ASE L2 - Quiz Questions with Answers

A. General Inspection and Diagnosis

1.

Technician A states that slow acceleration can be caused by a restricted diesel oxidation catalyst (DOC). Technician B states the cause of slow acceleration may be due to a restricted air cleaner.

Who is correct?

- **Both A and B**
- Technician A
- Technician B
- Neither A nor B

Correct answer: Both A and B

Both technicians are correct. Any component that's restricting airflow through the engine can slow acceleration. Reduced airflow through the air intake or exhaust can be to blame.

Slow acceleration can come from a restricted diesel oxidation catalyst (DOC) or a restricted air cleaner.

2.

Technician A states that leaking injector tube seals can cause steam from the exhaust stream. Technician B states that steam from the exhaust indicates water has entered the combustion process.

Who is correct?

- **Both A and B**
- Technician A
- Technician B
- Neither A nor B

Correct answer: Both A and B

Both technicians are correct. White steam is indicative of water entering the combustion process. Faulty injector tube seals can be to blame, as water can enter the combustion process through the damaged seals. If an injector tube continues to leak coolant, the engine may endure permanent damage or experience hydrostatic lock.

3.

Technician A states that an air filter should be replaced when it's dirty. Technician B states that an air filter should only be replaced when the restriction indicator shows excessive restriction.

Who is correct?

Technician B

Technician A

Both A and B

Neither A nor B

Correct answer: Technician B

An air filter that shows acceptable restriction, even if it is dirty, is still serviceable. Air filters should be replaced when the restriction exceeds manufacturer specifications. Restriction is measured by a restriction gauge, or with a restriction indicator installed on the vehicle.

If the restriction indicator isn't reset when serviced, it may give a false reading. The technician must reset the indicator, run the engine at full RPM, and check if the indicator reads the same.

4.

Technician A states that the voltmeter function of the DMM should be used to check the amperage. Technician B states that the ohmmeter function of the DMM should be used to measure amperage.

Who is correct?

Neither A nor B

Technician A

Technician B

Both A and B

Correct answer: Neither A nor B

The ammeter function of the DMM is used to check for amperage. Make sure to set the amperage scale to the correct setting before testing. If the wrong scale is set, the fuse in the meter will be damaged.

The voltmeter function measures the voltage, while the ohmmeter checks resistance and for continuity.

5.

Technician A states that incorrect antifreeze concentration can cause false temperature sensor readings in the ECM. Technician B states that a faulty coolant temperature sensor can cause erratic readings.

Who is correct?

Both A and B

Technician A

Technician B

Neither A nor B

Correct answer: Both A and B

Incorrect antifreeze concentration may cause the coolant temperature sensor to send faulty data to the ECM. A faulty coolant temperature sensor can also lead to erratic readings.

Faulty wiring and a faulty module can all cause incorrect readings with the scan tool. Sensors and circuits should be checked prior to condemning a module.

6.

Technician A states that a stall speed test will be high if the low power complaint is engine-related. Technician B states that a low stall speed indicates a slipping transmission.

Who is correct?

Neither A nor B

Technician A

Technician B

Both A and B

Correct answer: Neither A nor B

When diagnosing a low power condition using a stall test, a low stall speed is engine-related. High stall speed means a slipping transmission.

Normal stall speeds with low engine power can indicate other driveline problems, such as a broken engine mount. Where a stall test isn't allowed, technicians must rely on a road test or dynamometer.

7.

Technician A states that blue smoke indicates that oil is being burned in the combustion chamber. Technician B states that blue smoke is a sign of low engine compression.

Who is correct?

- **Technician A**
- Technician B
- Both A and B
- Neither A nor B

Correct answer: Technician A

Blue smoke exists when oil is being burned. It can be caused by a bad turbocharger seal, a worn valve guide, or defective piston rings.

Low engine compression leads to unburned fuel, which causes white smoke from the exhaust. White smoke can also be caused by non-working or faulty injectors, and when the engine temperature doesn't get hot enough.

8.

Technician A states that the scan tool talks directly to the engine control sensors. Technician B states that the scan tool is the most valuable tool when diagnosing vehicle electrical systems.

Who is correct?

Neither A nor B

Technician A

Technician B

Both A and B

Correct answer: Neither A nor B

The scan tool communicates directly with the module, not the sensors. The module receives information from the sensors and passes that information to the scan tool.

Scan tools offer information about trouble codes and sensor readings, but a digital multimeter (DMM) provides the best measurement of electrical values.

9.

Technician A states that the barometric pressure sensor isn't connected to the 5-volt reference, but is connected to the sensor ground. Technician B states that the turbo boost pressure sensor is connected to the 5-volt reference and the sensor ground.

Who is correct?

Technician B

Technician A

Both A and B

Neither A nor B

Correct answer: Technician B

The turbo boost pressure sensor, barometric pressure sensor, and oil pressure sensor are connected to both the 5-volt reference and the sensor ground.

10.

Technician A states that low ECM supply voltage could cause the ECM to not communicate with the diagnostic tool when evaluating a no-start situation where the engine cranks. Technician B states that the problem could be a malfunctioning data link connector.

Who is correct?

Technician A

Technician B

Both A and B

Neither A nor B

Correct answer: Technician A

Technician A is correct because low voltage supply can cause the ECM to shut down. If this occurred, the ECM wouldn't operate the injectors or communicate with the scanner.

A malfunctioning data link connector may stop the scanner from communicating with the ECM, but it wouldn't cause a no-start condition.

11.

Technician A states that all transmission manufacturers allow stall tests. Technician B states that the limit of a stall test is no longer than 20 seconds.

Who is correct?

Neither A nor B

Technician A

Technician B

Both A and B

Correct answer: Neither A nor B

A stall test is helpful for distinguishing between an engine defect and transmission/driveline problems. Before performing a stall test, the technician should check to make sure the manufacturer allows it.

All stall tests should be limited to 10 seconds or less. Otherwise, damage may occur.

12.

Technician A states that a leaking fuel injector can cause blue smoke. Technician B states that a leaking fuel injector can cause a lean condition.

Who is correct?

Neither A nor B

Technician A

Technician B

Both A and B

Correct answer: Neither A nor B

A leaking fuel injector is a common cause of a rich condition. Rich-running engines cause black smoke from the exhaust.

Lean-running engines are caused by a lack of fuel or too much air entering the combustion chamber.

Blue smoke is the result of oil entering the combustion chamber. It can be caused by a bad turbocharger seal, defective piston rings, or worn valve guides.

13.

Technician A states that the ohmmeter function can be used to check a component's resistance. Technician B says that an ohmmeter should never be used on a live circuit.

Who is correct?

Both A and B

Technician A

Technician B

Neither A nor B

Correct answer: Both A and B

Components sometimes have a specific value for resistance and can be checked using an ohmmeter. Ohmmeters also check for continuity.

Ohmmeters are self-powered and should never be used on a live circuit or components.

14.

All of the following complaints would be considered mechanical, except:

Shorted injector wiring harness

Low compression

Clogged fuel injectors

Faulty exhaust gas recirculation (EGR) cooler

Correct answer: Shorted injector wiring harness

A shorted injector wiring harness is considered an electrical problem. With a short, power cannot flow to the injector. The wiring harness may need to be replaced or repaired, depending on the recommendation of the manufacturer.

Low compression, clogged fuel injectors, and a faulty exhaust gas recirculation (EGR) cooler are all considered mechanical.

15.

Technician A states that vehicle information includes information on the software used by the ECM. Technician B states that the software information can be obtained using a diagnostic data reader.

Who is correct?

Both A and B

Technician A

Technician B

Neither A nor B

Correct answer: Both A and B

Software information can be found in two ways: reading the vehicle information or using the diagnostic data reader. If a fleet includes two vehicles of the same model year, one may have a later software version because of the production date.

Based on the information provided, the vehicles may also require different diagnostic procedures.

16.

Technician A states that when experiencing multiple failures, look for something that all the components have in common. Technician B states that if multiple failures occur and there is a module in common, that module should be replaced first.

Who is correct?

- **Technician A**
- Technician B
- Both A and B
- Neither A nor B

Correct answer: Technician A

When diagnosing a vehicle with multiple failures, the technician should start by examining the schematic for something in common. Locating the related connectors, splices, fuses, and modules can save the technician money and time.

All components in common should be tested before replacing them. Only after the related components are checked, should a module replacement be considered.

17.

Technician A states that the ohmmeter function can be used to check the continuity of a circuit. Technician B states that the ohmmeter function is used to check the continuity of a live circuit.

Who is correct?

Technician A

Technician B

Both A and B

Neither A nor B

Correct answer: Technician A

The ohmmeter function of a digital multimeter (DMM) verifies the continuity of circuits. It also measures the resistance of components.

An ohmmeter is self-powered, so it should never be used on a live component or circuit.

18.

Technician A states that a diesel engine that has an exhaust stream with white smoke indicates a blown head gasket. Technician B states that a diesel engine with a white exhaust stream indicates unburned fuel.

Who is correct?

Technician B

Technician A

Neither A nor B

Both A and B

Correct answer: Technician B

White smoke from the diesel exhaust indicates unburned fuel. It can be caused by damaged or malfunctioning injectors, low compression, or engine temperature that's not hot enough. It may show up more often during a cold start.

A blown head gasket is often combined with steam coming from the exhaust. Steam indicates that coolant has entered the combustion chamber.

19.

Technician A states that low voltage codes could be caused by a poor connection at a 5-volt reference. Technician B states low voltage codes could be caused by one faulty sensor pulling down the voltage from the other sensors.

Who is correct?

Both A and B

Technician A

Technician B

Neither A nor B

Correct answer: Both A and B

Low voltage codes could be caused by a faulty 5-volt connection or one sensor pulling down the other sensors. Both should be checked when diagnosing a low voltage concern.

High voltage codes may be caused by a poor ground connection. Both the ground connection and 5-volt reference begin at the ECM.

20.

Technician A states that all diesel engines have dual thermostats. Technician B states that engine overheating will occur if one of the two thermostats fails.

Who is correct?

Neither A nor B

Technician A

Technician B

Both A and B

Correct answer: Neither A nor B

Many, but not all, diesel engines use two thermostats. It is possible for one thermostat to fail without the engine overheating.

Thermostat malfunctions can block the flow of coolant. With two thermostats, the engine may not overheat as long as the second thermostat is still functional.

21.

Technician A states that an engine serial number can be found on the tag mounted to the engine. Technician B states that the engine serial number cannot be found in the vehicle identification number (VIN).

Who is correct?

Both A and B

Technician A

Technician B

Neither A nor B

Correct answer: Both A and B

Technician A is correct because the engine serial number is found mounted on the engine's tag. It can also be found stamped on the engine block.

Technician B is also correct because the VIN doesn't contain the engine serial number. It does, however, have valuable information about the vehicle being worked on, such as the manufacturer, make/model, and the trim level.

22.

Technician A states that a damaged turbo charger may cause a low power condition. Technician B states that a malfunctioning diesel particulate filter (DPF) may cause a low power condition.

Who is correct?

Both A and B

Technician A

Technician B

Neither A nor B

Correct answer: Both A and B

A damaged turbo will cause a low power condition due to not building enough boost. Any damaged exhaust component can also cause a low power condition due to excessive exhaust back pressure.

When the diesel particulate filter (DPF) malfunctions, the unit may overheat and a code can be set due to the high exhaust temperatures.

23.

Technician A states that a leaking air filter gasket causes immediate boost pressure reduction. Technician B states that a restricted air filter causes a reduction in boost pressure.

Who is correct?

Technician B

Technician A

Both A and B

Neither A nor B

Correct answer: Technician B

A restricted air filter slows airflow and lowers the boost pressure.

A leaking air filter gasket may allow contaminated air to enter the engine, but it doesn't cause a reduction in boost pressure because it's located before the turbocharger. The dirty air can eventually cause wear on the turbocharger's compressor wheel, leading to damage.

Other possible causes of immediate reduction in boost power include leaking charge air cooler hoses and a restricted diesel particulate filter (DPF).

24.

Technician A states that a corroded connection may still give a good voltage reading. Technician B states that a corroded connection will not allow current to flow under a load.

Who is correct?

Both A and B

Technician A

Technician B

Neither A nor B

Correct answer: Both A and B

A corroded connection may give a correct voltage reading, so Technician A is correct. Current will not flow under a load with a corroded connection, so Technician B is also correct.

Both current and voltage should be checked with a digital multimeter (DMM) when diagnosing an electrical fault.

25.

Technician A states that a new differential gear ratio can lead to engine performance problems. Technician B states that replacing a differential with a different gear ratio is not permitted by manufacturers.

Who is correct?

Technician A

Technician B

Both A and B

Neither A nor B

Correct answer: Technician A

Engine control modules (ECMs) contain the differential gear ratio values. When replacing a differential unit with a different gear ratio, the ECM must be reprogrammed with the correct final drive ratio to avoid performance issues.

The incorrect gear ratio value may or may not set a trouble code. However, a scanner still reveals the necessary information, and usually allows for the ability to program the ECM with the correct ratio.

26.

Technician A states that a customer complaint must be verified before performing work. Technician B states that to verify the complaint, you may need to drive the vehicle and talk to the customer.

Who is correct?

Both A and B

Technician A

Technician B

Neither A nor B

Correct answer: Both A and B

Both technicians are correct. A customer complaint must be verified before completing any work. To verify the complaint, it may be necessary to speak with the customer. It may also be vital to drive the vehicle, especially if the problem has to do with performance.

27.

Technician A states that checking TSBs is only necessary when service manual diagnostics lead to an incorrect repair. Technician B states that checking the TSBs can save time when diagnosing a vehicle.

Who is correct?

Technician B

Technician A

Both A and B

Neither A nor B

Correct answer: Technician B

Technical Service Bulletins (TSBs) should always be checked when diagnosing a vehicle. TSBs can often lead technicians directly to the problem with little or no diagnostics. The TSBs should be used in conjunction with the service manual.

Service history should also be checked when diagnosing a vehicle to reduce troubleshooting time. The service history allows the technician to see what other components have recently been replaced.

B. Electronic Engine Controls Diagnosis

28.

Using the composite vehicle on the ASE website, answer the following question:

Technician A states that the ignition switch supplies 12 V to the ECM when the power relay is in the ON position. Technician B states that the ignition switch supplies 12 V to the ECM when in the START position.

Who is correct?

- **Both A and B**
- Technician A
- Technician B
- Neither A nor B

Correct answer: Both A and B

Technician A is correct because the ignition switch supplies 12 V to the ECM when the power relay is in the ON position. During this time, the ignition switch commands the ECM and additional modules to start communication.

Technician B is also correct because the ignition switch supplies 12 V to the ECM when in the START position. During this time, the ignition switch requests starter operation.

29.

Using the composite vehicle on the ASE website, answer the following question:

How many ohms is the resistor in the VGT actuator?

120 ohms

100 ohms

60 ohms

240 ohms

Correct answer: 120 ohms

There is a 120-ohm terminating resistor in the VGT actuator used for diagnostics.

The VGT actuator is connected to the ECM at terminals 411 and 412. It contains four wires: data high, data low, 12 V, and ground.

30.

How many wires does a resistor have?

Two or three

One or two

Two

Three

Correct answer: Two or three

Resistors contain either a two-wire or three-wire configuration. Temperature sensors are commonly configured as a two-wire resistor, while the throttle position sensor (TPS) is usually a three-wire resistor.

Resistors need to restrict the current flow. However, a component is only considered a resistor when placed under a load. If it's not part of a complete circuit, it cannot perform its necessary function.

31.

Using the composite vehicle on the ASE website, answer the following question:

How many different modes of operation does the DEF lamp have?

Three

Two

Four

Five

Correct answer: Three

The DEF lamp has three modes of operation: on, off, and flashing.

With the DEF lamp off, the level is considered normal and there's no action needed. When the DEF lamp is on, it means that the level is low. Once it begins flashing, the DEF level is at a critical level.

32.

Using the composite vehicle on the ASE website, answer the following question:

How many modes of operation does the high exhaust temperature lamp have?

Three

Two

Four

Five

Correct answer: Three

The high exhaust temperature system temperature lamp has three different modes of operation: on, off, and flashing.

The high exhaust system temperature lamp (HEST) comes on when it receives a signal from the ECM that the exhaust outlet temperature has reached 850 °F (454 °C) or greater with the vehicle traveling at speeds under 5 MPH.

33.

Using the composite vehicle on the ASE website, answer the following question:

Technician A states that the DEF pressure sensor voltage range is the same as the AFT fuel pressure sensor voltage range. Technician B states that the DEF pressure sensor PSI range is the same as the engine oil pressure sensor.

Who is correct?

Both A and B

Technician A

Technician B

Neither A nor B

Correct answer: Both A and B

The DEF pressure sensor voltage varies between 0.5 and 4.5, while the pressure varies between 0 and 200 PSI. As pressure increases, voltage increases.

These are the same ranges shared by the AFT fuel pressure sensor and engine oil pressure sensor, making both technicians correct. These values are also shared by the exhaust back pressure sensor and the fuel delivery pressure sensor.

34.

Using the composite vehicle on the ASE website, answer the following question:

What should the voltage show at APP 1 sensor on a scan tool with the pedal fully released?

1.50 volts

3.50 volts

2.50 volts

4.50 volts

Correct answer: 1.50 volts

The APP 1 sensor voltage varies between 1.50 and 4.50. With the pedal at rest, the app sensor should read 1.50 volts from the scan tool. At the same time, APP 2 sensor would read 0.50 volts.

The sensor should read 4.50 volts when fully depressed while monitoring the scan tool, while APP 2 sensor would read 3.50 volts.

35.

Using the composite vehicle on the ASE website, answer the following question:

What is the coil resistance specification for the DEF supply pump relay coil?

86-94 ohms

80-85 ohms

76-89 ohms

92-102 ohms

Correct answer: 86-94 ohms

The DEF supply pump relay provides battery voltage to the DEF supply pump. The coil resistance specification is 90 ± 4 Ω, so it could be anywhere from 86 to 94 ohms.

The DEF supply pump relay gets energized by the ECM and gives battery voltage (B+) to the DEF supply pump.

36.

Using the composite vehicle on the ASE website, answer the following question:

Technician A states that the crankshaft position is used for injector timing. Technician B states that the crankshaft position is used for fuel control.

Who is correct?

Both A and B

Technician A

Technician B

Neither A nor B

Correct answer: Both A and B

The ECM uses a crankshaft position for fuel control and injector timing. If there is a fault in the circuit, a DTC will set.

The CKP is found in the engine rear flywheel housing. It faces the trigger/tone wheel that's mounted on the crankshaft. The signal generated by the CKP increases in conjunction with the crankshaft's speed.

37.

Technician A believes that freeze frame data stores sensor readings when a DTC is set. Technician B states that the operating condition of most engine actuators is recorded when a DTC is set.

Who is correct?

Both A and B

Technician A

Technician B

Neither A nor B

Correct answer: Both A and B

Both technicians are correct. Freeze frame data is stored by the ECM when a diagnostic trouble code (DTC) is set.

The freeze frame data includes sensor readings, the operating condition of most engine actuators, the ECM time, and engine parameters at the time of the DTC being set. This data allows technicians to see the conditions at the time of the malfunction.

38.

Using the composite vehicle on the ASE website, answer the following question:

Technician A states that if fuse 41 were blown, it would cause a DEF DTC to set. Technician B states that if fuse 41 were blown, it would cause a NOx sensor module code.

Who is correct?

Both A and B

Technician A

Technician B

Neither A nor B

Correct answer: Both A and B

Fuse 41 sends power to the DEF quality sensor along with all the NOx sensors. If this fuse were blown, DTCs in both systems would set, making both technicians correct.

The aftertreatment temperature sensor module and the PM sensor module also run on fuse 41.

39.

Using the composite vehicle on the ASE website, answer the following question:

How many pins are there for the data link connector on the public network?

Nine

Three

Five

Seven

Correct answer: Nine

On the public network, the diagnostic tool communicates with the modules through a nine-pin connector for information retrieval and software updates. The public network data link connector is found in the cab.

The private network data link connector only has three pins. This connector is found in the engine compartment.

40.

Using the composite vehicle on the ASE website, answer the following question:

Technician A states that the transmission gear position sensor is located on the transmission top plate. Technician B states that the transmission gear position sensor delivers voltage to the ECM.

Who is correct?

Technician A

Technician B

Both A and B

Neither A nor b

Correct answer: Technician A

The transmission gear position sensor is located on the transmission top plate. It is a non-adjustable potentiometer that monitors the positioning of the transmission gear selector motor.

The signal from the transmission gear position sensor is sent to the TCM. It delivers a signal between 0.5 to 4.5 V.

41.

Using the composite vehicle on the ASE website, answer the following question:

What is the minimum engine cranking speed to start the engine?

200 RPM

150 RPM

250 RPM

300 RPM

Correct answer: 200 RPM

The minimum engine cranking speed needed to start is 200 RPM. The starter is responsible for this process. The 12-V gear reduction starter on the composite vehicle is mounted to the flywheel housing.

42.

Using the composite vehicle on the ASE website, answer the following question:

Technician A states that both the J1939 data links on public and private networks use a pair of twisted unshielded wires. Technician B states that both the J1939 data links on public and private networks use a pair of twisted shielded wires.

Who is correct?

Technician A

Technician B

Both A and B

Neither A nor B

Correct answer: Technician A

Both the public and private networks use a pair of twisted unshielded wires for the J1939 data link that the modules communicate over. The modules of the private and public link communicate when the key is turned ON.

The public bus uses a 9-pin data link connector in the cab, while the private bus contains a 3-pin data link connector in the engine compartment.

43.

Using the composite vehicle on the ASE website, answer the following question:

With the accelerator at 100% apply, what should APP 2 sensor read on a scan tool?

3.50 volts

1.50 volts

2.50 volts

2.90 volts

Correct answer: 3.50 volts

APP 2 sensor voltage varies between 0.5 and 3.50 volts: 0.5 volts at 0% applied and 3.50 volts at 100% applied.

APP 1 sensor voltage varies between 1.50 and 4.50 volts: 1.50 volts at 0% applied and 4.50 volts at 100% applied.

44.

Using the composite vehicle on the ASE website, answer the following question:

Technician A states that a buzzer sounds when the check engine light comes on to alert the driver that there is an issue. Technician B states that the ECM always reduces engine power 30 seconds after the lamp illuminates.

Who is correct?

Neither A nor B

Technician A

Both A and B

Technician B

Correct answer: Neither A nor B

When the check engine light (CEL) comes on, it could simply be due to a warning. At this point, the buzzer will not sound and the engine power won't derate, making both technicians incorrect.

If conditions warrant, the engine may enter derate mode, where power is reduced. There's also a shutdown mode to prevent further engine damage from occurring.

45.

Using the composite vehicle on the ASE website, answer the following question:

Technician A states that if one of the APP sensors fail, the vehicle will only set a DTC. Technician B states that if a correlation error occurs, the vehicle will set a DTC and only idle.

Who is correct?

Both A and B

Technician A

Technician B

Neither A nor B

Correct answer: Both A and B

When one APP sensor fails, a DTC is set. The engine continues to run normally because the potentiometers are redundant.

If there is an issue with both circuits or sensors, the vehicle will only idle as a safety measure. It will also set a DTC.

46.

Using the composite vehicle on the ASE website, answer the following question:

Technician A states that the NOx sensors display data in PPM. Technician B states that the NOx sensors display data in PSI.

Who is correct?

Technician A

Technician B

Both A and B

Neither A nor B

Correct answer: Technician A

The NOx sensors display data in parts per million (PPM). For this composite vehicle, the NOx IN sensor module has a value range of 0 to 3000 PPM.

The NOx OUT sensor module also contains a value range of 0 to 3000 PPM.

47.

Using the composite vehicle on the ASE website, answer the following question:

At what ambient temperature is the DEF heater commanded on?

Below 50 °F

Below 40 °F

Below 30 °F

Below 10 °F

Correct answer: Below 50 °F

At temperatures below 50 °F, the ECM energizes the DEF heater relay. At this time, coil resistance is 90 ± 4 Ω. The relay then sends battery voltage (B+) to the DEF system heaters.

48.

Using the composite vehicle on the ASE website, answer the following question:

Where is the barometric pressure sensor mounted?

Inside the engine compartment

Under the rear of the vehicle

Under the front of the vehicle

Inside the passenger compartment.

Correct answer: In the engine compartment

The barometric pressure sensor is mounted inside the engine compartment. This sensor monitors ambient air pressure.

The ECM takes this signal to determine the appropriate injection timing and fuel metering, based on the altitude.

49.

How are many of a vehicle's electrical systems interconnected?

Vehicle data bus

ECM

Ground connection

Battery

Correct answer: Vehicle data bus

Most of the electrical systems in a vehicle are connected with the data bus. Because of this connection, one failure could lead to symptoms with another system.

As an example, if the engine brake isn't working, it could also be related to the engine ECM, engine brake circuit, or the antilock brake system (ABS). To troubleshoot the issue, controllers must be removed from the data bus to determine when the problem disappears.

50.

Using the composite vehicle on the ASE website, answer the following question:

Technician A states that an open circuit between the instrument cluster module and the transmission control module would cause the scan tool to not communicate with the ECM on the public BUS. Technician B states that an open circuit between the instrument cluster module and the transmission control module would cause a loss of communication with only the transmission control module.

Who is correct?

Technician B

Technician A

Both A and B

Neither A nor B

Correct answer: Technician B

Following the wiring schematic, if the open circuit was between the instrument cluster module and the transmission control module, the only module that would not communicate would be the transmission control module. All the other modules would still have a direct path to the data link connector.

51.

What does a scanner value of N/A mean?

Not applicable

Not available

Not found

Non-functioning

Correct answer: Not applicable

N/A stands for not applicable when displayed on a code scanner. This reading occurs when the data list has parameters that aren't programmed in the vehicle. Either the associated part isn't installed in the vehicle or the scanner is unable to read it.

52.

How many milliamps can a test lamp draw up to?

400 milliamps

100 milliamps

500 milliamps

200 milliamps

Correct answer: 400 milliamps

Test lamps can draw as much as 400 milliamps, which can damage electronic systems. The test light can destroy the ECM's output driver.

DMMs should be used for electronic testing instead of test lights. They should never be used for troubleshooting electronic system malfunctions.

53.

Using the composite vehicle on the ASE website, answer the following question:

How many ground feeds does the ECM have?

Three

Two

Four

Six

Correct answer: Three

There are three ground feeds for the ECM on the composite vehicle. The first ground shown is G13, the second is G16, while the final one is marked G605.

54.

Using the composite vehicle on the ASE website, answer the following question:

Technician A states that the displayed data of the BCM supply voltage varies between 0 and 12 volts. Technician B states that the displayed data of the BCM supply voltage varies between 0 and 14.

Who is correct?

Neither A nor B

Technician A

Technician B

Both A and B

Correct answer: Neither A nor B

The BCM supply voltage can display between 0 and 16 volts when using a scan tool. The voltage range is merely an indication of what can be shown, not necessarily what's considered normal.

Further diagnosis is needed if the reading doesn't line up with the manufacturer's specifications.

55.

Using the composite vehicle on the ASE website, answer the following question:

Which of the following modules uses the public bus network?

Instrument cluster module (ICM)

AFT temperature sensor module

PM sensor module

EGR valve

Correct answer: Instrument cluster module (ICM)

The instrument cluster module (ICM) uses the public network to communicate. The J1939 data link connector for the public network is located within the cab.

The AFT temperature sensor module, PM sensor module, and EGR valve are all on the private network. This J1939 data link connector is found in the engine compartment.

56.

Using the composite vehicle on the ASE website, answer the following question:

At what coolant temperature does the engine shut down?

240 °F

235 °F

210 °F

225 °F

Correct answer: 240 °F

At 210 °F, the cooling fans turn on to cool the engine. As the coolant temperature reaches 225 °F, the engine derates at 20%.

It isn't until the coolant temperature hits 240 °F that shutdown occurs to protect the engine.

57.

Using the composite vehicle on the ASE website, answer the following question:

How many modules are connected to the public bus network?

Five

Two

Three

Four

Correct answer: Five

The public bus network has five modules connected to it. Attached to the public network is the transmission control module (TCM), the electronic clutch actuator module, the electronic shift select module, the instrument control module (ICM), and the body control module (BCM).

These modules transmit information across the public network to the ECM.

58.

Using the composite vehicle on the ASE website, answer the following question:

Technician A states that a short to ground at terminal 102 of the ECM will cause the electric fuel primer pump not to run. Technician B states that a short to ground at terminal 102 of the ECM will cause fuse 12 to open.

Who is correct?

Both A and B

Technician A

Technician B

Neither A nor B

Correct answer: Both A and B

A short to ground will cause fuse 12 to open. Fuse 12 feeds the coil side of the primer relay. Since the relay will not work, the pump will not operate.

59.

Using the composite vehicle on the ASE website, answer the following question:

Technician A states that the A/C high pressure switch is wired to the BCM. Technician B states that there should be a 5-V reference at pin 853.

Who is correct?

Both A and B

Technician A

Technician B

Neither A nor B

Correct answer: Both A and B

The A/C high pressure switch is wired to the BCM. After the switch opens at a predetermined pressure, the BCM signals the ECM to operate the cooling fans.

Based on the composite vehicle on the ASE website, the A/C high pressure switch can be tested for 5-V reference at pin 853.

60.

Using the composite vehicle on the ASE website, answer the following question:

Technician A states that four terminals are used at the J1939 public data link connector. Technician B states that there are nine terminals at the J1939 public data link connector.

Who is correct?

- **Both A and B**
- Technician A
- Technician B
- Neither A nor B

Correct answer: Both A and B

The J1939 data link connector (in-cab) has nine terminals (A-H, J). Four of these terminals are used. A is grounded at G51, while B connects to Fuse 51. C connects to pin 581 and D is connected to pin 582 at the ECM.

61.

Using the composite vehicle on the ASE website, answer the following question:

What should the voltage be on APP 1 sensor with 50% throttle?

3.00 volts

4.50 volts

1.50 volts

2.00 volts

Correct answer: 3.00 volts

The APP 1 sensor voltage varies between 1.50 and 4.50 volts with the accelerator pedal position ranging between 0% and 100%. At 50% throttle, the APP 1 sensor reads 3.00 volts, while the APP 2 sensor reads 2.00 volts.

62.

Using the composite vehicle on the ASE website, answer the following question:

Which of the following pins are used to communicate with the scan tool on the private BUS?

Pins A and B

Pins A and C

Pins B and C

Pins C and D

Correct answer: Pins A and B

The J1939 data link connector (engine compartment) on the private network contains three pins. Pins A and B are responsible for communicating with the scan tool.

Pins C and D are responsible for communication on the J1939 data link connector (in-cab) on the public network.

63.

Using the composite vehicle on the ASE website, answer the following question:

How many levels of protection are there in the engine protection system?

Three

Two

One

Four

Correct answer: Three

There are three levels of protection: warning, derate, and shutdown. The engine protection system is responsible for monitoring the following to determine if there are any abnormal readings:

- *Coolant level*
- *Coolant temperature*
- *Diesel particulate filter (DPF) restriction*
- *EGR exhaust gas temperature*
- *Fuel temperature*
- *Intake manifold temperature*
- *Oil pressure*
- *Oil temperature*

Depending on the fault, the warning mode activates and turns on the amber CEL or MIL to alert the operator. Derate or limp mode reduces engine power 30 seconds after the first warning. Shutdown mode prevents the engine from running, so no further damage can occur.

64.

How many wires does a typical ECT sensor have?

Two

Three

Four

Five

Correct answer: Two

A typical engine coolant temperature (ECT) sensor has two wires — there's typically a voltage wire and a ground wire. The ECT is a resistor that is temperature variable and usually has a negative temperature coefficient.

65.

Which type of sensor is a typical throttle position sensor?

Mechanically variable resistor

A pressure sensor

Negative coefficient thermistor

A solid state resistor

Correct answer: Mechanically variable resistor

A throttle position sensor is typically a three-wire mechanically variable resistor. Resistors can only function as a resistor when placed under a load.

An example of a negative coefficient thermistor is a typical coolant temperature sensor, while a pressure sensor can be a typical manifold pressure sensor. An example of a solid state resistor is a typical blower motor module/resistor.

66.

Technician A states that oil leaking past the turbocharger seals can set an exhaust temperature code. Technician B states that an exhaust temperature code can be set by a defective catalytic converter.

Who is correct?

Both A and B

Technician A

Technician B

Neither A nor B

Correct answer: Both A and B

When oil leaks past the turbocharger seals, the catalytic converter has to work harder. The same condition occurs if there's a leaking or damaged wastegate. Whenever the catalytic converter has to work harder, the exhaust temperature code can set, so technician A is correct.

If the catalytic converter is defective, an exhaust temperature code can set, so technician B is also correct.

67.

Using the composite vehicle on the ASE website, answer the following question:

With the key on and engine off and with a DMM hooked between the negative battery terminal and terminal 4 of the PM sensor with the meter set to voltage, what should the reading approximately be?

0 volts

5 volts

12 volts

16 volts

Correct answer: 0 volts

The meter is set between two ground circuits, and the voltage should be around zero. Connecting to pin 3 would read 12 volts.

68.

Using the composite vehicle on the ASE website, answer the following question:

How many power feeds does the ECM have?

Three

Two

Four

Five

Correct answer: Three

There are three fused power feeds to the ECM. Fuses 11,12, and 61 power the ECM.

The other fuses aren't directly connected to the ECM.

69.

Using the composite vehicle on the ASE website, answer the following question:

Technician A states that a fuel injector should be replaced if the measured resistance is 3.5 ohms. Technician B states a fuel injector should be replaced if the measured resistance is 0.4 ohms.

Who is correct?

Both A and B

Technician A

Technician B

Neither A nor B

Correct answer: Both A and B

The fuel injector coil resistance specifications are 2 Ω ± 0.5 Ω, meaning a normal reading would be between 1.5 and 2.5 ohms. If the readings are outside of the specification, the injector needs to be replaced.

Technician A is correct because the reading is too high, while technician B is correct because the reading is too low.

70.

Using the composite vehicle on the ASE website, answer the following question:

What action occurs two minutes after the low coolant indicator comes on if the coolant is severely low?

Shutdown

No action

Warning

Derate

Correct answer: Shutdown

Two minutes after the low coolant indicator, the engine will shut down if the coolant level is not adjusted. There are three levels of protection: warning, derate, and shutdown.

No action will only occur if the coolant indicator is not on and the system is working as designed. At the first sign of low coolant, a warning is issued. After that, the system derates power to protect the engine from wear.

71.

Using the composite vehicle on the ASE website, answer the following question:

Technician A states that the amber check engine light (CEL) comes on when the engine enters derate (limp) mode. Technician B states that a solid red stop engine lamp (SEL) occurs when the engine is in shutdown mode.

Who is correct?

- **Technician A**
- Technician B
- Both A and B
- Neither A nor B

Correct answer: Technician A

As part of the engine protection system, the amber check engine light (CEL) will come on when the engine goes into derate mode, making technician A correct.

Technician B is incorrect because shutdown mode causes the red stop engine lamp (SEL) to flash. It doesn't come on solid.

72.

Using the composite vehicle on the ASE website, answer the following question:

Technician A states that the EGR differential pressure sensor has a maximum reading of 40 PSI. Technician B states that the EGR differential pressure sensor has a maximum reading of 5 PSI.

Who is correct?

Technician B

Technician A

Both A and B

Neither A nor B

Correct answer: Technician B

The EGR differential pressure sensor is a low reading sensor that varies from 0-5 PSI/0–35 kPa. These are the maximum values that will be displayed with diagnostic equipment hooked to the composite vehicle.

73.

Sensors fall into all of the following categories, except:

Capacitors

Switches

Resistors

Signal generators

Correct answer: Capacitors

Sensors fall into three categories: switches, resistors, and signal generators. Sensors are not capacitors.

Switches open or close a circuit, while resistors restrict the flow of current. The signal generator creates a repeating or non-repeating waveform.

74.

Using the composite vehicle on the ASE website, answer the following question:

Technician A states that the engine coolant temperature sensor is located on the driver's side of the engine block. Technician B states that the engine coolant temperature sensor is located on the passenger's side of the block.

Who is correct?

Neither A nor B

Technician A

Technician B

Both A and B

Correct answer: Neither A nor B

Technician A and B are both incorrect, because the engine coolant temperature sensor isn't located in the block. It's found in the cylinder head.

The engine coolant sensor is found near the coolant thermostats, and it sends a signal to the ECM that's used for fuel management, cooling fan operation, DPF regeneration, engine protection, and the instrument cluster temperature gauge.

75.

Using the composite vehicle on the ASE website, answer the following question:

Technician A states that the engine protection override switch is wired to the ECM.
Technician B states that the engine protection override switch is wired to the BCM.

Who is correct?

Technician A

Technician B

Both A and B

Neither A nor B

Correct answer: Technician A

The engine protection override switch is a two-wire switch that is connected to the ECM, making technician A correct. This switch is usually open, but closes during a warning shutdown period when a 30-second delay is requested.

The engine protection override switch is not connected to the BCM.

76.

Using the composite vehicle on the ASE website, answer the following question:

How many amps is the alternator/generator rated at?

200 amps

150 amps

175 amps

225 amps

Correct answer: 200 amps

The alternator/generator is a 200-amp, internally regulated alternator equipped with remote sense.

The target voltage for the alternator/generator is 14.1 VDC (± 0.5 VDC).

77.

All of the following statements are true about an output that can be energized by a scan tool, except:

The output device is faulty

The output device is operable

The ECM can operate the output device

All connections to the output device are intact

Correct answer: The output device is faulty

If the scanner can be used to energize an output device, the device is operable and doesn't need to be replaced. This method also proves that the ECM can operate the device.

All connections to the output device are intact and further diagnosis is needed to figure out the cause of the faults.

78.

Technician A states that tampering with original equipment emission control systems is legal but not recommended. Technician B states that it is illegal to tamper with original equipment emission control systems.

Who is correct?

Technician B

Technician A

Neither A nor B

Both A and B

Correct answer: Technician B

It is illegal to tamper with emission control systems on a vehicle. It's also illegal to modify or remove any original equipment emission control systems.

If equipment is missing or modified, it must be replaced or repaired to match with the original equipment.

79.

Using the composite vehicle on the ASE website, answer the following question:

Technician A states that if the EGR valve loses communication with the ECM, the valve will default to the closed position. Technician B states that if the EGR valve loses communication with the ECM, the valve defaults to the open position.

Who is correct?

Technician A

Technician B

Both A and B

Neither A nor B

Correct answer: Technician A

Power and ground is supplied to the EGR over the private CAN network. If communication with the ECM is lost, the valve will default to the closed position, making technician A correct.

If power becomes interrupted to the valve, the position remains where it currently is.

80.

Using the composite vehicle on the ASE website, answer the following question:

How many accelerator pedal position (APP) sensors are there?

Two

Three

Four

Five

Correct answer: Two

The ECM of this composite vehicle is connected to two accelerator pedal position (APP) sensors. They are labeled APP 1 and APP 2.

Each APP sensor has three connections: signal, ground, and the 5-V reference.

81.

Using the composite vehicle on the ASE website, answer the following question:

Technician A states that the fuel delivery pressure sensor is before the secondary filter. Technician B states that the fuel delivery pressure sensor is after the secondary filter.

Who is correct?

Technician B

Technician A

Both A and B

Neither A nor B

Correct answer: Technician B

The fuel delivery pressure sensor monitors fuel pressure after the secondary fuel filter, making technician B correct. The sensor monitors the pressure of the fuel before it enters the high pressure pump.

The ECM uses this signal to control injection timing and fuel metering.

82.

Using the composite vehicle on the ASE website, answer the following question:

Technician A states that a short between terminal 251 of the ECM and the APP sensor will not cause a DTC. Technician B states that an open at terminal 253 will cause a DTC to set.

Who is correct?

Technician B

Technician A

Both A and B

Neither A nor B

Correct answer: Technician B

Terminal 251 is the signal circuit from the ECM. If this circuit was shorted to ground, a DTC would be set, making technician A incorrect. Terminal 253 is a 5-V reference, and a DTC would also be set if the circuit was open.

A bad connection at terminal 252 could also lead to a DTC.

83.

Technician A states that a scanner stores active codes. Technician B states that a scanner stores inactive codes.

Who is correct?

Both A and B

Technician A

Technician B

Neither A nor B

Correct answer: Both A and B

Scanners typically reveal active codes, making technician A correct. Technician B is also correct because the inactive code data will be stored.

Technicians should always examine the operating hours from the last code set to help determine what's wrong.

84.

Using the composite vehicle on the ASE website, answer the following question:

How many of the terminating resistors used on the private network CAN system are found at the end of the backbone harness?

One

Two

Three

Four

Correct answer: One

There are two 120-ohm terminating resistors used on the private network CAN system. One is located at the end of the backbone harness and the other is located in the VGT actuator.

On the public network, there are two 120-ohm terminating resistors, both of which are located at each end of the backbone harness.

85.

Using the composite vehicle on the ASE website, answer the following question:

Technician A states that the exhaust back pressure sensor voltage varies between 1 and 5 volts. Technician B states that as exhaust back pressure increases, voltage decreases.

Who is correct?

Neither A nor B

Technician A

Technician B

Both A and B

Correct answer: Neither A nor B

The back pressure sensor voltage varies between 0.5 and 4.5 volts, making technician A incorrect.

As pressure increases, voltage increases, making technician B incorrect. When the PSI is 0, the voltage measures 0.50 volts, but when the PSI is 200, the voltage measures 4.50 volts.

86.

Technician A states that high counts of inactive codes signifies an issue with the scan tool. Technician B says that a large number of inactive codes reveals loose connections or intermittent conditions.

Who is correct?

Technician B

Technician A

Both A and B

Neither A nor B

Correct answer: Technician B

Technician B is correct, as the scanner will read both active and inactive codes. Seeing high counts of inactive codes signifies the possibility of loose connections or intermittent conditions.

Inactive codes can't be diagnosed because they are not active, but are not an indication that something is wrong with the scan tool.

87.

Using the composite vehicle on the ASE website, answer the following question:

What is the minimum normal oil pressure for an engine at normal idle?

15 PSI

50 PSI

35 PSI

75 PSI

Correct answer: 15 PSI

The minimum pressure at normal idle is 15 PSI. The pressures vary up to 70 PSI depending on RPM.

The ECM uses this signal to display on the instrument cluster panel gauge and protect the engine.

88.

Using the composite vehicle on the ASE website, answer the following question:

The ignition switch contains all of the following positions, except:

ACCESSORY

OFF

ON

CRANK

Correct answer: ACCESSORY

The ignition switch is a three-position switch. It contains the following positions: OFF, ON, and CRANK.

The ignition switch in the composite vehicle doesn't have an ACCESSORY position. This switch provides 12 volts of power to the ECM to communicate with other modules and to request starter operation.

89.

Using the composite vehicle on the ASE website, answer the following question:

Where is the camshaft position sensor located?

Engine rocker box cover

Engine oil pan

Engine front cover

Rear of the engine block

Correct answer: Engine rocker box cover

The cam sensor detects the position of the camshaft. It is located in the engine rocker box cover.

It sends the information to the ECM so injection timing and fuel control can be determined.

90.

Using the composite vehicle on the ASE website, answer the following question:

What should the voltage on a scan tool read while monitoring the fuel rail pressure sensor if the pressure was 15,000 PSI?

1.5 volts

2.5 volts

3.5 volts

4.5 volts

Correct answer: 1.5 volts

The pressure and voltage on the fuel pressure sensor vary between 5,000-45,000 PSI and 0.5-4.5 volts. As pressure increases, voltage increases.

When the fuel rail pressure sensor reads 15,000 PSI, the corresponding voltage reading would be 1.5 volts.

91.

Using the composite vehicle on the ASE website, answer the following question:

Technician A states that the fuel temperature sensor is mounted to the secondary fuel filter housing. Technician B states that the data from the fuel temperature sensor is sent to the ECM.

Who is correct?

Both A and B

Technician A

Technician B

Neither A or B

Correct answer: Both A and B

Technician A is correct because the fuel temperature sensor is mounted to the secondary fuel filter housing. This sensor is responsible for monitoring the fuel temperatures.

Technician B is also correct because the data from the fuel temperature sensor is sent to the ECM. The ECM uses the data to compensate for any changes in fuel temperature to protect the engine.

92.

Using the composite vehicle on the ASE website, answer the following question:

At what fuel temperature does power derate begin?

180 °F

190 °F

200 °F

210 °F

Correct answer: 180 °F

Temperatures in excess of 180 °F cause a 20% power derate. If the temperature continues to remain too high, derated power increases to 40%.

Derated power (limp mode) causes the amber CEL or MIL to illuminate. The ECM begins to reduce engine power starting 30 seconds after the first warning.

93.

Using the composite vehicle on the ASE website, answer the following question:

Technician A states that the ECM uses the signal from the fuel delivery pressure sensor to control injection timing. Technician B states that the ECM uses the signal from the fuel delivery pressure sensor to control fuel metering.

Who is correct?

Both A and B

Technician A

Technician B

Neither A nor B

Correct answer: Both A and B

The fuel delivery pressure sensor monitors pressure before the high pressure pump, but after the secondary fuel filter. The ECM uses the signal to control injection timing, making Technician A correct. It also controls fuel delivery, making Technician B correct.

94.

Using the composite vehicle on the ASE website, answer the following question:

Technician A states that the crankcase pressure sensor sends data to the BCM.
Technician B states that the crankcase pressure sensor sends data to the ECM.

Who is correct?

Technician B

Technician A

Both A and B

Neither A nor B

Correct answer: Technician B

The crankcase pressure sensor monitors the crankcase pressure and sends the data back to the engine control module (ECM). This data verifies the condition of the closed crankcase ventilation system and filter.

The body control module (BCM) on the composite vehicle is responsible for the cruise control on/off switch, ambient air temperature sensor, engine brake on/off switch, as well as other switches.

95.

Technician A states that resistors are used to restrict current. Technician B states that resistors with a loss of ground will cause sensor value and reference voltage to be different regardless of the sensor position.

Who is correct?

Technician A

Technician B

Both A and B

Neither A nor B

Correct answer: Technician A

Resistors are either a two- or three-wire design and are used to restrict current, making technician A correct. A resistor is only a resistor when it is placed under a load.

If there's a loss of the ground connection, the sensor value and reference voltage will be the same, making technician B incorrect. This factor is critical on a diesel engine because the TPS is needed to throttle the motor.

96.

Using the composite vehicle on the ASE website, answer the following question:

Technician A states that an open at fuse 91 will cause an interruption of communication with the ECM. Technician B states that an open at fuse 91 will cause the EGR valve to be inoperative.

Who is correct?

Neither A nor B

Technician A

Technician B

Both A and B

Correct answer: Neither A nor B

Fuse 91 feeds the instrument cluster module. No components on the engine control module side would be affected if this fuse were open.

The issue stemming from fuse 91 blowing is that the instrument cluster module won't receive power.

97.

Using the composite vehicle on the ASE website, answer the following question:

Technician A states that the ECM uses the fuel rail pressure sensor for injection timing. Technician B states that the ECM uses the fuel rail pressure sensor to maintain fuel rail pressure control.

Who is correct?

Technician B

Technician A

Both A and B

Neither A nor B

Correct answer: Technician B

The fuel rail pressure sensor is a strain gauge sensor that monitors the rail pressure. The ECM uses this signal to maintain fuel rail pressure control, not for injection timing.

Pressures range between 5,000 and 45,000 PSI, leaving voltage readings between 0.50 and 4.50 volts.

98.

Using the composite vehicle on the ASE website, answer the following question:

Technician A states that if fuse 61 was open, the DEF tank heater would be inoperative. Technician B states if fuse 61 was open, none of the DEF heaters would work.

Who is correct?

Both A and B

Technician A

Technician B

Neither A nor B

Correct answer: Both A and B

Fuse 61 is the DEF heater relay coil voltage supply. If it were open, the four connected heaters would not work.

The DEF pressure line heater, DEF supply line heater, DEF tank heater, and DEF pump heater all rely on both fuse 61 and fuse 62 to run.

99.

Using the composite vehicle on the ASE website, answer the following question:

How many wires does the intake manifold pressure/temperature sensor have?

Four

Two

Three

Five

Correct answer: Four

The sensor has four wires. The first wire is a pressure signal, while the second is a temperature signal. It also contains a ground wire and a 5-V reference. These are connected at pins 373-376.

100.

Using the composite vehicle on the ASE website, answer the following question:

How many pins does the J1939 data link connector for the private network have?

Three pins

Five pins

Seven pins

Nine pins

Correct answer: Three pins

The J1939 data link connector (engine compartment) for the private network contains three pins. It allows the engine ECM to talk with other vehicle control systems, such as the VGT, EGR, and exhaust aftertreatment.

It's not to be confused with the J1939 data link connector (in-cab), which is part of the public network. The in-cab data link connector contains nine pins.