PRACTICE EXAM 6: RED SEAL 310S SIMULATION (125 QUESTIONS)

1. A technician notices a small pinhole leak in a high-pressure hydraulic line spraying a fine mist. What is the most appropriate response?

A. Wipe the leak with a clean rag and continue the work in progress

B. Use the technician's bare finger to feel for the leak's exact source

C. Tighten the fitting beyond manufacturer torque to seal the small leak

D. Stop work and depressurize the system before any inspection or repair

2. The WHMIS 2015 exclamation mark pictogram (inside a red diamond border) identifies products that are:

A. Acutely toxic and may cause death from a small single exposure

B. Less severe health hazards like irritants, skin sensitizers, or narcotic effects

C. Corrosive and may cause severe damage to skin and eyes on contact

D. Flammable liquids requiring storage in approved metal cabinets

3. During lock-out tag-out of an electrical machine before service, the verification step requires the technician to:

A. Attempt to operate the machine controls to confirm the energy source is isolated

B. Apply a tag indicating "do not operate" without further verification needed

C. Have a coworker visually confirm the lock is in place on the disconnect

D. Notify the supervisor by radio that the energy isolation is in place

4. A "hot work permit" is required before:

A. Operating a hydraulic floor jack for routine vehicle service work

B. Using compressed air for blowing dust off engine components in the shop

C. Performing welding, cutting, or grinding in areas with potential fire hazards

D. Charging a discharged customer vehicle battery during regular service

5. Shop fire extinguishers must be visually inspected at what minimum frequency?

A. Annually by a certified fire safety inspector during the licensed visit

B. Every six months by the shop's designated safety officer or manager

C. Quarterly by anyone authorized within the shop's safety procedures

D. Monthly by shop personnel to confirm pressure, accessibility, and condition

6. In the hierarchy of hazard controls, PPE (personal protective equipment) is considered:

A. The least preferred control, used only when other controls cannot eliminate the hazard

B. The most preferred control because it directly protects each individual worker

C. Equivalent to engineering controls in preventing exposure to occupational hazards

D. The only acceptable control for biological and chemical hazards in shops

7. A technician planning to work alone in the shop after regular hours should:

A. Lock the shop doors and disconnect the phone to avoid interruption

B. Limit work to administrative tasks that do not require any tools

C. Follow the shop's working-alone protocol, including check-in procedures

D. Disable the shop's security alarm to allow free movement around the bays

8. Before using a hand tool such as a chisel or punch, the technician should:

A. Sharpen the tool's working surface to maximize cutting efficiency

B. Inspect for mushrooming, cracks, or other damage that could cause failure

C. Lubricate all metal surfaces with light oil to prevent corrosion

D. Demonstrate the tool's use to apprentices before applying force

9. To reduce slip and fall risk in a shop, the most important practice is:

A. Wearing steel-toed boots with deep treads at all times during shifts

B. Posting "wet floor" signs after spills have been cleaned thoroughly

C. Installing handrails along the walls of all main work areas in the shop

D. Cleaning up fluid spills immediately and keeping floors free of debris

10. Excessive crankshaft endplay measured at the thrust bearing typically indicates:

A. Worn thrust bearing surfaces requiring crankshaft service or replacement

B. Worn main bearing journals requiring full engine rebuild service

C. A failed pilot bearing inside the crankshaft rear flange

D. Misaligned crankshaft pulley requiring repositioning during service

11. During cylinder bore measurement, the technician finds 0.10 mm of taper from top to bottom of the cylinder. This wear pattern indicates:

A. Improper engine assembly causing uneven piston ring loading

B. Normal manufacturing tolerance that does not require any service

C. Wear caused by maximum side load on the rings at the top of the stroke

D. Coolant contamination of the cylinder causing chemical wear

12. Insufficient piston ring end gap (rings installed without checking the gap) typically causes:

A. Excessive oil consumption from rings sealing too tightly to cylinder walls

B. Ring breakage as the rings expand under heat with nowhere to expand into

C. Reduced engine power output due to incorrect piston-to-wall clearance

D. Lower engine compression readings during the compression test procedure

13. Variable valve lift systems (such as Honda VTEC or BMW Valvetronic) differ from variable valve timing (VVT) by:

A. Controlling only valve open timing without affecting actual valve lift

B. Operating on the exhaust valves only and leaving intake valves fixed

C. Using electric solenoids instead of hydraulic pressure for actuation control

D. Changing the actual height the valves open (the lift), not just the timing

14. On a vehicle with a stretched timing chain, the most likely OBD-II symptom is:

A. A code indicating camshaft position correlation with crankshaft position is incorrect

B. A code indicating the catalytic converter efficiency is below threshold

C. A code indicating the fuel trim is excessively positive at idle conditions

D. A code indicating the mass airflow sensor reading is below specification

15. During cylinder head service, head deck warpage is most accurately measured using:

A. A vernier caliper across the deck surface diagonally and lengthwise

B. A dial indicator clamped to the camshaft bore registering surface flatness

C. A precision straightedge and feeler gauge across the deck surface

D. A digital level placed in multiple positions on the deck surface

16. Engine oil sludge accumulation in the rocker arm area is most commonly caused by:

A. Use of synthetic oil instead of conventional petroleum-based oil

B. Extended oil change intervals combined with short-trip driving cycles

C. Use of high-viscosity oil in a warm climate during summer operation

D. Frequent highway driving at sustained moderate engine RPM range

17. OAT (Organic Acid Technology) coolant differs from traditional IAT (Inorganic Additive Technology) coolant by:

A. Using inorganic phosphate and silicate additives for corrosion prevention

B. Having a shorter service life (typically two years) than IAT coolant

C. Being incompatible with aluminum engine components in modern vehicles

D. Using organic acid additives that provide extended service life (typically five years or more)

18. A cooling system surge tank functions to:

A. Provide a separate reservoir at the highest point for coolant expansion and air separation

B. Pressurize the cooling system independently of the radiator cap pressure

C. Filter the engine coolant before it returns to the radiator from the engine

D. Cool the coolant additionally with a small electric fan during high-load operation

19. The EVAP charcoal canister stores:

A. Excess engine combustion byproducts from incomplete fuel burning

B. Fuel vapours that evaporate from the fuel tank during temperature changes

C. Air from the engine intake that contains harmful contaminants

D. Excess engine oil that has been displaced during operation

20. On a port fuel injection (PFI) system, fuel rail pressure typically operates at approximately:

A. 50 to 200 bar across the full engine operating range

B. 25 to 45 psi at idle, controlled by the in-tank pressure regulator

C. 40 to 60 psi controlled by the fuel pressure regulator at the fuel rail

D. 100 to 150 psi only when the engine is operating at wide-open throttle

21. A wideband (AFR) oxygen sensor signal at 0.45 V (mid-scale) typically indicates:

A. The mixture is rich and the PCM should command less fuel injection

B. The mixture is lean and the PCM should command more fuel injection

C. The exhaust contains zero oxygen, indicating excessive fuel addition

D. The mixture is at stoichiometric (14.7:1 for gasoline) air-fuel ratio

22. The OBD-II catalyst monitor compares which two sensor outputs to determine catalyst efficiency?

A. The MAP sensor output and the MAF sensor output values continuously

B. The upstream and downstream oxygen sensor switching activity at operating temp

C. The crankshaft position and camshaft position sensor outputs over time

D. The intake air temperature and the engine coolant temperature readings

23. Secondary air injection (SAI) systems pump fresh air into the:

A. Engine intake manifold to lean the air-fuel mixture under heavy load

B. Exhaust system after a cold start to help oxidize unburned hydrocarbons

C. Catalytic converter substrate to maintain its temperature in cold weather

D. Crankcase ventilation system to dilute oil vapours before combustion

24. A variable geometry turbocharger (VGT) on a modern diesel engine adjusts:

A. The compressor wheel diameter to match the engine speed at any condition

B. The wastegate valve opening to control the maximum boost pressure produced

C. The angle of vanes inside the turbine housing to control exhaust gas flow

D. The intake manifold tract length to optimize cylinder filling at all RPM

25. A twin-scroll turbocharger improves performance over a single-scroll design by:

A. Separating exhaust pulses from different cylinder groups to reduce interference

B. Using two compressor wheels in series for higher pressure ratios at low RPM

C. Doubling the maximum boost pressure available at all engine speeds

D. Using two wastegates for redundancy in case one fails during operation

26. On a modern common rail diesel injector, a "pilot" or "pre-injection" event occurs to:

A. Pre-fill the injector with fuel before the main injection event

B. Heat the diesel fuel before main injection for better atomization

C. Inject extra fuel after the main event to regenerate the DPF system

D. Initiate combustion smoothly, reducing diesel knock and combustion noise

27. On a diesel SCR system, the AdBlue (DEF) dosing rate is controlled by:

A. A fixed mechanical pump delivering DEF at a constant rate during operation

B. The PCM, based on NOx sensor input and engine operating conditions

C. The driver, through a dashboard-mounted DEF flow control knob

D. The exhaust back pressure sensor at the DPF outlet measuring restriction

28. The "dexos" specification developed by GM:

A. Is identical to API SP and provides no additional protection benefits

B. Applies only to diesel engine oils manufactured for European markets

C. Specifies enhanced protection against LSPI and turbocharger deposits

D. Requires a thicker oil viscosity than standard manufacturer ratings

29. Reduced valve spring tension (worn or weakened springs) typically produces which symptom at high RPM?

A. Valve float, where valves fail to close fully before the next cycle

B. Lower engine compression on the affected cylinders measurably

C. Increased oil consumption past the valve guide seal area

D. Premature timing belt wear from increased valve train load

30. Camshaft bearings inside an overhead-cam cylinder head are typically:

A. Sealed ball bearings packed with grease for the engine's service life

B. Tapered roller bearings adjusted with shims at assembly time

C. Needle bearings rolling directly on the camshaft journal surfaces

D. Plain (sleeve) bearings lubricated by pressurized engine oil from the head

31. On a modern engine, the term "interference engine" describes an engine where:

A. The valves and pistons can contact each other if the timing belt fails

B. The intake and exhaust valves overlap during the gas exchange period

C. The engine produces interference patterns visible on a scope diagnosis

D. The engine block and cylinder head are made of different metals

32. On a CAN bus, when two modules attempt to transmit simultaneously, message priority is determined by:

A. The CAN identifier (CAN-ID) — the lower the numerical ID, the higher the priority

B. The chronological order of when each module finished initialization

C. A central arbiter module that grants permission to transmit on the bus

D. The physical position of the module along the bus (closest to terminator)

33. The J1939 protocol is most commonly used on:

A. Passenger car infotainment systems for high-bandwidth media transfer

B. Body and comfort control modules on light-duty passenger vehicles

C. Engine and transmission control on luxury performance sport vehicles

D. Heavy-duty trucks, buses, agricultural, and commercial equipment

34. OBD-II Mode 09 (service $09) provides:

A. Pending diagnostic trouble codes from one-cycle failures detected

B. Confirmed emissions-related diagnostic trouble codes for repair

C. Vehicle information including VIN, calibration ID, and CVN data

D. Erasure of all diagnostic codes and freeze frame data combined

35. OBD-II Mode 0A (service $0A) returns:

A. The list of available services supported by the vehicle's PCM and other modules

B. Permanent DTCs that cannot be cleared by scan tool until repair is verified

C. The result of the most recent on-board monitor test for each emissions system

D. Real-time data parameters from the vehicle's PCM stored in current operation

36. OBD-II Mode 04 (service $04) is used to:

A. Erase emissions-related DTCs and freeze frame data from the PCM memory

B. Read the current values of OBD-II monitor readiness flags individually

C. Request a specific module to perform an output state diagnostic test

D. Read the calibration verification number (CVN) from the powertrain control module

37. Generic OBD-II diagnostic codes differ from enhanced (manufacturer-specific) codes by:

A. Using a different code format with letters in different positions of the code

B. Being readable only by manufacturer-specific scan tools rather than generic ones

C. Covering only emissions-related faults that are standardized across all manufacturers

D. Being applicable only to vehicles manufactured before the year 2008

38. OBD-II Mode 06 (service $06) provides:

A. The current state of OBD-II readiness monitors during operation

B. A list of the vehicle's supported OBD-II PIDs available for diagnosis

C. Pending DTCs that have failed monitor criteria once but not enough times

D. On-board monitor test results, showing pass/fail status and values against limits

39. Active output testing through a scan tool allows the technician to:

A. Read the live data from all sensors connected to the vehicle's PCM

B. Command individual actuators (solenoids, motors, relays) on and off for testing

C. Reprogram the vehicle's PCM with updated calibration software files

D. Clear stored diagnostic codes from all vehicle modules at once

40. The J2534 standard defines:

A. A pass-through programming interface for OEM-developed software through generic hardware

B. The physical connector specifications for the OBD-II diagnostic port

C. The data link layer specifications for CAN bus communication on vehicles

D. The wireless communication standard for vehicle-to-everything (V2X) data

41. GMLAN single-wire CAN (also called SWCAN) operates at:

A. The same speed and protocol as standard high-speed CAN buses (500 kbps)

B. A higher speed than standard CAN to compensate for the single conductor

C. A speed of 1 Mbps for high-bandwidth in low-cost vehicles only

D. A low speed (typically 33.3 kbps), and uses one wire with ground return

42. CAN-FD (Flexible Data Rate) allows a maximum data payload per frame of:

A. 8 bytes per frame, the same as classic CAN messages historically

B. 32 bytes per frame, doubled from classic CAN at 2× the rate

C. 64 bytes per frame, much larger than classic CAN's 8-byte limit

D. 256 bytes per frame, enabling streaming-like data transfers via CAN

43. When diagnosing a complex multi-module concern on a 2026 model vehicle, the technician should generally use:

A. A generic OBD-II scan tool for cost-effective basic diagnostic capability

B. A manufacturer-capable (OEM) scan tool for full bidirectional control and module access

C. A code reader that displays only the diagnostic code text and definition

D. A multimeter and oscilloscope only, without any scan tool involvement

44. A concentric slave cylinder (CSC) used on modern manual transmissions:

A. Surrounds the input shaft and integrates the throwout bearing with the hydraulic cylinder

B. Mounts externally on the transmission bell housing with a separate throwout fork

C. Is operated by engine vacuum from the intake manifold during clutch use

D. Uses two separate pistons working on opposite sides of the input shaft

45. The counter shaft (cluster gear) inside a manual transmission:

A. Connects directly to the engine crankshaft through a flexible coupling

B. Rotates only when reverse gear is engaged through the reverse idler

C. Continuously rotates with the input shaft and provides gear options for the output shaft

D. Is the same component as the output shaft, just at the rear of the transmission

46. In a typical manual transmission engaged in 1st gear, the power path is:

A. Input shaft → reverse idler → counter shaft → output shaft directly

B. Input shaft → planetary gearset → output shaft through the sun gear

C. Input shaft → counter shaft → output shaft through the highest-ratio synchronizer

D. Input shaft → counter shaft → 1st gear on the output shaft → output shaft

47. In an automatic transmission, a band servo applies a brake band that:

A. Holds the entire planetary gearset stationary during park position

B. Wraps around a planetary gear drum to hold it stationary during specific gear engagement

C. Engages the torque converter clutch during highway cruising operation

D. Connects the transmission output shaft to the driveshaft during gear shifts

48. At engine idle with the transmission in drive and brakes applied, the torque converter:

A. Allows the impeller to spin while the turbine remains relatively stationary

B. Locks the impeller and turbine together preventing all relative motion

C. Multiplies engine torque by approximately 5:1 against the held turbine

D. Disengages mechanically and provides no torque transfer to the transmission

49. On a modern automatic transmission, line pressure is regulated by:

A. A mechanical centrifugal governor on the transmission output shaft

B. The throttle cable connected to the carburetor's throttle linkage

C. A vacuum-modulated pressure valve sensing engine intake vacuum

D. The PCM commanding electronic pressure control (EPC) solenoid duty cycle

50. A customer complains of a harsh 1-2 shift on a vehicle with otherwise normal transmission behaviour. The most likely cause is:

A. Failed transmission cooler restricting return ATF flow at all speeds

B. Excessive line pressure during the 1-2 shift event due to a solenoid or sensor fault

C. Worn rear axle differential bearings allowing wheel speed variation during shift

D. A failed clutch master cylinder allowing pedal pressure inconsistency

51. On-vehicle driveshaft balancing requires:

A. A torque wrench to verify the U-joint clamp bolt torque before any test

B. A laser alignment tool to measure the driveshaft's parallel relationship

C. An electronic balancer with vibration sensor and strobe light to locate imbalance

D. A dial indicator on the driveshaft to measure runout while spinning the shaft

52. Pinion bearing preload on a differential is measured using:

A. A torque wrench measuring the inch-pounds of resistance to rotation

B. A dial indicator measuring axial play in the pinion shaft assembly

C. A magnetic angle gauge on the pinion flange during slow rotation

D. A digital scale at the pinion flange measuring resistance during turning

53. A driver-selectable locking differential (e.g., on a Jeep Wrangler Rubicon) engages by:

A. Sensing wheel speed differences via the ABS module and engaging automatically

B. Using viscous silicone fluid to lock when speed differences develop with slip

C. Applying brake pressure to individual wheels through stability control

D. Mechanically locking both axle shafts together via an electric or air actuator on driver command

54. A Torsen (Torque-Sensing) AWD center differential:

A. Uses electronic clutches commanded by the AWD control module

B. Uses a viscous coupling that engages with sustained wheel speed difference

C. Uses helical worm gears whose internal friction provides limited slip and torque biasing

D. Uses a planetary gearset that splits torque equally regardless of grip

55. A 4WD vehicle with a center differential (full-time 4WD):

A. Operates only when the driver shifts the transfer case into 4WD position

B. Allows different rotational speeds between front and rear driveshafts, useful on dry pavement

C. Locks the front and rear driveshafts together at all times mechanically

D. Uses a chain drive to connect the front and rear without a differential function

56. During routine inspection, a CV joint is suspected of failure when:

A. A clicking noise is heard during turns or visible grease leaks from the boot are seen

B. A whining noise is heard at all speeds regardless of cornering or load

C. The vehicle pulls to one side during straight-line driving on level surfaces

D. The wheel hub becomes warm to the touch during a short test drive

57. A typical part-time 4WD transfer case fluid should be inspected for:

A. Specific gravity using a hydrometer at each service interval scheduled

B. Octane rating using a specialized diesel test device for the trade

C. Refractive index using an optical refractometer during the service event

D. Colour, debris, smell, and level for signs of wear or contamination during service

58. During driveshaft installation, U-joint phasing means:

A. Setting the U-joint angles so they are exactly equal at both ends of the shaft

B. Greasing the U-joint zerks at the correct time intervals during operation

C. Aligning the front and rear yokes so they are in the same plane (parallel)

D. Adjusting the U-joint cup tightness at each cap during the install

59. On a "C-clip" rear axle shaft (common on GM RWD vehicles):

A. The axle shaft is held in by a press-fit bearing at the outer end

B. A clip inside the differential carrier retains the inner end of the axle shaft

C. The axle shaft can be removed by simply pulling on the brake drum outward

D. The axle shaft is locked to the differential with a splined nut and washer

60. A clutch-type limited-slip differential requires:

A. A specific friction modifier additive in the gear oil to prevent chatter

B. A high-zinc engine oil to lubricate the friction clutch packs properly

C. Synthetic transmission fluid drained from the manual transmission case

D. Hydraulic brake fluid added through a service port in the differential

61. An auto-ranging digital multimeter (DMM):

A. Is more accurate than a manual-range DMM at all measurement settings

B. Requires the technician to select the expected range before each measurement

C. Automatically selects the appropriate measurement range based on input value

D. Cannot measure resistance values below 200 ohms accurately for testing

62. The proper procedure for measuring voltage drop across a high-current circuit component is:

A. Disconnect the component and measure resistance with an ohmmeter

B. Disconnect the load and measure open-circuit voltage at the component

C. Apply 12V directly to the component and verify the voltage at the output

D. Connect the meter across the component while the circuit operates under normal load

63. An inductive amp clamp measures current without breaking the circuit by:

A. Using a hall sensor that contacts the conductor directly through insulation

B. Sensing the magnetic field around the current-carrying wire and converting to a reading

C. Inserting a small shunt resistor in the line through a tiny incision in the cable

D. Measuring the temperature rise of the conductor due to resistive heating

64. The min/max recording function on a DMM is most useful for:

A. Capturing intermittent voltage spikes or dips that may be missed by direct observation

B. Calculating the average voltage of a fluctuating signal over a time period

C. Identifying which terminal of a sensor is positive and which is negative

D. Measuring resistance values that change due to temperature changes

65. A "pull-up" resistor in an automotive circuit:

A. Reduces the voltage at the connected pin during fault conditions only

B. Limits the maximum current that can flow through the circuit

C. Connects the signal line to the reference voltage (typically 5V) to define the default state

D. Connects the signal line to ground to define a fixed low signal output

66. In diode test mode on a DMM, a healthy silicon diode should show:

A. Continuous beeping in both directions when tested across the diode

B. Open circuit (OL) in both polarities of test lead connection

C. A reading of approximately 0 ohms when tested in either polarity direction

D. A forward voltage drop of approximately 0.5–0.7 V in one direction and OL in the other

67. A traditional carbon-pile battery load tester applies a load equal to:

A. Approximately half the battery's CCA rating for 15 seconds, expecting voltage to stay above 9.6 V

B. The battery's full CCA rating for 30 seconds continuously without voltage drop

C. A fixed 50-amp load for 5 minutes regardless of the battery's CCA rating

D. The battery's reserve capacity rating in amps applied for one full hour

68. An oscilloscope test of alternator output should show:

A. A pure DC line with no variation from start to finish during operation

B. A clean sinusoidal AC waveform like household power output continuously

C. A small rectified ripple over a DC voltage; excessive ripple indicates a failed diode

D. A square wave signal at the alternator's pulley rotation frequency rate

69. On a standard ISO automotive relay, terminals 85 and 86 are:

A. The high-current contacts that switch power to the load circuit

B. The control coil terminals that energize the relay's electromagnet

C. The normally open and normally closed contacts to the load

D. The battery positive and ground reference for the load circuit

70. A stepper motor (used in some IAC valves and HVAC actuators) operates by:

A. Applying a continuously variable voltage to control the rotor position

B. Using a hydraulic chamber that responds to incoming oil pressure during operation

C. Allowing the motor to rotate freely until reaching the desired position by inertia

D. Energizing multiple coils in a specific sequence to step the rotor in discrete increments

71. A solid-state relay (SSR) differs from a conventional electromechanical relay by:

A. Using semiconductors (transistors, MOSFETs) instead of moving mechanical contacts

B. Operating at higher voltages than electromechanical relays can handle safely

C. Requiring more control current to switch the output load than mechanical relays

D. Being much larger physically than an equivalent electromechanical relay

72. A vehicle parked overnight with all modules properly entering sleep mode should have a total parasitic draw of approximately:

A. 0.5 to 1.0 amp for a typical modern passenger vehicle

B. 10 to 20 milliamps for a typical modern passenger vehicle

C. 30 to 80 milliamps for a typical modern passenger vehicle (varies by model)

D. 200 to 500 milliamps for a typical modern passenger vehicle

73. A power window's "auto-up" feature (where one tap raises the window fully):

A. Uses a mechanical latch on the window switch to hold the up command

B. Uses motor current sensing and Hall pulse counting in the BCM for pinch protection

C. Operates the window slowly to prevent injury at the top of the travel

D. Requires the driver to hold the switch for at least three seconds during operation

74. A heater core leak is most commonly diagnosed by:

A. Smelling for a sweet odour from the engine's exhaust pipe area

B. Observing coolant dripping from the vehicle's wheel well opening

C. Checking for low coolant level on the dashboard warning light

D. Detecting a sweet coolant odour, fog from defrost vents, or wet floor inside the cabin

75. A variable displacement A/C compressor adjusts cooling output by:

A. Cycling the compressor clutch on and off rapidly during operation

B. Varying the speed of the engine through the PCM during demand

C. Changing the angle of an internal swashplate to vary the piston stroke

D. Diverting refrigerant around the evaporator through a bypass valve

76. The A/C compressor clutch coil typically draws approximately:

A. 1 to 2 amps when energized at battery voltage at 12V operation

B. 3 to 5 amps when energized at battery voltage at 12V operation

C. 10 to 15 amps when energized at battery voltage at 12V operation

D. 30 to 40 amps when energized at battery voltage at 12V operation

77. A power door lock actuator typically uses:

A. A vacuum-operated diaphragm fed from the engine intake manifold

B. A hydraulic cylinder driven by the brake fluid system pressure

C. A pneumatic cylinder driven by the compressor stored in a tank

D. A small reversible DC motor with a rack-and-pinion or screw mechanism

78. On older vehicles, a heater control valve was used to:

A. Block coolant flow to the heater core to prevent cabin heating when not needed

B. Adjust the temperature of the engine coolant before it entered the heater core

C. Replace the thermostat function in vehicles without a dedicated thermostat

D. Mix hot coolant with cold air before entering the cabin air distribution

79. An A/C system that is approximately 25 percent undercharged typically produces:

A. Vent temperature dropping well below 0°C inside the cabin in summer

B. Excessive high-side pressure and overheating of the compressor under load

C. Reduced cooling capacity and possibly compressor short cycling during operation

D. Continuous compressor operation but no measurable refrigerant pressure at all

80. On most modern vehicles, the cabin air filter is located:

A. Inside the engine compartment behind the intake plenum near the firewall

B. Behind the glove box assembly or under the hood near the cowl intake

C. Inside the trunk near the spare tire well in a separate housing

D. Built into the headliner above the front passenger seat compartment

81. A failed headlight switch that allows headlights to operate but with intermittent flickering most likely has:

A. A failed dimmer control in the switch's internal circuitry only

B. Open circuit conditions in the switch's parking light circuit

C. A failed turn signal indicator inside the switch electrical contacts

D. Worn or corroded internal contacts causing intermittent connection

82. The evaporator core in an A/C system functions as:

A. The heat exchanger where refrigerant absorbs heat from cabin air, cooling the cabin

B. The reservoir where refrigerant is stored when the system is not operating

C. The compressor inlet filter that removes debris from the refrigerant flow

D. The pressure regulator that controls the high-side pressure of the system

83. A vehicle's charging system is tested with all electrical loads on (headlights, blower, rear defrost). The alternator output voltage should remain:

A. Below 12 V to prevent overcharging the battery during sustained loads

B. Above 16 V to ensure adequate current to all loads simultaneously

C. Between approximately 13.5 and 15 V indicating proper alternator operation

D. Exactly 12.6 V regardless of load conditions or battery state

84. A grinding noise during braking on the front wheels most commonly indicates:

A. Glazed brake pads that need replacement and rotor resurfacing service

B. Brake pads worn through completely, with metal backing contacting the rotor

C. The brake calipers are sticking on their slide pins during operation

D. The brake pedal switch has failed and is causing the brake lights to stay on

85. A brake pedal that gradually sinks to the floor under steady foot pressure (no visible fluid leak) most likely indicates:

A. Air trapped in the hydraulic system requiring complete brake system bleeding

B. A failed brake booster losing its vacuum supply from the engine intake

C. Worn brake pads requiring service or replacement of the pad and rotor

D. An internal master cylinder bypass where the primary seal cup is leaking past

86. To service the brake pads on a vehicle with electric parking brake (EPB) integrated into the rear calipers, the technician must:

A. Activate the EPB service mode through the scan tool to retract the caliper piston motor

B. Manually retract the caliper piston with a C-clamp as on conventional rear calipers

C. Disconnect the EPB cable from the rear caliper and back the piston off with a screwdriver

D. Remove the EPB motor assembly from the caliper before retracting the piston

87. On an ABS wheel speed sensor that requires manual adjustment, the air gap between the sensor tip and the tone ring should be:

A. Snug contact between the sensor tip and the tone ring during installation

B. Approximately 5 mm to allow for thermal expansion of the components

C. Within manufacturer specifications (typically 0.5 to 1.0 mm) for proper signal generation

D. Tightened to maximum torque until the sensor cannot rotate further inward

88. A brake proportioning valve in a hydraulic brake system is designed to:

A. Apply equal brake pressure to all four wheels regardless of weight transfer

B. Reduce brake pressure to the rear brakes during heavy braking to prevent rear lockup

C. Increase brake pressure to the front brakes proportional to the pedal force input

D. Adjust the parking brake cable tension automatically as the rear pads wear

89. A "quick take-up" master cylinder design used on some vehicles with low-drag calipers:

A. Allows the brake fluid to compress slightly during rapid pedal application

B. Reduces the brake pedal travel required during normal stopping events

C. Increases the brake pedal effort required during heavy braking conditions

D. Provides a large initial volume of fluid to take up caliper clearance, followed by normal pressure

90. Power steering pump output pressure is tested with:

A. A pressure gauge installed in the high-pressure hose between the pump and steering gear

B. A vacuum gauge measuring the low-pressure return line from the steering gear

C. A flow meter installed in the return line measuring fluid volume at idle speed

D. A multimeter measuring the electrical signal from the steering torque sensor

91. On a vehicle with a "strut cartridge" design, strut replacement involves:

A. Replacing the entire strut assembly including the spring and upper mount as a unit

B. Removing the strut shaft assembly and installing a new cartridge inside the existing strut housing

C. Replacing only the shock absorber bushings at the upper and lower mounting points

D. Replacing only the coil spring while reusing the original strut shaft

92. On a vehicle with recirculating ball steering, a worn pitman arm typically causes:

A. Squealing noise during low-speed parking maneuvers in the driveway

B. The brake pedal to feel spongy during normal stopping events

C. Excessive engine vibration through the steering wheel during idle

D. Steering wander or play that cannot be corrected by adjusting the steering box

93. Sway bar (anti-roll bar) mounting bushings (the ones attaching the bar to the chassis) typically fail by:

A. Cracking due to ozone exposure over time and high mileage operation

B. Loss of grease lubrication and requiring annual greasing service

C. Hardening and cracking with age, producing rattling or clunking over bumps

D. Snapping completely apart during sudden stops or sharp turns

94. A wheel bearing failure typically produces a noise that:

A. Changes pitch or volume during cornering, often louder when weight transfers to the failing side

B. Occurs only during braking and disappears when the brake pedal is released

C. Is constant regardless of vehicle speed, cornering, or braking conditions

D. Only occurs at engine idle and disappears when the vehicle starts moving

95. A tire wear pattern showing "cupping" (scalloped wear around the tire's circumference) most commonly indicates:

A. Excessive tire inflation pressure for the vehicle's normal operating conditions

B. Worn shock absorbers or struts allowing the tire to bounce on the road surface

C. Incorrect toe alignment producing scrubbing wear as the wheels roll forward

D. Excessive positive camber wearing the outer tire shoulder unevenly over time

96. Direct TPMS sensors with internal batteries typically have a service life of:

A. Approximately 1 to 2 years before requiring sensor replacement

B. Approximately 2 to 3 years before requiring sensor replacement

C. The full life of the vehicle, never requiring replacement during ownership

D. Approximately 5 to 10 years depending on usage and operating conditions

97. The "included angle" used in front-end alignment is the sum of:

A. Camber and steering axis inclination (SAI) at the same wheel

B. Toe-in and caster at the front wheels for stability calculation

C. Caster and steering axis inclination (SAI) summed at the same wheel

D. Camber and caster at the front wheels combined for handling calculation

98. A brake fluid level sensor in the master cylinder reservoir illuminates the brake warning light when:

A. The brake pads have worn to the minimum thickness specification

B. The brake hydraulic system has reached its maximum operating pressure

C. The fluid level drops below a calibrated minimum, indicating leak or wear

D. The brake booster vacuum drops below the minimum acceptable supply

99. During brake service, caliper slide pins should be lubricated with:

A. Standard wheel bearing grease left over from previous service work

B. A high-temperature silicone-based brake caliper grease rated for the application

C. Engine oil applied with a small brush to each pin during reassembly

D. Anti-seize compound applied generously to allow easy removal in future

100. An internal collapse of a brake hose typically produces which symptom?

A. Reduced power steering assist at parking lot speeds during turning

B. The brake fluid level dropping rapidly in the master cylinder reservoir

C. Continuous noise from the affected wheel during normal driving

D. The brake on one wheel either dragging or being slow to release after pedal application

101. After replacing the ABS module on a stability-control-equipped vehicle, the yaw rate sensor:

A. Will automatically calibrate during the first drive cycle without scan tool input

B. Will not require calibration since yaw sensors are factory-calibrated for life

C. Often requires calibration through a scan tool, parking the vehicle on a level surface

D. Requires manual mechanical adjustment by rotating the sensor housing

102. An adaptive damping shock absorber (electronic shocks) varies its damping rate by:

A. Using a solenoid valve to change fluid orifice openings, controlled by a vehicle module

B. Pumping air into a sealed chamber within the shock body during operation

C. Using a temperature-sensitive fluid that thickens or thins with shock heat

D. Mechanically adjusting the internal piston shape by an electric motor

103. An air suspension compressor that runs continuously without raising the vehicle indicates:

A. The compressor pressure relief valve is operating normally to prevent overpressure

B. An air leak in the system or a failed compressor unable to build pressure

C. The vehicle is operating normally in self-leveling mode during driving

D. The air suspension module is calibrating the height sensors automatically

104. Modern computerized wheel alignment equipment uses which type of measurement?

A. Mechanical strings stretched between the wheels at four equal points

B. Bubble levels attached to each wheel and read manually by the technician

C. Targets attached to each wheel read by cameras or laser sensors for digital measurement

D. Magnetic compasses attached to each wheel measuring relative angles

105. Brake hose banjo bolts at the caliper should be torqued to:

A. Manufacturer specification with new copper washers installed on each side of the fitting

B. Maximum torque to ensure no fluid leaks under heavy braking conditions

C. Hand-tight only, then verified by visual inspection during a test drive

D. The same torque as the caliper bracket bolts for uniform clamping pressure

106. Brake fluid contamination by water can be tested using:

A. A hydrometer to measure the fluid's specific gravity at room temperature

B. A pH test strip dipped into the brake fluid reservoir during inspection

C. A magnetic test wand to attract metallic particles from the brake fluid

D. An electronic moisture tester (electrochemical) inserted into the reservoir to measure water content

107. Before servicing any SRS component after disconnecting the battery, the technician must wait at least:

A. 5 seconds to allow the SRS module's internal voltage to fully drop

B. 30 seconds for any stored backup current to dissipate from the SRS modules

C. The manufacturer-specified time (typically 1 to 10 minutes depending on the system)

D. 24 hours to fully reset the SRS module's stored crash sensor data

108. The Sensor Diagnostic Module (SDM) in an SRS system is responsible for:

A. Monitoring all crash sensors and deciding when to deploy airbags during a collision

B. Adjusting the speed of seat belt retractor during a low-speed crash event

C. Controlling the deployment of pretensioners only, without involvement of airbags

D. Sensing tire pressure and reporting it to the dashboard cluster display

109. A seat occupancy classification (weight) sensor in the passenger seat is used to:

A. Adjust the seat heating element power based on the occupant's weight

B. Control passenger airbag deployment based on whether the seat is occupied and by whom (adult or child)

C. Adjust the seat suspension stiffness automatically during normal driving

D. Activate the seat belt warning chime regardless of belt status

110. On a vehicle with rollover-deployed roof side airbags, deployment is triggered by:

A. The driver pressing a manual rollover button on the dashboard during an event

B. The vehicle exceeding 100 km/h on a curved road during normal driving

C. Roll rate and lateral acceleration sensors detecting an imminent rollover event

D. The vehicle's brake system applying emergency stops on slick surfaces

111. A vehicle's hood release cable that operates the secondary latch (under hood) is:

A. Connected directly to the door lock cylinder for a single key operation

B. Operated only by the vehicle's keyless entry system with a fob press

C. Connected to the trunk release switch on the dashboard for combined operation

D. Operated mechanically by a release lever or cable from the cabin

112. During major body repair after a collision, body alignment is verified using:

A. A frame measuring system comparing actual control points to manufacturer's specifications

B. A standard tape measure between visible body panels and the vehicle frame

C. Visual inspection by an experienced body technician without measurement

D. A laser pointer projected onto the body from multiple positions on the floor

113. To adjust the alignment of a sagging door on its hinges, the technician typically uses:

A. Manual adjustments at the door's latch striker plate to compensate for sag

B. Adjustments at the window regulator to raise the door position

C. Shims or adjustment slots at the hinge mounting points on the door

D. Replacement of the entire door panel with a properly aligned new one

114. A vehicle's windshield washer fluid not spraying despite a full reservoir and operating pump motor most likely has:

A. A failed washer fluid heating element preventing fluid from flowing in cold weather

B. A blocked or kinked washer fluid line between the pump and the nozzles

C. Failed wiper motor preventing the washer system from synchronizing properly

D. Low ambient temperature freezing the washer fluid completely in the reservoir

115. After an SRS airbag deployment, scan tool data recovery typically reveals:

A. The driver's facial recognition data during the event for insurance purposes

B. The vehicle's GPS coordinates at the time of deployment for emergency services only

C. The deployment time, crash severity values, and sensor inputs preserved by the SRS module

D. A photograph of the passenger compartment taken automatically at the time

116. On a vehicle with auto-lock at speed (doors lock when vehicle reaches a threshold speed):

A. The BCM commands the door lock actuators to lock when the vehicle exceeds the threshold speed

B. The vehicle's transmission control module operates the door locks based on gear position

C. The driver must manually configure each door to lock independently of the others

D. The system operates only when the doors are first opened then closed during the drive

117. Many EVs use a PTC (Positive Temperature Coefficient) heater for cabin heat. The PTC heater:

A. Uses combustion of stored fuel to generate cabin heat in winter

B. Routes engine coolant through the heater core as in a conventional vehicle

C. Operates as a heat pump moving heat from the battery to the cabin air

D. Uses a resistive electrical element drawing significant power from the HV battery

118. On an EV with regenerative braking, when the driver presses the brake pedal lightly:

A. The hydraulic brakes engage first, and regen only activates if the pedal travels far

B. The regen braking activates first; hydraulic friction brakes engage if more deceleration is needed

C. Only the hydraulic friction brakes engage, since regen is a separate system entirely

D. Both regen and hydraulic brakes always engage equally on any pedal press

119. Most modern EVs use a "single-speed reducer" instead of a multi-speed transmission because:

A. EVs operate at very low motor speeds that cannot use traditional gearing

B. Multi-speed transmissions are too heavy for EVs to remain efficient on road

C. Electric motors produce maximum torque at zero RPM and have a wide power band, eliminating the need for multiple gears

D. EVs operate at fixed speeds that do not require any gear changes

120. A BEV electric motor's torque characteristic differs from an internal combustion engine by:

A. Producing maximum (or near-maximum) torque from zero RPM, with no need to "rev up"

B. Producing torque only at high RPM, requiring careful gear selection

C. Producing constant torque at all RPM values throughout the operating range

D. Producing torque only when the battery is at maximum state of charge

121. Cylindrical lithium-ion battery cells (e.g., the 18650 or 21700 used by Tesla and others):

A. Are larger than the prismatic cells used in most other EV manufacturers

B. Use a completely different chemistry than the cells used by other manufacturers

C. Cannot be combined with cooling systems due to their rigid round shape

D. Are named for their dimensions in millimetres (18650 = 18mm diameter, 65mm length)

122. High-voltage cables on an EV have orange insulation and an internal shield because:

A. The orange color matches the vehicle's safety color scheme for shop safety

B. The shield reduces electromagnetic interference (EMI) and orange identifies HV danger

C. The shield carries the return current back to the battery during normal operation

D. The shield provides a backup conductor in case the main wire fails

123. After de-energizing an EV's HV system, the manufacturer typically specifies a waiting period before working on HV components because:

A. The battery's chemistry takes time to fully stabilize at zero voltage

B. The orange high-voltage cables can retain a charge through their insulation

C. The DC bus capacitors in the inverter take time to discharge through bleeder resistors

D. The vehicle's BMS continues to send small currents through the HV system

124. After a vehicle collision involving an EV or hybrid, the technician should:

A. Immediately attempt to start the vehicle to verify the HV system is intact

B. Treat the HV system as energized until verified with a high-voltage meter and follow manufacturer's emergency procedures

C. Disconnect the 12V battery and continue with normal collision repair work

D. Drain the high-voltage battery into a labeled container for proper disposal

125. An EV's battery thermal management system maintains the battery in what approximate temperature range during normal operation?

A. Below 0 °C to maintain maximum charge density at all times

B. Above 60 °C to maximize internal chemical reactions inside cells

C. 0 to 80 °C, the full safe operating range without specific control

D. Approximately 20 to 40 °C for optimum performance and longevity

Practice Exam 6: Answer Key and Explanations

1. D — Stop work and depressurize the system. High-pressure hydraulic injection can drive fluid through the skin into deeper tissue, causing chemical and pressure damage that requires surgical treatment. Bare-skin contact with the fine mist or any attempt to feel for the leak is a serious injury risk and is never permitted regardless of the pressure level.

2. B — The exclamation mark identifies less severe health hazards including irritants, skin sensitizers, narcotic effects, and respiratory tract irritation. The pictogram is deliberately distinct from skull-and-crossbones (acute toxicity) and the health hazard silhouette (chronic effects like carcinogenicity). Recognizing it tells the technician that ventilation and skin protection are sufficient controls.

3. A — The verification step in lock-out tag-out is the "try-out" — the technician attempts to operate the machine controls to confirm that no energy reaches the equipment. Locks and tags alone do not prove isolation; only attempting to operate proves the energy source is truly disconnected. Skipping verification is the most common cause of fatal LOTO failures.

4. C — Hot work permits are specifically required for ignition-source operations such as welding, cutting, brazing, and grinding in areas where combustible materials or flammable vapours may be present. The permit ensures pre-work hazard review, fire watch arrangements, and post-work monitoring. Permits are not required for routine non-ignition tasks.

5. D — NFPA 10 and provincial codes require shop personnel to visually inspect fire extinguishers monthly: check pressure gauge, accessibility, seal integrity, and physical damage. Annual professional inspection by a certified service technician is a separate requirement. Monthly checks catch problems before an emergency.

6. A — In the hierarchy of hazard controls (elimination, substitution, engineering controls, administrative controls, PPE), PPE is the least preferred because it relies on individual compliance and proper use, and does not remove the hazard from the workplace. PPE is the last line of defence when higher controls cannot eliminate the hazard.

7. C — Provincial regulations require working-alone protocols including periodic check-ins, communication devices, and emergency contact procedures. Working alone increases risk because no one is immediately available to call for help if an incident occurs. Locking out access or disabling alarms creates additional risk rather than reducing it.

8. B — A mushroomed chisel or punch head can shatter when struck, sending steel fragments at high velocity toward the technician and bystanders. Visual inspection before each use catches damage before injury occurs. A damaged tool must be repaired (ground back) or replaced.

9. D — Slip and fall injuries are among the most common shop injuries, and the most effective prevention is immediate cleanup of fluid spills and keeping floors free of debris. Signs and footwear are supplementary, not substitutes. A clean, dry floor eliminates the hazard at its source.

10. A — Crankshaft endplay is controlled by the thrust bearing surfaces at one main bearing position. Excessive endplay indicates worn thrust faces, often caused by constant clutch pressure on manual transmission vehicles or a worn thrust washer. The repair is crankshaft service or replacement, plus correcting the underlying cause.

11. C — Cylinder taper develops because the piston rings exert maximum side load at the top of the stroke where combustion pressure peaks. The greater pressure at TDC produces faster wear at the top of the bore than at the bottom, creating the characteristic taper pattern that's measured during rebuild.

12. B — Piston rings expand significantly when they reach combustion temperature. Insufficient end gap causes the ring ends to butt together as the ring expands, breaking the ring or scoring the cylinder wall. Always check ring end gap with the ring squared in the bore before installation.

13. D — Variable valve timing (VVT) changes when valves open (the timing) by rotating the camshaft phaser; variable valve lift changes how far valves open (the lift) by switching cam lobes (Honda VTEC) or using an eccentric shaft (BMW Valvetronic). The two technologies are complementary and often used together on modern engines.

14. A — A stretched timing chain allows the camshaft to lag the crankshaft, breaking the precise position relationship the PCM expects. The PCM detects the cam-to-crank correlation error and sets a corresponding DTC (P0008, P0016, P0017, etc.). Chain stretch is the most common cause of these correlation codes on high-mileage engines.

15. C — Head deck warpage is measured with a precision straightedge laid across the deck and feeler gauges to measure the gap. Checks are performed in multiple positions (diagonal, lengthwise, crosswise) to find the maximum warp. The maximum allowable warp is typically 0.05 mm; warpage beyond spec requires resurfacing.

16. B — Engine oil sludge accumulates when short trips don't allow the engine to reach full operating temperature, leaving moisture and combustion byproducts in the oil. Extended oil change intervals compound the problem by giving the contaminants more time to oxidize and accumulate. Switching to shorter intervals or longer drives largely prevents the problem.

17. D — OAT (Organic Acid Technology) coolants use organic acid corrosion inhibitors (typically carboxylates) that last much longer than the silicates and phosphates in IAT (Inorganic Additive Technology) coolant. OAT service intervals of 5+ years or 240,000+ km are typical. The two chemistries should not be mixed because the additive packages are incompatible.

18. A — A surge tank is mounted at the highest point in the cooling system and provides coolant expansion space, air separation, and the system fill point. The high location allows air bubbles to rise into the tank rather than accumulate at engine high points. A surge tank differs from a simple overflow bottle, which is only an expansion reservoir.

19. B — The EVAP charcoal canister stores fuel vapours that evaporate from the fuel tank during heating and pressure changes. The PCM purges the canister into the intake during engine operation, drawing the stored vapours into the combustion chamber for burning. Without the canister, fuel vapours would vent directly to atmosphere.

20. C — Port fuel injection (PFI) operates at moderate fuel rail pressure (40-60 psi), maintained by a regulator at the rail. This pressure is sufficient to atomize fuel through the injector spray pattern at the intake port. Gasoline direct injection (GDI) operates at much higher pressures (50-200 bar) because injection occurs directly into the combustion chamber.

21. D — On most wideband O2 sensor systems, the calibration is set so that 0.45V at the scan tool represents stoichiometric (lambda = 1.0, or 14.7:1 for gasoline). Voltage below 0.45V indicates lean operation; voltage above 0.45V indicates rich operation. The 0.45V mid-scale provides backward compatibility with the narrowband display conventions.

22. B — The catalyst monitor compares the switching activity of the upstream (pre-catalyst) and downstream (post-catalyst) oxygen sensors. A healthy catalyst absorbs and releases oxygen, smoothing the downstream switching; a failed catalyst lets oxygen pass through, producing fast downstream switching similar to the upstream sensor.

23. B — Secondary air injection pumps fresh air into the exhaust just downstream of the exhaust manifold during cold-start operation. The added oxygen oxidizes unburned hydrocarbons in the exhaust stream, reducing emissions before the catalyst reaches operating temperature. The system runs for 30-90 seconds after cold start, then shuts off.

24. C — Variable geometry turbochargers use movable vanes inside the turbine housing that adjust the angle and effective flow area of exhaust gas onto the turbine wheel. Closing the vanes at low RPM speeds up exhaust flow for quick spool-up; opening them at high RPM prevents over-boost. The control is hydraulic or electric, commanded by the PCM.

25. A — Twin-scroll turbochargers use two separate exhaust passages in the turbine housing, each fed by a different cylinder group. The separation prevents exhaust pulses from one cylinder from interfering with the scavenging of another, improving low-RPM response and reducing turbo lag. Twin-scroll designs are common on 4-cylinder turbo engines.

26. D — Pilot (pre-) injection introduces a small amount of fuel before the main injection event. The pre-flame heat starts the main fuel burning more gradually, reducing the sharp pressure rise that produces the characteristic diesel knock and combustion noise. Modern common-rail diesels may use multiple pilot, main, and post-injection events per cycle.

27. B — DEF dosing is controlled by the PCM (or dedicated SCR controller) based on inputs from the NOx sensor at the SCR catalyst inlet, engine load, and exhaust temperature. The system adjusts DEF flow continuously to optimize NOx reduction while preventing ammonia slip (unreacted DEF passing through the catalyst).

28. C — The GM dexos specification requires enhanced protection against LSPI (low-speed pre-ignition) and turbocharger deposit formation, both of which are critical for modern direct-injection turbocharged engines. The dexos requirements exceed API SP minimums and include specific testing for these failure modes.

29. A — Worn or weakened valve springs cannot close the valve fast enough to follow the cam profile at high RPM. The valves "float" — they do not fully close before the next combustion event — causing loss of compression, power loss, and potential valve-piston contact. The symptom appears only at high RPM where the cam acceleration exceeds the spring's ability to respond.

30. D — Overhead-cam bearings are plain (sleeve) bearings, either machined directly into the head or in replaceable shells, lubricated by pressurized engine oil through head passages. The bearing surface rides on a thin oil film and never actually contacts the journal in a properly lubricated engine.

31. A — An interference engine has valves and pistons whose travel paths overlap; precise timing keeps them out of contact with each other. If the timing belt or chain fails, the piston can strike the valves,

causing bent valves, damaged piston crowns, and possible cylinder head damage. Most modern engines are interference designs.

32. A — On a CAN bus, message priority is determined by the CAN identifier (CAN-ID): the lower the numerical ID, the higher the priority. During simultaneous transmission, modules transmit one bit at a time and a dominant (0) bit overrides a recessive (1) bit, so the lower-ID message wins and the higher-ID module backs off and waits.

33. D — J1939 is the SAE-defined protocol for heavy-duty trucks, buses, agricultural and construction equipment. It uses a 250 kbps CAN base with standardized Parameter Group Numbers (PGNs) for engine, transmission, brakes, and other systems, enabling interoperability across manufacturers.

34. C — Mode 09 returns vehicle information including the VIN, calibration ID (CAL ID), calibration verification number (CVN), and ECU name. This information is useful for verifying that flashed calibrations match expected values during diagnostic or programming work.

35. B — Mode 0A returns permanent DTCs, which cannot be cleared by the scan tool. The PCM only clears permanent codes after the underlying monitor has run and passed, verifying that the fault has been repaired. This prevents resetting and selling a vehicle with an unrepaired emissions fault.

36. A — Mode 04 erases emissions-related DTCs, freeze frame data, and resets readiness monitors. The technician uses this after a repair to clear stored codes and verify the repair through the next drive cycle. Mode 04 does not affect permanent DTCs (which require monitor pass to clear).

37. C — Generic OBD-II codes (P0xxx, P2xxx) cover only emissions-related faults that are standardized across all manufacturers. Enhanced (manufacturer-specific) codes (P1xxx, P3xxx in some ranges, B/C/U codes) cover everything outside the emissions standard. Generic scan tools read only generic codes; enhanced codes require manufacturer-capable tools.

38. D — Mode 06 returns on-board monitor test results, including pass/fail status and the actual measured values compared to specification thresholds. This is invaluable for diagnosing marginal emissions failures and verifying that a repair has fully restored monitor performance.

39. B — Active output testing (bidirectional control) allows the scan tool to command individual actuators (solenoids, motors, relays, indicators) on and off, isolating which specific component or circuit is at fault. This active testing is far more efficient than passive observation and is a core diagnostic capability on OEM scan tools.

40. A — The SAE J2534 standard defines a pass-through programming interface that lets generic hardware run OEM-developed programming software. The standard enables independent shops to flash modules using manufacturer software without owning every manufacturer's proprietary scan tool. J2534 has been mandated by regulators in the US and Canada for emissions-related programming.

41. D — GMLAN single-wire CAN (SWCAN) operates at 33.3 kbps with a single wire and ground return. The lower speed and simpler wiring are acceptable for non-critical body comfort systems (door locks, mirrors, seats). An optional 83.3 kbps wake-up mode is used during programming.

42. C — CAN-FD (Flexible Data Rate) increases the data payload to 64 bytes per frame, much larger than classic CAN's 8-byte limit. Combined with the higher data-phase bit rate (up to 5 Mbps), CAN-FD provides much greater bandwidth without changing the overall network topology or terminator requirements.

43. B — A manufacturer-capable (OEM) scan tool provides full bidirectional control, access to all modules, programming capability, and the most current TSB-related procedures. Complex multi-module concerns on modern vehicles require this depth of access that generic OBD-II tools cannot provide.

44. A — A concentric slave cylinder (CSC) surrounds the input shaft (concentric to it) and integrates the throwout bearing with the hydraulic cylinder itself. The design simplifies clutch operation by eliminating the external slave cylinder, fork, and pivot point. Failure typically requires transmission removal to replace.

45. C — The counter shaft (cluster gear) is parallel to the main shaft and continuously rotates with the input shaft through a meshed gear. The counter shaft carries the various gear ratios that the output shaft can select via shift forks and synchronizers. It is the heart of the manual transmission gear train.

46. D — In 1st gear, power flows from the input shaft to the counter shaft via the input gears, then through the 1st gear set on the output shaft. The 1-2 synchronizer locks the 1st gear to the output shaft, completing the path. This produces the highest torque multiplication and lowest output speed of all gear ratios.

47. B — In an automatic transmission, a brake band wraps around a planetary gear drum and is applied by a servo to hold the drum stationary. Holding one element of a planetary gearset changes the gear ratio. Bands are activated and released to produce specific gear changes during shifting.

48. A — At idle with the transmission in drive and brakes applied, the impeller (engine-driven) spins while the turbine (transmission-driven) is held stationary by the brakes. Fluid coupling slips, transmitting only enough torque to create the gentle creep that is normal for an automatic transmission at idle.

49. D — Modern automatic transmission line pressure is controlled by the PCM commanding an electronic pressure control (EPC) solenoid with variable duty cycle. The PCM adjusts pressure based on throttle position, gear, vehicle speed, and other parameters, producing smooth, controlled shifts under all conditions.

50. B — A harsh 1-2 shift in an otherwise normally-functioning transmission typically indicates excessive line pressure during the 1-2 shift event, often from a stuck EPC solenoid or a failed throttle position sensor sending the PCM an incorrect load signal. The over-pressurized 2nd-gear clutch applies too aggressively, producing the harsh feel.

51. C — On-vehicle driveshaft balancing requires an electronic balancer with a vibration sensor (accelerometer or magnetic pickup) and a strobe light to identify the angular position of the imbalance. Test weights are added and the imbalance is reduced iteratively until vibration is within spec.

52. A — Pinion bearing preload is measured by the torque required to start the pinion rotating after final assembly. The reading is taken with an inch-pound torque wrench (or a beam-style torque indicator) and must fall within the manufacturer's specified range (typically 8-20 in-lbs depending on the differential).

53. D — A driver-selectable locker mechanically locks both axle shafts together via an electric or air-actuated mechanism, transferring full engine torque to both wheels regardless of differential action. The result is maximum traction off-road, but driveline binding on dry pavement, so it's only engaged when needed.

54. C — Torsen (Torque-Sensing) differentials use helical worm gears whose mesh geometry creates internal friction proportional to torque demand. The friction biases torque to the wheel with more grip, providing limited-slip behaviour without electronics, hydraulics, or wear surfaces. Common on Audi Quattro and other performance AWD systems.

55. B — A center differential allows different rotational speeds between the front and rear driveshafts, which is essential on dry pavement where the front and rear axles travel slightly different distances during turns. Full-time 4WD systems with center differentials can be driven on pavement; part-time systems cannot.

56. A — The classic CV joint failure symptom is a clicking or popping noise during turns. The noise occurs because worn balls or races inside the outer CV joint cannot transmit torque smoothly through the high steering angles. A torn boot allowing grease loss is a related and equally diagnostic finding.

57. D — Routine transfer case fluid inspection looks for colour change (darkening from oxidation), debris (metal particles from wear), smell (burnt from overheating), and level. Each finding points to different problems and helps gauge service interval timing or developing issues.

58. C — On a driveshaft (single-piece or two-piece), the U-joints must be phased so that the yoke ears at each end are in the same plane (parallel). This phasing ensures the speed variations introduced by each U-joint cancel out rather than amplify, eliminating driveline vibration at highway speeds.

59. B — A C-clip axle is retained by a clip inside the differential carrier that seats in a groove on the inner end of the axle shaft. Removal requires accessing the clip through the differential carrier (typically by removing the cover and unbolting the differential cross-shaft) before the axle can be pulled outward.

60. A — Clutch-type limited-slip differentials require a specific friction modifier additive in the gear oil. The additive provides the correct friction characteristics for smooth clutch engagement during slip events, preventing the chatter (chuck-chuck noise during slow turns) that occurs without it.

61. C — An auto-ranging DMM automatically selects the appropriate measurement range based on the input signal value. This eliminates the need to estimate the expected value first and select the range manually. Manual-range meters can be slightly more accurate at the boundary of a range, but auto-range is faster for general diagnostic work.

62. D — Voltage drop testing requires the circuit to be operating under normal load. The meter is connected across the component (or wire segment) being tested while current is flowing. Without current flow, all the voltage appears across any high-resistance fault as open-circuit voltage, missing the actual drop under load.

63. B — Inductive amp clamps sense the magnetic field surrounding a current-carrying conductor and convert it to a current reading without breaking the circuit. The clamp uses either a Hall-effect sensor (for DC and AC) or a transformer coil (for AC only) to translate field strength to a meter reading.

64. A — The min/max recording function captures the highest and lowest values seen during the recording period, including momentary spikes or dips that the technician might miss while reading the live display. Particularly useful for intermittent voltage drop, brief opens, or transient signal anomalies.

65. C — A pull-up resistor connects the signal line to the reference voltage (typically 5V) through a high-value resistor. With no signal source driving the line, it floats up to the reference voltage, defining the default high state. When a switch or sensor pulls the line low, the resistor limits current and the line reads low.

66. D — A healthy silicon diode shows a forward voltage drop of approximately 0.5-0.7V in one direction (forward bias) and OL (open) in the reverse direction. The forward voltage drop represents the energy required to overcome the P-N junction barrier; the open in reverse confirms the diode blocks current in that direction.

67. A — A carbon-pile load tester applies a load equal to half the battery's CCA rating for 15 seconds. The battery passes if voltage stays above 9.6V at the end of the load period. The half-CCA load simulates real-world cranking conditions; the 9.6V threshold corresponds to the minimum voltage for reliable PCM and starter operation.

68. C — A healthy alternator output is DC with a small rectified ripple from the three-phase stator. Excessive ripple (more than approximately 0.5V AC) indicates a failed diode in the rectifier bridge, allowing significant AC to pass through the DC output. The ripple is best diagnosed with an oscilloscope showing the waveform.

69. B — On a standard ISO automotive relay, terminals 85 and 86 are the control coil terminals that energize the relay's electromagnet. Terminals 30, 87, and 87a are the high-current power and load terminals. Knowing the pinout enables direct testing of the coil resistance and the contact operation.

70. D — Stepper motors have multiple coils energized in a specific sequence (typically two or four coils), with each step rotating the rotor a fixed angle (often 1.8 or 7.5 degrees). The PCM commands a specific number of steps to achieve precise position control, common in IAC valves, HVAC blend doors, and other actuators.

71. A — Solid-state relays use semiconductor switching elements (TRIACs, MOSFETs, or IGBTs) instead of mechanical contacts. SSRs have no moving parts, no contact arcing, longer life, and faster switching, but generate more heat than electromechanical relays and require heat sinking in higher-current applications.

72. C — Modern vehicles with multiple modules properly entering sleep mode typically have a total parasitic draw of 30-80 mA (varies by manufacturer and equipment level). Higher draw drains the battery within a few weeks of inactivity. Values below 30 mA are excellent; values above 100 mA require investigation for a module that's not sleeping.

73. B — A power window's auto-up feature uses motor current sensing and Hall-effect pulse counting in the BCM to track window position and detect obstructions. If current rises sharply (indicating a pinch), the BCM stops or reverses the motor to prevent injury. The pulse counting enables auto-reverse from any position.

74. D — A heater core leak produces a characteristic combination of symptoms: a sweet glycol odour in the cabin, fog or steam from the defrost vents (vapourized coolant), and a wet front passenger floor where the heater core drains. The three symptoms together are diagnostic for heater core failure.

75. C — A variable displacement A/C compressor uses an internal swashplate whose angle changes to vary the piston stroke. A small swashplate angle produces short strokes and low displacement (low cooling); a steep angle produces long strokes and high displacement (high cooling). The result is continuous variable output without compressor cycling.

76. B — A/C compressor clutch coils typically draw 3-5 amps at 12V, providing about 36-60 watts of magnetic field power. The current is enough to engage the clutch reliably against the compressor's torque load without overheating the coil during extended operation. Higher current indicates a coil with shorted turns.

77. D — Power door lock actuators use a small reversible DC motor with a rack-and-pinion or worm gear mechanism that converts rotation into linear motion. The motor's direction is reversed by switching polarity through the BCM-commanded relay drivers, locking or unlocking the door as needed.

78. A — Older vehicles used a heater control valve to block coolant flow to the heater core when cabin heating was not needed. Modern vehicles use blend door control instead — coolant flows through the heater core continuously, and the blend door directs the air either across or around the core. The mechanical valve was a common leak source on older designs.

79. C — A moderately undercharged A/C system produces reduced cooling capacity (vent temperatures higher than spec) and may cause the compressor to short-cycle on the low-pressure switch as pressures dance around the cut-in threshold. Severely low refrigerant trips the low-pressure cut-off entirely, preventing compressor operation.

80. B — Cabin air filters are most commonly located behind the glove box assembly or under the hood near the cowl intake at the base of the windshield. Both locations provide reasonable access for filter replacement at the manufacturer-recommended interval (typically 20,000-30,000 km).

81. D — Intermittent flickering with otherwise functional headlights points to worn or corroded internal switch contacts inside the headlight switch. The high current through the switch contacts (often 10-15 A for halogen headlights) accelerates contact erosion over time, eventually producing the intermittent connection.

82. A — The evaporator core is the cabin-side heat exchanger where the refrigerant absorbs heat from cabin air. The low-pressure liquid refrigerant entering the evaporator boils into vapour as it absorbs heat, dramatically cooling the air passing through the evaporator fins. The cooled, dehumidified air is then blown into the cabin.

83. C — Under loaded conditions (headlights, blower, rear defrost on), the alternator output voltage should remain between approximately 13.5 and 15V (typically 13.8-14.7V). Below 13.5V the battery is no longer being charged adequately; above 15V indicates overcharging that can damage the battery and electronics.

84. B — A grinding noise during braking indicates the brake pads have worn completely through and the metal backing plates are contacting the rotor. The result is severe rotor damage requiring replacement of both pads and rotors, plus inspection of the calipers for damage.

85. D — A pedal that gradually sinks under steady foot pressure with no visible leak indicates an internal master cylinder bypass — fluid is leaking past the piston cup seal back into the reservoir. The hydraulic system loses pressure internally rather than externally. Replacement of the master cylinder is the repair.

86. A — Vehicles with electronic parking brake (EPB) integrated into the rear calipers require activation of EPB service mode through the scan tool. The mode commands the EPB motor to retract the piston,

providing clearance for new pad installation. Forcing the piston without service mode damages the EPB motor.

87. C — Manually adjustable ABS wheel speed sensors require an air gap of approximately 0.5-1.0 mm between the sensor tip and the tone ring (consult manufacturer specs). Too close causes contact and damage; too far weakens the signal. Modern integrated sensors (in the wheel bearing) eliminate this adjustment.

88. B — A brake proportioning valve reduces pressure to the rear brakes during heavy braking, preventing rear lockup that would result from weight transfer to the front during deceleration. With the rear brakes properly proportioned, the vehicle maintains stability during emergency stops.

89. D — A quick take-up master cylinder design delivers a large initial volume of fluid quickly to take up caliper clearance on vehicles with low-drag (knock-back) calipers, then shifts to normal pressure operation. The design provides good pedal feel despite the increased caliper clearance.

90. A — Power steering pump pressure is tested with a pressure gauge installed in the high-pressure hose between the pump and the steering gear. The test checks pump output (typically 1000-1500 psi at relief), pressure relief valve operation, and steering gear internal sealing.

91. B — A strut cartridge design has a removable inner shock absorber cartridge inside a permanent outer housing welded or bolted to the chassis. Replacement involves opening the housing (often by unscrewing a gland nut) and swapping the cartridge, rather than replacing the entire strut assembly.

92. D — A worn pitman arm has internal play at its connection to the steering gear sector shaft, allowing the linkage to move without corresponding steering wheel input. The result is steering wander or play that cannot be corrected by adjusting the steering box, since the wear is in the arm itself.

93. C — Sway bar mounting bushings harden and crack with age, producing the characteristic clunking or rattling noise over bumps as the bar pivots in the worn bushing. Hardening is accelerated by ozone exposure, salt, temperature swings, and cyclic loading. Replacement is relatively quick and inexpensive.

94. A — A failing wheel bearing typically produces a noise that changes during cornering as vehicle weight transfers between sides. Cornering loads the outside (opposite side from the turn direction)

bearing more heavily, often making the noise louder when weight transfers to the failing side. Static noise that doesn't change with cornering points elsewhere.

95. B — Tire cupping (scalloped wear in patterns around the tire's circumference) is caused by worn shock absorbers or struts that allow the tire to bounce or skip on the road surface. The intermittent contact creates uneven wear pattern. Replacing the damping components restores even tire contact.

96. D — Direct TPMS sensors with internal lithium batteries have a typical service life of 5-10 years depending on usage and operating temperatures. When the battery fails, the entire sensor must be replaced (the battery is not replaceable). Most sensors fail within this range based on accumulated radio transmissions.

97. A — Included angle = Camber + SAI (steering axis inclination) at the same wheel. This relationship is geometrically determined by the suspension design and is constant for a given vehicle. Comparing left vs right included angle is a key diagnostic for bent components (spindle, knuckle, strut).

98. C — The brake fluid level sensor (typically a magnetic float switch in the reservoir) illuminates the brake warning light when the fluid level drops below a calibrated minimum. The condition can indicate either a leak in the brake system or normal pad wear (fluid migrating to the caliper pistons as pads thin).

99. B — Caliper slide pins require a high-temperature silicone-based brake caliper grease that's formulated for the brake operating environment and is compatible with the rubber boots. Standard greases break down at brake temperatures, and petroleum-based products may damage the boots.

100. D — An internal collapse of a brake hose creates a one-way valve effect: brake fluid flows out to apply the brake, but the collapsed section restricts return flow. The result is the brake either dragging continuously or being slow to release after pedal application, often producing localized overheating and pull.

101. C — After ABS module replacement, the yaw rate sensor typically requires calibration through the scan tool, performed with the vehicle parked on a level surface. The calibration teaches the new module the sensor's zero offset, ensuring accurate yaw measurements for stability control intervention.

102. A — Adaptive damping shock absorbers use a solenoid valve to change fluid orifice openings, varying the damping rate. A vehicle module commands the solenoid based on inputs like speed, steering angle, throttle position, and accelerometer readings, providing different damping for ride comfort versus handling response.

103. B — An air suspension compressor that runs continuously without raising the vehicle indicates either a significant air leak in the system (the compressor cannot keep up with the leak) or a failed compressor unable to build pressure. Both are diagnosed by pressure testing and listening for leaks with the system pressurized.

104. C — Modern computerized wheel alignment equipment uses targets attached to each wheel, read by cameras or laser sensors. The computer calculates each alignment angle from the target images and compares to the manufacturer's specifications, displaying live readings as adjustments are made.

105. A — Brake hose banjo bolts at the caliper must be torqued to manufacturer specification with new copper sealing washers installed on each side of the fitting. Used copper washers have been compressed and may not seal again; the new soft copper crushes properly under the bolt torque to create a leak-free seal.

106. D — Electronic brake fluid moisture testers measure water content directly using electrochemical or conductive principles. They display the result as a percentage of water content; above approximately 3% indicates the fluid has absorbed enough moisture to lower its boiling point significantly, requiring replacement.

107. C — The manufacturer-specified SRS waiting time (typically 1-10 minutes depending on the system) allows the SRS module's backup capacitor to fully discharge. The capacitor stores enough energy to deploy an airbag if the battery is suddenly disconnected during a crash; servicing without waiting risks inadvertent deployment.

108. A — The Sensor Diagnostic Module (SDM, sometimes called ACM or airbag control module) is the brain of the SRS. It monitors all crash sensors (accelerometers, rollover sensors, seat occupancy classification), validates inputs through redundant algorithms, and decides when and which airbags and pretensioners to deploy during a crash.

109. B — The seat occupancy classification sensor determines whether the passenger seat is empty, has a child or child seat, or has an adult. The SDM uses this input to control passenger airbag deployment:

deployment is suppressed for empty seats and most child configurations, and may be reduced for smaller adults.

110. C — Rollover-deployed roof side airbags are triggered by roll rate sensors (measuring rotation rate) combined with lateral acceleration sensors. When the sensor combination indicates an imminent rollover, the SDM deploys the curtains before the vehicle actually inverts, cushioning occupants against the side glass and pillars.

111. D — The hood release cable is operated mechanically by a release lever inside the cabin (typically on the driver's side floor or dashboard). The cable pulls the primary hood latch; the secondary safety latch under the front of the hood is then manually released to fully open the hood.

112. A — Body alignment after collision is verified using a frame measuring system (mechanical jigs or laser-based systems) that compares actual chassis control points to manufacturer specifications. Properly aligned frames are essential for correct steering geometry, wheel alignment, and crash safety in any future collision.

113. C — Door alignment for a sagging door is adjusted using shims or slotted hinge mounting points at the door hinges. Loosening the hinge bolts allows repositioning to lift the door or shift it laterally to match the body opening, then re-tightening to spec. Severe sag may require new hinges.

114. B — A washer system with a full reservoir and operating pump but no spray most likely has a blocked or kinked washer fluid line between the pump and the nozzles, typically at a hood-to-body grommet or near a nozzle. Inspect the line routing for obvious kinks before disassembling for a clog.

115. C — After an SRS deployment, the SDM stores a permanent record of deployment time, crash severity (delta-V), sensor inputs, and module status. This data is recoverable via scan tool and is used for diagnosis, recall investigations, and forensic crash analysis. The SDM typically must be replaced after deployment.

116. A — The BCM monitors vehicle speed from the speed sensor or CAN bus signal and commands the door lock actuators to lock when the vehicle exceeds a programmed threshold (typically 15-25 km/h). The threshold is customer-configurable on many vehicles. The function provides security and safety while driving.

117. D — Many EVs use a PTC (Positive Temperature Coefficient) heater with a resistive ceramic element that produces heat when current flows. The heat output requires significant battery power — typically 3-7 kW — which reduces winter EV range significantly. Heat pumps are increasingly used to improve cold-weather efficiency.

118. B — On a regenerative-capable EV, light brake pedal pressure activates regenerative braking first; hydraulic friction brakes engage only if more deceleration is needed. The blending is invisible to the driver and managed by the brake controller, maximizing energy recovery during normal stops.

119. C — EV motors produce maximum (or near-maximum) torque at zero RPM and have a wide power band (some operate to 12,000+ RPM). A single-speed reducer (typically about 9:1 ratio) is sufficient for normal driving across the full speed range, without needing the multiple gears that ICE vehicles require.

120. A — Electric motors produce maximum torque at zero RPM and maintain it through the lower speed range. This contrasts dramatically with internal combustion engines, which produce minimal torque at low RPM and require gear reduction to provide useful torque for acceleration. The flat torque curve is a fundamental EV characteristic.

121. D — Cylindrical lithium-ion cells are named by their dimensions in millimetres: 18650 = 18 mm diameter × 65 mm length; 21700 = 21 mm diameter × 70 mm length. The trailing "0" indicates a cylindrical shape. Tesla and others use these to build high-density packs from thousands of small cells, often individually fused.

122. B — High-voltage cables on EVs use orange insulation to identify the high-voltage danger (a standardized industry color convention) and include an internal shield to reduce electromagnetic interference (EMI). The shield prevents the high-voltage switching currents from emitting EMI that could disrupt other vehicle electronics.

123. C — The DC bus capacitors inside the inverter store significant energy when the high-voltage system is energized. After shutdown, bleeder resistors discharge them gradually; the manufacturer specifies the wait time (typically 5-10 minutes) until voltage drops to safe levels. Skipping the wait risks electric shock from the stored capacitor energy.

124. B — After an EV or hybrid collision, the technician must treat the high-voltage system as energized until verified de-energized with a high-voltage rated meter, following the manufacturer's

emergency response procedures. The procedures specify safe disable steps, including specific cut-loops or service plug pulls, before any HV work begins.

125. D — EV batteries operate optimally at approximately 20-40 °C. Higher temperatures accelerate degradation (electrolyte decomposition, SEI growth); lower temperatures reduce performance (slower ion mobility, lower charge acceptance). The battery thermal management system maintains this range using liquid cooling and heating loops.