PRACTICE EXAM 14: ASE A6 SIMULATION (50 QUESTIONS)

1. A technician measures voltage across a 6-ohm resistor and reads 9 volts. The current flowing through the resistor is:

A. 0.67 amperes during operation

B. 1.5 amperes through the circuit

C. 54 amperes at steady state

D. 15 amperes of draw

2. Technician A says that in a series circuit, current is the same through every component. Technician B says that in a series circuit, voltage is the same across every component. Who is correct?

A. Both A and B, both principles apply to series

B. Technician B only, voltage is shared equally

C. Neither, both statements are incorrect entirely

D. Technician A only; current is identical in series

3. A wire color code of "BK" on a schematic represents:

A. A solid black wire with no tracer marking

B. A blue wire base color with tracer stripe

C. A brown wire with a black secondary marking

D. A black wire with a yellow primary stripe

4. A DMM reads 00.0 on the 12-volt DC range when connected across a known 12-volt circuit. The MOST likely cause is:

A. The test leads are inserted into the current jacks

B. The circuit is dead and needs battery replacement

C. The test leads are inserted into the current jacks

D. A broken internal fuse in the voltage measurement circuit

5. A technician observes a fault that appears when the harness is moved near a door jamb. This suggests:

A. Normal behavior of automotive wiring over time

B. A broken wire inside the insulation at the flex point

C. A software bug requiring module reprogramming

D. An EMI interference from the door module

6. Ohm's Law, when solved for current, states:

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

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

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

D. I = E + R (current equals voltage plus resistance)

7. A technician measures 0.02 volts of drop across a connection during a 5-ampere test. This reading indicates:

A. A completely broken connection requiring replacement

B. Excessive resistance in the connection joint

C. An overcharging voltage regulator in the alternator

D. A healthy low-resistance connection within specification

8. A zener diode in an automotive circuit is used to:

A. Amplify small signals to drive larger current loads

B. Convert AC voltage from the alternator to DC for battery charging

C. Maintain a constant voltage across itself in reverse breakdown mode

D. Provide one-way current flow from the battery to the load

9. A circuit breaker differs from a fuse primarily because it:

A. Opens at a lower current threshold than a fuse

B. Resets automatically or manually after a fault

C. Is made of different materials than a standard fuse

D. Has no current rating specification printed on it

10. A soldered electrical splice inside heat-shrink tubing with an adhesive liner provides:

A. Mechanical connection with environmental sealing integrity

B. Protection against only mechanical stress with no sealing

C. Signal amplification for low-voltage sensors

D. Reduced resistance compared to original factory wiring

11. Kirchhoff's voltage law states that:

A. The sum of voltage drops around a closed loop equals the source voltage

B. Current entering a node equals the current leaving that node

C. Power is proportional to current squared times resistance

D. Resistance is inversely proportional to conductor area

12. A technician is using a lab scope to diagnose a fuel injector. A large voltage spike appears when the injector is turned off. This spike is caused by:

A. A failed driver transistor shorting to battery voltage

B. A low battery voltage insufficient to power the circuit

C. The collapsing magnetic field inducing voltage in the coil

D. The engine control module's PWM signal reaching peak

13. A conductor's resistance decreases when:

A. Its length is increased significantly at the same gauge

B. Its cross-sectional area is increased at the same length

C. The surrounding temperature rises above ambient levels

D. The voltage applied to the circuit is raised

14. A flooded lead-acid battery reading 12.6 volts at rest is:

A. Approximately 25 percent state of charge

B. Over-charged, requiring immediate attention

C. Approximately 50 percent state of charge

D. Fully charged at 100 percent capacity

15. An AGM battery is different from a conventional flooded battery because:

A. Electrolyte is absorbed into fiberglass mats between plates

B. It produces higher voltage output at normal conditions

C. It cannot be charged with any conventional smart charger

D. The plates are made of aluminum instead of lead oxide

16. A conductance tester indicates a battery's CCA is 400, while the rated CCA is 700. The battery:

A. Is within normal specifications for its age

B. Has exceeded its original performance level

C. Is fully charged but undersized for the vehicle

D. Has significantly degraded and requires replacement

17. Before performing a parasitic draw test on a modern vehicle, the technician should:

A. Disconnect the alternator from the charging circuit

B. Fully discharge the battery for accurate readings

C. Allow the vehicle to sleep for at least 30 minutes

D. Remove all fuses from the main fuse panel

18. The correct jumper cable connection sequence is:

A. Negative to dead vehicle first, then positive to good

B. Positive to dead, positive to good, negative to good, ground on dead

C. Both positives first, then both negatives simultaneously

D. Any sequence that matches battery polarity correctly

19. Cold Cranking Amperes (CCA) is measured at:

A. 0°F for 30 seconds while maintaining 7.2 volts

B. 70°F under normal shop temperature conditions

C. 32°F for 15 seconds at half the rated capacity

D. −40°F for extreme cold weather operation

20. A starter cranking current that is twice its rated specification indicates:

A. A weak battery limiting starter performance during cranking

B. A normal condition for starting under heavy load

C. Starter internal binding or shorted windings causing excess draw

D. An overcharged battery forcing excessive current flow

21. Battery registration on a modern vehicle with BCM-controlled charging is required because:

A. The battery's warranty is activated at registration

B. Federal law mandates battery documentation for all replacements

C. The BCM's charging strategy must be updated for the new battery

D. The BCM must verify the battery's physical dimensions

22. A battery load test requires maintaining:

A. Above 9.6 volts for 15 seconds at 70°F to pass

B. Above 12 volts for 30 seconds under half-rated load

C. Below 10.5 volts to ensure realistic stress on the battery

D. A constant 14.4 volts throughout the test period

23. A starter solenoid performs two simultaneous functions: switching high current to the motor and:

A. Timing the fuel injection pulse for smooth starting

B. Activating the neutral safety switch for gear protection

C. Regulating the voltage supplied to the ignition system

D. Mechanically engaging the pinion with the flywheel ring gear

24. A starter that engages but produces a whining sound without cranking the engine indicates:

A. A completely discharged battery preventing engagement

B. A failed overrunning clutch or broken pinion assembly

C. A shorted armature winding in the starter motor

D. A failed voltage regulator causing low output

25. The voltage regulator in a modern alternator controls output by:

A. Switching between single-phase and three-phase operation

B. Changing the drive belt ratio at the alternator pulley

C. Adjusting the main output terminal voltage directly

D. Varying the current through the rotor field winding

26. Excessive AC ripple measured at the battery terminals indicates:

A. One or more failed rectifier diodes in the alternator

B. A drive belt slipping under electrical load

C. A fully charged battery no longer accepting current

D. An overcharging voltage regulator at low RPM

27. A voltage drop test across the alternator B+ cable during charging reads 0.9 volts. This reading indicates:

A. Normal cable resistance well within specification

B. A failed voltage regulator in the alternator

C. Excessive resistance in the charging cable or terminations

D. An overcharging condition in the system

28. A computer-controlled charging system may command lower voltage during periods of:

A. Engine cranking when battery needs maximum charge

B. Stable highway cruise with a fully charged battery

C. Cold engine warm-up requiring maximum output

D. Heavy electrical loads from headlights and accessories

29. HID headlights require approximately how long to reach full brightness?

A. Less than 100 milliseconds from activation

B. 2 to 5 minutes for complete stabilization

C. 30 to 60 seconds for warm-up to complete

D. 10 to 30 seconds for the arc to fully establish

30. A halogen bulb installed with bare fingers contacting the glass envelope is likely to:

A. Operate at normal brightness for its specified lifetime

B. Produce a different color temperature than specified

C. Fail prematurely due to thermal stress points from skin oils

D. Cause electromagnetic interference with vehicle electronics

31. The Center High-Mount Stop Lamp (CHMSL) is required by:

A. Individual state motor vehicle inspection regulations

B. SAE International recommended practice J2012

C. Vehicle manufacturer-specific design standards

D. Federal Motor Vehicle Safety Standard 108

32. A turn signal on one side flashes at twice the normal rate. This symptom indicates:

A. A failed hazard flasher relay affecting both sides

B. A burned-out turn signal bulb on the fast-flashing side

C. An open circuit in the brake light wiring system

D. A short to ground in the dome light circuit

33. Daytime Running Lights (DRLs) typically operate by:

A. Using reduced voltage on the headlights for visibility without glare

B. Flashing intermittently during engine operation for visibility

C. Switching headlights on only when ambient light drops below a threshold

D. Operating at full brightness equivalent to high beams always

34. A modern instrument cluster's speedometer displays vehicle speed based on:

A. A mechanical cable driven from the transmission output shaft

B. A direct analog signal from the vehicle speed sensor

C. A network message broadcast by the ABS module via CAN

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

35. A warning lamp that illuminates during engine operation but extinguishes upon ignition cycle indicates:

A. A stored fault that has been cleared by the cycle

B. A normal bulb check sequence has completed successfully

C. The cluster's dimmer has failed causing intermittent display

D. A momentary voltage drop affecting cluster operation

36. A fuel level gauge reads full despite the tank being nearly empty. The sending unit's resistance checks correct at both extremes. The MOST likely cause is:

A. A loose battery ground connection at the chassis

B. An overcharged alternator affecting cluster operation

C. A fuel pressure regulator limiting the fuel flow

D. The instrument cluster's internal fuel gauge circuit

37. A head-up display (HUD) shows a clear primary image with a ghost image above it. The MOST likely cause is:

A. A weak projector lamp requiring replacement

B. A standard replacement windshield installed on the HUD-equipped vehicle

C. Software corruption in the HUD control module

D. A dirty windshield where the HUD is projected

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

A. A blown fuse during the replacement procedure itself

B. The battery was discharged during the installation work

C. A disconnected harness at the cluster electrical connector

D. The cluster has not been programmed to the immobilizer

39. A driver information center (DIC) displays incorrect outside air temperature while the scan tool shows the correct sensor value. The fault is MOST likely in:

A. The outside air temperature sensor hardware itself

B. The wiring between the sensor and the BCM input

C. The DIC's internal data reception or display processing

D. The BCM's signal conditioning for the sensor input

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

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

B. A completely failed window motor requiring replacement

C. A discharged battery affecting only the door switch

D. A blown fuse for the entire power window circuit

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

A. Monitoring motor current for a spike caused by obstruction

B. Using infrared sensors across the window opening path

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

D. Measuring force on the glass through a piezoelectric sensor

42. A rain-sensing wiper system detects precipitation using:

A. Piezoelectric sensors measuring raindrop impact on the glass

B. Ultrasonic sensors detecting surface moisture content levels

C. Infrared optical sensors measuring total internal reflection changes

D. Humidity sensors in the cabin air intake for HVAC system

43. A horn that sounds weakly compared to normal is MOST likely caused by:

A. A completely failed horn requiring replacement

B. Voltage drop in the horn circuit wiring or connections

C. A stuck horn button at the steering wheel

D. Low battery voltage affecting all vehicle electrical functions

44. A remote keyless entry fob operates only at close range but not at the typical distance. The MOST likely cause is:

A. Defective radio receiver in the vehicle's RKE module

B. An unsynchronized rolling code between fob and vehicle

C. Radio frequency interference from nearby cellular towers

D. A weak or depleted battery inside the key fob

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

A. The defogger relay supplying power to the entire grid

B. The dashboard defogger switch and its indicator lamp

C. The specific broken horizontal trace on the glass surface

D. The body control module timer logic for the defogger

46. Before performing service on any SRS component, the technician MUST:

A. Scan the SRS module for DTCs with ignition on first

B. Disconnect the battery and wait the manufacturer-specified time

C. Remove the steering wheel to access the clock spring safely

D. Discharge the SRS capacitors manually through the squib connector

47. A squib connector in the SRS system includes a shorting bar that:

A. Measures squib resistance during normal SRS operation cycles

B. Provides low-resistance ground reference for module testing

C. Reduces electromagnetic interference from the squib wiring harness

D. Automatically shorts the squib wires when disconnected to prevent deployment

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

A. 60 ohms, representing two parallel 120-ohm terminators

B. 120 ohms, representing a single terminator in the bus

C. 240 ohms, representing both terminators in series

D. 30 ohms, representing three terminators in parallel

49. A gateway module in a modern vehicle is responsible for:

A. Storing all diagnostic trouble codes from every module

B. Distributing 12-volt power to body electrical systems

C. Translating messages between different vehicle network types

D. Terminating the CAN bus at both its physical endpoints

50. A U0100 diagnostic trouble code typically indicates:

A. A power supply fault in the body control module

B. Lost communication with the engine control module

C. A calibration fault in the instrument cluster hardware

D. A high-voltage condition detected on the CAN bus

Practice Exam 14: Answer Key and Explanations

1. B — Applying Ohm's Law, I = E ÷ R, so 9 volts ÷ 6 ohms = 1.5 amperes. This calculation determines current flow when voltage and resistance are known. Fluency with the three rearrangements of Ohm's Law is fundamental for virtually every automotive electrical diagnostic scenario on the A6 exam.

2. D — In a series circuit, current is identical through every component because all components share a single path. Voltage, however, divides among the components based on their resistance — voltage is

NOT the same across every component. Technician A is correct; Technician B is wrong. Understanding this distinction is essential for series circuit analysis.

3. A — The wire color code "BK" standing alone represents a solid black wire with no tracer marking. When two letters separated by a slash appear (like "BK/YE"), the first is the base color and the second is the tracer. Understanding this notation is essential for reading automotive schematics and identifying wires correctly.

4. C — A DMM reading 00.0 on the voltage range with leads in the current jacks creates a near-short circuit condition. The meter effectively shunts the voltage being measured, producing a reading of zero volts. This is one of the most common DMM operating errors and can blow the meter's internal current fuse. Always verify probe placement before measurement.

5. B — A circuit that responds to physical movement of wiring near flex points (door jambs, hinges) indicates a broken wire inside the insulation at the flex point. The copper conductors fatigue from repeated flexing and break while the insulation remains intact. This is a common failure mode that requires harness inspection and repair.

6. A — Ohm's Law solved for current is $I = E \div R$ (current equals voltage divided by resistance). The three forms of Ohm's Law are $E = I \times R$, $I = E \div R$, and $R = E \div I$. Fluency with rearranging this equation to solve for any unknown is essential for virtually every automotive electrical diagnostic calculation.

7. D — A 0.02-volt drop at 5 amperes indicates approximately 0.004 ohms of resistance — well within normal specification for a healthy connection. Acceptable voltage drop for automotive connections is typically under 0.1 volts at operating current. This reading confirms the connection is providing reliable low-resistance contact.

8. C — 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 in automotive electronics. Understanding zener behavior is essential for diagnosing protection and regulation circuits.

9. B — Circuit breakers reset automatically (thermal-type) or can be reset manually after a fault condition, unlike fuses which must be physically replaced after opening. Breakers are often used where

nuisance trips are possible or where access to the fuse panel is inconvenient. Understanding this functional difference helps select appropriate protection for specific applications.

10. A — Heat-shrink tubing with an adhesive liner combines crimp mechanical connection with thermoplastic environmental sealing when heated. The adhesive flows and seals against moisture intrusion, producing a splice suitable for underhood and exposed locations. This provides both mechanical protection and environmental sealing in a single component.

11. A — Kirchhoff's voltage law states that the sum of voltage drops around any closed loop equals the source voltage. Each component absorbs a portion of the source voltage, and these individual drops must sum exactly to the total applied voltage. This principle underlies series circuit analysis and is essential for understanding voltage distribution.

12. C — When current to an inductive load like a fuel injector is interrupted, the collapsing magnetic field induces a large voltage spike of opposite polarity — typically 60-100 volts on a fuel injector. This inductive kick is a normal characteristic of inductive switching, not a fault. Clamping diodes are often used to limit this voltage where necessary.

13. B — Resistance is inversely proportional to cross-sectional area. Increasing the wire's cross-sectional area provides more pathway for current flow, reducing resistance. This is why automotive starter cables and main power feeds use thick wire — to minimize voltage drop under heavy current load. Length and temperature both increase resistance, while area decreases it.

14. D — A flooded lead-acid battery reading 12.6 volts at rest is fully charged at 100% state of charge. The voltage-to-SOC relationship is: 12.6+ V = 100%, 12.4 V = 75%, 12.2 V = 50%, 12.0 V = 25%, below 11.9 V = essentially discharged. Surface charge must dissipate before an accurate rest voltage reading can be obtained.

15. A — AGM (Absorbed Glass Mat) 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 superior vibration resistance, spill-proof construction, and better deep-cycle performance than flooded designs.

16. D — A battery measuring only 57% of rated CCA (400 of 700) is significantly degraded and requires replacement. The typical acceptable threshold is 80% of rated CCA; 57% is well below

acceptable and indicates internal deterioration too severe for reliable service. Replacement is required; the battery cannot reliably support vehicle starting.

17. C — Parasitic draw testing requires the vehicle to be in its fully asleep state. Modern vehicles take approximately 30 minutes after shutdown for all modules to complete their shutdown sequences and enter standby mode. Testing too soon produces inflated readings that include module wake-up activity, leading to false diagnosis of excessive parasitic draw.

18. B — The correct jumper cable 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.

19. A — Cold Cranking Amperes is specified at 0°F (−17.8°C) for 30 seconds while maintaining at least 7.2 volts at the battery terminals, per SAE J537. This simulates worst-case cold-start conditions when battery chemistry is slowest and engine oil is thickest. The 7.2-volt threshold ensures sufficient voltage for ignition and fuel injection to function.

20. C — A starter drawing twice its rated current indicates starter internal damage — typically binding bushings, a dragging armature, or partial shorts in the field or armature windings. This excess draw suggests mechanical or electrical internal problems. Starter replacement is typically required; rebuilding starters is increasingly uncommon due to the availability of remanufactured units.

21. C — Battery registration informs the BCM that a new battery has been installed, allowing the BCM to update its charging strategy to match the new battery's characteristics. The BCM adapts its charging profile over time based on the installed battery; without registration, the outdated profile continues to be applied, potentially leading to improper charging and premature failure.

22. A — A battery load test per SAE J537 requires maintaining above 9.6 volts for 15 seconds at 70°F while drawing one-half the rated CCA. A reading below 9.6 volts indicates excessive internal resistance and the battery is defective. This is the standard load test specification and one of the most heavily tested procedures on the A6 exam.

23. D — The starter solenoid performs two simultaneous functions: mechanically engaging the pinion with the flywheel ring gear through a plunger mechanism, and electrically switching high battery current

to the starter motor windings. Both happen simultaneously when the ignition is turned to START. This dual-function design makes the solenoid essential to starter operation.

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

25. D — 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 enables voltage regulation independent of RPM and load conditions.

26. A — A healthy alternator produces less than 100 millivolts of AC ripple at the battery terminals. Excessive AC ripple 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 excess ripple damages other vehicle electronics.

27. C — A 0.9-volt drop across the charging cable is excessive (typical specification is under 0.5 volts). This indicates corroded connections, damaged wire, or loose terminals causing high resistance. Many "alternator failures" are actually cable problems — voltage drop testing prevents unnecessary alternator replacement when the wiring is the actual fault.

28. B — Modern computer-controlled charging systems intentionally reduce voltage during stable highway cruise with a fully charged battery. This conserves fuel by reducing alternator load and protects the battery from overcharging. Understanding this adaptive behavior prevents unnecessary alternator replacement when the system is simply operating within its programmed strategy.

29. D — HID bulbs require 10-30 seconds to reach full brightness because the metal halide salts inside must vaporize and the arc must fully establish before the bulb operates at rated output. This warm-up period is normal and inherent to HID technology, not a fault. LED and halogen technologies reach full brightness much faster.

30. C — Skin oils transferred during handling create thermal stress concentration points on halogen bulb glass envelopes, causing premature failure. This is the single most common cause of early halogen bulb

failure. Proper installation technique — handling by base or with clean cloth, and cleaning any finger contact with isopropyl alcohol — prevents this problem.

31. D — The Center High-Mount Stop Lamp (CHMSL) is required by Federal Motor Vehicle Safety Standard (FMVSS) 108, which regulates all vehicle exterior lighting and signaling. CHMSL has been required on all U.S. passenger cars since 1986 as a safety measure to reduce rear-end collisions by providing an additional brake signal to following drivers.

32. B — A fast-flashing turn signal on one side is the flasher circuit's deliberate fault indicator, designed to alert the driver that one of the turn signal bulbs on that side has failed. The reduced current load from the burned-out bulb triggers the flasher to accelerate its flash rate. Replacing the failed bulb on the fast-flashing side restores normal flash rate.

33. A — Daytime Running Lights typically operate the headlight filaments at reduced voltage (around 60-70% of normal voltage), producing dimmer output than full headlights while providing daytime visibility. 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.

34. C — Modern instrument clusters receive vehicle speed as a network message 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 cables.

35. A — A warning lamp that illuminates, then extinguishes after an ignition cycle, indicates a stored fault that has been cleared by the cycle. Some intermittent faults may not set DTCs immediately but still trigger warning lamps. Using a scan tool to check for pending or stored DTCs is essential before assuming the fault is resolved.

36. D — If the sending unit tests correctly and wiring is intact, but the cluster displays incorrect values, the fault must be in the cluster itself. Modern clusters include internal electronic processing of fuel gauge signals that can fail independently of external components. Cluster repair or replacement is typically required to address these internal electronic failures.

37. B — 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 the characteristic "ghost" double image. Replacement with the correct HUD-compatible glass is the only fix for this problem.

38. D — 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. C — If the scan tool shows correct data from the sensor but the DIC displays incorrect information, the data is reaching the DIC correctly but something in its internal processing or display has failed. This isolates the problem to the DIC itself. The sensor and upstream modules are functioning; the DIC's internal electronics are the fault.

40. A — A window that operates from one switch but not from 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 door control module is the most likely cause.

41. A — 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. C — Rain-sensing wiper systems use infrared optical sensors that measure changes in total internal reflection from the windshield. Water droplets on the outer glass surface reduce the reflected signal, and the sensor interprets this as precipitation, commanding wiper activation. This is the dominant rain-sensing technology on modern vehicles and requires a clean windshield for proper operation.

43. B — Reduced horn volume indicates voltage drop somewhere in the horn circuit — corroded ground, degraded wire, or failing switch contacts. Voltage drop testing from the 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; wiring and grounds are typically the cause.

44. D — A fob working at close range but failing at longer distances is the classic signature of a weak battery. The transmitter output is reduced, shortening effective range progressively. This is the simplest

and most common RKE complaint; battery replacement almost always restores normal range. Try this before proceeding to receiver or programming diagnosis.

45. C — 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.

46. B — 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, removing the steering wheel, or manually discharging is not sufficient — the full system must be de-energized through proper battery disconnect.

47. D — 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.

48. A — 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 is a fundamental CAN diagnostic check; significant deviation indicates missing, damaged, or shorted terminators.

49. C — Gateway modules translate messages between different network types — 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 protocols could not coordinate their systems. Gateway failures produce widespread symptoms across apparently unrelated systems.

50. B — The U0100 code specifically indicates lost communication with the engine 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 U0100 suggests the ECM is offline, in bus-off state, or has lost its network connection.