PRACTICE EXAM 8: ASE A6 SIMULATION (50 QUESTIONS)

1. A circuit contains two 6-ohm resistors in series. What is the total current drawn from a 12-volt source?

A. 6 amperes at steady state

B. 2 amperes during normal operation

C. 1 ampere through the circuit

D. 0.5 amperes across the resistors

2. A technician measures voltage at a switch input and reads 11.8 volts, while the specification says 12 volts. This slight difference is MOST likely due to:

A. Normal voltage drop in the supply wiring to the switch

B. A failed battery requiring immediate replacement

C. An incorrect meter calibration requiring service

D. An open circuit between the battery and the switch

3. Which Ohm's Law formula correctly solves for resistance when voltage and current are known?

A. R = E × I (resistance equals voltage times current)

B. R = I ÷ E (resistance equals current divided by voltage)

C. R = P × E (resistance equals power times voltage)

D. R = E ÷ I (resistance equals voltage divided by current)

4. The purpose of using twisted-pair wiring in a CAN bus is to:

A. Increase the bus bandwidth to 500 kilobits per second

B. Reduce electromagnetic interference through common-mode noise rejection

C. Provide redundant signal paths for fault tolerance

D. Allow for higher voltage signals in automotive harsh environments

5. A technician measures 0.02 ohms across a healthy wire using a DMM. This reading typically indicates:

A. The DMM cannot resolve resistances this low, and voltage drop testing is needed

B. The wire is completely broken and must be replaced

C. An excessively long wire that requires replacement with larger gauge

D. A short-circuit to ground that must be repaired immediately

6. A zener diode in an automotive circuit is designed to:

A. Provide one-way current flow from battery to load

B. Amplify small signals to control larger current loads

C. Convert AC voltage to DC for battery charging

D. Maintain a constant voltage across itself in reverse-breakdown mode

7. Technician A says that a MOSFET gate draws a small but measurable current to switch. Technician B says that a MOSFET gate is voltage-controlled and draws essentially no current. Who is correct?

A. Technician A only, the gate does draw current

B. Both, depending on the application context

C. Technician B only; MOSFET gates are voltage-controlled

D. Neither, because MOSFETs are not used in modern vehicles

8. An automotive wiring diagram shows a wire color code of "RD/BK." This means the wire has:

A. A black base color with a red primary stripe

B. A red base color with a black tracer stripe

C. Two separate wires bundled together, red and black

D. A solid red wire with no stripe or tracer markings

9. A technician observes that the fuse for a circuit has blown. The correct first step before replacing the fuse is:

A. Replace the fuse with a higher-rated one to prevent recurrence

B. Add a circuit breaker in place of the fuse for continuous protection

C. Jumper the fuse terminals temporarily to check circuit operation

D. Identify the cause of the fuse failure before installing a new one

10. The formula for calculating power dissipated by a resistive load is:

A. $P = E \times I$ (power equals voltage times current)

B. $P = E \div I$ (power equals voltage divided by current)

C. $P = I \times R$ (power equals current times resistance)

D. $P = E \times R$ (power equals voltage times resistance)

11. A soldered wire splice inside heat-shrink tubing without an adhesive liner is:

A. Approved for all automotive applications without restriction

B. Suitable only for interior applications with minimal moisture

C. Required for all under-hood engine compartment work

D. Mandatory for SRS and emission-related circuit repairs

12. A technician is troubleshooting a parasitic drain and finds 450 milliamperes draw 30 minutes after the vehicle is locked. The typical acceptable range is:

A. 500 to 800 milliamperes during any vehicle sleep cycle

B. 100 to 250 milliamperes at full alternator output

C. 200 to 400 milliamperes during engine operation only

D. 30 to 50 milliamperes after the vehicle has settled into sleep mode

13. Kirchhoff's current law states that:

A. Current entering a node must equal the current leaving that node

B. Voltage around any closed loop must equal zero

C. Power dissipated by a resistor is proportional to current squared

D. Resistance varies directly with wire length and temperature

14. A battery fails a load test, dropping to 8.5 volts at one-half the CCA rating. The battery is:

A. Fully charged but under load correctly

B. Marginal but acceptable for normal service

C. Defective and requires replacement

D. Lightly discharged and needs charging first

15. An AGM battery differs from a conventional flooded battery primarily because:

A. AGM batteries have higher voltage output than flooded batteries

B. AGM electrolyte is absorbed into fiberglass mats between plates

C. AGM batteries cannot be used in modern stop-start applications

D. AGM batteries have significantly lower cold-cranking capacity

16. The specific gravity of a fully charged flooded lead-acid battery cell is typically:

A. 1.000, equal to pure water density

B. 0.875, indicating discharged electrolyte

C. 1.450, excessive and potentially damaging

D. 1.265, standard for full charge state

17. A technician is jumping a vehicle. The correct sequence for connecting jumper cables is:

A. Positive to dead, positive to good, negative to good, ground on dead vehicle chassis

B. Both positives first, then both negatives simultaneously

C. Negative to dead first, then positive to dead for charge flow

D. Only the positive cables need connection on modern vehicles

18. A vehicle's starter engages but produces a whining sound without cranking the engine. The MOST likely cause is:

A. A discharged battery preventing solenoid engagement

B. Excessive current draw from a shorted armature winding

C. A blown starter motor fuse interrupting the circuit

D. A failed overrunning clutch or broken pinion

19. Cold Cranking Amperes (CCA) is specified at what temperature?

A. 70°F for normal room-temperature conditions

B. 32°F for freezing-point performance

C. 0°F for cold-weather cranking capability

D. −40°F for extreme arctic environments

20. A starter draws the normal amperage rating but cranks the engine very slowly. The MOST likely cause is:

A. A completely failed starter requiring replacement

B. High resistance in the battery cables or ground path

C. A blown starter relay preventing full current flow

D. A stuck ignition switch in the crank position

21. When installing a replacement battery on a modern vehicle with a Battery Management System, the technician must:

A. Match the CCA rating to the original specification

B. Verify the group size fits in the battery tray correctly

C. Check the battery's warranty date before installation

D. Perform a battery registration procedure with a scan tool

22. A battery hydrometer is used to measure:

A. Specific gravity of the electrolyte in flooded batteries

B. Internal resistance of AGM and gel batteries

C. Current capacity during cold-cranking tests

D. Voltage output under varying load conditions

23. The voltage regulator on a modern alternator controls output by:

A. Changing the drive ratio between crankshaft and alternator

B. Adjusting the number of active stator windings electronically

C. Varying the current through the rotor field winding

D. Switching between internal three-phase and single-phase modes

24. AC ripple measured at the battery terminals with the engine running exceeds 1 volt. The MOST likely cause is:

A. A weak drive belt slipping under load

B. One or more failed rectifier diodes in the alternator

C. An overcharged battery with internal sulfation

D. Excessive vehicle electrical load exceeding alternator capacity

25. A customer complains that the charging system warning lamp illuminates at idle but goes out above 2000 RPM. This is MOST likely caused by:

A. A failed battery no longer accepting a charge

B. A shorted rectifier diode in the alternator assembly

C. An overcharging voltage regulator at high RPM conditions

D. A loose or glazed drive belt slipping at low engine RPM

26. A voltage drop test on the ground circuit of an alternator reads 0.2 volts. This reading indicates:

A. Normal ground circuit performance within specification

B. Excessive ground resistance requiring repair

C. A complete ground circuit failure

D. An overcharging condition masking ground issues

27. A computer-controlled charging system commands 13.2 volts during highway cruise despite a recently replaced battery. The technician should:

A. Replace the alternator as the most likely cause

B. Verify this is normal adaptive behavior with a scan tool

C. Check the battery for surface charge contamination

D. Install a higher-output alternator to compensate

28. HID (xenon) bulbs require a ballast that produces what initial ignition voltage?

A. Approximately 12 volts DC during cold start

B. Between 200 and 500 volts AC during warm-up

C. 15,000 volts or higher to strike the initial arc

D. Up to 1000 volts DC through a boost capacitor

29. A halogen headlight bulb handled with bare fingers during installation is likely to:

A. Fail prematurely due to skin oils creating thermal stress points

B. Operate at normal brightness with no measurable difference

C. Produce a bluer light color than specified

D. Cause electromagnetic interference with radio receivers

30. The dual-filament bulb in a combined tail/brake light function operates because:

A. The filaments are wired in series for voltage division

B. A separate relay switches between the two functions

C. The ballast circuit modulates filament brightness

D. One filament serves the tail circuit, the other the brake circuit

31. Daytime Running Lights (DRLs) on most modern vehicles operate at reduced voltage to:

A. Produce a dimmer output than high beams while providing visibility

B. Extend the life of the filament during daytime operation

C. Reduce the current draw on the alternator system

D. Comply with specific safety regulations regarding brightness

32. A CHMSL (Center High-Mount Stop Lamp) that is not functioning while the two main brake lights operate correctly is MOST likely caused by:

A. A failed brake light switch at the pedal assembly

B. A blown main brake light fuse affecting all circuits

C. A failed CHMSL bulb or damaged CHMSL circuit only

D. A short to ground in the tail light wiring system

33. An aftermarket LED replacement bulb installed in a factory halogen turn-signal socket causes the turn signal to flash rapidly. This is because:

A. The LED has a different color temperature than halogen

B. The LED has much lower current draw, which the flasher interprets as a bulb-out condition

C. The LED's polarity is reversed from halogen specifications

D. The LED produces higher heat causing thermal flasher tripping

34. A modern instrument cluster displays incorrect outside air temperature, but the scan tool shows the correct value from the sensor. The fault is MOST likely in:

A. The outside air temperature sensor hardware itself

B. The wiring between the sensor and the BCM

C. The ambient temperature reporting module

D. The instrument cluster's internal data processing or display

35. A warning lamp that fails to illuminate during the key-on bulb check indicates:

A. A fault in the lamp itself or its driver circuit

B. The system the lamp monitors is functioning normally

C. The engine is running and bulb check is complete

D. A low battery voltage condition during the test

36. A head-up display (HUD) shows images that appear to have a ghost or double image. This is caused by:

A. The HUD projector bulb reaching end of service life

B. Software corruption in the HUD control module

C. A dirty windshield requiring cleaning at the projection point

D. A standard replacement windshield installed on a HUD-equipped vehicle

37. A modern reconfigurable TFT cluster displays vehicle speed based on:

A. A mechanical cable driven from the transmission tail shaft

B. A direct analog signal from the vehicle speed sensor

C. A network message broadcast by the ABS module

D. The engine control module's fuel injection pulse rate

38. After installing a replacement instrument cluster, the technician discovers the vehicle will not start. The MOST likely cause is:

A. A blown fuse from the replacement procedure itself

B. The new cluster has not been programmed to the vehicle's immobilizer

C. A disconnected wiring harness at the cluster connector

D. The battery was discharged during the replacement work

39. A fuel level gauge reads full when the tank is empty. After testing, the sending unit is shown to be functional. The MOST likely cause is:

A. A shorted wire between the sending unit and the cluster

B. A faulty fuel pressure regulator limiting fuel flow

C. An open ground on the battery negative terminal

D. A defective BCM misreporting the fuel level data

40. A power window operates from the master switch but not from the passenger door switch. The MOST likely cause is:

A. A failed window motor requiring replacement

B. A defective passenger door switch or break in its wiring

C. A blown fuse affecting the entire power window circuit

D. A disconnected battery cable at the door module

41. Pinch protection in a modern auto-up power window system works by:

A. Using infrared sensors across the window opening path

B. Timing the up-travel cycle against a stored maximum duration

C. Monitoring motor current for a spike caused by obstruction

D. Measuring mechanical force on the window glass surface

42. A rain-sensing wiper system activates falsely on a dry sunny day. The MOST likely cause is:

A. A failed rain sensor module requiring immediate replacement

B. Contamination on the windshield where the rain sensor is mounted

C. A weak wiper motor with worn brushes drawing erratic current

D. Corrupted BCM software requiring a flash update

43. A power door lock actuator on the driver's door operates from the fob but not from the interior lock switch. The MOST likely cause is:

A. A defective interior switch or break in its signal wiring to the module

B. A blown fuse shared by both the fob and switch circuits

C. An unsynchronized rolling code between the fob and vehicle

D. A failed lock actuator on the driver's side only

44. A rear defogger grid has one horizontal trace that does not heat while others operate normally. The fault is in:

A. The defogger relay controlling the entire grid operation

B. The defogger fuse protecting the complete defogger circuit

C. The dashboard defogger switch and its indicator lamp assembly

D. The specific horizontal trace on the glass, which is broken

45. Before performing any service on SRS components, the technician MUST:

A. Scan the SRS module for DTCs with the ignition in the ON position

B. Disconnect only the airbag deployment connectors while the battery remains

C. Disconnect the battery and wait the manufacturer-specified time for capacitor discharge

D. Remove the steering wheel first to access the clock spring safely

46. Squib connectors in an airbag system include a shorting bar that:

A. Automatically shorts the squib wires together when disconnected to prevent accidental deployment

B. Provides low-resistance continuity for SRS module diagnostic testing

C. Reduces electromagnetic interference from the squib wiring harness

D. Allows the module to detect when a connector is not fully seated

47. The occupant classification system must be calibrated after:

A. Replacing the vehicle's 12-volt main battery

B. Any service to the front passenger seat assembly

C. Engine control module software reprogramming events

D. Replacing the steering wheel clock spring assembly

48. A gateway module failure on a modern vehicle may cause:

A. A single specific DTC in one isolated module only

B. The engine to fail to start but all other systems to work

C. Only the infotainment system to stop functioning

D. Multiple seemingly unrelated symptoms across different systems

49. A healthy high-speed CAN bus measured across CAN-H and CAN-L with the ignition off reads approximately:

A. 120 ohms, matching a single active termination resistor

B. 240 ohms, twice the nominal terminator value

C. 60 ohms, indicating two parallel 120-ohm terminators

D. 30 ohms, because three terminators are parallel

50. A U0101 DTC typically indicates:

A. Lost communication with the transmission control module

B. A power supply fault in the body control module

C. A high-voltage condition on the CAN bus

D. Calibration fault in the instrument cluster hardware

Practice Exam 8: Answer Key and Explanations

1. C — Two 6-ohm resistors in series produce a total resistance of 12 ohms. Applying Ohm's Law, I = E ÷ R, so 12 volts ÷ 12 ohms = 1 ampere. Series resistances add directly, which distinguishes series from parallel configurations. This fundamental series-circuit calculation appears repeatedly on the A6 exam.

2. A — Every wire, connector, and switch contact has a small amount of resistance that produces minor voltage drop under current flow. A reading of 11.8 volts at a switch input vs. 12.0 volts at the battery reflects this normal loss. Readings within 0.2 volts of source voltage are typical; values significantly below source voltage indicate excessive resistance requiring investigation.

3. D — Ohm's Law rearranged to solve for resistance is R = E ÷ I (resistance equals voltage divided by current). The three forms of Ohm's Law are E = I × R, I = E ÷ R, and R = E ÷ I. Fluency with rearranging this equation to solve for any unknown is essential for automotive electrical calculations.

4. B — Twisted-pair wiring reduces electromagnetic interference through common-mode noise rejection. Any external EMI that affects one wire in the pair also equally affects the other wire. The differential signaling of CAN bus (where the receiver measures the difference between the two wires) cancels out this common noise, providing excellent immunity to interference.

5. A — A DMM's ohms function typically cannot reliably resolve resistances below 0.1 ohm. A reading of 0.02 ohms is at or below the meter's resolution threshold. For low-resistance connections and wires, voltage drop testing under load is the reliable method. This is why voltage drop testing is preferred for diagnosing high-current circuits.

6. D — A zener diode is designed to conduct in reverse-breakdown at a specific voltage, maintaining a constant voltage drop regardless of current within its rated range. This property makes zener diodes useful for voltage regulation, voltage reference, and overvoltage protection circuits. Understanding zener behavior is essential for diagnosing certain protection and regulation circuits.

7. C — MOSFETs use voltage-controlled gates with an insulated layer that prevents current flow through the gate terminal. The gate voltage creates an electric field that controls the current path between drain and source. This voltage-controlled operation with virtually no gate current distinguishes MOSFETs from BJTs, which are current-controlled.

8. B — The standard wire color code convention lists the base color first and the tracer stripe second. "RD/BK" indicates a red base color with a black tracer stripe. This notation appears throughout service information and is essential for identifying the correct wire within a harness bundle during diagnostic and repair work.

9. D — Before installing a new fuse, the technician must identify why the original fuse blew. Fuses blow because of a fault — a short to ground, a shorted component, or sustained overload. Installing a replacement without addressing the cause simply wastes another fuse and may cause additional damage when the fault causes another failure.

10. A — Watt's Law states that P = E × I (power equals voltage times current). This fundamental formula applies to any electrical circuit and is used for calculating power consumption, heat generation, and sizing components. Combined with Ohm's Law, these formulas provide complete analytical capability for automotive electrical circuits.

11. B — Heat-shrink tubing without an adhesive liner provides mechanical protection but not environmental sealing. Moisture can enter the splice area over time, leading to corrosion and eventual failure. This type of splice is acceptable only in protected interior locations where moisture exposure is minimal. Underhood or exposed locations require adhesive-lined heat-shrink.

12. D — Typical parasitic drain specifications for modern vehicles are 30 to 50 milliamperes after the vehicle has fully entered sleep mode. A reading of 450 milliamperes is nearly ten times the acceptable limit and indicates a module or circuit is not properly entering its low-power state. This excessive draw will discharge the battery over several days of parking.

13. A — Kirchhoff's current law states that the total current entering a node must equal the total current leaving it. This principle underlies current distribution analysis in parallel circuits and is the basis for understanding how current divides and recombines at junction points. Mastery of Kirchhoff's laws is foundational to circuit analysis.

14. C — A battery that drops below 9.6 volts at 70°F during a one-half CCA load test is defective. The 9.6-volt threshold per SAE J537 indicates internal resistance has risen beyond acceptable limits. Replacement is required; a battery that fails this standard load test cannot reliably support vehicle starting and should not be returned to service.

15. B — AGM batteries replace the free liquid electrolyte of flooded batteries with electrolyte absorbed into compressed fiberglass mats between the plates. The chemistry remains lead-acid; only the physical form of the electrolyte changes. This provides vibration resistance, spill-proof construction, and better deep-cycle performance — making AGM ideal for start-stop and premium applications.

16. D — A fully charged flooded lead-acid battery has electrolyte specific gravity of approximately 1.265 to 1.280, measured with a hydrometer or refractometer. As the battery discharges, sulfuric acid combines with the plates, making the remaining electrolyte closer to pure water (1.000). Cell-to-cell comparison is useful for identifying damaged cells within an otherwise functional battery.

17. A — The correct jumper cable connection sequence is: positive to discharged battery first, positive to good battery second, negative to good battery third, and the final ground connection on the discharged vehicle's engine or chassis (not directly on the dead battery negative). This places any spark away from accumulated hydrogen gas around the dead battery.

18. D — A starter that engages (solenoid pulls in, pinion extends) but produces a whining sound without cranking indicates the pinion is spinning without transferring torque to the flywheel. A failed overrunning clutch (one-way clutch) allows the starter armature to spin without driving the pinion, or the pinion itself is broken. Starter replacement or overhaul is required.

19. C — Cold Cranking Amperes is specified at 0°F (−17.8°C) per SAE J537, simulating worst-case cold-start conditions. The test measures current delivery at this temperature while maintaining 7.2 volts for 30 seconds. This rating indicates the battery's ability to deliver sufficient current during cold-weather starting when engine oil is thickest and battery chemistry is slowest.

20. B — A starter that draws normal current but cranks slowly indicates the starter is receiving inadequate voltage due to voltage drop in the supply cables or ground path. Voltage drop testing during cranking reveals the specific location of unwanted resistance. The starter itself is functioning correctly; the supply circuit needs attention. Cleaning corroded terminals often resolves this.

21. D — Modern vehicles with Battery Management Systems track battery characteristics over time and adjust their charging strategy accordingly. When a new battery is installed, the BCM must be notified through a registration procedure performed with a scan tool. Skipping this step leaves the BCM using outdated parameters calibrated to the old battery, leading to premature failure.

22. A — A battery hydrometer measures the specific gravity of electrolyte in flooded batteries, indicating state of charge and helping identify damaged cells. The tool draws electrolyte into a float chamber; the float's depth indicates specific gravity. Hydrometers cannot be used on AGM or gel batteries where the electrolyte is not in liquid form accessible to the tool.

23. C — The voltage regulator controls alternator output by varying the current through the rotor field winding. Stronger field current creates a stronger magnetic field, which induces higher voltage in the stator. Weaker field current reduces output voltage. This electrical field control is what allows voltage regulation independent of RPM and load conditions.

24. B — A healthy alternator produces less than 100 millivolts of AC ripple at the battery terminals. AC ripple exceeding 1 volt indicates one or more failed rectifier diodes — the diodes that convert three-phase AC to DC have lost their ability to prevent AC from reaching the output. This requires alternator replacement before the excess ripple damages other vehicle electronics.

25. D — A charging warning lamp that illuminates at idle but goes out at higher RPM is characteristic of belt slippage. At low RPM with high electrical load, a loose or glazed belt slips and cannot drive the alternator at adequate speed. At higher RPM, the slippage becomes less significant and the alternator produces full output. Belt inspection and replacement addresses this common issue.

26. A — A 0.2-volt drop on an alternator ground circuit is at the upper limit but within acceptable specification. Maximum acceptable voltage drop on charging circuit grounds is typically 0.2 volts under full current. This reading indicates the ground is marginally acceptable; readings higher than 0.2 volts require investigation and repair to restore full charging system performance.

27. B — Modern computer-controlled charging systems intentionally vary voltage based on operating conditions. A reduction to 13.2 volts during highway cruise is normal adaptive behavior when the BCM determines the battery is fully charged and reduced voltage protects it from overcharging. A scan tool confirms this is commanded behavior, preventing unnecessary alternator replacement.

28. C — HID (xenon) bulb ballasts generate an ignition pulse of 15,000 volts or higher to strike the initial arc between the electrodes. Once the arc is established, the ballast drops to the sustaining AC voltage (typically 85-95 V). The high-voltage ignition is essential for arc initiation and is why HID systems require fully de-energizing before service.

29. A — Skin oils transferred during handling create thermal stress concentration points on the halogen bulb's glass envelope, causing cracking and premature failure. Always handle halogen bulbs by the base or with a clean cloth. If accidental contact occurs, clean the glass with isopropyl alcohol before installation — this removes the oils and allows normal service life.

30. D — A dual-filament bulb (such as the common 1157 or 2057 bulb) has two separate filaments in the same glass envelope. One filament operates at lower brightness for the tail light circuit; the other operates at full brightness for the brake light circuit. This allows a single bulb to serve both functions through separate electrical inputs to each filament.

31. A — Daytime Running Lights typically operate the headlight filaments at reduced voltage (around 60-70% of normal voltage), producing dimmer output than high beams while still being visible in daylight conditions. Some implementations use dedicated DRL lamps or operate fog lights at reduced intensity. The dimmer output provides daytime visibility without the full glare of normal headlights.

32. C — A CHMSL that is not functioning while the two main brake lights work normally isolates the fault to the CHMSL-specific circuit. The brake light switch, main fuse, and brake signal are all working correctly. A failed CHMSL bulb, damaged wiring to the CHMSL, or a failed CHMSL connector are the likely specific causes.

33. B — LED bulbs draw substantially less current than halogen bulbs of the same function. Thermal or electronic flashers interpret this lower current as a burned-out bulb condition, accelerating the flash rate to alert the driver. The fix is either an LED-compatible flasher module, a load-resistor kit to simulate original halogen current, or an OEM-style LED assembly designed to work with the vehicle's existing flasher.

34. D — If the scan tool shows correct temperature data from the sensor but the cluster displays incorrect information, the data source is correct but something in the cluster's processing or display is faulty. This isolates the problem to the cluster itself — either internal processing errors, display driver issues, or firmware problems. Cluster repair or replacement is typically required.

35. A — A warning lamp that fails to illuminate during the key-on bulb check indicates the lamp itself or its driver circuit has failed. The bulb check briefly illuminates each lamp to verify it is functional. A non-lighting lamp confirms a lamp-circuit fault. This is distinct from a lamp that stays illuminated after bulb check, which indicates a fault in the system being monitored.

36. D — HUD-equipped vehicles require a special windshield with a wedge-shaped PVB inner layer that prevents ghost imaging. A standard replacement windshield reflects the projected image from both inner and outer glass surfaces, creating a double or "ghost" image. This is the most common cause of HUD ghosting after windshield service and requires the correct HUD-compatible glass to fix.

37. C — Modern instrument clusters receive vehicle speed as a network message, typically broadcast by the ABS module that reads wheel speed sensors. The ABS module calculates vehicle speed from wheel rotation data and transmits it on the CAN bus, where the cluster receives it and renders the speedometer display. This centralized architecture replaced mechanical speed cables and dedicated analog sensors.

38. B — Modern clusters store immobilizer authentication data that must match other vehicle modules. A replacement cluster not properly programmed to the vehicle is rejected by the immobilizer, which denies the engine-enable signal and prevents starting. Programming or pre-programmed cluster supply is required on modern vehicle cluster replacement; a simple physical swap alone is insufficient.

39. A — A shorted wire between the sending unit and the cluster may produce a signal the cluster interprets as a full tank continuously. When the wire is shorted to the signal reference or battery voltage, the cluster reads this as the condition indicating "full." Testing the wire for continuity to ground or battery voltage identifies the specific short location.

40. B — A window that operates from one switch but not another isolates the fault to the non-working switch's circuit. The motor, regulator, and master switch wiring are all functional since the master switch works. A defective passenger door switch or broken wiring between the switch and the door control module is the most likely cause.

41. C — Modern pinch protection monitors motor current through the H-bridge driver during up-travel. An obstruction causes a sudden current spike that the module detects, immediately reversing motor direction to prevent injury. This function is federally mandated on auto-up windows and protects occupants from pinching hazards. Current monitoring is the most practical and responsive sensing method.

42. B — 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 wipers. Cleaning the windshield in the sensor area resolves this common nuisance complaint without any repair to the system itself.

43. A — The lock actuator responds to fob commands, confirming the actuator, wiring, and module output are all functional. A separate switch input path isn't reaching the module. A defective interior switch or broken wiring between the switch and the door module is the most likely cause. Testing the switch output with a voltmeter at the module input identifies the specific fault.

44. D — A defogger grid has multiple parallel horizontal traces; one broken trace disables only that one line while others continue operating normally. A voltmeter walking along the broken trace locates where voltage drops abruptly from battery voltage to zero. Small breaks can be repaired with silver-ceramic paint kits; larger damage requires glass replacement.

45. C — Every SRS requires a manufacturer-specified disabling procedure including battery disconnection and a waiting period (typically 1-10 minutes) for deployment-energy capacitors to discharge. Accidental airbag deployment during service causes severe injury. Scanning DTCs or disconnecting only the airbag connector is not sufficient; the full system must be de-energized before physical service on any SRS component.

46. A — Squib connectors include a mechanical shorting bar that automatically shorts 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 airbag deployment. When the connector reconnects, the bar retracts to allow normal operation. This is a critical safety feature.

47. B — The occupant classification system must be calibrated after any service involving the passenger seat — cushion replacement, cover changes, sensor repair, or mat replacement. Uncalibrated systems can misclassify occupants (child as adult or empty as occupied), making dangerous airbag deployment decisions. This safety-critical calibration must be performed before returning the vehicle to service.

48. D — Gateway module failures affect message translation between network types, causing multiple seemingly unrelated modules to lose communication with each other. Symptoms appear across systems that don't share obvious functional connections — cluster, infotainment, climate, and safety systems can all exhibit issues simultaneously. Recognizing this pattern quickly saves significant diagnostic time on complex vehicles.

49. C — A healthy high-speed CAN bus uses two 120-ohm termination resistors at its physical endpoints. Measured across CAN-H and CAN-L with the ignition off, these two resistors appear in parallel, giving a combined reading of approximately 60 ohms. This measurement is a fundamental CAN diagnostic check; significant deviation indicates missing or shorted terminators or wire faults.

50. A — The U0101 code specifically indicates lost communication with the transmission control module. U-codes (network family) identify communication faults; each specific number points to a particular module. Multiple U-codes across many modules often indicate bus-level faults; a single U0101 suggests the TCM is offline, in bus-off state, or has lost its network connection.