PRACTICE EXAM 16: ASE G1 SIMULATION — 55 QUESTIONS

1. A technician finds an unknown fluid leak under a vehicle. The fluid is reddish-pink, slightly oily, and has a distinctive petroleum smell. Which of the following is this fluid MOST likely?

A. Automatic transmission fluid or power steering fluid (which uses ATF on many vehicles) — reddish-pink color with a petroleum odor is the characteristic appearance of fresh ATF

B. Engine coolant that has been dyed red for identification

C. Brake fluid that has been contaminated with rust from the master cylinder bore

D. Diesel fuel that has oxidized and changed color from sitting in the tank

2. A vehicle's battery is being load tested. The technician applies a load equal to half the battery's CCA rating for 15 seconds. At the end of the test, the voltage reads 9.4 volts. The ambient temperature is 70°F. Which of the following is the correct interpretation?

A. The battery has passed the load test and is serviceable

B. The test was performed incorrectly — the load should equal the full CCA rating, not half

C. The battery has failed the load test — at 70°F, the voltage should not drop below 9.6 volts during a 15-second load; a reading of 9.4 volts indicates the battery cannot deliver adequate cranking current

D. The battery should be retested at a higher temperature to get an accurate reading

3. A technician is jump-starting a vehicle with a dead battery using another vehicle. Which of the following describes the correct cable connection sequence?

A. Connect positive-to-positive first, then negative-to-negative on both batteries

B. Connect negative cables first, then positive cables

C. Connect all four clamps to the dead vehicle's battery only

D. Connect the positive cable to the dead battery's positive terminal, connect the other positive cable end to the good battery's positive terminal, connect the negative cable to the good battery's negative terminal, and connect the final negative cable to an unpainted engine ground on the dead vehicle — NOT to the

dead battery's negative terminal — to avoid creating a spark near the battery that could ignite hydrogen gas

4. A vehicle's underhood Vehicle Emission Control Information (VECI) label is missing. The technician needs to determine which emission components the vehicle was originally equipped with. Which of the following is the correct action?

A. Visually inspect the engine to determine which components are present

B. Look up the VECI information through the manufacturer's service information system using the VIN — the VECI label data is archived and can be accessed electronically to identify the vehicle's original emission equipment, vacuum hose routing, and ignition timing specifications

C. Contact the EPA directly to obtain the vehicle's emission certification information

D. Use the vehicle's model year alone to determine emission equipment since all vehicles of the same year have identical equipment

5. A customer brings in a vehicle with a frozen battery in extremely cold weather. The battery case is visibly swollen. Which of the following is the correct procedure?

A. Jump-start the vehicle immediately to warm the battery through the charging process

B. Place the battery on a fast charger at maximum amperage to thaw it quickly

C. Do NOT attempt to charge or jump-start a frozen battery — allow the battery to thaw at room temperature first; a frozen battery can explode if charged because the ice blocks internal current flow and the charging energy converts to heat and gas with nowhere to dissipate; the swollen case confirms ice formation inside

D. Tap the battery case with a hammer to break up the internal ice before charging

6. A technician is selecting an oil filter wrench for a cartridge-style oil filter housing cap. The cap is a large plastic hex-shaped piece on top of the engine. Which type of oil filter wrench is MOST appropriate?

A. A cap-type socket wrench that fits over the hex flats of the cartridge housing cap — this provides even clamping pressure around the cap and prevents the damage that plier-type or strap wrenches cause on plastic housings

B. A metal strap wrench tightened around the cap's circumference

C. An adjustable plier-type wrench clamped onto the cap's hex flats

D. A standard socket and ratchet applied to the cap's center bolt

7. A vehicle requires the correct replacement lug nut. The original lug nuts have a 60-degree conical (tapered) seat. The technician finds lug nuts in the parts bin that have a flat washer-style seat. Which of the following is the correct action?

A. Use the flat-seat lug nuts since the thread size is the same

B. Use ONLY lug nuts that match the wheel's seat geometry — conical-seat lug nuts center the wheel on conical-seat wheel holes; using flat-seat nuts on conical-seat holes (or vice versa) prevents proper wheel centering, creates inadequate clamping force, and can cause wheel loosening and separation during driving

C. The seat type only matters on alloy wheels, not steel wheels

D. Apply anti-seize compound to compensate for the seat geometry difference

8. A vehicle's engine has an oil leak at the oil drain plug. The technician removes the plug and finds the sealing washer is a crush-type copper washer that has been reused multiple times and is flattened beyond its design compression. Which of the following is the correct action?

A. Reinstall the same washer with thread sealant tape on the plug threads

B. Tighten the drain plug an additional quarter turn to compensate for the worn washer

C. Replace the drain plug with a larger diameter plug that creates a tighter fit

D. Replace the crush washer with a new one of the correct size and material — copper crush washers are designed to deform once to create a seal; reusing them reduces their ability to conform to surface irregularities, and continued over-tightening to compensate damages the oil pan threads

9. A technician is preparing to charge a conventional flooded lead-acid battery on a bench charger. The battery has removable vent caps. Which of the following is the correct preparation procedure?

A. Leave the vent caps tightly sealed to prevent electrolyte splashing during charging

B. Remove the vent caps and seal the openings with tape to prevent acid mist from escaping

C. Remove or loosen the vent caps to allow hydrogen gas to escape during charging, verify the electrolyte level covers the plates (add distilled water if needed), connect the charger leads (positive to positive, negative to negative), and set the charger to the appropriate rate — never charge in an enclosed area without ventilation

D. Flip the battery upside down to equalize the electrolyte level before charging

10. A vehicle's owner's manual specifies a maintenance schedule that includes "inspect brake pads and rotors" at 30,000 miles. The technician inspects and finds the front pads at 6 mm and the rotors within specification. What should the technician document?

A. Record the actual measured pad thickness and rotor condition on the inspection report — documenting specific measurements rather than just "OK" or "pass" creates a baseline that allows tracking wear rate over future inspections and helps predict when replacement will be needed

B. Simply mark "pass" on the inspection checklist since everything is within specification

C. Replace the brake pads preemptively since the vehicle is at 30,000 miles

D. No documentation is needed for components that are within specification

11. A vehicle's coolant appears to have a slight oily film on the surface in the recovery bottle, but the oil dipstick shows clean oil with no coolant contamination. Which of the following is the MOST likely source of the oily film?

A. A failed head gasket that is leaking oil into the coolant but not coolant into the oil

B. Normal silicone-based gasket sealer residue or corrosion inhibitor additive that has separated and floats on the coolant surface — some RTV sealants and coolant additives naturally create a thin oily appearance on the coolant surface without indicating any mechanical failure

C. A cracked engine block that only leaks in one direction

D. Transmission cooler failure that is mixing ATF with coolant

12. A vehicle's scan tool shows a stored DTC but the Malfunction Indicator Lamp (MIL) is NOT illuminated. Which of the following explains this condition?

A. The scan tool is reading a false code that does not exist in the PCM's memory

B. The MIL bulb has burned out and cannot illuminate

C. The code has been cleared by a previous technician but the repair was not completed

D. The DTC is stored as a history (previously active) code — it was detected in the past but the fault has not recurred for a sufficient number of drive cycles to keep the MIL on; the PCM turned the MIL off after the condition self-corrected but retained the code in memory for diagnostic reference

13. A vehicle's brake system uses DOT 4 brake fluid. During service, the technician discovers the system has been previously filled with DOT 5 silicone brake fluid. There are no current brake complaints. Which of the following is the correct action?

A. Leave the DOT 5 in place since the brakes are functioning normally

B. Top off with DOT 4 to restore the correct fluid type

C. The entire brake system must be flushed, all rubber components inspected for swelling or deterioration, and the system refilled with the correct DOT 4 fluid — DOT 5 silicone and DOT 3/4 glycol fluids are chemically incompatible; mixing causes gelling, seal damage, and unpredictable brake performance that may not be immediately apparent

D. Add a brake fluid conditioner to make the two fluid types compatible

14. A vehicle's engine has a steady P0420 code. The technician wants to evaluate the catalytic converter's efficiency using scan tool data. Which of the following O2 sensor data patterns would confirm a failing converter?

A. The upstream sensor switches rapidly while the downstream sensor shows a nearly flat line at 0.6–0.7 volts

B. Both the upstream and downstream sensors show flat readings at 0.45 volts

C. The downstream (post-converter) sensor's switching pattern closely mirrors the upstream sensor's rich-lean oscillation — this means the converter is no longer buffering the exhaust gas oxygen content, and the raw engine exhaust composition is passing through unchanged

D. The upstream sensor shows a flat line while the downstream switches rapidly

15. A customer asks why the shop charges a diagnostic fee when the vehicle "just needs a part." Which of the following is the MOST professional and accurate explanation?

A. The diagnostic fee covers the shop's overhead costs and is charged regardless of the work performed

B. The diagnostic fee covers the technician's time, training, and equipment used to accurately identify the specific root cause of the problem — without proper diagnosis, replacing parts based on symptoms alone often results in unnecessary expense, repeated repairs, and the original problem remaining unfixed; diagnosis ensures the correct repair is performed the first time

C. The diagnostic fee is a standard industry markup that all shops charge

D. The diagnostic fee is waived if the customer authorizes the recommended repair

16. A vehicle's engine has an intermittent stalling condition. The technician connects a scan tool and drives the vehicle for 45 minutes without the stall occurring. The scan tool's data recording function captured all PID data during the drive. Which of the following is the MOST useful scan tool feature for analyzing this type of intermittent fault?

A. The scan tool's code reading function

B. The scan tool's actuator test function

C. The scan tool's freeze frame data viewer

D. The scan tool's data recording/playback function — by recording all sensor data (PIDs) continuously during the drive, the technician can review the data frame-by-frame if the stall occurs on a future test drive, looking for the sensor reading that dropped or changed at the exact moment of the stall

17. A vehicle has a P0507 (Idle Control System — RPM Higher Than Expected). The idle speed is 1,100 RPM. The technician checks for vacuum leaks using a smoke machine and finds no leaks. Which of the following should the technician check NEXT?

A. The fuel pressure regulator for a stuck-open condition

B. The exhaust system for restrictions

C. The throttle body for carbon buildup that is holding the throttle plate slightly open, and the IAC valve (if equipped) for a stuck-open condition — if no vacuum leak exists, the excess air entering the engine at idle is coming through the throttle bore itself or through the idle air bypass passage

D. The catalytic converter for increased backpressure

18. A technician is replacing a maxi-fuse in the underhood power distribution box. The blown fuse is a 40-amp fuse that protects the cooling fan circuit. The technician has a 50-amp fuse available but not a 40-amp. Which of the following is the correct action?

A. Do NOT install the 50-amp fuse — obtain the correct 40-amp fuse; an oversized fuse allows more current to flow through the wiring than it was designed to handle, potentially overheating the wire insulation and causing a fire before the fuse blows

B. Install the 50-amp fuse temporarily and advise the customer to return for the correct fuse

C. The 10-amp difference is within acceptable tolerance and the 50-amp fuse is safe to use

D. Install the 50-amp fuse and add an inline fuse holder with a 40-amp fuse to the circuit

19. A vehicle's tires have been balanced on a standard spin balancer, but the customer still reports a vibration between 50 and 60 mph. The technician suspects a tire force variation. Which of the following tools can measure this condition?

A. A standard dial indicator mounted against the tire tread

B. A road force balancer — this machine presses a large roller against the spinning tire to simulate road load and measures radial force variation (the amount of force variation the tire produces against the road surface during rotation); it can detect internal tire defects that a standard spin balancer cannot identify

C. An alignment machine that measures tire runout during the alignment process

D. A tire pressure gauge that measures dynamic pressure changes during rotation

20. A vehicle's engine starts and runs but the battery warning light stays on. The technician tests the alternator and finds the output is 12.4 volts — the same as battery voltage with no additional charging voltage. Which of the following is the MOST likely cause?

A. The battery is fully charged and the alternator has reduced its output to prevent overcharging

B. The serpentine belt is slipping on the alternator pulley

C. The battery has a dead cell that is pulling the voltage down

D. The alternator is not generating output — common causes include worn brushes that cannot contact the slip rings, an open rotor winding, a failed voltage regulator, or a broken connection in the alternator field circuit; without field current, the rotor produces no magnetic field and the stator generates no voltage

21. A customer's vehicle has a musty odor and damp carpet on the passenger side floor. There is no evidence of a coolant leak (no sweet smell, no coolant loss). Which of the following is the MOST likely cause?

A. A clogged HVAC evaporator condensate drain tube — water that normally condenses on the cold evaporator and drains harmlessly under the vehicle is instead backing up inside the HVAC case and overflowing onto the passenger floor through the case seams or drain pan edges

B. A leaking windshield seal allowing rainwater to enter the passenger compartment

C. A clogged sunroof drain tube routing water into the headliner and down the A-pillar

D. A leaking heater core that is releasing water vapor only (no coolant)

22. A vehicle's engine has a no-start condition. The technician verifies that the battery is fully charged and the starter motor cranks the engine at normal speed. There is no spark at the spark plugs. Fuel pressure is within specification. Which of the following should the technician check NEXT?

A. The fuel injectors for proper spray pattern

B. The engine compression on all cylinders

C. The crankshaft position sensor and its circuit — the CKP sensor is the primary trigger for the ignition system; if it is not producing a signal (failed sensor, broken wire, corroded connector, excessive air gap), the PCM will not command the ignition coils to fire; no CKP signal = no spark

D. The catalytic converter for restriction

23. Technician A says that a battery hold-down is a cosmetic accessory that keeps the battery tidy in the engine compartment. Technician B says the battery hold-down is a safety device that prevents the battery from shifting during vehicle operation, cornering, and collision impact. Who is correct?

A. Technician A only

B. Technician B only — the battery hold-down prevents the heavy battery from tipping or dislodging during driving, which could short the terminals against the hood or fender, rupture the case, spill acid, or disconnect power causing loss of vehicle control; a missing hold-down is a safety inspection failure point

C. Both Technician A and Technician B

D. Neither Technician A nor Technician B

24. A vehicle's brakes produce a low-frequency moaning or groaning sound during the first few brake applications in the morning. The sound disappears after 3-4 stops. Pads and rotors are within specification. Which of the following is the MOST likely cause?

A. Brake pad delamination that requires immediate pad replacement

B. A caliper piston that is slow to retract in cold temperatures

C. A warped rotor that straightens as it heats up from braking friction

D. Overnight moisture creating a thin layer of corrosion on the rotor surface that produces a moaning noise as the pad scrapes through it during the first few applications — once the corrosion is removed by the pad, the noise disappears; this is a normal condition, especially in humid climates

25. A technician notices that a customer's vehicle has mismatched tires — two different brands on the front axle. The tires are the same size and speed rating. The customer has no handling complaints. Which of the following is the correct recommendation?

A. While mismatched brands on the same axle is not ideal, it is acceptable if the tires are the same size, speed rating, and have comparable tread depth and construction type (both radial) — the technician should note the condition and recommend matching tires when the next replacement is due

B. Replace both front tires immediately because mismatched brands create a dangerous handling condition

C. Move both mismatched tires to the rear axle where they will have less effect on handling

D. Mismatched brands cause automatic failure of the vehicle's stability control system

26. A vehicle's engine has been recently serviced with a new oil filter. Two days later, the customer returns with oil all over the driveway. The technician finds oil pouring from the oil filter area. Which of the following is the MOST likely cause?

A. The oil filter is defective and has a hole in the canister

B. The engine oil pressure is too high and blew the filter seal

C. The old oil filter gasket remained stuck to the engine mounting surface when the old filter was removed, creating a double-gasket condition that cannot seal — oil pours past the gap between the two stacked gaskets; this is prevented by visually verifying the old gasket is removed before installing the new filter

D. The new oil filter is the wrong thread size for the engine

27. A vehicle equipped with stability control has the ESC light illuminated after a wheel alignment. A DTC for the steering angle sensor is stored. Which of the following is the correct action?

A. Replace the steering angle sensor since the alignment procedure damaged it

B. Perform a steering angle sensor calibration (zero-point reset) — the alignment changed the toe settings, which changed the relationship between the steering wheel's center position and the front wheels' straight-ahead position; the sensor must be recalibrated to recognize the new center point

C. The DTC will clear itself after driving 50 miles in a straight line

D. Realign the vehicle to the pre-alignment settings to restore the sensor calibration

28. A vehicle's engine has a P0300 (Random Misfire) that occurs only during the first 2 minutes after a cold start and then clears completely. The engine runs perfectly once warmed up. No other DTCs are stored. Which of the following is the MOST likely cause?

A. A faulty thermostat that causes the engine to warm up too quickly

B. Worn spark plugs with widened gaps that cannot fire reliably in the denser (colder, more resistant) air-fuel mixture present during cold start — as the mixture warms and becomes less dense, the plugs can fire normally; this is often the earliest symptom of plugs approaching the end of their service life

C. A faulty MAP sensor that misreads barometric pressure during startup

D. A clogged fuel filter that restricts fuel only during cold cranking

29. A technician is performing a battery terminal cleaning. After cleaning and reconnecting, the technician applies a protective compound to the terminals. Which of the following is the correct type of compound and application method?

A. Apply a battery terminal corrosion preventive spray or felt washers AFTER the cable clamps are reconnected and tightened — the protectant goes on the OUTSIDE of the assembled connection to prevent future corrosion; it should NOT be applied between the terminal and the clamp because it would insulate the connection and increase resistance

B. Apply dielectric grease between the terminal post and the cable clamp before reconnecting

C. Apply petroleum jelly to the terminal post before installing the cable clamp

D. Spray WD-40 on the terminals after reconnecting for moisture protection

30. A vehicle with a turbocharged engine has reduced power and a check engine light. The scan tool shows a code for the boost pressure sensor circuit. The sensor reads 14.7 psi (atmospheric) at all times — even under full boost. Which of the following is the MOST likely cause?

A. The turbocharger has failed and is not producing boost

B. The wastegate is stuck open, preventing boost from building

C. The boost pressure sensor has failed, its connector is disconnected, or the vacuum/pressure hose between the intake manifold and the sensor is cracked or disconnected — the sensor reads atmospheric pressure because it is not receiving the actual manifold pressure; the PCM enters a reduced-power mode because it cannot verify actual boost level

D. The intercooler is leaking and reducing boost pressure

31. A vehicle's scan tool PID data shows that the calculated engine load is 85% at idle. Normal idle load for this engine is 15–25%. Which of the following would cause this abnormally high idle load reading?

A. An overcharged A/C system that is creating excessive compressor drag

B. A restricted air filter that limits airflow and increases pumping losses

C. A faulty torque converter that is not unlocking at idle

D. A dragging brake caliper, a seized accessory (power steering pump, A/C compressor, alternator), a tight engine from internal bearing problems, or an engaged parking brake — the PCM calculates engine load based on how hard the engine is working relative to its maximum capacity; excessive mechanical resistance at idle forces the engine to work much harder than normal, dramatically increasing the load percentage

32. A customer's vehicle has aftermarket wheel spacers installed. The customer brings the vehicle in for a vibration complaint. The technician removes the spacers and the vibration disappears. Which of the following BEST explains the vibration?

A. The wheel spacers altered the vehicle's ride height and suspension geometry

B. The wheel spacers moved the wheels outward, changing the effective wheel offset and extending the lever arm on the wheel bearings and studs — the increased stress and the potential for the spacer-to-hub or spacer-to-wheel interface to not be perfectly concentric introduced a vibration that standard balancing could not correct

C. The wheel spacers increased the vehicle's track width, creating wind resistance

D. The wheel spacers added rotational mass that the tires could not overcome at speed

33. A vehicle's engine has a code for the knock sensor circuit. The technician replaces the knock sensor and clears the code. The code returns immediately. Which of the following should the technician check?

A. The knock sensor wiring harness and connector for damage, corrosion, incorrect routing, or electromagnetic interference — the sensor itself was replaced, but the wiring between the sensor and the PCM carries the signal and is susceptible to damage from heat, vibration, and proximity to ignition coils or injector wiring that can induce electrical noise the PCM interprets as a circuit fault

B. The camshaft position sensor, which works in conjunction with the knock sensor

C. The fuel octane level, which affects knock sensor operation

D. The engine's compression ratio, which determines knock sensor sensitivity

34. A vehicle's cooling system has been serviced and refilled. The technician runs the engine to operating temperature with the radiator cap off and the heater on. Bubbles intermittently appear in the coolant at the radiator neck. Which of the following is the correct interpretation?

A. The bubbles indicate a blown head gasket allowing combustion gases into the cooling system

B. The bubbles are caused by a faulty water pump creating cavitation

C. Air trapped in the cooling system is gradually working its way to the highest point and escaping through the open radiator neck — this is a normal part of the bleeding process after a coolant service; the technician should continue idling until bubbles stop and the thermostat has opened, then top off and cap the system

D. The radiator has an internal crack that is admitting air

35. A vehicle is equipped with a factory-installed trailer brake controller. The customer reports that the trailer brakes are not activating. The controller display shows "No Trailer Detected." Which of the following should the technician check FIRST?

A. The trailer brake controller module for an internal fault

B. The vehicle's own brake system for adequate pressure to trigger the controller

C. The engine control module for a trailer mode software update

D. The trailer connector wiring at the vehicle's hitch receptacle for power, ground, and brake signal continuity — a corroded, damaged, or disconnected trailer connector pin prevents the controller from detecting the trailer's brake circuit; this is the most accessible and most common failure point

36. A vehicle's engine has a timing chain that the manufacturer recommends replacing at 120,000 miles. The vehicle has 115,000 miles and the engine runs normally with no noise or DTCs. The customer declines the replacement due to cost. Which of the following is the correct response?

A. Refuse to release the vehicle until the timing chain is replaced since it is a safety hazard

B. Document the manufacturer's recommendation on the repair order, explain the risk of continued operation beyond the interval (potential chain failure leading to catastrophic engine damage on interference engines), have the customer sign acknowledging the declined service, and release the vehicle — the customer has the right to decline recommended maintenance after being informed of the consequences

C. Replace the timing chain without customer authorization since it is a critical component

D. Tell the customer the chain will definitely break at 120,000 miles

37. A vehicle's engine has a rough idle with a P0172 (System Too Rich — Bank 1). The technician checks the fuel pressure and finds it is 15 psi above specification. Which of the following is the MOST likely cause of the high fuel pressure?

A. A faulty fuel pressure regulator that is stuck closed or has a blocked vacuum reference line — when the regulator cannot bleed off excess fuel pressure (either mechanically stuck or because it lost its vacuum reference signal), pressure builds beyond specification, and the injectors deliver more fuel than the PCM intends, creating the rich condition

B. A clogged fuel filter restricting flow volume

C. A weak fuel pump that is overcompensating for a restriction

D. A contaminated MAF sensor underreporting airflow

38. A technician is inspecting a vehicle's exhaust system and notices the catalytic converter has a weld line around its circumference that does not match factory construction. A small metal tag wired to the converter shows an aftermarket part number. The customer states they purchased the vehicle recently. Which of the following is the significance of this observation?

A. Aftermarket converters are always superior to OEM converters

B. The weld line indicates the converter was installed by a less-skilled technician

C. The vehicle's catalytic converter was likely replaced previously — the technician should verify the replacement converter meets OEM and/or CARB requirements for the vehicle's application year and state, as many aftermarket converters do not meet OBD II efficiency thresholds and may be the cause of any P0420/P0430 codes

D. All catalytic converters are manufactured with a visible weld line

39. A vehicle's engine has a P0401 (EGR Flow Insufficient) code. The technician tests the EGR valve with a hand vacuum pump and the valve opens and closes freely. The engine RPM drops when the valve is held open at idle, confirming exhaust gas is flowing. Which of the following would STILL cause a P0401 code despite the EGR valve functioning correctly?

A. A faulty throttle position sensor reading incorrectly during EGR operation

B. An incorrect engine oil viscosity that affects EGR system monitoring

C. A faulty ignition coil that misfires during EGR valve opening

D. A faulty EGR position sensor, a clogged DPFE (delta pressure feedback EGR) sensor hose, or a malfunctioning EGR temperature sensor — the EGR VALVE works, but the MONITORING sensor that tells the PCM whether adequate flow is occurring may be faulty or its sensing passages may be clogged with carbon, causing the PCM to believe flow is insufficient even though the valve functions

40. A vehicle's scan tool data shows short-term fuel trim at +25% and long-term fuel trim at +18% at idle. At 2,500 RPM, STFT drops to +3% and LTFT remains at +18%. What does this idle-versus-RPM fuel trim pattern indicate?

A. The fuel pump is weak and cannot maintain pressure at higher RPM

B. The oxygen sensor is responding too slowly at idle

C. The LTFT is stuck at +18% due to a PCM software glitch

D. The large positive fuel trim at idle that drops significantly at higher RPM indicates a vacuum leak — at idle, total airflow is low, so the unmetered air from the leak represents a large percentage of total intake air, requiring massive fuel compensation; at higher RPM, total airflow increases dramatically, making the same leak a much smaller percentage of total air, reducing the required compensation

41. A technician discovers that a vehicle's frame has been repaired with a welded steel plate patch. The customer states this was done by a previous owner. Which of the following is the correct action?

A. Document the modification on the inspection report, note the location and apparent quality of the repair, and advise the customer that welded frame repairs may or may not meet structural safety standards depending on the repair quality, materials, and location — if there are concerns about structural integrity, referral to a qualified frame/body shop for evaluation is appropriate

B. The welded repair is always stronger than the original frame and no further action is needed

C. Remove the welded plate and replace the entire frame section

D. Frame welding is standard practice and requires no documentation or further evaluation

42. A vehicle's headlight has condensation (moisture droplets) visible inside the lens. The headlight is an OEM sealed assembly. Which of the following is the correct interpretation?

A. All headlight assemblies develop internal condensation as a normal characteristic of their design

B. The headlight bulb is generating excessive heat that is vaporizing moisture inside the housing

C. The headlight housing seal has failed or a vent tube is clogged — sealed headlight assemblies use small vent tubes to equalize pressure as the housing heats and cools; if a seal cracks or a vent tube clogs, moisture enters and cannot escape, creating persistent internal condensation that reduces light output and can corrode the reflector surface

D. The condensation is caused by water splashing into the vent tube during car washes

43. A vehicle's engine has an oil change interval specified by the manufacturer as 7,500 miles with full synthetic oil. The customer insists on changing the oil every 3,000 miles. Which of the following is the correct response?

A. The customer is wasting money — 3,000-mile intervals were only necessary with older conventional oils

B. The customer should follow the manufacturer's recommendation exactly and never deviate

C. More frequent oil changes cause engine damage due to the repeated drain-and-fill thermal cycling

D. More frequent oil changes will not harm the engine — the customer may choose to change oil more often than the manufacturer recommends for their own peace of mind or due to severe driving conditions; the technician should respect the customer's preference while informing them that the manufacturer's interval is engineered for adequate protection

44. A vehicle's front suspension produces a popping sound when the steering wheel is turned from center to full lock in either direction, but ONLY when the vehicle is stationary (not moving). The sound does not occur while driving. Which of the following is the MOST likely cause?

A. A worn CV joint that only pops during stationary steering

B. A dry or binding front strut upper bearing plate — during stationary steering, the strut assembly must rotate against the full friction of the tires on the pavement; a dry or worn bearing plate resists this rotation and suddenly releases, producing a pop; while driving, reduced tire friction from forward motion makes the rotation smoother and eliminates the pop

C. A worn lower ball joint that loads differently when stationary

D. A loose sway bar end link that pops when the steering is turned

45. A vehicle's A/C system is not cooling. The technician observes that the compressor clutch engages for 5 seconds and then disengages for 15 seconds, continuously cycling. The system was recently recharged at a quick-service shop. Which of the following is the MOST likely cause?

A. The system is undercharged — the quick-service shop likely did not add enough refrigerant; the low-pressure switch detects the low charge and cuts power to the compressor clutch to protect it; pressure briefly builds during the off-cycle, the switch re-engages the clutch, pressure drops again immediately, and the rapid cycling continues; the system must be properly recovered, leak-tested, evacuated, and recharged to the exact specification

B. The compressor clutch air gap is too large, causing intermittent engagement

C. The high-pressure switch is stuck in the closed position

D. The expansion valve is stuck open, flooding the evaporator

46. A vehicle's engine runs rough at idle. The technician performs a relative compression test using the scan tool's misfire counter feature — watching the RPM variation between cylinders during cranking. Cylinder 3 shows significantly less RPM contribution than the other cylinders. Which of the following does this indicate?

A. Cylinder 3 has lower compression than the other cylinders — a relative compression test compares how much each cylinder contributes to crankshaft acceleration during cranking; a cylinder with significantly less contribution is producing less compression, indicating a mechanical sealing problem (ring, valve, or gasket) on that cylinder without needing a traditional compression gauge

B. Cylinder 3 has a faulty fuel injector that is not delivering fuel

C. Cylinder 3's ignition coil is not firing during the cranking test

D. The CKP sensor is not reading cylinder 3's position correctly

47. A vehicle's service manual specifies that the front suspension lower control arm bolts require a torque of 95 ft-lbs plus an additional torque angle of 180 degrees. The technician torques the bolts to 95 ft-lbs but does not have a torque angle gauge. Which of the following is the correct action?

A. Use a paint marker to mark the bolt and housing, then turn an additional half turn (180°)

B. Estimate the additional rotation by feel since the initial torque has already been applied

C. The 180-degree rotation is optional and 95 ft-lbs alone is sufficient

D. Obtain a torque angle gauge or use a paint-mark method — a 180-degree (half-turn) rotation after the initial torque is a torque-to-yield procedure that stretches the bolt to a precise clamping load; the angle must be accurate because too little rotation under-clamps the joint and too much risks bolt failure; the paint-mark method (marking bolt and surface, then measuring 180° of rotation) is an acceptable alternative to a dedicated angle gauge

48. A customer's vehicle has a dead battery. The customer states they left the interior lights on overnight. After jump-starting and driving for 30 minutes, the battery gauge shows normal. The customer asks if the battery needs replacement. Which of the following is the correct advice?

A. The battery must be replaced because a full discharge always damages the internal plates

B. The battery should be tested with a load test or conductance test after it has been fully recharged — a single discharge from leaving lights on does not necessarily damage a healthy battery, but the test will

reveal whether the discharge caused any permanent capacity reduction; if it passes, the battery is serviceable

C. The battery is fine since it accepted the jump-start charge

D. Replace the battery as a precaution since its state of health is now unknown

49. A vehicle's coolant temperature gauge reads higher than normal. The technician checks the cooling fan and finds it is not running even though the engine is at operating temperature. The fan works when connected directly to battery power. Which of the following should the technician check NEXT?

A. The cooling fan relay, the engine coolant temperature sensor signal to the PCM (or fan control module), and the PCM's commanded fan output — the fan motor works (proved by direct power test), so the fault is in the CONTROL circuit; the relay, the temperature input that triggers the relay, or the PCM's decision to command the relay must be tested

B. The fan motor brushes for excessive wear

C. The fan blade pitch for incorrect angle

D. The radiator cap for incorrect pressure rating

50. A vehicle's engine stalls immediately after starting unless the throttle is partially depressed to keep the RPM above 1,200. Once warmed up for 2 minutes, the engine idles normally. Which of the following is the MOST likely cause?

A. A faulty crankshaft position sensor that loses signal at low RPM

B. A weak fuel pump that cannot maintain pressure at idle RPM

C. A malfunctioning idle air control valve, stuck-closed electronic throttle (on cold start), or a large vacuum leak that overwhelms the cold-start idle compensation — the engine needs extra air during cold start to maintain an elevated idle; if the additional air pathway is blocked, the engine stalls at the lower base idle speed until it warms enough for the standard idle calibration to sustain combustion

D. A restricted catalytic converter that creates excessive backpressure at idle

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51. A vehicle's scan tool shows that the thermostat monitor status is "Not Ready." The vehicle needs to pass an emissions inspection that requires the thermostat monitor to be complete. Which of the following is the correct action?

A. Use the scan tool to manually set the thermostat monitor to "Ready"

B. Replace the thermostat to force the monitor to run during the next drive cycle

C. Add an engine coolant additive that raises coolant temperature and triggers the monitor

D. Drive the vehicle through the manufacturer's specified drive cycle — the thermostat monitor requires a specific sequence of engine-off cold soak followed by a warm-up period where the PCM tracks the coolant temperature rise rate; the monitor must see the characteristic temperature curve that proves the thermostat is functioning before it will change to "Ready"

52. A vehicle's steering feels "notchy" — the driver feels resistance at certain points when turning the steering wheel. The resistance is felt at the same positions each time the wheel is turned. Power steering fluid is at the correct level. Which of the following is the MOST likely cause?

A. A faulty power steering pump with a worn flow control valve

B. A damaged or corroded steering column intermediate shaft universal joint — a joint with tight spots, dry bearings, or corrosion on the cross and cap assemblies creates resistance at specific rotational positions that the driver feels as "notchy" feedback through the steering wheel; the same positions feel resistant on every turn

C. A worn steering rack input shaft seal

D. A binding clock spring that creates resistance at certain steering wheel positions

53. A vehicle's engine has a ticking noise that is synchronous with engine speed. The technician uses a length of vacuum hose as a stethoscope to isolate the noise. The noise is loudest when the hose is placed near cylinder 4's exhaust port area on the outside of the exhaust manifold. Which of the following is the MOST likely cause?

A. An exhaust manifold leak at cylinder 4 — a cracked manifold, a blown gasket, or a loose/broken manifold bolt at that cylinder allows exhaust pulses to escape at engine speed frequency; the hose-as-stethoscope technique pinpoints the noise to the exact cylinder location, confirming the leak source before any disassembly

B. A worn cam lobe on cylinder 4's exhaust valve

C. A cracked exhaust valve on cylinder 4

D. A bent pushrod on cylinder 4's exhaust rocker arm

54. A vehicle's brake pedal requires pumping to become firm but holds pressure once firm. The pedal slowly sinks to the floor if held at a stoplight. Which of the following describes the TWO separate faults indicated by these symptoms?

A. A faulty brake booster (pedal requires pumping) and worn brake pads (pedal sinks at stoplights)

B. Air in the brake lines (pedal requires pumping) and a failing master cylinder (pedal sinks when held)

C. The pumping-to-firm symptom indicates air trapped in the brake hydraulic system (air compresses, requiring multiple pumps to compress it and build hydraulic pressure), while the slow sinking under sustained pressure indicates an internal master cylinder seal bypass (fluid leaks past worn seals when pressure is held) — both conditions are present simultaneously and each requires its own repair: bleeding for the air, and master cylinder replacement for the internal bypass

D. A proportioning valve fault (pedal requires pumping) and a rear wheel cylinder leak (pedal sinks)

55. A vehicle is brought in for a routine oil change. During the multi-point inspection, the technician notices that the serpentine belt has a small crack on the back (flat) side but no cracks on the ribbed side. The belt rib depth appears adequate when checked with a belt wear gauge. Which of the following is the correct recommendation?

A. Replace the belt immediately since any crack indicates belt failure is imminent

B. The belt is within specification since the wear gauge measures only the rib side

C. Apply belt dressing to the cracked area to seal the surface and extend belt life

D. Note the back-side cracking on the inspection report and recommend belt replacement at the next service or within the near future — while ribbed-side wear is the primary indicator of belt life, back-side cracking indicates age-related rubber deterioration; the belt is not in immediate danger of failure but is aging and should be planned for replacement before the cracks propagate to the rib side

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Practice Exam 16: Answer Key and Full Explanations

1. A — Fresh automatic transmission fluid is characteristically reddish-pink with a distinct petroleum odor. Many vehicles also use ATF as their power steering fluid, so the same fluid may appear under

either system. As ATF ages and degrades, it darkens from pink to dark red to brown to black. Engine coolant, brake fluid, and diesel fuel each have distinctly different colors, viscosities, and odors that differentiate them from ATF during leak identification.

2. C — The standard battery load test applies a load equal to half the CCA rating for 15 seconds while monitoring voltage. At 70°F, the battery must maintain a minimum of 9.6 volts throughout the test. A reading of 9.4 volts falls below this threshold, indicating the battery cannot deliver adequate cranking current under load. The minimum voltage threshold decreases as ambient temperature drops — at 0°F, the minimum is approximately 9.1 volts — because cold temperatures naturally reduce the battery's chemical reaction rate.

3. D — The jump-start cable sequence is designed to prevent a hydrogen gas explosion at the dead battery. Batteries produce hydrogen gas, especially when deeply discharged. The final connection — negative to an engine ground on the dead vehicle rather than to the dead battery's negative terminal — ensures that any spark from completing the circuit occurs AWAY from the battery and its hydrogen gas concentration. This single precaution prevents the most dangerous aspect of jump-starting.

4. B — The VECI (Vehicle Emission Control Information) label contains critical data including emission control equipment, vacuum hose routing, ignition timing specifications, and applicable emission standards. When the physical label is missing, the manufacturer's service information system can provide all VECI data by VIN lookup. This information is essential for emissions diagnosis and for verifying that all original emission equipment is present — which is required for passing emissions inspections in many states.

5. C — A frozen battery is a bomb waiting to explode. The electrolyte has converted to ice, which is non-conductive. Attempting to charge or jump-start a frozen battery forces electrical energy into a system that cannot conduct it — the energy converts to heat and gas with nowhere to go. The ice also expands the cell chambers, which is why the case is visibly swollen. The battery must thaw completely at room temperature before any attempt to charge or test it. A battery that froze was likely severely discharged, as fully charged batteries resist freezing down to -75°F.

6. A — Cartridge-style oil filter housing caps are typically made of engineered plastic with hex flats designed to accept a specific cap-type socket wrench. This wrench distributes removal and installation force evenly around the entire cap circumference. Metal strap wrenches can crush or crack plastic housings. Plier-type wrenches concentrate force on two points, gouging the hex flats. The correct tool prevents the expensive mistake of cracking a plastic filter housing that is molded into or bolted to the engine.

7. B — The lug nut seat geometry must match the wheel's lug hole geometry to create the correct centering and clamping interface. Conical (60-degree taper) seats center the wheel by wedging into matching tapered holes. Flat (washer-style) seats clamp against flat surfaces. Ball (radius) seats fit into radius-profile holes. Using a flat-seat nut in a conical hole fails to center the wheel, reduces the contact patch area, and concentrates stress on a thin ring of metal — creating conditions for the wheel to loosen progressively during driving.

8. D — Copper crush washers are single-use sealing components designed to deform (crush) once under torque to fill microscopic surface imperfections between the drain plug and the oil pan boss. Once crushed, the copper has permanently deformed and cannot re-crush to create a reliable seal on subsequent installations. Reusing a flattened crush washer forces the technician to over-tighten the drain plug to compensate, which progressively damages the aluminum oil pan threads — eventually stripping them and creating a far more expensive repair.

9. C — Removing or loosening the vent caps during charging is critical because the charging process generates hydrogen gas inside the battery cells. Sealed caps trap this gas, building pressure that can rupture the battery case or cause an explosion if the gas contacts a spark. Checking electrolyte level before charging ensures the plates are covered — exposed plates can sulfate permanently and overheat during charging. The charger should be set to the appropriate rate: slow (2–10 amps) for a deeply discharged battery, never exceeding the manufacturer's maximum charge rate.

10. A — Recording specific measurements (pad thickness in millimeters, rotor thickness, rotor condition) rather than simply marking "pass" creates a quantitative baseline that transforms a single inspection into part of a longitudinal wear tracking system. At the next 30,000-mile inspection, the technician can calculate the wear rate (mm per mile) and accurately predict when replacement will be needed — allowing the customer to plan and budget. "Pass" or "OK" provides no trackable data and no predictive value.

11. B — A thin oily film on coolant is commonly caused by residual silicone RTV sealant that has cured and shed a microscopic surface layer into the coolant, or by certain coolant additive packages that contain surfactants or anti-foam agents that can separate and float. The critical diagnostic distinction is that the engine oil on the dipstick is CLEAN — no coolant contamination, no milky appearance. If the head gasket or oil cooler were leaking, you would typically see evidence in the oil as well as in the coolant. An oily film alone, without corresponding oil contamination, is usually benign.

12. D — OBD II systems retain DTCs in memory as "history" or "matured" codes even after the MIL has been extinguished. When a fault occurs intermittently and then self-corrects for a defined number of consecutive fault-free drive cycles (typically 40 warm-up cycles for most DTCs), the PCM turns off the

MIL but keeps the code stored. This history code is valuable diagnostic information — it tells the technician what fault occurred in the past, even if it is not currently active. The code remains until cleared with a scan tool or until the PCM's internal timer erases it.

13. C — DOT 5 silicone fluid and DOT 3/4 glycol fluid are fundamentally incompatible chemistries. When mixed, they can form a gel that clogs ABS modulator passages, swells certain seal materials while shrinking others, and creates unpredictable brake pedal behavior that may not manifest immediately. The entire system — master cylinder, all lines, all calipers/wheel cylinders, ABS modulator, and all hoses — must be completely flushed to remove every trace of the silicone fluid. All rubber components should be inspected for swelling or deterioration before refilling with the correct DOT 4 specification.

14. C — A healthy catalytic converter stores and releases oxygen, which smooths out the rich-lean oscillations from the engine. The upstream sensor switches rapidly (multiple times per second) as the PCM hunts around stoichiometric. On a working converter, the downstream sensor should show a relatively flat, stable reading because the converter has buffered the oxygen variation. When the downstream sensor's switching pattern mirrors the upstream — oscillating at similar frequency and amplitude — the converter is no longer storing oxygen effectively, confirming catalytic efficiency loss.

15. B — The diagnostic fee compensates for the technician's expertise, time, specialized training, and equipment investment required to accurately identify the root cause of a problem. Without proper diagnosis, "replacing parts based on symptoms" becomes an expensive guessing game where the customer pays for multiple incorrect parts before the actual cause is found — or never found. Professional diagnosis ensures the first repair is the correct repair, ultimately saving the customer both time and money while preventing unnecessary parts replacement.

16. D — The scan tool's continuous data recording function captures ALL sensor PIDs at a rapid sampling rate during driving, creating a complete timeline of every engine parameter. If the intermittent stall occurs during a recorded drive session, the technician can scroll to the exact moment of the stall and examine what every sensor was doing in the seconds leading up to the event — identifying the specific input that dropped, spiked, or deviated immediately before the engine died. This is far more powerful than freeze frame, which captures only a single snapshot.

17. C — With no vacuum leaks found via smoke testing, the excess air causing the high idle must be entering through the intended airflow path — the throttle body itself or its idle air bypass circuit. Carbon deposits can accumulate on the throttle plate's edge and bore, preventing the plate from closing fully and creating a gap that passes excess air. Similarly, a stuck-open IAC valve (or idle air bypass passage) allows too much air to bypass the closed throttle plate. Cleaning the throttle body and testing the IAC valve targets these specific pathways.

18. A — Circuit protection devices (fuses, fusible links, circuit breakers) are the last line of defense between an electrical fault and a vehicle fire. They are sized to blow at a specific current that is slightly above the circuit's normal operating load but below the wire's amperage capacity. A 50-amp fuse in a 40-amp circuit allows 25% more current through wiring rated for only 40 amps — the wire will overheat and potentially ignite before the 50-amp fuse blows. Never upsize a fuse; always obtain the correct rating.

19. B — A road force balancer adds a critical measurement that standard spin balancers cannot provide: radial force variation. The machine presses a large roller against the spinning tire to simulate the road surface and measures how the tire's force output varies during each revolution. A tire with a shifted internal belt, a stiff sidewall spot, or an inconsistent rubber thickness produces a force variation that creates a vibration even when the tire is perfectly weight-balanced. Road force balancing identifies these hidden defects and can often reduce their effect through match-mounting.

20. D — The alternator is spinning but producing no additional voltage above what the battery itself provides (12.4V). A functioning alternator should produce 13.5–14.8V — the additional 1–3 volts is the charging voltage. Zero additional voltage means zero generation: the rotor is not producing a magnetic field (worn brushes, open field winding), the stator is not producing current (open or shorted stator winding), or the voltage regulator has failed and is not commanding field current. The alternator physically turns but electrically produces nothing.

21. A — The A/C evaporator operates below the dew point, causing atmospheric moisture to condense on its surface — exactly like a cold glass sweating in humid air. A drain tube channels this condensation out through the firewall to drip harmlessly under the vehicle. When the drain clogs (from debris, mold, insulation material, or insect nests), water accumulates inside the HVAC case until it overflows through case seams or the blower motor opening onto the passenger-side floor. Clearing the drain with a flexible probe or compressed air restores proper drainage.

22. C — The engine cranks at normal speed (battery and starter confirmed good) and has fuel pressure within specification (fuel delivery confirmed good), but there is NO SPARK. The ignition system requires a crankshaft position sensor signal to tell the PCM when to fire the coils. Without a CKP signal, the PCM does not know the crankshaft's position and cannot command ignition events. A failed CKP sensor, a broken signal wire, a corroded connector, or an excessive air gap between the sensor and the reluctor ring produces the no-spark condition.

23. B — Technician B is correct. The battery hold-down clamp is a critical safety device that secures the heavy battery (typically 30–50 lbs) against movement in all directions — forward during braking, laterally during cornering, and vertically over bumps. A dislodged battery can short its terminals against

the hood or fender (creating a fire), rupture its case (spilling acid), or disconnect from the electrical system (causing loss of all vehicle electrical systems including power steering assist and ABS). A missing hold-down is a safety inspection failure.

24. D — Overnight humidity deposits a microscopic layer of iron oxide (rust) on the bare cast-iron rotor friction surfaces. The first few brake applications scrape this corrosion layer off through normal pad-to-rotor contact. The rough, uneven oxide layer produces a moaning or groaning noise as the pad drags across it. Once removed (typically 3–5 stops), the clean rotor surface restores normal quiet braking for the rest of the day. This is a normal, harmless condition that occurs in all disc brake systems, especially in humid or coastal environments.

25. A — While matching all four tires (or at minimum, both tires on each axle) in brand, model, and tread depth is the ideal practice, mismatched brands of the same size, speed rating, and construction type are acceptable for continued service. The critical parameters for safe operation are dimensional compatibility (same size), performance compatibility (same speed rating), structural compatibility (both radial), and wear compatibility (comparable tread depth). Brand differences may create subtle handling variations but do not create a safety hazard.

26. C — The double-gasket condition is one of the most common and preventable oil leak comebacks in automotive service. When a spin-on oil filter is removed, the old rubber O-ring gasket can stick to the engine's filter mounting surface. If the technician installs the new filter without verifying the old gasket was removed, two gaskets stack against each other. The doubled gasket cannot compress enough to seal, and oil pours from the gap between them — often catastrophically, draining the engine within minutes. A 2-second visual check prevents this.

27. B — The steering angle sensor establishes a center reference point that the ESC system uses to compare driver intent (steering input) with actual vehicle behavior (yaw rate and lateral acceleration). A wheel alignment changes the toe settings, which changes where the front wheels point relative to the steering wheel's center position. After alignment, the sensor's stored center reference no longer matches the steering wheel's physical center. A zero-point recalibration updates the sensor's reference to match the new alignment, restoring accurate ESC function.

28. B — Cold-start misfires that clear after warm-up point to an ignition component that operates marginally in cold, dense intake charges but adequately in warm, less-dense charges. Cold air is denser, which means higher cylinder compression pressure — and higher pressure requires more ignition voltage to ionize the gap and initiate the spark. Spark plugs with widened gaps (from electrode erosion over tens of thousands of miles) require more voltage than the coils can deliver under cold-dense

conditions. Once the intake charge warms and pressure drops slightly, the same worn plugs fire adequately.

29. A — The anti-corrosion compound (spray, grease, or felt washers) must be applied AFTER the cable clamp is reconnected and tightened — on the OUTSIDE of the assembled connection. The protectant's job is to prevent future corrosion by sealing the external surfaces from atmospheric moisture and acid vapor. If applied between the terminal post and the cable clamp (the current-carrying contact surfaces), it acts as an insulator that increases electrical resistance, potentially causing starting and charging problems. Clean metal-to-metal contact must be maintained at the connection interface.

30. C — A boost pressure sensor reading atmospheric pressure (14.7 psi) at all times — even during full boost — means the sensor is not receiving the actual manifold pressure. The three most common causes are a disconnected or cracked pressure hose between the intake manifold and the sensor, a disconnected electrical connector, or a failed sensor element. The PCM cannot verify actual boost level and enters a reduced-power safety mode to prevent potential engine damage from uncontrolled boost. Inspecting the sensor's vacuum/pressure line connection is the first and simplest diagnostic step.

31. D — Calculated engine load is the PCM's measurement of how hard the engine is working relative to its maximum output capacity. At idle with no accessories engaged, load should be 15–25% — the engine is doing minimal work. A reading of 85% at idle means something is creating enormous resistance that the engine must overcome just to maintain idle speed. Possible sources include a dragging brake caliper, a seized A/C compressor, a failing alternator with internal shorts, a hydraulic power steering pump binding, or severe internal engine friction from bearing failure.

32. B — Wheel spacers move the wheel assembly outward from the hub, changing the effective wheel offset. This creates two vibration sources: the increased distance from the hub centerline amplifies any existing balance imperfection (the same weight imbalance at a greater radius produces more centrifugal force), and the spacer-to-hub and wheel-to-spacer interfaces add two additional mating surfaces that may not achieve perfect concentricity. The vibration disappearing with spacer removal confirms the spacers — not the wheels or tires — are the cause.

33. A — The knock sensor was replaced but the code returned immediately — proving the sensor is not the fault. The wiring harness between the sensor and the PCM is the remaining suspect. Knock sensor wiring is uniquely vulnerable because the sensor is mounted on the engine block where it is exposed to extreme heat, vibration, and oil contamination. The signal wire can chafe against engine components, the connector pins can corrode from heat cycling, and the wire routing near ignition coils or injector harnesses can introduce electromagnetic interference that the PCM misinterprets as a circuit fault.

34. C — Air trapped in the cooling system after a service is completely normal and expected. The cooling system contains numerous high points, curves, and pockets where air can become trapped during refilling. Running the engine with the radiator cap off and the heater on creates maximum coolant flow through all circuits, allowing trapped air bubbles to migrate to the highest point — the open radiator neck — where they escape. The technician should continue this process until no more bubbles appear and the thermostat has opened (confirmed by a sudden coolant level drop as the thermostat allows flow to the radiator).

35. D — The trailer connector at the hitch receptacle is the most exposed and most frequently damaged component in the trailer brake circuit. It is subjected to road spray, salt, mud, physical impact from trailer coupling/uncoupling, and connector pin corrosion from dissimilar metal contact. A corroded or bent pin, a damaged connector housing, or a broken wire at the connector prevents the trailer brake controller from detecting the trailer's brake circuit impedance. Cleaning and testing the connector pins for power, ground, and signal continuity is the fastest and most common resolution.

36. B — The customer has the legal right to decline ANY recommended service after being fully informed of the consequences. The technician's responsibility is to clearly explain the manufacturer's recommendation, the potential consequences of delaying (catastrophic engine damage if the chain fails on an interference engine), and document both the recommendation and the customer's informed decision to decline on the repair order. Having the customer sign acknowledging the declined service creates a record that protects the shop if the component later fails and the customer claims they were never warned.

37. A — Fuel pressure above specification means more fuel is being delivered to the injectors than the PCM calculated, creating a rich condition. The fuel pressure regulator's job is to maintain target pressure by bleeding excess fuel back to the tank. A regulator stuck in the closed position cannot bleed off excess pressure, so it rises above specification. Similarly, if the regulator uses a vacuum reference line that has become disconnected or clogged, it loses its pressure-modulating reference and defaults to maximum pressure. Either condition delivers excess fuel volume.

38. C — An aftermarket catalytic converter with a visible non-factory weld line and a third-party part tag indicates the converter was replaced at some point. Many aftermarket "universal fit" converters meet the minimum EPA requirements for federal emissions but do NOT meet the stricter OBD II catalyst efficiency thresholds — they may physically fit and appear functional but lack sufficient precious metal loading to pass the PCM's catalyst monitor. If the vehicle has a recurring P0420/P0430, the inadequate aftermarket converter is a prime suspect.

39. D — The EGR valve WORKS — confirmed by the hand vacuum test and the RPM drop proving gas flow. The P0401 code means the PCM's MONITORING system is not DETECTING adequate flow, which is a separate issue from actual flow. The monitoring system uses feedback sensors (DPFE sensor, EGR temperature sensor, or EGR position sensor) to verify flow independently of the valve itself. If the monitoring sensor has failed, or if its sensing passages (pressure feedback hoses, temperature probe port) are clogged with carbon, the PCM receives a "no flow" signal even though flow is actually occurring.

40. D — This idle-versus-RPM fuel trim split is the diagnostic fingerprint of a vacuum leak — one of the most important data interpretation skills in the entire series. At idle, total intake airflow is approximately 2–4 grams/second. A vacuum leak adding 0.5 grams/second of unmetered air represents 15–25% of total airflow — requiring massive fuel compensation (+25% STFT). At 2,500 RPM, total airflow is 15–25 grams/second. The SAME 0.5 grams/second leak now represents only 2–3% of total airflow — requiring minimal compensation (+3% STFT). The leak size didn't change; its proportional impact did.

41. A — A welded frame repair is a significant finding that should be documented and evaluated based on its quality, location, and structural implications. Professional frame welding performed by a qualified structural repair facility using the correct materials, joint preparation, and welding techniques can restore structural integrity. However, amateur welds using incorrect materials, poor penetration, or inappropriate joint design can create a weak point that fails under crash loading. The technician should document the finding and recommend professional evaluation if there are any concerns about the repair quality.

42. C — Sealed headlight assemblies use small vent tubes or breathable membranes that allow the housing to equalize pressure as it heats up (expands) and cools down (contracts) during normal operation. When these vents clog or when a housing seal cracks, the normal breathing cycle brings in humid air that cannot escape. The moisture condenses on the cooler interior surfaces when the headlight is off. Persistent internal condensation reduces light output by 30%+ and can corrode the reflective coating on the reflector surface, permanently degrading headlight performance.

43. D — More frequent oil changes than the manufacturer recommends will never harm an engine — the customer is simply replacing protective oil before its useful life is exhausted. While the manufacturer's interval is engineered to provide adequate protection (and modern oils support extended intervals), some customers prefer the additional insurance of shorter intervals, especially if their driving includes conditions the manufacturer classifies as "severe." The technician should inform the customer that the manufacturer's interval is safe, respect their preference, and continue providing quality service.

44. B — The strut upper bearing plate (also called the strut mount bearing) allows the entire strut assembly to rotate with the steering while isolating the vehicle body from the rotating assembly. During stationary steering, the full vehicle weight presses down on the bearing while the wheels scrub against the pavement — creating maximum rotational resistance. A dry, worn, or corroded bearing plate resists this rotation, builds tension, and suddenly releases with an audible pop. While driving, the reduced tire-to-road friction from forward motion eliminates the binding condition and the pop disappears.

45. A — Rapid compressor cycling (5 seconds on, 15 seconds off) is the classic symptom of a low refrigerant charge triggering the low-pressure cutout switch. When the compressor runs, it pulls refrigerant from the low side faster than the reduced charge can supply, causing low-side pressure to drop below the switch's cutoff threshold. The switch disengages the clutch. During the off-cycle, pressure equalizes and rises above the switch's reset point, re-engaging the clutch — and the cycle repeats. The system was likely undercharged by the quick-service shop and must be properly evacuated, leak-tested, and recharged to exact specification.

46. A — A relative compression test uses the CKP sensor's signal to measure how much each cylinder accelerates the crankshaft during its compression stroke. A cylinder with good compression creates more resistance to the starter motor, momentarily slowing the crankshaft before accelerating it more strongly on the power stroke. A cylinder with low compression offers less resistance and less contribution to crankshaft acceleration. Comparing the contribution pattern across all cylinders identifies the weak cylinder without disconnecting anything — it is the fastest and least invasive compression evaluation method available.

47. D — A torque-plus-angle specification is a torque-to-yield (TTY) fastening method where the initial torque seats the components and the additional angular rotation deliberately stretches the bolt into its plastic deformation zone for precise clamping. The 180-degree (half-turn) rotation must be measured accurately. A torque angle gauge attaches to the torque wrench and measures the rotation directly. The paint-mark method — marking the bolt head and the surface, then measuring 180° of rotation against the marks — is a widely accepted alternative that achieves the same precision without a dedicated angle gauge.

48. B — A single deep discharge from leaving lights on does not automatically condemn a battery. Many healthy batteries fully recover from a single event discharge with proper recharging. However, the technician cannot visually determine whether the discharge caused permanent plate sulfation, active material shedding, or other internal damage. The only way to know is to fully recharge the battery (a partially recharged battery will give misleading test results) and then perform a load test or conductance test. If the battery passes, it is serviceable. If it fails, the discharge revealed pre-existing weakness.

49. A — The direct-power test confirmed the fan motor is functional. The fault is therefore in the CONTROL circuit — the path between the PCM's decision to turn on the fan and the relay that sends power to the motor. The technician should check: the fan relay (for stuck contacts or coil failure), the ECT sensor signal (is the PCM receiving a temperature reading that exceeds the fan activation threshold?), and the PCM's commanded fan output (is the PCM sending the relay activation signal?). These three components form the control chain from temperature detection to relay activation.

50. C — During cold startup, the engine requires an elevated idle speed (typically 1,200–1,500 RPM) to overcome increased friction and maintain stable combustion with the dense cold air-fuel charge. The PCM achieves this through the IAC valve, fast-idle cam, or electronic throttle opening. If the cold-start air pathway is restricted (stuck IAC, carbon-blocked idle passage, or electronic throttle not responding to the cold-start idle command), the engine starts on the initial cranking fuel enrichment but immediately stalls at the base idle speed because it cannot sustain combustion without the additional cold-start airflow.

51. D — OBD II readiness monitors are self-tests that the PCM runs under specific operating conditions to verify emissions systems are functioning. The thermostat monitor specifically tracks the coolant temperature rise rate during warm-up — it expects to see the characteristic temperature plateau (thermostat closed, temperature rising) followed by a brief dip and then stable temperature (thermostat opening). This pattern can only be captured during a cold start after an adequate engine-off soak period. The manufacturer's drive cycle specifies the exact conditions required, and the vehicle must be driven through that cycle for the monitor to complete.

52. B — A "notchy" steering feel — where specific rotational positions have increased resistance — that repeats at the same positions each time the wheel is turned indicates a mechanical binding at a fixed point in the steering column's rotation. The intermediate shaft universal joint(s) connect the steering column to the steering gear through one or two U-joints. When these joints develop dry bearings, corrosion on the cross and cap assemblies, or physical damage, they create tight spots at specific angular positions. The notchy feel is most noticeable at low speed where the driver has the most tactile feedback.

53. A — Using a length of vacuum hose or rubber tubing as a stethoscope allows precise sound localization by directing sound from a specific point directly to the technician's ear. When the noise is loudest with the hose placed at the OUTSIDE of the exhaust manifold near cylinder 4's exhaust port, the sound is escaping from that specific location — not from inside the engine (which would be loudest at the valve cover). An exhaust manifold crack, a blown manifold gasket at that runner, or a loose/broken manifold bolt at cylinder 4 allows exhaust pulses to escape at the identified point.

54. C — This question presents TWO distinct symptoms that each indicate a different fault. The pumping-to-firm pedal indicates air in the hydraulic system — air is compressible, so the first pedal stroke compresses the air pocket rather than moving fluid; subsequent pumps progressively compress the air smaller until hydraulic pressure builds. The slow sinking under sustained pressure indicates an internal master cylinder seal bypass — the seals cannot hold static pressure and fluid leaks past internally. Both faults coexist: the system has air AND a failing master cylinder. Bleeding alone won't fix the sinking; master cylinder replacement alone won't fix the air.

55. D — Modern serpentine belts are evaluated primarily by rib-side wear (using a belt wear gauge that measures rib depth). However, the back (smooth) side is also an indicator of belt condition — back-side cracking indicates UV degradation, heat aging, and rubber compound deterioration that has not yet progressed to the rib side. The belt is not in immediate danger of failure, but the cracking signals that the rubber is aging and the belt should be scheduled for replacement at the next convenient service interval before the deterioration reaches the load-bearing rib side.