

# PRACTICE EXAM 3: ASE A6 SIMULATION (50 QUESTIONS)

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1. A technician needs to measure approximately 350 amperes of starter current during cranking. The correct tool for this measurement is:

- A. A DMM with its leads placed in series with the starter positive cable
- B. An analog voltmeter set to its highest DC voltage range
- C. A standard test light connected across the starter terminals
- D. An inductive amp clamp placed around the starter positive or negative cable

2. Two resistors of 6 ohms each are connected in series across a 12-volt battery. What is the voltage drop across each resistor?

- A. 12 volts across each resistor
- B. 2 volts across each resistor
- C. 6 volts across each resistor
- D. Zero volts across each resistor

3. A technician is troubleshooting a circuit and finds that the fuse has blown. After replacing the fuse, it blows immediately when the circuit is energized. The fault is:

- A. A short to ground somewhere in the circuit
- B. An open circuit between the switch and the load
- C. A loose connection at the battery negative terminal
- D. A normal inrush condition that will resolve itself

4. A standard automotive incandescent test light has a current draw of approximately:

- A. Less than 1 milliampere, making it universally safe
- B. 150 to 300 milliamperes, which can damage electronic modules
- C. 50 amperes, requiring a special fused test lead
- D. Exactly 1 ampere at all applied voltages

5. Technician A says that voltage must always be measured in series with the circuit to get accurate readings. Technician B says that current must always be measured in parallel with the load being tested. Who is correct?

- A. Technician A only
- B. Technician B only
- C. Both A and B
- D. Neither A nor B

6. A silicon diode's characteristic forward voltage drop is approximately:

- A. 0.6 to 0.7 volts
- B. 1.5 to 2.0 volts
- C. 3.0 to 3.3 volts
- D. 5.0 volts regardless of current

7. Which statement about automotive wire gauge (AWG) is correct?

- A. A larger AWG number indicates a thicker, lower-resistance wire
- B. AWG and metric  $\text{mm}^2$  are completely unrelated measurement systems
- C. A smaller AWG number indicates a thicker, higher-current-capacity wire
- D. Automotive wire gauge changes with temperature during operation

8. A PWM signal measured on a scope shows a 12-volt pulse that is high for 7 milliseconds and low for 3 milliseconds in each cycle. The duty cycle is:

- A. 30 percent
- B. 70 percent
- C. 50 percent
- D. 100 percent

9. A voltage drop test reads 0.05 volts across a wire during a load test. This reading indicates:

- A. Excessive resistance requiring immediate repair
- B. A failed ground connection at the load
- C. A broken wire requiring replacement
- D. A healthy connection well within specification

10. A bipolar junction transistor (BJT) differs from a MOSFET primarily in that:

- A. BJTs can only switch DC while MOSFETs switch AC signals
- B. BJTs operate at higher voltages than any MOSFET design
- C. BJTs require a small base current while MOSFETs use gate voltage
- D. BJTs contain no semiconductor junctions in their internal structure

11. The purpose of electromagnetic induction in an automotive alternator is to:

- A. Convert mechanical rotation into electrical voltage in the stator windings
- B. Rectify AC output from the battery for use by DC loads
- C. Control the voltage regulator through direct coil current
- D. Produce heat that regulates the alternator's internal temperature

12. A circuit has 12 volts applied, and current of 3 amperes flows through a single resistor. The power dissipated by the resistor is:

- A. 4 watts
- B. 9 watts
- C. 15 watts
- D. 36 watts

13. Technician A says a heat-shrink butt splice with adhesive liner provides both mechanical connection and environmental sealing in one component. Technician B says acid-core solder is the appropriate material for automotive electrical splices. Who is correct?

- A. Both A and B
- B. Technician A only
- C. Technician B only
- D. Neither A nor B

14. The specific gravity of a fully charged flooded lead-acid battery's electrolyte is approximately:

- A. 0.990
- B. 1.100
- C. 1.265
- D. 1.450

15. A fuel-injected vehicle will not start. Cranking voltage at the battery is 8.9 volts. This is MOST likely due to:

- A. A weak battery that cannot support fuel injection and ignition
- B. A failed crankshaft position sensor preventing timing signals
- C. Normal cranking voltage for a cold engine

D. An overfilled battery causing electrolyte dilution

16. An EFB (Enhanced Flooded Battery) is typically used in:

- A. Heavy-duty diesel commercial trucks exclusively
- B. Entry-level start-stop vehicles where AGM is not required
- C. Hybrid electric vehicles as the main traction battery
- D. Motorcycles and ATV applications with limited space

17. During cranking on a gasoline engine, a voltage drop of 0.3 volts is measured across the positive battery cable. This reading is:

- A. Excessive and requires immediate cable replacement
- B. A sign of severe starter internal damage
- C. Evidence of failed battery cells
- D. Within acceptable specification for a healthy cable

18. A starter that engages but produces a whining sound without cranking the engine MOST likely has:

- A. A burned-out field coil winding
- B. Worn solenoid main contacts
- C. A failed overrunning clutch or broken pinion
- D. A discharged battery unable to support cranking

19. When registering a replacement battery on a modern vehicle with battery management, the technician typically uses a:

- A. Scan tool with the correct programming capability
- B. Universal voltage tester with battery output reading

- C. Mechanical test gauge calibrated for the battery type
- D. Handheld analog voltmeter connected to the OBD port

20. Why is a memory saver used during battery disconnection?

- A. To protect the technician from electrical shock during the procedure
- B. To maintain charge on the battery while it is disconnected
- C. To prevent hydrogen gas from accumulating in the engine compartment
- D. To preserve keep-alive memory and stored settings in vehicle modules

21. A starter current draw test shows 420 amperes during cranking on an engine that normally draws 200 amperes. This reading indicates:

- A. A weak battery limiting starter performance
- B. Starter internal binding or a partially shorted armature winding
- C. A normal current draw for this engine type
- D. High resistance in the positive battery cable only

22. A battery's CCA rating is determined at what ambient temperature?

- A. 0°F (-17.8°C)
- B. 32°F (0°C)
- C. 70°F (21°C)
- D. 100°F (37.8°C)

23. When the voltage regulator commands more rotor field current in an alternator, the alternator output will:

- A. Decrease proportionally to the increase in field current

- B. Remain constant because regulation is independent of field
- C. Increase as the stronger field induces more stator voltage
- D. Fluctuate randomly until the regulator recalibrates

24. Technician A says that an alternator's output current at idle is typically equal to its maximum rated output. Technician B says that an alternator produces most of its rated output only at mid to high engine RPM. Who is correct?

- A. Technician A only
- B. Both A and B
- C. Neither A nor B
- D. Technician B only

25. An overrunning alternator pulley (OAP) is designed to:

- A. Increase the alternator's effective drive ratio at low RPM
- B. Absorb engine-speed fluctuations that would otherwise stress the alternator
- C. Prevent the alternator from charging during deceleration events
- D. Reduce the alternator's drive speed for extended service life

26. A technician tests the AC ripple on a healthy alternator's DC output and expects to find:

- A. No AC content whatsoever in a properly functioning alternator
- B. Between 2 and 5 volts of AC ripple at normal operating conditions
- C. Ripple at exactly 60 hertz matching utility power frequency
- D. Less than 100 millivolts of AC ripple at the battery terminals

27. A vehicle with a charging complaint tests as follows: alternator B+ terminal reads 14.5 volts; battery positive post reads 13.0 volts during the same test. The fault lies in:

- A. The positive charging cable or its terminations between alternator and battery
- B. The alternator's voltage regulator commanding incorrect output
- C. A failed battery that cannot accept charging voltage
- D. A broken drive belt preventing alternator rotation

28. A halogen headlight bulb fails within days of being installed. The MOST likely cause is:

- A. Installing a higher wattage bulb than specified for the vehicle
- B. Using an OEM-equivalent replacement from an approved supplier
- C. Contamination of the glass envelope during installation
- D. A temporary voltage spike during engine start

29. Technician A says that HID headlight ballasts produce voltages that can be lethal during service. Technician B says that HID systems can be safely serviced with the ignition in the ACC position. Who is correct?

- A. Technician A only
- B. Technician B only
- C. Both A and B
- D. Neither A nor B

30. A center high-mount stop lamp (CHMSL) is required by federal regulation to:

- A. Illuminate continuously during all headlight operation
- B. Operate only during brake application, not during tail light operation
- C. Function as both a tail and brake lamp with dual-filament bulbs
- D. Remain illuminated for 30 seconds after ignition shutoff

31. A vehicle's headlights are dim after a recent repair. The technician checks battery voltage at the headlight connector and reads 10.2 volts while the headlights are on. The MOST likely cause is:

- A. A failed voltage regulator commanding low output
- B. An overloaded vehicle charging system
- C. A burned-out high-beam filament in the bulb
- D. Voltage drop in the wiring between battery and headlight

32. Federal motor vehicle safety standard 108 specifies requirements for:

- A. Vehicle exterior lighting including headlights, taillights, and signal lamps
- B. Engine control module software version tracking for emissions compliance
- C. Battery state-of-health thresholds for certified vehicle technicians
- D. Catalytic converter efficiency monitoring and reporting protocols

33. On modern vehicles, the headlight switch position is typically processed by:

- A. Direct switching of battery voltage to the headlight bulbs through the switch
- B. The body control module, which then commands headlight activation
- C. A mechanical relay that bypasses all electronic logic in the headlight circuit
- D. The engine control module through the fuel injection control processor

34. A variable-reluctance (VR) vehicle speed sensor produces:

- A. A DC voltage directly proportional to vehicle speed at any RPM
- B. A square wave with amplitude independent of sensor rotational speed
- C. An AC voltage whose amplitude and frequency increase with speed
- D. A pulse-width-modulated signal requiring decoding by the ABS module

35. An oil pressure warning lamp illuminates while driving. The technician should FIRST:

- A. Assume the sending unit is faulty and replace it as a quick fix
- B. Clear the fault with a scan tool to see if the lamp returns
- C. Continue operating the vehicle to see if the lamp extinguishes
- D. Mechanically verify actual oil pressure before continued operation

36. Technician A says that modern check-engine warning lamps are commanded by the engine control module via a network message to the instrument cluster. Technician B says that the instrument cluster independently decides which warning lamps to illuminate based on its own sensor inputs. Who is correct?

- A. Technician A only
- B. Technician B only
- C. Both A and B
- D. Neither A nor B

37. Which cluster technology produces the highest-quality and most flexible display capability?

- A. Mechanical analog gauges with magnetic two-coil movements
- B. Full-color TFT or OLED reconfigurable digital displays
- C. Vacuum fluorescent displays common in 1980s vehicles
- D. Segment-based LCD displays with predefined gauge layouts

38. A HUD (head-up display) that shows no image at all during operation should FIRST be diagnosed by:

- A. Replacing the HUD module assembly as a complete unit
- B. Installing a non-HUD-compatible windshield for testing
- C. Cleaning the windshield area where the HUD projects

D. Checking HUD fuse, power supply, and data communication

39. A driver information center (DIC) displays incorrect outside air temperature. The fault is MOST likely in:

- A. The infotainment head unit's display processor
- B. The data communication line between the DIC and ECM
- C. The outside air temperature sensor or its wiring
- D. The instrument cluster's dimmer control circuit

40. A power seat memory system fails to return the seat to its stored position. The seat operates manually but will not recall memory. The MOST likely cause is:

- A. A failed seat heating element preventing module communication
- B. A miscalibrated position sensor requiring a memory relearn
- C. A defective power seat motor unable to reach target position
- D. A failed seat occupancy classification sensor in the cushion

41. Rain-sensing wipers activate on a dry, clear day without precipitation. The MOST likely cause is:

- A. The wiper relay contacts have fused in the closed position
- B. The BCM has failed and is commanding wipers continuously
- C. Dirt or residue on the windshield where the rain sensor is located
- D. A weak or failing wiper motor requiring replacement

42. A horn sounds but at reduced volume. The technician should:

- A. Perform voltage drop testing on the horn circuit during operation
- B. Replace the horn relay immediately to restore normal sound level

- C. Increase the horn's ground wire gauge to improve current flow
- D. Install a supplemental horn wired in parallel with the original

43. A remote keyless entry key fob must be paired with the vehicle before it will operate the door locks. This process is called:

- A. Fob activation by the vehicle's receiver module automatically
- B. Battery synchronization between fob and vehicle systems
- C. Fob replacement by an OEM authorized dealer only
- D. Key programming using a scan tool or manufacturer procedure

44. Which statement about occupant classification systems is correct?

- A. The system measures only the weight of the passenger seat occupant
- B. The system must be calibrated after passenger seat service or replacement
- C. The system is independent of the SRS airbag deployment logic
- D. The system is disabled whenever the passenger seat belt is unbuckled

45. A CAN bus measured across CAN-H and CAN-L with the ignition off reads 50 ohms. This suggests:

- A. An additional terminator may be installed or one wire may be partially shorted
- B. The bus is operating within specification for high-speed CAN
- C. Both CAN wires are broken, producing an open circuit condition
- D. The scan tool is still connected and drawing additional current

46. On a LIN (Local Interconnect Network) bus, slave modules:

- A. Transmit messages whenever they detect a change in their inputs
- B. Communicate directly with other slaves without passing through the master

- C. Operate at 500 kilobits per second using differential signaling
- D. Respond to polling from the master module when addressed

47. Gateway modules in modern vehicles serve to:

- A. Provide a single diagnostic connector for all service information
- B. Combine all network messages into a single high-speed Ethernet stream
- C. Translate messages between different network types such as CAN and LIN
- D. Filter out emission-related messages before they reach the scan tool

48. A DTC of U0100 typically indicates:

- A. A fault in the engine's oxygen sensor heater circuit
- B. Lost communication with the engine control module
- C. A high-voltage condition detected on the CAN bus
- D. A calibration fault in the instrument cluster module

49. Before performing any service that involves SRS components, the battery must be:

- A. Disconnected, with a manufacturer-specified wait period before any physical work
- B. Fully charged to prevent the SRS module from entering fault mode
- C. Replaced with a jumper cable connected to a bench power supply
- D. Left connected so the SRS module can detect tampering attempts

50. Why do squib circuits in airbag systems include shorting bars in their connectors?

- A. To reduce electromagnetic interference from the airbag wiring harness
- B. To prevent simultaneous deployment of multiple airbags during a crash

- C. To prevent accidental deployment by shorting the squib wires when disconnected
- D. To allow the SRS module to test the squib resistance more accurately

## Practice Exam 3: Answer Key and Explanations

1. D — Direct in-line DMM measurement is impossible at 350 amperes because handheld meters are internally limited to 10–20 amperes. An inductive amp clamp measures current without breaking the circuit by sensing the magnetic field around the conductor. AC/DC Hall-effect clamps are essential for starter current, charging output, and any high-current automotive measurement.
2. C — In a series circuit with two equal resistors, the applied voltage divides equally across each resistor. 12 volts divided between two 6-ohm resistors produces 6 volts across each. The sum of voltage drops around any complete circuit loop must equal the source voltage, a principle known as Kirchhoff's voltage law.
3. A — A fuse that blows immediately upon replacement indicates a low-resistance path allowing excessive current to flow, which is the signature of a short to ground. The fuse is doing its protective job; the short must be located and repaired before the circuit can function normally. Never substitute a higher-rated fuse to "solve" this problem.
4. B — Incandescent test lights draw 150–300 milliamperes to illuminate the bulb. This current is sufficient to damage sensor output drivers, load low-current signal lines, and destroy electronic control module inputs designed for microampere-range signals. Logic probes drawing under 1 milliampere are the safe alternative for modern electronic circuits.
5. D — Both technicians are wrong. Voltage is measured in parallel (across a component), and current is measured in series (through a component). Reversing these configurations either produces meaningless readings or damages the meter and circuit. Understanding probe placement is foundational to correct DMM use.
6. A — A silicon PN junction in forward bias drops approximately 0.6 to 0.7 volts and passes current. This characteristic drop is a fundamental property of silicon semiconductors used in every diode, transistor base-emitter junction, and rectifier in an automotive electrical system. Diode testing on a DMM confirms this forward drop indicates a healthy junction.

7. C — AWG uses a counterintuitive scheme where smaller numbers indicate larger wires. A 2 AWG wire is thicker than a 14 AWG wire, carrying more current with less voltage drop. Matching or exceeding original wire gauge on any repair is essential; smaller-gauge substitution creates voltage drop problems and fault-protection issues.

8. B — Duty cycle is the percentage of each cycle that the signal is high. A signal high for 7 ms and low for 3 ms in a 10 ms total cycle has a duty cycle of  $7 \div 10 = 70$  percent. Duty cycle interpretation matters for PWM fuel injectors, PWM alternator field drivers, and PWM-controlled accessory circuits.

9. D — Voltage drops across a single wire or connection should be under 0.1 volt for most automotive circuits. A reading of 0.05 volts is well within specification and confirms a healthy low-resistance connection. High voltage drops over 0.2 volts typically indicate corrosion, damaged strands, or loose terminals requiring repair.

10. C — A BJT uses a small base current to control a much larger collector-emitter current, while a MOSFET uses gate voltage (drawing almost no current) to control drain-source current. MOSFETs dominate modern automotive electronics because they switch faster, waste less control-circuit power, and handle large currents efficiently. Both operate on semiconductor junction principles.

11. A — An alternator produces voltage through electromagnetic induction — a rotating magnetic field from the rotor induces voltage in the stationary stator windings. The rate of change of the field, the number of turns, and the field strength determine induced voltage magnitude. This is the fundamental operating principle of every automotive alternator.

12. D — Watt's Law gives  $P = E \times I$ , so 12 volts  $\times$  3 amperes = 36 watts. This calculation determines power dissipation in any automotive circuit and explains why high-current connections with even small resistance generate significant heat. Recognizing power consumption is essential for sizing protective devices and understanding circuit behavior.

13. B — Heat-shrink butt splices with adhesive liners combine crimp mechanical connection with thermoplastic sealing when heated, producing a complete splice in one component. Technician B is wrong; acid-core solder contains corrosive flux that damages copper and has no place in automotive electrical work. Rosin-core electronic solder is the correct material.

14. C — A fully charged flooded battery has electrolyte specific gravity of approximately 1.265 to 1.280, measured with a hydrometer or refractometer. As the battery discharges, sulfuric acid leaves the

electrolyte and combines with the plates, making the remaining liquid closer to pure water (1.000). Cell-to-cell comparison reveals cell-level damage.

15. A — A cranking voltage of 8.9 volts is below the threshold required by most modern fuel injection and ignition systems. Most modules require at least 9.6–10.5 volts during cranking to operate reliably. This low cranking voltage typically indicates a weak battery, high-resistance connections, or excessive starter load — all of which need diagnosis.

16. B — EFB batteries are flooded-construction batteries with design enhancements (thicker plates, carbon additives, robust internal connections) that provide better deep-cycle tolerance than conventional flooded batteries at lower cost than AGM. They are used in entry-level start-stop vehicles that require more robust batteries than standard flooded but not the full AGM specification.

17. D — Voltage drop across a healthy battery cable during cranking should be under 0.5 volt for most applications. A reading of 0.3 volts is within specification and indicates the cable is delivering cranking current efficiently. Values above 0.5 volts suggest corrosion, loose terminals, or damaged cable requiring attention.

18. C — A whining starter that engages but doesn't crank indicates the pinion is not transferring torque to the flywheel. A failed overrunning clutch allows the armature to spin without driving the pinion, or a broken pinion tooth creates a similar symptom. The starter must be removed for inspection or replacement.

19. A — Modern vehicles with battery management systems track battery characteristics through a module and require that new batteries be registered so the charging strategy matches the new battery's specifications. This requires a scan tool with programming capability — typically manufacturer-specific or a professional aftermarket tool with the correct coverage. Skipping registration causes premature replacement battery failure.

20. D — Memory savers preserve keep-alive data in control modules during battery disconnection — radio presets, seat memory, climate preferences, security codes, and adaptive transmission data. Without a memory saver, these settings are lost and require relearning or reprogramming. The saver draws only minimal current sufficient for memory retention, not vehicle operation.

21. B — A starter drawing more than twice its normal current indicates internal binding (worn bushings, dragging armature) or a partially shorted armature winding. The excess current suggests mechanical or

electrical internal damage. Replacement is typically required; rebuilding starters is increasingly uncommon due to the low cost of remanufactured units.

22. A — Cold Cranking Amperes is specifically defined at 0°F (−17.8°C) per SAE J537, simulating worst-case cold-start conditions when battery chemistry is slowest and engine oil is thickest. The test measures maximum current delivery at this temperature while maintaining 7.2 volts for 30 seconds. This is the most heavily tested battery rating specification on the A6 exam.

23. C — The rotor field winding creates the magnetic field that sweeps past the stator. Stronger field current creates a stronger magnetic field, which induces higher voltage in the stator windings. The voltage regulator varies field current to adjust output, maintaining target voltage regardless of RPM or load conditions.

24. D — An alternator rated at maximum output achieves that output only at mid to high rotor RPM (typically 5,000+ alternator RPM). At engine idle, output is reduced because the rotor isn't spinning fast enough for peak induction. Modern alternators are specifically designed to produce adequate output at idle, but the maximum rating is always at higher RPM.

25. B — Overrunning alternator pulleys (OAPs) include a one-way clutch that allows the pulley to slip relative to the alternator shaft during engine speed fluctuations. Without this decoupling, the alternator's rotational inertia would transfer vibration and stress to the belt drive system, causing noise, bearing wear, and belt damage. This feature is common on modern alternators.

26. D — A healthy rectifier bridge produces less than 100 millivolts of AC ripple at the battery terminals under normal load. Some residual AC always remains because three-phase rectification is not perfectly smooth, but the output should be predominantly DC. Readings above 500 mV indicate rectifier diode failure and typically require alternator replacement.

27. A — A 1.5-volt discrepancy between alternator output and battery voltage is dropping across the positive cable or its connections. The alternator is producing correct voltage; the cable is the fault. Many unnecessary alternator replacements happen when voltage drop testing is skipped — this measurement-based diagnosis takes ten minutes and prevents repeat failures.

28. C — Halogen bulbs contain gas at high pressure with a tungsten filament operating at extreme temperatures. Skin oils on the glass envelope create thermal stress concentration points that cause bulb

cracking and premature failure. Always handle halogen bulbs by the base or with clean cloth, cleaning any contact with isopropyl alcohol before installation.

29. A — HID ballasts produce ignition pulses exceeding 15,000 volts and sustained AC voltage of 85–95 volts, both capable of causing serious electrical shock or fatal injury. Technician B is wrong; ACC position does not guarantee the ballast has discharged, and the system must be fully de-energized before service. Always disconnect battery and wait for capacitor discharge.

30. B — The center high-mount stop lamp is a brake-light-only device that does not function as a tail light. This differentiates it from the other rear lamps and improves brake signal visibility to following drivers. CHMSL has been required on passenger cars since 1986 under FMVSS 108 and is wired only to the brake circuit.

31. D — A 2-volt drop between battery and headlight indicates significant resistance in the supply wiring or ground path during operation. Voltage drop testing under load identifies the specific segment responsible — corroded connections, damaged wire, or poor terminal contact. Correct diagnosis addresses the wiring problem rather than replacing headlights or alternator.

32. A — FMVSS 108 establishes comprehensive requirements for vehicle exterior lighting including headlights, tail lights, signal lamps, brake lights, and CHMSL. It specifies photometric output, beam patterns, mounting locations, and color requirements. Aftermarket lighting modifications must comply with FMVSS 108 to be legal for road use.

33. B — Modern vehicles route headlight switch inputs to the BCM, which then commands headlight activation through dedicated output drivers. Direct switching of headlight current through the switch itself is largely obsolete. This architecture enables features like automatic headlights, daytime running lights, and intelligent lighting control based on ambient conditions.

34. C — A variable-reluctance sensor produces an AC signal whose amplitude and frequency both increase with rotational speed. At low RPM the signal is weak; at high RPM it becomes strong and high-frequency. This output characteristic is fundamental to diagnosing VR sensors including crankshaft, camshaft, and wheel speed sensors.

35. D — An illuminated oil pressure warning lamp must be treated as a real low-oil-pressure condition until verified otherwise with a mechanical gauge test. Engine damage from low oil pressure is rapid and

catastrophic — a few minutes of operation at zero pressure destroys bearings and camshafts. Never assume a faulty sending unit without mechanical verification.

36. A — Modern warning lamps are module-driven. The engine control module evaluates sensor data, detects faults, and commands the cluster to illuminate specific warning lamps through network messages. The cluster itself does not decide which warnings to show; it displays commands received from other modules. Diagnosis always starts with the commanding module.

37. B — Full-color TFT or OLED reconfigurable displays offer the highest flexibility, with driver-selectable gauge layouts, high resolution, photorealistic graphics, and the ability to render any gauge or information layout under software control. These have become standard on premium vehicles and are increasingly common on mainstream applications as manufacturing costs decrease.

38. D — Before assuming HUD hardware failure, verify basic power and data — check HUD-specific fuse, confirm power and ground reach the HUD module, and verify data communication is intact. A HUD that has lost power or data connection shows no image at all. This systematic check takes minutes and avoids unnecessary component replacement.

39. C — The DIC faithfully displays data received over the vehicle network. If displayed temperature is incorrect, the source — the outside air temperature sensor or its wiring — is the fault, not the DIC itself. Diagnosis targets the sensor input to whichever module broadcasts temperature data, not the display module.

40. B — Memory seats rely on position sensors that feed back to the seat module. After battery disconnection or motor replacement, position calibration may drift, and the module's stored positions no longer match actual seat positions. A memory relearn procedure, performed per service information, recalibrates the sensors to their home positions and restores memory function.

41. C — Rain-sensing wiper systems interpret changes in infrared light reflection from the windshield. Dirt, grime, or residue on the glass in the sensor area absorbs or scatters infrared light, mimicking water droplets and falsely activating the system. Cleaning the windshield in the sensor area resolves this common nuisance complaint.

42. A — Reduced horn volume indicates voltage drop somewhere in the horn circuit — most likely a corroded ground connection, degraded wire, or failing horn switch contacts. Voltage drop testing from

battery positive to the horn connector during operation reveals the location of unwanted resistance. The horn itself is rarely the fault when volume is merely reduced.

43. D — Key fobs must be cryptographically paired with the vehicle before they will operate remote keyless entry or authorize starting. This requires manufacturer-specific procedures or scan tool access. Salvage fobs without proper programming are rejected by the vehicle's immobilizer. Adding or replacing fobs typically requires a trip to a dealer or specialty locksmith.

44. B — The occupant classification system must be calibrated after any service involving the passenger seat — cushion replacement, sensor repair, or cover changes. Uncalibrated systems may misclassify occupants, making dangerous airbag deployment decisions. The calibration procedure teaches the module the expected sensor signals for empty, child, and adult occupancy.

45. A — A healthy high-speed CAN bus reads approximately 60 ohms across CAN-H and CAN-L (two 120-ohm terminators in parallel). A reading of 50 ohms suggests lower-than-normal resistance, typically from an extra terminator (such as a scan tool or additional module termination), or partial wire shorting. Investigation is required to identify the specific cause.

46. D — LIN is a master-slave protocol where slaves respond only when the master polls them. This simple architecture is perfect for low-bandwidth applications like window switches, mirror motors, and sensor modules. Slaves never initiate communication; the master dictates all bus traffic through its polling schedule at intervals matched to each slave's data update needs.

47. C — Gateway modules bridge different network types within the vehicle — translating messages from high-speed CAN to low-speed CAN, forwarding relevant data to LIN sub-networks, routing between CAN and Ethernet for cameras and ADAS. Without gateways, modern vehicles with multiple network types could not coordinate their systems. Gateway failures produce widespread symptoms across apparently unrelated systems.

48. B — The U0100 code specifically indicates lost communication with the engine control module. U-codes (network family) identify communication faults rather than specific system problems. Multiple U-codes across many modules often indicate bus-level faults; a single U-code pointing to one module suggests that specific module is offline, in bus-off state, or has lost its connection.

49. A — Every SRS requires a specific disabling procedure including battery disconnection and a manufacturer-specified wait period (typically 1–10 minutes) for deployment-energy capacitors to fully

discharge. Skipping this procedure risks accidental deployment that can cause severe injury. Scan-tool DTC reading alone is not sufficient; physical disabling is required before any work on components.

50. C — Squib connectors include shorting bars that automatically short the two squib wires together when the connector is disconnected. This prevents stray voltages from static electricity, inadvertent battery contact, or test equipment from triggering accidental deployment. When the connector reconnects, the shorting bar retracts for normal operation. This is a critical safety feature during service.