PRACTICE EXAM 9: ASE G1 SIMULATION — 55 QUESTIONS

1. A vehicle equipped with a forward-collision warning camera system has had the windshield replaced at a glass shop. Afterward, the forward-collision and lane-departure warning systems display error messages. Which of the following is the MOST likely cause?

A. The new windshield is a different thickness than the original, permanently blocking the camera signal

B. The replacement glass was manufactured with a tint that absorbs all camera wavelengths

C. The battery was disconnected during the repair, erasing the camera module's programming

D. The forward-facing camera requires recalibration after any windshield replacement because the camera's aiming reference has changed

2. A technician needs to repair a damaged section of wiring in a vehicle's engine harness. Which of the following is the correct repair method per manufacturer and industry standards?

A. Twist the wires together and wrap them tightly with electrical tape

B. Use a solder-and-heat-shrink splice or a manufacturer-approved crimp connector with adhesive-lined heat shrink to create a sealed, mechanically sound connection

C. Strip the wires, twist them together, and coat the connection with liquid electrical tape

D. Use household wire nuts to join the conductors and secure with a cable tie

3. A vehicle equipped with an automatic engine start-stop system has a battery failure after only 18 months. The battery is replaced with a standard flooded lead-acid battery because an AGM battery is not in stock. Which of the following is a potential consequence?

A. The standard battery will function identically since all 12-volt batteries are interchangeable

B. The vehicle's charging system will automatically adjust to compensate for the different battery chemistry

C. The standard flooded battery may fail prematurely because it is not designed for the frequent deep cycling demanded by start-stop systems — AGM or EFB batteries are specifically engineered for this application

D. The standard battery will provide longer life because it has more liquid electrolyte

4. A technician is using Ohm's Law to calculate the current flow in a headlight circuit. The headlight bulb has a resistance of 1.2 ohms and the system voltage is 12 volts. What is the current flow through the bulb?

A. 10 amps (I = V ÷ R = 12 ÷ 1.2 = 10)

B. 14.4 amps

C. 0.1 amps

D. 13.2 amps

5. A technician is looking up the torque specification for a cylinder head bolt and the service information states: "Torque to 22 ft-lbs, then rotate an additional 90 degrees." What does the additional 90-degree rotation indicate?

A. The bolt must be loosened 90 degrees after reaching 22 ft-lbs to relieve stress on the threads

B. The bolt should be tightened an additional quarter turn only if the bolt head is not yet flush with the surface

C. The fastener uses a torque-to-yield (TTY) method that stretches the bolt to a precise clamping load beyond what torque alone can achieve — these bolts typically cannot be reused

D. The 90-degree rotation is an optional step for aluminum heads only

6. A vehicle's TPMS warning light illuminates during cold morning driving but turns off after 20 minutes of highway driving. All tires appear properly inflated when checked later in the day. Which of the following is the MOST likely explanation?

A. A TPMS sensor battery is failing and only works at higher temperatures

B. The TPMS module has a software glitch that activates the light based on ambient temperature

C. One or more tires are inflated to the exact threshold pressure when warm but drop below the warning threshold in cold conditions

D. One or more tires are marginally inflated — cold ambient temperatures reduce tire pressure (approximately 1 psi per 10°F), dropping one or more tires below the TPMS warning threshold during cold starts; driving warms the tires and raises pressure back above the threshold

7. A technician notices that a vehicle's engine oil appears gray and frothy on the underside of the oil filler cap but the dipstick oil appears normal. The vehicle is driven on short trips in cold weather. Which of the following is the correct interpretation?

A. Moisture condensation from short-trip driving is collecting in the upper engine where temperatures are lower — this is normal in cold-weather, short-trip conditions and typically resolves with longer driving intervals

B. The head gasket is leaking coolant into the oil and the engine requires immediate teardown

C. The PCV system is malfunctioning and allowing excessive moisture into the crankcase

D. The wrong oil viscosity was installed, causing the oil to emulsify at operating temperature

8. A vehicle's brakes produce a high-pitched squeal that occurs during light braking but disappears when the brakes are applied firmly. The pads have adequate material and the rotors are within specification. Which of the following is the MOST likely cause?

A. The brake caliper piston seals have hardened, preventing proper piston retraction

B. The brake pads are vibrating at their natural resonant frequency against the rotor during light contact — this is typically corrected with anti-squeal shims, brake pad compound (paste) on the backing plate, or chamfering the pad edges

C. The brake rotor has developed hot spots that excite the pads at specific pressures

D. The brake master cylinder is releasing pressure unevenly between the front and rear circuits

9. A vehicle's steering wheel is not centered — it is rotated approximately 15 degrees to the right when driving straight on a level road. The vehicle does not pull in either direction. Which of the following is the MOST likely cause?

A. Unequal caster angles between the left and right front wheels

B. Unequal toe settings on the left and right sides — the individual toe values are not balanced even though the total toe may be within specification

C. A bent steering column shaft that has shifted the wheel position

D. A worn steering gear with excessive internal play

10. Technician A says that a digital storage oscilloscope (DSO) can be used to view the waveform of a crankshaft position sensor signal. Technician B says that a standard test light is sufficient to test the output of a crankshaft position sensor. Who is correct?

A. Technician B only

B. Both Technician A and Technician B

C. Technician A only

D. Neither Technician A nor Technician B

11. A vehicle's engine produces a deep, rhythmic knocking from the lower end that becomes louder under load and quieter at idle. Oil pressure is lower than specification. Which of the following is the MOST likely cause?

A. Worn main bearings that have excessive clearance, allowing the crankshaft to move and producing a low-frequency knock that worsens under the increased cylinder pressures of acceleration

B. A worn piston pin (wrist pin) producing a double-knock at the top of the piston stroke

C. A cracked flywheel flexing under engine torque

D. Excessive connecting rod side clearance causing the rod to rattle against the crankshaft journal

12. A customer's vehicle has a P0430 (Catalyst System Efficiency Below Threshold — Bank 2). The technician verifies that Bank 1 is functioning normally. Which of the following is TRUE about this diagnostic scenario?

A. Both catalytic converters must be replaced whenever a catalyst efficiency code is present on either bank

B. The Bank 2 converter is located on the same side as cylinder number 1

C. A P0430 does not necessarily confirm converter failure — the technician must first verify there are no exhaust leaks, the Bank 2 O2 sensors are functioning, and no engine conditions are damaging the converter before recommending replacement

D. Only the downstream O2 sensor on Bank 2 needs to be replaced to resolve the code

13. A vehicle's power window motor has been tested and confirmed to be good. The window moves up and down freely by hand when disconnected from the motor. However, when the motor is reconnected, the window moves up very slowly and then stops midway. Which of the following is the MOST likely cause?

A. The window switch has excessive internal resistance

B. The window motor is overheating due to continuous operation

C. The window regulator has a binding point or obstruction in its travel path that only creates resistance under motor load — the window moves freely by hand because less force is required than the motor applies

D. The window motor gear teeth are stripped and cannot maintain engagement under load

14. A technician is performing a diesel particulate filter (DPF) regeneration status check on a diesel-equipped light-duty vehicle. The customer complains of reduced power and a DPF warning light. Which of the following is the correct FIRST step?

A. Check the DPF soot loading level with a scan tool and perform a forced regeneration if the soot level is excessive — the filter may be clogged because the vehicle's driving pattern has not allowed passive regeneration to occur

B. Remove and replace the DPF immediately since a warning light indicates permanent failure

C. Clean the DPF by spraying it with a degreaser and compressed air

D. Delete the DPF system with an aftermarket tuner to eliminate the warning

15. A vehicle has a vibration that is felt through the entire vehicle at all speeds — even at 25 mph — and increases proportionally with speed. The vibration is present in all gears and in Neutral. Tire balance has been verified. Which of the following is the MOST likely cause?

A. An engine misfire that produces vibration at all vehicle speeds

B. Warped front brake rotors causing constant steering wheel shimmy

C. A worn engine mount that transmits vibration at higher RPM

D. A damaged tire with a broken belt or sidewall defect, or a bent wheel that cannot be corrected by balancing

16. Technician A says that R-1234yf refrigerant can be mixed with R-134a in a vehicle's A/C system without consequence. Technician B says that R-1234yf and R-134a require separate, dedicated recovery/recycling machines and must never be cross-contaminated. Who is correct?

A. Technician A only

B. Technician B only

C. Both Technician A and Technician B

D. Neither Technician A nor Technician B

17. A vehicle's alternator output test shows 14.4 volts and 95 amps — both within specification. However, the battery goes dead overnight. A parasitic draw test reveals 450 milliamps with all modules asleep. The technician pulls fuses one at a time and the draw drops to 45 milliamps when the interior lights fuse is removed. Which of the following is the correct NEXT step?

A. Identify all components on the interior lights fuse circuit and test each one individually to find the specific component that is staying energized and drawing excessive current

B. Replace the interior lights fuse with a higher amperage unit to handle the additional load

C. Replace the body control module since it controls all interior lighting functions

D. Disconnect the battery each night until the customer returns for follow-up

18. A vehicle's exhaust system has a metallic rattling noise at specific RPM ranges. The technician locates the noise at the catalytic converter. Tapping the converter with a rubber mallet produces a hollow rattling sound from inside. Which of the following does this indicate?

A. The converter's outer shell has separated from its mounting brackets

B. Normal operation — all catalytic converters rattle slightly when cold

C. The converter's internal ceramic substrate (honeycomb brick) has broken apart, and loose pieces are rattling inside the shell

D. The heat shield bolts have loosened and the shield is vibrating against the converter body

19. A vehicle with automatic headlights and daytime running lights has a customer complaint that the dashboard instrument cluster is too dim to read during daytime driving. Which of the following is the MOST likely cause?

A. A failing instrument cluster backlight inverter

B. A faulty body control module dimming the cluster below minimum brightness

C. A blown fuse for the instrument cluster illumination circuit

D. The automatic headlight system has activated nighttime mode during the day (due to a faulty ambient light sensor or covered sensor), causing the instrument cluster to dim to its nighttime brightness setting

20. A vehicle's engine has a ticking noise that occurs only during the first 30 seconds after a cold start and then disappears completely. Oil level is correct and oil pressure builds normally. Which of the following is the MOST likely cause?

A. A cracked exhaust manifold that seals when hot

B. Hydraulic valve lifters that are bleeding down overnight and require a few seconds of oil pressure to refill and take up lash — this is common on higher-mileage engines and is not typically a serious concern

C. A worn timing chain that tightens as the tensioner extends

D. A loose accessory belt that tensions once the tensioner warms up

21. A technician is measuring the specific gravity of battery electrolyte using a hydrometer. The reading in one cell is 1.200 while the remaining five cells read 1.265. What does this indicate?

A. The cell reading 1.200 is significantly weaker than the others — a difference of more than 0.050 specific gravity between any two cells indicates a failing cell, and the battery should be replaced

B. All six cells are within acceptable range and the battery is serviceable

C. The battery needs only a full recharge to equalize the cell readings

D. The hydrometer is out of calibration and should be replaced

22. A vehicle equipped with a blind spot monitoring system displays a "system unavailable" message after the rear bumper cover is removed and reinstalled for a minor bumper repair. Which of the following is the MOST likely cause?

A. The blind spot monitoring system is permanently damaged by any bumper removal

B. The vehicle's main computer requires a factory reset after any body panel removal

C. The blind spot monitoring radar sensors mounted in or behind the rear bumper cover may have been disconnected, damaged, or repositioned during the repair and require reconnection and/or recalibration

D. The rear bumper paint color affects the radar sensor wavelength and requires a color-matched replacement

23. A vehicle has a single loud click from the starter area when the key is turned to Start. Battery voltage is 12.6 volts and the cables are clean and tight. The technician taps on the starter motor with a hammer and the engine then cranks and starts normally. What does this confirm?

A. The battery has a dead cell that only delivers current after the physical impact vibrates the plates

B. The flywheel ring gear has a damaged tooth that the impact shifted past

C. The solenoid contacts are oxidized and temporarily welded shut

D. The starter motor has worn brushes or a bad spot on the commutator — the tap shifted the armature to a position where the brushes make better contact; the starter should be replaced

24. A vehicle's power steering makes a groaning noise when turning and the fluid level is correct. The fluid has been recently changed with the manufacturer-specified fluid. Which of the following should the technician check NEXT?

A. The power steering pump internal relief valve pressure

B. Whether the system was properly bled of air after the fluid change — trapped air in the hydraulic circuit causes cavitation and groaning during turns

C. The steering rack for internal bypass

D. The serpentine belt for glazing

25. A technician finds a TSB (Technical Service Bulletin) that describes a software update to address a customer's exact complaint — a rough idle on cold startup. The TSB states the fix is a PCM recalibration. Which of the following is the correct course of action?

A. Perform the PCM recalibration and bill the customer for the time only since the fix was identified by the manufacturer

B. Ignore the TSB and perform traditional diagnostic procedures since the TSB may not apply

C. Inform the customer that a manufacturer-issued TSB addresses their exact complaint, recommend the PCM update, and verify the vehicle's VIN falls within the TSB's applicability range before performing the update

D. Refer the customer to the dealer because TSB repairs can only be performed at franchised dealerships

26. A vehicle has a no-start condition. The scan tool shows RPM at 0 during cranking and no injector pulse width activity. Spark is absent. Which single sensor failure could cause BOTH no-spark and no-injector pulse simultaneously?

A. A failed crankshaft position (CKP) sensor — the PCM requires the CKP signal as the primary trigger for both the ignition system and the fuel injection system; without it, neither system is activated

B. A failed camshaft position (CMP) sensor

C. A failed throttle position sensor

D. A failed mass airflow sensor

27. A customer's vehicle has a rattle from the exhaust system when idling in Drive with the A/C on but NOT when idling in Park. All exhaust components appear secure. Which of the following BEST explains this behavior?

A. The A/C compressor is creating a vibration in the exhaust through the engine block

B. The catalytic converter substrate is loose and only rattles when the vehicle is in gear

C. A loose exhaust heat shield or pipe contact point is excited by the slight RPM drop and increased engine load when the transmission is engaged

D. The engine mounts have shifted the engine position enough in Drive to alter the exhaust system contact with the drivetrain — the rattle occurs because a pipe or hanger contacts a crossmember only when the engine tilts under the load of the engaged torque converter and A/C compressor

28. A vehicle's scan tool shows a misfire count of 45 on cylinder 4 and zero misfires on all other cylinders over 1,000 engine revolutions. The technician swaps the ignition coil from cylinder 4 to cylinder 2. After clearing the misfire counters and running the engine, cylinder 2 now shows 42 misfires and cylinder 4 shows zero. What should the technician replace?

A. The spark plug on the original cylinder 4

B. The ignition coil that was moved from cylinder 4 to cylinder 2

C. The fuel injector on cylinder 4

D. The PCM driver for cylinder 4

29. A vehicle is brought in for a four-wheel alignment. The technician measures the rear toe and finds the left rear wheel has 0.15 degrees of toe-out and the right rear has 0.10 degrees of toe-in. What effect does this have on vehicle handling?

A. The vehicle will track straight with no noticeable handling issues

B. The steering wheel will be off-center but the vehicle will not pull

C. The unequal rear toe creates a thrust angle that points to the right of the vehicle's centerline, which will cause the vehicle to drift or pull to the left and may cause the steering wheel to be off-center

D. The rear tires will wear evenly despite the toe difference

30. A technician is testing a blower motor resistor that has four wire terminals. The DMM shows continuity between terminals 1-2, 2-3, and 3-4 but shows OL (open) between terminals 1-4. Which of the following is the correct interpretation?

A. The resistor is functioning normally — each terminal pair represents a different resistance value for each fan speed, and the full-range path (terminals 1-4) bypasses the resistor entirely through the relay for maximum speed

B. One of the internal resistor elements has failed and the resistor must be replaced

C. The DMM is malfunctioning because all terminals should show continuity to each other

D. The resistor is designed for a three-speed blower and the fourth terminal is unused

31. A technician is inspecting a vehicle's fuel system and discovers that the fuel injector O-rings are hardened, cracked, and no longer sealing properly. Which of the following symptoms would this condition MOST likely produce?

A. A loud knocking noise from the engine under load

B. A transmission shift flare during 2-3 upshift

C. Reduced fuel economy from evaporative fuel loss at the tank

D. A fuel odor in the engine compartment, a rough or unstable idle from vacuum leaks at the injector seat, and potential fuel dripping onto hot engine surfaces creating a fire hazard

32. Technician A says that all wheel speed sensors produce an AC voltage signal that increases in frequency with wheel speed. Technician B says that some wheel speed sensors are digital (Hall-effect type) that produce a square-wave DC voltage signal. Who is correct?

A. Technician A only

B. Both technicians are correct — older vehicles commonly use passive (variable reluctance) sensors that produce AC signals, while newer vehicles often use active (Hall-effect) sensors that produce digital square-wave signals

C. Technician B only

D. Neither Technician A nor Technician B

33. A vehicle's A/C compressor has been replaced. The system has been evacuated and recharged to the correct specification. The compressor runs and the system cools, but the compressor is noticeably louder than the original. Which of the following is the MOST likely cause?

A. The incorrect amount or type of compressor oil was installed — too much oil causes liquid slugging inside the compressor, and the wrong viscosity creates inadequate lubrication, both of which produce abnormal noise

B. The replacement compressor is a different brand and all compressors have unique sound profiles

C. The serpentine belt tension is too tight, placing excessive side load on the compressor bearing

D. The refrigerant charge is slightly above specification, causing liquid to enter the compressor

34. A vehicle has a humming noise from the front end that increases with vehicle speed. The noise does NOT change when the steering wheel is turned slightly left or right. The tires are rotated and the noise moves to the rear of the vehicle. Which of the following is confirmed?

A. The noise is caused by a worn front suspension component

B. The noise is from a failing front wheel bearing since it was present before the rotation

C. The noise source is the tires — an irregular wear pattern or tread design is producing the hum, confirmed by the noise moving with the tires during rotation

D. The noise is from the front differential and coincidentally appeared to move with the rotation

35. A vehicle's engine has excessive blowby — the oil filler cap blows off when the engine is running and there is visible vapor coming from the oil fill opening. Compression test results show all cylinders are below specification. Which of the following is the MOST likely cause?

A. A stuck-open PCV valve creating excessive crankcase vacuum

B. A failed oil filler cap gasket that cannot maintain the seal

C. A restricted PCV valve that is not venting crankcase pressure

D. Worn piston rings allowing combustion gases to escape past the pistons and pressurize the crankcase beyond what the PCV system can evacuate

36. A customer asks why their vehicle's fuel economy has decreased over the past several months. There are no DTCs, the engine runs normally, and the tires are properly inflated. Which of the following maintenance items should the technician investigate FIRST?

A. The catalytic converter efficiency

B. The engine air filter — a clogged air filter restricts intake airflow, causing the engine to work harder and consume more fuel; it is the simplest, least expensive, and most commonly overlooked cause of gradual fuel economy decline

C. The fuel injector flow rates

D. The exhaust backpressure

37. A vehicle's electric radiator cooling fan has two speeds — low and high. The fan operates on low speed normally but does not operate on high speed when the engine reaches the high-speed activation temperature. Which of the following is the MOST likely cause?

A. The high-speed fan relay or its control circuit has failed — the low-speed circuit is independent and functioning, confirming the fan motor is operational; the fault is in the high-speed control path

B. The fan motor is failing and cannot generate enough torque for high speed

C. The engine coolant temperature sensor is not reaching the high-speed activation threshold

D. The fan blade has a crack that prevents it from spinning at higher RPM

38. A technician is replacing the front wheel bearings on a 4WD vehicle. The service information indicates the hub assembly bolts require a specific torque and sequence. The technician torques all bolts to specification in a clockwise pattern rather than the specified alternating (star) pattern. Which of the following is the MOST likely consequence?

A. No consequence — the sequence only matters on cylinder heads and exhaust manifolds

B. The torque wrench will give an incorrect reading when bolts are tightened sequentially

C. The bearing preload will be excessive, generating heat and causing premature failure

D. The hub assembly can be unevenly loaded against the steering knuckle, causing the rotor mounting surface to be distorted and producing brake pulsation or premature bearing failure

39. A vehicle equipped with adaptive cruise control and automatic emergency braking has a warning message: "Front Radar Blocked." There is no visible obstruction on the front bumper. Which of the following is the MOST likely cause?

A. The radar module has internally failed and must be replaced

B. The adaptive cruise control has been recalled and the system is disabling itself

C. The radar sensor behind the front bumper fascia is obscured by a buildup of ice, snow, road grime, mud, or a misaligned bumper cover — even a thin film of material can block the radar signal

D. The vehicle requires a software update to recalibrate the radar sensitivity

40. A technician is pressurizing an A/C system with nitrogen to check for leaks before evacuation and charging. Why is nitrogen used instead of compressed shop air?

A. Nitrogen is dry and moisture-free, preventing water contamination inside the A/C system — shop air contains moisture that would mix with refrigerant oil and create corrosive acids that damage internal components

B. Nitrogen produces higher pressure than compressed air for more sensitive leak detection

C. Shop air contains oxygen that would react with the refrigerant and create a toxic gas

D. Nitrogen is required by law for all A/C pressure testing procedures

41. A vehicle has an intermittent loss of all electrical power — the engine dies, all lights go out, and the vehicle is completely dead for a few seconds before everything restores on its own. Battery and cables have been inspected and appear secure. Which of the following is the MOST likely cause?

A. A faulty ignition switch that has a thermal intermittent failure

B. A loose or corroded battery cable CONNECTION (the cable end may look tight externally but have internal corrosion at the clamp-to-post interface) or a damaged fusible link that momentarily loses contact under vibration

C. A failing alternator that intermittently stops producing power

D. A defective body control module that randomly shuts down the vehicle's power distribution

42. A vehicle's engine oil dipstick has two dots (or holes) marked at the bottom — one labeled "MIN" and the other labeled "MAX." The oil level reads at the MIN mark. Which of the following is the correct interpretation?

A. The engine is critically low on oil and must not be driven until oil is added

B. The oil level is at the minimum acceptable level but the engine is safe to operate for a short time

C. The oil level is in the normal range since it is between the two marks

D. The oil level is at the minimum mark, which means the engine is approximately one quart low — oil should be added to bring the level to the MAX mark; operating at MIN is acceptable temporarily but sustained operation at this level provides reduced oil volume for cooling and lubrication

43. A technician is performing a brake inspection and finds that the rear brake drums are wet with axle grease on the inside friction surface. The brake shoes are contaminated with grease. Which of the following is the MOST likely source of the contamination?

A. A leaking rear wheel cylinder allowing brake fluid to spray on the shoes

B. An overfilled rear differential housing pushing fluid past the vent tube

C. A leaking rear axle seal allowing differential gear oil to migrate along the axle shaft and into the brake drum

D. Excessive wheel bearing grease that has migrated from a recently packed wheel bearing

44. Technician A says that engine oil should always be drained when the engine is cold to prevent burns. Technician B says that engine oil should be drained when warm because warm oil flows more freely and carries more contaminants in suspension, resulting in a more complete drain. Who is correct?

A. Technician B only

B. Technician A only

C. Both Technician A and Technician B

D. Neither Technician A nor Technician B

45. A vehicle has a P0340 (Camshaft Position Sensor "A" Circuit — Bank 1) DTC. The engine starts and runs but has rough idle and reduced power. The technician replaces the CMP sensor and clears the code. The code returns immediately. Which of the following should the technician check NEXT?

A. The fuel pressure regulator for a leaking diaphragm

B. The CMP sensor wiring harness, connector, and the reluctor ring (tone wheel) on the camshaft for damage — a new sensor will not fix a wiring fault or a damaged trigger wheel

C. The engine compression on all cylinders

D. The mass airflow sensor calibration

46. A vehicle's headlight lenses have yellowed and become hazy, significantly reducing light output. The customer asks for the most cost-effective solution. Which of the following is the correct recommendation?

A. Replace both headlight assemblies with OEM units since lens restoration is not possible

B. Apply clear coat spray paint over the hazy lenses to restore transparency

C. Install higher-wattage bulbs to compensate for the reduced lens clarity

D. Restore the lenses using a headlight restoration kit (wet sanding and polishing) followed by a UV-protective clear coat — this is the industry-standard cost-effective repair for oxidized polycarbonate headlight lenses

47. A vehicle has P0106 (MAP Sensor Circuit Range/Performance) and the engine surges at idle. The technician checks the MAP sensor vacuum hose and finds it cracked. Which of the following BEST explains how this single fault causes BOTH symptoms?

A. The cracked hose allows exhaust gases to contaminate the MAP sensor element

B. The cracked hose restricts vacuum to the brake booster, causing the engine to surge as the booster draws additional vacuum

C. The cracked hose allows atmospheric air to reach the MAP sensor instead of manifold vacuum, causing the sensor to report an inaccurate (higher) pressure reading — the PCM then miscalculates fuel delivery and ignition timing, producing the surge, and the out-of-range reading triggers the P0106

D. The cracked hose creates a vacuum leak large enough to stall the engine, but the MAP sensor compensates by adding fuel

48. A vehicle's engine coolant recovery bottle is empty even though the cooling system pressure test holds pressure. The radiator is full when checked cold. Which of the following MOST likely explains the empty recovery bottle?

A. The radiator cap is not releasing coolant into the recovery bottle on expansion and/or not drawing coolant back on contraction — the cap's pressure relief or vacuum valve is malfunctioning

B. The recovery bottle has a hairline crack that leaks only when hot

C. The thermostat is stuck open and never allows enough pressure to build for coolant transfer

D. The water pump weep hole is draining coolant before it reaches the recovery bottle

49. A vehicle with an electronic parking brake (EPB) requires rear brake pad replacement. The service information states that a scan tool is required to retract the EPB caliper pistons before pad removal. Which of the following is the correct action if no scan tool is available?

A. Manually force the pistons back with a C-clamp as on a conventional caliper

B. Do not attempt the brake service without the required scan tool — the EPB motor-driven caliper cannot be retracted manually without risking damage to the motor mechanism, and the correct tool must be used

C. Disconnect the EPB motor connector and use a battery jumper to reverse the motor manually

D. Remove the EPB motor from the caliper and use a standard piston retraction tool

50. A vehicle's clutch pedal on a manual transmission vehicle has excessive free play — the pedal travels approximately 3 inches before any resistance is felt. The clutch engages only at the very top of pedal travel. Which of the following is the MOST likely cause?

A. A worn clutch disc that has reduced friction material thickness

B. Air in the hydraulic clutch system causing a spongy, low pedal

C. A weak clutch pressure plate with reduced clamping force

D. The clutch is severely worn — as the disc friction material wears thinner, the pressure plate fingers move closer to the flywheel, changing the release bearing engagement point and increasing pedal free play; the clutch assembly is approaching the end of its service life

51. A vehicle's scan tool shows that the downstream (post-converter) O2 sensor on Bank 1 is reading a constant 0.1 volts. The upstream sensor is switching normally. Which of the following is the MOST likely cause?

A. A properly functioning catalytic converter efficiently storing oxygen, which keeps the downstream sensor reading lean

B. The downstream sensor has been contaminated by silicone sealant or antifreeze and has failed in the lean position

C. The catalytic converter is performing poorly and allowing excess oxygen to pass through, OR the downstream sensor itself has failed and is stuck at a low-voltage reading — further diagnosis is needed to determine which

D. The engine is running too lean on Bank 1 and the downstream sensor is accurately reporting the condition

52. A technician is verifying the torque on a set of wheel lug nuts using a torque wrench. The first three lugs click at the specified 100 ft-lbs. The fourth lug does not click until 130 ft-lbs. What does this indicate?

A. The fourth stud or lug nut has thread damage, cross-threading, or corrosion that is creating additional resistance — the stud and nut should be inspected and replaced if damaged

B. The torque wrench is losing calibration and reading inconsistently

C. One high reading out of five is within acceptable manufacturing tolerance

D. The wheel is warped and applying uneven clamping pressure on the fourth stud

53. A vehicle's engine runs normally for 15 minutes, then gradually overheats. The upper radiator hose is hot and pressurized, but the lower radiator hose remains cool to the touch. Which of the following is the MOST likely cause?

A. A faulty engine coolant temperature sensor reading low

B. A thermostat stuck closed preventing hot coolant from flowing through the radiator

C. A collapsed lower radiator hose that prevents coolant from returning to the water pump

D. A clogged radiator that is allowing hot coolant to enter at the top but blocking flow through the core to the lower hose — the hot upper and cool lower hose combination confirms the blockage is within the radiator itself

54. A vehicle's rear drum brakes have been inspected and the brake shoes are found to be worn to minimum thickness on one side. The star wheel adjuster is frozen and cannot be turned. Which of the following is the correct repair?

A. Install new shoes only and leave the frozen adjuster in place

B. Replace the star wheel adjuster, install new shoes and all hardware on BOTH rear wheels, and verify the adjusters function correctly on both sides — a frozen adjuster caused the premature wear and will cause the same problem with new shoes if not replaced

C. Apply penetrating oil to the adjuster and attempt to free it before reassembly

D. Install new shoes and manually set the shoe-to-drum clearance without using the adjuster

55. A technician discovers during an inspection that a vehicle's serpentine belt has been installed with the ribbed side contacting the smooth (flat) idler pulley. Which of the following is the correct assessment?

A. This is incorrect — the ribbed side should always contact all pulleys including idlers

B. The belt is routed incorrectly and will fail immediately

C. This is correct — the smooth (back) side of the belt is designed to contact flat (non-grooved) idler and tensioner pulleys, while the ribbed side contacts the grooved accessory pulleys; this is standard serpentine belt routing

D. The idler pulley must be replaced with a grooved pulley to match the belt ribs

Practice Exam 9: Answer Key and Full Explanations

1. D — Forward-facing ADAS cameras (forward collision, lane departure, automatic emergency braking) are precisely aimed relative to the windshield during factory installation. When the windshield is replaced, even a fraction of a degree of misalignment between the new glass and the camera's optical axis changes where the camera "sees" relative to the road. The camera must be recalibrated — either statically (using a target fixture in the shop) or dynamically (using a scan tool during a specific drive procedure) — to restore accurate detection. Skipping recalibration can cause false alerts, missed detections, or unintended braking events.

2. B — Automotive wiring repair must create a connection that is mechanically secure, electrically sound, corrosion-resistant, and sealed against moisture. The industry-standard methods are soldering with rosin-core solder followed by adhesive-lined heat-shrink tubing, or using a manufacturer-approved butt connector with adhesive-lined heat shrink. Twist-and-tape, wire nuts, and liquid tape all fail to meet these criteria — they allow moisture intrusion, create high-resistance connections, and deteriorate over time in the harsh underhood environment.

3. C — Start-stop systems cycle the battery through partial discharge and recharge dozens of times per drive — a duty cycle that standard flooded lead-acid batteries are not designed to handle. AGM (Absorbent Glass Mat) and EFB (Enhanced Flooded Battery) batteries use construction that withstands deep cycling without the plate shedding and internal short circuits that kill standard batteries prematurely. Installing a standard flooded battery in a start-stop vehicle typically results in failure within 6–18 months instead of the expected 4–6 year battery life.

4. A — Ohm's Law states I = V ÷ R. With 12 volts applied across a 1.2-ohm bulb resistance, current flow is 12 ÷ 1.2 = 10 amps. This calculation is fundamental to automotive electrical diagnosis — knowing how to calculate expected current helps the technician determine whether a circuit is drawing normal current, excessive current (short), or insufficient current (high resistance). Understanding Ohm's Law is essential for fuse sizing, wire gauge selection, and voltage drop analysis.

5. C — Torque-to-yield (TTY) fastening is a two-step process: the bolt is first torqued to a specified value to seat the components, then rotated an additional measured angle (typically 60°, 90°, or 120°) that deliberately stretches the bolt into its elastic-to-plastic transition zone. This stretch creates a more precise and uniform clamping load than torque alone can achieve because it eliminates the friction variables that affect torque readings. TTY bolts are permanently deformed by this process and must be replaced each time they are removed — reusing them risks bolt failure.

6. D — Tire pressure follows the ideal gas law: as temperature decreases, pressure decreases proportionally. The rule of thumb is approximately 1 psi lost for every 10°F drop in ambient temperature. A tire inflated to exactly the TPMS threshold in warm afternoon conditions will drop below the threshold in cold morning temperatures, triggering the warning light. As the tires heat up from driving friction and ambient warming, the pressure rises back above the threshold and the light turns off. The fix is to set cold tire pressures to the vehicle's placard specification.

7. A — Moisture is a normal byproduct of combustion — the engine produces water vapor that condenses inside the engine when it cools. During short trips in cold weather, the engine never reaches full operating temperature long enough to evaporate this moisture from the upper valve cover area where ventilation is poorest. The condensation mixes with oil vapor to create a milky, frothy residue on the oil

filler cap and upper engine surfaces. The dipstick oil — which is heated by the crankcase and oil pan — remains clean because it reaches adequate temperature. Extended highway driving evaporates the moisture and the condition resolves.

8. B — Brake squeal during light pedal application is a vibration phenomenon, not a wear or damage issue. When the pads make light contact with the rotor, the pad's friction material and backing plate can vibrate at their natural resonant frequency, producing a high-pitched squeal. Firm pedal pressure dampens this vibration by pressing the pad tightly against the rotor. Anti-squeal shims (which add dampening mass), brake paste on the backing plate (which breaks the vibration path), and chamfering the pad edges (which reduce the contact area that initiates the vibration) are all effective remedies.

9. B — An off-center steering wheel with straight tracking means the front wheels are pointed straight ahead, but the individual toe adjustments on the left and right tie rods are not equal — one side has more toe-in (or less toe-out) than the other, creating a net steering wheel rotation even though total toe sums to within specification. Equalizing the individual toe values on both sides by adjusting each tie rod the same amount centers the steering wheel while maintaining the same total toe angle.

10. C — Technician A is correct. A DSO captures the CKP sensor's voltage waveform in real time, showing its amplitude, frequency, shape, and any irregularities (missing teeth, weak signal, noise) that reveal sensor condition and engine mechanical timing. Technician B is incorrect because a standard test light requires sufficient current to illuminate and cannot respond to the rapid, low-current signal changes of a CKP sensor — it is the wrong tool for this test. A test light would show nothing useful from a magnetic or Hall-effect CKP sensor.

11. A — A deep, low-frequency knocking from the lower engine block that intensifies under load and correlates with low oil pressure is the textbook presentation of worn main bearings. Main bearings support the crankshaft, and as they wear, the clearance between the bearing shell and the crankshaft journal increases, allowing the crankshaft to move and impact the bearing surface with each power stroke. Under acceleration, higher cylinder pressures increase the force on the crankshaft, amplifying the knock. Low oil pressure confirms the excessive bearing clearance.

12. D — A P0430 Bank 2 code means the Bank 2 catalytic converter's oxygen storage capacity has degraded, but it does NOT automatically mean the converter needs replacement. The technician must first rule out exhaust leaks near the Bank 2 sensors (which introduce false oxygen readings), verify that both the upstream and downstream O2 sensors on Bank 2 are functioning correctly, and confirm no engine conditions (misfires, rich running, oil consumption) are actively damaging the converter. Installing a new converter without fixing the underlying cause simply destroys the replacement.

13. C — The key diagnostic clue is that the window moves freely BY HAND but binds under MOTOR LOAD. This indicates a restriction in the regulator mechanism that only becomes significant when the motor applies its full force — the friction increases under higher loads due to a bent track, a worn roller catching in a groove, or a cable-style regulator with a frayed cable that binds at a specific point in its travel. The motor is confirmed good, and the window channel is not the issue since the window moves freely when detached.

14. A — A DPF warning light with reduced power indicates excessive soot loading. The first step is to check the soot level with a scan tool. Many DPF issues result from driving patterns (exclusively city driving, frequent short trips) that prevent the exhaust temperatures from reaching the 1,100°F+ required for passive regeneration. A forced regeneration commanded through the scan tool burns off the accumulated soot and often completely resolves the complaint. Replacing the DPF without attempting regeneration first is premature and extremely expensive.

15. D — A vibration present at ALL vehicle speeds (even 25 mph), in ALL gears AND Neutral, that increases proportionally with speed and persists after tire balancing points to a tire or wheel defect that balancing cannot correct. A tire with a shifted or broken internal belt creates a radial or lateral force variation that produces a constant vibration at any speed. A bent wheel produces a similar constant disturbance. Both conditions require replacement of the affected component — no amount of weight can compensate for a structural deformation.

16. B — Technician B is correct. R-1234yf and R-134a are chemically different refrigerants with different operating pressures, oil compatibility requirements, and flammability characteristics (R-1234yf is mildly flammable). Mixing them contaminates both refrigerants, damages the A/C system, and violates EPA regulations. Each refrigerant requires its own dedicated recovery/recycling/recharging (RRR) machine to prevent cross-contamination. Technician A is incorrect — cross-contamination can cause compressor failure and system damage.

17. A — Removing the interior lights fuse dropped the parasitic draw from 450 mA (excessive) to 45 mA (normal), confirming the offending component is on that fuse's circuit. However, a single fuse typically protects multiple components — interior lights, courtesy lights, trunk light, glove box light, vanity mirrors, and potentially a door module or BCM input. The technician must now systematically disconnect each component on that circuit, one at a time, while monitoring the ammeter to identify which specific component is staying energized and drawing the 405 mA of excess current.

18. C — A catalytic converter that produces an internal rattling sound when tapped is a clear indication that the ceramic honeycomb substrate has fractured and broken into loose pieces. The substrate can crack from thermal shock (rapid heating/cooling from misfires), physical impact (road debris, bottoming

out), or age-related deterioration. Once broken, the loose fragments restrict exhaust flow, rattle at certain RPMs, and can migrate downstream to clog the muffler. The converter must be replaced, and the cause of the substrate failure should be investigated.

19. D — Many vehicles dim the instrument cluster to nighttime brightness when the headlights are activated. If the ambient light sensor malfunctions and reports "dark" during daylight, the auto headlight system activates the headlights (or parking lights) and the cluster dims to nighttime mode — which appears too dim to read in bright ambient light. The customer sees dim gauges during the day but may not realize the headlights are also on unnecessarily. Replacing or cleaning the ambient light sensor restores proper day/night mode switching.

20. B — Hydraulic valve lifters maintain zero valve lash by using engine oil pressure to extend a small plunger inside the lifter body. When the engine sits overnight, oil slowly bleeds out of the lifters through their internal check valves, allowing the plunger to collapse slightly. On startup, it takes a few seconds for oil pressure to reach all lifters and refill them. During those seconds, the collapsed lifters create a small lash gap that produces the familiar cold-start tick. Once filled, the tick disappears. This is normal on higher-mileage engines and does not indicate imminent failure.

21. A — Battery specific gravity directly measures the sulfuric acid concentration in each cell, which indicates the cell's state of charge and health. A fully charged cell reads approximately 1.265, while a cell at 1.200 is significantly discharged or damaged. The critical diagnostic threshold is a difference greater than 0.050 between any two cells — this indicates the weak cell cannot be equalized through charging and has suffered irreversible plate sulfation, shedding, or an internal short. The battery must be replaced.

22. C — Blind spot monitoring systems use radar sensors typically mounted inside or behind the rear bumper cover. During bumper removal and reinstallation, these sensors can be physically disconnected, damaged by impact, or shifted from their calibrated position. Even a few degrees of angular change in the sensor's mounting position can make the detection zone inaccurate. The sensors must be reconnected, inspected for physical damage, and recalibrated per the manufacturer's procedure to restore accurate blind spot detection.

23. D — The tap test is a classic field diagnostic for starter motors. A starter motor with worn brushes or a dead spot on the commutator may fail to conduct current in certain armature positions. Tapping the starter body with a hammer shifts the armature slightly, moving the commutator to a position where the brushes make contact, and the motor cranks. This confirms the starter has an internal mechanical/electrical defect that will worsen progressively. The starter should be replaced — the tap-and-start technique is a temporary workaround, not a repair.

24. B — Groaning from the power steering system after a fluid change — with correct fluid level and type — is almost always caused by air trapped in the hydraulic circuit during the service. Air in the system compresses under pressure (unlike hydraulic fluid), causing cavitation inside the pump and producing the characteristic groaning or moaning noise during turns. The system must be bled by cycling the steering wheel lock-to-lock several times with the front wheels off the ground, allowing trapped air to rise to the reservoir and escape.

25. C — TSBs are manufacturer-issued documents that describe known issues and their approved fixes for specific vehicles identified by VIN range, production date, and build specifications. The technician should verify that the customer's VIN falls within the TSB's applicability criteria before performing the update. Informing the customer about the TSB, explaining that it addresses their exact concern, and obtaining authorization before proceeding is the professional standard. TSBs can be performed by any shop with the appropriate tools — they are not dealer-exclusive.

26. A — The CKP sensor is the PCM's primary trigger for both the ignition and fuel injection systems. Without a CKP signal, the PCM has no reference for crankshaft position or engine speed, so it cannot determine when to fire the ignition coils or when to pulse the fuel injectors. The scan tool showing 0 RPM during cranking confirms the PCM is not receiving the CKP signal. A failed CMP sensor would typically cause the engine to default to a less efficient injection strategy but would not completely disable both spark and fuel.

27. D — This question tests multi-system interaction. In Drive with A/C on, two things change simultaneously compared to Park: the torque converter loads the engine (causing it to dip slightly in RPM and shift rearward on its mounts), and the A/C compressor adds parasitic load. The combination of engine mount deflection and reduced RPM changes the physical relationship between the exhaust system and the vehicle's undercarriage. A pipe or hanger that clears the crossmember in Park makes contact in Drive — but only when the engine tilts under the combined load.

28. B — The coil swap test is the definitive isolation procedure for coil-on-plug ignition systems. By moving the suspect coil from cylinder 4 to cylinder 2, the technician created a controlled experiment: if the misfire follows the coil to its new location, the coil is the fault. The misfire moved from cylinder 4 to cylinder 2 — confirming the coil is defective. If the misfire had stayed on cylinder 4, the fault would be in the plug, injector, or mechanical condition of that cylinder.

29. C — The thrust angle is the direction the rear axle pushes the vehicle, determined by the combined rear toe settings. With the left rear toe-out and right rear toe-in at the values given, the net thrust angle points to the right of the vehicle centerline. The rear pushes the vehicle right, so the front must compensate by steering left to maintain straight tracking — this causes the vehicle to drift leftward and

the steering wheel to be rotated left of center to drive straight. Correcting the rear toe on both sides to equal values eliminates the thrust angle offset.

30. A — A blower motor resistor is a series of resistors in a stepped configuration. Low speed routes current through all resistor elements (maximum resistance, lowest current). Medium speeds bypass some elements. High speed bypasses the resistor entirely through a dedicated relay circuit — current goes directly from the relay to the motor at full voltage. The OL reading between terminals 1 and 4 is expected because that path includes the full series resistance, and on many designs, the high-speed circuit is not wired through the resistor block at all.

31. D — Failed fuel injector O-rings create three simultaneous problems. First, the broken seal allows fuel to leak externally onto hot engine surfaces, creating a fuel odor and a serious fire hazard. Second, the lost seal creates a vacuum leak at the injector mounting point, allowing unmetered air into that cylinder and causing a rough or unstable idle. Third, the external fuel loss reduces the amount of fuel reaching the combustion chamber, potentially causing a lean misfire on the affected cylinder. All three symptoms trace to the single failed O-ring.

32. B — Both technicians describe real sensor types used in modern vehicles. Passive variable reluctance sensors (Technician A's description) generate an AC sine wave that increases in both frequency and amplitude with wheel speed — these are common on older ABS systems. Active Hall-effect sensors (Technician B's description) produce a clean digital square wave at a consistent amplitude, with only the frequency changing with wheel speed — these are standard on modern vehicles. A technician must know which type is installed to select the correct test method.

33. A — Compressor oil quantity and viscosity are precisely specified by the compressor manufacturer. Too much oil causes liquid slugging — the compressor tries to compress incompressible liquid, producing a knocking or hammering noise and risking mechanical damage. Too little oil causes metal-to-metal contact and a grinding or whining noise. The wrong viscosity (PAG 46 vs. PAG 100 vs. PAG 150) creates inadequate film strength or excessive drag, both of which produce abnormal operating sounds. Verifying correct oil type and quantity is always the first check on a noisy replacement compressor.

34. C — The definitive test in this scenario is the tire rotation. A noise that moves from front to rear when the tires are rotated confirms the noise source is the tires, not a bearing, suspension component, or differential. Irregular tire wear patterns — cupping, scalloping, feathering, or flat-spotting — create harmonics against the road surface that produce a humming or droning noise. The noise did not change with steering input, which also rules out wheel bearings. Replacing the offending tires or correcting the alignment condition that caused the wear eliminates the noise.

35. D — Excessive blowby is caused by combustion gases forcing their way past the piston rings into the crankcase. Healthy piston rings create a near-perfect seal between the combustion chamber and the crankcase. When the rings wear, lose tension, or the cylinder walls develop excessive bore wear, the seal weakens and high-pressure combustion gases blow past the rings on every power stroke. This pressurizes the crankcase beyond the PCV system's ability to evacuate the pressure, blowing off the oil cap and producing visible vapor. Low compression across all cylinders confirms the ring/bore wear is systemic.

36. B — A clogged engine air filter is the single most common and most frequently overlooked cause of gradual fuel economy decline in a vehicle with no DTCs and no drivability complaints. As the filter loads with dirt and debris over time, it progressively restricts intake airflow, forcing the engine to work harder to draw air. The PCM compensates by adjusting fuel trim, but the engine operates less efficiently. Checking and replacing the air filter is a 2-minute, low-cost inspection that should always be the first step before pursuing more complex or expensive diagnoses.

37. A — The fact that the fan operates normally on low speed confirms the fan motor and its wiring are functional. Low and high fan speeds use separate relays (or separate circuits within the fan control module). If the high-speed relay has failed open, its contact set is corroded, or the control circuit wire from the PCM to the relay coil is open, the relay cannot energize and the fan cannot switch to high speed. Testing for voltage at the high-speed relay control terminal while the engine is at high-speed activation temperature confirms whether the PCM is commanding the relay.

38. D — Bolt tightening sequence matters on any flanged or multi-bolt assembly because the sequence controls how clamping force is distributed across the mating surfaces. A star (alternating) pattern draws the component down evenly from the center outward, distributing load uniformly. A sequential (clockwise) pattern pulls one side tight before the opposite side is loaded, creating a rocking effect that distorts the hub flange against the knuckle. This distortion transfers to the brake rotor mounting surface, inducing lateral runout that causes brake pulsation, and unevenly loads the bearing races, reducing bearing life.

39. C — Adaptive cruise control and automatic emergency braking radar sensors transmit and receive millimeter-wave signals that are highly sensitive to surface obstructions. Even a thin layer of ice, snow, road film, bug residue, or mud on the bumper fascia covering the sensor can attenuate or reflect the radar signal enough to prevent reliable detection. The system correctly identifies the degraded signal quality and disables itself with a "blocked" warning rather than risk false readings. Cleaning the bumper surface over the sensor location usually resolves the message immediately.

40. A — Moisture is the enemy of A/C system components. Water inside the sealed system reacts with refrigerant and compressor oil to form hydrochloric and hydrofluoric acids that corrode the evaporator, condenser, and compressor internals. Shop compressed air contains atmospheric moisture, oil mist, and other contaminants from the compressor. Nitrogen is commercially available as a dry, inert gas that provides adequate pressure for leak testing without introducing any moisture or reactive chemicals into the system. Using nitrogen protects the system's internal surfaces during the test.

41. B — A total, momentary loss of ALL electrical power — engine dies, all lights extinguish, then everything restores — points to a complete circuit interruption at the battery or the main power distribution point. A cable clamp that appears externally tight can have internal corrosion between the clamp and the battery post, creating a connection that conducts normally under steady-state conditions but briefly opens under vibration or thermal expansion. A damaged fusible link with a heat-fatigued conductor exhibits the same intermittent total-power-loss behavior. Both are invisible externally and require physical disassembly to inspect.

42. D — The MIN mark on a dipstick represents the minimum safe operating level — typically one quart below the MAX mark. At MIN, the engine has enough oil to function but has reduced oil volume for heat absorption, sludge suspension, and bearing lubrication. The correct action is to add oil to bring the level to MAX as soon as practical. Operating at MIN for extended periods is not ideal because the reduced oil volume must work harder, runs hotter, and degrades faster. However, MIN is not an emergency — the engine is not at immediate risk of damage.

43. C — Rear axle seals prevent differential gear oil from migrating along the axle shaft and exiting the axle housing into the brake drum. When an axle seal fails, gear oil — which is petroleum-based and has a distinctive strong odor — coats the inside of the drum and saturates the brake shoe friction material. Contaminated brake shoes cannot be cleaned and reused because the petroleum products permanently alter the friction material's stopping ability. The axle seal must be replaced and all contaminated brake components must be renewed.

44. A — Technician B is correct. Warm engine oil has lower viscosity (it flows more freely) and holds combustion byproducts, metal particles, and sludge in suspension more effectively than cold oil. Draining warm oil produces a more complete drain and removes more contaminants from the engine. Technician A is incorrect — while burn precautions should be taken, the recommended practice is to drain oil when warm, not cold. The technician should use appropriate PPE and drain pans to manage the warm oil safely.

45. B — Replacing a sensor that immediately resets the same code confirms the sensor is not the problem — the fault is in the circuit or the signal source. The CMP sensor wiring harness may have a

chafed wire, a corroded connector pin, or a broken conductor that intermittently loses signal. The reluctor ring (tone wheel) on the camshaft may have a cracked tooth, a missing tooth, or debris between teeth that produces an erratic signal regardless of which sensor is installed. Inspecting the wiring and the physical tone wheel targets the actual failure point.

46. D — Headlight lens oxidation is caused by UV radiation breaking down the clear coat on the exterior surface of polycarbonate lenses, creating a yellow, hazy, pitted layer. Professional headlight restoration involves wet-sanding with progressively finer grits (800 → 1500 → 2500 → 3000) to remove the oxidized layer, machine-polishing to restore optical clarity, and applying a UV-resistant clear coat to prevent recurrence. This process restores 90%+ of original light output at a fraction of the cost of new headlight assemblies and is the industry-standard repair.

47. C — The MAP sensor measures absolute pressure in the intake manifold. With a cracked vacuum hose, the sensor receives a mixture of manifold vacuum and atmospheric air leaking through the crack, causing it to read a pressure higher than actual manifold vacuum. The PCM interprets this elevated reading as "more air in the engine" and enriches the fuel mixture accordingly — but the extra fuel is unneeded, causing the rich surge. Simultaneously, the PCM recognizes the sensor reading is outside its expected range for the current engine conditions and flags P0106.

48. A — The radiator cap has two functions: it maintains cooling system pressure (via the pressure relief spring) and it manages coolant transfer to and from the recovery bottle (via the vacuum valve). When the engine heats up, expanding coolant should push past the pressure relief into the recovery bottle. When the engine cools, the contracting coolant should create a vacuum that pulls coolant back from the recovery bottle. If either valve malfunctions, the transfer cycle fails — coolant pushed to the bottle is never drawn back, and the bottle gradually empties while the radiator stays full.

49. B — Electronic parking brake calipers use a motor-driven mechanism (either a screw or a cable actuator) to apply and release the parking brake. These motors are controlled by the EPB module and require a specific electrical command to retract. Attempting to force the piston back with a C-clamp can strip the internal motor gears, break the screw mechanism, or damage the motor. The correct procedure requires a scan tool or dedicated EPB service tool that commands the motor to retract electrically. Without the correct tool, the brake service should not be attempted.

50. D — As a clutch disc wears, it becomes thinner, which allows the pressure plate to move closer to the flywheel. This changes the geometry of the release mechanism — the release bearing engagement point shifts, and more pedal travel is consumed as "free play" before the release bearing contacts the pressure plate fingers. The clutch engages very close to the top of pedal travel because the wear has

shifted the entire engagement point. This pattern of increasing free play and rising engagement point is the classic indication of a clutch disc approaching the end of its life.

51. C — A constant 0.1V downstream reading has two possible causes that require further testing to distinguish. If the catalytic converter has failed, it is no longer storing and releasing oxygen effectively — excess oxygen passes through, keeping the downstream sensor in a lean (low-voltage) state. Alternatively, the downstream sensor itself may have failed — contamination, heater failure, or wiring damage can cause it to produce a fixed low reading regardless of actual exhaust conditions. Comparing the downstream sensor's response to a commanded rich condition (propane enrichment test) differentiates between converter failure and sensor failure.

52. A — When four out of five lug nuts reach the click point at the specified 100 ft-lbs but one requires 130 ft-lbs, the additional 30 ft-lbs of resistance on that stud is being consumed by something other than clamping force — specifically, thread friction from damage, cross-threading, or corrosion. This means the actual clamping load on that stud is less than the other four (because energy is lost to friction), creating uneven wheel clamping that can cause rotor warpage. The stud and nut must be inspected and replaced if thread damage is found.

53. D — A hot upper radiator hose combined with a cool lower radiator hose on an overheating engine tells a clear diagnostic story: hot coolant is entering the radiator at the top but is NOT flowing through the core to exit at the bottom. The obstruction is inside the radiator — internal corrosion, sediment buildup, or collapsed tube passages are blocking flow through the core. The thermostat is open (confirmed by the hot upper hose), and the water pump is circulating (coolant reaches the radiator top). The radiator itself is the restriction point.

54. B — A frozen star wheel adjuster is the ROOT CAUSE of the premature shoe wear — the adjuster could not extend to maintain proper shoe-to-drum clearance as the shoes wore, so the shoes wore beyond their normal limit on one side. Installing new shoes on a frozen adjuster simply repeats the cycle. The adjuster must be replaced (penetrating oil and freeing frozen adjusters is unreliable long-term), new shoes and hardware installed on BOTH sides for balanced braking, and adjuster function verified before returning the vehicle. Both sides should be serviced to ensure equal brake performance.

55. C — Serpentine belt routing is designed so that the ribbed (grooved) side of the belt contacts all grooved pulleys (alternator, power steering, A/C compressor, water pump, crankshaft), while the smooth (back) side of the belt contacts flat (non-grooved) idler and tensioner pulleys. The flat pulleys are specifically designed to run against the belt's smooth backside — this is standard OEM routing, not an error. If a flat idler pulley were replaced with a grooved one, or if the belt's ribbed side contacted the flat pulley, the belt would track incorrectly and wear prematurely.