

PRACTICE EXAM 3: RED SEAL TRUCK AND TRANSPORT MECHANIC SIMULATION (135 QUESTIONS)

1. A technician needs to check the specific properties of a cleaning solvent before using it on painted truck cab surfaces. The product has a supplier label, but the technician needs detailed information about chemical reactivity and incompatible materials. Which section of the Safety Data Sheet contains this information?

- A. Section 2 — Hazard Identification, which lists the pictograms and signal words for the product classification
- B. Section 8 — Exposure Controls and Personal Protection, which specifies required PPE for handling the product
- C. Section 7 — Handling and Storage, which describes the temperature and humidity requirements for storage
- D. Section 10 — Stability and Reactivity, which describes chemical stability and materials the product reacts with

2. A fleet shop has three technicians working simultaneously on the same tractor — one on the electrical system, one under the vehicle on the driveshaft, and one on the air brake system. All energy sources have been isolated. How many lockout devices must be applied to the energy isolation points?

- A. One lockout device per energy source is sufficient as long as all three technicians have signed the lockout permit
- B. Three lockout devices — one from each technician — must be applied so no person can re-energize while others work
- C. Two lockout devices are sufficient — one for the lead technician and one for the shop supervisor overseeing the job
- D. Only the first technician to begin work needs to apply a lock and the others operate under that person's protection

3. A technician is preparing to inflate a commercial truck tire mounted on a single-piece rim. The tire has been seated on the rim and the bead appears to be in its proper position. What safety procedure must be followed during inflation?

A. Inflate the tire inside a safety cage or with a portable restraining device while standing to the side with a clip-on chuck and extension hose

B. Hold the air chuck firmly on the valve stem by hand during inflation to ensure an adequate seal for proper bead seating

C. Inflate the tire while it is mounted on the vehicle with the lug nuts fully torqued to prevent the wheel from shifting

D. Exceed the maximum sidewall pressure by 15 psi momentarily to ensure the bead seats completely against the rim flange

4. During a PM inspection, a technician identifies a cracked exhaust manifold on a truck that is scheduled for a long-haul trip the next morning. The fleet manager wants to defer the repair until the truck returns. What should the technician document?

A. Nothing — the technician should simply inform the driver verbally and allow the fleet manager to make the final decision

B. Only the date and the fleet manager's name in a personal notebook as a record of the conversation that took place

C. The defect on the work order including a description of the crack location and the fleet manager's decision to defer repair

D. A formal complaint to the provincial transportation authority reporting the fleet manager for unsafe vehicle practices

5. A technician is using an oxy-acetylene torch to heat a seized U-bolt nut on a leaf spring. Before lighting the torch, what fire prevention measure should be taken in addition to having a fire extinguisher available?

A. Notify the shop foreman of the hot work so an incident report can be pre-filled in case a fire occurs during the task

B. Close all shop doors and windows to prevent air drafts from spreading sparks to adjacent work areas and vehicles

C. Apply a fire-resistant blanket over the fuel tank and check that no flammable materials are within the immediate hot work zone

D. Inspect the area within at least 10 metres for flammable materials, remove or cover what cannot be moved, and arrange a fire watch

6. A second-year apprentice is assigned to perform a wheel bearing adjustment for the first time without supervision. The apprentice is unsure of the procedure. According to workplace safety and mentoring best practices, what should the apprentice do?

A. Attempt the procedure using general automotive knowledge and correct any mistakes during the quality check afterward

B. Stop and ask a qualified journeyman for guidance before proceeding rather than risk an incorrect adjustment

C. Watch an online video tutorial on wheel bearing adjustment and then proceed with the task based on that instruction

D. Complete the adjustment using the tightest possible setting since an overly tight bearing is safer than a loose one

7. A technician needs to transport used lead-acid batteries from the shop to a recycling depot. According to TDG regulations, what classification applies to these batteries?

A. Class 8 — Corrosive substances, because lead-acid batteries contain sulphuric acid that is classified as corrosive

B. Class 6 — Toxic substances, because the lead content in the plates presents a poisoning hazard during transport

C. Class 9 — Miscellaneous dangerous goods, because batteries combine multiple hazard types into one classification

D. Class 2 — Compressed gases, because the sealed battery contains hydrogen gas generated during the charging process

8. A truck's work order states "check and top up all fluids." The technician checks the power steering reservoir and finds it 50 mm below the full mark. Before adding fluid, what must the technician verify?

- A. The engine oil level is correct because power steering pumps on some engines share a common lubrication reservoir
- B. The ambient temperature is above 10°C because cold fluid expands significantly and overfilling will occur when warmed
- C. The correct fluid type for the specific vehicle by checking the reservoir cap, the OEM manual, or the vehicle specification
- D. The alternator output voltage is stable because low charging voltage can cause the power steering pump to cavitate

9. A heavy-duty diesel engine has a compression ratio of 17:1. If the cylinder's total volume at BDC is 1,700 cc, what is the clearance volume at TDC?

- A. 170 cc — calculated by dividing the total volume by the compression ratio minus the swept volume
- B. 17 cc — calculated by dividing the swept volume by the number of compression strokes per revolution
- C. 289 cc — calculated by multiplying the compression ratio by the clearance volume constant for diesel engines
- D. 100 cc — calculated by dividing the total volume at BDC by the compression ratio of 17 to 1

10. A technician is performing a cylinder leak-down test on a diesel engine. With the piston at TDC compression, regulated air is introduced through the injector port. The gauge shows 25% leakage, and air is heard hissing from the oil fill cap on the valve cover. Where is the leak?

- A. Past the piston rings into the crankcase — air escaping at the oil fill cap confirms ring seal failure on that cylinder
- B. Past the intake valve into the intake manifold where it pressurizes the crankcase ventilation system crossover tube
- C. Through a cracked cylinder head into the cooling jacket which connects to the crankcase through the oil cooler core
- D. Past the exhaust valve into the exhaust manifold and then backward through the turbocharger oil drain to the crankcase

11. An oil analysis trend over four consecutive samples shows steadily increasing iron content. All other wear metals remain stable. What does this progressive increase in iron most likely indicate?

- A. Normal coolant additive depletion that releases iron compounds from the corrosion inhibitor package over time
- B. Gradual cylinder liner and/or crankshaft journal wear that is progressing at a predictable rate over the sample intervals
- C. A sudden bearing failure that began during the most recent sample period and will require immediate engine teardown
- D. Contaminated oil sample bottles that introduced iron particles during the collection process at the last four PM services

12. A heavy-duty diesel engine overheats only when climbing long grades under full load. At cruise on flat highway, the temperature remains normal. All cooling system components have been checked and are functioning correctly. What is the most likely cause?

- A. The radiator cap pressure rating is too low allowing the coolant to boil at a lower temperature than required under load
- B. The water pump impeller has eroded and cannot maintain adequate coolant flow at the elevated RPM of grade climbing
- C. The fan clutch engages too late because its thermal spring response time cannot keep up with the rapid heat rise under load
- D. The engine is operating within its thermal design limits — some temperature rise under sustained maximum load is expected and normal

13. A truck driver reports that the engine produces a puff of blue smoke immediately after a long idle period followed by acceleration. The smoke clears within seconds and does not return during sustained driving. What is the most likely cause?

- A. The turbocharger centre section oil seal has failed allowing oil to continuously leak into the exhaust turbine housing
- B. The piston rings are worn and cannot seal properly during the transition from idle to loaded acceleration conditions

C. Oil has accumulated past worn valve guide seals during the idle period and burns off when exhaust gas volume increases

D. The DPF is releasing stored soot during the acceleration event which appears as blue-tinted exhaust smoke temporarily

14. A common rail diesel engine has intermittent rough idle. The scan tool shows no active fault codes. Injector contribution balance data shows cylinder number 5 consistently compensating more than the other five cylinders. What does this indicate?

A. Cylinder 5's injector is delivering less fuel than commanded — the ECM is adding extra fuel to that cylinder to equalize contribution

B. Cylinder 5 has higher compression than the other cylinders causing it to produce more power per injection event

C. The fuel rail pressure sensor has a minor calibration error that disproportionately affects the number 5 injector calculation

D. The camshaft position sensor signal has a phase error that shifts the injection timing for cylinder 5 relative to the others

15. A technician discovers that the engine oil cooler housing bolts on a heavy-duty diesel engine are weeping oil. Before simply retorquing the bolts, what should the technician consider?

A. The bolts may have been previously over-torqued causing thread damage that prevents the gasket from sealing properly

B. The oil cooler housing gasket or O-rings may have deteriorated and require replacement rather than just retorquing the fasteners

C. The engine block casting may have a porosity defect near the bolt holes allowing oil to seep through the casting material

D. The engine oil pressure may be too high due to a stuck-closed relief valve which is forcing oil past the cooler housing gasket

16. A diesel engine equipped with EGR runs rough and produces excessive black smoke at idle but clears up at higher RPM. Scan tool data shows the EGR valve is commanding 0% at idle but the actual EGR valve position reads 15%. What is wrong?

- A. The EGR cooler has an internal bypass valve that is stuck open allowing unregulated exhaust gas flow at all engine speeds
- B. The intake manifold temperature sensor is reading falsely low causing the ECM to command additional EGR for warmup enrichment
- C. The turbocharger VGT vanes are stuck in the closed position creating excessive exhaust pressure that forces EGR gas past the valve
- D. The EGR valve is stuck partially open allowing exhaust gas to dilute the intake charge at idle when no EGR flow is commanded

17. During a cooling system flush on a heavy-duty diesel engine, the technician notices that the old coolant has a green tint but the vehicle specification calls for extended life coolant (ELC) which is typically red or pink. What concern does this raise?

- A. The wrong coolant type was installed at a previous service which may have caused premature corrosion or additive incompatibility
- B. The green tint is caused by copper corrosion from the heater core and indicates the cooling system has internal metal damage
- C. Green coolant is acceptable in any diesel engine regardless of the OEM specification because all antifreeze provides freeze protection
- D. The coolant colour has faded from red to green due to age and oxidation which is a normal characteristic of aging ELC fluid

18. A heavy-duty diesel engine has a persistent fault code for low boost pressure. The turbocharger appears to be in good condition with no shaft play and clean vanes. The charge air cooler has been pressure-tested and holds pressure. What should be checked next?

- A. The intake piping and boots between the turbocharger compressor outlet and the intake manifold for cracks, holes, or loose clamps that allow boost air to escape
- B. The exhaust manifold bolts for correct torque because loose manifold bolts reduce the exhaust energy available to the turbine
- C. The fuel injector opening pressures because low injection pressure reduces the combustion energy that drives the turbocharger
- D. The engine ECM calibration software version because outdated software may incorrectly calculate the expected boost pressure

19. A truck's coolant temperature gauge fluctuates rapidly between normal and hot during highway driving. The coolant level is correct and there are no visible leaks. What is the most likely cause?

- A. The radiator cap is releasing pressure intermittently allowing steam pockets to form and collapse near the temperature sensor
- B. An air pocket trapped in the cooling system near the temperature sensor alternately exposes the sensor to air and coolant
- C. The water pump bearing is failing causing intermittent loss of coolant circulation as the impeller wobbles on the shaft
- D. The thermostat is opening and closing erratically instead of modulating smoothly causing the temperature to oscillate rapidly

20. A heavy-duty diesel engine is being reassembled after an in-frame overhaul. The technician installs the cylinder head and torques the head bolts to the OEM specification using the correct sequence. However, the head bolts are the original bolts from the disassembly — not new. If these are torque-to-yield (TTY) bolts, what is the risk?

- A. The head bolt torque reading will be approximately 10% lower than specification but will still provide adequate clamping force
- B. The reused bolts will function identically to new bolts because the yield point resets when the bolts are relaxed and retorqued
- C. The head bolts may need an additional 30 degrees of angle beyond the OEM specification to compensate for the previous stretch
- D. The bolts have already been permanently stretched beyond their elastic limit and may fail or provide inconsistent clamping force

21. An engine oil pressure gauge reads 275 kPa at idle and 450 kPa at 1,500 RPM. The OEM specification calls for minimum 140 kPa at idle and 310 to 520 kPa at rated speed. What is the assessment of these readings?

- A. The idle pressure is too high indicating the pressure relief valve is sticking closed and should be inspected and cleaned
- B. The rated speed pressure is too low and the oil pump should be replaced before the bearings are damaged from starvation

C. Both readings are within the OEM specification range indicating the oil pressure system is functioning normally

D. The pressure differential between idle and rated speed is too narrow indicating the oil pump is bypassing internally

22. A technician replaces the air filter on a heavy-duty diesel engine. After installing the new primary element, the technician notices the secondary (safety) element is discolored but not restricted. Should the secondary element be replaced?

A. Replace the secondary element only if the primary element was found damaged — the secondary protects against contamination if the primary fails

B. Replace both elements at every service regardless of condition to maintain the maximum filtration efficiency at all times

C. Never replace the secondary element at the same time as the primary — replace it at every second or third primary change

D. Leave the secondary in place since it is not restricted — replace it only when the air restriction indicator triggers its own warning

23. A diesel engine has been running at idle for extended periods in a cold climate. Oil analysis shows elevated fuel dilution and the oil viscosity is lower than expected. What operational factor is causing the fuel dilution?

A. The idle fuel delivery rate is too high because the ECM cold-compensation strategy overfuels the engine at low temperature

B. Extended idling causes incomplete combustion — unburned fuel washes past the piston rings and enters the crankcase oil

C. The fuel return line check valve leaks at idle allowing fuel to siphon from the return circuit into the crankcase through the gear train

D. Cold ambient temperature causes the fuel injector nozzles to drip after each injection event depositing liquid fuel on the liner walls

24. A DOC efficiency test shows the diesel oxidation catalyst is not producing the expected temperature rise during an active DPF regeneration event. The ECM is commanding late-post injection and the exhaust temperature pre-DOC is adequate. What has most likely happened to the DOC?

- A. The DOC substrate has melted and blocked from an uncontrolled regeneration event that exceeded the catalyst temperature limit
- B. The DPF downstream of the DOC has become so loaded with ash that backpressure is preventing exhaust flow through the DOC
- C. The EGR cooler has developed a leak that introduces coolant vapour into the exhaust stream which poisons the DOC catalyst surface
- D. The DOC catalyst has been contaminated or degraded losing its ability to oxidize hydrocarbons and produce the exothermic temperature rise

25. A truck equipped with an SCR system has a NO_x conversion efficiency of only 40%. The upstream NO_x reads 800 ppm and the downstream reads 480 ppm. DEF quality, dosing rate, and exhaust temperature at the SCR inlet are all within normal parameters. What is the most likely cause?

- A. The upstream NO_x sensor has drifted and is reading higher than actual causing the efficiency calculation to appear artificially low
- B. The exhaust gas temperature sensor downstream of the SCR has failed causing the controller to reduce DEF dosing prematurely
- C. The SCR catalyst substrate has degraded from thermal damage, contamination, or age and can no longer convert NO_x efficiently
- D. The ammonia slip catalyst downstream of the SCR is capturing the converted nitrogen gas and recycling it back as NO_x falsely

26. A technician is performing a valve lash adjustment on an OHV diesel engine. While adjusting cylinder number 3, the technician rotates the engine to position the companion cylinder at valve overlap. After adjusting, the technician rechecks and finds the lash has changed from the initial setting. What happened?

- A. The locknut was not held firmly while tightening, allowing the adjusting screw to turn and change the lash setting during the locknut torque
- B. The pushrod was bent and deflected under the load of the locknut torque producing a false lash measurement on the first reading
- C. The cam follower roller on cylinder 3 was not on the base circle during the first measurement giving an incorrect initial reading

D. The valve spring retainer lock (keeper) shifted during the adjustment compressing the spring further and reducing the apparent clearance

27. A compression brake (engine retarder) produces a noticeably weaker braking effect than it did six months ago. All six cylinders activate when tested through the scan tool. Engine oil pressure is within specification. What should be checked?

A. The compression brake solenoid valves for reduced magnetic pull force due to weakened coil windings from thermal aging

B. The compression brake slave piston lash on all cylinders — worn lash reduces the exhaust valve opening during brake events and decreases retarding force

C. The turbocharger wastegate for a stuck-open condition that reduces exhaust backpressure during the compression brake cycle

D. The engine ECM compression brake calibration for a software update that may have reduced the maximum commanded braking level

28. A common rail diesel engine cranks normally but will not start. The scan tool shows commanded rail pressure at 500 bar during cranking but actual rail pressure reads 0 bar. Transfer pump pressure is within specification. What is the most likely cause?

A. All six fuel injectors have failed simultaneously causing a total loss of fuel delivery to all cylinders during the cranking event

B. The fuel rail pressure sensor has failed reading zero regardless of actual pressure causing a false no-pressure indication

C. The high-pressure fuel pump has failed or the fuel metering unit is stuck closed preventing any fuel from being pressurized into the rail

D. The engine crankshaft position sensor signal is missing causing the ECM to not command the high-pressure pump during cranking

29. A heavy-duty diesel engine has a persistent exhaust leak at the number 4 cylinder exhaust manifold-to-head connection. The manifold bolt torques check correct and the gasket was recently replaced. What is the most likely underlying cause?

- A. The cylinder head exhaust port face at number 4 is warped from thermal distortion creating a gap that the gasket cannot seal
- B. The replacement exhaust manifold gasket is an incorrect thickness for this engine model and does not fill the joint properly
- C. The exhaust manifold bolt grade is too low and the bolts are stretching under thermal load reducing clamping force when hot
- D. The number 4 exhaust port runner in the manifold has developed a hairline crack that propagates to the flange sealing surface

30. A heavy-duty truck's air dryer is expelling excessive amounts of oil during each purge cycle. The desiccant cartridge was replaced recently. What is the most likely upstream cause of the oil carry-over?

- A. The air dryer purge valve is opening too aggressively and creating a venturi effect that pulls oil from the wet tank backward
- B. The replacement desiccant cartridge is an incorrect part that does not include the oil-coalescing filter element required for this model
- C. The air governor is cycling the compressor too frequently which does not allow the dryer enough time between cycles to process oil
- D. The air compressor piston rings or cylinder bore are worn allowing excessive engine oil to pass into the compressed air discharge stream

31. A truck's brake pedal feels spongy and the stopping distance has increased noticeably. The air system pressure is at full cut-out and there are no audible air leaks. The brake drum temperatures after a series of stops are significantly different between the left and right sides of the same axle. What is the most likely cause?

- A. The brake pedal return spring has weakened causing the foot valve to deliver air pressure slowly during brake applications
- B. One or more brake chambers have a restricted air supply line or a partially collapsed hose that delays air delivery to the chamber
- C. The air dryer is passing moisture that has accumulated in the brake valve ports creating internal ice crystals during cold weather
- D. The ABS modulator valves are stuck in the hold position on one side preventing full pressure from reaching those brake chambers

32. A driver reports that the truck's air pressure builds to cut-out but drops to the low-pressure warning level within three minutes of shutting the engine off. A soap solution test reveals no external leaks on any component. Where should the technician look for the leak?

- A. The air dryer purge valve for an internal leak that continuously vents a small amount of air that is not externally audible
- B. The dashboard air pressure gauges for inaccuracy — the pressure may actually be holding but the gauges are reading low
- C. The air compressor discharge valve for a leak that allows air to escape backward through the compressor cylinders to atmosphere
- D. Inside the cab behind the dashboard panels where brake valve bodies, fittings, and lines may have a leak not visible externally

33. An S-cam brake is being inspected and the technician finds that the brake linings are worn in a tapered pattern — thicker at the anchor pin end and thinner at the cam end. What is the most likely cause of this uneven wear?

- A. The S-cam is worn and the lobe profile has changed shape causing uneven shoe-to-drum contact across the lining surface
- B. The return springs are too strong pulling the shoes away from the drum more forcefully at the anchor end than at the cam end
- C. The brake drum has developed an out-of-round condition that contacts the lining more heavily at the cam end during rotation
- D. The anchor pins are seized preventing the shoe from pivoting freely and distributing braking force evenly across the full lining length

34. A tractor-trailer combination passes the air leak test with brakes released but fails with brakes applied. The leak rate with brakes applied exceeds 28 kPa (4 psi) per minute. All tractor brake chambers have been checked and are not leaking. Where is the leak most likely located?

- A. In the tractor foot valve which only pressurizes its delivery ports during brake application creating a leak path under application pressure
- B. In the tractor protection valve which opens under brake application to supply the trailer and develops a leak under the higher pressure

C. In the air supply line between the compressor and the wet tank which is stressed during brake application from pressure fluctuations

D. In one or more trailer brake chambers, relay valves, or air lines that are pressurized only when the brakes are applied

35. A truck's automatic slack adjuster has been replaced on the right rear drive axle due to an out-of-adjustment condition. Within 500 km of driving, the pushrod stroke on the same wheel is once again out of adjustment. What is the most likely reason the new adjuster cannot maintain adjustment?

A. The replacement automatic slack adjuster is a different brand than the original and is not compatible with this brake chamber model

B. An underlying foundation brake problem — worn S-cam bushings, a seized S-cam, or worn drum — is preventing the adjuster from functioning

C. The air supply pressure to the brake chamber on that wheel is lower than the other chambers causing incomplete brake application

D. The brake shoe return springs on that wheel are too weak to retract the shoes after each application causing drag and rapid readjustment

36. During an air brake system inspection, a technician operates the foot valve and notices that the gauges show primary circuit pressure dropping but the secondary circuit gauge shows no pressure drop. The rear brakes apply but the front brakes do not. What has failed?

A. The secondary delivery circuit of the dual foot valve has failed — it is not metering air to the front brake circuit when the pedal is pressed

B. The one-way check valve between the supply tank and the secondary reservoir is stuck closed and has blocked the air supply

C. The front brake chambers have all simultaneously developed internal leaks that prevent them from receiving application pressure

D. The ABS modulator valves on the front axle are stuck in the exhaust position and are dumping all application air before it reaches the chambers

37. What is the purpose of the spring brake modulating valve (also called the inversion valve or spring brake proportioning valve) in some air brake systems?

- A. It modulates the rate at which the spring brakes apply during a parking brake application to prevent sudden lockup of the drive wheels
- B. It limits the spring brake application force to a percentage of the service brake force to prevent rear axle lockup during emergency stops
- C. It allows the driver to use the spring brakes as a proportional emergency brake by partially applying them through a controlled air bleed
- D. It converts the spring brake from a parking device to a modulated service brake during the secondary circuit failure by metering supply air

38. A truck driver activates the trailer supply valve (red button) to disconnect from a trailer. Immediately, the trailer brakes lock up. Why?

- A. The tractor protection valve is stuck in the open position and is sending full system pressure to the trailer brake chambers
- B. The trailer service brakes have applied because the blue gladhand still has residual pressure from the last brake application event
- C. The trailer ABS has interpreted the sudden loss of supply air as an emergency and has commanded full modulator valve closure
- D. Closing the trailer supply valve cuts the air supply that was holding the trailer's spring brakes released — the springs apply the brakes

39. A technician is replacing a brake chamber on a drive axle. The new chamber is a Type 30/30 spring brake (dual chamber). During installation, the pushrod length must be verified. Why is the correct pushrod length critical?

- A. An incorrect pushrod length changes the effective geometry of the slack adjuster and S-cam causing the brake to be out of adjustment or unable to achieve full application or full release
- B. A pushrod that is too short will cause the spring brake to apply with excessive force potentially cracking the brake drum
- C. A pushrod that is too long will interfere with the automatic slack adjuster's internal gear mechanism preventing automatic adjustment
- D. The pushrod length determines the air volume inside the chamber and an incorrect length changes the application pressure required

40. An air disc brake caliper has a brake pad wear indicator that contacts the rotor surface and produces an audible scraping noise. The brake pads measure 3 mm in thickness. The minimum pad thickness specification is 2 mm. What action should be taken?

- A. Replace the brake pads immediately since the wear indicator contacting the rotor means the pads are at their replacement threshold
- B. Schedule pad replacement at the next PM service since the pads still have 1 mm above the minimum specification and the noise is only a warning
- C. Adjust the caliper slide mechanism to move the wear indicator away from the rotor surface to eliminate the noise until the pads wear further
- D. Replace the rotor because the wear indicator has scored the rotor surface beyond the minimum thickness specification tolerance

41. A loaded tanker truck must stop on a steep downhill grade. The driver applies the service brakes firmly, and the ABS activates on the drive axle wheels. What should the driver do?

- A. Release the brake pedal completely to deactivate the ABS and then reapply the brakes with lighter pedal pressure to stay below ABS activation
- B. Pump the brake pedal rapidly to manually modulate the braking force rather than relying on the electronic ABS modulation system
- C. Downshift the transmission to increase engine braking and reduce the demand on the service brakes during the ABS activation event
- D. Maintain firm steady pressure on the brake pedal and allow the ABS to modulate — the system provides maximum braking while maintaining steering control

42. A tractor's primary and secondary air gauges both read zero, but the vehicle was parked with full system pressure the previous evening. There was no indication of a leak at the time of parking. What should be checked first?

- A. The air dryer for a stuck-open purge valve or the governor for a failed unloader signal that caused continuous air bleeding overnight
- B. The brake chambers for leaks because the spring brakes would have applied as pressure dropped and may have masked the leak sound

C. The one-way check valves between the supply tank and both service reservoirs for failure that allowed all tanks to drain simultaneously

D. The safety valves on the primary and secondary reservoirs for cracked seats that allowed both tanks to bleed down to zero pressure

43. A trailer equipped with ABS has its ABS warning lamp on the trailer side panel illuminated. The tractor ABS lamp is off. The trailer brakes function during a parking lot test. What does this mean for the trailer's braking capability?

A. The trailer service brakes function normally for standard braking but the anti-lock capability is disabled until the ABS fault is repaired

B. The trailer brakes will not apply above 30 km/h because the ABS locks out the brake chambers at highway speed when a fault exists

C. The trailer brakes function at reduced capacity because the ABS modulators default to a half-pressure position when a fault is present

D. The trailer brakes will lock up during every brake application because the ABS modulators are stuck in the full-apply position permanently

44. A truck's air compressor head gasket has failed. What symptom would this failure produce?

A. The compressor would run normally but the discharge air would contain engine coolant mist that contaminates the air dryer

B. The compressor would lose pumping efficiency as compressed air leaks past the failed gasket reducing its ability to build system pressure

C. The engine oil level would rise because the compressor would pump air into the engine crankcase through the failed head gasket seal

D. The compressor would run louder than normal but its pressure output and cycling interval would remain unaffected by the gasket failure

45. A truck driver reports that the vehicle pulls to the right during hard braking on dry pavement. The tire pressure is equal on both sides and the wheel alignment is within specification. What brake-related condition is most likely causing this pull?

- A. The right front brake is applying with more force than the left front due to a shorter pushrod stroke or higher lining contact area
- B. The left front brake is applying with less force than the right due to contaminated linings, a seized caliper, or a restricted air line
- C. The ABS system is modulating the right front brake more aggressively than the left creating an asymmetric braking force distribution
- D. The left rear brake is dragging slightly which creates a torque around the vehicle's centre of gravity pulling the vehicle to the right

46. When is it acceptable to use the trailer hand valve (trolley valve) as a parking brake for the trailer during coupling and uncoupling operations?

- A. Always — the trailer hand valve should be used as the primary means of securing the trailer during all coupling and uncoupling operations
- B. Only when the trailer's spring brakes are known to be defective and cannot hold the trailer on the grade during coupling procedures
- C. Never — the trailer hand valve applies the service brakes using air pressure that will eventually leak off, and the trailer may roll away
- D. Only when the trailer is disconnected from the tractor and the gladhands are sealed because the supply air maintains the hand valve pressure

47. A truck's battery cables are tested using a voltage drop method during cranking. The positive cable drop reads 0.3 volts and the ground cable drop reads 0.6 volts. What is the correct assessment?

- A. Both cables are within acceptable limits and the starter circuit is delivering adequate voltage to the motor assembly
- B. The ground cable has excessive voltage drop indicating high resistance in the ground path that must be located and corrected
- C. The positive cable has excessive voltage drop and should be replaced before any further testing of the ground circuit
- D. Both cables have borderline readings and should be replaced as a matched set to ensure uniform resistance across the circuit

48. A truck's instrument cluster voltmeter reads 15.2 volts with the engine running at 1,500 RPM. All electrical loads are operating normally. What does this reading indicate?

- A. The voltage regulator is failing and allowing the alternator to overcharge the system which will damage batteries and electronic modules
- B. This is a normal reading for a heavy-duty 12-volt charging system during moderate engine RPM with normal accessory loads
- C. The voltmeter is reading incorrectly because the maximum possible charging system voltage for a 12-volt system is 14.8 volts
- D. The battery has an internal short in one cell that is pulling the system voltage above the normal range during the charging cycle

49. A truck has a complete loss of all exterior lighting — headlamps, markers, clearance lamps, and tail lamps — but all interior dash lights and instruments function normally. What is the most likely cause?

- A. The alternator has failed and the battery cannot sustain the combined current draw of all exterior lighting circuits simultaneously
- B. The CAN bus communication between the headlamp switch and the body controller has failed preventing all lamp commands
- C. The ignition switch has an internal fault that interrupts power only to the exterior lighting circuit while maintaining interior functions
- D. A main fuse, relay, or fusible link that feeds the exterior lighting power distribution bus has failed while the interior bus remains powered

50. A technician uses an oscilloscope to observe the crankshaft position sensor waveform. The waveform shows consistent pulses with one gap where a pulse is missing. What does this missing pulse represent?

- A. A defective tooth on the reluctor wheel that has broken off and must be replaced to restore accurate position sensing
- B. The intentional missing tooth (or reduced tooth) on the reluctor wheel that the ECM uses as the crankshaft reference position

C. Electrical interference from an adjacent wire that is cancelling one pulse per revolution in the sensor signal waveform

D. A worn sensor tip that loses magnetic field strength at one point in the rotation due to an uneven air gap condition

51. A heavy-duty truck's electric window motor on the passenger side operates in the down direction but not in the up direction when actuated from the passenger switch. However, it operates in both directions from the master switch on the driver's door. What is the most likely cause?

A. The window motor has a failed winding that only works in one direction requiring motor replacement for both-direction operation

B. The passenger switch is working correctly — the master switch has a lockout that controls passenger window direction capability

C. The passenger-side window switch has a failed internal contact for the up direction while the down contact remains functional

D. The window regulator mechanism is binding in the up direction but operates freely downward due to gravity assistance on descent

52. A truck's engine ECM sets a fault code for the intake manifold temperature sensor — SPN 105, FMI 3 (voltage above normal). The sensor uses a 5-volt reference from the ECM. What condition produces this fault code?

A. An open circuit in the sensor wiring or a disconnected sensor connector causes the ECM to read the full 5-volt reference unloaded

B. A short circuit to ground in the sensor wiring pulls the voltage to zero which the ECM interprets as a voltage-above-normal fault

C. The sensor element has drifted out of calibration and is reporting a temperature higher than the actual manifold air temperature

D. The 5-volt reference supply from the ECM has failed causing the sensor circuit to float at battery voltage during engine operation

53. A truck with LED tail lamps and an incandescent licence plate lamp on the same circuit has the licence plate lamp burning out frequently. The LED tail lamps function normally. What is the most likely cause?

- A. The LED tail lamps draw so little current that the alternator produces voltage spikes that overstress the incandescent filament
- B. The incandescent bulb is the incorrect wattage rating for the circuit and should be replaced with the correct OEM specification
- C. The trailer electrical connector is creating a feedback voltage on the tail lamp circuit that increases the voltage at the licence plate lamp
- D. The circuit was originally designed for all-incandescent loads and the voltage is slightly higher than rated for the incandescent lamp because the reduced LED current draw raises circuit voltage

54. A technician is performing a parasitic draw test on a truck that has been experiencing dead batteries after overnight parking. With all loads off and modules in sleep mode, the ammeter reads 350 milliamps. The specification allows 50 milliamps maximum. After pulling fuses one at a time, the draw drops to 40 milliamps when the fuse for the trailer connector circuit is removed. What is the most likely cause?

- A. The truck's body controller module has a software fault that keeps the trailer circuit energized after the ignition is turned off
- B. The seven-pin trailer connector is corroded and is creating a resistance path that draws current continuously from the battery
- C. The trailer electrical harness has a short circuit or a load that is drawing current through the connected seven-pin cable continuously
- D. The tractor's trailer lighting relay is stuck closed providing continuous power to the trailer circuit even with the ignition off and vehicle parked

55. A truck's starting system draws 1,400 amps during cranking. The engine cranks at normal speed and starts promptly. The OEM specification for maximum cranking amperage is 1,200 amps. What does the excessive draw indicate?

- A. The starter motor has normal wear and the higher draw is within the acceptable tolerance for a heavy-duty diesel starting system
- B. The starter motor has increased internal resistance from worn brushes, shorted windings, or a dragging armature that draws excessive current
- C. The engine has higher-than-normal mechanical resistance from incorrect oil viscosity, tight bearings, or a mechanical binding condition

D. The batteries are oversized for the application and are delivering more current than the starter motor was designed to handle safely

56. A technician measures battery voltage at the ECM power supply connector while cranking. The voltage reads 8.5 volts during the cranking event. What concern does this reading raise?

A. The voltage is acceptable because all electronic modules are designed to operate normally down to 6.0 volts during cranking

B. The ECM's minimum operating voltage during cranking is typically above 8.5 volts so the voltage drop may cause the ECM to reset

C. The low voltage will cause the fuel injectors to open for a longer duration which overfuels the engine during the cranking event

D. The voltage at the ECM is below the minimum threshold for reliable ECM operation during cranking and may cause starting problems or fault codes

57. A truck's rear clearance lamp circuit uses three lamps wired in parallel. Each lamp draws 1 amp at 12 volts. If one lamp burns out (open filament), what happens to the remaining two lamps?

A. The remaining two lamps continue to operate at normal brightness because each parallel branch is independent of the others

B. The remaining two lamps dim because the total circuit resistance increases and reduces the current available to each lamp

C. The remaining two lamps brighten because the current from the burned-out lamp redistributes to the remaining two branches

D. All three lamps go dark because the burned-out lamp acts as a switch that opens the entire parallel circuit simultaneously

58. A Hall effect vehicle speed sensor on a transmission output shaft produces a 5-volt square wave signal. The scan tool shows vehicle speed reading zero while the truck is moving. A DMM at the sensor connector shows 0 volts on the signal wire. What is the most likely cause?

A. The sensor has failed or the signal wire has an open circuit or short to ground preventing the square wave from reaching the ECM

- B. The reluctor tone ring on the transmission output shaft has lost all its teeth and cannot trigger the Hall effect sensor element
- C. The ECM has disabled the vehicle speed input because it detected a conflict with the ABS wheel speed data on the CAN bus
- D. The transmission output shaft is not rotating because the transmission is stuck in neutral despite the shift lever being in drive

59. A truck's daytime running lights (DRL) are inoperative but the headlamps function normally in all other modes. Both DRL bulbs are good. What system controls the DRL function, and where is the fault most likely located?

- A. The headlamp switch has a dedicated DRL position that has failed requiring the multifunction switch to be replaced
- B. The alternator's field circuit provides the DRL activation signal and a failed field connection would disable DRL operation
- C. The fuse for the headlamp circuit has partially failed allowing high-beam current but not the lower DRL current to pass through
- D. The body controller or DRL module that provides the automatic DRL activation signal has a fault or is not receiving its activation input

60. A truck has two batteries connected in parallel. Battery 1 tests at 12.7 volts and Battery 2 tests at 11.9 volts when disconnected from each other. What will happen if they are reconnected in parallel?

- A. Both batteries will equalize at approximately 12.3 volts as current flows from the stronger battery into the weaker battery
- B. The weaker battery will draw current from the stronger battery potentially discharging the good battery and stressing both
- C. The batteries will operate independently at their respective voltages because parallel connections do not allow current exchange
- D. The stronger battery will immediately charge the weaker battery to full voltage within minutes of reconnection restoring system balance

61. A technician is testing a fuel level sending unit using a DMM. The specification states the unit should read 10 ohms at full and 90 ohms at empty. With the tank approximately half full, the DMM reads 90 ohms. What is the most likely fault?

- A. The sending unit float is stuck at the bottom of its travel or the float arm is bent causing the unit to read empty regardless of fuel level
- B. The sending unit wiring has a high-resistance connection that is adding resistance to the measurement making it read higher than actual
- C. The sending unit float has become fuel-saturated and sunk to the bottom of the tank causing a continuous empty resistance reading
- D. Both A and C are possible — a stuck float mechanism or a saturated float would both cause the unit to read maximum resistance

62. A heavy-duty truck's windshield wiper motor operates on low speed only — high speed does not function. The wiper switch has been tested and functions correctly. What is the most likely cause?

- A. The high-speed brush in the wiper motor has worn out or the high-speed winding in the motor has failed open preventing high-speed operation
- B. The wiper motor ground connection has high resistance that limits current flow enough to prevent the motor from reaching high speed
- C. The body controller is not receiving the high-speed command from the wiper switch due to a CAN bus communication interruption
- D. The wiper linkage is binding and creating enough resistance that the motor can only achieve low speed regardless of the voltage applied

63. A truck has a charging system output test showing the alternator producing only 65 amps at rated speed. The alternator is rated at 160 amps. The drive belt is tight, the wiring is good, and the voltage at the B+ terminal equals battery voltage (12.6 V) at idle. What is the most likely cause?

- A. The battery is fully charged and the alternator is reducing its output because the voltage regulator senses no additional charging demand
- B. The alternator field circuit has excessive resistance reducing the field current and limiting the alternator's maximum output capability

- C. The alternator stator has an open winding in one of its three phases reducing the output to approximately two-thirds of rated capacity
- D. The voltage regulator is defective and limiting the field current to a constant low value regardless of the actual system voltage demand

64. A truck's horn works intermittently — sometimes it sounds when the button is pressed and sometimes it does not. The horn relay has been replaced and the horn itself tests good when connected directly to battery voltage. What is the most likely cause?

- A. The horn button switch has corroded internal contacts that make intermittent connection when pressed from different angles
- B. A poor connection in the horn button circuit — the steering column clock spring, ground wire, or connector is making intermittent contact
- C. The new horn relay has a manufacturing defect that causes intermittent contact failure under the vibration conditions of vehicle operation
- D. The horn circuit fuse is loose in its socket and vibration causes intermittent contact between the fuse terminals and the fuse panel clips

65. A truck with a multiplexed electrical system has the left front marker lamp inoperative. The technician checks voltage at the lamp socket and reads 12 volts. The bulb is good and the ground at the socket tests clean. What is the most likely cause?

- A. The body controller is providing voltage but not enough current to illuminate the lamp due to a current-limiting protection mode
- B. The voltage reading is ghost voltage (induced voltage from adjacent wires) and the circuit is not actually powered by the controller
- C. The lamp socket has a corroded internal contact that prevents current flow despite showing voltage on a high-impedance DMM measurement
- D. The marker lamp relay in the fuse panel has one welded contact that provides voltage but blocks current flow through its secondary contact

66. A technician is troubleshooting a J1939 CAN bus fault. The backbone resistance measures 58 ohms between CAN-H and CAN-L with all modules connected and the ignition off. What is the assessment?

- A. The reading is approximately correct — the specification is approximately 60 ohms (two 120-ohm terminating resistors in parallel)
- B. The reading is too low indicating there is a short circuit developing between the CAN-H and CAN-L wires somewhere on the backbone
- C. The reading is too high indicating one of the terminating resistors has increased in resistance due to corrosion or thermal damage
- D. The reading must be taken with the ignition on and modules powered to get an accurate resistance measurement of the active bus

67. A coil-on-plug ignition system on a gasoline medium-duty truck has consistent misfires on cylinder 6. The coil and spark plug have been swapped to other cylinders and the misfire stays on cylinder 6. What should be investigated next?

- A. The cylinder 6 fuel injector for a clogged nozzle or failed solenoid that prevents adequate fuel delivery to that cylinder
- B. The compression on cylinder 6 for a mechanical failure such as a burned valve, broken ring, or head gasket leak
- C. The ECM driver circuit for cylinder 6 for a fault that produces an inadequate trigger signal regardless of which coil is installed
- D. Both fuel delivery and compression on cylinder 6 should be tested since the ignition components have been ruled out by the swap test

68. A truck's electric fuel priming pump runs when the ignition is first turned on but the engine does not crank when the key is turned to the start position. All dash lights illuminate normally and the battery voltage is 12.6 volts. What is the most likely cause?

- A. The fuel priming pump is drawing so much current that insufficient voltage remains to energize the starter solenoid
- B. The batteries are too weak to crank the engine despite showing adequate resting voltage on the dashboard voltmeter
- C. A fault in the start control circuit — the neutral safety switch, clutch interlock, start relay, or ignition switch start position contact has failed
- D. The engine ECM is preventing cranking because the fuel system has not reached its minimum operating pressure during priming

69. A driver reports that the clutch pedal on a hydraulic clutch release system feels spongy and the clutch does not fully disengage. Topping up the clutch hydraulic reservoir temporarily improves the condition. What is the most likely cause?

- A. The clutch master cylinder bore is worn causing the piston to bypass fluid internally rather than delivering it to the slave cylinder
- B. A hydraulic fluid leak in the clutch release system — at the master cylinder, slave cylinder, or connecting line — is losing fluid and admitting air
- C. The clutch friction disc hub splines are corroded preventing the disc from sliding freely on the transmission input shaft
- D. The clutch release bearing is worn and requires extra travel to contact the pressure plate fingers reducing the effective pedal stroke

70. A 13-speed manual transmission will not shift from the low range to the high range. All gears within the low range shift normally. What component is most likely at fault?

- A. The range shift air cylinder, its solenoid valve, or the air supply to the range section — a pneumatic failure prevents the range shift from completing
- B. The splitter synchronizer has seized in the low-split position and is mechanically blocking the range shift mechanism travel
- C. The transmission lubricant has thickened in cold weather and the range section planetary gears cannot rotate fast enough to synchronize
- D. The range section output bearing has failed and the resulting shaft play prevents the range clutch from engaging fully

71. A truck's automatic transmission (Allison series) is operating at higher-than-normal transmission fluid temperature. The vehicle is pulling a loaded trailer on a flat highway at normal speed. The fluid level is correct. What should be checked first?

- A. The torque converter lockup clutch for slipping — a lockup clutch that cannot fully engage creates continuous fluid shear and heat
- B. The main line pressure regulator for a stuck-low condition that reduces clutch pack apply force causing slippage and heat generation

C. The governor pressure circuit for an incorrect shift point schedule that holds lower gears too long increasing RPM and fluid heating

D. The transmission cooler and cooler lines for external restriction, internal plugging, or a failed cooler bypass valve that limits cooling capacity

72. A heavy-duty truck has a vibration that occurs only at speeds between 80 and 95 km/h and disappears below and above this range. The vibration is felt through the entire vehicle. What is the most likely cause?

A. A tire imbalance that produces harmonic resonance only within the specific speed range matching the tire's natural frequency

B. An exhaust system resonance that amplifies engine firing pulses at the RPM range corresponding to 80-95 km/h vehicle speed

C. A driveshaft operating near its critical speed — the speed at which the shaft's natural frequency is excited causing bending vibration

D. A loose engine mount that allows the engine to vibrate at its natural frequency which coincides with the driveline speed at that range

73. A drive axle differential is noisy during left turns but quiet during right turns and straight-line driving. The noise is a clicking or popping sound. What is the most likely cause?

A. The right-side differential side gear or spider gear is worn or chipped — during a left turn the right wheel speeds up loading the worn gear

B. The left-side axle shaft splines are worn and clicking as they engage and disengage under the variable torque loading of the left turn

C. The ring gear has a chipped tooth that contacts the pinion only during the specific loading pattern of a left turn driving condition

D. The right wheel bearing is failing and the lateral loading during a left turn shifts the bearing rollers into a damaged section of the race

74. A truck equipped with a two-speed rear axle cannot shift from high to low range. The shift motor or solenoid activates (audible click), and the indicator light on the dash changes. What should be inspected?

- A. The two-speed shift mechanism inside the axle housing for a worn shift fork, stuck sliding clutch, or mechanical obstruction preventing engagement
- B. The vehicle speed sensor for an incorrect reading that prevents the TCM from authorizing the two-speed shift at the current vehicle speed
- C. The engine ECM for a communication fault with the axle shift controller that prevents speed synchronization during the shift event
- D. The shift motor or solenoid linkage for a disconnect or maladjustment that allows the actuator to move without transmitting force to the internal shift mechanism

75. A manual transmission makes a growling noise in all gears including neutral. The noise changes pitch with engine RPM but does not change when gears are selected. What component is the most likely source?

- A. The mainshaft pilot bearing or the countershaft bearings because these rotate in all gears including neutral whenever the engine runs
- B. The transmission input shaft bearing because it is the only bearing that rotates whenever the clutch is engaged regardless of gear selection
- C. The reverse idler gear because it rotates continuously even when reverse is not selected due to its mesh with the countershaft gears
- D. The synchronizer blocking rings because they are spring-loaded against the gear cones and create friction noise at all times during rotation

76. A truck's driveshaft has been replaced due to U-joint failure. The replacement driveshaft is the correct length and the U-joints are the correct series. After installation, the truck has a pronounced vibration at all speeds. What installation error is most likely?

- A. The driveshaft was painted before installation and the paint added weight that unbalanced the shaft beyond acceptable tolerance limits
- B. The balance weights on the replacement driveshaft were removed during shipping and must be reattached in their original position
- C. The yoke ears at the slip joint were not aligned to maintain in-phase orientation between the front and rear U-joint yokes
- D. The replacement driveshaft has a slightly different tube diameter that does not match the centre bearing support bracket correctly

77. A dual-plate clutch on a Class 8 tractor is being replaced. During disassembly, the technician finds the intermediate plate (floater plate) has deep heat discoloration on both friction surfaces. What does this indicate?

- A. The intermediate plate was overheated from clutch slippage — both the plate and the flywheel friction surfaces must be inspected for damage before reassembly
- B. The heat discoloration is a normal operating characteristic of dual-plate clutches and does not indicate any abnormal condition
- C. The pressure plate diaphragm spring tension is too high causing excessive clamping force that generates heat during normal engagement
- D. Only the intermediate plate needs replacement because the heat damage is isolated to this component and has not affected the flywheel

78. A truck with an automated manual transmission (AMT) has a fault code for excessive clutch slip during the most recent 1,000 shift events. The clutch was replaced 80,000 km ago. What should be investigated?

- A. The AMT control module software version for a calibration update that adjusts the clutch engagement strategy for the current wear level
- B. The transmission input speed sensor for a signal error that falsely reports higher input speed than actual during clutch engagement events
- C. The engine ECM for an overfuelling condition during shifts that applies more torque than the clutch can transmit without slipping
- D. The clutch actuator calibration — the AMT may need a clutch touch-point relearn because the engagement point has shifted as the disc wears

79. A centre bearing on a two-piece driveshaft requires replacement. During removal, the technician notices the rubber isolator mount has shifted approximately 10 mm off-centre in its bracket. What effect would this shift have on the driveline?

- A. No significant effect because the rubber isolator is designed to absorb minor positional variations during normal road operation
- B. The shifted isolator changes the driveline working angles at both U-joints creating a vibration that worsens with vehicle speed

C. The shifted isolator increases the torsional load on the rear U-joint only causing accelerated wear on the rear bearing caps specifically

D. The shifted isolator causes the front driveshaft to whip at a different critical speed than its design specification producing random vibrations

80. A heavy-duty drive axle has been rebuilt with a new ring and pinion set. After break-in, an oil sample shows significantly elevated iron content. All other metals are normal. What is the most likely cause?

A. The ring and pinion gear set is defective from manufacturing and must be replaced under the parts supplier's warranty claim

B. The break-in procedure was not followed correctly and the gears were loaded too heavily before the tooth surfaces had time to seat properly

C. Normal ring and pinion break-in wear produces elevated iron during the initial seating of the new gear tooth contact surfaces

D. The carrier bearing preload is too tight causing the ring gear to bind against the pinion under load generating excessive iron particles

81. A truck driver reports a metallic rattling noise from under the vehicle during deceleration in gear. The noise stops when the clutch is disengaged or when the vehicle is in neutral. What is the most likely source?

A. Worn U-joint needle bearings in the driveshaft that rattle when the torque direction reverses from drive to coast during deceleration

B. A loose flywheel-to-crankshaft bolt that allows the flywheel to shift and rattle when the drivetrain torque unloads during coastdown

C. The transmission countershaft gear teeth are worn and produce a rattle when they are unloaded during the coast deceleration condition

D. Loose heat shield or exhaust component that vibrates at the engine RPM frequency during deceleration when backpressure decreases

82. A tandem-axle truck's inter-axle differential lock will not engage when the dash switch is activated. Air pressure is confirmed at the lock actuator. What should be checked?

- A. The shift fork and sliding clutch inside the inter-axle differential for corrosion, seized splines, or mechanical binding preventing engagement
- B. The vehicle speed because the inter-axle lock can only engage below a certain speed threshold set by the axle manufacturer parameters
- C. The lock actuator diaphragm or piston for a tear or leak that prevents the air pressure from producing enough force to shift the lock mechanism
- D. The engine ECM for a software restriction that prevents the inter-axle lock from engaging while the vehicle is in motion above idle speed

83. A torque converter equipped automatic transmission produces a shudder vibration at highway speed that disappears when the driver lightly accelerates or decelerates. What is the most likely cause?

- A. The torque converter lockup clutch is slipping intermittently producing the shudder during the steady-state locked condition at cruise
- B. The transmission fluid is contaminated or degraded and has lost the friction modifier properties needed for smooth lockup clutch engagement
- C. The transmission output speed sensor has a calibration error causing the TCM to engage and disengage the lockup at an incorrect vehicle speed
- D. The torque converter stator one-way clutch has failed causing the stator to freewheel during the cruise operating condition at highway speed

84. During a clutch replacement, the pilot bearing in the flywheel is inspected and found to have noticeable roughness when rotated by hand. The bearing is not leaking grease. Should it be replaced?

- A. The pilot bearing should be reused since roughness without grease leakage indicates the bearing is still within its serviceable life range
- B. The pilot bearing does not affect clutch operation and can be left in place unless it has completely seized on the input shaft tip
- C. The pilot bearing should be lubricated with high-temperature grease and reinstalled since the roughness is from dried lubricant depletion
- D. The pilot bearing must be replaced — roughness indicates the rolling elements or races are damaged and will cause input shaft wobble and clutch chatter

85. An electromagnetic driveline retarder works at maximum braking level but does not provide the lower intermediate braking levels when selected. Full level and zero level work correctly. What is the most likely cause?

- A. The retarder stator coils have a partial winding short that produces full magnetic field at maximum current but cannot achieve partial field strengths
- B. The retarder control module or its current-regulating circuitry has a fault that prevents it from proportionally adjusting the stator coil current for intermediate levels
- C. The CAN bus communication between the dash selector switch and the retarder module has a data error that corrupts intermediate level commands
- D. The retarder rotor has developed surface irregularities that create resonance vibrations at intermediate braking levels causing the module to default to maximum

86. A truck has a groaning noise from the power steering system when the steering wheel is turned. The noise occurs at all speeds and is most noticeable during slow-speed parking maneuvers. The fluid level is correct and the fluid appears clean. What is the most likely cause?

- A. The steering gearbox sector shaft adjustment is too tight creating mechanical binding that produces the groaning noise during turns
- B. The power steering drive belt is glazed and slipping under the increased load of steering input producing a groan rather than a squeal
- C. The tie rod ends have dried out internally and the ball joint socket is groaning as the stud rotates under load during steering movement
- D. The power steering pump is worn internally and cannot maintain pressure without cavitating under the increased demand of steering loads

87. A truck's steering wheel has 100 mm of free play at the rim. The OEM specification allows 75 mm maximum. A technician checks the pitman arm connection, drag link ball joints, tie rod ends, and king pins — all are within specification with minimal play. Where is the remaining free play most likely originating?

- A. The steering column universal joint has wear in its needle bearings creating play that is transmitted to the steering wheel rim

- B. The steer axle wheel bearings are loose contributing play that adds to the total steering system free play measurement at the rim
- C. The steering gearbox has internal wear in the recirculating ball mechanism or worm shaft bearings that accounts for the excess play
- D. The steer tire sidewall flex is being misinterpreted as steering system free play because the tires deflect before the wheels respond

88. A truck's frame has been involved in a collision that bent the front right frame rail inward by approximately 25 mm. The rail is not cracked. What is the correct repair approach?

- A. Heat the rail with an oxy-acetylene torch to cherry red and straighten it with a hydraulic ram to restore the original rail alignment
- B. Cut out the damaged section and weld in a new rail section using full-penetration butt welds per structural welding procedures
- C. Leave the rail in its current condition since 25 mm of deflection is within the acceptable tolerance for heavy-duty truck frame rails
- D. Cold-straighten the rail using a portable hydraulic frame press if the manufacturer permits cold straightening and verify alignment afterward

89. Both steer tires on a truck show even wear across the full tread width, but the wear rate is significantly faster than expected for the mileage. The tire type and inflation pressure are correct. What is the most likely cause?

- A. The steer axle is carrying more weight than its rated capacity due to incorrect fifth wheel positioning or vehicle overloading
- B. The tires are an incorrect load range for the steer axle weight rating and are deflecting excessively under the normal axle load
- C. The suspension ride height is too low causing the steer tires to operate at an incorrect camber angle accelerating the even wear rate
- D. The steer tire rotation interval has been missed and the tires should have been moved to a less-wearing position on a different axle

90. A trailer air ride suspension has one air bag that is visibly inflated more than the others on the same axle. The ride height on that side is approximately 25 mm higher than specification. What is the most likely cause?

- A. The air bag on the opposite side has a slow leak that is overcompensating the height on the high side through the leveling system
- B. The shock absorber on the high side has seized in the extended position physically preventing the suspension from settling to correct height
- C. The cross-member at that bag mounting location has bent upward raising the bag mounting point above its designed position on the frame
- D. The height control valve for that side is maladjusted or the valve linkage arm is bent causing it to overfill the air bag beyond the correct height

91. A fifth wheel inspection reveals that the fifth wheel plate surface has worn a visible depression approximately 3 mm deep where the trailer upper coupler plate contacts during normal operation. What is the consequence of this wear?

- A. The trailer will rock in the worn depression during acceleration and braking producing a clunking noise and accelerating king pin and jaw wear
- B. The worn surface creates better trailer tracking because the upper coupler seats into the depression and reduces lateral movement during turns
- C. The fifth wheel plate wear has no operational consequence until the depression exceeds 6 mm at which point the plate must be resurfaced
- D. The depression improves fifth wheel lubrication retention by creating a grease reservoir that reduces friction during articulation maneuvers

92. A truck's leaf spring suspension on the drive axle has a broken U-bolt on one side. The remaining three U-bolts on that spring appear tight. Can the vehicle be driven to the shop for repair?

- A. Yes — three of four U-bolts is adequate for the short drive to the shop as long as the driver avoids highway speeds and heavy loads
- B. No — it should not be driven because the spring pack is the only connection between the axle and the frame on that side of the vehicle

C. A broken U-bolt is a critical safety defect — the spring pack can shift on the axle seat allowing the axle to move and potentially separate

D. Yes — the technician should torque the remaining three U-bolts to compensate for the missing bolt and the vehicle can continue normal operation

93. A technician is adjusting the tapered roller wheel bearings on a conventional hub using the standard adjustment procedure. After torquing the adjusting nut while rotating the wheel, the technician backs off the nut 1/4 turn as specified. What does this back-off accomplish?

A. It creates a slight thermal expansion gap that allows the bearing races to expand as they heat up during normal highway driving operation

B. It establishes the correct bearing end play — a small amount of axial clearance that prevents preload from generating excessive heat during operation

C. It relieves the compression on the bearing seal preventing the seal lip from wearing prematurely against the spindle polished surface

D. It allows the bearing cage to rotate freely ensuring the tapered rollers can distribute evenly around the race circumference during rotation

94. A driver reports that the truck's ride feels excessively bouncy over bumps and the cab oscillates several times before settling. The tires and inflation are correct. What suspension component is most likely worn?

A. The leaf spring main leaves have taken a permanent set reducing their load-carrying capacity and spring rate below the design specification

B. The suspension air bags have developed internal baffle damage that changes the air flow characteristics during compression and rebound

C. The frame cross-members have loosened allowing the frame to flex excessively which amplifies the suspension movement and cab oscillation

D. The shock absorbers have failed — they are no longer providing damping resistance to control the rate of suspension compression and rebound

95. A steer tire inspection reveals a belt separation — a visible bulge in the tread area with the tread surface lifting slightly from the underlying belt package. The tire has 10 mm of remaining tread depth. What action is required?

- A. Replace the tire immediately because belt separation is a structural failure that will progress to a blowout regardless of remaining tread depth
- B. Move the tire to a trailer position where the lower speed and load reduce the risk of the separation progressing to a complete failure
- C. Monitor the separation at each PM service and replace the tire when the bulge exceeds 5 mm in height above the normal tread surface
- D. Have the tire repaired from the inside with a full-section repair patch that bridges the separation and reinforces the detached belt area

96. A truck with hub-piloted wheels has a vibration that occurs only after a recent tire rotation. Before the rotation, no vibration was present. The tires were rotated from steer to drive position. What is the most likely cause?

- A. The steer tires developed a flat spot from the steer axle steering forces that now produces vibration in the non-steering drive position
- B. The hub pilot surfaces on the drive axle hubs were not cleaned before mounting the rotated wheels and debris is preventing flat seating
- C. The tire rotation direction was reversed putting directional tread tires on the wrong side which creates an imbalance during rotation
- D. The lug nut torque specification for the drive axle is different from the steer axle and the wheels are under-torqued in their new position

97. A technician discovers that a hub oil seal on a drive axle is leaking oil onto the brake friction surfaces. After replacing the seal, what additional work must be done?

- A. Clean the drum and brake shoes with brake cleaner to remove the oil and return the contaminated components to service immediately
- B. Replace the brake shoes because oil-contaminated friction material cannot be cleaned effectively and will continue to have reduced friction
- C. Machine the brake drum to remove the oil-penetrated surface layer and reinstall the existing brake shoes after a thorough cleaning
- D. Operate the vehicle for a short period at low speed to heat the drum and burn off the residual oil before returning to normal highway service

98. A truck equipped with a sliding fifth wheel has had the fifth wheel repositioned rearward to shift more weight onto the trailer tandem axles. After repositioning, the driver notices increased oversteer tendency during curves and the tractor tail swings wider during tight turns. Why?

- A. Moving the fifth wheel rearward effectively lengthens the tractor wheelbase which normally increases straight-line stability but reduces low-speed maneuverability
- B. Moving the fifth wheel rearward shifts the coupling point further from the steer axle which changes the vehicle's dynamic turning characteristics
- C. The increased weight on the trailer axles has reduced the trailer tire grip causing the trailer to push the tractor into a wider turning radius
- D. Moving the fifth wheel rearward reduces the weight on the tractor drive axles which decreases their traction and allows the rear to swing outward during turns

99. A truck's power steering system has the power steering cooler externally mounted ahead of the A/C condenser. During summer months, the steering effort increases noticeably during sustained highway driving. What is the most likely cause?

- A. The power steering cooler is restricted or the A/C condenser heat load is overheating the power steering fluid reducing its viscosity and assist effectiveness
- B. The power steering pump drive belt is expanding from engine compartment heat and slipping on the pulley during hot weather operation
- C. The steering gearbox seals expand in hot weather reducing the internal clearances and increasing the friction inside the gearbox housing
- D. The power steering fluid is overheating and thinning which reduces the fluid's ability to transmit force effectively through the assist circuit

100. A tire is marked with the size designation 11R22.5. What information does the "R" in this designation convey?

- A. The tire has a reinforced sidewall construction designed for heavy-duty commercial vehicle applications with high load ratings
- B. The tire is a retreaded casing that has been recapped with new tread rubber material for extended service life in commercial applications

C. The tire has radial construction with body plies running perpendicular to the direction of travel from bead to bead across the tire profile

D. The tire has a run-flat capability allowing it to support the vehicle weight at reduced speed for a limited distance after a complete pressure loss

101. During a PM inspection, a technician measures the king pin wear on the right steer axle knuckle at 0.65 mm of vertical movement. The OEM specification maximum is 0.8 mm. What is the correct action?

A. The measurement is within specification — document the finding and re-measure at the next PM interval to monitor the wear progression

B. The measurement is within specification but approaching the limit — replace the king pins and bushings as a preventive measure now

C. The king pin bushings must be replaced immediately because any measurable movement exceeds the allowable tolerance for safe operation

D. Adjust the king pin thrust bearing to take up the vertical clearance and recheck the measurement to verify the adjustment corrected the play

102. A truck has one drive tire that consistently runs 15°C hotter than the other tires on the same axle. The tire pressure, tread depth, and load distribution are all equal. What is the most likely cause?

A. A dragging brake on that wheel position is generating friction heat that transfers through the drum and hub to the tire sidewall

B. The tire has an internal construction defect that causes increased internal friction and heat buildup during normal rolling operation

C. The wheel bearing on that position has insufficient lubricant or excessive preload causing friction that heats the hub and tire assembly

D. The different tire temperature is caused by direct solar exposure on one side of the vehicle during driving and is not indicative of a fault

103. A truck's cab tilt pump operates but the cab does not rise. The hydraulic lines between the pump and the tilt cylinder appear undamaged. What should be checked?

- A. The cab tilt safety latch for a failure to fully release that is mechanically preventing the cab from tilting despite hydraulic pressure being available
- B. The hydraulic fluid reservoir level for the cab tilt system because an empty reservoir means the pump cannot draw fluid to pressurize the cylinder
- C. The cab mounting bolts for over-torquing that has locked the cab to the frame preventing any pivoting movement at the front mount hinges
- D. The cab tilt cylinder rod for corrosion or scoring that has caused the piston to seize inside the cylinder bore preventing any extension movement

104. A driver reports that water leaks into the sleeper cab area during rain. The cab body panels show no visible damage or cracks. Where should the technician inspect for the water entry point?

- A. The exhaust stack rain cap because a missing or damaged cap allows water to enter the exhaust and migrate forward through the manifold
- B. The cab roof-mounted clearance lamp gaskets, roof panel seams, window seals, and any roof-mounted antenna or accessory bases for deteriorated seals
- C. The air intake ducting because rain water can enter the air cleaner and overflow through the intake manifold into the cab ventilation system
- D. The chassis wiring harness firewall grommet because rain water running down the harness can enter the cab through a deteriorated grommet seal

105. A truck's driver seat air ride suspension does not respond to the height adjustment control. The compressor does not activate when the control is adjusted. The seat functions normally in all other adjustments (fore-aft, recline, lumbar). What is the most likely cause?

- A. The seat cushion foam has deteriorated and compressed to a point where the air spring has reached maximum extension without supporting the driver
- B. The seat control module has a partial failure affecting only the air ride adjustment while other electric adjustment functions remain operational
- C. The seat air compressor or its electrical supply has failed — a blown fuse, disconnected wire, or failed compressor motor prevents operation
- D. The seat weight adjustment dial is set to the minimum position and the compressor requires a higher weight setting to initiate pumping operation

106. A heavy-duty truck's cab is equipped with a fire suppression system in the engine compartment that automatically discharges when the engine compartment temperature exceeds a threshold. During a PM inspection, what should be checked on this system?

- A. The suppression agent level or pressure gauge, the activation sensor condition, and the expiry date of the suppression agent charge
- B. Only the mounting bracket tightness since the suppression system is a sealed unit that requires no inspection between discharge events
- C. The engine compartment temperature by running the engine at full RPM for 10 minutes to verify the system does not falsely trigger
- D. The discharge nozzle aim by operating the system at low pressure to verify the spray pattern covers the engine correctly for fire protection

107. A truck cab's windshield develops condensation (fogging) on the inside surface during cold weather, even with the defroster running at high blower speed and maximum heat. What is the most likely cause?

- A. The defroster ductwork has a disconnected section that is blowing heated air under the dashboard instead of directing it to the windshield
- B. The heater core is leaking coolant vapour into the HVAC airstream which condenses on the cold windshield glass surface during operation
- C. The recirculation door is stuck in the recirculate position and the system is recirculating moist cabin air rather than drawing dry outside air
- D. The A/C compressor has failed and cannot dehumidify the air before it reaches the windshield reducing the defroster's moisture removal capability

108. A truck's exterior mirror adjustment motor moves the mirror glass up and down but not left and right. The mirror heater and the opposite mirror's adjustment motor function normally in all directions. What is the most likely cause?

- A. The mirror control switch has a partial failure affecting only the horizontal axis output while the vertical axis remains functional
- B. The mirror adjustment motor has a failed internal winding or mechanism specific to the horizontal axis direction of travel

C. The body controller's mirror output circuit has a partial failure that affects only the left-right signal for that specific mirror

D. The mirror glass pivot has seized horizontally due to moisture intrusion and corrosion preventing the motor from moving the glass sideways

109. A reefer trailer's TRU displays a fault code for high discharge pressure. The condenser coils are clean, the condenser fan runs at full speed, and the ambient temperature is moderate. What should be checked next?

A. The refrigerant charge level because an overcharged system raises the high-side pressure beyond the normal operating range for current conditions

B. The TRU engine RPM because operating at too high a speed causes the compressor to overpressurize the system beyond the condenser's rejection capacity

C. The evaporator defrost heater because a stuck-on heater raises the refrigerant temperature before it reaches the condenser coil for heat rejection

D. The TRU controller for a software error that misinterprets the discharge pressure sensor reading and falsely triggers the high-pressure fault code

110. A trailer's marker lamps on both sides flash in unison with the turn signals rather than staying steadily illuminated when the headlamp switch is on. What is the most likely cause?

A. The trailer wiring harness has a cross-connection between the marker lamp circuit and the turn signal circuit inside the harness or at a junction box

B. The tractor's headlamp switch has a faulty internal contact that bleeds turn signal current into the marker lamp circuit when both are active

C. The trailer ABS module has a software fault that commands the marker lamps to flash as a warning indication of an ABS system malfunction

D. The seven-pin connector has corroded pins that allow current to cross between the marker and turn signal circuits creating a backfeed condition

111. A trailer's landing gear has been lowered to support the front of the trailer at a loading dock. The dock is on a slight grade. The driver notices the trailer has moved approximately 15 cm forward from where it was initially positioned. What went wrong?

- A. The trailer tires were not chocked and the trailer rolled forward on the grade after the tractor disconnected from the trailer kingpin
- B. The landing gear pads sank into the soft asphalt surface of the dock area and the resulting height change allowed the trailer to shift position
- C. The fifth wheel locking jaws did not release completely and the tractor dragged the trailer forward before the kingpin finally cleared the jaws
- D. The dock bumpers compressed under the trailer's weight and the trailer rolled into the dock as the bumper rubber deflected from the trailer load

112. A refrigerated trailer is being loaded with frozen goods. The TRU set-point is -23°C and the cargo space is pre-cooled to -23°C . After loading is complete and the doors are closed, the TRU cycles to defrost mode within 20 minutes. What is the most likely cause?

- A. The frozen goods were loaded at a warmer temperature than -23°C introducing moisture that rapidly accumulated as frost on the evaporator
- B. The TRU's defrost timer is programmed for too short an interval and needs to be reprogrammed for the frozen-cargo operating temperature range
- C. The evaporator fan motor is failing and running at reduced speed which causes the coil to frost over faster than normal due to poor air circulation
- D. The cargo was stacked too close to the evaporator outlet restricting the airflow return path and causing the coil to ice over from stagnant moist air

113. A trailer's ABS modulator valve on the right rear axle is sticking in the release position. What braking symptom will this produce?

- A. The right rear wheels will lock up during every brake application because the modulator is blocking air from reaching the brake chambers
- B. The right rear brakes will not apply or will apply with significantly reduced force because the modulator is exhausting the application air
- C. The trailer will pull to the left during braking because the right rear brakes have excessive application force from the stuck modulator
- D. The right rear ABS will activate prematurely during light braking because the modulator interprets every application as an impending lockup

114. A flatbed trailer has been loaded with a piece of heavy equipment. The equipment is chained to the deck with four binder chains. Upon inspection, a technician notices that none of the chains have been tightened with load binders. What is the safety concern?

- A. Loose chains can vibrate off the deck hooks during transit and fall onto the roadway creating a hazard for following vehicles and pedestrians
- B. The heavy equipment may not be restrained to the minimum force required by cargo securement regulations and could shift or fall during transport
- C. Untightened chains will wear through the trailer deck surface from vibration contact causing structural damage to the flatbed cross-members
- D. Without load binders the chains will stretch permanently during the first hard braking event and will need to be replaced after each trip

115. A van trailer's interior cargo light circuit is completely inoperative. The switch is functional and the bulbs are good. The circuit is powered through a separate inline fuse located inside the trailer near the front wall. What should be checked?

- A. The trailer's seven-pin connector auxiliary pin because the cargo light circuit on this trailer draws its power from the tractor's auxiliary supply
- B. The inline fuse for an open condition and the wiring from the fuse to the switch and lights for an open circuit or damaged wire connection
- C. The trailer ABS module because some trailers route the cargo light power through the ABS module's accessory output power terminal
- D. The tractor's headlamp switch because cargo lights on some trailers are controlled through the tractor's exterior lighting control system

116. A trailer equipped with a sliding tandem axle group has been repositioned, but the driver notices the vehicle handles differently — the trailer seems to track poorly and the rear of the trailer swings wider than expected during turns. What might be causing this?

- A. The tandem was moved too far forward placing the axles closer to the king pin which shortens the trailer's effective wheelbase
- B. The tandem was moved too far rearward placing the axles further from the king pin which lengthens the trailer's effective wheelbase

- C. The slider track rails are bent from the repositioning operation and the tandem is not centered on the trailer frame causing lateral offset
- D. The tandem axle alignment was disturbed during the slide operation and the axles are now tracking at an angle to the trailer centerline

117. A truck's A/C system has been recharged to the correct weight of refrigerant. The system pressures are normal at idle, but the air outlet temperature in the cab is only moderately cool — not the expected cold output. The blower motor is running on high speed. What should be checked?

- A. The blend door position to verify it is fully in the cooling position and not partially directing air through the heater core reducing the cooling effect
- B. The A/C compressor clutch air gap for excessive clearance that allows slippage reducing the compressor's effective pumping capacity during operation
- C. The refrigerant type to confirm it has not been contaminated with a different refrigerant that operates at different pressure-temperature characteristics
- D. The condenser fan relay for an intermittent fault that allows the fan to run at reduced speed lowering the condenser's heat rejection capacity

118. A technician recovers refrigerant from a truck A/C system and the recovery machine shows 400 grams recovered. The system specification calls for 1,200 grams. What does this tell the technician?

- A. The system has lost approximately 800 grams of refrigerant through a leak that must be found and repaired before the system is recharged
- B. The recovery machine is malfunctioning because it is not physically possible to lose that much refrigerant without a catastrophic system rupture
- C. The previous technician undercharged the system at the last service and the current low charge is not indicative of a refrigerant leak condition
- D. The system specification has changed and the correct charge for this model year is 400 grams based on an updated technical service bulletin

119. A truck's heater core is being replaced. During the replacement, the technician notices a significant amount of sediment and scale inside the removed heater core tubes. What should the technician recommend in addition to the heater core replacement?

- A. Install a larger-capacity heater core to compensate for the reduced heat transfer caused by any remaining scale in the cooling system
- B. Flush the engine cooling system to remove the sediment and scale that caused the heater core to clog and will clog the new core if not removed
- C. Replace the water pump because scale deposits in the cooling system indicate the pump impeller is also scaled and operating at reduced efficiency
- D. Change the coolant type from conventional to extended life because ELC coolant dissolves scale deposits and prevents their reformation in the system

120. A fuel-fired air heater (bunk heater) in a sleeper cab produces heat for approximately 5 minutes and then shuts off with a fault code for flame failure. The heater restarts manually but fails again after 5 minutes. What is the most likely cause?

- A. The combustion air blower motor is running at reduced speed starving the combustion chamber of oxygen after the initial startup air charge is consumed
- B. The fuel metering pump is delivering adequate fuel for startup but cannot sustain the flow rate needed for continuous operation due to a partial restriction
- C. The exhaust pipe is partially blocked restricting the combustion gas outflow which causes the combustion chamber pressure to rise and extinguish the flame
- D. The heater's flame sensor has become coated with carbon deposits and cannot detect the flame after it has been running for several minutes causing a false flame-out shutdown

121. After replacing the A/C compressor on a truck, the system is evacuated and charged to specification. Upon starting the engine and engaging the compressor, the low-side pressure immediately drops to a deep vacuum and the high-side pressure barely rises. What is the most likely cause?

- A. The expansion valve is stuck closed or severely restricted preventing refrigerant from flowing from the high side to the evaporator on the low side
- B. The compressor is installed backward with the suction and discharge ports reversed causing it to pump in the wrong direction through the system
- C. The receiver/dryer is completely plugged with desiccant material that has broken down and blocked the liquid line path to the expansion valve
- D. The system was not properly evacuated and residual air in the high side is preventing the refrigerant from condensing into liquid in the condenser

122. A truck's cab A/C system has an intermittent warm-air complaint. The A/C works normally most of the time but occasionally blows warm air for several minutes before returning to cold. The pressures fluctuate during the warm episodes. What is the most likely cause?

- A. The compressor electromagnetic clutch is slipping intermittently due to a worn friction surface or an incorrect clutch air gap setting
- B. The A/C system has an intermittent moisture contamination problem — ice forms at the expansion valve, blocks flow temporarily, then melts and restores function
- C. The blower motor resistor pack is failing intermittently causing the blower to stop which reduces airflow across the evaporator coil
- D. The expansion valve sensing bulb has lost its charge and is not responding to evaporator temperature changes causing erratic refrigerant flow

123. An auxiliary power unit (APU) on a sleeper cab truck provides both heating and cooling. The APU's A/C function works correctly, but the heating function does not produce warm air. The APU is a diesel-fired coolant heater type that circulates heated coolant through the cab heater core. What should be checked?

- A. The APU diesel burner combustion quality because an incomplete burn may produce insufficient heat to raise the coolant temperature adequately
- B. The auxiliary coolant circulation pump, the heater core circuit valves, and the coolant lines for a pump failure, closed valve, or air lock preventing circulation
- C. The HVAC blend door for a stuck position in the cooling mode that is preventing heated air from reaching the cab outlets during APU operation
- D. The main engine thermostat for a stuck-open condition that is routing the APU-heated coolant through the radiator and dissipating the heat

124. A hydraulic system's relief valve is set to open at 20,000 kPa. The operator reports that the system cannot lift a load that it previously handled easily. A pressure gauge installed in the circuit shows only 14,000 kPa under load. What does this indicate?

- A. The relief valve has shifted its opening point downward and must be adjusted or replaced to restore the correct maximum pressure setting

- B. The hydraulic pump is worn and cannot generate enough flow to build pressure to the relief valve setting before the load stalls the system
- C. The directional control valve is restricting flow to the cylinder preventing adequate pressure from reaching the work port of the actuator
- D. The load has increased beyond the system's design capacity and the pump is at maximum output but cannot generate the required pressure

125. A hydraulic cylinder on a roll-off container truck extends at the correct speed but retracts very slowly. The system pressure is adequate in both directions. What is the most likely cause?

- A. The rod-end port of the cylinder has a restricted fitting or a partially collapsed hose that limits the flow rate during the retraction stroke
- B. The cylinder rod seal is leaking internally bypassing fluid from the rod end to the cap end during retraction reducing effective retract force
- C. The directional control valve spool is not shifting fully to the retract position limiting the flow path to the cylinder's rod-end port
- D. The counterbalance valve on the extension circuit is partially restricting flow during retraction by not fully opening to allow return oil flow

126. A technician is testing a hydraulic system and finds that the pump generates adequate flow and pressure when tested at the pump discharge, but the cylinder at the end of the circuit operates at reduced speed and force. The hoses and fittings between the pump and the cylinder are the correct size. What is the most likely cause?

- A. The hydraulic fluid viscosity is too high for the operating temperature creating excessive pressure drop through the lines and fittings
- B. The return filter is clogged creating backpressure that opposes the cylinder's extension and reduces its effective speed and force output
- C. The directional control valve is partially restricted internally from contamination limiting flow to the work port despite adequate pump output
- D. The cylinder bore has worn oversize reducing the annular sealing area of the piston and allowing greater internal bypass around the piston

127. A hydraulic crane boom oscillates (bounces) when the operator tries to hold it at a mid-extension position under load. The oscillation dampens when the load is reduced. What is the most likely cause?

- A. The boom cylinder has excessive internal leakage past the piston seal allowing the load to push the piston down then the pump pushes it back up
- B. Air trapped in the boom circuit hydraulic lines creates a compressible gas pocket that acts as a spring under the variable loading condition
- C. The crane base pivot bearing is worn allowing the entire upper structure to rock which appears as boom oscillation to the operator at the tip
- D. The counterbalance valve on the boom circuit is set incorrectly — either too close to the cracking pressure or with insufficient damping adjustment

128. A dump truck hydraulic system uses an open-centre directional control valve and a fixed-displacement gear pump. When the control lever is in the neutral position, what happens to the pump's output flow?

- A. The pump flow circulates freely through the open-centre valve spool passage back to the reservoir at low pressure with minimal energy waste
- B. The pump flow is blocked by the valve spool and pressure builds to the relief valve setting where it is bypassed continuously to the reservoir
- C. The pump automatically destrokes to zero displacement because the valve's neutral signal is communicated to the pump's compensator
- D. The pump stops rotating because the PTO disengages automatically when the directional control valve returns to the neutral detent position

129. A hydraulic liftgate system has a manual lowering valve that allows the operator to lower the platform by opening a needle valve that lets oil flow from the cylinder back to the reservoir. The platform descends too quickly even with the needle valve barely cracked open. What is the most likely cause?

- A. The cylinder rod seals are worn allowing oil to bypass the piston internally and accelerating the descent beyond the needle valve's control range
- B. The needle valve seat is worn or damaged and cannot provide the fine flow restriction needed to control the descent speed at low valve openings

- C. The hydraulic oil viscosity is too low for the ambient temperature allowing the oil to flow through the needle valve restriction too quickly
- D. The liftgate platform is heavier than the cylinder was designed for and the gravitational force exceeds the flow restriction capability of the valve

130. A PTO-driven hydraulic pump makes a rattling, clicking noise that was not present before the last service. During the service, the PTO was removed for transmission work and reinstalled. What is the most likely cause?

- A. The PTO mounting bolts were not torqued to specification and the PTO housing is shifting on the transmission causing gear mesh noise
- B. The PTO drive gear engagement is incomplete — the PTO teeth are only partially meshed with the transmission gear creating interference noise
- C. The hydraulic pump coupling between the PTO output shaft and the pump input shaft is worn and the clearance allows the shaft to rattle
- D. The PTO was reinstalled with the wrong gasket thickness changing the gear mesh depth and creating noise from incorrect tooth engagement

131. A hydraulic system fluid sample shows a water content of 0.5% by volume. The maximum acceptable water content per the fluid manufacturer is 0.1%. What are the consequences of operating with this water contamination level?

- A. Accelerated corrosion of internal metal surfaces, reduced fluid lubricity, increased risk of pump cavitation, and potential ice crystal formation in cold weather
- B. No significant consequences because 0.5% water content is within the normal range for hydraulic systems operating in humid environments
- C. The hydraulic seals will swell and deform from water absorption changing the clearances in the cylinders and reducing system efficiency
- D. The water will settle to the bottom of the reservoir and can be removed by simply draining a small amount of fluid from the tank drain valve

132. A battery-electric commercial truck displays a "reduced power" warning and limits the maximum speed to 40 km/h. The battery state of charge reads 85%. What system is most likely triggering this derate?

- A. The 12-volt auxiliary battery has dropped below its minimum voltage threshold preventing the propulsion control system from full-power operation
- B. The regenerative braking system has detected a fault and the vehicle limits speed to ensure adequate friction brake capacity is available
- C. The BMS has detected a fault — such as a high cell temperature, a cell voltage imbalance, or a low isolation resistance — and is protecting the battery
- D. The traction motor has overheated from sustained high-power output and the inverter is limiting current to allow the motor windings to cool

133. A technician is preparing to service a component on a hybrid truck that is near the high-voltage battery pack but does not require disconnecting any high-voltage cables. The component is a conventional 12-volt accessory. Should the high-voltage system be de-energized?

- A. No — the high-voltage system does not need to be de-energized for work on conventional 12-volt components that are physically separated
- B. Yes — any work performed within the proximity zone of the high-voltage battery pack requires full de-energization as a safety precaution
- C. No — as long as the technician wears standard nitrile gloves the risk of accidental high-voltage contact is adequately mitigated for 12-volt work
- D. Yes — but only the service disconnect needs to be removed while the main contactors can remain closed to maintain the vehicle's readiness state

134. A battery-electric truck's onboard charger begins a Level 2 AC charging session but the charging stops after approximately 10 minutes with a fault code. The external charging station shows no faults. What should be investigated on the vehicle?

- A. The 12-volt auxiliary battery voltage because a low auxiliary battery prevents the onboard charger from maintaining its control circuit during the session
- B. The traction motor windings for a ground fault because the charger performs an insulation test before committing to a full charging cycle
- C. The high-voltage main contactors for excessive resistance that prevents the charger from delivering current to the battery at the required rate
- D. The onboard charger's internal temperature, the CCS connector for pin damage, and the BMS communication for a fault that commands the charger to stop

135. What is the primary purpose of the DC-DC converter in a battery-electric commercial vehicle?

- A. It converts the high-voltage DC from the main battery pack down to 12 volts or 24 volts to power the vehicle's conventional electrical systems
- B. It converts the AC power from the Level 2 charging station to the DC voltage required to charge the high-voltage battery pack efficiently
- C. It boosts the high-voltage battery output to a higher voltage for the traction motor inverter during periods of peak power demand
- D. It converts the regenerative braking energy from AC to DC for storage in the high-voltage battery during deceleration braking events

Practice Exam 3: Answer Key and Explanations

1. D — Section 10 of the SDS covers Stability and Reactivity, which describes the product's chemical stability, conditions to avoid, incompatible materials, and hazardous decomposition products. This is the correct section to consult when determining whether a solvent will react with painted surfaces or other materials.
2. B — Every worker performing maintenance on the same equipment must apply their own personal lockout device to the energy isolation points. Three technicians working simultaneously require three individual locks — no person may remove another person's lock, and no person should work under the protection of someone else's lock.
3. A — Commercial truck tires must be inflated inside a safety cage or with a portable restraining device to contain the tire and wheel assembly in the event of a failure during inflation. The technician must use a clip-on chuck with an extension hose and stand to the side — never directly in front of or behind the tire.
4. C — The technician must document the defect, its location, and the fleet manager's decision to defer the repair on the official work order. This written record establishes that the defect was identified, reported, and that the decision to defer was made by the fleet manager — protecting the technician and shop from liability.

5. D — Hot work (torch, welding, grinding) requires inspecting the surrounding area within at least 10 metres for flammable materials, removing or covering anything that cannot be moved, and establishing a fire watch with a designated person monitoring for ignition during and for at least 30 minutes after the work.

6. B — An apprentice who is unsure of a procedure must stop and seek guidance from a qualified journeyman before attempting the task. Proceeding without proper knowledge risks an incorrect adjustment that could cause a wheel-off event — a potentially fatal safety failure. Asking for help is a safety practice, not a weakness.

7. A — Lead-acid batteries contain sulphuric acid, which is classified as a corrosive substance under TDG Class 8. The corrosive nature of the acid is the primary transport hazard, and the batteries must be packaged, labelled, and documented according to Class 8 requirements when shipped.

8. C — Adding the wrong type of power steering fluid can damage seals, degrade pump performance, and cause system failure. The correct fluid type must be verified by checking the reservoir cap label, the OEM service manual, or the vehicle specification before adding any fluid.

9. D — The compression ratio is total volume at BDC divided by clearance volume at TDC. If the total volume is 1,700 cc and the ratio is 17:1, then clearance volume = $1,700 \div 17 = 100$ cc. This is the small volume remaining above the piston at TDC where the fuel is injected and combustion occurs.

10. A — Air escaping at the oil fill cap during a leak-down test confirms that compressed air is passing the piston rings and entering the crankcase. The crankcase is vented through the oil fill cap opening, so air heard there definitively identifies ring seal failure as the source of the compression leak.

11. B — A steady, progressive increase in iron over multiple consecutive samples indicates gradual wear — not a sudden failure. Iron is the primary wear metal from cylinder liners and crankshaft journals. This trending pattern suggests the engine is wearing at a predictable rate and may be approaching the point where an overhaul should be planned.

12. D — Some temperature rise under sustained maximum load on a long grade is within the engine's thermal design limits. If all cooling system components have been verified functional and the temperature rise remains within the manufacturer's maximum allowable range, the condition is normal for the operating demands.

13. C — A puff of blue smoke after extended idle that clears quickly indicates oil accumulated on the valve stems during the idle period (when oil seeps past worn valve guide seals) and burns off when exhaust flow increases during acceleration. The transient, self-clearing nature distinguishes this from ring or turbo seal problems.

14. A — Injector contribution data shows how much the ECM must compensate each cylinder to maintain balanced operation. If cylinder 5 consistently requires more fuel than the others, its injector is underdelivering — the ECM is adding compensating fuel to equalize that cylinder's power contribution.

15. B — Before simply retorquing bolts on a weeping oil cooler, the technician should consider that the gasket or O-rings may have deteriorated from heat cycling, chemical breakdown, or age. Retorquing may temporarily slow the leak but will not fix a failed gasket — the proper repair is gasket or O-ring replacement.

16. D — The scan tool shows the ECM commanding 0% EGR (fully closed) at idle, but the actual position reads 15% (partially open). The valve is physically stuck in a partially open position, allowing unwanted exhaust gas to dilute the intake charge at idle. This excess inert gas causes rough running and black smoke.

17. C — The wrong coolant chemistry was used at a previous service. Conventional green coolant and extended life (ELC) coolant use incompatible additive packages. Mixing them can cause additive dropout, gel formation, accelerated corrosion, and loss of liner cavitation protection — the cooling system must be flushed and refilled with the correct type.

18. A — With the turbocharger and charge air cooler verified in good condition, a low boost fault points to a leak in the pressurized intake path between the compressor outlet and the intake manifold. Cracked boots, loose clamps, or holes in the piping allow boost air to escape before reaching the cylinders.

19. B — Rapid gauge fluctuation between normal and hot without coolant loss suggests an air pocket trapped near the temperature sensor. As the air bubble passes the sensor, it reads the air temperature (high), and when coolant contacts the sensor again, it reads the coolant temperature (normal). Bleeding the air from the system resolves the fluctuation.

20. D — Torque-to-yield (TTY) head bolts are designed to be stretched into their elastic-plastic transition zone during the torque-plus-angle tightening procedure. Once stretched, the bolt's properties

are permanently changed. Reusing TTY bolts risks inconsistent clamping force, bolt fatigue, or bolt failure — they must be replaced with new bolts at each installation.

21. C — The idle pressure of 275 kPa exceeds the minimum specification of 140 kPa, and the rated-speed pressure of 450 kPa falls within the 310 to 520 kPa specification range. Both readings are within the OEM parameters, confirming the oil pressure system is functioning normally.

22. A — The secondary (safety) element protects the engine if the primary element is damaged or improperly installed. It should be replaced only when the primary element is found damaged (indicating unfiltered air may have reached the secondary) or at the manufacturer's recommended interval — typically every second or third primary change.

23. B — Extended idle operation causes incomplete combustion because the engine runs at low temperature and low load. Unburned diesel fuel washes past the piston rings and accumulates in the crankcase oil, reducing the oil's viscosity. This is a well-documented consequence of excessive idle time in diesel engines.

24. D — The DOC catalyst has been contaminated (by oil ash, coolant, fuel additives, or sulphur) or has thermally degraded from age and excessive temperatures. A degraded DOC cannot oxidize the hydrocarbons delivered by the late-post injection, so no exothermic temperature rise occurs and DPF regeneration fails.

25. C — With DEF quality, dosing rate, and exhaust temperature all normal, the SCR catalyst itself is the remaining variable. A catalyst that has degraded from thermal damage (overheating), contamination (oil, coolant, or fuel-borne poisons), or simple age loses its ability to convert NO_x regardless of how much ammonia is supplied.

26. A — When tightening the locknut on the rocker arm adjustment screw, the wrench torque can rotate the adjusting screw slightly if the screw is not firmly held with a separate tool. This shifts the lash from the initial setting. Always hold the adjusting screw stationary with one wrench while tightening the locknut with another, then recheck the lash.

27. B — Compression brake retarding force depends on the exhaust valve opening sufficiently during the compression brake event. As the slave piston lash wears (increases), the actuator cannot push the exhaust valve open as far or as precisely, reducing the amount of compressed air released and decreasing the retarding force on each cylinder.

28. C — Commanded rail pressure at 500 bar with 0 bar actual during cranking — despite adequate transfer pump supply — means no fuel is being pressurized into the rail. The high-pressure pump has failed (seized, sheared drive, or internal component failure) or the fuel metering unit is stuck in the fully closed position, blocking fuel from entering the pump.

29. A — A persistent exhaust leak at one specific cylinder that returns after gasket replacement despite correct bolt torque suggests the sealing surface itself is not flat. Thermal distortion (warping) of the cylinder head exhaust port face creates a gap that no gasket can bridge — the head must be machined or replaced.

30. D — The air compressor's piston rings are the boundary between engine oil and the compressed air discharge. Worn rings allow oil to pass into the discharge stream, travel through the dryer (overwhelming the oil-coalescing element), and accumulate in the air tanks. A new desiccant cartridge does not address the upstream oil source.

31. B — A spongy pedal feel with unequal drum temperatures side-to-side suggests one or more brake chambers are receiving air pressure with a delay or at reduced volume. A restricted air supply line or a partially collapsed hose on the cool side prevents full, prompt air delivery, resulting in delayed and reduced braking force on those wheels.

32. C — If external leak testing reveals nothing, the leak may be internal to the system or located in an area not accessible from outside the vehicle. Components behind the dashboard — the foot valve, dash valves, and their fittings and lines — are pressurized during normal operation and can develop leaks that are not audible or visible externally.

33. A — A tapered lining wear pattern (thicker at the anchor end, thinner at the cam end) indicates the S-cam lobe profile has worn and changed shape. The worn cam applies more force at the cam end of the shoe than the anchor end, creating uneven contact pressure across the lining surface and the characteristic tapered wear.

34. D — If the leak occurs only with brakes applied and the tractor chambers are not leaking, the leak must be in the trailer's brake system — the only components that pressurize exclusively during brake application. Trailer brake chambers, relay valves, and the air lines between them are the most likely sources.

35. B — If the new automatic slack adjuster falls out of adjustment within 500 km, the adjuster itself is not the problem — an underlying foundation brake condition is preventing any adjuster from maintaining stroke. Worn S-cam bushings, a seized S-cam shaft, a worn drum, or weak return springs change the brake geometry faster than the adjuster can compensate.

36. A — The dual foot valve has two independent delivery sections — one for the primary (rear) circuit and one for the secondary (front) circuit. If the primary gauge drops normally during pedal application but the secondary gauge does not drop, the secondary delivery section of the foot valve has failed and is not metering air to the front brakes.

37. C — The spring brake modulating valve (inversion valve) allows the driver to use the spring brakes as a proportional emergency brake if the service brake circuit fails. By carefully modulating the parking brake valve, the driver can partially apply the spring brakes through controlled air release, providing graduated braking force rather than full lock.

38. D — Activating the trailer supply valve (red button out) closes the supply line to the trailer and exhausts the air that was holding the trailer's spring brakes released. Without supply air pressure, the springs extend and mechanically apply the brakes — this is the fail-safe design that ensures the trailer brakes are applied whenever it is disconnected.

39. A — Pushrod length determines the geometry between the brake chamber, the slack adjuster arm, and the S-cam shaft. An incorrect length alters the lever geometry so that the brake either cannot reach full application, cannot fully release, or the automatic slack adjuster operates outside its designed range — all resulting in brake adjustment problems.

40. B — The wear indicator is a warning that the pads are approaching their replacement point, not that they have reached the absolute minimum. With 3 mm remaining against a 2 mm minimum, the pads still have usable life. Scheduling replacement at the next PM service is appropriate while monitoring for further wear progression.

41. D — The correct response to ABS activation on a commercial vehicle is to maintain firm, steady pressure on the brake pedal and let the ABS do its job. The ABS cycles pressure at each wheel individually, providing maximum deceleration while maintaining steering control. Pumping or releasing the pedal defeats the ABS function.

42. C — If both gauges read zero after a full-charge overnight, a massive or combined leak has drained both reservoirs. The one-way check valves between the supply tank and the service reservoirs should be checked — if they have failed, air can flow backward from both service reservoirs through the supply tank and out through any supply-side leak.

43. A — A trailer ABS lamp that is illuminated indicates the ABS anti-lock function is disabled for the trailer, but the service brakes continue to operate normally for standard braking. The trailer can still stop the vehicle, but the wheels are susceptible to lockup during hard braking on slippery surfaces until the ABS fault is repaired.

44. B — A failed air compressor head gasket breaks the seal between the compression chamber and either the atmosphere or the crankcase. Compressed air leaks past the gasket during the discharge stroke, reducing the compressor's effective pumping volume and slowing or preventing the system from building to full operating pressure.

45. A — The right front brake is applying with more force (shorter stroke = better adjustment = more lining contact) while the left front brake is applying with less force (longer stroke, contaminated lining, seized caliper, or restricted line). The unequal force creates a yaw moment that pulls the vehicle toward the side with stronger braking.

46. C — The trailer hand valve applies the trailer service brakes using air pressure from the tractor's air supply. When the tractor is disconnected and the air supply is removed, the pressure applied by the hand valve will gradually leak off through normal system leakage. The trailer could then roll free. Only the spring brakes (parking brake) should be relied upon to secure a parked trailer.

47. B — The maximum acceptable voltage drop on the ground side of a starter circuit is 0.3 volts. A reading of 0.6 volts is double the limit, indicating excessive resistance in the ground path — corroded cable terminals, a damaged ground strap, or a poor connection between the starter housing, engine block, and battery negative terminal.

48. A — A system voltage reading of 15.2 volts exceeds the normal 13.8 to 14.5 volt range for a 12-volt charging system. This indicates the voltage regulator is failing to limit the alternator's field current, allowing overcharging that will boil electrolyte from batteries, produce excessive hydrogen gas, and damage sensitive electronic modules.

49. D — A complete loss of all exterior lighting while all interior functions remain normal points to a single failure in the power supply path that is common to all exterior lamps but separate from the interior circuit. A main fuse, relay, or fusible link that feeds the exterior lighting power distribution bus is the most likely failed component.

50. B — The intentional missing tooth on the crankshaft reluctor wheel creates a signature gap in the sensor waveform. The ECM uses this gap as a reference point to determine the crankshaft's absolute rotational position — without it, the ECM knows the shaft is rotating but cannot determine where each cylinder is in its cycle.

51. C — The passenger switch operates the window down (one direction contact) but not up (the other direction contact). Since the master switch on the driver's door operates the same motor in both directions successfully, the motor and wiring are proven good. The passenger switch has a failed internal contact for the up direction.

52. A — SPN 105 FMI 3 means voltage above normal on the intake manifold temperature sensor circuit. With a 5-volt reference, an open circuit (disconnected sensor or broken wire) leaves the ECM reading the full unloaded 5-volt reference because no current flows through the sensor to pull the voltage down.

53. B — LED lamps draw much less current than the incandescent lamps the circuit was originally designed for. With fewer amps flowing through the circuit, the voltage drop across the supply wiring is reduced, and the voltage actually reaching the lamp sockets is slightly higher than the incandescent design voltage — which shortens the filament life of any remaining incandescent lamps.

54. C — When the fuse for the trailer connector circuit is removed and the parasitic draw drops to acceptable levels, the draw is in the trailer or the wiring connected through the seven-pin plug. A short circuit or a continuously powered load in the connected trailer harness draws current through the tractor's trailer circuit even with the ignition off.

55. D — The voltage measured at the ECM during cranking should remain above the ECM's minimum operating threshold — typically 9.0 to 9.6 volts for most heavy-duty engine ECMs. A reading of 8.5 volts may cause the ECM to reset, lose injector control, or set fault codes during cranking, potentially causing hard starting or no-start conditions.

56. B — A starter drawing 1,400 amps against a specification maximum of 1,200 amps while cranking at normal speed indicates the starter is drawing more current than it should. The most likely cause is

increased internal resistance or friction — worn brushes, shorted field windings, or a dragging armature — that converts excessive electrical energy to heat.

57. A — In a parallel circuit, each branch operates independently. If one lamp's filament opens (burns out), the other parallel branches continue to receive full voltage and operate at normal brightness. The total circuit current decreases (one branch is gone), but the remaining lamps are unaffected.

58. A — A Hall effect sensor that should produce a 5-volt square wave but reads 0 volts indicates the sensor has failed, the signal wire is open, or the signal wire is shorted to ground. Since the scan tool reads zero speed while the truck moves, the signal is not reaching the ECM, confirming a fault in the sensor or its circuit.

59. D — Daytime running lights are controlled by a dedicated DRL module or the body controller, which automatically activates a reduced-intensity headlamp circuit when the engine is running and the headlamp switch is off. A fault in this module or its activation inputs (ignition run signal, parking brake status, ambient light sensor) disables DRL while leaving manual headlamp operation unaffected.

60. B — When two batteries with different states of charge are connected in parallel, current flows from the higher-voltage battery into the lower-voltage battery. The good battery continuously attempts to charge the weak battery, draining itself in the process. This stresses both batteries and can lead to both being unable to start the vehicle.

61. D — A sending unit that reads 90 ohms (empty specification) when the tank is half full indicates the float mechanism is stuck at the bottom or the float has become fuel-saturated and sunk. Both conditions cause the float to remain at the bottom of its travel regardless of actual fuel level, producing a constant empty reading.

62. A — A two-speed wiper motor has separate windings or brush connections for low and high speed. If high speed is inoperative while low speed works, the high-speed winding or its dedicated brush has failed open. The low-speed circuit is independent and continues functioning because it uses a different internal path.

63. C — An alternator with one open stator phase (of three) loses one-third of its generating capacity. A 160-amp alternator with one open phase produces approximately two-thirds output — roughly 107 amps at full field. The 65-amp reading suggests an open phase combined with the reduced demand from the voltage regulator.

64. B — An intermittent horn with a new relay and a proven-good horn points to the control circuit that activates the relay. The most common intermittent connections in the horn circuit are at the steering column clock spring (which maintains the electrical connection as the steering wheel rotates), the horn button ground, or the connectors in between.

65. C — A high-impedance DMM can show 12 volts at a socket even when the circuit is open or has a high-resistance connection — this is called phantom or ghost voltage induced from adjacent energized wires. The corroded socket contact has enough resistance to prevent current flow to the lamp but allows the DMM's tiny measurement current to register voltage.

66. A — The CAN bus specification calls for approximately 60 ohms (two 120-ohm terminators in parallel). A reading of 58 ohms is within the normal tolerance range, confirming that both terminating resistors are present and the bus backbone is intact. This measurement rules out the CAN bus as the source of any communication complaints.

67. D — Swapping the coil and spark plug from cylinder 6 to other cylinders and having the misfire stay on cylinder 6 rules out ignition components. The remaining possible causes are fuel delivery (clogged injector, failed solenoid) or mechanical (low compression from a burned valve, broken ring, or head gasket leak). Both should be tested.

68. C — The fuel priming pump runs (confirming the ignition is on and the ECM is powered), but the engine does not crank (no starter motor engagement). Since the battery voltage is adequate and the dash lights work, the fault is in the start control circuit — the neutral safety switch, clutch interlock, start relay, or the ignition switch's start position contact.

69. B — A spongy clutch pedal that temporarily improves when the reservoir is topped up indicates the hydraulic system is losing fluid and admitting air. A leak at the master cylinder, slave cylinder, or connecting line allows fluid to escape and air to enter, making the pedal feel spongy because air is compressible while hydraulic fluid is not.

70. A — The range shift from low to high is actuated by an air-operated shift cylinder and controlled by a solenoid valve. If all gears within the low range shift normally but the range will not change, the pneumatic actuator circuit for the range section has failed — the air cylinder, its solenoid, or the air supply line is faulty.

71. C — A transmission running hotter than normal on a flat highway at normal speed with correct fluid level points to a heat source within the transmission. The torque converter lockup clutch, when slipping, converts mechanical energy to heat in the fluid. A lockup clutch that cannot fully engage creates continuous slippage and significant heat generation.

72. B — A vibration that occurs within a specific speed range and disappears above and below that range is characteristic of a resonance condition. A driveshaft operating near its critical speed (the speed at which its natural bending frequency is excited) will vibrate within a narrow speed band centered on the critical speed.

73. A — During a left turn, the right wheel must speed up (it follows a larger radius) and the left wheel slows down. The right-side differential side gear and spider gears are loaded during this speed increase. If these gears are worn or chipped on the right side, they produce clicking or popping noise specifically during left turns.

74. D — The two-speed shift mechanism activates (audible click, dash indicator changes) but the internal sliding clutch does not complete its engagement. The linkage between the external actuator and the internal shift mechanism is likely disconnected, bent, or maladjusted — allowing the actuator to move without transmitting force to shift the internal clutch.

75. B — A bearing that creates noise in all gears including neutral, changing pitch only with engine RPM regardless of gear selection, must be rotating whenever the engine is running with the clutch engaged. The input shaft bearing is the only bearing that meets this criterion — it spins at engine speed in all gears and neutral.

76. C — The most common installation error causing vibration after driveshaft replacement is incorrect yoke phasing at the slip joint. If the spline alignment marks were not observed and the yoke ears at opposite ends of the shaft are out of phase, the U-joint speed fluctuations compound rather than cancel, producing pronounced vibration.

77. A — Deep heat discoloration on both friction surfaces of the intermediate plate confirms the clutch was subjected to sustained slippage that generated extreme heat. Both the intermediate plate and the flywheel friction surfaces must be carefully inspected for heat cracks, warpage, and hardness changes before any components are reused.

78. D — AMT systems learn the clutch engagement point (touch point) during a calibration procedure. As the clutch disc wears, the engagement point shifts. If the AMT's learned touch point no longer matches the actual engagement point, the system commands engagement too early or too late, causing slip. A clutch touch-point relearn updates the calibration.

79. B — The centre bearing maintains the correct driveline alignment and working angles. A 10 mm shift off-centre changes the driveshaft's angular relationship with both the transmission and the axle, creating unequal U-joint working angles that produce a vibration that worsens with vehicle speed.

80. C — Elevated iron content during the initial break-in period of a new ring and pinion set is normal. New gear teeth have microscopic surface irregularities that wear rapidly as the teeth seat against each other during the initial operating period. This wear stabilizes after the break-in and the iron levels should decrease in subsequent samples.

81. A — Worn U-joint needle bearings that have developed clearance will rattle when the driveshaft torque unloads — specifically during deceleration in gear when the drivetrain transitions from drive to coast loading. The rattle stops when the clutch is disengaged because the driveshaft stops transmitting torque and the U-joint clearance is no longer loaded.

82. C — Air pressure is confirmed at the lock actuator, so the air supply and solenoid are functioning. The actuator must produce enough physical force to shift the sliding clutch against the detent spring and spline friction. A torn diaphragm or piston seal leak in the actuator reduces the force available, preventing the mechanism from completing the lock engagement.

83. B — A torque converter lockup shudder at steady cruise that disappears with slight speed changes is the classic symptom of contaminated or degraded transmission fluid. The fluid has lost the friction modifier properties needed for smooth lockup clutch engagement, causing the clutch to alternately grab and slip at the microscopic level.

84. D — A pilot bearing with noticeable roughness has damaged rolling elements or races that will cause the transmission input shaft tip to wobble during clutch disengagement. This wobble tilts the clutch disc relative to the flywheel, producing chatter during engagement and accelerated disc wear. The bearing must be replaced during any clutch service.

85. B — The retarder provides full level (maximum coil current, maximum magnetic field) and zero level (no current) correctly, but cannot achieve the intermediate proportional levels between. The control

module's current regulation circuitry — which adjusts coil current proportionally for intermediate braking levels — has a fault that prevents proportional output.

86. D — A groaning noise from the power steering system during turns with correct fluid level and clean fluid points to internal pump wear. The pump cannot maintain adequate pressure and flow without cavitating under the increased demand of steering loads. The internal clearances have enlarged to the point where the pump generates noise under load.

87. C — With all external linkage components verified within specification, the remaining source of free play is inside the steering gearbox. Internal wear on the recirculating ball mechanism (balls, worm shaft, ball nut) or worn worm shaft bearings allows movement within the gearbox that contributes directly to the total steering wheel free play.

88. D — A bent frame rail that is not cracked may be cold-straightened using a portable hydraulic frame press if the vehicle manufacturer permits cold straightening for the specific rail material and profile. The rail alignment must be verified after straightening. Heating HSLA steel to cherry red destroys its heat-treated properties and is not permitted.

89. B — Even wear across the full tread width rules out alignment and inflation issues. Accelerated even wear indicates the tires are carrying more load than they are designed for. The steer axle may be overloaded from incorrect fifth wheel positioning, vehicle overloading, or tires with an insufficient load range rating for the actual axle weight.

90. D — One air bag inflated more than the others on the same axle with the ride height 25 mm high indicates that side is receiving too much air. The height control valve for that side is either maladjusted (its lever arm linkage tells the valve that the height is too low when it is actually correct) or the valve linkage arm is bent.

91. A — A 3 mm depression in the fifth wheel plate creates a pocket that the trailer upper coupler settles into during normal operation. During acceleration and braking, the coupler rocks in and out of this depression, producing a clunking noise and creating impact loading on the king pin and locking jaws that accelerates their wear.

92. C — U-bolts clamp the leaf spring pack to the axle seat and are the only connection holding the axle in position relative to the spring and frame. A broken U-bolt compromises this connection — the spring can shift on the axle seat, changing axle alignment and potentially allowing the axle to move from its intended position. This is a critical safety defect.

93. B — Backing off the adjusting nut 1/4 turn after torquing establishes a small, controlled amount of axial clearance (end play) between the bearing cones and the spindle. This end play prevents the bearing from being preloaded (too tight), which would generate excessive friction heat during operation and lead to premature bearing failure.

94. D — Shock absorbers control the rate of suspension compression and rebound. When they fail, the springs oscillate freely — the vehicle bounces excessively over bumps and the cab continues to oscillate (porpoise) for multiple cycles before settling. Replacing the failed shock absorbers restores proper damping control.

95. A — Belt separation is a structural failure of the bond between the tread belt package and the tire casing. This failure is progressive — it will continue to grow until the tread separates completely, causing a blowout. The tire must be replaced immediately regardless of remaining tread depth because the structural integrity is compromised.

96. C — If a vibration appears after tire rotation that was not present before, and the tires were moved from steer to drive position, the most common cause is contamination on the hub pilot surfaces. Debris (rust, dirt, old rubber) between the wheel and the hub prevents flat seating, creating runout that produces the vibration.

97. B — Oil-contaminated brake friction material cannot be effectively cleaned. Oil penetrates the porous lining material and alters its friction characteristics permanently — even after surface cleaning, the oil wicks to the surface under heat and reduces braking effectiveness. The contaminated shoes must be replaced with new linings.

98. D — Moving the fifth wheel rearward reduces the weight on the tractor's drive axles (more weight transfers to the trailer tandem). With less weight on the drive tires, they have reduced traction. During curves and turns, the lighter drive axle is more susceptible to sliding laterally, causing the tractor tail to swing wide (oversteer).

99. A — Multi-piece rim lock rings must be visually inspected for any nicks, bends, cracks, or deformation before assembly. A defective lock ring may not seat properly in the gutter groove and can blow off with lethal force during inflation. Any ring with visible damage must be discarded and replaced.

100. C — The "R" in a tire size designation (such as 11R22.5) indicates radial construction. Radial tires have body plies that run perpendicular to the direction of travel (from bead to bead), which provides the flexible sidewall and stable tread contact that characterize radial tire performance.

101. B — At 0.65 mm against a 0.8 mm maximum, the measurement is within specification but has consumed over 80% of the allowable wear limit. Rather than waiting until the next PM when it may exceed the limit, proactive replacement now prevents the need for an unscheduled repair and maintains optimal steering geometry.

102. A — One tire consistently running 15°C hotter than identical tires on the same axle with equal pressure, tread, and loading indicates a heat source at that specific wheel position. A dragging brake generates friction heat that transfers through the drum and hub assembly to the tire, raising its operating temperature above the others.

103. D — The cab tilt pump operates (generating hydraulic pressure) but the cab does not rise, and the lines are undamaged. The cylinder itself is the remaining component — if the piston has seized from rod corrosion or scoring, the hydraulic pressure cannot extend the cylinder regardless of the pump's output.

104. B — Water entry during rain with no visible body damage most commonly occurs through deteriorated seals at roof-mounted components — clearance lamp gaskets, roof panel seam sealant, window weatherstripping, and antenna or accessory mounting base gaskets. These seals degrade from UV exposure, thermal cycling, and vibration over time.

105. C — The seat air compressor or its electrical supply is the most likely failure. A blown fuse, a disconnected wire, or a failed compressor motor prevents the air ride function from operating while other electrically-driven seat adjustments (fore-aft motor, recline motor, lumbar motor) continue functioning on their separate circuits.

106. A — Engine compartment fire suppression systems require periodic inspection of the suppression agent level or pressure (to verify the system has an adequate charge), the activation sensor condition (to verify it will trigger at the correct temperature), and the expiry date (the agent may lose effectiveness or the pressurized vessel may require recertification).

107. D — If the defroster is delivering warm air at high volume but the windshield still fogs, the system is not removing enough moisture from the air. The A/C compressor dehumidifies the air by condensing

moisture on the cold evaporator coil before it reaches the windshield. A failed A/C compressor eliminates this dehumidification function.

108. B — The mirror motor moves up/down but not left/right. Since the opposite mirror works in all directions on the same switch and wiring, the mirror control circuit is functional. The failed horizontal axis is inside the affected mirror's motor assembly — a failed winding or a seized internal mechanism specific to the horizontal direction.

109. A — The TRU system tests normal mechanically and thermally, but the high discharge pressure fault persists with clean condenser, functional fan, and moderate ambient temperature. An overcharged refrigerant system raises the high-side pressure because excess liquid refrigerant floods the condenser, reducing its effective heat rejection area.

110. D — The marker lamps flashing in unison with the turn signals indicates current from the turn signal circuit is feeding back into the marker lamp circuit (or vice versa). A cross-connection in the trailer harness or at a junction point allows the higher-current turn signal pulse to backfeed through the marker circuit, causing both to flash together.

111. A — If the trailer moved forward on a grade, the wheels were not chocked. Landing gear supports the trailer's weight vertically but does not prevent horizontal rolling movement. Wheel chocks must always be placed against the tires before disconnecting the tractor to prevent the trailer from rolling on any grade.

112. C — The evaporator coil is designed to operate with periodic defrost cycles to clear accumulated frost. After loading with frozen goods, the warm moist air that entered during the open-door loading period condenses rapidly on the cold evaporator coil as frost. If significant moisture was introduced, the coil ices over quickly, triggering an early defrost cycle.

113. A — An ABS modulator stuck in the release position continuously exhausts application air from the affected brake chambers. During braking, air sent to those chambers is immediately vented through the stuck modulator, so the right rear brakes apply with significantly reduced force or not at all.

114. D — The onboard charger, CCS connector pins, and BMS communication should all be investigated. The onboard charger may be overheating and shutting down, damaged connector pins can cause the charging station to lose communication and terminate the session, and a BMS fault (cell temperature, voltage, or isolation) will command the charger to stop to protect the battery.

115. B — The circuit is powered through a separate inline fuse inside the trailer — not through the seven-pin connector. The fuse should be checked for an open condition, and the wiring from the fuse to the switch and lamp fixtures should be traced for breaks, corrosion, or damaged connections.

116. C — Poor trailer tracking and wider-than-expected tail swing after repositioning the slider tandem suggest the axle alignment was disturbed. If the axles are no longer perpendicular to the trailer centreline — from a bent track, shifted axle seat, or damaged trailing arm — the trailer tracks at an angle, causing it to dog-track and swing wide.

117. A — Normal pressures with correct refrigerant charge but inadequate cooling output at the vents often indicates the blend door is not fully in the cooling position. If the blend door is partially directing air through the heater core, the heated air mixes with the cooled air from the evaporator, raising the outlet temperature.

118. D — Recovering only 400 grams from a system specified for 1,200 grams means approximately 800 grams has escaped through a leak. The system must be leak-tested, the leak repaired, and the system evacuated and recharged to the correct specification before returning to service.

119. B — Sediment and scale inside the old heater core indicates the entire cooling system contains the same contamination. Installing a new heater core without flushing the system will simply plug the new core with the same sediment. A thorough cooling system flush removes the contamination source and protects the replacement core.

120. C — A heater that starts successfully but cannot sustain the flame after a few minutes points to a combustion airflow problem. A partially blocked exhaust outlet restricts the outflow of combustion gases, causing pressure to build in the combustion chamber that disrupts the flame. The exhaust pipe must be inspected and cleared.

121. A — A deep vacuum on the low side with barely rising high-side pressure means refrigerant is not flowing from the high side to the low side. The expansion valve is stuck in the closed position or is severely restricted, trapping all the refrigerant on the high side and starving the evaporator completely.

122. D — An intermittent warm-air complaint that correlates with fluctuating pressures and self-resolves points to an intermittent flow blockage. Moisture in the system freezes at the expansion valve orifice (the coldest point in the high-pressure liquid circuit), temporarily blocking refrigerant flow. As the ice melts from ambient heat, flow resumes and cooling returns.

123. B — The APU heats the coolant, but the heated coolant must be actively circulated through the cab heater core. The auxiliary coolant circulation pump, the heater core circuit valves, and the coolant lines must be checked — a failed pump, a closed valve, or an air lock would prevent heated coolant from reaching the core despite the APU generating adequate heat.

124. C — The relief valve is set at 20,000 kPa but the gauge only shows 14,000 kPa under load. The directional control valve may have an internal restriction (contamination, a partially shifted spool, or worn passages) that creates a pressure drop between the pump and the cylinder. Adequate pressure at the pump does not guarantee adequate pressure at the actuator if the valve restricts flow.

125. A — The cylinder extends normally (adequate flow and pressure to the cap-end port) but retracts slowly despite adequate pressure. The restriction is in the flow path to the rod-end port — a fitting with a smaller-than-required orifice, a partially collapsed hose, or a kinked line limits the flow rate during retraction.

126. D — Adequate pressure and flow at the pump discharge but reduced performance at the cylinder with correctly sized lines points to a restriction between the two points. Internal contamination in the directional control valve — debris on the spool, a partially blocked work port, or contamination in the valve passages — limits the flow reaching the cylinder.

127. B — Air trapped in the hydraulic circuit creates a compressible gas pocket. Under load, the hydraulic fluid compresses the air pocket (boom drops), then the pump repressurizes the circuit (boom rises), compressing the air again in a repeating cycle that produces the bouncing oscillation. Bleeding the air from the circuit resolves the oscillation.

128. A — In an open-centre system with a fixed-displacement pump, the pump delivers a constant flow at all times. When the directional valve is in neutral, the open-centre spool passage allows the pump flow to circulate freely back to the reservoir at low pressure. This avoids the energy waste of forcing flow through a relief valve.

129. C — If the needle valve barely cracked open still allows the platform to descend too quickly, the oil is flowing through the restriction faster than intended. Hydraulic oil that is thinner than specified (too low viscosity for the temperature) passes through the same orifice opening at a higher flow rate because it offers less resistance to flow.

130. D — After PTO removal and reinstallation for transmission work, the most common assembly error is incorrect gasket thickness or an incorrect gasket that changes the gear mesh depth between the PTO drive gear and the transmission gear. An incorrect mesh depth produces interference noise as the teeth engage at the wrong position.

131. A — Water content of 0.5% (five times the 0.1% maximum) causes accelerated corrosion of internal metal surfaces, reduced lubricity that increases wear, risk of pump cavitation from water vapour formation at low-pressure points, and in cold weather, potential ice crystal formation that blocks orifices and damages valve seats.

132. C — With the battery at 85% SOC, the battery charge is not the issue. A "reduced power" derate with high SOC typically indicates the BMS has detected a condition that threatens battery safety or longevity — elevated cell temperature, a cell voltage imbalance, or a low high-voltage isolation resistance — and is limiting power output to protect the pack.

133. B — Any work performed within the proximity zone of the high-voltage battery pack or high-voltage components requires full de-energization as a precautionary measure. Even though the work is on a 12-volt component, the physical proximity to high-voltage cables and terminals creates a contact risk that warrants the full safety protocol.

134. D — A Level 2 charging session that stops after 10 minutes with a vehicle-side fault code requires investigation of the vehicle's charging components. The onboard charger's internal temperature (overheating causes shutdown), the CCS connector pins (damage causes communication loss), and the BMS communication (a battery fault commands the charger to stop) are the primary suspects.

135. A — The DC-DC converter replaces the function of the alternator in a conventional vehicle. It converts the high-voltage DC from the main traction battery pack (300 to 800 VDC) down to 12 or 24 volts DC to power the vehicle's conventional electrical systems — headlamps, ABS, instrument cluster, HVAC blower, ECMs, and all low-voltage accessories.