenoids, bulbs, LEDs, sockets, connectors, and wiring.
6. Diagnose the cause of turn signal and/or hazard light system malfunctions; determine needed repairs.
7. Inspect, test, repair, and/or replace switches, flasher units, bulbs, sockets, connectors, terminals, wires, and control modules of turn signal and hazard light circuits.
8. Inspect, test, adjust, repair, or replace backup lights, alarms and warning device circuit switches, relays, solenoids, bulbs, LEDs, sockets, horns, buzzers, connectors, and wiring.
9. 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.

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## S6 TASK LIST (CONTINUED)

10. Inspect, test, and repair override circuits for 4-lamp and 8-lamp warning light systems.
11. Inspect, test, adjust and repair electronically-controlled stop arms and crossing gates.

### ► Dome Lights, Dash Lights, and Stepwell Lights

12. Inspect, test, repair, or replace dome light circuit switches, relays, control modules, bulbs, LEDs, sockets, connectors, and wiring.
13. Inspect, test, repair, or replace dash light circuit switches, bulbs, LEDs, sockets, connectors, control modules, wiring, printed circuits, and instrument panel warning lights.
14. 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 inaccurate gauge readings; determine needed repairs.
2. Inspect, test, adjust, repair, or replace gauge circuit sending units/sensors, gauges, control modules, connectors, and wiring.
3. Inspect, test, repair, or replace instrument warning light circuit sending units, bulbs, sockets, control modules, connectors, wiring, diodes, and printed circuits.
4. Inspect, test, repair, or replace audible alarm circuit sending units, buzzers, switches, relays, control modules, connectors, wiring, and printed circuits.
5. Inspect, test, and replace instrument clusters, electronic speedometer, odometer, tachometer, hour meters, and control modules.

### G. Miscellaneous (6 questions)

1. Diagnose, inspect, test, repair, or replace horn circuit relays, horns, switches, connectors, control modules, and wiring.
2. Diagnose, inspect, test, repair, or replace wiper motor, intermittent (delay) module, wiper transmission linkage, resistors, park switch, relays, switches, connectors, control modules, and wiring.
3. Diagnose, inspect, test, repair, or replace windshield washer motor, pump/relay assembly, switches, relays, connectors, control modules, and wiring.
4. Diagnose, inspect, test, repair, or replace mirror heater grid circuit, relays, timer circuits, switches, connectors, control modules, and wiring.
5. Diagnose, inspect, test, repair or replace motorized sideview mirror relays, motors, switches, connectors, control modules, and wiring.
6. Diagnose, inspect, test, repair, or replace heater electrical components including blower motors, booster pumps, resistors, relays, switches, connectors, control modules, and wiring.
7. Diagnose, inspect, test, repair, or replace accessory power outlets, integral fuses, connectors, and wiring.
8. Diagnose, inspect, test, adjust, repair, or replace starter interlock system switches, actuators, relays, solenoids, alarms, connectors, control modules, and wiring.
9. Diagnose, inspect, test, adjust, and repair electrically actuated door opening devices, switches, relays, solenoids, control modules, connectors, terminals, and wiring (air and electric entrance doors). ■

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# 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

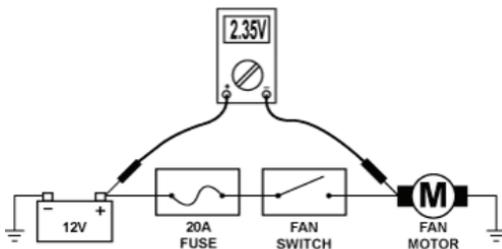
2. Both headlights on a school bus are dim on high beam, and normal on low beam.

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.

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## 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.

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# 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](http://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%
<b>Total</b>	<b>40</b>	<b>100%</b>

#### 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.

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## S7 TASK LIST (CONTINUED)

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.

### **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. ■

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# 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 restricted 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) Noth A and B
  - \* (D) Neither A nor B



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# TEST PREP & TRAINING

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](http://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.

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## Test Taking Tips

An easy, self-guided introduction to taking your ASE certification test, including examples of the types of questions you'll see and proven tips for success.

## 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.

## ASE Testing Demo

Are you new to ASE testing or has it been a few years? The demonstration at [www.ase.com/asedemo](http://www.ase.com/asedemo) will show you how the test platform works, so you'll feel right at home with the testing format.

## In-service Training Providers

You can choose from a variety of training programs, both instructor-led and self-directed, that have been evaluated through a quality-assurance process and verified as ASE accredited training providers.

## Community Colleges and Technical Training Schools

Get instructor-led, hands-on training at schools accredited by the National Automotive Technician Education Foundation.

## 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 the ATMC website. [www.atmc.org](http://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.



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