PRACTICE EXAM 8: RED SEAL 310S SIMULATION (125 QUESTIONS)

1. A pneumatic impact wrench rated at a maximum 7 bar (100 psi) operating pressure is connected to a shop air system with the pressure regulator set at 10 bar. The technician should:

A. Use the impact at the higher pressure to access more torque output

B. Reduce the regulator setting to the tool's rated maximum to prevent damage and exposure

C. Bleed the air line before each use to reduce pressure temporarily

D. Add an additional hose to the line to dissipate the higher pressure

2. When drilling stainless steel with a high-speed steel (HSS) twist drill, the correct drilling speed (RPM) should be:

A. Slower than for mild steel of the same diameter, with steady feed and cutting fluid

B. Faster than for mild steel of the same diameter, with light feed and no fluid

C. The same as for mild steel of the same diameter, with hand pressure feed

D. The fastest possible speed to minimize heat generation during cutting

3. When restoring a worn surface by hand filing, the file must be drawn so that:

A. The teeth cut on both the forward and backward strokes for efficiency

B. The teeth contact the surface only during the backward stroke

C. The file is rotated continuously during the forward stroke to spread wear

D. The teeth cut only on the forward (pushing) stroke, with the file lifted on the return

4. After completing welding work in an area covered by a hot work permit, the technician must:

A. Remove the permit document immediately for filing in the shop records

B. Resume normal shop operations because the welding task is complete

C. Provide fire watch monitoring of the area for a specified time (typically 30 to 60 minutes) after work

D. Hand the welder to the next user without any further inspection requirements

5. A workplace hazard assessment must be:

A. Documented in writing and reviewed periodically or when work conditions change significantly

B. Performed only when a workplace incident has already occurred at the location

C. Conducted verbally between the technician and the shop owner during morning meetings

D. Completed only once during shop opening and considered permanent thereafter

6. The WHMIS 2015 pictogram showing a gas cylinder identifies products that are:

A. Compressed gases (compressed, liquefied, refrigerated, or dissolved gases) under pressure in containers

B. Aerosol products in spray cans regardless of contents under pressure

C. Substances that are oxidizing gases supporting combustion of other materials

D. Pressurized hydraulic fluids used in equipment operation under pressure

7. On discovering a fluid spill (e.g., used motor oil) in the shop, the first response priority should be:

A. Immediately mop the spill with shop towels to clean the floor surface

B. Ensure personal safety, alert nearby workers, then contain the spill with absorbent material

C. Identify which technician caused the spill for shop incident records

D. Photograph the spill before any cleanup for insurance documentation purposes

8. When lighting an oxyacetylene cutting torch, the correct sequence is:

A. Open both oxygen and acetylene valves simultaneously and light with a striker

B. Open the oxygen valve fully first, then add acetylene gradually for ignition

C. Open the acetylene valve first and light it, then add and adjust the oxygen

D. Pre-mix the gases in the hose, then open and light the combined mixture

9. A workplace incident causing serious injury must typically be reported to:

A. Provincial occupational health and safety authority within the timeframe set by regulation (often immediately for serious injuries)

B. The vehicle manufacturer if the incident occurred during the manufacturer's warranty

C. Local police only, who will determine if further reporting is required

D. The shop's insurance broker, who will handle all required notifications

10. An engine that has ingested water through the air intake and is suspected of hydrolock will most likely show:

A. Free engine rotation with normal compression on all cylinders during testing

B. Smooth idle with white exhaust smoke during operation

C. Difficult starting with rough idle that improves with throttle input

D. Inability to rotate the engine (locked crankshaft) or a bent connecting rod after attempting to start

11. A vehicle with 200,000 km sets DTC P0008 "Engine Position System Performance" and P0017 "Crankshaft Position–Exhaust Camshaft Position Correlation." The most likely cause is:

A. A failed crankshaft position sensor that requires replacement to restore correlation

B. A failed exhaust camshaft position sensor reporting incorrect position to the PCM

C. A stretched timing chain that has allowed cam timing to retard outside specification

D. A failed PCM that needs reprogramming to correct the position calculations

12. A diesel engine shows engine oil that has risen above the dipstick full mark and smells of diesel fuel. The most likely cause is:

A. Excessive engine idle time causing oil expansion above the full mark

B. A leaking diesel fuel injector or injector return that is dripping fuel into the oil sump

C. A failed oil pump pressure relief valve that has elevated the oil level

D. Excessive engine wear allowing combustion gases to pressurize the crankcase

13. On a diesel engine, the DPF differential pressure sensor's primary function is to:

A. Measure the pressure difference across the DPF, indicating soot load and triggering regeneration when needed

B. Monitor exhaust back pressure at the turbocharger outlet during all operating conditions

C. Detect DEF quality and concentration in the SCR aftertreatment system

D. Measure intake manifold pressure to calculate EGR flow rate from the exhaust

14. A vehicle sets DTC P0011 "Intake Camshaft Position System Performance" at idle but the code clears at higher RPM. The most likely cause is:

A. A failed camshaft position sensor that needs replacement to restore correct signal

B. Low engine oil level reducing oil flow to all engine components at idle

C. A failed intake camshaft that has worn beyond service limit on the lobes

D. A stuck or sluggish VVT phaser or oil control valve, unable to achieve commanded cam position at low idle oil pressure

15. A vehicle with cylinder deactivation (DOD/AFM) develops a tick noise from the engine that is louder under light load. The most likely cause is:

A. Worn timing chain guides allowing chain slap during light load operation

B. A failed lifter (collapsed or stuck) on a deactivated cylinder, common with this technology

C. A loose exhaust heat shield rattling against the exhaust pipe during operation

D. Worn engine mounts allowing the engine to contact the body during operation

16. A vehicle with 150,000 km has a complaint of unstable idle and occasional stalling. The throttle body plate shows heavy carbon buildup around the perimeter. The correct service is:

A. Replace the entire throttle body assembly due to permanent carbon damage

B. Clean the throttle plate with carburetor cleaner and continue with normal operation

C. Clean the throttle body with approved throttle body cleaner, then perform the idle relearn procedure

D. Adjust the idle air bypass screw to compensate for the restricted airflow

17. A vehicle's EVAP purge solenoid is stuck in the open position. The most likely driveability symptom is:

A. Rough idle and possible stalling at idle due to uncontrolled fuel vapour entering the intake manifold

B. Excessive fuel consumption at highway speeds with normal idle quality

C. No driveability symptoms because purge has no effect on engine running quality

D. Severely retarded ignition timing causing reduced power and excessive heat

18. A scan tool shows long-term fuel trim (LTFT) on bank 1 at +18% and short-term fuel trim (STFT) varying around zero, while bank 2 LTFT is at 0%. The most likely cause is:

A. A failed mass airflow sensor causing both banks to read incorrectly together

B. A vacuum leak or fuel delivery problem affecting bank 1 only, prompting PCM to add fuel

C. A failed oxygen sensor on bank 2 that has stopped reporting actual exhaust conditions

D. Normal fuel trim behaviour for an engine in proper operating condition at idle

19. A vehicle has a tapping/ticking noise from the engine that is loudest at cold start and quiets after warm-up. The technician suspects:

A. A loose timing belt that tensions as the engine warms up to operating temperature

B. Worn rocker arm bearings that lubricate after oil pressure builds at start

C. A loose intake manifold gasket that seals as components expand with heat

D. A cracked exhaust manifold, where the crack closes as the manifold heats and expands

20. A converter that is glowing red during a test drive indicates:

A. Excess unburned fuel reaching the catalyst, typically from a misfire or rich-running condition

B. Normal operation of a high-performance converter under heavy load conditions

C. A failed catalyst monitor that is allowing excessive heat to build up internally

D. Excessive secondary air injection during cold start enrichment operation

21. On a modern GDI engine with frequent short trips, the oil level may rise above the full mark and smell of gasoline. The most likely cause is:

A. Worn piston rings allowing combustion gases to pressurize and expand the oil

B. A failed PCV valve allowing fuel vapour to accumulate in the crankcase

C. Fuel washing past the piston rings during cold-start enrichment, with insufficient operating temperature to evaporate it out of the oil

D. Excessive oil pump pressure forcing oil up the dipstick tube against gravity

22. On a healthy modern engine started cold, oil pressure typically:

A. Reads zero for the first 30 seconds before climbing slowly to operating range

B. Reads high immediately at start due to cold (thick) oil, then drops to specification as the oil warms

C. Reads at its operating value (typically 30-60 psi) within one second of cranking

D. Cycles rapidly between zero and maximum during the first minute of operation

23. A vehicle has noticeable engine vibration at idle that smooths out above 1,500 RPM. Compression and fuel pressure are normal. The most likely cause is:

A. A failing fuel pump causing intermittent fuel pressure drops at idle

B. A failing crankshaft position sensor causing intermittent ignition timing changes

C. A loose serpentine belt that tensions correctly above idle speed

D. A broken or collapsed engine mount, which transmits engine vibration to the body at idle

24. A diesel engine's coolant has been found to contain engine oil. The most likely cause is:

A. A failed engine oil cooler (oil-to-coolant heat exchanger) allowing oil to mix with coolant

B. A cracked cylinder head allowing combustion gases into the cooling system

C. A failed water pump seal that has contaminated coolant with grease from the pump

D. Engine overheating that has degraded the coolant and produced oil-like residue

25. A vehicle with 250,000 km consumes 1 litre of oil every 3,000 km with no visible external leaks. Compression is within 10% across all cylinders. The most likely cause is:

A. A failed PCV valve drawing oil from the crankcase into the intake

B. A leaking valve cover gasket that drips internally onto hot exhaust components

C. Worn piston rings and cylinder walls, allowing oil to pass into the combustion chamber

D. A failed engine oil pump producing excessive pressure that overcomes seals

26. A customer complains of a sweet smell inside the cabin, fogged windshield from the inside, and damp passenger-side carpet. The most likely cause is:

A. A clogged sunroof drain leaking water onto the cabin floor during rain events

B. A leaking heater core inside the HVAC case, releasing coolant into the cabin air stream and carpet

C. A failed windshield washer reservoir leaking fluid into the cabin foot well

D. A blocked A/C evaporator drain, allowing condensate to back up into the cabin

27. A diesel engine has a "knocking" noise that is loudest at idle and changes pitch with engine load. The technician determines the noise originates near the bottom end of the engine. This suggests:

A. Worn rocker arms or valve train clatter from upper engine components

B. Worn timing chain or chain guides at the front of the engine

C. Loose accessory belt pulley contacting another component during operation

D. Worn rod or main bearings, which are bottom-end components affected by load changes

28. A diesel engine sets a DEF quality fault code. The technician confirms the DEF tank has been filled with the correct fluid. The most likely cause is:

A. A failed DEF quality sensor in the DEF tank, requiring replacement after verifying the fluid is correct

B. A failed NOx sensor downstream of the SCR catalyst, mistakenly interpreted as DEF fault

C. A worn engine that produces excessive NOx beyond the SCR system's capability

D. A failed DPF that has cross-contaminated the SCR system with soot

29. A diesel engine has visible blue smoke from the exhaust at startup, an oily residue inside the intercooler piping, and a whine from the turbocharger that varies with engine speed. The most likely cause is:

A. A failed EGR valve allowing exhaust to bypass into the intake during operation

B. A failed intercooler producing internal restriction to airflow under boost conditions

C. Failed turbocharger bearings, allowing oil to enter the intake (compressor side) or exhaust (turbine side) and producing the whine

D. A failed PCV system pressurizing the crankcase and pushing oil into the air intake

30. A vehicle sets DTC P0420 "Catalyst System Efficiency Below Threshold" with no fuel trim issues, no other DTCs, and a downstream O2 sensor that mirrors the upstream sensor activity. The most likely cause is:

A. A failed upstream oxygen sensor that has stopped switching at the expected rate

B. A catalytic converter that has lost its oxygen storage capacity and no longer differentiates upstream and downstream readings

C. An intermittent vacuum leak that has corrupted the catalyst efficiency calculation in the PCM

D. A failed PCM that needs reprogramming to correct the catalyst monitor threshold

31. DTC P0455 "EVAP Large Leak Detected" differs from P0442 "EVAP Small Leak Detected" by:

A. The size of the leak — a missing fuel cap or a major hose disconnection sets P0455; a smaller pinhole or weak seal sets P0442

B. The location of the leak — P0455 indicates a fuel tank leak; P0442 indicates a charcoal canister leak

C. The age of the leak — P0455 sets for new leaks; P0442 sets for old, weathered leaks

D. The PCM software version — P0455 sets on older vehicles; P0442 sets on newer vehicles only

32. On a modern vehicle with a sleeping CAN network, the wake-up signal that brings the network back online can be initiated by:

A. Only the PCM through a programmed wake-up event during driving

B. Only the scan tool when connected to the DLC during diagnosis

C. Only the body control module on receiving a remote start signal

D. Any module on the network, typically triggered by a door switch, key fob signal, or scan tool

33. After all modules have entered sleep mode, the vehicle's normal parasitic current draw is typically:

A. 200 to 500 milliamps measured at the battery negative cable during the test

B. 30 to 80 milliamps measured at the battery negative cable during the test

C. 1 to 3 amps measured at the battery negative cable during the test

D. Zero amps because all modules are completely off during sleep mode

34. OBD-II permanent DTCs (Mode 0A) differ from confirmed DTCs because:

A. Permanent DTCs are cleared by the scan tool only after multiple drive cycles are completed

B. Permanent DTCs apply only to manufacturer-specific enhanced codes, not generic OBD-II codes

C. Permanent DTCs cannot be scan-tool cleared; the PCM must verify the fault is gone before clearing

D. Permanent DTCs are stored in the BCM rather than the PCM for emissions tracking purposes

35. An OBD-II "drive cycle" is:

A. A specific sequence of operating conditions (cold start, idle, acceleration, cruise, deceleration) required to complete emissions monitor tests

B. The vehicle's total distance travelled since the last DTC clear operation by the scan tool

C. The time the engine has been running since the most recent ignition cycle

D. Any time the vehicle has been driven for more than 30 minutes continuously

36. A vehicle is required to pass an emissions test, and the PCM shows multiple monitors as "Not Ready." The technician should:

A. Tell the customer that the vehicle has multiple problems requiring repair before testing

B. Reset the PCM using a scan tool to force the monitors to ready status for testing

C. Tell the customer to drive immediately to the inspection station because monitors are irrelevant

D. Drive the vehicle through the manufacturer's specified drive cycle until the monitors complete and report Ready status

37. OBD-II "generic" DTCs (P0xxx) differ from manufacturer "enhanced" DTCs (P1xxx) because:

A. Generic DTCs apply only to emissions-related faults; enhanced DTCs cover all systems on the vehicle

B. Generic DTCs are stored in different memory; enhanced DTCs are stored in flash memory only

C. Generic DTCs are defined and standardized across all manufacturers (SAE J2012); enhanced DTCs are manufacturer-specific and require manufacturer scan tools or software

D. Generic DTCs are only set during cold operation; enhanced DTCs are set only when warm

38. After replacing a body control module (BCM) on a modern vehicle, the technician must typically:

A. Replace the PCM simultaneously because they are programmed together as a matched set

B. Configure the new BCM with the vehicle's VIN, options, and operating parameters through the scan tool

C. Drive the vehicle 100 km to allow the new BCM to learn its configuration automatically

D. Reset the immobilizer transponder before any operation by removing it from the key

39. The Calibration ID (CAL ID) reported by the PCM through OBD-II Mode 09 is used to:

A. Verify the current PCM software calibration matches the manufacturer's specification and any required updates

B. Identify the vehicle's manufacturer and model year through the diagnostic port

C. Determine the type of fuel the PCM is calibrated for (gasoline, E85, diesel)

D. Display the vehicle's odometer reading at the time of the last DTC clear

40. To perform some module reprogramming operations, the scan tool must complete a security access (seed-and-key) exchange with the module. This procedure exists to:

A. Test the scan tool's cable connection to the DLC during operation

B. Verify the technician's identity through a biometric scan at the scan tool

C. Confirm the module's serial number matches the database of authorized modules

D. Prevent unauthorized parties from reprogramming critical modules without proper credentials

41. ISO 14229 (Unified Diagnostic Services, UDS) is the modern diagnostic protocol used over CAN. Compared to the older OBD-II generic protocol, UDS provides:

A. Lower diagnostic data rates suitable for legacy vehicles only

B. Identical functionality with no additional services beyond OBD-II

C. Extended diagnostic services beyond emissions, including module reprogramming, security access, and detailed data retrieval

D. Only the basic 10 OBD-II modes without any manufacturer extensions

42. A U-series DTC (e.g., U0100 "Lost Communication with PCM") indicates:

A. An undefined fault that requires the manufacturer to define before diagnosis can proceed

B. A network communication problem; one module cannot establish or has lost communication with another module

C. An underbody sensor fault, specific to wheel speed or suspension sensors only

D. An unfiltered exhaust fault, related to the catalytic converter or DPF system

43. A vehicle has DTCs in multiple modules reporting "Lost Communication with BCM" (e.g., U0140). The first diagnostic step should be:

A. Verify BCM power and ground circuits and the BCM's CAN connections to the bus

B. Replace the BCM immediately because the multiple DTCs indicate definite BCM failure

C. Replace the PCM because it is the most likely module to lose BCM communication

D. Clear all DTCs and road-test the vehicle to see if any codes return after operation

44. A dual-clutch transmission (DCT) is exhibiting slipping during 2-3 upshifts under heavy throttle, and the scan tool shows odd-gear clutch adaptation values at the limit. The most likely cause is:

A. Low transmission fluid level reducing hydraulic pressure to both clutches

B. A failed shift solenoid in the valve body that requires replacement to restore function

C. Worn synchronizer rings in the odd-gear gearset of the transmission

D. Worn odd-gear clutch friction plates, beyond the transmission's adaptation range

45. A CVT-equipped vehicle has a complaint of rubber-band feel under acceleration and a high-pitched whine that varies with engine RPM. Fluid level and condition are normal. The most likely cause is:

A. A failed CVT input speed sensor causing the transmission to lose pulley position data

B. A failed CVT valve body requiring complete transmission replacement for repair

C. Worn pulley surfaces or a stretched steel belt, allowing slip between belt and pulleys

D. A failed CVT torque converter lock-up clutch slipping under acceleration

46. In a full-time AWD vehicle with a center differential, the center differential's primary function is to:

A. Lock the front and rear driveshafts together at all times for maximum traction

B. Allow speed difference between the front and rear driveshafts during cornering, preventing driveline binding on dry pavement

C. Multiply engine torque to the wheels for improved acceleration on all surfaces

D. Disconnect the rear axle when AWD is not needed to improve fuel economy

47. A vehicle has a whine from the rear axle that occurs only during deceleration (coast), not under acceleration. The most likely cause is:

A. Worn carrier bearings allowing the differential to shift under torque application

B. A worn ring gear with damaged drive side teeth from manufacturing defects

C. Low gear oil level allowing intermittent contact between gear teeth

D. Incorrect pinion depth or worn coast side gear teeth, producing noise only on coast

48. A vehicle with a limited-slip differential (LSD) is making a chatter or grunting noise during tight low-speed turns. The most likely cause is:

A. Missing or degraded LSD friction modifier additive in the gear oil

B. A failed LSD clutch pack requiring replacement to restore function

C. Excessive backlash in the ring and pinion gear set requiring shimming

D. Worn axle shaft splines allowing axles to slip during low-speed turns

49. A differential or transfer case breather (vent) is provided on the housing to:

A. Allow gear oil to be added without removing the fill plug

B. Provide a relief path for excess gear oil during overfilling at service

C. Equalize pressure inside the housing as air heats and cools, preventing seal failure

D. Drain water that accumulates inside the housing during winter operation

50. A transmission gear set with helical-cut gears typically produces:

A. Loud whine on hard acceleration only, with no noise during coast operation

B. A quiet hum at all loads, with helical cut spreading load gradually across the tooth contact

C. Loud clicking with the shifter in neutral and clutch released at idle speed

D. Loud rattling sounds during all operating conditions regardless of vehicle speed

51. Manual transmission lubricant change is typically recommended:

A. At the manufacturer's specified interval (often 100,000-150,000 km) or sooner under severe operating conditions

B. Only when the transmission begins to make noise during shifting operations

C. Every oil change interval, because the gear oil ages at the same rate as engine oil

D. Never under normal driving, because manual transmission lubricant lasts the life of the vehicle

52. After replacing a transmission valve body or doing major transmission service, the technician should:

A. Drive the vehicle for at least 1,000 km before checking shift quality

B. Replace the PCM simultaneously to clear adaptive memory of the old transmission

C. Reset the transmission's adaptive learning through the scan tool, allowing it to relearn shift characteristics

D. Disconnect the battery for 30 minutes to clear all transmission adapts

53. A 4WD-equipped vehicle does not engage 4-Hi when the dash switch is pressed. The transfer case responds to manual lever input. The most likely cause is:

A. A failed transfer case chain that has prevented power flow to the front axle

B. A failed transfer case differential that has locked the transfer case in 2WD

C. A failed transmission output speed sensor that prevents the PCM from commanding shift

D. A failed transfer case electric shift motor, encoder, or associated wiring/control circuit

54. A vehicle equipped with a suspension lift kit develops a vibration at highway speeds. The most likely cause related to the lift is:

A. The vehicle's exhaust system being too close to the lifted body, causing resonance

B. Driveshaft U-joint operating angles changed by the lift, now outside the recommended range and producing vibration

C. The vehicle's wheel hubs being out of round from the wheel adapters used with the lift

D. The vehicle's transmission mount being damaged by the increased ride height of the lift

55. A driveshaft slip yoke that lacks proper lubrication on its splines typically produces:

A. A clunk on acceleration-to-deceleration transitions as the spline binds and releases under load reversal

B. A continuous whine that increases with vehicle speed at all loads

C. A rapid clicking sound that matches engine RPM during operation

D. Tire vibration that increases with wheel speed and changes with load

56. Modern transfer cases (especially those with electronic clutch packs) require:

A. Standard automatic transmission fluid identical to the transmission specification

B. 80W-90 gear oil identical to the differential specification on the vehicle

C. The manufacturer-specified transfer case fluid (often a proprietary formulation with specific friction properties)

D. Whatever lubricant is available, as transfer cases tolerate any oil type during service

57. During differential rebuild, pinion depth is adjusted by:

A. Replacing the crush sleeve with a thicker or thinner unit as needed

B. Adjusting the pinion nut torque to a higher or lower value as needed

C. Reshimming the carrier bearings with thicker or thinner shims as needed

D. Changing the pinion depth shim between the pinion gear head and its bearing race

58. A manual transmission grinds only when shifting into 3rd gear, with smooth shifts in 1st, 2nd, 4th, and 5th. The most likely cause is:

A. Low transmission lubricant level affecting only one gear set in the transmission

B. A worn 3rd gear synchronizer ring, failing to match speeds before engagement

C. A failed clutch slave cylinder affecting only 3rd gear engagement

D. Worn shift fork pivot bushings on the 1-2 fork only

59. A clutch hydraulic system that has been contaminated with petroleum-based brake fluid (instead of the specified DOT brake fluid) typically:

A. Causes rubber seals to swell and fail, requiring complete hydraulic system replacement

B. Improves seal life by providing additional lubrication to the rubber components

C. Has no immediate effect because all hydraulic fluids are compatible with the rubber

D. Reduces hydraulic pressure but does not damage any of the rubber components

60. A vehicle has a vibration that increases with vehicle speed but is unchanged by engine RPM at the same vehicle speed. The most likely cause is:

A. An engine misfire that varies with engine load during operation

B. A worn clutch friction disc creating engagement irregularities at idle

C. A failed harmonic balancer at the front of the engine crankshaft

D. A driveline imbalance (driveshaft, wheel, or tire) where the rotational rate matches vehicle speed

61. The maximum acceptable voltage drop across a typical low-current automotive connection (e.g., a sensor ground or signal wire) during normal operation is:

A. 1.0 V or less, after which the circuit may show intermittent operation

B. 5.0 V or less for any circuit on the vehicle regardless of load

C. 0.1 V or less for a sensor connection, with higher allowances for high-current circuits

D. 12 V (full battery voltage) for any single connection in the circuit

62. To accurately test an alternator's maximum output, the technician should:

A. Measure the alternator's no-load voltage at idle with all accessories off

B. Load the charging system to near the alternator's rated output using a carbon pile or shop load tester, then compare the output current to specification

C. Check the alternator belt for slip during cold start with the headlights on

D. Connect a DMM to the battery and observe voltage change with the engine off

63. Before performing an open-circuit voltage test on a battery, the surface charge should be removed by:

A. Allowing the battery to sit undisturbed for 60 minutes before testing the voltage

B. Adding distilled water to the battery cells to dilute the surface charge ions

C. Connecting a fast charger for 5 minutes to homogenize the cell electrolyte

D. Applying a brief load (e.g., headlights for 15 seconds, or per the procedure) to dissipate surface charge before reading the voltage

64. To measure voltage drop in a starter circuit, the DMM is connected with:

A. The leads at the battery positive and negative terminals during cranking

B. The leads at the starter motor's two main studs during cranking operation

C. The leads at the starter relay coil terminals during cranking operation

D. The leads across the connection being tested (e.g., positive cable from battery to starter), while the starter is being cranked under load

65. Diesel engine glow plugs are tested for proper operation by:

A. Measuring the resistance from each plug to ground with an ohmmeter while installed

B. Visually inspecting the plug tip for cherry-red glow after several minutes of operation

C. Measuring the current draw of each plug with an amp clamp during the glow cycle, comparing the readings to specification

D. Removing the plugs and immersing them in water to check if they boil the water

66. A break in a single line of a rear window defroster grid is repaired by:

A. Replacing the entire rear window glass to ensure consistent defrost performance

B. Applying conductive paint or a defroster grid repair kit to bridge the break in the grid line

C. Soldering a copper jumper wire across the break in the grid line

D. Reflashing the BCM to bypass the broken grid line during operation

67. A vehicle's power window with an auto-up feature stops moving after a fixed time even if the window has not reached the upper limit. This timeout function exists to:

A. Prevent motor damage if the window is jammed or the regulator has failed mechanically

B. Trigger the security alarm when the window is left partially open at parking

C. Conserve battery power during overnight parking with the windows open

D. Allow time for the window seal to compress evenly during the closing operation

68. A heated seat that does not warm is tested by:

A. Measuring the seat's surface temperature with a thermometer during normal operation

B. Replacing the entire heated seat assembly to verify the heating element function

C. Measuring the voltage at the seat heater module input during operation only

D. Measuring the heating element resistance at its connector, comparing to specification, and verifying power and ground supply

69. A vehicle's HVAC blower works only on the highest fan speed (typically speed 4), with no operation on speeds 1, 2, or 3. The most likely cause is:

A. A failed blower motor that has lost its winding insulation completely

B. A failed HVAC control head with no signal output to the blower system

C. A failed blower resistor (or BCM-controlled FET on newer vehicles), which controls the lower fan speeds while bypassing for speed 4

D. A failed cabin air filter that restricts airflow at low fan speed settings

70. On a modern vehicle, the PCM/ECM receives constant battery voltage (B+) at the connector even with the ignition off. The purpose of this constant-power supply is to:

A. Maintain Keep-Alive Memory (KAM) for adaptive learning values and DTC storage

B. Power the engine's cooling fans continuously after key-off for engine cool down

C. Operate the fuel injectors and provide a startup priming cycle for the engine

D. Allow the PCM to crank the engine without ignition key input at any time

71. A vehicle's TPMS warning lamp is on, and the scan tool reports "No Signal" from one wheel position. The most likely cause is:

A. Low tire pressure at that specific wheel position requiring inflation immediately

B. A failed TPMS sensor (often due to dead internal battery, typically after 5-10 years of service)

C. A failed TPMS receiver antenna located inside the spare tire well

D. A failed wheel speed sensor at that wheel position that needs replacement first

72. A variable displacement A/C compressor controls cooling output by:

A. Cycling the compressor clutch on and off based on evaporator temperature

B. Opening and closing the expansion valve at varying rates to control flow

C. Varying the speed of the compressor through a separate electric drive motor

D. Tilting the internal swashplate to change piston stroke and refrigerant output, often without clutch cycling

73. After repairing an A/C system, before charging refrigerant, the system must be pulled into vacuum for at least:

A. 5 minutes at 5 inHg of vacuum, which is sufficient for most modern systems

B. 10 minutes at 15 inHg, which removes contaminants from the system rapidly

C. 30 to 45 minutes at deep vacuum (below 500 microns or 29 inHg), removing moisture and verifying no leaks

D. 5 hours at deep vacuum, regardless of the system size or condition during service

74. Cabin air filters are typically replaced:

A. At the manufacturer's specified interval (commonly 24,000-32,000 km), or sooner in dusty environments

B. Only when the customer complains about poor airflow at the vents during operation

C. Every oil change interval to ensure clean cabin air at all times

D. Never, because cabin filters are designed to last the life of the vehicle

75. A vehicle has a clicking sound from behind the dashboard that occurs only when the HVAC mode is changed (e.g., from defrost to floor). The most likely cause is:

A. A failed climate control head with internal relay clicking on each mode change

B. A failed HVAC mode door actuator (stripped gears or stuck door) clicking as the actuator stalls

C. A loose dashboard panel rattling when the air pressure changes inside the case

D. A failed blower motor commutator brushes contacting the housing during operation

76. An A/C refrigerant identifier is used to:

A. Identify the location of refrigerant leaks within a system during service work

B. Test the moisture content of refrigerant currently in the system before service

C. Determine the type of compressor oil in the system before any service is performed

D. Determine if the refrigerant in the system is the type specified (e.g., pure R-134a) or contaminated with other refrigerants

77. A customer complains the A/C is blowing warm air. With the engine running, A/C on, the compressor is engaged and the high-side pressure is normal, but low-side pressure is too low. The most likely cause is:

A. An overcharged refrigerant system requiring partial recovery to specification

B. A failed compressor that has lost internal pumping capacity in the system

C. A restricted expansion device (orifice tube or TXV), or a low refrigerant charge, both producing low low-side pressure

D. A failed condenser fan that has overheated the high side under load

78. A vehicle's headlights operate only when the high-beam switch is on, with no operation in low-beam position. The most likely cause is:

A. A failed BCM module that has lost all headlight output to the system

B. A failed low-beam relay, with the high-beam circuit using a separate relay path that still functions

C. A blown headlight fuse for both low and high beam circuits in the system

D. A failed multi-function switch on the steering column losing all output signals

79. A customer reports that the dome lights stay on, the door locks operate erratically, and the wipers have a mind of their own. The most likely cause is:

A. A failed body control module (BCM) or a corrupted BCM software issue, since one module controls all these functions

B. Three separate failures occurring simultaneously, each requiring individual diagnosis

C. A failed PCM that has cross-contaminated other systems through the network

D. A corroded ground connection at the alternator affecting the entire vehicle

80. A vehicle has a parasitic battery drain of 500 mA (much higher than the 30-80 mA spec). To locate the source, the technician should:

A. Replace the battery first to rule out battery self-discharge as the cause

B. Disconnect the alternator to isolate any back-flow current from the alternator

C. Replace the BCM because it is the most common cause of parasitic drains on modern vehicles

D. Use the fuse pull method or a low-amp clamp on the fuse cabinet, isolating the offending circuit one fuse at a time

81. A vehicle's power door locks operate intermittently. The technician hears a relay click in the BCM when the lock switch is pressed, but the locks do not always actuate. The most likely cause is:

A. A failed BCM that requires replacement to restore lock function

B. A failed lock switch that has stopped sending signal to the BCM

C. A failed door lock actuator motor or its wiring, intermittently providing power flow despite the BCM relay output

D. A failed lock switch wiring open circuit at the door connector

82. A customer complains that the windshield wipers do not park at the bottom of the windshield when shut off — they stop wherever they are mid-stroke. The most likely cause is:

A. A failed wiper motor that needs to be replaced as a complete assembly

B. A failed wiper park switch inside the motor assembly, which determines the park position signal

C. A failed wiper relay that controls the wiper motor power for normal operation

D. Worn wiper arm pivots that allow the arms to stop in any position randomly

83. A vehicle's A/C is blowing only slightly cool air. The technician finds high-side pressure significantly higher than specification and low-side pressure also higher than specification. The most likely cause is:

A. A restricted expansion device (orifice tube or TXV) causing both pressures to climb

B. A failed compressor with internal leakage between high and low sides

C. A failed condenser cooling fan reducing high-side heat transfer at idle conditions

D. An overcharged refrigerant system, with too much refrigerant elevating both side pressures simultaneously

84. A vehicle pulls left during braking. The most likely cause is:

A. A sticking right front caliper or restricted right front brake hose, limiting right-side braking force

B. A failed master cylinder reducing brake fluid pressure to all four wheels equally

C. Worn brake pads on the left side rear that are missing material at all four wheels

D. A failed ABS module that has reduced all brake pressure during normal braking

85. A customer complains of progressively weaker brakes after driving down a long mountain descent. After stopping for 30 minutes, brakes return to normal. The most likely cause is:

A. A failed ABS module that disables during heat soak and recovers when cool

B. A failed brake booster losing vacuum assistance under heat conditions

C. Brake fade due to overheated friction material, with brake fluid possibly approaching boiling at the calipers

D. A failed proportioning valve that limits brake pressure during heat conditions

86. A vehicle's brake pedal sinks slowly to the floor under steady pressure. The brake fluid reservoir level is normal, and there are no visible external leaks. The most likely cause is:

A. A failed brake booster check valve allowing vacuum leak into the system

B. A failed master cylinder primary or secondary seal allowing internal fluid bypass past the piston

C. A failed proportioning valve allowing rear brake pressure to bleed off slowly

D. A failed ABS valve body allowing fluid to bypass back to the reservoir slowly

87. To test a vacuum brake booster, the technician should:

A. Apply the brakes hard with the engine off and observe pedal feel during application

B. Disconnect the booster vacuum hose with the engine running and feel for vacuum with a hand

C. Remove the booster check valve and visually inspect it for damage and free movement

D. Pump the pedal to deplete vacuum, hold the pedal down, start the engine, and verify the pedal drops as vacuum returns

88. A parking brake lever or pedal that travels its full range with insufficient holding force, after verifying brake shoes/cables are within service spec, is typically adjusted by:

A. The parking brake cable adjustment at the equalizer or lever, taking up excess slack to bring travel back to specification

B. Replacing the parking brake lever or pedal assembly with a new unit only

C. Tightening the parking brake actuator bolt at the wheel side of the system

D. Replacing the brake fluid in the master cylinder to remove moisture from the system

89. A vehicle pulls hard to the left after a hard left-turn stop, and only relaxes after several minutes. The right front wheel is hotter than the left. The most likely cause is:

A. A failed right front caliper piston that has expanded with heat and seized

B. Air in the right front brake line preventing normal fluid release after application

C. A collapsed (internally restricted) right front brake hose acting as a one-way valve, holding pressure on the caliper after the pedal is released

D. A failed right front wheel speed sensor causing ABS to mis-activate

90. During brake drum service, the technician notices brake fluid inside the dust boot of the wheel cylinder. The correct service is:

A. Wipe the fluid out, reassemble, and continue with normal brake shoe replacement

B. Replace the wheel cylinder, since fluid past the seal indicates seal failure that will worsen

C. Replace only the dust boot to retain fluid containment in the wheel cylinder

D. Increase the wheel cylinder spring tension to compress the seal more tightly

91. On a drum brake with self-adjusters that have stopped functioning, the technician adjusts the brake manually by:

A. Pumping the brake pedal repeatedly to engage the self-adjuster mechanism manually

B. Pulling the parking brake lever with maximum force several times to engage adjustment

C. Driving the vehicle in reverse and applying the brakes hard to engage automatic adjustment

D. Rotating the star wheel of the adjuster (through the backing plate access hole or with the drum off) until the proper drum-to-shoe clearance is set

92. An ABS-equipped vehicle shows DTC for "ABS Pump Mot or Performance." The scan tool can command the ABS pump on, but the motor does not run audibly. The most likely cause is:

A. A failed wheel speed sensor that has prevented ABS pump activation through the network

B. A failed brake light switch that has prevented ABS pump activation during operation

C. A failed ABS pump motor (open winding, seized motor, or open electrical circuit feeding the motor)

D. A failed brake fluid level sensor that has prevented ABS pump activation in the system

93. The chamfer (angled edge) on the leading edge of a brake pad backing plate is provided to:

A. Reduce brake noise and squeal by gradually engaging the rotor's friction surface during contact

B. Provide a wear indicator that becomes flush with the friction surface as the pad wears

C. Allow brake fluid to flow between the pad and rotor surface during normal operation

D. Increase the friction surface area available for braking at the leading edge of the pad

94. Anti-rattle clips between the brake pad and the caliper bracket must be installed:

A. In any orientation that allows the brake pad to slide freely in the caliper bracket

B. In the manufacturer-specified orientation to apply spring tension correctly against the pad and the bracket's contact area

C. With the clip's spring force pointing away from the brake pad to provide free movement

D. Removed permanently, since they are only for shipping protection during installation

95. A vehicle has a clunking noise from the front end when driving over uneven pavement. The clunk is most prominent when the suspension travels up and down on one side of the vehicle (asymmetric loading). The most likely cause is:

A. A failed lower ball joint causing wheel knuckle to deflect on uneven pavement

B. Worn strut bearings causing the front strut to deflect on suspension travel

C. A worn lower control arm bushing allowing arm to move excessively under load

D. A failed sway bar end link or worn sway bar bushing, producing the clunk under asymmetric suspension travel

96. A solid-axle 4WD vehicle has a violent steering oscillation ("death wobble") that occurs at highway speed after hitting a bump. The most likely cause is:

A. Excessive caster on the front axle causing oversteer response to road inputs

B. Excessive positive camber on the front axle causing wandering tendency only

C. Worn front suspension or steering component (track bar, ball joint, tie rod end), amplified by an under-damped front axle

D. A failed brake booster that has reduced brake response during the oscillation

97. A vehicle has a creaking or popping sound from the front struts during slow turns and over bumps. The most likely cause is:

A. A worn or dry strut bearing or strut top mount, which rotates with the steering and supports the upper strut

B. A failed strut cartridge that has lost gas charge and produces noise during operation

C. A loose strut tower bolts that allow the strut to shift slightly during turns

D. A failed lower control arm bushing that allows the strut to deflect during operation

98. Inner tie rod ends on a rack-and-pinion steering system are inspected for play by:

A. Removing the wheel and feeling the inner tie rod connection by hand at the rack

B. Rocking the steering wheel back and forth while feeling the outer tie rod end for play

C. Removing the rack from the vehicle and bench-testing the inner tie rod ends for movement

D. Pulling back the rack boot and feeling for play at the inner tie rod ball stud, or having an assistant move the wheel while the technician feels the joint

99. A vehicle's power steering fluid is foamy and the reservoir shows bubbles after operation. The most likely cause is:

A. The vehicle was driven hard, agitating the fluid in the reservoir to produce foam

B. The wrong type of power steering fluid is in the system, producing foam during operation

C. Air entering the system through a leak on the suction (low-pressure) side, including a loose return-line clamp or a failed reservoir seal

D. The power steering pump is failing internally, producing foam from cavitation damage

100. After a complete four-wheel alignment, the steering wheel is off-center while the vehicle drives straight. The technician should:

A. Remove the steering wheel and reinstall it at the correct position to center it

B. Re-perform the toe adjustment with the steering wheel locked in the centered position, adjusting both tie rods to center the wheel

C. Replace the steering angle sensor with a new unit to recalibrate the centered position

D. Drive the vehicle for at least 100 km to allow the steering to self-center automatically

101. A vehicle's brake fluid is found to be contaminated with engine oil (incorrectly added to the master cylinder). The correct repair is:

A. Replace all rubber components in the system (master cylinder, calipers, hoses, ABS seals if accessible), flush thoroughly, and refill with specified brake fluid

B. Flush the contaminated fluid out with new brake fluid and continue normal operation

C. Add petroleum-compatible additive to the brake fluid to neutralize the contamination

D. Drain the system and refill with new brake fluid; the rubber components will recover

102. A complaint of brake pulsation a few months after rotor and pad replacement is most likely caused by:

A. Defective rotors from the parts supplier, requiring warranty replacement and retorque

B. Excessive heat warping the rotors during normal driving and braking conditions

C. The vehicle being driven through deep water shortly after the brake service

D. Lateral runout from poor hub cleaning, debris between hub and rotor, or uneven lug nut torque, causing uneven rotor wear over time

103. A tire that shows a feathered wear pattern (a sharp ridge on one side of each tread block) is typically caused by:

A. Excessive negative camber concentrating wear on the inside edge of the tire

B. Underinflation causing the center of the tire to wear minimally compared to edges

C. Incorrect toe alignment, which causes the tire to scrub sideways as it rolls

D. Wheel imbalance producing the wear pattern across the entire tire surface

104. A tire showing cupping (scalloped, repetitive dips around the tire) typically indicates:

A. Incorrect camber causing wear concentrated on the inside or outside edge of the tire

B. Worn shock absorbers or struts, allowing the tire to bounce and produce repetitive scalloped wear

C. A bent rim that produces a localized flat spot in one position on the tire surface

D. Incorrect inflation pressure causing center or shoulder wear across the tread

105. Installing wheels with an offset different from the manufacturer's specification can:

A. Affect wheel bearing load, steering geometry (scrub radius), and the tire's clearance with body and suspension components

B. Improve fuel economy by reducing rolling resistance through wheel position change

C. Reduce tire wear by improving the tire's contact patch with the road surface

D. Increase the brake system's stopping power by improving leverage at the wheel

106. Brake fluid moisture content can be measured using:

A. A visual inspection of fluid color, where dark fluid indicates moisture contamination

B. A specific gravity hydrometer like that used for testing battery electrolyte

C. A vacuum gauge to verify the fluid maintains pressure during a system test

D. An electronic brake fluid tester that measures moisture content directly, or a boiling point tester

107. A seat belt pretensioner is activated in a collision to:

A. Loosen the seat belt slightly to allow occupant movement during the impact event

B. Replace the function of the airbag in a low-severity collision event

C. Pull the seat belt tight against the occupant just before the airbag deploys, removing slack and positioning the occupant correctly

D. Release the seat belt automatically after the collision is complete

108. A knee airbag deploys to:

A. Position the driver's lower body correctly during a frontal collision, reducing forward submarining and lower-limb injury

B. Replace the function of the frontal airbag in a heavy collision event

C. Provide head impact protection in a side collision impact event

D. Cushion the foot pedal area to prevent injury from intruding firewall

109. A body panel with surface rust that has not penetrated through the metal is typically repaired by:

A. Replacing the entire panel because surface rust will rapidly penetrate the metal

B. Sanding to bare metal, treating with a rust converter or primer, then refinishing with the matched paint

C. Painting directly over the rust to seal it from further moisture exposure

D. Welding new metal patches over the rusted area without sanding first

110. A vehicle's hood release cable is sticking, requiring excessive force to release the hood. The most likely cause is:

A. A failed hood latch mechanism that needs adjustment or replacement immediately

B. A bent hood that has misaligned the latch and prevents the cable from releasing

C. The wrong type of cable installed during a previous repair on the vehicle

D. Cable corrosion or contamination inside the cable's outer sheath, increasing friction during operation

111. A power sliding door (on a minivan) is operating slowly and noisily. The most likely first service step is:

A. Replace the sliding door drive motor with a new unit to restore speed of operation

B. Replace the sliding door cable assembly to restore proper operation of the system

C. Clean and lubricate the door's tracks and rollers with the manufacturer-specified lubricant

D. Replace the sliding door's plastic guide rollers without inspecting the tracks for damage

112. After windshield replacement on a vehicle equipped with a forward camera for lane keeping and automatic emergency braking, the camera must be:

A. Calibrated using the manufacturer's procedure (static targets, dynamic drive, or both), since the camera has been removed and reinstalled in a new optical environment

B. Removed and discarded because windshield replacement always damages the camera

C. Left alone, because the camera self-calibrates during normal driving conditions

D. Replaced with a new camera, since the camera cannot be reused after windshield service

113. A trunk lid that does not align flush with the surrounding body panels (uneven gap on one side) is adjusted by:

A. Replacing the entire trunk lid with a new unit to ensure correct fit

B. Loosening the trunk hinge bolts (or using the elongated hinge slots), repositioning the trunk lid for even gap, then re-tightening to specification

C. Adjusting the trunk latch position to pull the trunk closed at one corner

D. Heating and bending the trunk lid to match the body opening gap

114. A vehicle's sunroof leaks water into the cabin during heavy rain, despite the sunroof being closed. The most likely cause is:

A. A torn sunroof seal that must be replaced as a complete assembly with the sunroof

B. A failed sunroof motor that has not closed the sunroof properly during last operation

C. A failed sunroof glass that has cracked invisibly along the bonded edge during use

D. Plugged sunroof drain tubes (commonly leaves and debris), causing water to back up and overflow into the cabin

115. A vehicle's door does not close properly, with the door dropping below the body line and contacting the striker too low. The most likely service is:

A. Replace the door hinges with new ones to restore correct door position to body

B. Replace the door's striker plate to match the new door position at the body

C. Adjust the door using shims at the hinges (or hinge slots/elongated holes) to raise the door to align with the body opening

D. Replace the entire door assembly to ensure correct fit to the body opening

116. A convertible top that opens slowly and stops partway through travel has hydraulic fluid visible at one of the rams. The most likely cause is:

A. A failed convertible top hydraulic ram (cylinder) seal, leaking pressure that prevents full operation

B. A failed convertible top hydraulic motor that has lost output pressure capacity completely

C. A low hydraulic fluid level in the reservoir from manufacturer-default settings

D. A failed convertible top control module that has limited the operation speed to half

117. On a typical EV battery management system (BMS), "passive" cell balancing works by:

A. Transferring charge from high-voltage cells to low-voltage cells through capacitor circuits

B. Bleeding small amounts of charge from higher-voltage cells through resistors until all cells are balanced

C. Routing current around higher-voltage cells through bypass switches to prevent further charging

D. Disconnecting higher-voltage cells from the pack temporarily during charging operations

118. A Permanent Magnet Synchronous Motor (PMSM), used as the traction motor in most modern EVs, is characterized by:

A. Brushes contacting a commutator to switch current through the rotor windings during operation

B. A wound rotor that requires DC excitation to produce the rotor magnetic field

C. Iron-only rotor relying on induced current from the stator field for torque production

D. Permanent magnets embedded in or attached to the rotor, with the stator producing a rotating field through AC excitation

119. On a typical hybrid or EV, high-voltage cables are identified by:

A. Green-colored insulation distinguishing them from yellow 12V wiring

B. Blue-colored insulation distinguishing them from black 12V wiring

C. Orange-colored insulation, the international standard for HV automotive cables

D. Yellow-colored insulation distinguishing them from black 12V wiring

120. After removing the manual service disconnect (MSD) on an EV, the technician must verify high-voltage isolation by:

A. Waiting 24 hours for residual voltage to dissipate naturally throughout the system

B. Using an HV-rated Cat III or IV meter to measure between HV terminals and from each terminal to chassis, verifying near-zero readings

C. Touching the HV terminals briefly with an insulated screwdriver to discharge any voltage

D. Reading the BMS isolation resistance value through the scan tool only as verification

121. EV battery "preconditioning" function:

A. Heats or cools the high-voltage battery to its optimum temperature range before DC fast charging or driving in extreme conditions, while the vehicle is plugged in

B. Charges the 12V auxiliary battery to its maximum capacity before driving the vehicle

C. Conditions the cabin air to the driver's selected comfort temperature

D. Provides a power-on self-test for the high-voltage battery before driving

122. A plug-in hybrid (PHEV) differs from a battery electric vehicle (BEV) primarily because:

A. The PHEV uses a smaller traction motor than a BEV would use for the same vehicle size

B. The PHEV cannot be plugged into a Level 2 charger like a BEV during operation

C. The PHEV has both an internal combustion engine and an electric drive system, with a smaller battery than a BEV and the engine as a range extender or parallel drive

D. The PHEV has a larger battery than a BEV for extended electric-only range only

123. In North America, EV DC fast charging is provided through which connector types?

A. J1772 Type 1 only, which is also used for Level 1 and Level 2 AC charging

B. The Tesla NACS connector exclusively for all EV brands at all charging stations

C. The Mennekes Type 2 only, which is used primarily for European markets globally

D. CCS Combo 1 (J1772 plus DC pins), CHAdeMO (legacy), or NACS (Tesla, now industry-wide), depending on the vehicle

124. The factor that most accelerates EV battery degradation over time is:

A. Frequent charging to 80% state of charge instead of 100% during normal operation

B. Repeated exposure to high temperatures (above 40°C), especially while at high state of charge

C. Charging only at Level 1 (120V) instead of Level 2 (240V) for daily charging

D. Driving at moderate speeds (60-80 km/h) compared to highway speeds at 120 km/h

125. An EV's high-voltage battery thermal management system:

A. Heats the battery to maximum operating temperature for all conditions during driving

B. Cools the battery only when the vehicle's air conditioning is on for cabin comfort

C. Maintains the battery within an optimum range (typically 20-40°C), using heating or cooling as needed for performance and longevity

D. Operates independently of vehicle operation, controlled by ambient temperature sensors only

Practice Exam 8: Answer Key and Explanations

1. B — Operating a tool above its rated pressure damages internal components and increases the risk of bursting hoses or projectile failure. The regulator must be set to the tool's rated maximum (7 bar / 100 psi) to deliver designed torque safely; adjusting downstream with bleeds or extra hose length cannot regulate pressure reliably.

2. A — Stainless steel work-hardens rapidly when over-heated, so cutting must be slower with steady feed and cutting fluid to prevent the work surface from hardening ahead of the bit. Mild steel tolerates faster speeds; stainless requires reduced RPM with continuous chip flow to maintain the cut.

3. D — File teeth are cut to remove material only on the forward stroke; dragging the file back across the work dulls the teeth and clogs them with chips. Lifting the file on the return preserves the tooth edge and produces a clean surface.

4. C — Sparks and slag can smoulder for an extended period after welding finishes, and concealed combustibles may ignite minutes or hours later. Provincial OHS regulations and most hot work permit

programs require a fire watch (typically 30 to 60 minutes minimum) after the hot work ends to catch developing fires before they spread.

5. A — Provincial OHS regulations require workplace hazard assessments to be documented in writing, available to workers, and reviewed periodically and when work conditions or processes change. A written, current assessment is the legal record that controls are in place; verbal or one-time assessments fail the regulatory requirement.

6. A — The WHMIS 2015 gas cylinder pictogram identifies compressed gases, including compressed, liquefied, refrigerated, and dissolved gases stored under pressure. Recognition triggers the correct storage, handling, and transport requirements specific to pressurized containers.

7. B — Standard emergency response puts personal safety first, followed by alerting nearby workers, then containing the spill before any cleanup. Rushing to mop immediately ignores potential slip, fire, or exposure hazards that the spill creates for others in the area.

8. C — The correct procedure is to open the acetylene valve a small amount and light it, then add and adjust the oxygen to achieve a neutral flame. Opening oxygen first creates a fuel-lean condition that backfires; pre-mixing in the hose creates an explosion hazard.

9. A — Provincial OHS regulations require that serious workplace injuries be reported to the provincial occupational health and safety authority within the specified timeframe — often immediately for severe injuries or fatalities. Insurance and manufacturer notifications do not satisfy the legal reporting obligation.

10. D — Water is incompressible, so an attempted compression stroke against a cylinder full of water either locks the crankshaft completely or bends one or more connecting rods. The hard mechanical resistance is the diagnostic signature distinguishing hydrolock from electrical or fuel-side no-start conditions.

11. C — High-mileage engines develop timing chain wear, with the chain lengthening and altering the crank-to-cam relationship reported through the position sensors. DTCs P0008 and P0017 indicate the cam timing has retarded outside the PCM's correlation window, with chain stretch the most common high-mileage cause.

12. B — A leaking diesel injector or injector return drips fuel past the cylinder or returns it into the crankcase, raising the oil level and producing the distinctive diesel-fuel smell. Continued operation dilutes the oil, reduces its lubrication capacity, and can cause engine runaway if oil rises into the intake.

13. A — The DPF differential pressure sensor measures the pressure drop from before to after the diesel particulate filter. As soot accumulates the pressure drop rises; when it reaches a calibrated threshold the PCM initiates DPF regeneration to burn off the accumulated soot.

14. D — At idle, oil pressure is lower than at higher RPM, so a sluggish VVT phaser or sticking oil control valve may fail to achieve the commanded cam position only at idle and recover when higher oil pressure becomes available. The condition typically results from oil sludge or contamination at the phaser, not a sensor or PCM fault.

15. B — Cylinder deactivation systems use special collapsing lifters on the deactivated cylinders, and these lifters are prone to mechanical failure that produces tick noise — especially under light load when the cylinder is deactivated. The tick is the classic high-mileage symptom of GM DOD/AFM and similar systems.

16. C — Carbon buildup on the throttle plate restricts airflow at low throttle openings, causing unstable idle. After cleaning with the approved cleaner the PCM must relearn the idle position, because the throttle's effective opening has changed and the previous adaptive values no longer apply.

17. A — With the purge solenoid stuck open, fuel vapours from the EVAP canister flow into the intake manifold continuously and uncontrolled. The largest effect is at idle, where the unmetered vapour upsets the air-fuel ratio enough to cause rough idle or stalling; at high airflow the vapour is a small fraction of total intake and produces little symptom.

18. B — Long-term fuel trim significantly positive on only one bank indicates the PCM is adding fuel to that bank in response to a lean reading, while the other bank operates normally. Common causes are a vacuum leak on the affected bank's intake, a partial fuel delivery problem, or an exhaust leak before the bank's upstream O2 sensor.

19. D — A cracked exhaust manifold leaks exhaust loudest when cold because the metal contracts and opens the crack; as the manifold heats and expands, the crack closes and the noise diminishes. The cold-start tick that quiets after warm-up is the classic signature of this failure.

20. A — A glowing red catalytic converter indicates excessive unburned hydrocarbons reaching the converter, where they ignite and produce extreme heat. The most common upstream causes are an engine misfire or a severely rich condition; continued driving will destroy the catalyst substrate.

21. C — GDI engines inject fuel directly into the cylinder, and during cold-start enrichment some fuel washes past the rings into the crankcase. Short-trip driving never allows the oil to reach the temperature needed to evaporate this fuel back out, so it accumulates over time, raising the oil level and producing a gasoline smell.

22. B — Cold engine oil is thick (high viscosity), so the oil pump delivers it at pressure near or at the relief valve's setting immediately on start-up. As the engine warms and the oil thins, pressure drops to the normal operating range; this pattern is healthy, not a fault.

23. D — Engine mounts isolate idle vibration from the body, so when one is broken or collapsed the natural firing-pulse vibration of the engine transmits directly through to the body. The vibration disappears above idle because higher RPM moves the firing frequency out of the body's resonant range.

24. A — Oil-to-coolant heat exchangers on diesel engines can develop internal leaks that allow engine oil to enter the cooling system. The result is oil contamination of the coolant without combustion gases or grease — the distinguishing feature isolating the oil cooler as the source.

25. C — With compression within 10% across all cylinders and no external leaks, the oil is being burned in the combustion chamber. The most common high-mileage cause is worn piston rings and cylinder walls allowing oil to pass into the chamber during the intake stroke, then burning during combustion.

26. B — A leaking heater core releases coolant inside the HVAC case, where the fluid evaporates into the cabin airstream (producing the sweet smell and inside-fog) and drips onto the passenger-side floor (the damp carpet). The combination of all three symptoms together is the classic signature.

27. D — Bottom-end engine noise that changes pitch with engine load points to worn rod or main bearings, which are mechanically loaded by combustion pressure. Top-end noises (valve train, timing chain) and accessory noises do not respond to load the same way.

28. A — After verifying the DEF fluid in the tank is correct, the DEF quality fault must be coming from the sensor itself, not the fluid. The DEF quality sensor in the tank can develop internal failures that report false "incorrect fluid" readings and require sensor replacement to clear.

29. C — Failed turbocharger bearings allow the turbo shaft to wobble, throwing oil past the compressor and turbine shaft seals. Oil entering the compressor side produces oily intercooler piping; oil entering the turbine side produces blue exhaust smoke; bearing-induced shaft eccentricity produces the variable whine.

30. B — A healthy catalyst stores and releases oxygen during normal operation, producing a downstream O2 sensor signal much flatter than the upstream signal. When the downstream sensor mirrors the upstream switching, the catalyst has lost oxygen storage capacity and can no longer differentiate the two; replacement is required.

31. A — Both P0455 and P0442 are EVAP leak codes that differ in the size of the leak detected. P0455 indicates a major leak (loose or missing gas cap, large hose disconnection); P0442 indicates a smaller pinhole or weak seal. The diagnostic approach differs because P0455 leaks are usually visible or easily found.

32. D — Any module on the CAN network with an authorized wake-up event can initiate the network wake. Typical triggers include a door switch (BCM wakes), a key fob signal (RKE receiver wakes), or a scan tool connection at the DLC; restricting wake-up to one module would prevent normal vehicle operation.

33. B — Modern vehicles have many modules drawing small amounts of power even when sleeping for memory retention and event monitoring. Typical normal parasitic draw after the network has fully gone to sleep is 30 to 80 mA at the battery negative cable; significantly higher draw indicates a module that has not gone to sleep.

34. C — Permanent DTCs were added to OBD-II specifically to prevent shop "tricking" of emissions inspection by clearing codes immediately before testing. A scan tool cannot clear a permanent DTC; only the PCM can clear it, and only after running the relevant monitor and confirming the fault is no longer present.

35. A — An OBD-II drive cycle is a specific sequence of operating conditions — cold start, idle, acceleration, cruise, deceleration — required to run all the emissions monitors and report their results.

The cycle is defined by the manufacturer per OBD-II standard; simple time or distance does not satisfy monitor enable criteria.

36. D — Multiple "Not Ready" monitors typically result from a recent battery disconnect or code clear, not from underlying vehicle problems. The fix is to drive the manufacturer's specified drive cycle, which exercises each monitor's enable conditions until it completes and reports Ready; resetting the PCM would lose all stored data.

37. C — Generic DTCs (P0xxx) are defined and standardized across all manufacturers under SAE J2012, allowing any OBD-II scan tool to read and interpret them. Enhanced DTCs (P1xxx and manufacturer extensions) are manufacturer-specific and often require the manufacturer's scan tool or software to retrieve and decode.

38. B — A new BCM ships with default or no configuration and must be configured with the vehicle's VIN, optional equipment codes, and operating parameters through the scan tool. Without this configuration, the BCM cannot control vehicle-specific features correctly and may set additional DTCs.

39. A — The Calibration ID (CAL ID) is the unique identifier for the PCM's software version, retrieved through OBD-II Mode 09. Comparing the reported CAL ID to the manufacturer's current specification reveals whether the PCM needs reprogramming for emissions or driveability updates — a common check during recall verification.

40. D — Reprogramming critical modules can affect safety and emissions, so manufacturers require the scan tool to complete a seed-and-key security exchange before reprogramming. The cryptographic challenge prevents unauthorized parties from making unauthorized changes to modules that control braking, steering, propulsion, or emissions.

41. C — Unified Diagnostic Services supports a much broader range of diagnostic operations than OBD-II generic mode, including module reprogramming, security access, detailed data retrieval, and routine control. UDS is the modern diagnostic backbone for manufacturer scan tools on CAN-equipped vehicles.

42. B — U-series DTCs are network communication codes, indicating that one module has lost or cannot establish communication with another module on the bus. U0100 specifically means the module reporting the code has lost communication with the PCM; diagnosis starts with verifying the network's electrical integrity.

43. A — Multiple modules reporting "Lost Communication with BCM" point to a BCM that is unable to talk on the network — often because of a power, ground, or CAN connection problem rather than internal module failure. The first step is verifying these basic supplies before replacing the BCM unnecessarily.

44. D — DCT clutch packs wear over time, and the transmission's adaptive learning extends shift point timing to compensate. Once the adaptation reaches its limit and shift quality still degrades, the clutch pack has worn beyond the system's correction range and requires replacement.

45. C — A CVT transmits torque through the friction between a steel belt and the pulley surfaces; wear of either component allows belt slip under load. The slip produces the characteristic rubber-band feel under acceleration plus a high-pitched whine that varies with engine speed but not vehicle speed.

46. B — A center differential allows the front and rear driveshafts to rotate at different speeds during cornering, when the wheels travel different arc lengths. Without it, the driveline would bind on dry pavement, accelerating tire and driveline wear and producing skipping or chirping during slow turns.

47. D — A whine during deceleration only indicates the noise comes from gears loaded only during coast — the coast side of the ring and pinion tooth contact. Incorrect pinion depth or wear on the coast flank produces this specific noise pattern; drive-side noise occurs only under acceleration.

48. A — Limited-slip differentials with clutch-pack designs require a specific friction modifier additive in the gear oil to allow the clutches to slip smoothly during low-speed cornering. Without the additive, the clutches grab and release abruptly, producing the chatter or grunting noise customers describe.

49. C — A sealed differential housing would build pressure as the gear oil and air inside warm up during operation, eventually forcing oil past the seals. The breather (vent) equalizes internal pressure with atmosphere, preventing seal failure and oil leaks.

50. B — Helical-cut gears engage progressively across the tooth face rather than along a single line, which spreads the load gradually and produces a quiet hum rather than the loud whine of straight-cut (spur) gears. The smooth, quiet operation is why helical gears dominate passenger-vehicle transmissions.

51. A — Manual transmission lubricant degrades from heat, friction, and wear-debris contamination, and most manufacturers specify replacement intervals between 100,000 and 150,000 km. Severe-service conditions (towing, heavy load, off-road) shorten the interval; transmissions are not lifetime-sealed despite some claims.

52. C — Automatic transmissions store learned shift characteristics in non-volatile memory, optimizing shift quality for the worn condition of the transmission. After major service the worn characteristics no longer apply; resetting the adapts through the scan tool lets the transmission relearn from a clean baseline.

53. D — When the manual lever shifts the transfer case correctly but the dash switch does not, the mechanical components are good and the electric shift system is failed. Most commonly the electric shift motor, its position encoder, or the wiring/control circuit between the switch and motor has failed.

54. B — Suspension lift kits raise the axle relative to the transmission output, increasing the driveshaft U-joint operating angles. Once outside the recommended range, the joints produce a speed-related vibration; correction requires shimming the axle pinion or installing a longer-spline driveshaft to restore acceptable angles.

55. A — The slip yoke must slide smoothly along the driveshaft splines as suspension travels and torque reverses; dry splines bind and then release under load reversal, producing the distinctive clunk on accel-to-decel or vice versa. Proper lubrication during driveshaft service prevents the noise.

56. C — Modern electronically-controlled transfer cases use specific proprietary fluids formulated for the friction characteristics of the internal clutch packs. Using ATF, gear oil, or a generic substitute typically causes incorrect clutch engagement, shudder, or premature wear; the manufacturer-specified fluid is required.

57. D — Pinion depth — how deep the pinion gear meshes with the ring gear — is set by the shim between the pinion gear head and its inner bearing race. Increasing the shim thickness pushes the pinion away from the ring gear; decreasing it brings the pinion closer, changing the tooth contact pattern.

58. B — Grinding on shift to one specific gear, with smooth shifts in all other gears, isolates the fault to that gear's synchronizer ring. The synchronizer matches input and output shaft speeds before the dog teeth engage; a worn ring cannot match speeds fast enough, allowing teeth to clash.

59. A — Clutch hydraulic systems use DOT-rated brake fluid with rubber seals formulated for it. Petroleum-based fluids (engine oil, ATF, power steering fluid) cause the rubber seals to swell rapidly and fail, contaminating the entire system; complete hydraulic replacement is required.

60. D — A vibration that tracks vehicle speed independently of engine RPM points to a rotating component connected directly to the wheels — driveshaft, wheel, or tire. Engine RPM at a given vehicle speed varies with transmission gear, so a vibration that ignores engine RPM cannot be coming from the engine.

61. C — Sensor circuits operate on small voltage differences, so even small voltage drops corrupt their signals. The standard is 0.1 V or less per sensor connection, with higher allowances on high-current paths like the starter cable where small percentage drops are acceptable.

62. B — An alternator's actual output capacity is only revealed under load; no-load idle voltage indicates only that the regulator is set correctly, not how much current the alternator can produce. Loading the system with a carbon pile to near the rated output and reading current confirms the alternator meets specification.

63. D — A recently-charged battery shows a surface charge that reads higher than the actual cell state and corrupts open-circuit voltage testing. Applying a brief load (commonly the headlights for 15 seconds) dissipates the surface charge before the open-circuit reading is taken, giving an accurate cell condition.

64. D — Voltage drop is measured across the connection or cable being tested with the circuit under normal load. For a starter circuit, the meter goes from the battery terminal to the starter stud on the cable being tested while the engine is being cranked; the reading reveals the resistance of that connection.

65. C — A functional glow plug draws a specific current as it heats up; an open or partially burned element draws lower current or no current at all. Comparing each plug's current draw with an amp clamp against specification quickly identifies failed plugs without removing them from the engine.

66. B — A broken defroster grid line is repaired by applying conductive paint or a defroster grid repair kit across the break, restoring electrical continuity. Soldering a wire is not practical on the glass surface; replacing the window is unnecessary; the repair takes minutes and is verified with a voltmeter.

67. A — Auto-up motors will continue running against an obstruction until they overheat or burn out. The timeout function stops the motor after a fixed time even if the window has not closed, protecting the motor from damage when the regulator is jammed or the window is blocked.

68. D — A non-functioning heated seat is diagnosed by measuring the heating element's resistance at its connector and comparing to specification; open or shorted elements are identified by out-of-spec readings. Verifying power and ground supply at the connector confirms the element is the actual fault, not the wiring.

69. C — On a four-speed blower system, the resistor (or BCM-controlled FET on newer vehicles) drops voltage for speeds 1, 2, and 3, while speed 4 is connected directly to battery voltage. A failed resistor disables the lower speeds while speed 4 continues to work, producing the exact symptom described.

70. A — The PCM requires constant battery voltage even with the ignition off to maintain Keep-Alive Memory, which stores adaptive learning values, DTCs, and freeze frame data. Without this constant supply the PCM would lose its adaptive learning at every key-off, returning to default values.

71. B — Direct TPMS sensors contain a small internal battery that powers the sensor's radio transmitter, with a typical service life of 5 to 10 years. A "No Signal" report from one wheel position usually means the sensor's internal battery has died, and the sensor itself must be replaced.

72. D — Variable displacement compressors change refrigerant output by tilting the internal swashplate (or wobble plate), which changes how far each piston strokes within the cylinder. Smaller stroke means less refrigerant per revolution; the design eliminates clutch cycling for smoother, quieter operation.

73. C — A properly evacuated A/C system removes both air and moisture, which can otherwise produce acid that damages the compressor. Pulling the system to deep vacuum for 30 to 45 minutes both removes moisture and verifies system tightness; a faster pull traps moisture inside the system.

74. A — Cabin air filters trap pollen, dust, and pollutants from the air entering the cabin, becoming progressively restricted over time. Most manufacturers specify replacement every 24,000 to 32,000 km, with shorter intervals in dusty environments where the filter loads quickly.

75. B — Mode door actuators contain a small motor driving a gear train to position the door; stripped gears or a stuck door cause the motor to click as it stalls against the obstruction. The click is the diagnostic signature, distinguishing this failure from blower or pressure-related noises.

76. D — A refrigerant identifier samples the refrigerant in the system and analyzes whether it is the type specified (e.g., pure R-134a) or contaminated with mixed or hydrocarbon refrigerants. Recovery machines should not be connected to unidentified refrigerant because contamination can damage the machine and cross-contaminate other systems.

77. C — Low low-side pressure with normal high-side pressure points to a refrigerant flow restriction at the expansion device (orifice tube or TXV) or a low total charge. Both prevent enough refrigerant from reaching the evaporator, so it does not absorb enough heat from the cabin air and the air blows warm.

78. B — Most vehicles use separate relays for low and high beam circuits, allowing one circuit to fail while the other continues to work. High beams working with no low beams indicates the low-beam relay has failed; replacement of the relay typically restores operation.

79. A — On modern vehicles the BCM controls interior lighting, door locks, wipers, and many other body systems. When three apparently unrelated systems fail simultaneously, the common cause is most often the BCM itself — hardware failure or corrupted software — rather than three coincident failures.

80. D — Excessive parasitic drain is isolated by pulling fuses one at a time (with the network asleep) and watching for the current to drop, identifying which fused circuit is drawing the excess. A low-amp clamp on the fuse panel feed gives the same information without disturbing the network state.

81. C — The relay click confirms the BCM is sending power to the lock circuit; intermittent operation past that point isolates the fault to the lock actuator motor or its wiring. Worn brushes, internal contamination, or a wire chafe in the door harness produces the intermittent symptom.

82. B — The wiper motor's internal park switch tells the BCM (or directly powers the motor) where the bottom of the wipe stroke is; on shut-off the motor continues running until the park switch reports park position. A failed park switch leaves the motor stopping wherever it was at the moment of switch-off.

83. D — Refrigerant overcharge fills the condenser with more liquid than it can flow, raising high-side pressure; the same excess fills the evaporator and raises low-side pressure as well. Both pressures elevated together (with poor cooling) is the classic overcharge signature.

84. A — Pulling left during braking means the left side is braking more effectively than the right. The right side must be the restricted one — a sticking caliper (frozen slide pins, seized piston) or a hardened/restricted right front hose limiting the brake pressure that reaches the caliper.

85. C — Repeated heavy braking on a long descent heats the friction material until its coefficient of friction drops sharply, producing the progressive loss of stopping power. Heat-soaked brake fluid may also approach boiling at the caliper; cooling restores normal function.

86. B — A pedal that sinks under steady pressure with normal fluid level and no external leak indicates fluid is bypassing internally past a seal in the master cylinder, returning to the reservoir without producing pressure at the wheels. Master cylinder replacement is the standard repair.

87. D — The standard booster test is to deplete vacuum (engine off, pump pedal several times), hold the pedal firmly down, start the engine, and watch for the pedal to drop as vacuum builds in the booster and assists the pedal force. No drop indicates the booster is not pulling vacuum or is leaking.

88. A — When shoe and cable conditions are within spec but the lever travels its full range without enough holding force, the cable has stretched or the adjustment is loose. Taking up the slack at the equalizer or lever adjustment restores travel to specification and applies the parking brake correctly.

89. C — A collapsed brake hose internally restricts fluid flow in one direction more than the other, functioning as a one-way valve that allows pressure to apply but not to release. After a hard application the caliper stays engaged, dragging the wheel and producing heat at that corner until pressure eventually bleeds back.

90. B — Any brake fluid found inside the wheel cylinder dust boot means fluid has passed the cylinder's piston cup seal — a clear indication the seal has failed. Replacement of the wheel cylinder is mandatory; the leak will worsen and a full fluid loss could occur.

91. D — When the drum brake self-adjuster has failed or has not adjusted enough, the technician adjusts the brake manually by rotating the star wheel through the backing plate access hole. Turning the star wheel walks the shoes outward until the proper drum-to-shoe clearance is set, then a final check confirms the drum spins with light drag.

92. C — When the scan tool commands the ABS pump on but no audible motor operation occurs, the pump motor itself or its electrical supply is failed. Most commonly the motor has an open winding internally, is mechanically seized, or has an open circuit in its electrical supply.

93. A — The chamfered leading edge of a brake pad backing plate (and sometimes the friction material) reduces brake squeal by gradually engaging the rotor surface as the wheel rotates, smoothing the friction force buildup. Pads without proper chamfers tend to produce noise as the leading edge slaps against the rotor.

94. B — Anti-rattle clips apply spring tension between the brake pad and the caliper bracket, eliminating the looseness that causes rattling and supporting consistent pad position. They must be installed in the manufacturer-specified orientation so the spring force pushes the pad correctly against its slide surface.

95. D — Asymmetric suspension travel (one side compressing while the other extends) loads the sway bar and its end links; worn end links or bushings clunk audibly under this loading. Even suspension travel (both sides compressing together) does not produce the noise, isolating the sway bar components from other suspension wear.

96. C — Death wobble is a violent steering oscillation triggered by a road impact, sustained by underdamping in the front suspension and amplified by any worn component with slack (track bar, ball joint, tie rod end, steering damper). Diagnosis requires inspection of every front-end component plus verification of the steering damper and tire balance.

97. A — The strut top mount and bearing carry the strut load while rotating with the steering wheel; when dry or worn they bind during steering rotation, producing creaks or pops felt through the steering wheel and audible from the strut tower. Lubrication or replacement of the bearing eliminates the noise.

98. D — Inner tie rod ends are inside the rack-and-pinion boot, so play is inspected by pulling the boot back and feeling the ball stud, or by having an assistant move the steering wheel side to side while the technician feels the joint for play. Outer tie rod movement at the steering wheel can mask inner tie rod wear.

99. C — Foamy power steering fluid means air is being drawn into the system, and air can only enter on the suction (low-pressure) side of the pump. Common entry points are a loose return-line clamp, a failed reservoir cap or seal, or a hose leaking air without leaking fluid (because the suction side is below atmospheric pressure).

100. B — An off-center steering wheel after alignment indicates the toe was set with the wheel uncentered; the wheels point straight but the steering wheel does not. Correction requires repeating the toe adjustment with the steering wheel locked centered, with both tie rods adjusted equally and oppositely to maintain total toe.

101. A — Petroleum products (engine oil, ATF, power steering fluid) cause the rubber seals in the brake system to swell catastrophically and fail. The only correct repair is replacement of every rubber component in the system, thorough flushing of all metal lines and components, and refilling with new specified brake fluid.

102. D — Rotor "warpage" reported months after brake service is almost always caused by lateral runout — debris between the rotor and hub, an uncleaned hub face, or uneven lug nut torque, any of which forces the rotor to wobble. The wobble produces uneven pad-to-rotor contact and gradually wears the rotor unevenly, producing the pulsation.

103. C — Incorrect toe alignment causes the tire to scrub sideways as it rolls, producing a feathered (sawtooth) wear pattern with a sharp edge on one side of each tread block. Toe-in produces the feather pointing in one direction; toe-out produces the opposite direction; correction is by alignment.

104. B — Worn shocks or struts allow the wheel to bounce as it rolls, producing repetitive contact pressure variation around the tire and scalloped cupping wear. Replacement of the dampers and a new tire (or tire rotation) restores normal wear; the original tire's cupping pattern often remains visible until replacement.

105. A — Wheel offset positions the wheel inboard or outboard of the hub mounting face, directly affecting the wheel bearing load (cantilevered torque), the steering's scrub radius, and the tire's clearance with body, suspension, and brake components. Non-spec offset compromises one or more of these and can cause premature bearing wear or contact damage.

106. D — Brake fluid moisture is measured by an electronic tester that detects moisture content through electrochemical or refractive principles, or by a boiling-point tester that heats a fluid sample to its

boiling point (which drops as moisture content rises). Visual inspection of color is unreliable; hydrometers and vacuum gauges do not measure moisture.

107. C — A seat belt pretensioner fires (typically a small pyrotechnic charge) in the first few milliseconds of a crash, pulling the seat belt webbing tight against the occupant and removing slack from the belt system. The tightening positions the occupant correctly relative to the airbag before deployment, optimizing the airbag's protection.

108. A — A knee airbag deploys downward from below the steering column (driver) or below the glove box (front passenger), cushioning the occupant's knees and lower body during a frontal crash. The cushion prevents lower-body submarining under the lap belt and reduces leg injury from intruding pedals or firewall.

109. B — Surface rust that has not penetrated the metal is repaired by mechanical removal (sanding to bare metal), chemical treatment (rust converter or primer compatible with bare steel), and refinishing with matched paint. Painting over rust traps moisture and accelerates corrosion; full panel replacement is not required for surface rust.

110. D — A sticking hood release cable usually has corrosion or contamination inside the cable's outer sheath, increasing the friction the inner wire must overcome. Lubricating or replacing the cable restores normal operation; the latch itself is rarely the cause when the symptom is hard pulling.

111. C — A slow, noisy power sliding door usually has dirty or dry tracks and rollers — debris, road salt, and old grease build up over time. The first service step is to clean and lubricate the tracks and rollers per the manufacturer's specification before condemning the motor or cables, which are rarely the cause.

112. A — Forward-facing ADAS cameras are mounted to the windshield and rely on a precise optical alignment to function correctly. Windshield replacement removes and reinstalls the camera in a different glass with potentially slightly different geometry; manufacturer-specified static, dynamic, or combined calibration is mandatory before vehicle release.

113. B — Body openings have engineered tolerance built into the hinge mounting (elongated bolt holes or shims) specifically to allow alignment correction. Loosening the hinge bolts, repositioning the trunk lid for even gap, and re-tightening to specification is the standard correction; replacement or bending of the lid is not necessary.

114. D — A sunroof is designed to leak small amounts of water past its seal, captured by a tray under the sunroof and drained out through tubes to the body sills. When the drain tubes plug with leaves or debris, water backs up and overflows into the cabin; clearing the drains restores normal function.

115. C — A door that has dropped below the body line and contacts the striker too low requires hinge adjustment to raise it. Most factory hinges have elongated bolt holes or accept shims behind the hinge; loosening, repositioning, and re-tightening realigns the door to the body opening.

116. A — Visible hydraulic fluid at one ram with slow, incomplete operation isolates the leak to that ram's internal seals. The cylinder cannot maintain pressure to fully extend the top, so it stops partway; replacement of the leaking ram and refilling/bleeding the hydraulic system restores full operation.

117. B — Passive cell balancing equalizes cell voltages by bleeding small amounts of charge from higher-voltage cells through dedicated resistors until all cells in the pack are at the same voltage. The method is simple and reliable but wastes the bled energy as heat; active balancing transfers charge between cells without loss.

118. D — A Permanent Magnet Synchronous Motor has permanent magnets embedded in or attached to the rotor, eliminating the need for rotor windings, brushes, or excitation current. The stator produces a rotating magnetic field through AC excitation that drags the magnetized rotor along at synchronous speed, providing high efficiency and high torque density.

119. C — International automotive standards specify orange-coloured insulation for high-voltage cables on hybrid and electric vehicles, allowing immediate visual identification of dangerous cables and circuits. Recognition of the orange colour by technicians and first responders is a key safety control around hybrid/EV systems.

120. B — Removing the MSD opens the HV battery from the rest of the vehicle, but residual voltage may remain in DC bus capacitors. The technician verifies isolation by measuring with an HV-rated Cat III or IV meter between HV terminals and from each terminal to chassis, confirming near-zero readings before service begins.

121. A — Lithium-ion batteries accept and deliver power most efficiently within a specific temperature range. Preconditioning heats or cools the HV battery to the optimum range — typically when the vehicle is plugged in before DC fast charging or before driving in extreme temperatures — using grid power rather than depleting the battery itself.

122. C — A PHEV combines an internal combustion engine and an electric drive system, with a smaller battery than a typical BEV (electric range usually 30-80 km) and the engine functioning as a range extender or parallel drive after the battery is depleted. A BEV has no engine and relies entirely on its larger battery.

123. D — North American EVs use one of three DC fast charging connectors: CCS Combo 1 (Combined Charging System with J1772 plus two DC pins, used by most non-Tesla brands), CHAdeMO (legacy Japanese standard, mostly older Nissan/Mitsubishi), or NACS (Tesla, now adopted industry-wide). The connector type is vehicle-specific, with adapters available between some standards.

124. B — High temperature accelerates the chemical aging reactions inside lithium-ion cells, especially when the battery is at high state of charge. Sustained operation or storage above 40°C significantly shortens battery life, making thermal management one of the most important factors for long-term capacity retention.

125. C — The HV battery thermal management system uses heating (when too cold) and liquid or air cooling (when too hot) to keep the cells within an optimum temperature range, typically 20-40°C. Operating outside this range reduces available power, increases degradation, and risks thermal runaway at extreme temperatures.