PRACTICE EXAM 17: ASE A7 SIMULATION (50 QUESTIONS)

1. A vehicle's A/C system produces 44°F vent temperatures during a performance test at 84°F ambient. The technician measures both the suction line temperature at the evaporator outlet (42°F) and the compressor inlet (58°F). The low-side pressure is 30 psi throughout. What does the 16°F temperature rise along the suction line indicate?

A. A refrigerant undercharge that allows the vapor to superheat excessively as it travels from the evaporator to the compressor

B. An internal compressor bypass that is allowing hot discharge gas to leak back into the suction line near the compressor

C. A restriction in the suction line between the evaporator and compressor that is creating a secondary pressure drop

D. Normal heat absorption from the engine compartment as the cold suction line runs through the hot underhood environment

2. Technician A says that when replacing an accumulator, the new accumulator arrives with a measured amount of oil already inside and no additional oil should be added. Technician B says that the new accumulator must have oil added to replace the oil that was retained in the old accumulator when it was removed. Who is correct?

A. Technician B only, because new accumulators arrive dry and the correct amount must be added based on the old unit's retained oil

B. Technician B only, because while new accumulators may contain some oil, additional oil matching the old accumulator's retained amount must be added

C. Technician A only, because factory-installed oil in the new accumulator is pre-measured to account for the old unit's retained oil

D. Both Technician A and Technician B, because the correct approach depends on the specific accumulator manufacturer

3. A vehicle's engine coolant temperature stabilizes at 210°F with the A/C off. When the A/C is turned on during highway driving, the coolant temperature drops to 200°F and the heater output decreases slightly. What is the MOST likely explanation for this temperature drop?

A. The A/C compressor's mechanical load on the engine reduces combustion efficiency and lowers heat production

B. The condenser fan draws air through the radiator more aggressively when the A/C engages, increasing heat rejection

C. The condenser fan or additional fan activation when the A/C engages increases airflow through the radiator, cooling the engine slightly

D. The A/C evaporator absorbs heat from the engine bay through radiant transfer, lowering the overall engine temperature

4. On a vehicle with electronic HVAC controls, the technician retrieves DTC B0244 — Mode Door Actuator Overcurrent. The mode door does not move. The technician disconnects the actuator and the DTC clears. When the actuator is reconnected, the DTC returns within 5 seconds. What is the MOST likely cause?

A. The mode door is physically seized or obstructed, causing the actuator motor to draw excessive current trying to move it

B. The replacement actuator has an internal short in its motor winding that draws overcurrent regardless of door resistance

C. The HVAC control module's output driver is failing and sending excessive voltage to the actuator motor circuit

D. The LIN bus wire to the actuator has a short to ground that the module misinterprets as an overcurrent condition

5. A vehicle's A/C system has the following gauge readings at 92°F ambient: low side 50 psi, high side 285 psi. The vent temperature is 58°F. The condenser face is clean, the fan operates at high speed, and the system was charged to specification. The technician measures subcooling at 22°F and superheat at 5°F. What do these readings MOST likely indicate?

A. A condenser with marginal heat rejection due to an internal tube restriction that the clean external surface hides

B. A worn compressor that cannot maintain adequate pressure differential under high ambient heat load conditions

C. A restricted orifice tube that is causing excessive back-pressure on the high side and reduced evaporator flow

D. An overcharge of refrigerant with excess liquid backing up in the condenser, evidenced by high subcooling and low superheat

6. On a vehicle with automatic temperature control, the driver reports that the system blows comfortable air from the panel vents but uncomfortably cold air from the floor vents simultaneously. The system is set to AUTO at 72°F. The scan tool shows the mode door in the BI-LEVEL position. What does this indicate?

A. A failed mode door actuator that is stuck between the panel and floor positions and needs immediate replacement

B. Normal bi-level operation where cooler air is directed to the upper body through panel vents and warmer air should come from floor vents — the floor air being cold suggests a secondary blend issue

C. A cracked HVAC housing seal that is allowing untempered evaporator air to leak into the floor ductwork

D. The HVAC control module has a software fault that is commanding bi-level mode when panel-only is appropriate

7. Technician A says that a scroll compressor produces smoother, less pulsating refrigerant flow compared to a reciprocating piston compressor. Technician B says that scroll compressors are generally quieter than reciprocating compressors because they have fewer reciprocating components creating vibration. Who is correct?

A. Technician A only, because scroll compressors are actually louder due to the continuous metal-on-metal spiral contact

B. Both Technician A and Technician B are correct about the flow characteristics and noise advantages of scroll compressors

C. Technician B only, because both compressor types produce equally pulsating flow regardless of internal mechanism

D. Neither Technician A nor Technician B, because there is no measurable difference in noise or flow between the types

8. A vehicle has a cooling system that repeatedly pushes coolant into the overflow reservoir during normal driving. The pressure cap tests correctly at its 16 psi rating. The engine does not overheat. A combustion gas test on the coolant is negative. The technician performs an extended 4-hour pressure test and the system holds pressure without dropping. What should the technician investigate next?

A. The radiator for internal tube collapse that creates localized hot spots during flow but seals during static testing

B. A cylinder head crack that only opens under thermal expansion during sustained engine operation at full temperature

C. Whether the coolant level is being filled above the cold MAX line, causing normal thermal expansion to overflow

D. The water pump for intermittent cavitation that creates momentary pressure spikes during high-RPM operation

9. On a vehicle with electronic HVAC controls, the scan tool shows the A/C compressor is being commanded ON by the module. The relay clicks. The technician measures 12.3V at the clutch coil positive terminal and 12.2V at the clutch coil ground terminal. The clutch does not engage. What is the MOST likely cause?

A. An open ground circuit — battery voltage appears at both terminals because no current path exists through the coil

B. The clutch coil has excessive internal resistance that is limiting current flow despite adequate voltage being present

C. The relay contacts are passing voltage but the 0.1V voltage drop across the coil is insufficient to generate magnetism

D. A failed compressor shaft that has seized and prevents the clutch hub from rotating even though it magnetically engages

10. A vehicle's heater output gradually decreases over the course of one year. The engine temperature is consistently 200°F. Both heater hoses are hot. The coolant is the correct type and was recently flushed. The cabin air filter is new. What should the technician check that could still explain the progressive heat loss?

A. The thermostat for intermittent sticking that causes brief temperature drops only during idle periods in traffic

B. The water pump impeller for erosion that reduces flow rate below the threshold needed for full heater output

C. The blend door actuator calibration for gradual drift that shifts the door progressively away from the full-hot position

D. The heater core's external fin surface for dust and debris accumulation on the air side that insulates the heat transfer area

11. A vehicle's A/C system has the following condition: the evaporator drain tube produces no water during A/C operation on an extremely humid 95°F day. The system cools normally with a vent temperature of 42°F. What does the absence of condensation drainage MOST likely indicate?

A. Normal operation because some evaporator designs retain condensation internally without external drainage

B. The evaporator is not cold enough to reach the dew point of the incoming air despite producing cold vent air

C. The condensation drain tube is clogged, and water is accumulating inside the HVAC housing instead of draining

D. The cabin air filter is absorbing all the moisture before it reaches the evaporator surface for condensation

12. Technician A says that when a compressor with a known bearing noise (no internal debris release) is replaced, the system does not require flushing because bearing wear produces no circulating contamination. Technician B says that even bearing-only failures require full system flushing because microscopic metal particles are always released. Who is correct?

A. Technician A only, because bearing-only failures without debris do not contaminate the system and flushing is unnecessary

B. Both Technician A and Technician B, because the correct approach depends on visual inspection of the recovered oil

C. Technician B only, because any compressor failure automatically requires full system flushing regardless of debris

D. Neither Technician A nor Technician B, because all compressor replacements require condenser replacement regardless

13. A vehicle's A/C system has been working normally for five years. The customer moves from a moderate climate to a desert region where summer temperatures regularly exceed 110°F. The customer reports the A/C "barely cools" on the hottest days. The system was recently charged to specification and all components test normal. What is the MOST likely explanation?

A. The system's gauge readings are abnormally elevated for the stated ambient and the condenser needs professional cleaning

B. The compressor has developed internal wear that reduces its output specifically under extreme high-load conditions

C. The cabin air filter has become saturated with desert dust and is restricting airflow through the evaporator core

D. The system is operating at its maximum design capacity, which may be insufficient for ambient temperatures it was not designed for

14. A vehicle has a dual-zone ATC system. The driver side cools to 68°F as set. The passenger side blows 85°F air despite being set to 68°F. The scan tool shows the passenger blend door commanded at 8% (near full cold) and the actual position at 8%. What is the MOST likely cause?

A. A defective passenger-side in-car temperature sensor causing the module to undercommand cooling for that zone

B. The passenger-side blend door actuator reports 8% position but the door is physically disconnected from the shaft

C. The passenger-side evaporator section is partially blocked with ice that is preventing cold air from reaching that zone

D. The HVAC control module has a calibration offset error in the passenger zone that requires a software update

15. A vehicle's engine reaches 195°F operating temperature on a 20°F winter day. The heater works well initially. After 30 minutes of highway driving at 70 mph, the engine temperature drops to 178°F and the heater output decreases. The cooling fans are not running. What is the MOST likely cause?

A. The thermostat is weakening and opening too far at sustained highway speed, allowing excessive radiator heat rejection

B. The heater core is gradually restricting flow during extended operation, reducing heat transfer and engine cooling

C. The engine's EGR system is reducing combustion temperature during sustained highway cruise, lowering coolant heat input

D. Normal highway behavior on extreme cold days because high-speed ram airflow can overcool an aging thermostat

16. On a vehicle with electronic HVAC controls, the technician connects the scan tool and reads the evaporator temperature sensor. The reading is 120°F with the A/C off and the engine running at operating temperature on an 80°F day. The technician measures the actual temperature at the sensor location with a probe and reads 82°F. What does this 38°F discrepancy indicate?

A. Normal sensor behavior because the evaporator retains heat from the engine compartment when the A/C is not operating

B. The sensor wiring has developed a high resistance connection that is skewing the voltage signal toward a higher reading

C. The evaporator temperature sensor is reading higher than actual, which will cause the module to command more cooling than needed

D. The scan tool is displaying the sensor reading in a different scale than the probe thermometer is measuring

17. A vehicle's A/C system has a TXV with an external equalizer tube. The equalizer tube connects the TXV diaphragm chamber to the suction line at the evaporator outlet. If this equalizer tube becomes kinked or blocked, what effect will it have on TXV operation?

A. The TXV will use only internal equalization, which does not account for evaporator pressure drop and may cause underfeeding

B. The TXV will default to its fully open position because the equalizer supplies the closing force on the diaphragm

C. The blocked equalizer has no effect because modern TXVs use the equalizer only as a backup pressure reference

D. The TXV will oscillate rapidly between open and closed because it loses its pressure feedback reference entirely

18. A vehicle's heater control valve is cable-operated and mechanically linked to the temperature control on the dashboard. The customer reports that rotating the temperature knob from cold to hot produces no change in vent temperature — the air stays lukewarm. The cable appears intact visually. What should the technician check?

A. Whether the cable has stretched or the cable clamp at the valve lever has slipped, preventing the valve from opening fully

B. The heater core for a complete blockage that would produce lukewarm air regardless of the valve position setting

C. The blend door position because cable-operated valve systems do not use a blend door for temperature control

D. The engine thermostat for a stuck-open condition that is reducing coolant temperature below useful heating levels

19. On a vehicle with an ATC system, the customer complains that the climate control system takes approximately 3 minutes to respond to a temperature setting change. The customer changes the setting from 72°F to 65°F and expects immediate cold air. What should the technician explain?

A. A 3-minute response indicates a failed blend door actuator that is slow to move and should be replaced immediately

B. ATC systems use proportional control that gradually adjusts output to prevent abrupt temperature swings — some response delay is normal

C. The compressor displacement takes 3 minutes to increase from minimum to maximum when a large temperature change is requested

D. The evaporator thermal mass requires approximately 3 minutes to cool down regardless of the compressor output

20. A vehicle's A/C system has been sitting unused for 14 months. The customer starts using the A/C and reports a foul, musty odor that is worst during the first 30 seconds of operation and then diminishes. The system cools normally. What is the MOST likely cause?

A. Residual flushing solvent from a factory process that has accumulated in the lowest point of the evaporator during storage

B. Coolant from a slow heater core leak that has dried on the evaporator surface and releases odor when moistened by condensation

C. A dead rodent or decaying organic material trapped in the fresh air intake ductwork near the cabin air filter housing

D. Microbial growth on the evaporator surface that accumulated during the 14-month idle period and releases odor when air first passes over it

21. On a vehicle with vacuum-operated HVAC controls, the technician replaces the vacuum reservoir. After the repair, all mode door positions work correctly. However, the technician notices the check engine light has illuminated and the engine runs rough at idle. A DTC for a large EVAP system leak is stored. What is the connection?

A. The vacuum reservoir shares a common vacuum supply with the fuel tank vapor purge system on some vehicles

B. The new vacuum reservoir's larger capacity is drawing excessive vacuum from the intake manifold at idle speeds

C. The technician accidentally disconnected a vacuum line to the fuel tank vapor canister during the reservoir swap

D. The new reservoir is creating interference on the CAN bus that is triggering false EVAP system DTCs in the ECM

22. A vehicle's A/C compressor has been making a grinding noise for two weeks. The customer continued driving. The technician inspects and finds the compressor locked up — the clutch hub cannot be turned by hand. The suction line at the compressor inlet is hot and the discharge line is also hot. Gauge readings show equalized static pressure. All of the following components should be replaced EXCEPT:

A. The serpentine drive belt, unless inspection reveals no damage to the belt ribs or surface from the locked compressor

B. The condenser — which must always be replaced after any compressor failure regardless of the condenser type

C. The accumulator or receiver-drier — which must have fresh desiccant since the system will be opened for repair

D. The orifice tube or TXV — which must be replaced because debris from the failure will have contaminated the screens

23. A vehicle's cooling system uses a plastic-tank aluminum-core radiator. The customer reports finding a small pool of green coolant beneath the vehicle each morning. The technician pressure tests the system and finds coolant seeping from the junction where the plastic tank meets the aluminum core — visible only at the far-left corner. What is the MOST likely cause?

A. A cracked plastic tank that has developed a stress fracture from repeated thermal expansion and contraction cycles

B. The radiator cap is over-pressurizing the system, forcing coolant past the tank-to-core gasket at the weakest point

C. The tank-to-core gasket has deteriorated or the crimped seam has loosened, allowing seepage at the junction point

D. Internal corrosion from incompatible coolant types has eaten through the aluminum core at the tank seam location

24. On a vehicle with electronic HVAC controls, the scan tool shows the ambient temperature sensor reading 72°F. The actual outside temperature is also 72°F. However, the technician notices the sensor is mounted inside the front bumper grille area directly behind the condenser. What diagnostic concern should the technician keep in mind regarding this sensor location?

A. The sensor will always read significantly lower than actual ambient because it is shielded from direct sunlight by the bumper

B. The sensor will read accurately only when the vehicle is moving because ram air provides a true ambient sample

C. The sensor reading will be artificially elevated when the A/C is running because condenser heat radiates onto the sensor

D. The sensor will read lower than actual during nighttime driving because the cooler air at bumper height differs from ambient

25. A vehicle's A/C system has the following readings at 78°F ambient: low side 22 psi, high side 165 psi. The suction line feels cold and is sweating normally. The vent temperature is 40°F. However, the compressor cycles off after running for only 15 seconds and stays off for 45 seconds before re-engaging. This cycle repeats continuously. What is the MOST likely cause?

A. Normal system operation because the excellent 40°F vent temperature confirms the system is not undercharged

B. A slightly overcharged system where excess refrigerant is causing the low-side to drop below the cutout too quickly

C. A worn compressor that rapidly exhausts the available low-side refrigerant and triggers the cutout prematurely

D. A marginal undercharge that allows the compressor to quickly drop the low-side to the cutout point before adequate cooling accumulates

26. A vehicle has an electronically controlled A/C system with a variable displacement compressor. The scan tool shows the displacement control solenoid is being commanded to 100% (maximum output). The technician measures the resistance of the solenoid and reads 4.5 ohms. The specification is 4.0–5.0 ohms. The solenoid connector voltage reads 12.1V when commanded. Is the solenoid circuit functioning correctly?

A. No — the 12.1V reading indicates excessive voltage that will overdrive the solenoid beyond its rated capacity

B. Yes — the resistance is within specification and voltage is adequate to energize the solenoid for maximum displacement

C. No — the solenoid should receive a PWM signal rather than steady 12V when commanding variable displacement

D. Yes — but the solenoid response should be verified by checking actual gauge pressures since electrical tests alone are insufficient

27. Technician A says that when evacuating a system through only the low-side port, the vacuum must pull through the metering device restriction to reach the high side, which significantly increases evacuation time. Technician B says that opening both the high-side and low-side manifold valves during evacuation allows the pump to pull vacuum from both sides simultaneously, dramatically reducing total evacuation time. Who is correct?

A. Both Technician A and Technician B are correct about the metering device restriction and the benefit of dual-port evacuation

B. Technician A only, because opening the high-side valve during evacuation risks damaging the vacuum pump from excessive flow

C. Technician B only, because the metering device does not create any meaningful restriction during the evacuation process

D. Neither Technician A nor Technician B, because evacuation should only be performed through the high-side port alone

28. A vehicle's A/C evaporator drain tube exits through the firewall and drips onto the exhaust pipe directly below it. During A/C operation on humid days, the customer reports seeing steam and smelling a burnt odor from under the vehicle. What should the technician do?

A. Reroute the condensation drain hose to exit farther away from the exhaust so water does not contact the hot pipe

B. Replace the evaporator since excessive condensation dripping onto the exhaust indicates an internal core failure

C. Install a catch basin below the drain tube to collect condensation and prevent it from reaching the exhaust

D. Redirect the drain tube or add an extension so the condensation exits away from the exhaust pipe heat source

29. On a vehicle with automatic temperature control, the technician performs a blend door actuator calibration after replacement. The scan tool shows "calibration successful — range 0% to 100%." However, the customer returns one week later reporting that the vent temperature never reaches full hot — the maximum floor vent temperature is only 110°F when 135°F is expected. What should the technician check?

A. The blend door actuator's position under load to determine if the gears are strong enough to hold full hot against airflow

B. Whether the actuator was installed one spline position off, which would shift the range and prevent the door from reaching full hot

C. The HVAC module for a software recalibration that is needed after the successful mechanical calibration is completed

D. The engine coolant temperature, since a thermostat running below specification would limit maximum heat available

30. A vehicle's A/C system has a confirmed slow leak. The technician adds UV dye to the system, recharges, and instructs the customer to return in two weeks for a dye inspection. When the customer returns, the technician scans all accessible fittings, hoses, and components with a UV light but finds no fluorescence. The system has lost 3 ounces. Where should the technician look next?

A. The compressor shaft seal, which may only leak during operation and would drip dye onto the engine where it is washed away

B. The suction and discharge hose crimps for micro-cracks that allow permeation but do not produce visible dye accumulation

C. The evaporator inside the HVAC housing, which is inaccessible to standard external UV light inspection

D. The condenser tubes for stone damage pinhole leaks that may have been cleaned off by rain or car wash water

31. A vehicle's cooling system has the following condition: the engine reaches 200°F and the heater produces hot air. The technician notices that the coolant in the reservoir appears to be circulating — small ripples and movement are visible at the surface. On this vehicle, the reservoir is a pressurized degas bottle. Is coolant movement in the degas bottle normal?

A. Yes — on degas bottle systems, coolant flows through the bottle as part of the pressurized circuit, so movement is expected

B. No — coolant in any reservoir should be static, and movement indicates a blown head gasket pushing gases into the coolant

C. Yes — but only during warm-up when the thermostat cycles open and closed creating flow pulses through the system

D. No — a degas bottle is an overflow container only, and any movement indicates an internal leak in the bottle itself

32. On a vehicle with electronic HVAC controls, the technician retrieves DTC B0112 — Ambient Temperature Sensor Circuit Low Voltage. The scan tool live data shows the ambient sensor reading 265°F. The actual outside temperature is 75°F. What electrical condition produces a low-voltage reading that the module interprets as extreme high temperature on an NTC sensor?

A. An open circuit in the ground wire that prevents current from flowing and causes the signal to float at reference voltage

B. A short to battery voltage on the signal wire that drives the reading above the sensor's maximum expected output

C. A corroded connector that adds resistance to the circuit, producing a higher voltage that reads as colder temperature

D. A short to ground on the sensor signal wire that pulls the voltage to near-zero, which the module reads as minimum resistance and maximum temperature

33. A vehicle's A/C system is being diagnosed. The technician connects manifold gauges and finds the low-side pressure is 8 psi and the high-side is 95 psi at 80°F ambient. The compressor runs but the vent temperature is 65°F. The suction line at the evaporator outlet feels warm rather than cold. What is the MOST likely cause?

A. A failed compressor that cannot pump effectively, allowing both pressures to trend toward equalization

B. A severely restricted metering device or liquid line that is starving the evaporator of refrigerant flow

C. A massively overcharged system where excess liquid has flooded the evaporator and backed up into the suction line

D. A condenser with heavily bent fins on approximately 80% of its face blocking nearly all airflow through the unit

34. Technician A says that the pressure-temperature relationship for R-134a means that at 80°F, the static pressure in a properly charged system should be approximately 82–85 psi. Technician B says that the same P-T relationship means at 100°F, the static pressure should be approximately 115–120 psi. Who is correct?

A. Both Technician A and Technician B are correct about the R-134a pressure-temperature values at these temperatures

B. Technician A only, because R-134a's P-T curve flattens above 95°F and the 100°F reading would be closer to 100 psi

C. Technician B only, because the 80°F static pressure for R-134a should be approximately 95 psi rather than 82–85 psi

D. Neither Technician A nor Technician B, because static pressure depends on charge amount not on temperature

35. A vehicle's A/C system has an intermittent cooling complaint. The customer reports the A/C works perfectly most days but approximately once per week, the system blows warm air for an entire day before spontaneously resuming normal cooling the next morning. There are no DTCs stored. Gauge pressures during the warm-air event show both sides near static equilibrium. What should the technician investigate?

A. The compressor clutch relay for intermittent contact failure that prevents the relay from energizing for an entire day

B. The HVAC control module for a thermal shutdown feature that activates during high-load days and resets overnight

C. An intermittent electrical fault in the compressor clutch coil circuit that prevents engagement until thermal cycling resets it

D. A variable displacement compressor control valve that intermittently sticks at minimum and resets overnight

36. On a vehicle with electronic HVAC controls, the blend door, mode door, and recirculation door actuators all communicate with the HVAC module via a shared LIN bus. The technician finds that only the blend door actuator has lost communication. The mode and recirculation actuators function normally. What does this indicate about the fault location?

A. A failed HVAC control module LIN bus transmitter that cannot send commands to any actuator on the shared bus

B. A fault in the common LIN bus trunk wire that affects all actuators connected to the shared communication line

C. A system-wide power supply failure that has reduced voltage to all actuators below the LIN communication threshold

D. A fault specific to the blend door actuator itself or its individual connection to the LIN bus — not a shared bus problem

37. A vehicle has a heater performance complaint. The engine reaches 200°F. Both heater hoses at the firewall measure 198°F (supply) and 170°F (return) with an infrared thermometer. The floor vent temperature is 120°F. The blend door is confirmed at full hot. What does the 28°F differential between the heater hoses indicate?

A. Normal heater core operation — the coolant flows through and releases heat, exiting cooler than it entered

B. The heater core is transferring adequate heat because the 28°F drop demonstrates good thermal exchange between coolant and air

C. The heater core has an internal restriction because a 28°F drop indicates reduced flow volume through the core

D. The water pump is failing and cannot push enough coolant through the heater core at the current engine RPM

38. A vehicle's A/C system produces normal cooling output from all vents. However, the customer reports a periodic ticking sound from the dashboard area approximately every 45 seconds. The sound occurs only when the A/C is turned on. The technician confirms the compressor cycles off every 45 seconds (cycling clutch system) and the tick coincides with clutch disengagement. What is the source of the tick?

A. The compressor clutch de-energizing produces a mechanical click as the hub separates from the pulley — this is normal

B. The TXV closing abruptly when the compressor stops creates a hydraulic pressure spike that is heard as a tick

C. The cycling switch contacts arcing when they open produce an electrical spark that creates the audible tick sound

D. The refrigerant pressure wave created by the sudden compressor stoppage travels through the lines to the evaporator

39. Technician A says that R-1234yf has a GWP (Global Warming Potential) of approximately 4, which is drastically lower than R-134a's GWP of approximately 1,430. Technician B says that R-1234yf was adopted specifically to meet European and global environmental regulations targeting high-GWP refrigerants. Who is correct?

A. Both Technician A and Technician B are correct about R-1234yf's GWP value and the regulatory reason for its adoption

B. Technician A only, because R-1234yf was adopted due to its lower cost rather than environmental regulations

C. Technician B only, because R-1234yf's GWP is approximately 150, not 4, making it moderately better than R-134a

D. Neither Technician A nor Technician B, because R-1234yf was chosen primarily for its improved cooling performance

40. A vehicle's A/C system has a confirmed leak at the evaporator. The estimated repair cost is $1,800 for evaporator replacement. The customer asks whether simply recharging the system every six months is a reasonable alternative. What is the MOST important risk the technician should communicate?

A. Periodic recharging without repair gradually depletes compressor oil, risking expensive compressor failure

B. The gradual decline in vent temperature between charges will never provide adequate cooling in mid-summer

C. The repeated introduction of atmospheric air during each recharge cycle degrades all internal components

D. Each recharge introduces moisture and air that progressively corrode system components and may cause compressor failure

41. On a vehicle with ATC, the customer reports that the A/C overcools the cabin on cloudy days but maintains temperature correctly on sunny days. The set temperature is 72°F. Scan tool data shows the sun load sensor reading 0.8V on cloudy days and 3.5V on sunny days. All other sensor readings are accurate. What is the MOST likely explanation?

A. The module is not adding adequate cooling on sunny days because the sun load sensor reading is lower than expected

B. The system is overcharged and produces excessive cooling that is only masked by the solar heat load on sunny days

C. The sun load sensor on cloudy days (0.8V) causes the module to underestimate heat load, so it does not reduce cooling output quickly enough when solar input drops

D. A faulty ambient temperature sensor is reading higher than actual on cloudy days, causing the module to overcool

42. A vehicle's A/C compressor clutch engages and disengages rapidly — approximately once per second. The system does not cool. The gauges fluctuate wildly with each cycle. The scan tool shows the HVAC module commanding the compressor ON continuously. What is the MOST likely cause?

A. The HVAC module output driver is pulsing the relay command at a rapid rate due to an internal circuit malfunction

B. A low-pressure cutout switch that is right at its threshold — the compressor engages, drops pressure below cutout, disengages, pressure rises, and the cycle repeats rapidly

C. The compressor clutch air gap is too wide, causing the hub to repeatedly engage and immediately slip off the pulley

D. An intermittent electrical connection in the clutch coil power wire that makes and breaks contact with engine vibration

43. A vehicle's engine coolant temperature sender for the dashboard gauge reads 195°F. The ECT sensor for the engine management system reads 200°F. A separate coolant temperature input to the HVAC module reads 180°F. All three readings are taken simultaneously with the engine at operating temperature. How can three different readings be possible?

A. Only one reading can be correct — the other two sensors have failed and should be replaced immediately

B. Electromagnetic interference from the alternator is corrupting two of the three sensor signals simultaneously

C. The scan tool is malfunctioning and displaying calculated values rather than actual sensor readings for two inputs

D. The three sensors may be located at different points in the cooling circuit where coolant temperatures naturally vary

44. Technician A says that the EPA requires all recovered refrigerant to be recycled or reclaimed before it can be recharged into any vehicle. Technician B says that refrigerant recovered from a specific vehicle can be recycled and returned to the same vehicle without sending it to a reclamation facility. Who is correct?

A. Technician B only, because recovered refrigerant can be recycled on-site and returned to the same vehicle or same-owner vehicles

B. Technician A only, because all recovered refrigerant must be sent to an EPA-certified reclamation facility before any reuse

C. Both Technician A and Technician B, because the correct procedure depends on whether the refrigerant passes purity testing

D. Neither Technician A nor Technician B, because recovered refrigerant must always be disposed of and replaced with virgin stock

45. A vehicle's A/C system was charged to the specified 24 ounces of R-134a. The technician measures the vent temperature at 46°F at 90°F ambient and the subcooling at 10°F. The customer asks if adding 2 more ounces would improve the vent temperature. What should the technician explain?

A. Adding 2 ounces would improve subcooling by approximately 5°F, which directly produces colder vent temperatures

B. The system is already at specification — adding refrigerant above the designed amount will likely worsen rather than improve performance

C. The subcooling of 10°F is at the low end of normal and adding 2 ounces would bring it to a more optimal 15°F range

D. Vent temperature at 90°F ambient is limited by the evaporator design and additional refrigerant cannot overcome this

46. On a vehicle with electronic HVAC controls, the technician finds the blower motor runs at maximum speed whenever the ignition is on, even with the HVAC system turned completely off from the control panel. The scan tool shows the module is NOT commanding the blower. What is the MOST likely cause?

A. A failed HVAC control module that has lost its ability to control the blower speed output circuit

B. A shorted blower motor controller or a welded high-speed relay that bypasses the module's control and delivers full voltage

C. An electrical short in the blower motor winding that causes it to self-energize from induced electromagnetic fields

D. A ground circuit fault that allows battery voltage to back-feed through the motor and energize it independently

47. A vehicle has an intermittent A/C complaint. The technician connects a scan tool data logger and instructs the customer to drive normally until the fault occurs. The data log reveals that when the cooling stops, the compressor clutch command changes from ON to OFF and simultaneously the evaporator temperature reading spikes from 37°F to 155°F. What does this simultaneous change indicate?

A. The evaporator temperature sensor signal dropped out, sending the module a maximum-resistance value that it interprets as high temperature

B. An intermittent evaporator temperature sensor or its wiring that sends a false high reading, causing the module to disable the compressor for perceived overheat protection

C. A refrigerant leak that suddenly depletes the charge, causing the evaporator to warm instantly and the module to command off

D. A failing compressor that intermittently stops pumping, allowing the evaporator to warm while the module responds by commanding off

48. A vehicle's cooling system pressure cap is rated at 16 psi. The technician tests the cap and it releases at 18 psi. Is this cap acceptable for continued use?

A. Yes — a cap releasing 2 psi above its rating provides a wider safety margin against coolant loss during operation

B. No — the cap should release at exactly 16 psi, and any deviation above or below indicates a failed pressure spring

C. No — a cap that holds 2 psi above its rating over-pressurizes the system and risks damage to hoses, gaskets, or the heater core

D. Yes — the 2 psi overpressure is within the standard ±3 psi manufacturing tolerance for automotive pressure caps

49. Technician A says that when an A/C system has been open to atmosphere during a repair, the system must be evacuated to remove both air and moisture before recharging. Technician B says that evacuation serves three purposes: removing air, removing moisture by lowering the boiling point of water below room temperature, and testing for leaks through the vacuum decay test. Who is correct?

A. Both Technician A and Technician B are correct about the necessity and multiple purposes of system evacuation

B. Technician A only, because the vacuum decay test is not a reliable leak detection method and should not be cited

C. Technician B only, because brief system openings do not introduce enough air or moisture to require evacuation

D. Neither Technician A nor Technician B, because evacuation only removes air — moisture requires chemical desiccant

50. A vehicle has been in for A/C service three times in six months. Each time the system was low on charge, the technician added refrigerant, and the A/C worked well for approximately two months before the customer returned. No leak was found during any of the three visits. What fundamental error has occurred during these service visits?

A. The technician should have replaced the compressor after the second visit since repeated charge loss indicates internal bypass

B. The technician should have replaced all O-rings at every fitting since one of them must be the undetectable leak source

C. The technician should have stopped adding refrigerant and performed a more thorough leak investigation including evaporator access

D. The technician used an incorrect charge amount each time, and the system was never fully charged to begin with

Practice Exam 17: Answer Key and Explanations

1. D — The cold suction line exits the evaporator at 42°F and warms to 58°F by the time it reaches the compressor inlet — a 16°F temperature gain. This heat absorption is normal and expected because the cold metal suction line runs through the hot engine compartment where it is exposed to radiant and conducted heat from the engine, exhaust manifold, and surrounding components. The low-side pressure remains constant at 30 psi throughout the line, confirming no restriction or pressure drop — only thermal gain from the environment.

2. B — Technician B is correct that when a new accumulator is installed, oil must be added to replace the oil that was retained inside the old accumulator when it was removed from the system. The old accumulator traps oil in its internal passages and around its desiccant bag — this oil is lost from the system when the old unit is discarded. While some new accumulators may arrive with a small amount of shipping oil, the technician must add the manufacturer-specified amount of fresh oil to compensate for what was retained in the old unit.

3. C — On many vehicles, the A/C system activation triggers the condenser fan (or an additional fan) to run, which also pulls air through the radiator mounted directly behind the condenser. This increased airflow through the radiator enhances engine heat rejection beyond what occurs with the engine cooling fan alone. The result is a slight drop in coolant temperature — typically 5°F–10°F — which is normal and expected. The slight decrease in heater output is a direct consequence of the lower coolant temperature.

4. A — The overcurrent DTC sets when the actuator motor draws more amperage than the module's driver circuit can safely supply. When the actuator is disconnected, the DTC clears (no current draw). When reconnected, the DTC returns within 5 seconds — before the motor even completes a sweep — because the motor immediately encounters resistance. A physically seized or obstructed mode door forces the motor to stall against the immovable door, drawing locked-rotor current that triggers the overcurrent protection.

5. D — High subcooling (22°F — above the normal 10°F–20°F range) indicates excess liquid refrigerant is backing up in the condenser, cooling further below its condensation temperature. Low superheat (5°F — below the normal 8°F–12°F TXV specification) indicates the evaporator is receiving more refrigerant than it can fully evaporate. Both readings together — high subcooling and low superheat — are the signature pattern of a system overcharged with refrigerant. The elevated pressures at 92°F ambient further support this diagnosis.

6. B — In bi-level mode, the HVAC system is designed to deliver cooler air from the panel vents (upper body comfort) and warmer air from the floor vents (foot warmth). The module splits airflow so that panel air bypasses more of the heater core while floor air passes through more of the heater core. If the floor air is also cold instead of warm, a secondary blend issue exists — the floor-side airflow may not be passing through the heater core due to a stuck secondary blend door, a disconnected linkage, or an air path problem.

7. B — Both technicians correctly describe advantages of scroll compressor design. Technician A is right that scroll compressors produce smoother, less pulsating flow because the orbiting scroll provides near-continuous compression rather than the discrete intake-compression-discharge strokes of reciprocating pistons. Technician B is right that scroll compressors are generally quieter because they have only one major moving part (the orbiting scroll) with no reciprocating pistons, connecting rods, or crankshaft creating vibration.

8. C — The pressure cap holds correctly (eliminating a weak cap), the combustion gas test is negative (eliminating a head gasket breach), and a 4-hour extended pressure test holds steady (eliminating even slow leaks). The most commonly overlooked cause of coolant overflow from an otherwise healthy system is simple overfilling. When coolant is added above the cold MAX mark, normal thermal expansion during warm-up increases the coolant volume beyond the reservoir's capacity, pushing the excess out through the cap's relief valve.

9. A — With 12.3V at the positive terminal and 12.2V at the ground terminal — both referenced to chassis ground — virtually no voltage difference exists across the clutch coil (only 0.1V). For current to flow through the coil and generate a magnetic field, the ground terminal must read near 0V to create the full 12V potential across the winding. Battery voltage appearing at the ground terminal confirms the ground path is open — current has no return path to chassis, so the coil cannot energize.

10. D — The engine temperature is correct (200°F), both hoses are hot (adequate coolant supply), and the coolant was recently flushed (eliminating internal contamination). The cabin air filter is new (eliminating air-side restriction at the filter). A commonly overlooked cause of progressive heat loss is dust, lint, and debris accumulating on the heater core's external fin surfaces — the air side that the

blower pushes cabin air through. This layer insulates the fins and progressively reduces heat transfer efficiency over time.

11. C — On a 95°F humid day, a properly cooling A/C system with 42°F evaporator temperatures should produce substantial condensation as the cold evaporator surface cools the humid air well below its dew point. The absence of water dripping from the drain tube despite these conditions means condensation is forming but cannot exit — the drain tube is clogged. Water is accumulating inside the HVAC housing and will eventually overflow onto the passenger floorboard if not cleared.

12. A — Technician A is correct that a compressor failure limited to bearing noise — without catastrophic internal destruction that releases metallic debris into the refrigerant circuit — does not require full system flushing. If the recovered oil is clean and clear with no metallic particles visible, the system has not been contaminated by circulating debris. Replacing the compressor, accumulator/receiver-drier (system opened to atmosphere), and O-rings is sufficient. Flushing is required only when debris or contamination is confirmed.

13. D — Every component tests normal and the system is properly charged — there is no mechanical fault. The vehicle's A/C system was designed for the moderate climate where it was originally sold. At 110°F ambient, the massive heat load from solar radiation, road surface radiation, and the extreme air temperature exceeds the designed cooling capacity of the system's condenser, evaporator, and compressor. The system is performing at its maximum capability — it simply was not engineered for desert extremes.

14. B — The scan tool shows the passenger blend door at 8% commanded and 8% actual — the module and feedback agree perfectly. Yet the passenger side blows 85°F air while the driver side at a similar position cools correctly. If the actuator reports 8% and the system should deliver cold air at that position, the most likely cause is that the actuator shaft has disconnected from the blend door — the shaft turns and the feedback potentiometer tracks correctly, but the physical door remains at full hot.

15. A — The engine reaches 195°F initially but drops to 178°F after 30 minutes of sustained highway driving at 70 mph on a 20°F day. The cooling fans are not running (eliminating fan-related overcooling). At highway speed, high-velocity ram air forces enormous airflow through the radiator. A thermostat that is weakening with age opens wider than designed under these sustained conditions, allowing more coolant to flow through the radiator where the extreme cold ram air overcools it below the thermostat's normal regulating temperature.

16. C — The evaporator temperature sensor reads 120°F while the actual temperature at the sensor location is 82°F — a 38°F discrepancy with the sensor reading warmer than reality. In an ATC system, this warmer-than-actual reading has a direct operational consequence: when the A/C is engaged, the module will believe the evaporator is warmer than it actually is. A high-resistance connection in the NTC sensor wiring would shift the voltage signal to produce a warmer reading than actual conditions.

17. D — The external equalizer tube provides the TXV diaphragm with accurate evaporator outlet pressure feedback, which serves as the closing force that opposes the sensing bulb's opening force. If the equalizer is blocked, the diaphragm loses its pressure reference and cannot properly balance opening and closing forces. Without this feedback, the valve cannot find a stable operating point — it alternately overfeeds and underfeeds the evaporator in rapid succession, producing the characteristic hunting oscillation.

18. A — A cable-operated heater control valve relies on the mechanical cable to physically open and close the valve as the temperature knob is rotated. A stretched cable or a slipped cable clamp at the valve lever creates slack that prevents the cable from translating the knob's full rotation into full valve movement. The valve remains partially open regardless of the knob position, delivering a constant lukewarm output. Adjusting the cable clamp or replacing the stretched cable restores full valve travel.

19. B — ATC systems use proportional control to gradually adjust output based on the difference between set and actual temperatures. The module does not slam immediately to full cold when the set point drops by 7°F — instead, it progressively increases cooling output to bring the cabin to the new target without causing uncomfortable temperature swings or overshooting. A gradual 2–3 minute response to a moderate set-point change is normal programmed ATC behavior, not a malfunction.

20. D — A foul, musty odor that is worst during the first 30 seconds of A/C operation after extended idle time — then diminishes as the system runs — is the classic symptom of microbial growth on the evaporator surface. During the 14-month idle period, residual moisture on the evaporator provided an ideal environment for mold, mildew, and bacteria to colonize the fin surfaces. When the blower first activates, it disturbs these colonies and releases a concentrated burst of volatile organic compounds into the cabin airstream.

21. C — The vacuum reservoir shares its vacuum supply with other vacuum-operated systems through the intake manifold. During the reservoir replacement, the technician likely disconnected or dislodged a nearby vacuum line that serves the fuel tank vapor purge system (EVAP). The disconnected EVAP vacuum line creates a large vacuum leak that the ECM detects through its EVAP system monitoring, setting the large-leak DTC. The rough idle results from the unmetered air entering through the disconnected vacuum line.

22. A — This is an EXCEPT question — three components must be replaced and one does not necessarily require replacement. The serpentine drive belt does not automatically require replacement after a compressor lock-up. If the belt shows no visible damage — no missing ribs, glazing, cracks, or deformation from sliding on the locked pulley — it can be reused. The condenser must be replaced (debris from catastrophic failure), the drier must be replaced (system opened), and the metering device must be replaced (screens trap debris).

23. C — A visible coolant seep at the junction where the plastic tank meets the aluminum radiator core indicates the crimped seam or the gasket between them has failed. Plastic-tank radiators use a rubber gasket compressed by a crimped aluminum lip to seal the tank to the core. Over time and many thermal cycles, the gasket deteriorates, the crimp loosens, or the gasket material compresses permanently — creating a seepage path at the weakest point of the seam.

24. C — An ambient temperature sensor mounted directly behind the condenser will be exposed to the hot air that exits the condenser when the A/C is running. The condenser rejects heat from the refrigerant into the passing air, raising the air temperature significantly above actual ambient. This heated air flows directly over the sensor, causing it to read artificially high. This heat-soaked reading can affect the ATC module's calculations and should be considered during diagnosis.

25. D — The 40°F vent temperature confirms the system produces cold air when operating, but the short 15-second on-cycle and extended 45-second off-cycle indicate the low-side pressure drops to the cycling switch cutout point too quickly. A marginal undercharge reduces the total refrigerant mass available in the low side — the compressor rapidly evacuates the limited mass, dropping pressure to cutout within 15 seconds rather than the normal 30–60 seconds. The extended off-cycle reflects the slow pressure recovery from insufficient charge.

26. B — The solenoid resistance of 4.5 ohms falls within the 4.0–5.0 ohm specification, confirming the coil winding is intact and within its designed resistance range. The connector voltage of 12.1V when commanded to 100% displacement confirms adequate power is reaching the solenoid. Both the electrical measurements — resistance and voltage — indicate the solenoid circuit is functioning correctly. However, confirming actual gauge pressure response would verify the valve is mechanically responding to the electrical command.

27. A — Both technicians correctly describe evacuation principles. Technician A is right that pulling vacuum through only the low-side port forces the pump to draw through the metering device restriction (orifice tube or TXV), which significantly slows the evacuation process because the small restriction limits flow. Technician B is right that opening both ports simultaneously allows the pump to pull

vacuum from both sides of the system directly, bypassing the metering device restriction and dramatically reducing evacuation time.

28. D — Condensation water dripping from the evaporator drain tube onto a hot exhaust pipe produces steam and a burnt odor — which are concerning to the customer but not harmful to the system. The solution is to redirect the drain tube or add an extension so the water exits away from the exhaust pipe. Rerouting the drain eliminates both the steam and the odor without requiring any system repairs. This is a routing issue, not a system performance problem.

29. B — The calibration completed successfully showing a 0%–100% range, but the door does not reach full hot physically. The most common cause is the actuator being installed one spline position off on the blend door shaft. The actuator achieves its full electrical range (0%–100%), and the calibration sees both endpoints — but those endpoints are shifted relative to the door's actual mechanical stops. The door may reach full cold correctly but fall short of full hot by one spline position's worth of rotation.

30. C — After two weeks with UV dye circulating through the system, no fluorescence was found at any externally accessible fitting, hose, or component — yet 3 ounces are missing. The most probable remaining leak source is the evaporator, which is sealed inside the HVAC housing where standard external UV light inspection cannot reach. UV dye may be accumulating on the evaporator surface or dripping into the housing where it is not visible. Accessing the evaporator area directly for UV inspection is the next step.

31. A — On vehicles with a pressurized degas bottle (as opposed to a conventional unpressurized overflow reservoir), the degas bottle is plumbed directly into the pressurized cooling circuit. Coolant flows through the bottle during normal operation — entering through one connection and exiting through another — making visible coolant movement and surface ripples completely normal. This design allows the degas bottle to actively separate air bubbles from the circulating coolant during operation.

32. D — In an NTC sensor voltage divider circuit, a short to ground on the signal wire pulls the signal voltage to near-zero volts. Near-zero voltage represents minimum resistance in the NTC circuit, and since NTC sensor resistance decreases as temperature increases, the module interprets minimum resistance as maximum temperature. The "Circuit Low Voltage" DTC confirms the low-voltage condition, and the 265°F reading represents the module's maximum temperature calculation for a near-zero signal.

33. B — A low-side pressure of only 8 psi with a warm suction line indicates almost no refrigerant is reaching the evaporator — the compressor is pulling the low side toward vacuum because the metering device or liquid line is severely restricting flow. The warm suction line confirms no cold refrigerant is present at the evaporator outlet. The high side at only 95 psi (below normal) results from the restriction trapping some refrigerant upstream but the compressor's suction keeping overall pressure depressed.

34. A — Both technicians cite correct P-T chart values for R-134a. Technician A is right that at 80°F, the static equilibrium pressure for R-134a is approximately 82–85 psi. Technician B is right that at 100°F, the static pressure rises to approximately 115–120 psi. These values are derived directly from the R-134a pressure-temperature chart and represent the expected readings when the system is at rest with the engine off and the system at thermal equilibrium with the ambient temperature.

35. C — An intermittent all-day failure that spontaneously resolves the next morning — with both-sides-equalized pressures during the event — indicates the compressor is not operating despite appearing to be commanded on. The most likely cause is an intermittent electrical fault in the compressor clutch coil circuit — a connector with corrosion, a wire with internal damage, or a clutch coil with a thermal open that breaks contact when hot and re-establishes when cooled overnight. The equalized pressures confirm the compressor has not been pumping during the entire warm-air episode.

36. D — The mode and recirculation actuators communicate normally on the shared LIN bus — proving the bus trunk wire, the HVAC module's LIN transmitter, and the power supply are all functional. Only the blend door actuator has lost communication. Since the other actuators on the same bus work correctly, the shared infrastructure is intact. The fault must be specific to the blend door actuator itself (failed internal communication circuit) or its individual tap connection to the shared LIN bus wire.

37. B — A 28°F differential between the heater supply hose (198°F) and return hose (170°F) indicates the coolant is flowing through the heater core and releasing heat into the passing air — the temperature drops because energy is transferred from the coolant to the cabin air. This differential falls within the normal 20°F–40°F range expected when the heater core is functioning with adequate flow. The 120°F floor vent temperature confirms significant heat is being delivered. The heater core is performing its intended function.

38. A — The ticking sound coincides precisely with compressor clutch disengagement every 45 seconds. When the clutch coil is de-energized, the magnetic field collapses and the springs push the hub away from the pulley face. This separation produces a mechanical click as the hub snaps away from the spinning pulley. In a quiet cabin, this normal clutch disengagement sound can be audible through the firewall, especially in vehicles with engine compartment sound insulation that transmits specific frequencies.

39. A — Both technicians state correct facts about R-1234yf. Technician A is right that R-1234yf has a GWP of approximately 4 — dramatically lower than R-134a's GWP of approximately 1,430, making it over 99% less impactful as a greenhouse gas. Technician B is right that the automotive industry adopted R-1234yf specifically to comply with European Union Directive 2006/40/EC and subsequent global regulations that require mobile A/C systems to use refrigerants with a GWP below 150.

40. D — The most critical risk of periodic recharging without leak repair is the progressive introduction of atmospheric air and moisture through the leak point during the periods when the system runs low or empty. Moisture inside the system reacts with the refrigerant and PAG oil to form hydrofluoric acid, which aggressively corrodes aluminum components from the inside — attacking the condenser, evaporator, compressor, and all aluminum fittings. This corrosion damage accumulates with each charge cycle and eventually causes far more expensive failures.

41. C — On sunny days, the sun load sensor reads 3.5V (high solar input), so the module adds cooling to compensate — the system works correctly. On cloudy days, the sensor reads 0.8V (low solar input), so the module reduces the solar compensation factor. However, the module's control algorithm may not reduce the cooling output proportionally fast enough when the solar load drops — it continues cooling at a rate calibrated for higher heat input, producing an overcooled cabin until the temperature error accumulates enough for the module to pull back.

42. B — The module commands the compressor ON continuously (eliminating module-side cycling as the cause), but the clutch engages and disengages once per second with wildly fluctuating pressures. This rapid cycling pattern — too fast for normal cycling switch operation — indicates the low-pressure cutout switch is right at its threshold. The compressor engages, immediately drops the low-side below cutout (due to a critically low charge), disengages, pressure barely recovers above cut-in, and the cycle repeats within one second.

43. D — Three different temperature readings from three different sensors at the same time is entirely possible and normal when the sensors are located at different physical points in the cooling circuit. Coolant temperature varies throughout the system — hottest at the cylinder head outlet, cooler after passing through the radiator, and different temperatures at various tap points along the engine block, heater supply line, and thermostat housing. Each sensor accurately reads the temperature at its specific location.

44. A — Technician B correctly describes the EPA regulation: refrigerant recovered from a specific vehicle can be recycled using approved on-site equipment and returned to the same vehicle or other vehicles owned by the same entity without sending it to a reclamation facility. Technician A's statement that all refrigerant must be reclaimed is too broad — reclamation to ARI 700 purity standards is only

required when refrigerant will be sold to a different owner. On-site recycling for same-vehicle or same-owner reuse is explicitly permitted.

45. C — The system is charged to the manufacturer's specification of 24 ounces and all measurements are within normal range — 46°F vent temperature at 90°F ambient represents good cooling performance, and subcooling of 10°F falls within the acceptable 10°F–20°F range. Adding refrigerant above the engineered specification creates an overcharge that floods the condenser with excess liquid, reduces effective heat transfer area, raises high-side pressure, and typically produces warmer vent temperatures rather than colder ones.

46. B — The module is NOT commanding the blower (confirmed by the scan tool), yet the blower runs at maximum speed. This means full battery voltage is reaching the motor through a path that bypasses the module's control. A shorted electronic blower motor controller (power transistor failed short) passes full voltage regardless of the module's command. Alternatively, a welded high-speed relay stuck in the closed position bypasses the controller entirely and supplies full voltage directly to the motor.

47. B — The data log reveals two simultaneous events: the evaporator temperature reading spikes from 37°F to 155°F and the compressor command switches from ON to OFF at exactly the same moment. An evaporator temperature sensor with an intermittent electrical fault — loose connector, chafed wire, or failing sensor element — momentarily sends a signal that the module reads as 155°F. The module interprets this as an overheated evaporator or a circuit fault and immediately disables the compressor as a protective response.

48. C — A pressure cap rated at 16 psi that releases at 18 psi is over-pressurizing the system by 2 psi beyond its designed maximum. Cooling system components — heater cores, plastic radiator tanks, hoses, and gaskets — are engineered to operate safely at the cap's rated pressure with a safety margin. Consistently exceeding the rated pressure by 12.5% stresses these components beyond their design envelope, potentially causing heater core seepage, hose failure, or tank-to-core gasket leaks. The cap should be replaced.

49. A — Both technicians correctly describe the importance and purposes of evacuation. Technician A is right that any system opened to atmosphere must be evacuated to remove air and moisture before recharging. Technician B correctly identifies the three purposes of evacuation: removing non-condensable air, lowering the pressure to the point where trapped moisture boils at room temperature and is extracted by the vacuum pump, and performing the vacuum decay test to verify system integrity before introducing expensive refrigerant.

50. C — Three visits in six months with the same charge-loss complaint — and no leak found during any visit — reveals a fundamental diagnostic failure. The technician kept adding refrigerant without performing a thorough enough leak investigation to find the source. The leak is clearly present (the charge depletes every two months) but the standard external detection methods used at each visit could not locate it. A more aggressive approach — accessing the evaporator housing directly, extended UV dye accumulation, or nitrogen submersion testing — should have been employed after the second recurrence.