

PRACTICE EXAM 2: RED SEAL TRUCK AND TRANSPORT MECHANIC SIMULATION (135 QUESTIONS)

1. A technician spills approximately two litres of used engine coolant on the shop floor. The coolant is an extended life (OAT) ethylene glycol-based product. What is the correct immediate response?

- A. Hose the spill into the shop floor drain since ethylene glycol is water-soluble and non-toxic
- B. Allow the coolant to evaporate naturally since the quantity is too small to require cleanup action
- C. Contain the spill with absorbent material, clean it up, and dispose of the contaminated absorbent as regulated waste
- D. Pour cat litter over the spill and sweep it into the general shop waste dumpster at the end of the shift

2. A technician is using a hydraulic press to remove a king pin from a steer axle knuckle. Which safety precaution is most critical during this operation?

- A. Use appropriate shielding and stand clear of the press to protect against sudden component release under high force
- B. Wear chemical-resistant gloves to protect against hydraulic fluid contact during the pressing operation
- C. Disconnect the shop air supply to prevent the press from exceeding its rated pressure during the operation
- D. Place the work piece on wooden blocks rather than steel supports to absorb vibration from the press action

3. A hazardous product's Safety Data Sheet lists the product as having an NFPA health hazard rating of 3 (on a scale of 0 to 4). What does this rating indicate about the product?

- A. The product is a moderate irritant requiring standard safety glasses and nitrile gloves for handling

- B. The product presents minimal health risk and can be handled safely with basic hygiene practices
- C. The product is stable and non-reactive under normal storage and handling conditions in the workplace
- D. The product is seriously hazardous and short exposure could cause serious temporary or residual injury

4. During a routine PM inspection, a technician discovers that the fire extinguisher in the truck cab has an expired inspection tag. The extinguisher appears undamaged and the gauge shows adequate pressure. What should the technician do?

- A. Return the extinguisher to service since the gauge indicates it is still charged and functional for use
- B. Tag the extinguisher as requiring service and replace it with a current inspected unit before the truck operates
- C. Recharge the extinguisher using the shop air compressor and update the inspection tag with today's date
- D. Discharge the extinguisher completely to verify it functions then refill it at an authorized service station

5. A journeyman is explaining a brake adjustment procedure to a third-year apprentice. The apprentice performs the adjustment but sets the pushrod stroke 5 mm outside the specification. What is the most effective mentoring response?

- A. Acknowledge the effort, explain specifically where the measurement went wrong, and guide the apprentice through a correct readjustment
- B. Complete the adjustment yourself to save time and have the apprentice observe the correct result
- C. Document the error in the apprentice's training record and assign written homework on the adjustment procedure
- D. Allow the apprentice to discover the error independently by road-testing the vehicle and noting the brake performance

6. A technician must work inside a tanker trailer that previously carried diesel fuel. The trailer has been steam-cleaned but not gas-tested. According to confined space entry regulations, what must occur before the technician enters?

- A. Open all hatches and manways for 30 minutes to allow natural ventilation to clear any residual vapours
- B. Wear a standard particulate respirator (N95) to filter any remaining diesel fuel particles from the air
- C. Perform atmospheric testing for oxygen levels, combustible gases, and toxic gases before entry with a standby attendant
- D. Enter the trailer with a portable fan running to maintain continuous airflow during the inspection work period

7. A technician completes a major engine repair on a fleet truck. The work order requires documentation of all parts used. Which documentation practice best protects the shop and the customer?

- A. List the generic description of each part installed since specific part numbers can change between suppliers
- B. Photograph the installed components as proof of the repair completion for the customer's maintenance file
- C. Record the total parts cost on the invoice without individual line items to simplify the billing process
- D. Record the specific part numbers, quantities, descriptions, and supplier for every component installed in the repair

8. A technician is preparing to service the air conditioning system on a truck cab. Before connecting the manifold gauges, what must be verified about the refrigerant in the system?

- A. The refrigerant charge level is within 10% of the manufacturer's specification by weight measurement
- B. The refrigerant type is identified using a refrigerant identifier to prevent cross-contamination of different types
- C. The compressor oil charge has been measured and recorded before any refrigerant handling takes place
- D. The ambient temperature is above 15°C because A/C system testing below this temperature produces inaccurate readings

9. In a four-stroke diesel engine, the camshaft rotates at what speed relative to the crankshaft?

- A. Half the crankshaft speed because the complete valve cycle requires two full crankshaft revolutions to complete
- B. The same speed as the crankshaft because each valve must open once per crankshaft revolution for proper timing
- C. Twice the crankshaft speed because the intake and exhaust valves must each open and close twice per cycle
- D. One-quarter the crankshaft speed because the four strokes divide equally across four crankshaft revolutions

10. A heavy-duty diesel engine has a bore diameter of 137 mm and a stroke of 169 mm. This engine would be classified as which type of design?

- A. An oversquare engine optimized for high-RPM operation and maximum horsepower output at rated speed
- B. A square engine where bore and stroke are equal providing balanced torque and horsepower characteristics
- C. A variable geometry engine that adjusts the effective stroke length based on engine load and speed demands
- D. An undersquare (long-stroke) engine optimized for high torque at low RPM suited to commercial truck applications

11. A technician is replacing wet cylinder liners during an in-frame overhaul. After installing the new liner, the lower O-ring seals must be positioned correctly. What is the consequence of a damaged or improperly seated lower O-ring?

- A. The engine oil pressure will drop because the crankcase vacuum seal at the liner base will be compromised
- B. The liner will not achieve the correct protrusion height above the block deck surface causing head gasket issues
- C. Engine coolant will leak past the liner into the crankcase contaminating the engine oil with water and glycol
- D. Combustion gases will bypass the liner and enter the cooling jacket causing the coolant to become pressurized

12. During an engine rebuild, a technician uses Plastigage to measure connecting rod bearing oil clearance. The crushed Plastigage strip is compared to the scale and indicates 0.15 mm. The OEM specification is 0.04 to 0.10 mm. What action is required?

- A. Reinstall the bearing caps with new bolts since the over-clearance is caused by insufficient bolt stretch
- B. Install the next undersize bearing inserts or have the crankshaft journal machined to match undersize bearings
- C. Clean the journal and bearing surfaces more thoroughly because contamination is creating the false clearance reading
- D. Apply an anaerobic sealant to the bearing back surface to reduce the housing bore diameter and tighten the clearance

13. An engine oil analysis report shows a sharp increase in sodium and potassium levels. The iron, copper, and lead levels remain normal. What contamination source do elevated sodium and potassium indicate?

- A. Diesel fuel dilution from leaking injector O-rings that allow fuel to wash past the piston rings into the crankcase
- B. Airborne salt contamination entering through a damaged air filtration system in a coastal operating environment
- C. Additive package depletion from extended oil drain intervals beyond the manufacturer's recommended service limit
- D. Coolant contamination entering the oil through a failed head gasket, cracked head, or leaking oil cooler core

14. A heavy-duty diesel engine overheats during city driving with frequent stops but maintains normal temperature during sustained highway operation. The coolant level is correct and the radiator is clean. What is the most likely cause?

- A. The engine cooling fan clutch is not engaging at low vehicle speeds when ram airflow through the radiator is insufficient
- B. The water pump cavitates at low RPM because the impeller design creates air pockets during slow rotation speed

C. The thermostat opens too quickly at low speeds causing the coolant to bypass the radiator and recirculate internally

D. The EGR cooler is bypassing hot exhaust gas directly into the coolant during the frequent acceleration events

15. A truck driver reports white smoke from the exhaust that clears after the engine reaches operating temperature. The coolant level is stable and does not decrease over time. What is the most probable cause of the white smoke?

A. A cracked cylinder head that leaks coolant into the combustion chamber only when the engine is cold and contracted

B. Worn valve guide seals allowing oil to accumulate on the valve stems overnight and burn off during initial warmup

C. Condensation in the exhaust system and incomplete combustion of fuel during the cold warm-up period before the engine reaches operating temperature

D. A faulty coolant temperature sensor sending a false cold signal causing the ECM to overfuel during every startup

16. A common rail diesel engine has a fuel system diagnostic code indicating transfer pump output pressure below specification. The fuel filters were changed recently and the system was primed. What should be investigated?

A. The high-pressure fuel pump for worn internal elements that are not generating adequate rail pressure output

B. The transfer pump electrical connector, pump output, and the fuel supply line for restrictions or air leaks

C. The fuel rail pressure sensor for an incorrect signal that causes the ECM to misinterpret the transfer pump output

D. The injector return flow rates because excessive return leakage reduces the available fuel volume for the pump

17. A heavy-duty diesel engine equipped with a VGT turbocharger produces excessive black smoke under load. The scan tool shows that the actual boost pressure is significantly below the commanded boost pressure. What component should be examined first?

- A. The charge air cooler for an internal leak that reduces the pressurized air volume reaching the intake manifold
- B. The exhaust manifold for a crack that diverts exhaust energy away from the turbine reducing turbocharger speed
- C. The fuel injectors for an overfuelling condition caused by incorrect injector trim codes in the ECM calibration
- D. The VGT vane mechanism for carbon buildup or actuator failure preventing the vanes from closing to increase boost

18. What is the primary purpose of the charge air cooler (intercooler) on a turbocharged diesel engine?

- A. To reduce the temperature of the compressed intake air increasing its density for improved combustion efficiency
- B. To filter particulate contamination from the compressed air before it enters the intake manifold and cylinders
- C. To reduce turbocharger shaft speed by extracting energy from the compressed air stream before the intake manifold
- D. To condense moisture from the compressed air and drain it before the humid air enters the combustion chambers

19. A diesel engine equipped with an SCR aftertreatment system triggers a derate warning after the DEF tank is refilled. The DEF quality sensor indicates the fluid concentration is outside specification. What is the most likely cause?

- A. The DEF heater element in the tank has failed causing the urea to freeze and concentrate below the sensor
- B. The SCR catalyst has reached the end of its service life and cannot process the DEF regardless of its quality
- C. The DEF that was added is contaminated, diluted with water, or is not the correct 32.5% urea concentration
- D. The DEF dosing pump has failed and is injecting an incorrect volume that triggers the quality sensor fault

20. During a DPF regeneration event, the exhaust gas temperature at the DPF inlet rises to approximately 600°C. What produces this elevated temperature?

- A. The engine ECM advances the main injection timing significantly to increase the combustion temperature directly
- B. The DOC oxidizes unburned hydrocarbons from a late-post fuel injection creating an exothermic reaction that raises exhaust temperature
- C. The DPF substrate generates heat internally as the accumulated soot begins to oxidize in a self-sustaining reaction
- D. The turbocharger compresses the exhaust gas to a higher pressure which raises its temperature before the DPF inlet

21. A HEUI fuel system equipped engine has a diagnostic code for injection control pressure (ICP) below commanded value. The engine oil level is correct and the oil appears clean. What should be tested?

- A. The fuel rail pressure sensor to determine if a faulty reading is causing the ECM to reduce ICP unnecessarily
- B. The engine coolant temperature sensor because a false high reading causes the ECM to limit ICP during warmup
- C. The crankshaft position sensor signal for timing errors that affect the ECM's ICP control strategy calculations
- D. The high-pressure oil pump output, injection pressure regulator (IPR) valve, and injector O-rings for oil pressure loss

22. A technician notices that the air compressor on a heavy-duty diesel engine cycles between loaded and unloaded states much more frequently than normal. There are no audible air leaks and the brake system functions normally. What could cause this rapid cycling?

- A. The air dryer desiccant cartridge is saturated and not removing moisture which reduces the effective reservoir volume as water displaces air
- B. The governor cut-in and cut-out pressures are set too close together creating a narrow operating pressure band

C. The air compressor discharge valves are leaking allowing compressed air to escape back through the compressor during unload

D. The safety valve on the supply reservoir is cracked open slightly and bleeding pressure between governor cycles

23. An engine retarder (compression brake) on a heavy-duty truck activates on cylinders 1 through 3 but not on cylinders 4 through 6. The dash switch is set to the maximum braking position. What is the most likely cause?

A. The engine ECM has limited the compression brake to half-capacity due to a detected coolant temperature fault

B. The exhaust valve lash on cylinders 4 through 6 is set too tight preventing the compression brake from opening the valves

C. The solenoid valve or wiring for the cylinder group controlling cylinders 4 through 6 has failed or has an open circuit

D. The engine oil pressure is insufficient to actuate all six compression brake slave pistons simultaneously at this RPM

24. A technician is diagnosing an engine that runs rough at idle but smooths out as RPM increases. There are no active fault codes. What diagnostic approach would most efficiently isolate the cause?

A. Perform a power balance test by disabling each injector individually through the scan tool to identify the weak cylinder

B. Replace all six fuel injectors simultaneously since a rough idle without fault codes indicates overall injector wear

C. Adjust the valve lash on all cylinders because incorrect lash is the most common cause of rough idle without codes

D. Clean the intake manifold and EGR passages because carbon buildup is restricting airflow equally to all cylinders

25. A heavy-duty diesel engine consumes oil at a rate of two litres per 5,000 km. There is no visible blue smoke and the DPF differential pressure is rising faster than normal between regeneration events. Where is the oil going?

- A. The oil is leaking externally from a valve cover gasket in a location not visible during a standard walk-around inspection
- B. The turbocharger shaft seals are leaking oil into the intake and exhaust which is being captured by the DPF as ash
- C. The oil is being consumed by the EGR system which is burning it during exhaust gas recirculation at high temperatures
- D. The oil is passing the piston rings and being burned in the combustion chambers with the soot captured by the DPF increasing its ash load

26. A truck equipped with an exhaust brake and a compression brake has the exhaust brake controlled through the VGT vanes. The driver reports that the exhaust brake is significantly less effective than before. Scan tool data shows the VGT vane position reads 30% closed when the exhaust brake is commanded to maximum. What is the root cause?

- A. The VGT actuator or vane mechanism cannot reach the fully closed position due to carbon buildup, mechanical binding, or actuator failure
- B. The exhaust brake controller has been reprogrammed with a reduced maximum braking setting for fuel economy optimization
- C. The engine oil pressure is too low to supply adequate hydraulic force to the VGT actuator during exhaust braking events
- D. The charge air cooler has developed a restriction that creates backpressure preventing the VGT from closing fully

27. When replacing a diesel fuel injector on a common rail system, the technician must enter the new injector's calibration code into the ECM. What does this code correct for?

- A. The injector's maximum rated fuel pressure capacity which varies based on the manufacturing batch tolerance
- B. The specific electrical resistance of the injector solenoid coil which affects the ECM's driver circuit pulse timing
- C. Individual manufacturing variations in fuel delivery quantity so the ECM can equalize fuelling across all cylinders
- D. The nozzle spray pattern angle which must match the piston combustion bowl geometry for efficient fuel atomization

28. A technician measures cylinder compression on a six-cylinder diesel engine. Five cylinders read between 2,800 and 2,950 kPa. Cylinder number 4 reads 2,200 kPa. A leak-down test on cylinder 4 shows air escaping from the exhaust pipe. What is the most likely cause of the low compression?

- A. The piston rings on cylinder 4 are stuck in their grooves and not sealing against the liner wall properly
- B. The exhaust valve on cylinder 4 is not seating properly due to a burned valve face, worn seat, or bent valve stem
- C. The head gasket between cylinders 3 and 4 has failed allowing compression to leak between the adjacent cylinders
- D. The cylinder liner on number 4 has a crack below the waterline allowing coolant to enter the combustion chamber

29. An engine equipped with EGR has a persistent fault code for EGR flow insufficient. The EGR valve moves freely when commanded through the scan tool actuator test. What should be investigated next?

- A. The intake manifold pressure sensor for a reading error that falsely indicates low EGR flow to the engine ECM
- B. The turbocharger wastegate for a stuck-open condition that reduces the exhaust pressure driving EGR gas flow
- C. The EGR valve position sensor for a calibration drift that causes the ECM to undercommand the valve opening angle
- D. The EGR cooler for internal plugging with soot that restricts exhaust gas flow even when the valve is fully open

30. An air dryer's purge valve fails to open when the governor signals the compressor to unload. What is the immediate consequence of this failure?

- A. Moisture-laden compressed air passes to the reservoirs without being dried causing downstream contamination and potential freeze-up
- B. The compressor will continue to build pressure beyond the cut-out setting until the safety valve opens
- C. The air system will depressurize rapidly through the stuck purge valve dumping all reservoir pressure to atmosphere

D. The governor will cycle the compressor on and off rapidly because the system cannot reach cut-out pressure

31. A trailer's service brakes lock up intermittently during light brake applications at highway speed. The trailer ABS lamp is not illuminated and no ABS faults are stored. What is the most likely mechanical cause?

A. The trailer's brake drums are warped causing intermittent full-contact braking at certain rotational positions

B. The trailer relay valve is contaminated internally and sticking in the applied position delivering excessive pressure

C. The trailer brake shoes have been contaminated with grease from an over-lubricated wheel bearing on one axle

D. The tractor foot valve is sending unmodulated full-pressure signals through the service gladhand to the trailer

32. During a brake inspection on a drive axle, a technician measures one brake chamber pushrod stroke at 45 mm and the opposite side at 58 mm. Both are Type 30 long-stroke chambers with a 57 mm maximum limit. Beyond adjusting the over-limit side, what additional concern does this side-to-side difference indicate?

A. The air compressor is delivering unequal pressure to the left and right brake chambers during application events

B. The brake chambers have different internal diaphragm areas causing unequal force output at the same pressure

C. Unequal braking force side-to-side which can cause the vehicle to pull during braking and create vehicle instability

D. The parking brake spring on the over-limit side has weakened and is not providing adequate supplemental clamping force

33. A truck has a persistent slow air leak that is most noticeable when the brakes are applied. With brakes released, the leak rate is within specification. Where should the technician focus the leak search?

- A. The air dryer purge valve and discharge line because these components are pressurized only during brake application
- B. The air compressor head gasket because the pulsing pressure of brake application stresses the gasket seals
- C. The governor diaphragm because the brake application pressure signal cycles through the governor during braking
- D. The brake chambers, relay valves, quick-release valves, and application valve because these pressurize during braking

34. A spring brake chamber on a drive axle is leaking air audibly from the rear (spring side) of the chamber. The service brake (front section) is not leaking. What component has failed?

- A. The spring brake diaphragm or piston seal in the rear section of the dual-chamber assembly has developed a leak
- B. The service brake pushrod seal at the front chamber face is allowing air to bypass into the spring brake section
- C. The air line fitting on the spring brake supply port is loose and needs to be tightened to stop the audible leak
- D. The spring brake caging bolt was not fully retracted after the last brake service creating a seal bypass around the bolt

35. What is the function of the quick-release valve in an air brake system?

- A. It provides rapid application of brake pressure by bypassing the relay valve circuit for faster brake response time
- B. It allows rapid exhaust of air from the brake chambers during brake release without forcing the air back through long supply lines
- C. It releases the spring brakes quickly when the parking brake valve is pushed in to allow immediate vehicle movement
- D. It provides an emergency brake release function if the main air supply fails allowing the driver to release brakes manually

36. An air brake system has adequate pressure on the primary gauge but zero pressure on the secondary gauge. The compressor builds pressure normally and the primary brakes (rear) function properly. What is the most likely cause?

- A. The governor is faulty and only directing air to the primary reservoir while blocking the secondary circuit supply
- B. A massive leak in the secondary circuit or a failed one-way check valve that drained the secondary reservoir
- C. The foot valve has an internal failure in the secondary delivery port preventing air from reaching the front brakes
- D. The air dryer is channeling all dried air to the primary circuit due to an internal diverter valve malfunction issue

37. A technician is performing an annual brake inspection on a tractor. The front axle drum brakes have 4 mm of lining remaining on one shoe and 8 mm on the other shoe of the same wheel. The minimum specification is 6.35 mm for bonded linings. What action is required?

- A. Replace both brake shoes on that wheel since one shoe is below the minimum specification and shoes are replaced in sets
- B. Replace only the shoe that measures 4 mm and return the 8 mm shoe to service until the next scheduled inspection
- C. Continue to operate the vehicle since the average lining thickness between both shoes exceeds the minimum limit
- D. Rotate the brake shoes so the thicker shoe is in the leading position to equalize the wear rate between them

38. An electronic stability control (ESC) system detects that the vehicle is entering a potential rollover situation during a highway curve. What action does the ESC system take?

- A. The ESC alerts the driver with an audible warning and illuminates a lamp but does not intervene with the braking
- B. The ESC increases the engine power output to push the vehicle through the curve faster and reduce lateral forces

C. The ESC deploys the vehicle's airbag system preemptively to protect the occupants from the anticipated rollover

D. The ESC selectively applies brakes on specific wheels and may reduce engine power to decrease vehicle speed and lateral forces

39. A driver reports that the parking brake does not hold the vehicle on a moderate incline when the parking brake valve is applied. The air system pressure is at full cut-out. What should be inspected?

A. The governor cut-out setting because insufficient system pressure reduces the spring brake application force

B. The spring brake chambers for weak springs, air leaks in the spring section, or pushrod stroke beyond adjustment limit

C. The foot valve for an internal bypass that is allowing service air to partially release the spring brakes when parked

D. The air dryer for a stuck purge valve that is continuously bleeding pressure from the spring brake supply circuit

40. A technician is inspecting the air system and finds that the air dryer is purging every 30 to 45 seconds. Normal purge intervals for this vehicle are 3 to 5 minutes. What does this frequent purging indicate?

A. The governor cut-in and cut-out settings are correctly calibrated but the system demand has increased from accessories

B. The air dryer desiccant is contaminated with oil and needs replacement to restore normal moisture absorption

C. The air compressor is cycling too frequently because a leak or excessive air demand is consuming air faster than normal

D. The air dryer heater element is stuck on causing the desiccant to release moisture prematurely at each cycle interval

41. What is the purpose of the tractor protection valve in a tractor-trailer air brake system?

- A. It automatically closes the supply and service lines to the trailer if the tractor's air pressure drops below a safe threshold protecting the tractor's air supply
- B. It limits the maximum air pressure delivered to the trailer brakes to prevent over-application and wheel lockup
- C. It prevents the tractor brakes from applying if the trailer brakes have already reached their maximum application force
- D. It equalizes the air pressure between the tractor and trailer reservoirs during normal braking to ensure balanced stopping

42. A heavy-duty truck's front disc brakes produce a pulsation felt through the brake pedal during moderate braking. The rear drum brakes feel smooth. What is the most likely cause of the pulsation?

- A. The front brake pads are contaminated with oil from a leaking wheel seal causing inconsistent friction during application
- B. The ABS modulator valves on the front axle are cycling unnecessarily during non-emergency braking applications
- C. The front brake caliper slide pins are seized causing uneven pad contact and release across the rotor surface
- D. The front brake rotors have excessive lateral runout (thickness variation) causing the caliper piston to pulsate during rotation

43. A tractor-trailer combination has the trailer brake hand valve (trolley valve) applied but the trailer does not appear to be braking. The tractor service brakes work normally through the foot valve. What should be checked?

- A. The trailer relay valve for a stuck-closed condition preventing service air from reaching the trailer brake chambers
- B. The service (blue) gladhand connection for a disconnected, crossed, or sealed condition preventing signal delivery
- C. The tractor protection valve for a closed condition that is blocking all air flow from the tractor to the trailer circuits
- D. The trailer ABS module for a fault that is commanding the modulator valves to remain in the full-release position

44. A technician replaces the brake shoes on an S-cam drum brake assembly. After assembly, the technician notices that the new shoes contact the drum only at the toe and heel (ends) but not in the centre. What is the cause?

- A. The brake shoe return springs were installed with incorrect tension causing the shoes to bow outward at the ends
- B. The replacement shoes have an incorrect arc radius that does not match the drum's inner diameter for the application
- C. The new friction lining material is too thick and needs to be machined down to the correct profile before installation
- D. The brake drum has worn to an oval shape and must be machined round or replaced before new shoes will contact evenly

45. A truck has an air leak at a brake chamber that is audible only when the parking brake is released. No leak is heard when the parking brake is applied. Which section of the dual-chamber assembly is leaking?

- A. The spring brake (rear) section is leaking because it is pressurized only when the parking brake is released to compress the spring
- B. The service brake (front) section is leaking because it pressurizes when the parking brake releases to test the service circuit
- C. The pushrod seal between the two chamber sections is leaking allowing spring brake air to escape past the rod housing
- D. The air supply line to the spring brake section has a fitting leak that manifests only under the pressure of parking release

46. A new driver complains that the brakes on a properly functioning air brake truck feel different from the hydraulic brakes on a car — specifically that there is a slight delay between pressing the pedal and feeling the brakes engage. What explains this characteristic?

- A. The brake chambers require a higher minimum pressure before the diaphragm begins to move the pushrod assembly
- B. The air dryer adds a processing delay as it removes moisture from the application air before delivering it to brakes

C. The ABS system intentionally delays initial brake application to calculate optimal pressure distribution between axles

D. Air is compressible and must travel through lines and valves to reach the chambers creating a small application delay

47. A truck's 12-volt battery bank consists of four batteries — two parallel pairs connected in series for a 24-volt system. One battery in the left parallel pair has a dead cell. How does this affect the system?

A. The entire 24-volt system will read approximately 22 volts because one battery contributes only about 10.5 volts to its parallel pair

B. Only the 12-volt accessory circuits will be affected while the 24-volt starter circuit continues to function normally

C. The failed battery will pull down the voltage of the parallel pair reducing the total system to approximately 22 to 23 volts

D. The failed battery will be isolated automatically by the battery equalizer preventing any effect on overall system voltage

48. A technician is testing a suspected open circuit in a wire that runs from the cab fuse panel to a rear marker lamp. With the circuit activated, where should the DMM positive lead be placed to efficiently determine if the wire is the problem?

A. At the lamp-end connector of the suspect wire to check for voltage — presence of voltage clears the wire and absence confirms the open

B. At the fuse panel to verify that source voltage is present before tracing the circuit toward the lamp

C. At the midpoint of the wire to split the circuit into two halves for faster fault isolation by elimination

D. At the battery positive terminal to establish a baseline voltage reference for all subsequent measurements

49. A truck's horn does not function. The horn relay clicks audibly when the horn button is pressed. What does this symptom indicate?

A. The horn button switch is defective and not sending an adequate signal to energize the relay coil winding

- B. The relay coil is energizing (producing the click) but the relay contacts or the horn circuit downstream has a fault
- C. The fuse for the horn circuit has blown and the clicking is the relay attempting to close against an open circuit
- D. The horn button ground circuit is intermittent causing the relay to chatter rather than engage the horn continuously

50. A heavy-duty truck has an intermittent no-start condition. Sometimes the starter cranks the engine normally and other times nothing happens when the key is turned. When the no-start occurs, there is no click from the solenoid. What is the most likely cause?

- A. The starter motor has intermittent brush-to-commutator contact causing random loss of motor operation on cranking
- B. The battery has a weak cell that sometimes provides adequate voltage and sometimes drops below activation threshold
- C. The starter solenoid internal contacts are worn and intermittently fail to close the high-current motor circuit
- D. An intermittent fault in the start control circuit — the neutral safety switch, clutch interlock, ignition switch, or wiring connections

51. A technician replaces an alternator on a heavy-duty truck. After installation, the charging system warning lamp remains illuminated with the engine running. System voltage reads battery voltage (12.6 V) with no increase from the alternator. What is the most likely cause?

- A. The alternator field circuit excitation wire was not reconnected during installation preventing the rotor from being energized
- B. The new alternator is defective from the factory and must be returned for warranty replacement immediately
- C. The voltage regulator needs a 10-minute run-in period before it begins regulating the field current to the rotor
- D. The drive belt needs to stretch and seat on the pulleys before it can transmit enough torque to drive the alternator

52. What is the primary purpose of the fusible link in a vehicle's electrical system?

- A. To provide overcurrent protection for individual branch circuits with specific amperage ratings for each load
- B. To regulate voltage fluctuations between the alternator and battery during rapid electrical load changes
- C. To protect the main wiring harness from catastrophic damage in the event of a major short circuit near the battery
- D. To prevent reverse polarity damage if the battery cables are accidentally connected to the wrong terminal

53. A truck equipped with LED marker lamps has one lamp that flashes rapidly instead of staying steadily illuminated. All other LED marker lamps function normally. What is the most likely cause?

- A. The LED lamp driver circuit is detecting a voltage surge and flashing as a self-protection mechanism
- B. A poor connection at the lamp socket or ground is causing the LED to cycle on and off due to intermittent contact
- C. The vehicle's CAN bus is sending an incorrect multiplexed signal to the body controller for that specific lamp
- D. The lamp is receiving excessive voltage from the charging system causing the LED to rapidly cycle its duty cycle

54. A technician measures voltage at a fuel tank sending unit connector while the gauge reads empty. The DMM shows battery voltage on the signal wire. On this system, a full tank produces high resistance and an empty tank produces low resistance. What does this reading indicate?

- A. The sending unit signal wire is open — the ECM's pull-up voltage is not being pulled down by the sending unit's resistance
- B. The fuel tank is genuinely empty and the sending unit is correctly reporting the lowest resistance condition
- C. The sending unit has failed in the short-circuit position causing a false full reading on the dash gauge display

D. The gauge cluster has an internal failure that prevents it from reading the correct signal voltage from the sender

55. A truck's headlamp on the driver side is noticeably dimmer than the passenger side. Both bulbs are the same type and wattage and were replaced at the same time. A voltage measurement at the passenger side socket shows 12.3 volts and the driver side shows 10.8 volts. What is the most probable cause?

A. The driver-side headlamp bulb is defective from manufacturing with higher internal filament resistance than rated

B. The headlamp switch internal contacts have corroded on the driver-side output channel reducing current delivery

C. The vehicle's alternator is producing uneven voltage on different output phases causing circuit-specific voltage sag

D. A high-resistance connection in the driver-side headlamp circuit — corroded connector, damaged wire, or poor ground

56. A truck's electric fuel priming pump runs continuously even after the engine has started and fuel pressure is at normal specification. What component in the pump control circuit has most likely failed?

A. The fuel pressure sensor is stuck reading low causing the ECM to keep the priming pump relay energized indefinitely

B. The priming pump relay is stuck closed (welded contacts) keeping the pump powered regardless of the ECM command

C. The engine ECM has a software fault that prevents it from issuing the pump-off command after successful engine start

D. The fuel return line check valve is stuck open allowing pressure to bleed off which the pump continuously tries to restore

57. A truck with a 12-volt system has a parasitic draw of 3.5 amps when all systems are off and the vehicle is in sleep mode. The specification allows a maximum of 50 milliamps. What is the first diagnostic step?

- A. Systematically pull fuses one at a time while monitoring the ammeter to identify which circuit contains the excessive draw
- B. Disconnect the alternator output wire to determine if the alternator's rectifier diodes are leaking current back to ground
- C. Replace the battery because a parasitic draw of this magnitude indicates an internal short circuit within a battery cell
- D. Disconnect the trailer seven-pin connector to determine if the draw is coming from the trailer electrical system wiring

58. A truck's ABS module communicates with the engine ECM over the J1939 CAN bus. The ABS module needs vehicle speed data from the engine ECM to function. If the engine ECM stops broadcasting engine speed data, what will happen to the ABS?

- A. The ABS will use its own wheel speed sensor data exclusively and continue functioning with full anti-lock capability
- B. The ABS will not be affected because it derives all necessary speed information from its own wheel speed sensors
- C. The ABS will set a communication fault code and may disable some functions that depend on engine speed data
- D. The ABS will command all modulator valves to the full-release position preventing any brake application on the vehicle

59. A technician is testing a Hall effect camshaft position sensor with a DMM while the engine cranks. What type of signal should the meter display?

- A. A steady analog DC voltage that increases proportionally as cranking speed increases during the starting attempt
- B. A fluctuating AC voltage signal similar to a magnetic pickup sensor but with greater amplitude at low cranking speed
- C. A series of brief high-resistance pulses alternating with zero-resistance periods as the reluctor teeth pass the sensor
- D. A square wave digital signal switching between approximately 0 volts and a reference voltage as the reluctor rotates

60. A truck's instrument cluster shows the speedometer reading erratically — bouncing between 0 and the actual speed. The ABS lamp is off and the transmission shifts normally. What is the most likely cause?

- A. The vehicle speed sensor has an internal fault producing an intermittent signal that affects the cluster display
- B. An intermittent CAN bus connection between the module broadcasting speed data and the instrument cluster
- C. The speedometer stepper motor inside the instrument cluster is failing and needs to be replaced or recalibrated
- D. The ABS control module has an intermittent power supply causing it to drop speed data from the bus periodically

61. A 24-volt starting system uses two 12-volt batteries in series. After replacing the starter, the new starter turns very slowly. Both batteries test fully charged at 12.7 volts each. What should the technician check?

- A. The series connection between the two batteries for corrosion or a loose terminal that drops voltage under the heavy cranking load
- B. The new starter motor specification to verify it is rated for 24-volt operation and not a 12-volt replacement installed in error
- C. The alternator charging output to confirm it is producing 28 volts which is required to maintain the 24-volt series configuration
- D. The engine block ground strap for excessive resistance that prevents the full 24 volts from reaching the starter motor frame

62. A truck's right rear turn signal lamp flashes at double the normal rate. The left turn signal flashes at the normal rate. All bulbs appear to be installed correctly. What is the most common cause of the fast flash rate?

- A. The turn signal flasher module is failing and inconsistently timing the on/off cycle for the right-side circuit
- B. The body controller is detecting a CAN bus communication error and flashing the right signal as a warning indication

C. The wiring to the right rear turn signal has a partial short to ground drawing additional current from the flasher circuit

D. One of the bulbs in the right rear turn signal circuit has burned out reducing the circuit's current draw which speeds up the flash rate

63. A technician needs to test whether a solenoid valve is receiving a ground-side switched signal from the ECM. The solenoid has battery voltage on one terminal. What test confirms the ECM is providing the ground?

A. Measure the resistance of the solenoid coil by disconnecting both leads and testing across the coil terminals

B. Use a test light connected to battery positive and probe the ground-side terminal — it should illuminate when the ECM commands the solenoid on

C. Measure the voltage between battery positive and the solenoid ground terminal while the ECM commands the device on

D. Connect an ammeter in series with the solenoid supply wire to measure the current flow through the coil winding

64. A truck equipped with multiplexed lighting has the running lamps on one side of the vehicle inoperative. All fuses check good and the lamps on the other side work normally. The body controller has no fault codes. What should the technician check?

A. The headlamp switch for an internal contact failure affecting only the left or right output circuit

B. The CAN bus for a communication fault between the headlamp switch module and the body controller

C. The output driver circuit in the body controller and the wiring from the controller to the affected lamp string

D. The alternator output for an unbalanced three-phase condition that reduces voltage to one lighting circuit

65. A magnetic pickup wheel speed sensor is being tested. With the wheel rotating, the DMM reads 0.2 VAC. The specification calls for a minimum of 0.5 VAC at the test RPM. The sensor resistance tests within specification. What is the most likely cause of the low signal?

- A. The air gap between the sensor tip and the tone ring is too large reducing the magnetic field change per tooth passage
- B. The tone ring has lost its magnetic properties and needs to be replaced with a new magnetized exciter ring component
- C. The sensor cable has excessive resistance from corrosion at an inline connector reducing the signal voltage at the ECU
- D. The wheel bearing has excessive play that varies the sensor air gap dynamically as the wheel rotates under load

66. A truck's battery disconnect switch is turned off every night by the driver. In the morning, the driver reports that the clock and radio presets must be reprogrammed each time. What is the purpose of a battery disconnect switch, and why does this occur?

- A. The disconnect switch protects against fire risk — clock and radio memory loss is expected because all power is removed
- B. The disconnect switch is wired incorrectly and should maintain power to the memory circuits even when the main bus is disconnected
- C. The disconnect switch prevents parasitic discharge but the clock and radio should retain their settings on a separate keep-alive circuit
- D. The disconnect switch cuts all battery power including keep-alive memory circuits which explains the loss of stored settings

67. A coil-on-plug ignition system on a gasoline-powered medium-duty truck shows a diagnostic code P0300 (random/multiple cylinder misfire). No individual cylinder misfire codes are present. What does this indicate?

- A. The crankshaft position sensor is failing causing the ECM to misidentify which cylinder is misfiring during operation
- B. The ignition coils on all cylinders have reached the end of their service life and need simultaneous replacement
- C. A system-wide issue is affecting all cylinders — such as low fuel pressure, a vacuum leak, or a faulty crank sensor signal
- D. The ECM's misfire detection software is outdated and needs a calibration update to correctly identify individual cylinders

68. A technician is repairing a damaged wire in a truck's engine harness. What is the preferred method for making a permanent repair on a single wire?

- A. Twist the stripped wire ends together and wrap with standard electrical tape to insulate the exposed copper connection
- B. Use a solder connection or a sealed crimp splice with adhesive-lined heat-shrink tubing to create a weatherproof joint
- C. Use a wire nut to connect the stripped ends and secure with a cable tie to prevent the wire nut from vibrating loose
- D. Splice the wire using a butt connector with no additional sealing since the harness loom provides adequate protection

69. A heavy-duty truck with a dual-plate clutch experiences clutch chatter during engagement from a stop. The chatter is felt as a shuddering vibration through the drivetrain. No slippage is detected under load. What is the most likely cause?

- A. Oil or grease contamination on the friction disc surfaces causing inconsistent grab-release-grab during engagement
- B. The pressure plate diaphragm spring has weakened and cannot maintain consistent clamping force across the disc
- C. The transmission input shaft bearing has failed causing the shaft to wobble and tilt the disc during engagement
- D. The engine idle speed is set too high causing the engagement speed differential to exceed the clutch's design limit

70. A truck equipped with an Allison automatic transmission has a diagnostic code for the output speed sensor. The transmission defaults to third gear and will not shift. Why does the transmission default to a single gear?

- A. The transmission fluid temperature has exceeded the maximum limit causing the TCM to protect the clutch packs
- B. The torque converter lockup clutch has failed and the TCM restricts shifting to prevent further converter damage

C. The transmission pressure control solenoid has stuck in a position that only allows hydraulic flow to third gear apply

D. Without output speed data the TCM cannot calculate the correct shift points so it locks into a safe default gear

71. A technician is measuring driveshaft runout with a dial indicator mounted at the centre of the shaft while the shaft is rotated by hand. The indicator reads 0.8 mm. The maximum specification is 0.5 mm. What is the correct action?

A. Balance the driveshaft by adding counterweights at the heavy point identified by the dial indicator high reading

B. Straighten the driveshaft using a hydraulic press to bring the runout within the specification tolerance limits

C. Replace the driveshaft because the excessive runout will cause vibration that cannot be corrected by balancing alone

D. Rephase the U-joint yoke ears to shift the high runout point to a position that cancels with the opposite U-joint

72. A truck driver reports a grinding noise when shifting from third to fourth gear. The shift into all other gears is smooth and quiet. What is the most likely cause?

A. The third-to-fourth synchronizer ring is worn or damaged and cannot adequately match the gear speeds during the shift

B. The transmission countershaft bearing nearest to the fourth gear position has failed producing a speed-dependent grind

C. The fourth gear mainshaft gear teeth are chipped causing interference as the sliding clutch engages the gear

D. The clutch is not fully disengaging during the shift from third to fourth because the linkage travel is insufficient at this point

73. A drive axle produces a rhythmic clunking noise at low speed during tight turns in a parking lot. The noise disappears during straight-line driving. What is the most likely source?

- A. The ring and pinion gear set has excessive backlash that manifests during the speed differential of tight turns
- B. The axle shaft U-joints (on a full-floating axle) are worn and produce noise during the articulation angle of turning
- C. The wheel bearings have developed flat spots from a previous lockup event and produce noise at low rotational speed
- D. The differential spider gears or side gears are worn allowing excessive clearance during the speed differential of turning

74. A technician is setting up a new ring and pinion gear set in a drive axle. The gear contact pattern shows heavy contact at the heel (outer edge) of the ring gear teeth under loaded drive conditions. What adjustment corrects this pattern?

- A. Decrease the backlash by moving the ring gear closer to the pinion gear to shift the contact pattern toward the toe
- B. Increase the pinion depth by adding shim thickness behind the pinion head to shift the contact pattern inward
- C. Increase the backlash by moving the ring gear away from the pinion to reduce the heel-heavy contact condition
- D. Decrease the pinion depth by removing shim thickness behind the pinion head to shift the pattern toward the toe

75. A transfer case equipped truck has a vibration that occurs only when the front axle is engaged in four-wheel drive on dry pavement. The vibration is not present in two-wheel drive or on loose gravel in four-wheel drive. What causes this vibration?

- A. The front driveshaft U-joints are worn and produce vibration only when carrying torque in four-wheel drive mode
- B. The transfer case output seal is leaking allowing fluid loss that results in bearing noise during four-wheel engagement
- C. Driveline windup occurs because the front and rear axles cannot turn at different speeds on dry pavement when locked together
- D. The front axle differential lock is engaging intermittently due to a faulty solenoid creating pulsating driveline vibration

76. A manual transmission has difficulty shifting into reverse from neutral. All forward gears shift smoothly. The clutch fully disengages and there is no gear clash. What is the most likely mechanical cause?

- A. The reverse idler gear or the reverse shift fork is worn making it difficult to slide the idler gear into mesh position
- B. The transmission lubricant level is low and the reverse gear is positioned at the highest point in the housing requiring oil
- C. The engine idle speed is too high causing the gear teeth to rotate too fast for the reverse idler to mesh smoothly
- D. The reverse light switch on the transmission is binding against the shift rail restricting movement to the reverse position

77. A truck's automatic transmission slips in all forward gears but reverse functions normally. Fluid level is correct and the fluid appears clean with no burnt odour. What is the most likely cause?

- A. A forward clutch pack is burned or has failed — this pack engages in all forward gears but is not needed for reverse
- B. The torque converter stator one-way clutch has failed causing the converter to lose torque multiplication in forward only
- C. The transmission oil pump has worn beyond its pressure delivery capacity and cannot apply the forward clutch packs fully
- D. The main pressure regulator valve is stuck in a low-pressure position reducing apply force to all clutch packs equally

78. During a driveline inspection, a technician discovers that the U-joint yoke ears at the transmission end and the axle end of a single driveshaft are rotated 90 degrees out of phase with each other. What effect does this misalignment have?

- A. The driveshaft will transmit torque normally but with slightly increased operating noise at highway speeds only
- B. The misalignment has no effect on operation because the U-joints compensate for phase differences automatically

C. The driveshaft will experience torsional vibration at twice the rotational frequency because the speed fluctuations from the two joints compound rather than cancel

D. The driveshaft will not rotate because the opposing phase angles create a mechanical lock between the two U-joints

79. A truck with an automated manual transmission (AMT) has a fault code indicating the shift actuator cannot reach the commanded position for fifth gear. All other gears engage normally. What should be inspected?

A. The engine ECM calibration to verify the correct torque reduction value is being commanded during the fifth gear shift

B. The shift actuator mechanism, the fifth gear shift rail, detent, and any mechanical obstruction preventing full engagement

C. The transmission input speed sensor for a signal error that causes the TCM to miscalculate the fifth gear RPM match

D. The vehicle speed sensor because an incorrect reading would cause the TCM to skip fifth gear in the shift strategy

80. A truck has a driveline vibration that is noticeable only during deceleration (coast) and disappears under acceleration. U-joint play is within specification and the driveshaft runout is acceptable. What is the most likely cause?

A. The engine compression brake is activating inconsistently creating a pulsating torque that is felt as vibration during coast

B. The transmission output bearing is loaded differently during coast causing it to vibrate at the driveshaft frequency

C. Unequal U-joint working angles between the front and rear joints produce a vibration that manifests only during coast loading

D. The pinion bearing preload in the drive axle is too tight causing the pinion shaft to bind under the reverse loading of deceleration

81. A limited-slip differential makes a chattering noise during slow tight turns on dry pavement. The axle lubricant was recently changed. What is the most probable cause?

- A. The ring and pinion backlash has increased from bearing wear and requires shim adjustment to correct the noise
- B. The replacement gear oil does not contain the required limited-slip friction modifier additive for smooth clutch pack operation
- C. The differential side bearings have failed due to contamination from the new lubricant reacting with the old fluid residue
- D. The limited-slip clutch pack is worn beyond its service limit and must be replaced with a new clutch pack assembly

82. A truck has a two-piece driveshaft with a centre bearing. The technician replaces the rear U-joint and reinstalls the driveshaft. After the repair, a new vibration is present at highway speed that was not there before. What is the most likely cause?

- A. The driveshaft was reinstalled out of phase — the yoke ears at the slip joint were not aligned to their original position
- B. The new U-joint has a slightly different bearing cap diameter that changes the operating angle at the rear connection
- C. The centre bearing rubber mount shifted during the repair changing the driveshaft alignment and working angles
- D. The rear U-joint replacement changed the rotational balance of the driveshaft requiring rebalancing on a machine

83. What happens to the torque multiplication ratio of a torque converter as the turbine speed approaches the impeller speed during vehicle acceleration?

- A. The multiplication ratio remains constant at approximately 2:1 throughout the vehicle's acceleration from stop to cruise
- B. The torque multiplication ratio increases as speeds equalize because the stator vane angle becomes more efficient
- C. The multiplication ratio decreases toward 1:1 as the stator begins to freewheel and torque multiplication ceases
- D. The multiplication ratio reverses direction as the turbine begins to overdrive the impeller at higher vehicle speeds

84. A dual-plate clutch is being replaced on a Class 8 highway tractor. During inspection, the technician finds deep heat checks (a network of fine cracks) on the flywheel friction surface. What action is required before installing the new clutch?

- A. Apply a friction-enhancing spray to the flywheel surface to compensate for the reduced grip of the heat-checked surface
- B. Clean the flywheel surface with brake cleaner and emery cloth to remove the surface discoloration and oxidation residue
- C. Install the new clutch without modifying the flywheel since heat checks are cosmetic and do not affect clutch performance
- D. Machine or replace the flywheel because heat checks reduce friction contact area and will cause chatter or slippage with new discs

85. An electromagnetic driveline retarder is being diagnosed. The driver reports no braking effect when the retarder is selected. The retarder dash switch activates and the indicator lamp illuminates. A scan tool shows the retarder module is commanding full engagement. What should be checked?

- A. The CAN bus communication between the retarder module and the ABS module for a fault preventing brake integration
- B. The stator coil resistance and the electrical supply to the stator to determine if the electromagnetic coils are receiving current
- C. The driveshaft RPM sensor for the retarder because an incorrect speed signal prevents the module from activating output
- D. The rotor-to-stator air gap because an excessive gap due to wear or thermal expansion eliminates the eddy current effect

86. A power steering system produces a whining noise that increases with engine RPM. The noise is loudest when the steering wheel is turned to full lock. The power steering fluid level is correct but the fluid appears foamy. What is the most likely cause?

- A. Air is being drawn into the power steering system through a leak on the suction side of the pump or through the reservoir
- B. The power steering pump's internal pressure relief valve is chattering due to a worn valve seat in the pump housing

C. The steering gearbox has excessive internal bypass allowing pressurized fluid to recirculate and create turbulence noise

D. The power steering drive belt is slipping on the pump pulley creating a friction-induced noise that increases with speed

87. A truck driver reports that the steering wheel returns to centre very slowly after completing a turn. Tire inflation is correct and the wheel alignment is within specification. What component is the most likely cause?

A. The steering gearbox worm bearing preload is adjusted too loose allowing the input shaft to float freely in the housing

B. The steering damper (stabilizer shock) has seized internally creating resistance that opposes the steering return motion

C. The steering column universal joint is binding and creating friction that prevents the steering from returning smoothly

D. Insufficient positive caster is reducing the self-centering force that naturally returns the steering to the straight-ahead position

88. During a frame inspection on a 10-year-old truck, a technician finds corrosion on the inside of the C-channel frame rail that has reduced the web thickness by approximately 25%. The OEM limit for material loss is 20%. What repair is required?

A. Treat the corrosion with a rust converter chemical and apply a protective coating to prevent further deterioration

B. Install a bolted reinforcement plate over the corroded area per OEM repair guidelines to restore structural integrity

C. Weld a steel patch plate over the corroded area to restore the original material thickness of the frame rail web

D. No repair is required since web corrosion does not affect the structural capacity as much as flange corrosion would

89. A truck has both steer tires wearing heavily on the inner edges. The tire inflation pressure is at specification. What alignment angle is most likely incorrect?

- A. Excessive positive camber on both sides causing both tires to lean outward and load the inner tread edges excessively
- B. Excessive negative camber on both sides causing both tires to lean inward and overload the inner tread edges
- C. Excessive toe-out causing both tires to angle away from centre and scrub the inner edges against the road surface
- D. Insufficient positive caster on both sides causing the steering to be unstable and create irregular inner-edge wear patterns

90. A truck's air ride suspension on the drive tandem has the correct ride height on both sides when loaded, but when the truck is unloaded, both sides sit approximately 75 mm above the specification. What is the most likely cause?

- A. The shock absorbers are extended to their maximum length and physically preventing the suspension from settling lower
- B. The air springs are over-inflated because the pressure protection valve is set too high for the unloaded vehicle weight
- C. The height control valve linkage is misadjusted causing the valve to add excessive air to the springs when the load is removed
- D. The trailer slider position has shifted the weight distribution placing more load on the tractor drive axles than intended

91. A technician inspects a fifth wheel and finds the locking jaws are worn to the point where visible movement exists between the jaws and the trailer king pin. The king pin itself measures within specification. What action is required?

- A. Lubricate the jaw mechanism more frequently to reduce the wear rate and monitor the condition at shorter intervals
- B. Rebuild or replace the fifth wheel locking mechanism because the worn jaws create a coupling separation risk
- C. Install a larger-diameter king pin on the trailer to compensate for the increased jaw clearance from the wear
- D. Tighten the jaw adjustment bolt to reduce the clearance between the jaws and restore a secure grip on the king pin

92. A tandem axle truck's rear suspension uses an equalizer (walking beam) configuration. The driver reports that the truck rides harshly and bounces excessively over bumps. Upon inspection, the equalizer beam pivot bushings have 15 mm of play. What is the consequence of this worn condition?

- A. The worn bushings allow the two axles to track independently causing each axle to wander laterally during turns
- B. The worn bushings prevent the equalizer beam from distributing load evenly causing unequal axle loading and tire wear
- C. The worn bushings reduce the effectiveness of the shock absorbers because the beam movement absorbs the damping energy
- D. The worn bushings cause excessive wear on the equalizer beam pivot pin which will eventually fracture under the load

93. When should wheel bearing end play be checked on a conventional adjustable tapered roller bearing hub assembly?

- A. After every oil change to ensure the oil addition did not disturb the bearing preload adjustment mechanism
- B. Only when the hub is removed for brake service since the bearing adjustment is not affected by normal driving
- C. At every annual safety inspection and whenever bearing noise, looseness, or seal leakage is suspected during service
- D. Only when the vehicle has exceeded 500,000 km because tapered roller bearings are designed for lifetime operation

94. A truck has a severe pull to the left during braking only. The vehicle tracks straight during normal driving with no brake application. What is the most likely cause?

- A. The left steer tire has lower inflation pressure than the right causing it to deform more under the dynamic braking load
- B. The left front wheel bearing is loose allowing the wheel to shift position and change the brake geometry during stopping

C. The right front brake is underperforming due to a worn lining, seized caliper, restricted air line, or maladjusted chamber

D. The steering gearbox has excessive internal play that allows the steering to shift under the deceleration forces of braking

95. A truck is equipped with hub-piloted aluminium wheels. The OEM torque specification for the wheel nuts is 575 Nm. A technician torques the nuts to 680 Nm. What is the risk of this over-torque condition?

A. The wheel stud threads will strip immediately during the torque application requiring all studs to be replaced

B. The aluminium wheel will crack at the stud holes from the excessive clamping force or the studs will stretch and fatigue

C. The brake rotor will warp from the uneven clamping distribution of the over-torqued wheel nuts across the mounting face

D. The hub pilot surface will deform under the excessive force preventing the wheel from sitting flat against the hub face

96. During a tire inspection, a technician finds a nail embedded in the tread of a steer tire. The nail has penetrated only the tread rubber and has not reached the inner liner or the belt package. Air pressure is holding normally. Is this tire repairable?

A. The tire must be replaced immediately because any foreign object penetration in a steer tire is non-repairable regardless

B. The tire must be removed from the rim for internal inspection before a repair decision can be made about the puncture

C. The tire can be repaired with an external plug since the penetration did not reach the inner liner or compromise the casing

D. The tire can continue in service with the nail in place since it has not punctured through to the air cavity of the tire

97. A truck's leaf spring front eye bushing is severely worn. The driver reports a clunking noise from the front suspension over bumps and during braking. What does the worn bushing allow?

- A. The steer axle to shift fore-and-aft under braking and acceleration loads changing the caster angle and steering geometry
- B. The leaf spring to rotate in the spring hanger causing the leaves to separate and lose their load-carrying capacity
- C. The shock absorber to bottom out prematurely because the spring rate changes with the worn bushing deflection
- D. The frame to flex excessively at the spring hanger location concentrating stress and initiating frame rail cracking

98. A sliding fifth wheel has been repositioned forward on a loaded trailer to move weight off the steer axle and onto the drive axles. After repositioning, the driver notices significantly reduced steering effort. Why?

- A. Moving the fifth wheel forward shifts the king pin closer to the steer axle reducing the vertical load on the steer tires
- B. The trailer now hangs further behind the tractor creating a counterbalance effect that lifts the front of the tractor
- C. Repositioning the fifth wheel changes the tractor's wheelbase which alters the power steering system's effective ratio
- D. The forward fifth wheel position places the trailer load directly over the drive axles which reduces drive axle tire scrubbing

99. A technician is inspecting a multi-piece rim assembly before mounting a tire. What specific inspection must be performed on the lock ring before inflation?

- A. The lock ring must be inspected for nicks, bends, and cracks that could prevent it from properly seating in the gutter groove
- B. The lock ring must be measured with a micrometer to verify its cross-section diameter is within the wear specification
- C. The lock ring must be magnetic particle inspected for subsurface cracks that are not visible during a standard visual check
- D. The lock ring must be soaked in penetrating oil for 24 hours to ensure it is pliable enough to seat properly during assembly

100. A truck's power steering fluid appears dark brown and has a burnt odour. The system functions but the pump whines noticeably. What is the recommended service action?

- A. Flush and replace the power steering fluid, inspect the pump for internal damage, and identify the cause of overheating
- B. Add a power steering fluid additive to restore the viscosity and anti-foaming properties of the degraded fluid
- C. Replace the power steering pump only since the burnt fluid was caused by internal pump wear generating excess heat
- D. Continue operating the system and schedule a fluid change at the next regular PM interval to minimize vehicle downtime

101. A trailer's air ride suspension on the right side is significantly lower than the left side. The height control valve arm on the right side moves freely through its full range when actuated by hand and air flows to the bag. What is the most likely cause?

- A. The height control valve linkage arm on the right side is the wrong length or is bent causing it to signal the wrong ride height
- B. The right-side air spring has an internal failure that allows it to inflate but cannot support the load at the correct height position
- C. The frame cross-member on the right side has sagged placing the height control valve at a lower reference point than designed
- D. The air supply line to the right-side air spring has a partial restriction that limits airflow and prevents the bag from fully inflating

102. A truck has one steer tire with cupping (scalloped) wear around the circumference. The other steer tire shows normal even wear. What is the most likely cause of the cupping on the single tire?

- A. The tire was manufactured with an out-of-round condition that progressively worsened with mileage on the road surface
- B. The steering gearbox has excessive play that allows the steer axle to oscillate at a frequency matching the cup pattern

C. The tire inflation pressure has been chronically 10% below specification causing the tread to flex and cup during highway driving

D. A worn shock absorber, loose wheel bearing, or out-of-balance condition on that specific wheel is causing the tire to bounce

103. A cab-over-engine truck's steering wheel shakes violently at highway speed after hitting a bump. The shaking subsides after the driver reduces speed and then gradually builds back when highway speed is resumed. What is this condition called, and what typically causes it?

A. This is speed wobble caused by worn steer axle king pin bushings, tie rod ends, or a loose steering damper that allows the wheels to oscillate

B. This is brake judder caused by warped front brake rotors that are excited by the bump impact into a resonant vibration

C. This is torque steer caused by unequal axle loading that changes the steering geometry when the suspension is displaced

D. This is frame harmonics caused by a cracked cross-member that allows the frame to flex at its resonant frequency

104. A truck's cab air ride seat slowly sinks to the bottom of its travel when the driver sits in it. The seat compressor runs and the air spring appears undamaged. What is the most likely cause?

A. The seat weight adjustment valve is set too low for the driver's body weight and needs to be adjusted to a heavier setting

B. The seat height adjustment lever is stuck in the down position mechanically forcing the seat to the lowest travel point

C. The seat air spring has a slow leak at its base fitting or the air supply line has a pinhole leak causing gradual pressure loss

D. The seat compressor is worn and cannot maintain adequate air pressure against the driver's weight over time

105. During a cab inspection, a technician notices that the passenger-side door does not latch securely on the first attempt — it requires a second harder push to engage the latch fully. What is the most likely cause?

- A. The door hinges are worn causing the door to sag and the latch to misalign with the striker on the door frame
- B. The door latch mechanism is worn internally and needs to be adjusted or replaced to restore proper engagement
- C. The door seal rubber is too thick and is preventing the door from closing far enough for the latch to reach the striker
- D. The cab has twisted slightly on its mounts and the door frame is no longer parallel to the door opening geometry

106. A driver reports that the windshield wipers chatter and skip across the glass rather than wiping smoothly. The wiper blades were replaced recently. What should the technician check?

- A. The wiper arm spring tension and the wiper arm angle to the windshield to ensure proper blade-to-glass contact
- B. The wiper motor speed controller because an intermittent speed variation causes the blades to hesitate and skip
- C. The windshield washer fluid type because certain formulations leave a residue that causes the blade rubber to skip
- D. The wiper linkage pivot points for wear that introduces play and allows the arms to bounce rather than sweep smoothly

107. A truck cab equipped with a hydraulic cab tilt system has a slow hydraulic fluid leak from the tilt cylinder rod seal. The cab tilts and latches normally. What is the concern with this leak?

- A. The leaked hydraulic fluid will contaminate the engine compartment components below the cylinder causing corrosion damage
- B. Over time the fluid level will drop to the point where the cab tilt cannot complete its full tilt or may drop unexpectedly during service
- C. The leaking fluid will attract dust and road debris to the cylinder rod accelerating seal wear into a progressively worsening leak
- D. All of these are valid concerns and the cylinder seal should be replaced at the next available service opportunity

108. A truck's heated exterior mirrors work on the driver side but not on the passenger side. The driver-side mirror heater shares the same fuse and relay as the passenger side. What is the most likely cause?

- A. The mirror adjustment motor on the passenger side has a shorted winding that is pulling current away from the heater
- B. The mirror heater element on the passenger side has burned out or the connector to the heater has corroded or disconnected
- C. The body controller is selectively disabling the passenger heater because it detects a CAN bus addressing conflict
- D. The passenger-side mirror glass is a different part number that does not include the heating element in its assembly

109. A reefer trailer consistently fails to maintain the set-point temperature of -23°C during summer months. The TRU engine, compressor, and refrigerant charge all test normal. The condenser and evaporator coils are clean. What should be inspected on the trailer?

- A. The trailer's exterior paint reflectivity rating because non-reflective paint absorbs excessive solar heat radiation
- B. The TRU controller's ambient temperature compensation algorithm for a software fault that limits cooling output
- C. The trailer's insulation integrity, door seals, floor seams, and any air leaks that allow warm ambient air to infiltrate the cargo space
- D. The trailer's suspension alignment because misaligned axles create additional rolling resistance that generates heat

110. A trailer's landing gear legs are deployed but one leg is noticeably shorter than the other when measured from the ground to the trailer frame. The crank mechanism operates smoothly on both sides. What is the most likely cause?

- A. The cross-shaft connecting the two legs has a worn spline that allows one leg to extend further than the other during deployment
- B. The ground surface is uneven and the legs are actually the same length but appear different due to the terrain angle

C. The internal extension mechanism in the shorter leg is damaged or the leg sleeve is corroded internally restricting full extension

D. The landing gear mounting bracket on the short side has bent allowing the leg to sit at an angle reducing its effective height

111. A trailer ABS system uses power line communication (PLC) to transmit diagnostic data to the tractor. The tractor's scan tool cannot communicate with the trailer ABS. The trailer ABS self-test lamp functions normally indicating the system is powered. What is the most likely cause?

A. The PLC signal cannot reach the tractor because of excessive resistance or corrosion on the seven-pin connector power pin

B. The trailer ABS ECU has a failed communication module that prevents it from sending data while still performing self-tests

C. The tractor's scan tool is not equipped with the PLC communication protocol required to interface with trailer ABS systems

D. The trailer's main wiring harness has a break that interrupts the PLC signal path while still providing adequate power supply

112. A fleet manager reports that trailer doors on a van trailer are extremely difficult to open and close. The hinges are lubricated and the latching hardware functions properly. What is the most likely structural cause?

A. The trailer has been overloaded causing the frame to deflect downward which shifts the door frame out of square

B. The rear door frame has racked (twisted out of square) due to frame stress, road impacts, or improperly secured cargo loads

C. The door hinges have worn beyond their service limit and the hinge pins need to be replaced with oversized repair pins

D. The trailer floor has shifted forward on the cross-members pushing the rear wall and door frame out of alignment

113. A refrigerated trailer's TRU compressor clutch cycles on and off rapidly — engaging for a few seconds then disengaging repeatedly. The TRU engine runs at normal RPM. What is the most likely cause?

- A. The TRU controller is operating in a power-saving mode that limits compressor engagement to reduce fuel consumption
- B. The evaporator coil thermostat is reading incorrectly causing the controller to cycle the compressor in response to false readings
- C. The compressor drive belt is slipping and the TRU controller is cycling the clutch to prevent belt damage from overheating
- D. The refrigerant charge is low causing the low-pressure safety switch to cut out the compressor when suction pressure drops

114. During a trailer inspection, a technician finds that two of the eight slide lock pins on a sliding tandem suspension are broken. The remaining six pins appear engaged. Can the trailer operate safely?

- A. The trailer cannot operate safely because all slide lock pins must be intact and fully engaged to prevent tandem shift
- B. The trailer can operate with six of eight pins engaged provided the driver reduces speed and avoids heavy braking
- C. The broken pins only need to be replaced if the tandem needs to be repositioned since the remaining pins provide adequate lock
- D. The trailer can operate safely because four engaged pins on each side is the minimum required by the manufacturer

115. A trailer's refrigeration unit runs on standby electric power at the warehouse but will not start on its diesel engine for over-the-road operation. The diesel engine cranks but does not fire. What should be checked first?

- A. The TRU engine glow plug system because the small diesel engine relies on glow plugs for cold combustion assistance
- B. The TRU engine coolant temperature because an overheated engine may have a thermal lockout preventing restart
- C. The TRU fuel supply — the diesel fuel filter, fuel supply valve position, and fuel tank level for the TRU's dedicated supply
- D. The TRU alternator output because inadequate charging voltage prevents the fuel injection solenoid from energizing

116. A trailer's red (supply/emergency) gladhand is damaged and air leaks from the connection when coupled to the tractor. The blue (service) gladhand seals properly. What is the consequence of operating with this leak?

- A. The trailer service brakes will not function because the supply gladhand also carries the service brake application signal
- B. The tractor protection valve may close due to the supply line pressure drop cutting off all air to the trailer and applying its spring brakes
- C. The trailer ABS system will set a fault code because it monitors the supply line pressure as part of its diagnostic self-test
- D. The trailer marker lamps will dim because the air pressure regulation system shares a circuit with the electrical supply

117. A truck's A/C compressor engages but cycles off after approximately 10 seconds and then re-engages after a 30-second pause. This short cycling repeats continuously. The ambient temperature is 32°C. What is the most likely cause?

- A. The A/C compressor internal relief valve is opening due to excessive high-side pressure from an overcharged system
- B. The condenser fan motor has failed causing high-side pressure to rise rapidly until the high-pressure switch trips
- C. The evaporator temperature sensor is reading falsely cold causing the system to cycle off thinking it might freeze the coil
- D. The system is low on refrigerant causing the low-pressure switch to cycle the compressor off when suction pressure drops

118. A technician evacuates an A/C system to 500 microns and begins a vacuum hold test. After 30 minutes, the vacuum has risen to 2,000 microns. What does this indicate?

- A. The vacuum pump is functioning normally and the rise from 500 to 2,000 microns is within acceptable system tolerance
- B. Residual moisture in the system is evaporating into the vacuum and needs additional evacuation time to be fully removed

C. The system has a leak — the vacuum hold test has failed and the leak must be found and repaired before charging

D. The ambient temperature is causing the manifold hoses to expand and the readings will stabilize if evacuation continues

119. A truck's heater blower motor works on high speed only. Low, medium, and medium-high speeds are all inoperative. What is the most likely failed component?

A. The blower motor itself because internal brush wear causes the motor to only run at full speed with maximum voltage

B. The HVAC control panel because the speed selection switch contacts for the lower speeds have corroded open

C. The blower motor resistor pack because it contains the resistors that reduce voltage for the lower speed settings and high bypasses it

D. The blower motor relay because it controls the ground-side switching for all speeds below the maximum setting

120. An A/C system has been repaired and the technician is ready to charge it. The system specification calls for 1,200 grams of R-134a. The technician adds 1,500 grams. What effect will this overcharge have on system performance?

A. The system will cool more efficiently because the additional refrigerant provides greater heat absorption capacity

B. The high-side pressure will be elevated, condenser efficiency will decrease, and the compressor will work harder with reduced overall cooling

C. The excess refrigerant will collect in the receiver/dryer with no effect on system operation until the dryer capacity is exceeded

D. The expansion valve will compensate automatically by reducing flow to maintain the correct evaporator temperature setpoint

121. A fuel-fired coolant heater (Webasto-type) pre-warms the engine but the cab heater core produces only lukewarm air even after the heater has run for 30 minutes. The coolant heater output temperature is correct. What is the most likely cause?

- A. The cab heater core is restricted reducing the flow of hot coolant through the core despite the heater functioning normally
- B. The blend door actuator has failed leaving the blend door in a partial-bypass position reducing heated air delivery to the cab
- C. The auxiliary coolant circulation pump is not running so the heated coolant is not being circulated through the heater core circuit
- D. The thermostat is opening and routing the heated coolant through the radiator where it loses heat before reaching the heater core

122. During an A/C system diagnosis, a technician measures the temperature of the liquid line (between the condenser outlet and the expansion valve inlet) and finds it is significantly warmer than expected. Both high-side and low-side pressures are above normal. What does this indicate?

- A. The system has adequate refrigerant and the warm liquid line indicates efficient heat transfer occurring in the condenser
- B. The condenser is not rejecting heat adequately due to poor airflow, an overcharge, or a faulty condenser fan motor
- C. The expansion valve is stuck wide open allowing unrestricted flow that raises temperatures throughout the liquid circuit
- D. The compressor discharge valves are leaking allowing hot gas to recirculate through the compressor raising all temperatures

123. A sleeper cab APU (auxiliary power unit) provides heating and A/C while the main engine is off. The APU's A/C system uses the same cab evaporator as the main engine's A/C system. The APU A/C provides poor cooling even though the APU compressor appears to be running. What should be investigated?

- A. The main engine A/C compressor clutch for engaging simultaneously with the APU compressor creating a system conflict
- B. The cab recirculation door for a stuck-open position that draws hot outside air instead of recirculating cooled cab air
- C. The APU refrigerant charge, compressor clutch engagement, condenser airflow, and the crossover valve that switches between main and APU A/C circuits

D. The main engine thermostat for a stuck-closed position that overheats the engine coolant and radiates heat into the cab space

124. A hydraulic system's pressure gauge reads zero when the directional control valve is actuated, but the pump appears to be running. The relief valve is set correctly and the fluid level is adequate. What is the most likely cause?

A. The hydraulic pump drive coupling has sheared — the PTO shaft rotates but the pump shaft does not receive the torque

B. The directional control valve spool is stuck in the neutral open-centre position bypassing all pump flow directly to tank

C. The pressure gauge has failed internally and is not registering the actual system pressure that exists in the circuit

D. The hydraulic fluid viscosity is too low for the operating temperature causing the pump to cavitate and lose output

125. A dump truck's hydraulic cylinder raises the dump body but the body slowly descends when the control lever is placed in the hold position. Disconnecting the return line from the cylinder while holding shows fluid flowing from the return port. What does this confirm?

A. The directional control valve has an internal leak in the neutral position allowing pressure oil to bypass to the tank circuit

B. The relief valve is set too low and is cracking open at the pressure generated by the weight of the loaded dump body

C. The hydraulic pump check valve is leaking backward allowing the cylinder to drain back through the pump to the reservoir

D. The cylinder piston seals are worn allowing oil to bypass from the cap-end to the rod-end internally within the cylinder

126. A hydraulic system operates a liftgate that requires a cylinder to extend at a controlled slow speed during lowering. What type of valve is used to control the lowering speed?

- A. A flow control valve with a needle adjustment that restricts the oil flow rate exiting the cylinder during the lowering operation
- B. A pressure reducing valve that limits the maximum pressure available to the rod-end during the lowering extension phase
- C. A sequence valve that delays the lowering motion until the platform latch has fully released from the stowed position
- D. A counterbalance valve that prevents uncontrolled lowering by requiring a pilot pressure signal before allowing oil flow

127. A hydraulic power steering system suddenly loses all assist during a turn. The engine is running and the belt is intact and not slipping. Upon inspection, the power steering fluid reservoir is empty. What should the technician do before refilling?

- A. Replace the power steering pump immediately because running the pump dry has destroyed the internal components
- B. Flush the entire power steering system with solvent to remove any debris generated by the dry pump operation before refilling
- C. Locate and repair the leak that caused the fluid loss before refilling to prevent repeat failure and potential pump damage
- D. Refill the reservoir and operate the system to verify that steering assist returns before searching for the leak source

128. A hydraulic system flow meter test on a PTO-driven gear pump shows 40 LPM at no load (low pressure) but only 25 LPM at full system pressure (20,000 kPa). The pump is rated for 45 LPM. What does this result indicate?

- A. The flow control valve in the system is restricting the pump output and should be adjusted to allow full rated flow
- B. The pump has significant internal wear — the flow drop under pressure indicates enlarged clearances allowing internal bypass
- C. The relief valve setting is too low and is diverting 15 LPM back to the tank before the fluid reaches the flow meter outlet
- D. The test results are within normal tolerance because all positive-displacement pumps lose some volumetric efficiency under load

129. A hydraulic crane truck has a boom cylinder that extends jerkily rather than smoothly. The retraction is smooth. The hydraulic fluid level is correct and the fluid appears clean. What is the most likely cause?

- A. The counterbalance valve on the boom circuit is chattering during extension due to incorrect pilot pressure adjustment
- B. The boom extension relief valve is set too close to the operating pressure causing intermittent relief valve bypass
- C. Air is trapped in the cap-end of the boom cylinder making the fluid compressible during extension under load conditions
- D. The piston rod seal on the boom cylinder is worn causing intermittent friction variation during the extension stroke travel

130. A hydraulic reservoir breather cap is found to be completely clogged with dirt and debris. What problem will this cause in the system?

- A. A vacuum will form in the reservoir as the pump draws fluid out restricting pump inlet flow and potentially causing cavitation
- B. The hydraulic fluid will overheat because the breather cap also serves as the primary heat dissipation vent for the reservoir
- C. The system pressure will increase because the sealed reservoir creates a pressurized fluid supply to the pump inlet side
- D. The filter elements will clog more rapidly because contaminated air enters around the clogged breather cap seal edges

131. A technician is troubleshooting a PTO that will not engage. The PTO engagement switch is activated and air pressure is confirmed at the PTO air cylinder. The PTO shift mechanism moves partially but does not complete engagement. What is the most likely cause?

- A. The PTO engagement air pressure is below the minimum required to overcome the detent spring force for full engagement
- B. The transmission is in gear and the PTO requires the transmission to be in neutral for the engagement teeth to align

C. The PTO mounting bolts have loosened causing misalignment between the PTO drive gear and the transmission output gear

D. The hydraulic pump connected to the PTO output shaft has seized preventing the PTO shaft from completing its rotation

132. A parallel hybrid commercial vehicle can operate in electric-only mode at low speeds. As the driver accelerates onto a highway, the internal combustion engine starts automatically. What triggers the ICE to start?

A. A manual switch on the dashboard that the driver must activate before entering highway traffic for safety compliance

B. The propulsion control system determines that the power demand exceeds what the electric motor and battery can deliver alone

C. The battery state of charge drops below 50% triggering a mandatory ICE activation regardless of the current driving conditions

D. The vehicle speed exceeds 50 km/h which is the regulatory maximum for electric-only operation in commercial vehicles

133. A battery-electric truck's BMS sets a fault code for cell imbalance — certain cells in the pack have significantly different voltage levels than adjacent cells. What is the consequence of operating with unbalanced cells?

A. The unbalanced cells will equalize naturally during the next full charge cycle without any intervention or repair needed

B. The overall pack capacity remains unaffected because the BMS compensates by adjusting the power output algorithmically

C. The vehicle's regenerative braking force will increase to compensate for the reduced battery capacity during normal operation

D. The pack capacity is limited by the weakest cell — unbalanced cells reduce usable range and accelerate overall pack degradation

134. A technician needs to measure the insulation resistance between the high-voltage system and the vehicle chassis on a battery-electric truck. What instrument and minimum safety rating is required?

- A. A CAT III or CAT IV rated megohmmeter (insulation resistance tester) that can safely test at the system's operating voltage level
- B. A standard automotive DMM set to the megohm range with standard test leads rated for 600 volts maximum
- C. A clamp-on ammeter that measures leakage current between the HV bus and the chassis without direct contact
- D. The vehicle's onboard BMS diagnostic function accessed through the scan tool which reports isolation resistance values

135. What colour identifies high-voltage cables, connectors, and components on hybrid and electric vehicles according to SAE J1673?

- A. Red with yellow striping to distinguish high-voltage components from standard 12-volt and 24-volt vehicle wiring
- B. Blue with white markings to indicate the presence of DC voltage above the 60-volt safety threshold on the vehicle
- C. Orange to universally identify all components and cables operating above 60 volts DC in the high-voltage system
- D. Yellow with black hazard symbols to match the internationally recognized electrical danger warning sign standards

Practice Exam 2: Answer Key and Explanations

1. C — Ethylene glycol-based coolant is toxic to humans and animals and is an environmental contaminant. Spills must be contained immediately with absorbent material, cleaned up, and the contaminated absorbent disposed of as regulated waste per provincial environmental regulations. Coolant must never be hosed into floor drains.

2. A — Hydraulic presses generate enormous force (typically 20 to 100 tonnes), and components under pressure can release suddenly and unpredictably during pressing operations. Using appropriate shielding

and standing clear protects the technician from projectile components, flying debris, and sudden energy release.

3. D — An NFPA health hazard rating of 3 (on a 0 to 4 scale) indicates a seriously hazardous material where short exposure could cause serious temporary or residual injury. This rating requires specific PPE, controlled handling procedures, and immediate access to the Safety Data Sheet for first-aid and exposure information.

4. B — Fire extinguishers must carry a current inspection tag to verify they have been serviced and are functional. An expired tag means the extinguisher has not been inspected within the required interval and cannot be relied upon in an emergency. It must be tagged out of service and replaced with a current unit.

5. A — Effective mentoring requires specific, constructive feedback that acknowledges effort while identifying exactly where the error occurred. Guiding the apprentice through the correction reinforces the correct procedure and builds understanding of why the specification matters — this produces lasting skill development.

6. C — A tanker that previously carried diesel fuel is a confined space with potential atmospheric hazards — residual fuel vapours may be present at flammable or toxic concentrations, and oxygen may be depleted. Atmospheric testing for O₂, LEL (combustible gases), and toxic gases must be performed before entry, with a standby attendant stationed outside.

7. D — Recording specific part numbers, quantities, descriptions, and supplier information creates a complete, traceable record that supports warranty claims, regulatory compliance, future diagnostics, and liability protection. Generic descriptions and missing details undermine the work order's value as a legal and technical document.

8. B — Before connecting any service equipment to an A/C system, the refrigerant type must be identified using a refrigerant identifier. Connecting recovery equipment designed for R-134a to a system containing R-1234yf, R-12, or a contaminated blend causes cross-contamination that damages equipment and renders the refrigerant unusable.

9. A — In a four-stroke engine, the complete valve cycle (intake open, intake close, exhaust open, exhaust close) occurs once per two crankshaft revolutions (720°). The camshaft must therefore rotate at exactly half crankshaft speed, achieved by a 2:1 gear ratio in the timing gear train.

10. D — When the stroke (169 mm) is longer than the bore (137 mm), the engine is classified as undersquare or long-stroke. This configuration produces higher torque at lower RPM because the longer stroke creates a greater mechanical advantage at the crankshaft — ideal for the low-speed, high-load demands of commercial trucks.

11. C — The lower O-rings on a wet cylinder liner seal the coolant passage between the liner outer surface and the block bore. A damaged or improperly seated O-ring allows pressurized coolant to leak past the liner base into the crankcase, contaminating the engine oil with water and glycol — causing bearing corrosion and lubrication failure.

12. B — A Plastigage reading of 0.15 mm exceeds the maximum specification of 0.10 mm, indicating excessive bearing clearance. The bearing inserts must be replaced with the correct undersize set, or the crankshaft journal must be machined to the next undersize and fitted with matching bearings to restore proper oil clearance.

13. D — Sodium and potassium are elements present in engine coolant (from the corrosion inhibitor additive packages in ethylene glycol). Their appearance in the engine oil confirms coolant contamination — the coolant is entering the oil through a failed head gasket, cracked cylinder head, cracked liner, or failed oil cooler core.

14. A — During city driving at low speeds, there is insufficient ram airflow through the radiator to cool the engine. The cooling fan clutch must engage to pull air through the radiator cores. If the fan clutch fails to engage (stuck in the disengaged position), the engine overheats at low speed but cools adequately at highway speed where ram air provides sufficient airflow.

15. C — White smoke during cold startup that clears after warmup and does not accompany coolant loss is caused by condensation in the exhaust system and incomplete combustion of fuel during the cold warm-up period. This is normal behaviour, particularly in cold Canadian climates, and is not indicative of a component failure.

16. B — With the filters recently changed and the system primed, the fault code for low transfer pump pressure points to the transfer pump itself or the supply circuit upstream of the high-pressure pump. The pump's electrical connector, the pump output pressure, and the fuel supply line should be checked for a failed pump, loose connector, restricted line, or air leak.

17. D — When actual boost is significantly below commanded boost on a VGT-equipped engine, the turbocharger cannot generate the requested boost pressure. The VGT vane mechanism is the most common cause — carbon and soot buildup prevents the vanes from closing to the commanded position, reducing exhaust gas velocity across the turbine at partial loads.

18. A — The charge air cooler reduces the temperature of the compressed air exiting the turbocharger compressor. Cooler air is denser — it contains more oxygen molecules per unit volume — which allows more fuel to be burned efficiently per combustion cycle, improving power output, fuel economy, and reducing NO_x emissions.

19. C — The DEF quality sensor is calibrated to detect the 32.5% urea concentration. If the fluid triggers a quality fault immediately after refilling, the most likely cause is that the DEF itself is incorrect — it may be diluted with water, contaminated with another fluid, degraded from improper storage, or not automotive-grade urea solution.

20. B — During active DPF regeneration, the ECM commands a late-post fuel injection that delivers unburned hydrocarbons into the exhaust stream. These hydrocarbons reach the DOC, where the platinum/palladium catalyst oxidizes them in an exothermic reaction that raises exhaust gas temperature to 550°C to 650°C — sufficient to burn accumulated soot in the DPF.

21. D — In a HEUI system, injection control pressure is generated by the high-pressure oil pump and regulated by the IPR valve. If actual ICP is below commanded ICP, oil pressure is being lost somewhere in the high-pressure circuit — worn pump, maladjusted or stuck IPR valve, or internal O-ring leaks at one or more injectors dumping oil pressure.

22. A — If the governor settings are correct and no air leaks exist, rapid compressor cycling suggests the system's effective air volume is reduced. A saturated air dryer desiccant that can no longer remove moisture allows water to accumulate in the reservoirs, displacing air volume and causing the pressure to drop more quickly to the cut-in threshold.

23. C — Compression brake systems on inline six-cylinder engines typically use two solenoid-controlled groups — one for cylinders 1 through 3 and one for cylinders 4 through 6. If one group activates and the other does not, the solenoid valve, its wiring, or connector for the inactive group has failed or has an open circuit.

24. B — A power balance test (also called a cylinder cut-out test) disables each injector one at a time through the scan tool while monitoring RPM drop. A cylinder that produces little or no RPM drop when disabled is not contributing power — this isolates the weak cylinder for further diagnosis of its fuel, compression, or valve train condition.

25. D — Oil consumption without visible blue smoke in a DPF-equipped engine occurs because the DPF captures the oil-derived particulate before it exits the tailpipe. The oil passes the piston rings, burns in the combustion chamber producing soot and ash, and the DPF traps it — accelerating the DPF's ash loading and shortening the interval between DPF cleanings.

26. A — If the VGT can only reach 30% closed when maximum closure is commanded, the actuator or vane mechanism cannot physically move to the fully closed position. Carbon buildup on the vanes and unison ring is the most common cause, though actuator motor failure or mechanical binding in the linkage produces the same symptom.

27. C — Each common rail injector has slight manufacturing variations in fuel delivery quantity at a given pulse width and rail pressure. The calibration code characterizes these individual variations so the ECM can adjust the pulse width for each cylinder to equalize fuelling — ensuring smooth idle, balanced cylinder contribution, and consistent emissions.

28. B — A leak-down test that shows air escaping from the exhaust pipe while the piston is at TDC compression definitively identifies the exhaust valve as the leak source. The exhaust valve is not seating properly — due to a burned face, worn seat, carbon deposit, or bent stem — allowing compression to escape directly into the exhaust port.

29. D — If the EGR valve moves freely when commanded but the system still reports insufficient EGR flow, the exhaust gas is being restricted somewhere between the exhaust manifold and the intake manifold. The EGR cooler is the most common restriction point — internal soot accumulation progressively blocks the cooler tubes, reducing flow even with the valve fully open.

30. A — If the purge valve fails to open during the governor's unload signal, the air dryer cannot regenerate its desiccant. Moisture-laden compressed air passes through the saturated desiccant and enters the reservoirs, causing water accumulation that leads to valve corrosion, seal degradation, and freeze-ups in cold weather.

31. C — The trailer relay valve delivers proportional pressure based on the service signal. If the relay valve is contaminated internally, its spool can stick in the applied position, delivering higher-than-commanded pressure to the trailer brakes. This causes intermittent lockup during light applications when only minimal braking was requested.

32. B — The difference between the two reservoir pressures indicates that the secondary circuit has been completely depressurized. A massive air leak in the secondary circuit or a failed one-way check valve (allowing the secondary reservoir to drain backward through the supply tank) would cause complete pressure loss while the primary retains pressure through its own intact check valve.

33. C — A side-to-side stroke difference of 45 mm versus 58 mm means the braking force at each wheel is significantly unequal. During braking, the side with the shorter stroke (better adjustment) applies more force, and the vehicle pulls toward that side. Unequal braking creates instability, increases stopping distance, and accelerates tire wear.

34. D — Components that pressurize only during brake application include the brake chambers, relay valves, quick-release valves, and the foot valve delivery ports. If a leak is present only when brakes are applied, one of these components has a failed seal, diaphragm, or connection that allows air to escape under application pressure.

35. A — The audible leak from the spring brake (rear) section is present only when the parking brake is released because the spring chamber is pressurized only in the released state — air pressure is supplied to compress the spring and hold the brake off. When the parking brake is applied, the air is exhausted and the spring extends, so no pressure is present to leak.

36. B — The quick-release valve is positioned at or near the brake chambers. Its purpose is to provide a local exhaust path so that air in the chambers can vent rapidly to atmosphere when the brakes are released, rather than having to travel back through the long supply lines to the foot valve. This significantly reduces brake release time.

37. B — The secondary gauge reading zero while the primary gauge reads normally indicates either a massive leak that has drained the secondary reservoir, or a failed one-way check valve between the supply tank and the secondary reservoir that has allowed the secondary to drain. The check valve normally prevents backward flow, preserving secondary pressure.

38. A — With one shoe below the 6.35 mm minimum for bonded linings, it must be replaced. Brake shoes are always replaced as a set (both shoes on the same wheel) because mismatched lining thickness creates uneven contact with the drum, unequal braking force distribution, and accelerated wear on the new shoe.

39. D — ESC detects potential rollover through lateral acceleration and yaw rate sensors, then intervenes by selectively applying brakes on specific wheels (typically the inside wheels during a curve to create a stabilizing yaw moment) and reducing engine power. This decreases the vehicle's speed and lateral forces, preventing the rollover.

40. B — If the parking brake cannot hold on a moderate grade with full system pressure, the spring brake chambers must be inspected. Weak springs (from fatigue or heat damage), air leaks in the spring section (preventing full spring extension), or excessive pushrod stroke (the spring cannot push the brake shoes firmly against the drum) all reduce holding force.

41. C — The air dryer purging every 30 to 45 seconds (versus the normal 3 to 5 minutes) means the compressor is cycling between loaded and unloaded very rapidly. This indicates the system is consuming air faster than normal — a significant leak, excessive accessory demand, or a valve that is bleeding air causes the pressure to drop to cut-in almost immediately after reaching cut-out.

42. A — The tractor protection valve automatically closes the supply and service lines to the trailer when the tractor's air pressure drops below approximately 310 to 415 kPa (45 to 60 psi). This isolates the tractor's air system from a trailer leak or separation, preserving the tractor's braking capability.

43. D — The front brake rotors have excessive lateral runout — the rotor thickness varies as it rotates, pushing the brake pads in and out with each revolution. This piston pulsation is transmitted through the hydraulic or pneumatic circuit to the brake pedal as a rhythmic pulsation that corresponds to wheel rotation speed.

44. B — The trailer hand valve sends a service signal through the blue (service) gladhand to the trailer's relay valve. If the blue gladhand is disconnected, crossed with the red gladhand, or has a sealed dust cap installed, the hand valve signal cannot reach the trailer relay valve and the trailer brakes will not apply from the hand control.

45. C — The replacement shoes contact only at the toe and heel because their arc radius does not match the drum's worn inner diameter. After thousands of kilometres, the drum wears to a slightly larger

diameter, and new shoes manufactured to the original drum diameter have a tighter arc that only contacts at the ends until the surfaces wear together.

46. A — The spring brake (rear) section of a dual-chamber assembly is pressurized only when the parking brake is released — air is supplied to compress the spring and hold the brake off. A leak in this section is audible only when this air pressure is present, which is when the parking brake valve is pushed in (released).

47. D — Air brake systems inherently have a slight application delay because compressed air must travel from the foot valve through lines and valves to reach the brake chambers. Additionally, air is slightly compressible compared to hydraulic fluid, which adds to the response lag. This is a normal characteristic, not a fault.

48. C — In a 24-volt series-parallel system, one dead cell reduces that battery to approximately 10.5 volts. Since it is in parallel with a good 12.6-volt battery, the pair averages to approximately 11.5 volts. This pair in series with the other 12.6-volt pair produces approximately 24.1 volts total — a noticeable drop from the normal 25.2 volts that affects starting performance.

49. A — The most efficient approach is to check for voltage at the lamp-end connector of the suspect wire. If battery voltage is present, the wire is intact and the fault is at the lamp. If no voltage is present, the wire has an open between the fuse panel and that point. This single test determines which half of the circuit contains the fault.

50. B — The relay clicking confirms the coil circuit is functional — the horn button, wiring, and relay coil are all working. The click means the contacts are closing, but either the contacts are not making adequate connection (burned or pitted contacts) or the circuit downstream of the contacts (wiring to the horn, the horn ground, or the horn itself) has a fault.

51. D — An intermittent no-start with no solenoid click means the solenoid is not receiving its activation signal. Since the problem is intermittent, a component in the start control circuit has an intermittent connection — the neutral safety switch, clutch interlock, ignition switch, start relay, or a wiring connector is making contact sometimes but not always.

52. A — The new alternator was installed but the field excitation wire was not reconnected. Without field current flowing through the rotor winding, the rotor cannot create a magnetic field, the stator

cannot induce voltage, and the alternator produces zero output. This is the most common oversight during alternator replacement.

53. C — A fusible link is a short section of wire (typically four gauge sizes smaller than the wire it protects) designed to melt and open if a catastrophic short circuit occurs near the battery. It protects the main wiring harness from fire by sacrificing itself before the excessive current can heat the harness wires to the point of insulation ignition.

54. B — A single LED lamp flashing rapidly while all others function normally points to an intermittent connection at that specific lamp. A poor socket contact or corroded ground causes the LED to lose power momentarily and re-energize, creating a rapid flashing appearance as the connection alternates between making and breaking contact.

55. A — On this system where high resistance equals full tank, the ECM supplies a pull-up reference voltage (typically 5V) through a resistor. With the signal wire open (disconnected from the sending unit), no current flows through the sending unit to pull the voltage down, so the ECM sees full reference voltage — which it interprets based on the system design.

56. D — With 12.3 volts on the passenger side but only 10.8 volts on the driver side, 1.5 volts is being consumed somewhere in the driver-side circuit that is not present in the passenger circuit. This indicates a high-resistance connection — corrosion at a connector, damaged wire, or poor ground — specific to the driver-side headlamp branch.

57. B — If the priming pump relay contacts have welded shut, the relay remains closed continuously regardless of the ECM's command to de-energize it. The pump receives constant power through the welded contacts. Replacing the relay resolves the continuous operation while the original cause of the contact welding (possible overcurrent) should be investigated.

58. A — Systematically pulling fuses one at a time while monitoring the ammeter is the standard procedure for isolating a parasitic draw. When the fuse for the circuit containing the draw is removed, the ammeter reading drops to the acceptable level, identifying which circuit is responsible. Further testing within that circuit isolates the specific component.

59. C — If the engine ECM stops broadcasting engine speed data on the CAN bus, any module that depends on that data will detect the communication loss. The ABS module will set a communication

fault code and may disable functions that require engine speed information, though basic ABS using wheel speed sensors may continue operating.

60. D — A Hall effect sensor produces a clean digital square wave that switches between approximately 0 volts and the reference voltage (typically 5V or 12V) as each tooth of the reluctor passes the sensor. Unlike a magnetic pickup, the Hall effect signal amplitude is constant regardless of speed, making it reliable at very low cranking RPMs.

61. B — An erratic speedometer that bounces between zero and actual speed while the transmission shifts normally suggests the speed data is reaching the TCM (enabling correct shifts) but is intermittently lost at the instrument cluster. An intermittent CAN bus connection between the broadcasting module and the cluster is the most likely cause.

62. A — In a 24-volt series system, the connection between the two batteries carries the full cranking current. Corrosion or a loose terminal at this junction creates high resistance that drops voltage under the heavy starter load, leaving insufficient voltage to crank the engine at adequate speed even though each battery individually tests good.

63. D — The turn signal flasher module controls the flash rate based on the current draw of the circuit. When a bulb burns out, the circuit current drops below the expected level, and the flasher responds by increasing the flash rate. A fast flash rate on one side is the classic indicator that a bulb in that circuit has failed.

64. B — To test an ECM ground-side switch, connect a test light between battery positive and the solenoid's ground-side terminal. When the ECM commands the solenoid on, it completes the ground path, allowing current to flow through the test light and illuminate it. This confirms the ECM is providing the ground signal.

65. C — In a multiplexed system, the body controller receives the lamp command from the switch module over the data bus and drives the lamp output through its internal driver circuits. If one side's lamps are out with no controller fault codes, the output driver circuit for that side or the wiring from the controller to those lamps has failed.

66. A — The low AC voltage output indicates the magnetic field change per tooth is insufficient to generate the minimum signal voltage. The most common cause is an excessive air gap — the sensor is

too far from the tone ring teeth. Reducing the gap (by pushing the sensor closer to the ring) increases the signal strength.

67. D — A battery disconnect switch removes all battery power when opened, including the keep-alive voltage that maintains memory in the clock, radio, and other modules. This is the expected behaviour when the switch removes all connections — the clock resets and radio presets are lost because their volatile memory loses power.

68. C — A P0300 code (random/multiple misfire) without individual cylinder codes indicates a system-wide issue affecting all cylinders rather than a component failure specific to one cylinder. Common causes include low fuel pressure, intake manifold vacuum leaks, a contaminated fuel supply, or a failing crankshaft position sensor that disrupts timing for all cylinders.

69. B — A solder connection or sealed crimp splice with adhesive-lined heat-shrink tubing creates a permanent, weatherproof, mechanically secure repair that resists vibration, moisture intrusion, and corrosion. This is the industry-standard method for permanent wire repair in harsh automotive and commercial vehicle environments.

70. A — Clutch chatter during engagement is caused by inconsistent friction across the disc surfaces. Oil or grease contamination (from a leaking rear main seal, transmission input seal, or over-lubricated release bearing) creates areas of high and low friction that grab and release alternately, producing the characteristic shuddering vibration.

71. D — Without output speed data, the TCM cannot calculate the speed ratio between the input and output shafts, which is how it determines the current gear and the correct timing for the next shift. Without this critical data, the TCM locks the transmission into a safe default gear to prevent damage from incorrect shift commands.

72. C — Driveshaft runout of 0.8 mm exceeds the 0.5 mm maximum specification. Excessive runout means the shaft is bent or the yoke is distorted — either condition creates a rotating imbalance that produces speed-dependent vibration. The driveshaft should be replaced because straightening cannot reliably restore the original concentricity.

73. B — A grinding noise specific to one gear position indicates the synchronizer for that gear has failed. The synchronizer ring cannot match the speeds of the mainshaft gear and the mainshaft, so the

sliding clutch contacts the gear teeth while there is still a speed differential, producing the grinding noise during the third-to-fourth shift.

74. D — A rhythmic clunking during low-speed tight turns but not during straight driving is the classic symptom of worn differential spider gears or side gears. During turns, the spider gears must rotate on their cross shaft to allow the left and right wheels to turn at different speeds, and wear in these gears produces a clunking as the teeth engage and disengage unevenly.

75. A — A heel-heavy contact pattern under loaded drive conditions indicates the ring gear is positioned too far from the pinion. Decreasing the backlash (moving the ring gear toward the pinion by adjusting the carrier bearing shim packs) shifts the contact pattern from the heel toward the centre of the tooth face.

76. C — On dry pavement, the front and rear wheels must turn at different speeds during turns because they follow different radius arcs. With the transfer case locked (front and rear axles forced to the same speed), the wheels cannot accommodate this speed difference, causing driveline windup — torsional stress that manifests as vibration, binding, and hopping.

77. B — Difficulty engaging reverse gear on an otherwise smooth-shifting transmission is commonly caused by wear on the reverse idler gear or its shift fork. The reverse idler must physically slide into mesh between two gears, and if the idler gear teeth, the sliding mechanism, or the shift fork are worn, the idler cannot seat fully.

78. A — A forward clutch pack that engages in all forward ranges but is not part of the reverse gear apply circuit would cause slipping in all forward gears while leaving reverse unaffected. This pattern isolates the failure to a specific clutch pack within the transmission's planetary gear control strategy.

79. D — Out-of-phase yoke ears cause the speed fluctuations from the two U-joints to compound rather than cancel. Instead of the second joint correcting the first joint's variation, both joints add their fluctuations together, producing a pronounced second-order torsional vibration at twice the driveshaft rotational frequency.

80. B — A fault code indicating the shift actuator cannot reach the commanded position for one specific gear, with all others engaging normally, points to a mechanical problem in the shift mechanism for that gear. The shift rail, detent, interlock, or the actuator's ability to move the specific fork to the fifth gear position should be inspected.

81. C — A vibration present only during coast (deceleration) with acceptable U-joint play and shaft runout suggests the driveline working angles are unequal. Unequal angles produce a speed fluctuation that manifests as vibration. The vibration appears during coast because the loading direction reverses, changing how the U-joint bearings seat.

82. D — The limited-slip differential's clutch packs require a specific friction modifier additive in the gear oil to operate smoothly. If the replacement oil does not contain this additive, the clutch packs alternate between grabbing and slipping during the speed differential of turns, producing the characteristic chattering noise.

83. A — After replacing a U-joint, if the driveshaft was separated at the slip joint and reassembled out of phase (the spline marks were not aligned), the yoke ears at the two ends are no longer in the same rotational plane. This phasing error causes the U-joint speed fluctuations to compound rather than cancel, creating a new vibration.

84. C — As the turbine speed approaches the impeller speed (at higher vehicle speeds during acceleration), the fluid returning from the turbine strikes the stator vanes at a decreasing angle. Eventually, the stator begins to freewheel on its one-way clutch, and torque multiplication drops to 1:1 — the converter acts as a simple fluid coupling.

85. D — Heat checks on the flywheel surface are networks of fine surface cracks caused by repeated thermal cycling. These cracks reduce the effective friction area and create irregular contact with the new clutch disc, causing chatter or slippage. The flywheel must be machined (to remove the damaged surface) or replaced before installing a new clutch.

86. B — The stator coil resistance and the electrical supply to the stator are the first checks when an electromagnetic retarder produces no braking effect despite being commanded on. If the coils are open-circuited (no current flows) or if the power supply is interrupted, no magnetic field is generated and no eddy current braking force can be produced.

87. A — Air entering the power steering system through a suction-side leak causes the fluid to become foamy and aerated. The compressible air bubbles cause the pump to whine (cavitation noise), and the noise increases at full lock because the pump works hardest when the system is at maximum pressure and flow demand.

88. D — Positive caster creates the self-centering force that returns the steering to the straight-ahead position after a turn. Insufficient positive caster reduces this returnability force, causing the steering to feel sluggish returning to centre. The driver must manually steer back to straight rather than the wheels self-centering naturally.

89. B — Web corrosion that has reduced material thickness by 25% exceeds the OEM limit of 20%. The structural integrity of the rail is compromised. A bolted reinforcement plate installed per OEM guidelines restores structural capacity without the metallurgical risks of welding on the frame.

90. A — Heavy inner-edge wear on both steer tires with correct inflation pressure indicates a camber problem. Excessive negative camber (tops of the tires tilting inward) shifts the load concentration to the inner edges of both tires. On a beam steer axle, this indicates a bent axle beam, worn king pin bushings, or both.

91. C — If ride height is correct when loaded but too high when unloaded, the height control valve is not exhausting enough air from the springs when the load is removed. The valve linkage adjustment determines the "neutral" point — if the arm length or position is incorrect, the valve's neutral position corresponds to a higher-than-specified frame height at the unloaded condition.

92. B — Worn locking jaws create excessive movement between the jaws and the king pin, producing a loose coupling that allows the trailer to rock, clunk, and shift during acceleration and braking. This wear increases the risk of the king pin escaping the jaws during extreme maneuvering or in a collision. The fifth wheel must be rebuilt or replaced.

93. D — Worn equalizer beam pivot bushings with 15 mm of play prevent the beam from distributing load evenly between the two tandem axles. The beam cannot pivot smoothly, causing one axle to carry more load during dynamic events, producing harsh ride quality, excessive bouncing, and uneven tire wear across the tandem.

94. A — Wheel bearing end play on conventional adjustable bearings should be checked at every annual safety inspection and whenever symptoms suggest bearing problems — noise, heat, looseness, or seal leakage. Regular inspection catches bearing wear before it progresses to the point of failure, preventing potential wheel-off events.

95. C — A vehicle that pulls during braking but tracks straight during normal driving has a braking force imbalance. If the vehicle pulls left during braking, the right-side brake is producing less force than

the left. The right front brake must be inspected for worn linings, a seized caliper, restricted air line, or maladjusted pushrod stroke.

96. D — Over-torquing aluminium wheels beyond the OEM specification risks cracking the wheel at the stud holes (aluminium is less forgiving of excessive clamping force than steel), stretching and fatiguing the wheel studs (which can lead to stud fracture and wheel separation), and distorting the mounting surface.

97. B — Any foreign object penetration in a tire requires removal from the rim and internal inspection before a repair decision can be made. Even though the nail appears to have only penetrated the tread rubber externally, internal damage to the belt package or inner liner may be present that is invisible from the outside.

98. A — A worn front eye bushing allows the steer axle to shift forward and backward relative to the frame during braking and acceleration. This movement changes the effective caster angle and axle alignment, produces the clunking noise as the spring slides in the worn bushing, and compromises steering precision.

99. A — Moving the fifth wheel forward on a loaded trailer shifts the pivot point (king pin) closer to the steer axle. This reduces the proportion of the total vehicle weight carried by the steer tires, which reduces the force required to turn them. Less weight on the steer axle directly reduces steering effort.

100. A — The lock ring on a multi-piece rim must be visually inspected for nicks, bends, cracks, and any deformation that could prevent it from seating properly in the gutter groove. A defective lock ring can blow off with lethal force during inflation if it does not seat securely. Any damaged ring must be replaced before the tire is mounted and inflated.

101. A — Dark brown, burnt-smelling power steering fluid indicates the fluid has been overheated and its additives have degraded. The system should be flushed and refilled with fresh fluid, the pump inspected for internal damage that may have caused or resulted from the overheating, and the root cause (restricted cooler, overpressure, contamination) identified.

102. B — If the height control valve arm moves freely, air flows to the bag, but the right side remains low, the most likely issue is the linkage geometry. A bent arm, incorrect arm length, or an arm installed at the wrong angle changes the reference point at which the valve reads "correct height" — causing the valve to read the low position as normal.

103. D — Cupping (scalloped wear) on a single tire while the opposite steer tire wears normally isolates the cause to that specific wheel position. A worn shock absorber that allows the tire to bounce, a loose wheel bearing that lets the wheel wobble, or an out-of-balance condition that causes harmonic vibration are the most common position-specific causes.

104. A — Speed wobble (also called shimmy or death wobble) is an oscillation of the steer wheels that is triggered by a bump impact and sustained by worn components that cannot dampen the oscillation. Worn king pin bushings, worn tie rod ends, and a loose or failed steering damper are the typical contributors that allow the wheels to enter and sustain this resonant oscillation.

105. C — The seat air spring has a slow leak that gradually loses pressure under the driver's weight. The compressor runs (indicating it detects low pressure) but cannot keep up with the leak rate. The air spring base fitting, connection hose, or the spring bladder itself is leaking at a rate that slowly overcomes the compressor's output.

106. B — A door that requires two pushes to latch is symptomatic of worn hinges that allow the door to sag. The sagging changes the alignment between the latch and the striker — the first push gets the latch close but not aligned, and the second harder push forces the latch over the misaligned striker.

107. A — Wiper chatter and skipping on recently replaced blades indicates the wiper arm spring tension or the arm angle relative to the windshield is incorrect. If the arm does not press the blade firmly and squarely against the glass, the blade edge lifts and skips rather than maintaining consistent contact. Adjusting the arm angle and verifying spring tension resolves the issue.

108. D — All of these are valid concerns with a leaking cab tilt cylinder. Hydraulic fluid contaminates engine components below, progressive fluid loss eventually compromises the tilt function (potentially allowing the cab to drop during service), and oil on the cylinder rod accelerates seal wear. The seal should be replaced at the earliest opportunity.

109. B — The connector on the passenger side mirror heater has corroded or the heater element itself has burned out. Since the driver-side heater works on the same fuse and relay (confirming the shared power supply is functional), the fault is specific to the passenger-side branch — the element, its connector, or the wire between the shared supply point and the mirror.

110. C — If the TRU, condenser, evaporator, and refrigerant charge all test normal but the trailer cannot maintain -23°C in summer, the trailer is gaining heat faster than the TRU can remove it. Damaged

insulation panels, deteriorated door seals, gaps in floor seams, and any structural openings allow warm ambient air to infiltrate the cargo space.

111. D — One landing gear leg that is shorter than the other despite both crank mechanisms operating smoothly indicates an internal mechanical issue in the shorter leg. The extension tube sleeve may be corroded internally, restricting full travel, or the internal gear mechanism may have lost engagement at a certain extension point.

112. A — PLC transmits diagnostic data over the existing power wiring. If the seven-pin connector's power pin has excessive resistance or corrosion, the PLC signal is attenuated or lost even though enough power passes through to operate the ABS ECU. Cleaning or replacing the connector often restores PLC communication.

113. B — Trailer doors that are difficult to open and close despite functioning hinges and latches indicate the door frame has racked — twisted out of its original square geometry. Frame stress from road impacts, overloading, or improperly secured cargo shifts can distort the rear frame, misaligning the door opening.

114. D — Rapid compressor clutch cycling on a TRU — engaging briefly then disengaging — is the classic symptom of a low refrigerant charge. As the compressor runs, suction pressure drops quickly to the low-pressure safety switch threshold, cutting the compressor out. Pressure then slowly equalizes and rises above the switch reset point, re-engaging the compressor in a repeating cycle.

115. A — All slide lock pins must be intact and fully engaged to prevent the tandem from shifting. Even though six of eight pins remain, the two broken pins create weak points where the remaining pins bear disproportionate load. Under the dynamic forces of heavy braking or acceleration, the remaining pins may shear or disengage, allowing the tandem to shift.

116. C — The TRU's diesel fuel supply is the first check when the engine cranks but does not fire. The fuel filter may be clogged, the fuel supply valve (if equipped) may be closed, or the TRU's dedicated diesel tank may be empty. TRU fuel supply issues are the most common cause of crank-no-start on transport refrigeration units.

117. B — A leaking supply (red) gladhand reduces the supply line pressure. If the pressure drops below approximately 310 to 415 kPa (45 to 60 psi), the tractor protection valve automatically closes, cutting

off all air to the trailer. Without supply air, the trailer's spring brakes apply automatically — potentially causing a dangerous sudden stop.

118. D — An A/C compressor that engages but cycles off after approximately 10 seconds is being cut off by the low-pressure safety switch. Low refrigerant charge causes the suction pressure to drop below the switch's cut-out threshold within seconds of compressor operation. After the compressor stops, the pressure slowly equalizes above the switch reset point, and the cycle repeats.

119. A — A vacuum hold test that rises from 500 microns to 2,000 microns in 30 minutes indicates the system is not holding vacuum. While some rise from moisture evaporation is normal, a rise to 2,000 microns significantly exceeds the typical pass threshold of 1,000 microns or less. The system should be checked for a leak.

120. C — The blower motor resistor pack provides the resistance that reduces voltage to the motor for the lower speed settings. High speed bypasses the resistors entirely. When the resistor pack fails (open circuit), all speeds that route through the resistors are lost, but high speed continues to function normally because it does not use the resistor circuit.

121. B — Overcharging raises both high-side and low-side pressures. The excess refrigerant floods the condenser with liquid, reducing its effective heat rejection area and causing the condenser to operate less efficiently. The compressor works harder against the elevated pressures, overall cooling performance decreases, and component stress increases.

122. D — If the coolant heater produces adequate outlet temperature but the cab heater core delivers only lukewarm air, the heated coolant is not reaching the heater core at an adequate flow rate. The auxiliary circulation pump is responsible for moving heated coolant through the heater core circuit when the main engine is off — if the pump is not running, flow through the core is stagnant.

123. B — An abnormally warm liquid line combined with elevated pressures on both sides indicates the condenser is not rejecting heat effectively. Poor condenser airflow — from debris, a failed fan, or the condenser being blocked by other heat exchangers — prevents the refrigerant from fully condensing, keeping both the liquid temperature and the system pressures above normal.

124. C — APU A/C systems that share the cab evaporator with the main engine A/C system use a crossover valve to switch between the two refrigerant circuits. The APU's refrigerant charge, compressor

clutch engagement, condenser airflow, and the crossover valve operation must all be verified to diagnose poor APU A/C performance.

125. B — The pump appears to be running (the PTO is engaged and the shaft is rotating), but zero pressure at the gauge means the pump is not generating output. A sheared drive coupling between the PTO output shaft and the pump input shaft allows the PTO shaft to spin freely without transmitting torque to the pump.

126. D — Fluid flowing from the cylinder's return port while the valve is in the hold position proves that oil is crossing from the cap-end (pressurized by the load) to the rod-end (connected to the return port) inside the cylinder. This confirms internal piston seal leakage — the seals are allowing fluid to bypass the piston.

127. A — A flow control valve with a needle adjustment restricts the oil flow rate exiting the cylinder during the lowering operation. By controlling how fast oil can leave the extending cylinder, the valve controls the descent speed of the liftgate. Adjusting the needle opening provides proportional speed control.

128. C — Before refilling the reservoir, the leak that caused the complete fluid loss must be located and repaired. Running the pump dry (or near-dry) may have already caused internal damage, but refilling without repairing the leak will only repeat the failure. Locate and repair the leak first, then assess pump condition.

129. B — A flow drop from 40 LPM at no load to 25 LPM at full pressure (a 37.5% loss) indicates significant internal wear. The enlarged clearances between the gear teeth, the gear faces, and the pump housing allow more fluid to leak internally under high pressure rather than being delivered to the discharge port.

130. D — Low refrigerant charge causes the low-pressure safety switch to cycle the TRU compressor off when suction pressure drops. The charge is too low to maintain adequate evaporator pressure during continuous compressor operation. The system needs a leak check, repair, evacuation, and recharge to specification.

131. A — A clogged breather cap prevents air from entering the reservoir as the pump draws fluid out. This creates a vacuum in the reservoir that resists fluid flow to the pump inlet, potentially causing pump

cavitation. The pump struggles to draw fluid against the vacuum, reducing output and generating the characteristic cavitation whine.

132. B — The propulsion control system monitors driver demand (accelerator pedal), battery state of charge, and motor power limits continuously. When the power demand exceeds what the electric motor and battery can deliver alone — such as during highway acceleration — the PCS automatically starts the ICE to supplement the electric drive.

133. D — Cell imbalance means some cells have higher voltage (more charge) and others have lower voltage (less charge) within the same pack. The BMS limits the pack's usable energy based on the weakest cell — the pack can only be discharged to the minimum voltage of the weakest cell and charged to the maximum voltage of the strongest cell. This reduces usable range and accelerates degradation.

134. A — Insulation resistance between the high-voltage bus and the chassis is measured using a megohmmeter (insulation resistance tester) rated at CAT III or CAT IV for the system voltage. This instrument applies a controlled test voltage and measures the resistance of the insulation barrier. A standard automotive DMM does not have the capability to perform this test safely or accurately.

135. C — Orange is the internationally standardized colour (per SAE J1673) that identifies all high-voltage cables, connectors, and components operating above 60 volts DC on hybrid and electric vehicles. This universal colour coding ensures that any technician working on any vehicle can immediately identify high-voltage components regardless of manufacturer.