PRACTICE EXAM 11: RED SEAL 310S SIMULATION (125 QUESTIONS)

1. Technician A says the WHMIS skull-and-crossbones pictogram identifies a substance that is highly flammable. Technician B says the same pictogram identifies a substance that may cause acute toxic effects from a single exposure (potentially fatal). Who is correct?

A. Only Technician A is correct

B. Only Technician B is correct

C. Both Technicians are correct

D. Neither Technician is correct

2. A cylinder head bolt torque specification reads: "Step 1: 30 Nm in sequence. Step 2: 60 Nm in sequence. Step 3: 90° in sequence." The "90°" in Step 3 refers to:

A. The angle the wrench handle is from horizontal during tightening

B. Tightening until the bolt strips, then backing off 90°

C. The acceptable variance from torque specification during installation

D. Torque-to-yield angle — each bolt is turned an additional 90° after the previous torque step

3. Technician A says when reading a Vernier outside micrometer in inches, the main scale and thimble reading are added together (e.g., 0.250" + 0.013" = 0.263"). Technician B says the Vernier scale on the same micrometer is graduated in tenths of an inch. Who is correct?

A. Only Technician A is correct

B. Only Technician B is correct

C. Both Technicians are correct

D. Neither Technician is correct

4. A close friend asks the technician to perform a brake job at the shop after hours, off the books, using shop facilities and parts. The technician should:

A. Agree if the friend pays cash directly to the technician

B. Agree if the friend brings their own parts to install

C. Decline because using shop facilities and parts without authorization is unethical and against shop policy

D. Decline only if the shop owner is in the building at the time

5. Technician A says a compressed gas cylinder received from the supplier without a protective cap can be placed in service immediately. Technician B says any compressed gas cylinder should be inspected on receipt for damage, proper labelling, and a protective cap, and rejected if any are deficient. Who is correct?

A. Only Technician A is correct

B. Only Technician B is correct

C. Both Technicians are correct

D. Neither Technician is correct

6. Technician A says a Class B (or BC) fire extinguisher is appropriate for an engine-compartment fire involving gasoline. Technician B says a Class A water extinguisher is appropriate for the same fire. Who is correct?

A. Only Technician A is correct

B. Only Technician B is correct

C. Both Technicians are correct

D. Neither Technician is correct

7. Technician A says the most effective hazard control is requiring workers to wear PPE such as gloves, glasses, and respirators. Technician B says the most effective hazard control is administrative controls such as posted warnings, training, and shift rotations. Who is correct?

A. Only Technician A is correct

B. Only Technician B is correct

C. Both Technicians are correct

D. Neither Technician is correct

8. A torque specification of 100 Nm converts to approximately:

A. 7.4 ft-lb (multiply Nm by 0.0738)

B. 7.4 in-lb (multiply Nm by 0.0738)

C. 74 ft-lb (multiply Nm by 0.738)

D. 740 ft-lb (multiply Nm by 7.38)

9. Technician A says when transporting waste oil and used coolant to a recycling facility, the shipment must comply with TDG regulations including shipping documents, proper containers, and placarding above quantity thresholds. Technician B says small-quantity transports of waste fluids between shop locations are exempt from all TDG requirements regardless of quantity. Who is correct?

A. Only Technician A is correct

B. Only Technician B is correct

C. Both Technicians are correct

D. Neither Technician is correct

10. A compression test on a 6-cylinder engine shows: Cyl 1: 165, Cyl 2: 170, Cyl 3: 90, Cyl 4: 95, Cyl 5: 168, Cyl 6: 172 psi. Technician A says the readings indicate worn rings in cylinders 3 and 4. Technician B says the readings most likely indicate a blown head gasket between adjacent cylinders 3 and 4. Who is correct?

A. Only Technician A is correct

B. Only Technician B is correct

C. Both Technicians are correct

D. Neither Technician is correct

11. An engine vacuum gauge connected to the intake manifold shows a steady, low reading of approximately 12 in-Hg at idle (normal range 17-22 in-Hg). The most likely cause is:

A. A clogged catalytic converter restricting exhaust flow only

B. A defective MAP sensor reading incorrectly to the PCM

C. An open thermostat allowing too much coolant flow during operation

D. A vacuum leak, late ignition timing, or worn piston rings reducing manifold vacuum

12. The Positive Crankcase Ventilation (PCV) system:

A. Vents crankcase gases directly to the atmosphere through a breather tube

B. Pressurizes the crankcase to improve oil distribution to bearings

C. Routes crankcase blow-by gases back to the intake manifold to be re-burned, while admitting filtered air to ventilate the crankcase

D. Drains liquid contaminants from the oil pan during oil changes

13. Technician A says a stretched timing chain can set a P0008 or P0017 correlation DTC because the camshaft position no longer matches the crankshaft position within the PCM's tolerance window. Technician B says a stretched timing chain produces only an audible rattle and never sets a DTC. Who is correct?

A. Only Technician A is correct

B. Only Technician B is correct

C. Both Technicians are correct

D. Neither Technician is correct

14. Technician A says an oil pressure sending unit produces a digital signal that the gauge reads directly. Technician B says an oil pressure sending unit varies its electrical resistance (or generates an analog voltage) proportional to oil pressure, with the gauge or PCM interpreting the change. Who is correct?

A. Only Technician A is correct

B. Only Technician B is correct

C. Both Technicians are correct

D. Neither Technician is correct

15. Technician A says any 50/50 antifreeze can be added to any cooling system as long as the freezing point is correct. Technician B says coolant types (IAT, OAT, HOAT) can be safely mixed if the colour matches. Who is correct?

A. Only Technician A is correct

B. Only Technician B is correct

C. Both Technicians are correct

D. Neither Technician is correct

16. A cooling system pressure test holds 15 psi for 5 minutes, then drops to 8 psi over the next 5 minutes. No external leaks are visible. The most likely cause is:

A. A failed radiator cap unable to hold pressure during operation

B. A failed thermostat allowing pressure bypass through the radiator

C. An internal leak (head gasket, cracked head, or block) letting pressure escape into a cylinder or oil galleries

D. A failed water pump weeping coolant past the shaft seal during the test

17. A vehicle is brought in with the complaint of intermittent engine overheating. The technician's FIRST diagnostic step should be:

A. Verify cooling system coolant level, condition, and inspect for external leaks before performing further testing

B. Replace the thermostat as preventive maintenance regardless of inspection findings

C. Replace the water pump because most overheating complaints involve the water pump

D. Disconnect the temperature gauge wiring to determine whether the gauge itself is faulty

18. Technician A says diesel injection timing is mechanically advanced or retarded by the driver using a dashboard control. Technician B says diesel injection timing on a modern common-rail engine is electronically controlled by the PCM based on engine RPM, load, temperature, and emissions targets. Who is correct?

A. Only Technician A is correct

B. Only Technician B is correct

C. Both Technicians are correct

D. Neither Technician is correct

19. A port-injection fuel system specification reads "key on, engine off: 55-62 psi; idle: 45-50 psi." The drop in pressure between key-on and idle indicates:

A. A failing fuel pump that cannot maintain pressure under no-load

B. A blocked fuel filter restricting flow at idle only

C. A normal pressure specification for a returnless fuel system at all times

D. Normal operation of a vacuum-referenced fuel pressure regulator, which lowers fuel pressure by the amount of manifold vacuum

20. Technician A says a Hall-effect crankshaft position sensor produces a digital (on/off) signal as the trigger teeth pass the sensor. Technician B says a magnetic reluctance crankshaft position sensor produces a digital square-wave output. Who is correct?

A. Only Technician A is correct

B. Only Technician B is correct

C. Both Technicians are correct

D. Neither Technician is correct

21. Technician A says the catalyst monitor compares the upstream and downstream O2 sensor signals. Technician B says a healthy catalyst causes the downstream O2 sensor to show much less switching activity than the upstream sensor. Who is correct?

A. Only Technician A is correct

B. Only Technician B is correct

C. Both Technicians are correct

D. Neither Technician is correct

22. Technician A says serpentine belt tension is set by the technician's feel — approximately 12 mm of deflection at midpoint. Technician B says belt tension on a modern serpentine belt is maintained automatically by a spring-loaded tensioner, which the technician verifies is operating within its range markers. Who is correct?

A. Only Technician A is correct

B. Only Technician B is correct

C. Both Technicians are correct

D. Neither Technician is correct

23. Technician A says a turbocharger should be replaced if a small amount of oil residue is found in the intake tract after the intercooler. Technician B says shutting down a hot turbocharged engine immediately after high-speed driving has no effect on turbo life because modern engines have automatic shutdown delays. Who is correct?

A. Only Technician A is correct

B. Only Technician B is correct

C. Both Technicians are correct

D. Neither Technician is correct

24. A vehicle has a stored P0420 (Catalyst System Efficiency Below Threshold, Bank 1). The technician verifies the upstream O2 sensor is switching normally and there are no exhaust leaks. The most likely cause is:

A. A failed (aged or contaminated) catalytic converter that has lost its oxygen storage capacity

B. A loose gas cap that has allowed an EVAP leak to trigger the code

C. A faulty MAF sensor reading incorrect airflow

D. Low fuel pressure causing a lean condition unrelated to the catalyst

25. Technician A says passive DPF regeneration occurs naturally when exhaust temperatures are high enough, typically during sustained highway driving. Technician B says active DPF regeneration is initiated by the PCM, which injects extra fuel to raise exhaust temperature and burn off accumulated soot. Who is correct?

A. Only Technician A is correct

B. Only Technician B is correct

C. Both Technicians are correct

D. Neither Technician is correct

26. Technician A says a hydraulic valve lifter requires periodic adjustment with feeler gauges. Technician B says a hydraulic valve lifter automatically takes up clearance using engine oil pressure and requires no manual adjustment. Who is correct?

A. Only Technician A is correct

B. Only Technician B is correct

C. Both Technicians are correct

D. Neither Technician is correct

27. A spark plug installation specification reads "Tighten to 25 Nm (18 ft-lb) using a torque wrench." The technician should:

A. Tighten plugs as tight as possible by hand and check for leaks

B. Use an impact wrench at low setting to ensure consistent torque

C. Tighten without a torque wrench, since spark plugs are self-sealing

D. Use a torque wrench set to the manufacturer's specification, as overtightening damages threads and undertightening allows combustion leaks

28. Technician A says when the knock sensor detects pre-ignition or detonation, the PCM retards ignition timing to eliminate the knock. Technician B says when the knock sensor detects detonation, the PCM enriches the fuel mixture to add octane to the chamber. Who is correct?

A. Only Technician A is correct

B. Only Technician B is correct

C. Both Technicians are correct

D. Neither Technician is correct

29. An engine has a bore of 100 mm and a stroke of 90 mm. The displacement of a single cylinder is approximately:

A. 90 cc using the formula bore × stroke directly

B. 314 cc using the formula $\pi \times \text{bore} \times \text{stroke}$

C. 707 cc using the formula $(\pi/4) \times \text{bore}^2 \times \text{stroke}$

D. 9,000 cc using the formula $\text{bore}^2 \times \text{stroke}$

30. A vehicle overheats only in stop-and-go traffic but operates normally at highway speed. The most likely cause is:

A. A stuck-closed thermostat preventing coolant circulation

B. A failed electric cooling fan (motor, relay, or PCM control) that does not run when needed at low vehicle speed

C. A clogged radiator that cannot dissipate heat at highway speed only

D. A weak water pump that fails only at high RPM operation

31. Technician A says a misfire that occurs only under heavy acceleration with high MAP is most often caused by weak ignition (coil, plug) or fuel delivery insufficient at high load. Technician B says a misfire only under heavy load is most often caused by a vacuum leak. Who is correct?

A. Only Technician A is correct

B. Only Technician B is correct

C. Both Technicians are correct

D. Neither Technician is correct

32. A scope shows high-speed CAN-H and CAN-L wires at rest (recessive state). The expected voltage on both wires is approximately:

A. CAN-H at 5.0 V, CAN-L at 0 V

B. CAN-H at 0 V, CAN-L at 5.0 V

C. CAN-H at 12 V, CAN-L at 0 V

D. CAN-H and CAN-L both at approximately 2.5 V (the wires sit at the same recessive level until a dominant bit drives them apart)

33. Technician A says stable battery voltage during module reprogramming is critical because a brownout can leave the module unrecoverable. Technician B says OEM software (not generic scan tools) must be used for most reprogramming events. Who is correct?

A. Only Technician A is correct

B. Only Technician B is correct

C. Both Technicians are correct

D. Neither Technician is correct

34. On the SAE J1962 OBD-II Data Link Connector, pin 4 carries:

A. Battery positive (B+) supply to the scan tool

B. Chassis ground reference for the scan tool

C. CAN-H signal for high-speed CAN communication

D. K-line signal for ISO 9141 communication

35. Technician A says when multiple DTCs are present, the technician should diagnose codes in priority order, generally starting with hard codes from circuits that may cause other codes to set. Technician B says all DTCs should always be cleared first, then re-driven and re-read to determine which return. Who is correct?

A. Only Technician A is correct

B. Only Technician B is correct

C. Both Technicians are correct

D. Neither Technician is correct

36. A wiring diagram shows a network with a single wire connecting a master module to several slave devices (window switches, sunroof switch, mirror control). The data rate is approximately 20 kbps. This network is most likely:

A. High-speed CAN running at 500 kbps with a single-wire fault-tolerant fallback mode

B. FlexRay running in single-wire mode for compatibility

C. MOST optical network using a single fiber-optic cable

D. LIN (Local Interconnect Network), a single-wire master-slave bus for slow body electronics

37. A scan tool shows the following live data at idle: Engine RPM 750, MAP 100 kPa, MAF 2 g/s, ECT 90°C, IAT 25°C. The MAP reading of 100 kPa indicates:

A. The engine is running at maximum boost from a turbocharger

B. The MAP sensor is reading wide-open throttle when it should be reading idle

C. The MAP sensor is showing atmospheric pressure, suggesting the sensor is unplugged or the engine isn't running (idle should be 30-40 kPa)

D. Normal idle MAP readings on a properly tuned engine at sea level

38. Technician A says J2534 is a proprietary scan tool brand for use only on European vehicles. Technician B says J2534 is a SAE standard that allows generic interface hardware to be used with OEM diagnostic software for reprogramming. Who is correct?

A. Only Technician A is correct

B. Only Technician B is correct

C. Both Technicians are correct

D. Neither Technician is correct

39. With the vehicle battery disconnected, the technician measures resistance between CAN-H and CAN-L at the DLC. A healthy high-speed CAN should read approximately:

A. 60 ohms (the two 120-ohm terminating resistors in parallel)

B. 120 ohms (a single terminating resistor across the network)

C. Open circuit (the network has no resistance until energized)

D. Less than 1 ohm (a short circuit indicates a healthy network)

40. Technician A says a module that has entered the CAN bus-off state must always be replaced because the fault is permanent. Technician B says the bus-off state automatically clears after several minutes of operation without any intervention. Who is correct?

A. Only Technician A is correct

B. Only Technician B is correct

C. Both Technicians are correct

D. Neither Technician is correct

41. A gateway module in a modern vehicle's electrical architecture:

A. Stores all customer-specific configuration data including radio presets and seat positions

B. Provides the master power supply to all networked modules during operation

C. Routes messages between different vehicle networks (HS-CAN, LS-CAN, LIN, FlexRay) and filters unauthorized messages

D. Manages only the infotainment system's connection to the cellular network

42. OBD-II Mode 06 (also called Mode $06 in many scan tools) provides:

A. Generic vehicle information including VIN, calibration ID, and emissions readiness flags

B. On-board monitor test results: measured values, limits, and pass/fail status for each emissions monitor

C. Stored Diagnostic Trouble Codes (DTCs) for the current ignition cycle only

D. Pending DTCs that have failed a single drive cycle but not yet matured to confirmed codes

43. Technician A says a healthy high-speed CAN waveform on a scope shows CAN-H pulsing upward from the recessive level and CAN-L pulsing downward by an equal amount, producing a mirror-image differential signal. Technician B says a healthy CAN waveform shows both wires pulsing upward together with no differential signalling. Who is correct?

A. Only Technician A is correct

B. Only Technician B is correct

C. Both Technicians are correct

D. Neither Technician is correct

44. Technician A says clutch pedal free play (the slight slack at the top of the pedal stroke) should be eliminated by adjusting until the pedal has zero free play. Technician B says clutch pedal free play is determined by mechanical adjustments at the pedal cable on all modern manual transmissions. Who is correct?

A. Only Technician A is correct

B. Only Technician B is correct

C. Both Technicians are correct

D. Neither Technician is correct

45. Technician A says grinding only when shifting into reverse (with the vehicle stopped) is normal because most manual transmissions have no synchronizer on reverse gear. Technician B says grinding when shifting forward gears suggests worn synchronizer rings or insufficient clutch disengagement. Who is correct?

A. Only Technician A is correct

B. Only Technician B is correct

C. Both Technicians are correct

D. Neither Technician is correct

46. A vehicle's manual transmission clutch is slipping under heavy load. To verify the slip, the technician should:

A. Listen for unusual sounds from the bell housing during normal driving

B. With parking brake applied, release the clutch in 3rd gear at light throttle; if RPM rises with no movement, the clutch slips

C. Drive the vehicle at highway speed and check the speedometer for accuracy

D. Measure clutch pedal travel with a tape measure during operation

47. Technician A says ATF that is dark brown or black with a burned smell typically indicates the transmission has been overheated and may have internal damage. Technician B says ATF that smells burned is normal for any transmission with over 80,000 km, and a simple fluid change will restore normal operation. Who is correct?

A. Only Technician A is correct

B. Only Technician B is correct

C. Both Technicians are correct

D. Neither Technician is correct

48. In a torque converter, the function of the stator (centre element with one-way clutch) is to:

A. Drive the transmission input shaft directly from the engine

B. Pump transmission fluid for the hydraulic control circuit

C. Convert the engine's rotational motion into linear motion for the gear shift

D. Redirect fluid leaving the turbine back toward the impeller in a direction that multiplies torque at stall

49. A differential ring gear has 41 teeth and the pinion gear has 11 teeth. The final drive ratio is:

A. 11:1 (ring teeth divided by pinion teeth equals 11)

B. 4.10:1 (sum of teeth divided by 10)

C. 3.73:1 (ring teeth divided by pinion teeth: $41 \div 11 \approx 3.73$)

D. 11:41 (pinion teeth to ring teeth, expressed as a ratio)

50. Technician A says a whining noise that changes pitch with vehicle speed on both acceleration and deceleration is caused only by a worn pinion bearing in the differential. Technician B says the same noise may come from worn ring-and-pinion gears or worn carrier bearings and requires further inspection to isolate the source. Who is correct?

A. Only Technician A is correct

B. Only Technician B is correct

C. Both Technicians are correct

D. Neither Technician is correct

51. Technician A says a Haldex-style AWD coupling uses an electronically controlled wet clutch pack to engage rear-wheel drive on demand. Technician B says a Haldex coupling uses a viscous fluid coupling with no electronic control. Who is correct?

A. Only Technician A is correct

B. Only Technician B is correct

C. Both Technicians are correct

D. Neither Technician is correct

52. A driveshaft is being balanced after replacement. The technician notices a slight vibration at 80 km/h that disappears at 100 km/h. The proper action is to:

A. Replace the driveshaft assembly because vibrations cannot be corrected by balancing

B. Lubricate the slip yoke and rebalance, since slip yoke binding is the cause

C. Tighten the U-bolts on each end of the driveshaft until the vibration disappears

D. Use an electronic vibration analyzer to locate the imbalance and apply weights at the calculated position; verify across the speed range

53. Technician A says a torn outer CV joint boot allows grease to escape and contaminants to enter, leading to joint failure if not repaired promptly. Technician B says a clicking noise when turning sharply is a classic symptom of a worn outer CV joint on a FWD vehicle. Who is correct?

A. Only Technician A is correct

B. Only Technician B is correct

C. Both Technicians are correct

D. Neither Technician is correct

54. The slip yoke at the front of a rear-wheel-drive driveshaft:

A. Requires no lubrication because it has integral roller bearings

B. Is lubricated by transmission fluid through the rear extension housing, plus grease at U-joint service via the slip yoke fitting on many designs

C. Should be packed with chassis grease at every oil change

D. Is sealed for life and never requires lubrication during the vehicle's service life

55. Technician A says transfer case fluid type varies by manufacturer and model; using the wrong type can cause damage. Technician B says any 80W-90 gear oil is acceptable in all transfer cases regardless of design. Who is correct?

A. Only Technician A is correct

B. Only Technician B is correct

C. Both Technicians are correct

D. Neither Technician is correct

56. On a two-piece driveshaft (or a driveshaft with two U-joints), U-joint phasing refers to:

A. The angular relationship between the propeller shaft and the differential pinion

B. The vibration frequency of the U-joint during operation

C. The timing of the U-joint's grease passages during rotation

D. The angular orientation of the two U-joints (yokes in the same plane) so each joint's speed variation cancels the other

57. Technician A says a synchronizer in a manual transmission uses a hydraulic apply mechanism to engage the gear. Technician B says a synchronizer uses friction (between the synchronizer ring and the matching cone on the gear) to match input and output speeds before engagement teeth interlock. Who is correct?

A. Only Technician A is correct

B. Only Technician B is correct

C. Both Technicians are correct

D. Neither Technician is correct

58. A leaking pinion seal on a typical solid-axle differential is replaced by:

A. Disassembling the differential to access the seal from the inside

B. Splitting the axle housing along the parting line for access

C. Marking the pinion nut position, removing driveshaft and nut, replacing the seal, then re-installing the nut to its original position (or specified preload)

D. Replacing the entire differential housing because the seal is not separately serviceable

59. A differential ring-and-pinion specification lists "backlash 0.005-0.008 in." The technician's reading is 0.012 in. The correct action is to:

A. Adjust carrier bearing shims (or threaded adjusters) to move the ring gear toward the pinion, decreasing backlash to within specification

B. Replace the ring-and-pinion set because the backlash is out of specification

C. Reduce the pinion depth shim to move the pinion closer to the ring gear

D. Accept the reading as within tolerance because backlash specifications are flexible

60. Technician A says a transmission filter is permanent and should never be replaced during normal service. Technician B says a transmission filter is replaced only when the transmission is overhauled, not during routine fluid service. Who is correct?

A. Only Technician A is correct

B. Only Technician B is correct

C. Both Technicians are correct

D. Neither Technician is correct

61. Technician A says a battery load test should be performed with the battery at any state of charge to evaluate condition. Technician B says a battery load test requires the battery to be at full charge, then loaded at half the CCA rating for 15 seconds, observing that voltage remains above 9.6 V. Who is correct?

A. Only Technician A is correct

B. Only Technician B is correct

C. Both Technicians are correct

D. Neither Technician is correct

62. A wiring diagram shows a wire labelled "RD/BK 18 GA" connecting two components. This identifies:

A. A red wire 18 inches long with a black insulation jacket

B. A red wire with a black current-carrying capacity of 18 amperes

C. A wire with red insulation and a black tracer stripe, 18 American Wire Gauge

D. An 18-gauge wire carrying 18 amperes of black-channel current

63. Technician A says a voltage drop test must be performed with the circuit operating under normal load to reveal resistance that doesn't appear in an open-circuit ohms check. Technician B says a voltage drop test is performed with the circuit disconnected from the battery. Who is correct?

A. Only Technician A is correct

B. Only Technician B is correct

C. Both Technicians are correct

D. Neither Technician is correct

64. A vehicle exhibits slow cranking, with battery voltage of 12.6 V at rest but cranking voltage dropping to 9.0 V. The starter draws 250 A during cranking (specification: 150-180 A). The most likely cause is:

A. A weak battery that cannot support the cranking current despite normal rest voltage

B. Excessive resistance in the starter cable causing high voltage drop

C. A worn ring gear on the flywheel slipping during cranking

D. A worn starter motor (worn bushings, brushes, or shorted armature) drawing excessive current

65. A charging system test under heavy electrical load (headlights, blower on high, rear defrost on) shows battery voltage of 12.3 V at 2,000 RPM. The most likely cause is:

A. A weak battery that has lost charge despite the alternator output

B. The alternator is failing to produce sufficient output under load (spec is 13.5-14.7 V at the battery)

C. The accessory loads are excessive for any alternator to support

D. Normal alternator operation; voltage at the battery should be 12.3 V during heavy loads

66. An alternator output specification lists "Rated 130 A at 2,000 alternator RPM." The technician should test:

A. The alternator's voltage output only, since current is not specified for testing

B. The alternator's mechanical drive speed only

C. The alternator's full-load output using a carbon-pile or shop tester, comparing to rated output at the equivalent engine RPM

D. The battery's load capacity, not the alternator itself

67. Technician A says a starter that draws above specification typically has internal wear (brushes, bushings, armature) or excessive engine drag. Technician B says a starter that draws below specification has internal wear and should be replaced. Who is correct?

A. Only Technician A is correct

B. Only Technician B is correct

C. Both Technicians are correct

D. Neither Technician is correct

68. A customer reports headlights that flicker intermittently, particularly when the engine is warm. The most likely cause is:

A. A failing battery that cannot supply steady current to the headlights

B. A defective headlight bulb that arcs intermittently during operation

C. A faulty headlight switch that has worn contacts

D. A poor ground at the headlight harness or chassis (heat expands corroded connections and loses contact)

69. Technician A says a parasitic draw test is performed immediately after disconnecting the battery and reading current within seconds. Technician B says a parasitic draw test is performed with the meter in series with the battery negative cable after waiting the manufacturer's specified sleep time (typically 20-60 minutes) for modules to go to sleep. Who is correct?

A. Only Technician A is correct

B. Only Technician B is correct

C. Both Technicians are correct

D. Neither Technician is correct

70. Before connecting an A/C recovery machine to a vehicle, the technician should:

A. Add UV dye to the system to verify leaks before recovery

B. Disconnect the battery to prevent electrical damage during recovery

C. Use a refrigerant identifier to verify the system contains pure refrigerant (a contaminated mix would damage the recovery machine and contaminate the shop's recovery tank)

D. Recover the refrigerant first, then identify what was in the system after recovery

71. Technician A says modern A/C systems should be charged by weight using a recovery/recharge machine to the manufacturer's specification (e.g., 600 g). Technician B says A/C systems should be charged by adding refrigerant until the low-side pressure reaches a standard 30 psi regardless of vehicle or ambient temperature. Who is correct?

A. Only Technician A is correct

B. Only Technician B is correct

C. Both Technicians are correct

D. Neither Technician is correct

72. A vehicle has a sweet smell inside the cabin, fogging on the inside of the windshield, and wet carpet on the passenger side floor. The most likely cause is:

A. A failed cabin air filter contaminated with mould

B. A leaking heater core dripping coolant inside the HVAC case and onto the floor

C. A condenser drain tube blockage allowing condensate inside the cabin

D. A failed windshield washer reservoir leaking into the cabin

73. A power window operates slowly in both directions and occasionally stalls. The current draw at the window motor is 12 A (spec 4-6 A). The most likely cause is:

A. A weak battery unable to supply current to the window motor circuit

B. A defective window switch with high resistance contacts

C. A failed BCM commanding too high a voltage to the motor

D. A worn regulator (binding, broken cable, damaged track) increasing the mechanical load on the motor

74. Technician A says HVAC blend door actuators are typically diagnosed by scan tool bidirectional commands, observing whether the actuator moves and reports position. Technician B says a failed HVAC actuator can be heard as a clicking or tapping noise behind the dashboard. Who is correct?

A. Only Technician A is correct

B. Only Technician B is correct

C. Both Technicians are correct

D. Neither Technician is correct

75. A typical cabin air filter on most vehicles is located:

A. Behind the glove box, accessible by releasing the glove box from its stops, with the filter sliding out of a frame in the HVAC case

B. Under the hood near the cowl, replaced with the wiper arms removed for access

C. Inside the engine air intake manifold, requiring intake removal for replacement

D. In the trunk near the rear bumper, requiring trim removal for access

76. Technician A says A/C refrigerant must be recovered (not vented to atmosphere) using approved recovery equipment, regardless of refrigerant type. Technician B says the technician must hold a valid refrigerant handling certification (e.g., the Canadian ODSWAS card) to perform A/C service. Who is correct?

A. Only Technician A is correct

B. Only Technician B is correct

C. Both Technicians are correct

D. Neither Technician is correct

77. An A/C compressor clutch cycles on and off rapidly (3-5 times per minute) during operation. The most likely cause is:

A. Normal operation of a variable-displacement compressor at low load

B. Low refrigerant charge, causing the low-pressure cut-out switch to disengage the clutch repeatedly as pressure dips below threshold

C. A failed compressor clutch coil drawing intermittent current

D. A failed cabin temperature sensor commanding the compressor on and off

78. Technician A says a blower motor that operates only on the highest speed setting has a failed blower motor relay. Technician B says the same condition is caused by a failed thermostat in the cooling system. Who is correct?

A. Only Technician A is correct

B. Only Technician B is correct

C. Both Technicians are correct

D. Neither Technician is correct

79. On a hot day (35°C ambient), an A/C system's high-side pressure reads 450 psi at idle with the system on. The most likely cause is:

A. Overcharged refrigerant, restricted condenser airflow (failed fan, debris), or non-condensable gases in the system

B. Normal high-side pressure for hot weather operation at any RPM

C. Undercharged refrigerant causing the compressor to overheat

D. A failed evaporator allowing refrigerant to escape internally

80. Technician A says a broken rear defroster grid line can be repaired with a conductive paint repair kit. Technician B says the broken grid line can be located by measuring voltage along the grid; voltage drops to zero at the break point. Who is correct?

A. Only Technician A is correct

B. Only Technician B is correct

C. Both Technicians are correct

D. Neither Technician is correct

81. A power seat does not operate and the fuse is blown. After replacing the fuse, it blows again immediately when the seat switch is pressed. The most likely cause is:

A. A weak battery unable to support the seat motor current draw

B. A short circuit in the seat motor, switch, or wiring (the immediate fuse failure indicates a high-current short to ground)

C. A failed seat memory module commanding excessive current

D. Normal operation that requires a higher-amperage fuse than originally installed

82. Technician A says factory-installed remote start systems are designed to start the engine and immediately put the transmission in drive when the driver enters the vehicle. Technician B says aftermarket remote start systems bypass all factory safety interlocks (clutch, brake, gear position) without consequences. Who is correct?

A. Only Technician A is correct

B. Only Technician B is correct

C. Both Technicians are correct

D. Neither Technician is correct

83. A TPMS warning lamp illuminates after rotating the tires on a vehicle with direct (sensor-based) TPMS. The technician's next action should be:

A. Perform a TPMS relearn per manufacturer specification (manual with magnet/tool, or automatic by driving above a threshold speed)

B. Replace all four TPMS sensors as they have been disturbed by the rotation

C. Clear the TPMS DTC and the lamp will extinguish during normal driving

D. Reset the BCM by disconnecting the battery for 30 minutes

84. Technician A says brake pad thickness should be measured at the thinnest point of the pad friction material. Technician B says when one pad on an axle is significantly more worn than the other, the caliper slide pins or piston should be inspected for binding. Who is correct?

A. Only Technician A is correct

B. Only Technician B is correct

C. Both Technicians are correct

D. Neither Technician is correct

85. A brake rotor measures 22.5 mm thick. The rotor's specifications stamped on the hub read "MIN TH 23.0 mm." The technician should:

A. Machine the rotor and reinstall, since the rotor is within machining limits

B. Replace the rotor because it is below minimum thickness; machining is not permitted at or below this dimension

C. Reuse the rotor without machining because the wear is below the warning threshold only

D. Sand the rotor surface lightly and reinstall to restore the friction surface

86. Technician A says brake fluid is hygroscopic (absorbs moisture from the air) and should be replaced periodically (typically every 2-3 years) to maintain its boiling point and prevent component corrosion. Technician B says brake fluid never requires replacement unless the brakes are serviced. Who is correct?

A. Only Technician A is correct

B. Only Technician B is correct

C. Both Technicians are correct

D. Neither Technician is correct

87. Technician A says the brake bleeding sequence is the same for all vehicles: right rear, left rear, right front, left front. Technician B says the bleeding sequence doesn't matter as long as all four wheels are bled. Who is correct?

A. Only Technician A is correct

B. Only Technician B is correct

C. Both Technicians are correct

D. Neither Technician is correct

88. A floating brake caliper's slide pins require:

A. Engine oil for proper movement during operation

B. Brake fluid because the pins are part of the hydraulic system

C. High-temperature silicone caliper grease designed for slide pins (does not soften rubber boots and tolerates brake heat)

D. White lithium grease available from any auto parts supply

89. A vehicle's rear brakes produce a high-pitched squeal only when the brakes are not applied and the vehicle is moving. The most likely cause is:

A. Glazed brake pads with reduced friction coefficient at the rotor

B. The brake pad mechanical wear indicator (squealer) contacting the rotor, indicating the pads are at the replacement threshold

C. A failed master cylinder allowing brake fluid bypass

D. A seized caliper preventing the pad from releasing from the rotor

90. Technician A says an active wheel speed sensor (Hall-effect type) produces a digital square-wave signal whose frequency increases with wheel speed. Technician B says a passive wheel speed sensor (magnetic reluctance type) produces a constant DC voltage proportional to wheel speed. Who is correct?

A. Only Technician A is correct

B. Only Technician B is correct

C. Both Technicians are correct

D. Neither Technician is correct

91. Electronic Brakeforce Distribution (EBD) is a function of the ABS system that:

A. Increases braking force at all four wheels equally during heavy braking

B. Reduces braking force at all four wheels to prevent ABS activation

C. Distributes braking force based on the load on each wheel, replacing the mechanical proportioning valve in many modern systems

D. Adjusts brake force between front, rear, and sides based on wheel speed and load transfer during braking, providing optimal stopping without lock-up

92. Technician A says positive camber tilts the top of the wheel outward when viewed from the front of the vehicle. Technician B says toe-in describes wheels whose front edges point inward toward the vehicle's centerline. Who is correct?

A. Only Technician A is correct

B. Only Technician B is correct

C. Both Technicians are correct

D. Neither Technician is correct

93. A vehicle pulls strongly to the right during straight-ahead driving on a level road. The technician verifies tire pressures and tire condition are equal. The most likely cause is:

A. Excessive positive caster on both front wheels equally

B. Unequal camber (right front more positive than left) causing pull toward the wheel with more positive camber

C. Excessive toe-in on both front wheels equally

D. A failed power steering pump providing inconsistent assist

94. Technician A says tire pressure should be measured cold (before driving) because tire pressure rises with temperature during operation. Technician B says tire pressure should always be measured hot, immediately after driving, because that's when the tire is "at operating condition." Who is correct?

A. Only Technician A is correct

B. Only Technician B is correct

C. Both Technicians are correct

D. Neither Technician is correct

95. A tire sidewall reads "P225/65R17 102 H." The "102" indicates:

A. The tire's age in months from the date of manufacture

B. The maximum tire pressure in psi during operation

C. The tire's tread depth in 32nds of an inch when new

D. The tire's load index (102 = 850 kg / 1,874 lb max load per tire at rated pressure)

96. A vehicle has a vibration at 100 km/h in the steering wheel. The technician removes the front wheels for balancing. The wheels balance correctly on a static balance check but the vibration persists. The technician should:

A. Replace the wheels with new ones because the imbalance cannot be corrected

B. Replace the tires because they have an internal defect that cannot be balanced

C. Perform a dynamic (two-plane) balance, which detects imbalance on both inner and outer planes (static balance is single-plane)

D. Lower the tire pressure to reduce the vibration during operation

97. Technician A says a shock absorber that bounces more than 3 times after a deflection during a bounce test is operating normally. Technician B says a shock absorber that bounces more than 1.5 cycles after a deflection during a bounce test is worn and should be replaced. Who is correct?

A. Only Technician A is correct

B. Only Technician B is correct

C. Both Technicians are correct

D. Neither Technician is correct

98. A stabilizer (anti-roll/anti-sway) bar's function in the suspension is to:

A. Connect the left and right suspension components and resist body roll during cornering by transferring force between the sides

B. Absorb impact from road bumps similar to a shock absorber

C. Support the vehicle's weight as the primary spring element

D. Provide steering input from the driver to the front wheels

99. Technician A says a MacPherson strut assembly can be safely disassembled without a coil spring compressor when the spring force is low enough. Technician B says the strut spring can be released by removing the top mount nut without compressing the spring first. Who is correct?

A. Only Technician A is correct

B. Only Technician B is correct

C. Both Technicians are correct

D. Neither Technician is correct

100. A load-bearing ball joint on a SLA (Short-Long Arm) suspension is inspected by:

A. Driving the vehicle at highway speed and listening for noise

B. Removing the ball joint and measuring its dimensions with a micrometer

C. Lifting the vehicle so suspension hangs unloaded, then using a pry bar to check ball joint vertical play within specification

D. Visual inspection only, without removing the wheel

101. Technician A says a worn sway bar end link is detected by spinning the wheel and observing for play. Technician B says a worn sway bar end link causes a humming noise at highway speed. Who is correct?

A. Only Technician A is correct

B. Only Technician B is correct

C. Both Technicians are correct

D. Neither Technician is correct

102. After a wheel alignment, the vehicle drives straight but the steering wheel is off-center (turned about 5° to the right). The most likely cause is:

A. Front and rear toe specifications were not corrected during the alignment

B. Caster on the right front wheel is incorrect, causing the wheel to be off-center

C. Toe adjustments at the tie rods were not equalized; one side adjusted more than the other, leaving the steering off-center even though total toe is correct

D. The alignment rack is not level, causing inaccurate measurements

103. Technician A says no calibration is required after EPS rack replacement; the system self-calibrates during the first drive. Technician B says EPS calibration (often including a steering angle sensor zero-point calibration) is required after EPS rack replacement, alignment, or steering wheel removal, performed with a scan tool per the manufacturer's procedure. Who is correct?

A. Only Technician A is correct

B. Only Technician B is correct

C. Both Technicians are correct

D. Neither Technician is correct

104. A typical tire rotation pattern for a FWD vehicle with non-directional tires is:

A. Side-to-side only (left to right and right to left on both axles)

B. Front to rear only on the same side (left front to left rear, etc.)

C. Rotate front tires to the same-side rear position, and rear tires to the opposite-side front position

D. Rotate fronts straight to the rear; rear tires cross to the opposite-side front position (the "forward cross" pattern is also acceptable)

105. Technician A says a worn wheel bearing produces a humming or growling noise that changes pitch with vehicle speed but not with engine load. Technician B says a worn wheel bearing produces a clicking noise only when turning sharply. Who is correct?

A. Only Technician A is correct

B. Only Technician B is correct

C. Both Technicians are correct

D. Neither Technician is correct

106. During a routine inspection, the technician finds a brake hose with surface cracks visible when the hose is bent slightly. The proper action is to:

A. Apply heat-resistant tape over the cracks to extend the hose life

B. Replace the hose only if the cracks are accompanied by visible fluid weeping

C. Replace the hose because surface cracking indicates internal degradation; a hose can fail internally (collapse, leak, burst) even with minor cracks

D. Lubricate the hose with brake assembly lube to soften the rubber

107. Technician A says a deployed airbag module can be safely reinstalled in the vehicle if it appears undamaged. Technician B says a deployed airbag is the only component requiring replacement after deployment; the SDM (sensing and diagnostic module) is reusable. Who is correct?

A. Only Technician A is correct

B. Only Technician B is correct

C. Both Technicians are correct

D. Neither Technician is correct

108. A vehicle's SRS warning lamp is illuminated, but a quick scan shows no current DTCs. The most likely cause is:

A. A normal startup self-test that has not yet completed during the diagnostic time

B. A stored DTC in history that has not yet been cleared after a previous repair (or a fault in the lamp circuit itself)

C. A failed airbag module that needs replacement immediately

D. Normal operation; the SRS lamp is supposed to stay on at all times

109. Technician A says a seat belt pretensioner that has deployed must be replaced along with the seat belt webbing assembly. Technician B says pretensioner replacement requires an SRS waiting period (typically several minutes after disconnecting the battery) before working on the system. Who is correct?

A. Only Technician A is correct

B. Only Technician B is correct

C. Both Technicians are correct

D. Neither Technician is correct

110. A vehicle's driver door is misaligned: the latch contacts the striker too low, causing the door to drop when opened. The proper repair is to:

A. Replace the door because alignment cannot be corrected

B. Bend the door to align with the body using a hydraulic press

C. Loosen the door hinge bolts (or shims), reposition for proper alignment, re-tighten; adjust the striker if needed

D. Replace the latch assembly because the latch is the most common source of misalignment

111. Technician A says sunroof drain tubes route rainwater that enters the sunroof tracks to outlets at the corners of the vehicle (typically behind the front fenders and through rocker panels to the rear). Technician B says sunroof drain tubes are not present on factory sunroofs; water is sealed out by the rubber seal alone. Who is correct?

A. Only Technician A is correct

B. Only Technician B is correct

C. Both Technicians are correct

D. Neither Technician is correct

112. A power convertible top operates erratically and sometimes binds. The hydraulic fluid level is correct. The most likely cause is:

A. A failed battery unable to support the top motor current draw

B. A worn hydraulic pump, failing actuator cylinder, or aged seals causing inconsistent operation

C. A failed convertible top fabric stretching the system geometry

D. Normal operation; convertible tops always have some erratic behaviour

113. Technician A says windshield replacement requires no calibration of ADAS systems on modern vehicles. Technician B says urethane windshield adhesive cures in approximately 30 minutes regardless of conditions, allowing the vehicle to be released immediately. Who is correct?

A. Only Technician A is correct

B. Only Technician B is correct

C. Both Technicians are correct

D. Neither Technician is correct

114. A power outside mirror does not move in the vertical direction but moves left/right normally. The most likely cause is:

A. A failed mirror switch with no operation on any axis

B. A failed BCM no longer commanding the mirror

C. A failed vertical-axis motor inside the mirror assembly; the horizontal motor and circuitry are unaffected

D. A blown fuse in the mirror circuit causing all directions to fail

115. During collision repair, structural body measurements are taken at specific control points to:

A. Compare the damaged vehicle's dimensions to manufacturer specifications, ensuring structure is restored within tolerance for alignment, crash performance, and safety operation

B. Determine the colour of the original paint for repainting purposes

C. Measure the tire pressures of all four wheels during repair

D. Calculate the vehicle's curb weight for shipping requirements

116. Technician A says a trunk lid gas strut should be replaced only if both sides have completely failed and the lid will not stay open at all. Technician B says trunk gas struts should be replaced in pairs because a single new strut paired with a worn one applies uneven force and stresses the trunk hinges. Who is correct?

A. Only Technician A is correct

B. Only Technician B is correct

C. Both Technicians are correct

D. Neither Technician is correct

117. Technician A says HV battery service on a hybrid or EV requires Class 0 (rated to 1,000 V) insulated gloves that have been inspected and air-tested, plus periodic recertification (typically every 6 months). Technician B says the HV system must be de-energized (manual service disconnect removed, contactors commanded open, and voltage verified with a Cat III/IV meter) before any service work begins. Who is correct?

A. Only Technician A is correct

B. Only Technician B is correct

C. Both Technicians are correct

D. Neither Technician is correct

118. An HV system insulation resistance test (using a 500 V or 1,000 V DC megger) checks for:

A. The continuity of the high-voltage cable conductors from end to end

B. The voltage output of the HV battery pack under load

C. The state of charge of the HV battery

D. Leakage current between HV conductors and chassis (the IMD measures this continuously; high insulation resistance prevents shock hazard)

119. Technician A says regenerative braking on a hybrid/EV operates by reversing the direction of the traction motor's electrical power to drive the wheels backward. Technician B says regenerative braking uses the traction motor as a generator (driven by the wheels during deceleration), converting kinetic energy back to electrical energy and charging the HV battery. Who is correct?

A. Only Technician A is correct

B. Only Technician B is correct

C. Both Technicians are correct

D. Neither Technician is correct

120. The traction motor inverter on a typical EV is cooled by:

A. A dedicated liquid coolant loop (water/glycol or dielectric coolant) circulating through the inverter housing, removing heat from the switching power semiconductors

B. Passive air cooling only, with no active cooling system

C. The vehicle's air conditioning refrigerant routed through the inverter

D. The engine's coolant (only for hybrid vehicles, not BEVs)

121. A wall-mounted residential EV charger that supplies AC power at 240 V, 32 amperes through a J1772 connector is classified as:

A. Level 1 charging (120 V household outlet at 12-16 A typically)

B. Level 3 DC fast charging (DC output direct to battery)

C. Level 4 ultra-fast charging (300 kW+)

D. Level 2 AC charging (240 V at currents typically 16-80 A through J1772 or NACS connector)

122. Technician A says HV cables on a hybrid/EV are typically green to indicate ground reference. Technician B says HV cables on a hybrid/EV are typically yellow to indicate high voltage warning. Who is correct?

A. Only Technician A is correct

B. Only Technician B is correct

C. Both Technicians are correct

D. Neither Technician is correct

123. On a typical hybrid vehicle, the 12V auxiliary battery powers:

A. The vehicle's low-voltage electronics (lights, BCM, infotainment, modules), with the HV-to-12V DC-DC converter keeping it charged from the HV battery

B. The traction motor directly through a separate cable

C. The HV battery pack directly through a step-up converter

D. The regenerative braking system as the primary energy source

124. Most modern EV traction motors are:

A. Brushed DC motors with commutators, similar to industrial starter motors

B. Three-phase AC motors (permanent magnet synchronous or induction), driven by a power inverter that converts the HV battery's DC into three-phase AC

C. Single-phase AC motors running on 120 V household frequency

D. Stepper motors with discrete positioning control

125. Technician A says the Manual Service Disconnect (MSD) on a hybrid/EV physically opens the high-voltage battery circuit, electrically isolating the pack. Technician B says removing the MSD does not de-energize the inverter's DC bus capacitors immediately; the technician must wait the manufacturer-specified time and verify zero voltage before working on the system. Who is correct?

A. Only Technician A is correct

B. Only Technician B is correct

C. Both Technicians are correct

D. Neither Technician is correct

Practice Exam 11: Answer Key and Explanations

1. B — The WHMIS skull-and-crossbones pictogram identifies substances that may cause acute toxic effects from a single exposure, including potentially fatal outcomes. Tech A confuses it with the flame pictogram (used for flammables). Recognizing pictograms correctly determines what protective measures and emergency response are appropriate.

2. D — The "90°" in a torque-to-yield specification means the bolt is rotated an additional 90° after the previous torque step, stretching the bolt into its yield zone for consistent clamping force. The angle measurement is precise and repeatable across bolts, unlike torque measurements that vary with thread friction.

3. A — On an inch micrometer, the sleeve (main scale) reading is added to the thimble reading to produce the total measurement; the Vernier scale subdivides further to 0.0001 inch (ten-thousandths), not tenths of an inch. Tech B's "tenths of an inch" would make the Vernier worthless as a fine measurement aid.

4. C — Performing unauthorized work at the shop after hours bypasses the shop's quality control, parts traceability, tax reporting, and liability coverage; even with a friend, this exposes the technician to disciplinary action and creates ethical and legal problems. Off-the-books work also undermines the shop owner who provides the workspace.

5. B — Compressed gas cylinders are inspected on receipt for damage, proper labelling, and the protective cap; any deficiency is grounds for rejecting the cylinder. Installing a damaged or improperly labelled cylinder risks personnel injury and regulatory violations, so the receiving inspection is non-negotiable.

6. A — A Class B (or BC) extinguisher uses dry chemical or CO2 to smother flammable-liquid fires, which is appropriate for a gasoline engine fire. Water on gasoline would spread the fuel and the fire, which is why Class A water is reserved for ordinary combustibles like wood and paper.

7. D — The hierarchy of hazard controls from most to least effective is elimination, substitution, engineering controls, administrative controls, and PPE. Both technicians have selected controls near the bottom of the hierarchy and labelled them "most effective," so neither is correct.

8. C — Newton-metres convert to foot-pounds by multiplying by approximately 0.738, so 100 Nm × 0.738 = 73.8 ft-lb (rounded to 74). The technician needs comfortable unit conversion because torque specs appear in both units across different service information sources.

9. A — Waste oil and used coolant are regulated under TDG, requiring proper containers, shipping documents, and placarding above specified quantity thresholds when transported. Tech B's "exempt regardless of quantity" claim is incorrect; many shop transports of waste fluids cross TDG thresholds and require compliance.

10. B — Two adjacent cylinders with low compression is the signature of a head gasket failing between them, allowing pressure to transfer between cylinders during the compression stroke. Worn rings on two adjacent cylinders is statistically less likely; a wet test would confirm gasket vs. ring failure.

11. D — A steady but low vacuum reading indicates uniform compression loss across cylinders, with multiple common causes: late ignition timing reduces effective combustion pressure, exhaust restriction back-pressures the cylinders, and worn rings allow blow-by past pistons. Vacuum leaks produce similar steady-low readings when the leak is consistent.

12. C — The PCV system routes crankcase blow-by gases through the PCV valve into the intake manifold for re-combustion, while drawing filtered air into the crankcase through a separate breather. The system reduces emissions and prevents pressure buildup that would push oil past gaskets and seals.

13. A — A stretched timing chain shifts the cam position relative to the crank, and modern PCMs monitor this correlation through the CKP and CMP sensors. When the offset exceeds the calibration window, the PCM sets P0008, P0017, or similar correlation codes, often before the chain rattle is audible.

14. B — An oil pressure sender is a variable-resistance (or analog-voltage) device whose output changes proportionally to oil pressure. The gauge cluster or PCM converts that analog signal to a display value; there is no digital output from a traditional oil pressure sender.

15. D — Coolant compatibility depends on the chemical inhibitor package (IAT, OAT, HOAT), not just the freezing point or colour. Different formulations should not be mixed, since their inhibitors can react and form deposits, accelerate corrosion, or gel the coolant.

16. C — Pressure loss with no external leak points to an internal pathway: a head gasket, cracked head, or cracked block allowing pressure to escape into a cylinder, the exhaust, or the oil galleries. The cooling system pressure test isolates internal failures that can otherwise be hard to diagnose.

17. A — The first step in any overheating diagnosis is verifying coolant level, fluid condition, and inspecting for external leaks; the most common cause is simply low coolant. Replacing parts without inspection wastes the customer's money and frequently misses the actual cause.

18. B — Modern diesel injection timing is electronically controlled by the PCM based on RPM, load, ECT, IAT, MAP, and emissions targets; there is no driver-accessible mechanical timing adjustment. Older mechanical injection pumps had timing advance mechanisms, but these were internal to the pump, not driver-controlled.

19. D — A vacuum-referenced regulator subtracts manifold vacuum from rail pressure, so a system that reads 55-62 psi key-on (no vacuum) and 45-50 psi at idle (high vacuum) is operating exactly as designed. The 10-12 psi drop matches the typical 14-15 in-Hg vacuum at idle.

20. A — A Hall-effect sensor produces a digital (on/off) output as a magnetic field passes the sensing element, switching cleanly between two voltage levels. Magnetic reluctance sensors produce an analog AC sine wave whose amplitude and frequency vary with shaft speed, not a digital square wave.

21. C — The catalyst monitor compares upstream and downstream O2 sensor signals; a healthy catalyst stores oxygen, damping the rich/lean oscillation and producing a relatively flat downstream signal compared to the still-switching upstream sensor. The ratio quantifies catalyst efficiency.

22. B — Modern serpentine belts use a spring-loaded automatic tensioner that maintains the correct tension throughout the belt's service life; the technician verifies the tensioner arm is within its operating range markers. Tech A's deflection method describes an older V-belt adjustment that does not apply to spring-tensioned serpentine systems.

23. D — Small oil residue past the intercooler is typically normal carryover from the PCV system and does not require turbo replacement. Modern engines generally do not have automatic shutdown delays, and allowing a hot turbo to cool down before shutdown protects the bearings from coked oil and extends turbo life.

24. A — P0420 with a normally switching upstream O2 sensor and no exhaust leaks isolates the fault to the catalyst itself, which has lost the oxygen storage capacity that produces the damped downstream signal. Catalyst aging, contamination (from oil burning or coolant), or thermal damage are the common causes.

25. C — Passive DPF regeneration occurs naturally when exhaust temperatures rise high enough during sustained higher-load driving to oxidize accumulated soot. Active regeneration is PCM-initiated, using post-injection or an in-exhaust fuel doser to deliberately raise exhaust temperature when passive regeneration has not occurred frequently enough.

26. B — A hydraulic valve lifter contains an internal plunger that uses engine oil pressure to take up all valve train clearance automatically, eliminating the need for adjustment. Mechanical (solid) lifters require periodic adjustment because they have no internal compensation for wear or thermal expansion.

27. D — Spark plugs are torqued to the manufacturer's specification using a torque wrench; overtightening damages threads in the cylinder head (especially aluminum) while undertightening allows combustion gases to leak past the seat. Hand-tightening, impact wrenches, and assuming the plug is self-sealing all produce inconsistent and unsafe installations.

28. A — When the knock sensor detects detonation, the PCM retards ignition timing on the affected cylinder until knock disappears, then gradually re-advances toward optimal timing. Fuel enrichment does not "add octane"; that misunderstanding confuses how the engine responds to knock with how octane affects combustion in the first place.

29. C — Cylinder displacement equals $(\pi/4) \times \text{bore}^2 \times \text{stroke}$. With bore 100 mm and stroke 90 mm, the result is $0.7854 \times 10{,}000 \times 90 = 706{,}858\ \text{mm}^3 \approx 707$ cc per cylinder. The other formulas in the options produce incorrect units or relationships.

30. B — Overheating only in stop-and-go traffic with normal highway operation isolates the fault to the cooling fan system, since at highway speed ram air through the radiator provides sufficient cooling. A failed fan motor, relay, control circuit, or PCM driver allows temperature to climb only when ram air is absent.

31. A — A misfire that appears only under heavy acceleration with high MAP is the signature of weak ignition (worn plug, weak coil, secondary breakdown) or inadequate fuel delivery (low fuel pressure,

failing injector) at high load. Vacuum leaks affect idle and light-load conditions, where the unmetered air is a larger fraction of total airflow.

32. D — On high-speed CAN at rest (recessive state), both CAN-H and CAN-L sit at approximately 2.5 V — the same voltage on both wires. When a dominant bit transmits, CAN-H rises toward 3.5 V and CAN-L falls toward 1.5 V, producing the differential signal that the receivers decode.

33. C — Stable battery voltage during reprogramming prevents brownouts that can corrupt the module's flash memory and leave it unrecoverable. Most reprogramming events also require OEM software (often via J2534 pass-through), since generic scan tools do not have the signed calibration files.

34. B — Pin 4 of the J1962 OBD-II connector is chassis ground; pin 5 is signal ground, pin 16 is battery positive, and pins 6 and 14 carry CAN-H and CAN-L. The standardized pinout lets scan tools connect to any J1962-compliant vehicle without rewiring.

35. A — DTCs should be diagnosed in priority order because some codes (MAF, ECT, network communication faults) cause downstream codes (fuel trim, misfire, missing module data) that disappear when the root cause is repaired. Clearing all codes first loses freeze frame information and the prioritization context.

36. D — A single-wire, low-cost, master-slave network operating around 20 kbps for body electronics is LIN (Local Interconnect Network), used widely for window switches, sunroof switches, mirror controls, and similar non-critical functions. LIN's low cost and simple wiring make it well-suited to this duty.

37. C — MAP at idle should read approximately 30-40 kPa (corresponding to roughly 18-22 in-Hg vacuum); 100 kPa is atmospheric pressure, which means either the sensor is disconnected (defaulting to atmospheric) or the engine is not running. Live data must always be interpreted in the context of expected operating values.

38. B — J2534 is a SAE standard (originally J2534-1, with later revisions) that defines a pass-through programming interface allowing generic hardware to be paired with OEM diagnostic software for module reprogramming. It is not a proprietary brand and is not limited to European vehicles.

39. A — High-speed CAN uses two 120-ohm terminating resistors, one at each end of the bus, which appear in parallel between CAN-H and CAN-L. The parallel combination measures approximately 60 ohms with the battery disconnected, a quick check that the terminations are intact.

40. D — A module that has entered the bus-off state typically recovers after an ignition cycle, which resets its transmit error counter. Tech A's "always replace" is too aggressive, and Tech B's "automatic clear with time" is incorrect because most implementations require the power cycle.

41. C — A gateway module sits between the vehicle's networks (HS-CAN, LS-CAN, LIN, FlexRay, Ethernet) and routes messages between them according to predefined rules, while filtering or blocking unauthorized messages. The gateway also enforces cybersecurity by limiting which messages can cross between safety-critical and infotainment networks.

42. B — Mode 06 (Mode $06) returns on-board monitor test results, including the measured value, the minimum and maximum limits, and pass/fail status for each emissions-related monitor. Mode 06 is valuable for diagnosing borderline emissions faults before they mature to a confirmed DTC.

43. A — Healthy high-speed CAN signalling is differential: CAN-H pulses upward from the 2.5 V recessive level, CAN-L pulses downward by an equal amount, producing a mirror-image waveform that improves noise immunity. Both wires pulsing upward together describes a fault, not normal operation.

44. D — Some clutch pedal free play is necessary so the throw-out bearing does not ride on the pressure plate fingers continuously, which would cause premature bearing failure. Most modern manual transmissions use hydraulic clutches that self-adjust through the slave cylinder, not cable adjustments.

45. C — Reverse gear on most manual transmissions has no synchronizer, so a slight grind during reverse engagement (especially from a complete stop without a brief pause) is normal. Grinding on forward gears, by contrast, points to worn synchronizer rings, contaminated lube, or a clutch that is not fully releasing.

46. B — Confirming clutch slip requires loading the engine against the drivetrain: with the parking brake firmly applied and the transmission in 3rd or 4th gear, slowly releasing the clutch should stall the engine. If RPM rises while the vehicle remains stationary, the clutch is slipping rather than transferring engine torque to the wheels.

47. A — Dark brown or black ATF with a burned odour indicates the fluid has oxidized from sustained overheating, often a symptom that internal clutches and bands have already been heat-damaged. The technician inspects further before promising that a fluid change alone will restore normal operation.

48. D — The stator sits between the impeller and turbine on a one-way clutch and redirects the fluid leaving the turbine back toward the impeller in a direction that adds to the impeller's pumping force. The redirection multiplies engine torque during stall and acceleration, then freewheels at coupling speed.

49. C — Final drive ratio equals ring gear teeth divided by pinion gear teeth: $41 \div 11 \approx 3.73{:}1$. The ratio determines how many engine revolutions occur per wheel revolution after the transmission's selected gear ratio is applied.

50. B — A whining noise that changes with vehicle speed on both acceleration and deceleration may come from worn ring-and-pinion gears, worn carrier bearings, worn pinion bearings, or other differential components, requiring isolation through further inspection. Limiting the diagnosis to one cause (Tech A's pinion bearing) misses the alternative possibilities.

51. A — Haldex couplings use an electronically controlled wet clutch pack that engages rear-wheel drive based on inputs from wheel speed, throttle, and other sensors. The viscous coupling Tech B describes is an older, passive technology that Haldex specifically replaced.

52. D — Driveshaft imbalance is diagnosed and corrected with an electronic vibration analyzer that identifies the imbalance frequency, amplitude, and angular location, allowing the technician to apply balance weights at the correct position. Random weight placement or replacing the shaft without diagnosis often fails to resolve the imbalance.

53. C — A torn CV boot allows grease to fling out and contaminants to enter the joint, eventually destroying it; prompt boot replacement (with re-greasing) before joint damage saves the cost of joint replacement. A clicking noise when turning sharply is the classic symptom of a worn outer CV joint on a FWD vehicle.

54. B — The slip yoke splines are lubricated by transmission fluid that wets the splines as they slide in and out of the rear extension housing. Many designs add a grease fitting on the slip yoke for additional lubrication at U-joint service.

55. A — Transfer case fluid type varies significantly by manufacturer and model: some use ATF, some use specific transfer case fluids, and some use gear oils. Using the wrong fluid can cause clutch slip in viscous couplings, damaged synchronizers in some shift mechanisms, or corrosion of internal components.

56. D — U-joint phasing refers to the angular orientation of the two U-joints on a driveshaft relative to each other; the yokes should be in the same plane so the speed variation introduced by one joint is cancelled by the other. Improper phasing causes second-order driveline vibration that no amount of balancing can fix.

57. B — A synchronizer uses friction between the synchronizer ring and the matching cone on the gear to bring input and output shaft speeds together before the engagement teeth interlock. The action is purely mechanical and friction-based, not hydraulic.

58. C — Pinion seal replacement requires marking the pinion nut position (so preload is preserved), removing the driveshaft and pinion nut, prying out the old seal, installing the new one, and re-torquing the nut to the same position (or to the specified preload using new components). Disassembling the differential is not necessary.

59. A — Excess backlash is corrected by moving the ring gear toward the pinion (typically by shifting carrier bearing shims from one side to the other, or by rotating threaded carrier adjusters). The ring-and-pinion is not replaced for an out-of-spec backlash that can be adjusted, and pinion depth is set first and does not address backlash.

60. D — The transmission filter is replaced at every fluid service because it has trapped wear metal, clutch debris, and varnish from the previous service interval; reusing the filter sends accumulated debris through the new fluid. Both technicians' claims that the filter is permanent or only-at-overhaul are incorrect.

61. B — A meaningful battery load test requires the battery to be at full charge so the test evaluates the battery's capacity, not its state of charge. With the battery surface-charged, applying a load of half the CCA rating for 15 seconds and verifying voltage stays above 9.6 V is the standard procedure.

62. C — Wire labels on a typical North American wiring diagram use the format "BASE COLOUR/TRACER COLOUR GAUGE," so "RD/BK 18 GA" identifies a red-insulated wire with a black tracer stripe, 18 American Wire Gauge. Identifying the correct wire by colour code is essential for diagnosing modern multi-circuit harnesses.

63. A — A voltage drop test must be performed with the circuit operating under normal load because resistance only causes a voltage drop when current is flowing. A no-load ohms check often misses high-resistance connections that fail only when full current is demanded.

64. D — A starter drawing 250 A against a spec of 150-180 A, while the battery shows normal rest voltage, indicates the starter motor itself has internal wear — worn bushings increasing armature drag, worn brushes producing arcing, or shorted armature windings. The high draw causes the cranking voltage drop, even though the battery is healthy.

65. B — A healthy charging system produces 13.5-14.7 V at the battery under load; a reading of 12.3 V at 2,000 RPM means the alternator is not producing enough output to maintain the battery and supply the loads. The drop in voltage proves the alternator is failing under load, even if it might appear to work at no-load.

66. C — Alternator full-load testing uses a carbon-pile load tester (or equivalent shop tester) to draw the rated current at the equivalent engine RPM, with output measured at the battery terminal. The test verifies the alternator can deliver its full rated output, which a no-load voltage check cannot confirm.

67. A — A starter that draws above specification has either internal mechanical/electrical wear (brushes, bushings, armature) or external resistance from engine drag (low oil pressure, internal binding). A starter drawing below specification indicates excessive resistance in the supply circuit or weak field magnetism, not internal wear, so Tech B's claim is backwards.

68. D — Headlight flickering that worsens when the engine warms up is the classic signature of a poor ground (or other high-resistance connection) where thermal expansion of corroded surfaces breaks contact. The remedy is finding the offending connection and cleaning or repairing it; replacing the bulb or switch will not resolve a ground fault.

69. B — Parasitic draw must be measured after the vehicle's modules have entered sleep mode, which takes 20-60 minutes depending on the manufacturer's network design. Measuring immediately after the battery is reconnected captures wake-up current, not the parasitic load that drains the battery overnight.

70. C — Identifying the refrigerant in the system before recovery prevents contamination of the shop's recovery equipment and tanks, which can happen if a previous shop or owner added the wrong refrigerant or a sealer-laden "universal" product. A refrigerant identifier checks for purity in seconds before any recovery hose is connected.

71. A — Modern A/C systems are charged by weight (e.g., 400-900 g per vehicle) using a recovery/recharge machine that measures the refrigerant dispensed. Charging by pressure alone is unreliable because system pressures vary with ambient temperature, load, and refrigerant type.

72. B — A sweet smell in the cabin, fog on the inside of the windshield, and wet carpet on the passenger floor together point to a leaking heater core, with coolant escaping inside the HVAC case and dripping onto the floor. The sweet smell is from the glycol; the fog comes from coolant evaporating in the airstream.

73. D — A window motor drawing 12 A against a spec of 4-6 A is being overloaded by mechanical resistance in the regulator (binding, broken cable, debris in the track). The electrical components are functioning, but the mechanical load is excessive.

74. C — HVAC blend door actuators are diagnosed by commanding them through a scan tool and observing whether they move and report position correctly. A failed actuator often produces a tapping or clicking noise behind the dashboard as the motor strips its gear or fails to reach the commanded position.

75. A — On most modern vehicles, the cabin air filter is located behind the glove box, accessible by releasing the glove box from its stops to drop it down and exposing the filter housing built into the HVAC case. The filter slides out of a frame for replacement, typically without tools.

76. C — A/C refrigerant must always be recovered (not vented) using approved equipment, and the technician handling refrigerant must hold a valid certification (ODSWAS card in Canada, EPA Section 609 in the US). Both Technicians' statements are accurate and required for legal A/C service.

77. B — An A/C compressor clutch cycling rapidly (3-5 times per minute) indicates the low-pressure cut-out switch is opening repeatedly because system pressure dips below threshold; the most common cause is low refrigerant charge. The compressor cycles back on as pressure recovers, then off again as pressure drops, producing the rapid cycle.

78. D — A blower motor that operates only on highest speed has lost its lower-speed regulation, typically caused by a failed blower motor resistor (older bench-type systems) or a failed blower motor control module (PWM systems). Neither the blower relay nor the cooling-system thermostat is the cause of this specific symptom.

79. A — High-side pressure of 450 psi at 35°C ambient is well above the expected range and points to one of: overcharged refrigerant, restricted condenser airflow (failed fan, blocked fins, debris), or non-condensable gases in the system. Each of these causes elevated high-side pressure that can damage the compressor if not addressed.

80. C — A broken rear defroster grid line is repaired with a conductive paint kit applied across the break, and the break can be located by measuring voltage along the grid: the voltage drops to zero at the break point. Both techniques are correct and complementary procedures.

81. B — A fuse that blows immediately upon switch operation indicates a high-current short to ground in the motor, switch, or wiring downstream of the fuse. The fault current exceeds the fuse rating instantly because the circuit has near-zero resistance.

82. D — Factory remote start systems start the engine but do not engage gear; the driver must enter the vehicle and operate the gear selector before the vehicle can move. Aftermarket remote start systems, when properly installed, retain the factory safety interlocks (clutch, brake, gear position), since bypassing them creates serious safety hazards.

83. A — Direct TPMS sensors require a relearn procedure after tire rotation so the receiver associates each sensor ID with the correct wheel position. The relearn method varies (manual with a magnet or activation tool, or automatic by driving above a threshold speed for a specified time), per the manufacturer's procedure.

84. C — Brake pad thickness is measured at the thinnest point because that is what determines the remaining life of the pad; uniform measurements would miss tapered wear. Significantly unequal wear between the inner and outer pads of one caliper indicates the caliper is not floating correctly, prompting an inspection of the slide pins or piston.

85. B — A rotor that measures below the stamped minimum thickness must be replaced; machining is permitted only above the minimum-after-machining spec (which is slightly thicker than the discard thickness to leave material for in-service wear). Continuing to use a sub-minimum rotor risks heat fade, cracking, or warping under hard braking.

86. A — Brake fluid is hygroscopic, absorbing moisture from the atmosphere through hose walls and seals over time; the absorbed water lowers the fluid's boiling point and corrodes hydraulic components.

Periodic replacement every 2-3 years (or per manufacturer schedule) maintains boiling point and prevents corrosion-induced failures.

87. D — Brake bleeding sequence varies by vehicle and depends on the brake system's split type (front/rear vs. diagonal) and manufacturer specification; there is no single sequence that applies to all vehicles. The sequence absolutely does matter — bleeding in the wrong order leaves air trapped in the system.

88. C — Caliper slide pins require high-temperature silicone-based caliper grease that does not soften the rubber boots, tolerates the elevated brake temperatures, and resists washout from rain and brake fluid. Using engine oil, brake fluid, or white lithium grease leads to boot failure or pin seizure.

89. B — The high-pitched squeal heard when the brakes are not applied is produced by the mechanical wear indicator (squealer tab) contacting the rotor surface. The tab is positioned at the pad's replacement threshold; once contact begins, the pad has reached the manufacturer's minimum and should be replaced.

90. A — Hall-effect wheel speed sensors produce a digital square-wave output whose frequency rises with wheel speed; the amplitude is constant regardless of speed, making them more useful at low speeds (parking, hill-hold). Magnetic reluctance sensors produce AC voltage that varies with both speed and amplitude, not a constant DC voltage.

91. D — EBD continuously adjusts brake force between the front and rear (and on some systems side to side) based on wheel speed differences and load transfer during braking, providing optimal stopping power without lock-up. The function replaces the mechanical proportioning valve and adapts dynamically to driving conditions.

92. C — Positive camber tilts the top of the wheel outward (away from the vehicle) as viewed from the front; toe-in describes wheels whose front edges point inward toward the vehicle's centerline. Both technicians have stated the alignment definitions correctly.

93. B — A pull toward one side with equal tire pressures and condition most often indicates unequal camber between the front wheels; the wheel with more positive camber generates more lateral force toward the road's centre, pulling the vehicle that direction. Caster and toe affect different handling characteristics.

94. A — Tire pressure specifications reference the cold inflation pressure, measured before driving or after at least three hours of rest. Hot pressure readings can be 3-6 psi higher; setting hot tires to the cold spec leaves the tire underinflated when it cools.

95. D — On the tire size code "P225/65R17 102H," the 102 is the load index, and looking up 102 in the standard table gives 850 kg (1,874 lb) per tire at the rated inflation pressure. The H is the speed rating (210 km/h).

96. C — A wheel that balances correctly on a static (single-plane) check but still vibrates at speed is dynamically out of balance — there is imbalance between the inner and outer planes of the wheel that single-plane balancing cannot detect. A dynamic (two-plane) balance places weights on both faces of the wheel to correct for the offset.

97. B — A healthy shock absorber damps the suspension to fewer than 1.5 bounce cycles after a deflection; more than 1.5 cycles indicates loss of damping capacity and the shock should be replaced. The "3 bounces is normal" claim describes a failing shock and would allow a worn shock to remain in service.

98. A — A stabilizer (anti-roll) bar links the left and right suspension components and resists body roll during cornering by transferring force from the compressed side to the extended side, reducing the body's tendency to lean. It does not act as a spring or shock and has no role in steering.

99. D — MacPherson strut coil springs are under significant preload at any compressed position; releasing the top mount nut without a properly installed spring compressor can launch the spring with enough force to cause serious injury. Compressing the spring with the correct tool is mandatory regardless of how "low" the residual force appears.

100. C — A load-bearing ball joint must be inspected with the suspension unloaded (vehicle lifted so the suspension hangs free) and the joint moved with a pry bar to check for vertical play against the manufacturer's specification. With the suspension loaded, the joint preload masks worn-joint play.

101. D — Worn sway bar end link play is detected with the suspension loaded by visual inspection and by feeling for movement at the link, not by spinning the wheel. Worn end links produce a clunking or rattling noise over uneven pavement, not a humming noise at highway speed.

102. C — When total front toe is correct but the steering wheel is off-center, the toe adjustment was achieved by moving one tie rod more than the other. The correction is to equalize the tie rod adjustment so the steering wheel sits centered while keeping total toe in spec.

103. B — After EPS rack replacement, alignment, steering wheel removal, or related procedures, the EPS system typically requires a scan-tool calibration that often includes a steering angle sensor zero-point reset. Without calibration, the EPS module's reference point is wrong, which can cause assist anomalies, ESC false activations, and ADAS errors.

104. D — For FWD vehicles with non-directional tires, the typical rotation pattern moves the front tires straight back to the rear and crosses the rear tires to the opposite-side front position (X-pattern). The "forward cross" variant moves rear tires straight to the front and crosses fronts to the rear, and is also acceptable.

105. A — A worn wheel bearing produces a humming or growling noise whose pitch changes with vehicle speed but not with engine load, since the bearing rotates with the wheel. A clicking noise on sharp turns is the signature of a worn outer CV joint, not a wheel bearing.

106. C — Visible surface cracks on a brake hose indicate the rubber has degraded; even minor surface cracking points to internal degradation that can lead to hose collapse (causing brake drag), leakage, or sudden burst under pressure. The hose is replaced rather than repaired or treated.

107. D — A deployed airbag cannot be reinstalled and must be replaced with a new module; the propellant has been consumed and the bag is no longer functional. Most manufacturers also require the SDM (sensing and diagnostic module) be replaced after a deployment because it logs the crash event and may have been damaged.

108. B — An illuminated SRS lamp with no current DTCs usually points to a stored DTC in history that has not been cleared after a prior repair, or to a fault in the warning lamp circuit itself. A scan tool that reads both current and history DTCs will identify the underlying cause.

109. C — A deployed seat belt pretensioner must be replaced along with the seat belt webbing assembly (the pretensioner is integral to the retractor). SRS service also requires the manufacturer-specified waiting period after disconnecting the battery to allow the SDM capacitor to discharge before any work begins.

110. C — Door misalignment is corrected by loosening the door hinge bolts (or removing shims), repositioning the door for proper alignment with the body and striker, then re-tightening the bolts. The striker is adjusted as needed afterward to ensure proper latch engagement.

111. A — Factory sunroofs include drain tubes that route water from the sunroof's perimeter tracks to outlets at the corners of the vehicle, typically exiting behind the front fenders and through the rocker panels to the rear. Clogged drains let water back up into the cabin, so periodic clearing is part of sunroof maintenance.

112. B — An erratic power convertible top with correct hydraulic fluid level is typically caused by internal wear in the hydraulic system: a worn pump losing pressure, a failing actuator cylinder bypassing fluid, or aged rubber seals causing inconsistent operation. A failed battery would cause complete inoperation, not erratic operation.

113. D — Windshield replacement on most modern vehicles requires ADAS camera calibration (forward-facing camera mounted to the new glass), and urethane adhesive cure times vary by adhesive product and ambient conditions (typically 1-4 hours minimum drive-away time). Both technicians' claims oversimplify the procedure dangerously.

114. C — A power mirror that moves left/right but not up/down has a failed vertical-axis motor; the horizontal motor, switch, BCM, and wiring all check out because horizontal movement works. The mirror assembly is typically replaced as a unit since the motors are not separately serviceable.

115. A — Body measurements at specific structural control points are compared to the manufacturer's specifications to verify the vehicle's structure has been restored to within tolerance after collision repair. Structural alignment matters for proper panel fit, crash performance in subsequent collisions, and safety system operation (e.g., airbag sensor mounting).

116. B — Trunk gas struts should be replaced in pairs because matching a new strut with a worn one applies uneven force and stresses the trunk hinges and lid. Replacement is also done when struts cannot hold the lid in its full upright position, not only when both are completely failed.

117. C — HV service requires Class 0 insulated gloves (rated to 1,000 V) that have been inspected and air-tested before use, with periodic recertification typically every 6 months. The HV system must also be de-energized (MSD removed, contactors commanded open) and the absence of voltage verified with a Cat III/IV meter before any service work begins.

118. D — An HV insulation resistance test applies high DC test voltage (500 V or 1,000 V) and measures leakage current between the HV conductors and the vehicle chassis. The same parameter is monitored continuously by the IMD during operation; high insulation resistance prevents shock hazard from the HV system to the chassis.

119. B — Regenerative braking uses the traction motor as a generator: the wheels drive the motor during deceleration, converting kinetic energy to electrical energy that charges the HV battery. Tech A's "reverse direction" description confuses regeneration with reverse drive, which are entirely different functions.

120. A — EV traction motor inverters generate significant heat in the high-current switching semiconductors (IGBTs or SiC FETs) and require active liquid cooling — typically water/glycol coolant or a dielectric coolant — circulated through cooling channels in the inverter housing. Passive air cooling cannot remove the heat generated at full motor power.

121. D — Level 2 AC charging operates at 240 V with current ratings typically from 16 A (small wall units) up to 80 A (industrial wall chargers), delivered through a J1772 (or NACS) connector. The 240 V/32 A spec falls squarely in the Level 2 category, supplying about 7.7 kW to the vehicle's onboard charger.

122. D — HV cables on hybrid and EV vehicles are orange in North America (and in most international markets), serving as the universal visual warning of high voltage. Neither green (which signifies ground in low-voltage systems) nor yellow is the correct colour code for HV cabling.

123. A — The 12V auxiliary battery on a hybrid powers the vehicle's low-voltage electronics — lights, BCM, infotainment, control modules — and is kept charged by the HV-to-12V DC-DC converter during operation. The 12V battery does not power the traction motor or HV battery directly.

124. B — Modern EV traction motors are three-phase AC motors, typically permanent magnet synchronous (PMSM) or induction designs, driven by a power inverter that converts the HV battery's DC output into the three-phase AC required by the motor. Brushed DC motors are not used in modern traction applications because of efficiency and brush-wear limitations.

125. C — The Manual Service Disconnect physically opens the HV battery circuit when removed, electrically isolating the pack. The inverter's DC bus capacitors retain stored energy after the MSD is

removed, so the technician must wait the manufacturer-specified time and verify zero voltage with a meter before working on the HV system.