

RED SEAL EXAM PREP

310T Truck & Transport Mechanic

Free 50-Question Mock Exam

Practice for the Red Seal / Certificate of Qualification exam

Pass mark: 70% · Aligned to the published occupational standard topic weightings
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Mock Exam — answer all questions, then check the key

Q1. What is the function of the quick-release valve in an air brake system?

- A) Quickly increases brake application pressure for emergency stops
- B) Allows air to bypass the chambers when the parking brake is engaged
- C) Regulates maximum brake application pressure to prevent lockup
- D) Rapidly exhausts chamber air when the brakes are released

Q2. An engine uses a demand-regulated oil pump (variable displacement). The advantage over a fixed-displacement pump is:

- A) Simpler construction with fewer parts
- B) Lower parasitic loss — pumps only what is needed
- C) Provides more oil pressure at engine idle
- D) Eliminates the need for an oil pressure relief valve

Q3. Under the Canadian NSC Standard 1 (Safety Fitness), a carrier receives a "Conditional" safety rating when:

- A) The carrier has had more than 3 accidents in the past year
- B) The carrier fails to submit its annual safety filings
- C) All safety programs and compliance items are up to date
- D) The carrier has violations it must correct on a set timeline

Q4. What does the low air pressure warning device on a truck **MUST** activate when system air pressure drops to:

- A) Below 100 PSI
- B) Below 80 PSI
- C) At or before 55 PSI
- D) When the pressure reaches 70 PSI

Q5. Under the National Safety Code Standard 11, what constitutes an out-of-service condition for a commercial vehicle's steering system?

- A) Steering wheel freeplay is not regulated — only mechanical failure of steering components triggers an out-of-service
- B) Any looseness in the steering linkage — all steering linkage must be completely tight
- C) Power steering fluid level below maximum — low fluid is the only steering out-of-service condition
- D) Excess steering wheel freeplay, separated or fractured components, missing fasteners, or binding

Q6. A relay valve in an air brake system is located at the rear axle brakes. Its purpose is to:

- A) Automatically adjust rear brake pressure based on load
- B) Prevent brake pressure from exceeding governor cut-out pressure
- C) Speed brake application using air from a local reservoir
- D) Reduce maximum brake pressure to the rear axle

Q7. An inter-axle differential (power divider) on a tandem-drive truck is used to:

- A) Increase the gear ratio to the rear axle for better traction
- B) Allow the front and rear drive axles to turn at different speeds
- C) Disconnect the rear axle drive when it is not needed
- D) Split power evenly between left and right wheels of both axles

Q8. A newly installed driveshaft vibrates at a frequency approximately twice per revolution of the shaft. What type of vibration is this and what is the most likely cause?

- A) Second-order vibration from improper U-joint phasing or excessive operating angle
- B) Random vibration from loose driveshaft companion flange bolts — not frequency-correlated
- C) First-order vibration from driveshaft imbalance — occurs once per revolution
- D) Third-order vibration from an incorrect number of balance weights — three weights cause three pulses per revolution

Q9. A truck's cargo weighs 22,000 kg on a tandem drive axle. The tandem axle weight limit under provincial weight regulations (e.g., Ontario's Highway Traffic Act, harmonized nationally through the federal-provincial MOU on vehicle weights and dimensions) is 17,000 kg. The driver is caught at a weigh scale. What are the possible consequences?

- A) Only the carrier is fined — drivers are not personally responsible for cargo weight violations
- B) The driver receives a warning — first-time overweight is not an offence
- C) A fine for the driver, possible charges against the carrier, and a requirement to offload excess weight
- D) The truck is seized until the cargo is redistributed — all overweight violations result in immediate seizure

Q10. The one-way check valve between the primary and secondary air tanks fails open. What is the consequence?

- A) The primary pressure will always equal the secondary — better balance
- B) The compressor will cycle continuously due to tank equalization
- C) No consequence — the check valve is redundant and all stays normal
- D) A primary-circuit leak can drain both circuits, leaving no air brakes

Q11. What does "HPFP" stand for in a common-rail diesel fuel system, and what is its function?

- A) Hydraulic Pump Fuel Pressure — refers to fuel pressure at the hydraulic pump feed
- B) High-Performance Fuel Proportioner — balances fuel delivery to all cylinders
- C) Hot-Phase Fuel Processor — heats fuel for cold-start performance
- D) High-Pressure Fuel Pump — pressurizes fuel to common rail pressure

Q12. A truck equipped with a J1939 CAN bus system has an active fault for "SPN 168 FMI 1 — Battery Potential / Power Input 1 — Data Valid but Below Normal Range." What does this fault indicate?

- A) This is an informational code only — no action is required
- B) The J1939 data bus itself has a wiring fault — SPN 168 is a bus error code
- C) System battery voltage is below the normal operating range
- D) The power input module has failed and requires replacement

Q13. What is the purpose of the "dither" signal in a proportional solenoid control system for an electronically controlled transmission?

- A) A high-frequency, low-amplitude oscillation superimposed on the command signal to prevent solenoid stiction
- B) Dither is a diagnostic mode that cycles solenoids to test for sticking during pre-operation checks
- C) Dither refers to the controller's delay time between receiving a command and activating the solenoid
- D) Dither is a rapid alternating polarity signal that drives the solenoid in both directions to ensure it cannot stick

Q14. What is the purpose of "pilot injection" in a modern common-rail diesel injection system?

- A) To test injector function during each cycle before main injection
- B) To pre-fill the injector needle for faster main injection response
- C) To inject a small charge before the main event, reducing knock
- D) To inject fuel into the exhaust stream for DPF regeneration

Q15. A diesel engine has a fault code for "NOx efficiency below threshold" with no DTC for DEF quality or dosing system. What is the MOST likely underlying cause?

- A) The EGR valve is stuck closed, sending too much NOx to the SCR
- B) High altitude keeps the SCR outside its temperature range
- C) The DEF tank is over-filled, diluting the urea concentration
- D) The SCR catalyst has been poisoned by sulphur or oil ash

Q16. A diesel engine's diesel particulate filter (DPF) keeps reaching active regeneration temperature limits and requesting forced parked regeneration frequently. What is the MOST likely underlying cause?

- A) The DOC is working too well, pre-burning soot before the DPF
- B) Burned engine oil contaminating the DPF with unburnable ash
- C) The DPF is nearing end of life — frequent regens are normal then
- D) The EGR valve is stuck closed, sending too much PM to the DPF

Q17. A truck's diesel engine runs rough at idle, produces white smoke, and has a coolant level that keeps dropping with no visible external leaks. What is the most likely cause?

- A) EGR valve stuck open, flooding cylinders with recirculated exhaust
- B) Glow plugs failing — causing hard starts and rough idle when cold
- C) Dirty fuel injectors causing incomplete combustion and misfires
- D) A failed head gasket letting coolant into the combustion chambers

Q18. A truck's manual transmission requires double-clutching when shifting. A technician finds the synchronizers are worn. What is the purpose of synchronizers in a transmission?

- A) To synchronize the left and right drive axles during turns
- B) To prevent over-revving the engine when downshifting
- C) To match gear speed to shaft speed before engagement
- D) To prevent the clutch from engaging while the vehicle is moving

Q19. A truck diesel engine cranks normally but will not start in cold weather. The glow plugs have been verified as working. What should be checked NEXT?

- A) Check valve timing
- B) Replace the fuel injectors
- C) Check fuel quality and filter
- D) Replace the engine ECM

Q20. A truck clutch is slipping — engine RPM rises sharply during acceleration but vehicle speed does not increase proportionally. What would cause clutch slippage?

- A) Incorrect flywheel surface roughness — a smooth flywheel increases friction and causes slippage
- B) Excessive clutch free travel — too much free play causes the pressure plate to apply too much force
- C) Clutch disc too thick — excess disc material increases friction surface contact
- D) Oil or grease contamination on the clutch disc friction surfaces from a leaking rear main seal

Q21. A truck engine with selective catalytic reduction (SCR) has a warning that DEF quality is poor. The DEF tank was recently filled from a new container. What could cause a false DEF quality fault?

- A) The SCR catalyst is saturated — DEF quality fault appears when the catalyst needs replacement
- B) DEF is only stable for 6 months — the container was old even if unopened
- C) Off-spec urea concentration, contamination, or a faulty DEF quality sensor — any can trigger the fault
- D) DEF quality sensors always fail after 100,000 km and must be replaced — this is a normal maintenance item

Q22. A truck driver reports a "chatter" or vibration in the driveline only during low-speed tight turns. The MOST likely cause is:

- A) Loose engine mounts
- B) Worn U-joints
- C) Differential binding
- D) Worn steering linkage

Q23. What is the purpose of the inter-axle differential lock (power divider lock) on a tandem drive truck?

- A) Disengages the rear axle for highway driving
- B) Increases engine RPM for heavy loads
- C) Locks the steering axle for off-road use
- D) Equalizes torque between the two drive axles

Q24. A technician completes brake work on a commercial vehicle and must certify the vehicle has had a Level 1 brake inspection. What does a Level 1 brake inspection include that a routine brake adjustment does NOT?

- A) Level 1 includes a loaded road test to 60 km/h with emergency stop — routine adjustment does not require this
- B) Measurement of components to OEM wear limits with a certified, documented inspection report
- C) Level 1 inspection is identical to routine brake adjustment — the difference is only the documentation
- D) Level 1 includes measuring brake lining thickness with a gauge — routine adjustment does not

Q25. A trailer is equipped with an anti-lock braking system (ABS). After ABS repairs, the technician notices the ABS warning lamp stays on at all times during driving. What is the likely cause?

- A) The lamp is supposed to stay on — it only goes out during ABS modulation
- B) The ABS is in bypass mode — the lamp shows normal non-ABS braking
- C) Trailer ABS lamps are driven by the tractor ECU — it needs a software update
- D) An active fault code remains — not cleared after repair or newly introduced

Q26. What is the purpose of the tractor protection valve on a tractor-trailer combination?

- A) To allow the driver to apply trailer brakes independently of tractor brakes
- B) To prevent the trailer brakes from applying during normal service braking
- C) To isolate the tractor air supply if the trailer breaks away
- D) To limit maximum air pressure to the trailer to prevent brake lockup

Q27. A truck driver must complete a vehicle condition report (VCR) at the end of each day. Under NSC regulations, the report must be kept for a minimum of:

- A) 30 days
- B) 7 days
- C) 1 year
- D) 6 months

Q28. A truck differential pinion bearing preload is measured using a:

- A) Dial indicator and preload fixture
- B) Inch-pound torque wrench measuring rolling torque
- C) Feeler gauge between pinion and ring gear
- D) Pound-foot torque wrench on the pinion nut

Q29. A truck's ECM consistently logs DTC for "Sensor Supply Voltage Circuit High" on the 5V reference circuit. Multiple sensors share the same 5V reference. What is most likely causing this fault and how do you isolate it?

- A) A sensor sharing the reference has shorted internally to battery voltage — disconnect sensors one at a time to isolate it
- B) The battery voltage is too high — high battery voltage (above 14.5V) bleeds through sensor reference circuits
- C) The ECM internal voltage regulator is supplying more than 5V — replace the ECM
- D) All sensors must be replaced simultaneously — the 5V reference fault affects all sensors equally and individual replacement is ineffective

Q30. A truck body module controls cab lighting via PWM signals. The headlights dim randomly. When using a DMM (voltmeter) to test the circuit the voltage reads steady 12V but the lights still dim. What tool would best diagnose the intermittent signal fault?

- A) DMM set to Hz (frequency) mode
- B) An oscilloscope viewing the PWM signal
- C) Amp clamp around the headlight wire
- D) A 12-volt test light

Q31. A technician notices the engine oil level is ABOVE the maximum mark on the dipstick. The oil is black but smells like diesel fuel. The cause is:

- A) Fuel dilution of the engine oil
- B) Normal — oil expands when hot
- C) Engine overfilled during last oil change
- D) Coolant mixing with the engine oil

Q32. A pre-trip inspection reveals a cracked windshield with a crack in the driver's critical viewing area. What action must the driver take?

- A) Drive carefully and repair within 48 hours
- B) Do not operate the vehicle until it is repaired
- C) Report it in the logbook and continue
- D) Cover the crack with tape and proceed

Q33. A truck's drum brake shoe lining thickness is measured at 4mm. Under CVSA out-of-service criteria, what is the minimum lining thickness (at the shoe centre) before the vehicle is placed out of service?

- A) 1.6mm (1/16 inch)
- B) 1mm
- C) 10mm
- D) 6mm

Q34. A truck's battery isolator switch is turned off overnight but the battery is still discharged by morning. The MOST likely cause is:

- A) The starter motor is drawing current continuously
- B) Normal self-discharge of the battery over 8 hours
- C) The alternator is draining the battery when engine is off
- D) The isolator switch is not fully isolating the battery

Q35. An air brake system governor is set at 125 PSI cut-out and 100 PSI cut-in. If the governor cut-out pressure is adjusted to 135 PSI, what is the effect on system components?

- A) Potential damage to the dryer, fittings, valves, and tanks rated below that pressure
- B) Better braking — higher system pressure gives more force at the chambers
- C) The compressor runs more frequently because of the higher cut-out setting
- D) No change — brake chambers are designed for any pressure of 100–150 PSI

Q36. A truck's starter cranks slowly even after confirming the battery is fully charged at 12.7V. The battery passes a load test. What is the diagnostic sequence for slow cranking?

- A) Replace the starter — slow cranking always indicates a worn starter motor
- B) Replace the battery cables — voltage drop testing is too time-consuming for this common fault
- C) Perform voltage drop tests on the complete starter circuit — cables, ground strap, and solenoid contacts
- D) Perform a starter current draw test first — if current is below specification, replace the starter

Q37. A truck's body control module communicates on the J1939 datalink. Several modules lose communication simultaneously after a wiring repair. You measure 120 ohms between CAN-H and CAN-L. What does this reading mean?

- A) One termination resistor is missing or open from the network
- B) The network has a short between CAN-H and CAN-L
- C) Both termination resistors are intact — network should be healthy
- D) Normal reading for a J1939 network with multiple modules

Q38. Under NSC Standard 14, what are the tire inspection requirements for commercial vehicle operations?

- A) Tire inspection is only required at annual DOT inspection — not during pre-trip inspections
- B) Tires must be inspected for tread depth only — sidewall defects are acceptable if the tire holds pressure
- C) Tire pressure only — tires are considered acceptable if they hold pressure
- D) Tread depth, exposed cords, cuts, bulges, correct inflation, and tire matching on each axle

Q39. A trailer has a broken rear chamber on the right side, causing that spring brake to drag. The immediate safety action before repair is:

- A) Drive carefully to the shop with reduced speed
- B) Disconnect the air line to prevent pressure from reaching that axle
- C) Fill the chamber with compressed air and seal it
- D) Release the spring brake mechanically using the caging bolt

Q40. A truck's front axle service brakes are adjusting automatically, but during an inspection the left front is found to have significantly more push-rod travel than the right. What is the MOST likely cause?

- A) The S-cam on the left front is reversed — the cam must be reinstalled
- B) The air line to the left front is kinked, reducing air pressure to that chamber
- C) The left front automatic slack adjuster is not maintaining correct push-rod travel
- D) The left front brake drum is oversize and requires more travel to contact

Q41. What is the purpose of the water separator in a diesel fuel system?

- A) To remove water from the fuel
- B) To increase fuel pressure
- C) To cool the fuel before injection
- D) To filter large particles only

Q42. A tractor has had its trailer disconnect for one week. When reconnecting the trailer and attempting to release the trailer spring brakes via the trailer supply valve, the trailer spring brakes do not release despite the tractor system showing 120 PSI. The gladhand connections are confirmed secure. What should be checked first?

- A) Manually cage all trailer spring brakes — they cannot be released remotely after long storage
- B) Replace the trailer spring brake chambers — long-term storage causes internal corrosion
- C) Increase tractor air pressure to 140 PSI — trailer spring brakes need higher pressure
- D) Check the supply gladhand for obstruction and the trailer emergency relay valve for a tripped or sticking condition

Q43. What is the purpose of the fifth wheel on a tractor-trailer unit?

- A) A steering assist device for tight turns
- B) The coupling between tractor and trailer
- C) An additional axle for load distribution
- D) A spare tire mounting point on the frame

Q44. A driver is transporting dangerous goods (Class 3 Flammable Liquid) and is stopped at a border crossing inspection. The inspector asks for the transport documents. What specific information must the shipping document contain under the Transportation of Dangerous Goods (TDG) Act?

- A) Product name and the driver's WHMIS certification number confirming they are trained to transport hazardous materials
- B) Only the emergency response telephone number — all other information is on the MSDS in the cab
- C) Only the product name and total weight — border inspectors have access to SDS databases
- D) Proper shipping name, UN number, hazard class, packing group, quantity, emergency number, and consignor/consignee details

Q45. A circuit protected by a 10-amp fuse keeps blowing the fuse. The CORRECT diagnostic approach is:

- A) Add a second 10-amp fuse in parallel
- B) Find and repair the cause of the overcurrent
- C) Install a 20-amp fuse to stop the blowing
- D) Replace the fuse with a circuit breaker of any rating

Q46. A truck is equipped with ABS. During normal braking the ABS activates on every stop. What does this indicate?

- A) Air pressure is too high
- B) The ABS module has failed
- C) Wheel lockup is occurring on every stop
- D) ABS is working perfectly — this is normal

Q47. What type of lubricant is typically required for a truck's manual transmission versus its differentials, and why can't they use the same oil?

- A) Both use the same SAE 80W-90 GL-5 gear oil — there is no difference in lubrication requirements
- B) Transmissions typically require GL-4 or a specified fluid; differentials use GL-5, whose EP additives corrode brass synchronizers
- C) Both use ATF (Automatic Transmission Fluid) — manual transmissions require ATF for proper synchronizer function
- D) Transmissions use engine oil (SAE 30) for its detergent properties. Differentials use gear oil for its extreme pressure additives.

Q48. On a hybrid or battery-electric truck, what colour identifies the high-voltage cables, and above what voltage does this identification apply?

- A) Red — any circuit above 12 V must be colour-coded red
- B) Orange — circuits above 60 V DC (or 30 V AC)
- C) Blue — indicating 24 V chassis circuits shared with the trailer
- D) Yellow — indicating 48 V mild-hybrid circuits only

Q49. A truck driver complains of a vibration that increases with speed but is not affected by engine load. The MOST likely cause is:

- A) Failed or loose engine mounts
- B) Driveshaft imbalance or worn U-joints
- C) A slipping transmission clutch
- D) Engine cylinder misfiring

Q50. A truck engine coolant temperature is consistently 10°C below the thermostat opening point, even after a long highway run. What is the MOST likely cause?

- A) The water pump impeller has slipped on the shaft, reducing flow
- B) The coolant level is too high, causing excessive heat dissipation
- C) The thermostat is stuck in the open position
- D) The radiator fan is running continuously at maximum speed

Answer Key & Explanations

Q1. Answer: D

Quick-release valve: rapid local air exhaust from brake chambers on release, allowing spring return and reducing brake drag. Without a quick-release valve, air would have to travel all the way back through the treadle valve and exhaust at the driver's feet — taking too long and causing brake drag. The QR valve is located close to the brake chambers: when the pedal is released and line pressure drops, it immediately exhausts air locally at the chamber — rapid piston return and immediate brake release.

Q2. Answer: B

Variable displacement oil pump: matches output to demand — less heat and better fuel economy. A fixed pump always operates at maximum displacement, burning extra power circulating oil through the relief valve. A demand-regulated pump reduces displacement at highway speeds (lower demand), saving 1–3% fuel. It still maintains required oil pressure and flow at all operating conditions.

Q3. Answer: D

Conditional rating = violations found that, if not corrected, could lead to serious accidents. NSC Standard 1 sets out three ratings: Satisfactory (compliant), Conditional (violations found, correction required within a specified timeframe), and Unsatisfactory (serious non-compliance, may result in suspension of operating authority). A Conditional carrier must demonstrate corrective action within the specified timeframe.

Q4. Answer: C

Low air warning: activates at or before 55 PSI. This gives the driver warning before pressure drops to the point where spring brakes begin to apply (approximately 20–40 PSI). The warning can be visual (light), audible (buzzer), or both. NSC Standard 1 requires this warning device on all air-braked commercial vehicles.

Q5. Answer: D

Steering out-of-service conditions: excess freeplay, component separation/fracture, missing fasteners, binding. NSC Standard 11 specifies: maximum steering wheel freeplay (power steering allows more lash than manual — e.g., 20-in wheel: manual ~2½ in, power ~5¼ in, per the FMCSA/CVSA table), no separated or fractured steering components (ball joints, tie rods, pitman arm, idler arm), no missing fasteners, no binding throughout full range of travel. Any of these conditions = out of service.

Q6. Answer: C

Relay valve: speeds up brake application at remote axles. Without a relay valve, air must travel the full length of the vehicle (foot valve to rear brakes). The relay valve uses a small pilot signal from the foot valve to open a local valve, delivering air from a nearby reservoir rather than the foot valve — much faster response.

Q7. Answer: B

Inter-axle differential allows different speeds between front and rear drive axles on curves and uneven terrain.

On a curve or uneven road, the front and rear tandems travel slightly different distances. Without the inter-axle diff, drivetrain windup (torsional stress) builds up. Locking the inter-axle diff forces both axles to rotate together — useful in low-traction situations but must not be locked on dry pavement.

Q8. Answer: A

2× per revolution vibration = second-order = U-joint phasing error or excessive operating angle. A single U-joint operating at any angle creates velocity variation — the output shaft alternately speeds up and slows down twice per input revolution (second order). Two correctly phased U-joints cancel this variation. Incorrect phasing (yokes not in the same plane) means the second variation adds instead of cancels — producing a strong 2× vibration. Excessive operating angle on either joint also increases the magnitude of this variation.

Q9. Answer: C

Overweight consequences: fine for driver and/or carrier, possible offload requirement, and CVOR/safety rating impact. Overweight fines vary by province and increase with the amount over the limit (progressive fines). The driver, carrier, and sometimes the shipper can all be charged depending on the circumstances. The truck may be held until excess weight is removed or weight is redistributed to comply. Repeated overweight violations affect the carrier's Commercial Vehicle Operator's Registration (CVOR) record and safety rating.

Q10. Answer: D

Failed open check valve: air crosses between circuits — a single leak can drain both. The dual-circuit air system is designed so that primary and secondary circuits are isolated by check valves. A failure in one circuit (line break, valve failure) only depletes that circuit — the other remains functional. If the check valve between tanks fails open, both circuits are connected — a single failure drains both, potentially leaving the vehicle with no functioning air brakes.

Q11. Answer: D

HPFP = High-Pressure Fuel Pump. In a common-rail system, the HPFP raises fuel pressure from transfer pump pressure (~5–10 bar) to injection pressure (typically 1,600–2,200 bar / 23,000–32,000 PSI). This high-pressure fuel is stored in the common rail and distributed to solenoid or piezo injectors. The HPFP is driven by the engine and is the heart of the common-rail injection system.

Q12. Answer: C

SPN 168 FMI 1 = battery/system voltage below normal range. In J1939 SAE diagnostics, SPN (Suspect Parameter Number) 168 = Battery Voltage. FMI (Failure Mode Identifier) 1 = Below Normal Range. This means the ECM/ECU is seeing low system voltage — typically below 11.5–12V on a 12V system or below 23V on a 24V system. Causes: weak battery, charging system fault (alternator, belts, connections), excessive parasitic draw, corroded battery connections.

Q13. Answer: A

Dither: high-frequency low-amplitude signal superimposed on command to prevent solenoid stiction. Without dither, a proportional solenoid may stick at its current position due to static friction (stiction) between the plunger and bore. This causes hysteresis — the output at a given command differs depending on whether command is increasing or decreasing. Dither (typically 100–500 Hz) keeps the plunger in continuous slight motion, breaking static friction and ensuring the plunger position precisely tracks the command signal.

Q14. Answer: C

Pilot injection: small pre-injection reduces diesel knock. A very small amount of fuel injected slightly before the main event ignites first, raising cylinder temperature and reducing the ignition delay of the main charge. Diesel knock is caused by the pressure spike from rapid combustion of fuel that accumulated during ignition delay. Result: more gradual pressure rise, quieter and smoother combustion, less stress on bearings and pistons. Modern systems may use 3–5 injection events per cycle.

Q15. Answer: D

SCR NOx efficiency low: catalyst poisoning or degradation reducing conversion efficiency below threshold. The SCR catalyst converts NOx using ammonia from DEF. Over time, sulphur compounds (from low-quality diesel fuel) and phosphorus/zinc from engine oil ash coat the catalyst surface, reducing active sites. The OBD system monitors NOx before and after the SCR — when conversion efficiency falls below threshold, it sets a code and begins a derate.

Q16. Answer: B

Frequent DPF regens: engine oil contamination (ash buildup). Soot burns off during regen. Oil-based ash does NOT burn — it is a non-combustible deposit that accumulates permanently. If oil is entering combustion via worn rings, turbo seals, or valve guides, ash builds up in the DPF rapidly, causing high back pressure that triggers constant regeneration requests. Only solution: replace or clean the DPF and fix the oil consumption issue.

Q17. Answer: D

White smoke + coolant loss + rough idle = coolant entering combustion (failed head gasket). Coolant burns as white steam with a sweet smell. Combustion pressure also enters the cooling system, pressurizing it (visible bubbles in the coolant reservoir). A head gasket failing between a coolant passage and a cylinder allows coolant to flood that cylinder — a hydrostatic lock risk if left unaddressed. Confirm with a combustion leak test (CO detector at reservoir).

Q18. Answer: C

Synchronizers: match the speed of the gear being engaged to the main shaft speed before the dog teeth lock — enabling smooth shifts without double-clutching. Without synchronizers, the gear teeth must be exactly speed-matched before engagement (double-clutching). Synchronizers (cone clutches) use friction to speed-match before dog tooth engagement. Worn synchronizers require the driver to manually match speeds (double-clutching or rev-matching) for smooth shifts.

Q19. Answer: C

Cold no-start with good glow plugs = fuel issue. Check fuel quality (winter-grade fuel), fuel filter condition, and the fuel system for waxing/gelling. Diesel gels at low temperatures if not winter-grade, and a clogged filter from wax buildup restricts flow. Add anti-gel additive, replace the filter, and check for air in the fuel system.

Q20. Answer: D

Clutch slipping: oil/grease contamination on friction surface — pressure plate cannot grip the disc. Oil from a leaking rear main seal or improperly lubricated parts contaminates the disc friction material. Oil-soaked friction material has greatly reduced coefficient of friction. Other causes: worn friction disc (too thin, past minimum thickness), weak or broken pressure plate springs, overheated pressure plate (springs lose tension from clutch abuse). Contamination: replace both disc and pressure plate — cleaning oil from friction material is ineffective.

Q21. Answer: C

DEF quality faults: wrong concentration, contamination, or sensor failure. DEF must be exactly 32.5% urea solution (AUS32/ISO 22241). Diluted DEF (too much water) reduces SCR efficiency and triggers the sensor. Contaminated DEF (wrong fluid added to tank) can damage the SCR catalyst. The DEF quality sensor measures urea concentration using sound wave velocity or electrical properties. A faulty sensor can trigger quality faults even with good DEF. Test: compare refractometer reading of DEF to specification. DEF that froze and thawed incorrectly can also trigger the fault.

Q22. Answer: C

Chatter in turns = differential issue. Inter-axle or wheel differential binding — often wrong lubricant or a depleted limited-slip friction modifier — makes the clutch packs stick and release during slow tight turns, causing vibration. Drain, flush, and refill with correct gear oil + friction modifier.

Q23. Answer: D

Inter-axle diff lock = traction device. The power divider (inter-axle differential) normally allows speed differences between front and rear drive axles. Locking it forces equal torque to both axles when traction is lost — helpful in mud, ice, or loose gravel. Should NOT be used on dry pavement (causes driveline stress).

Q24. Answer: B

Annual/Level 1 (PVI) inspection is comprehensive: measures wear, verifies hardware, tests spring brakes, generates certified inspection certificate. Under NSC Standard 11B, an Annual (Periodic Vehicle Inspection) must be performed by a certified inspector and covers: brake lining and drum/rotor dimensions (to discard limits), hardware condition, push-rod stroke at 90 psi, spring brake function, ABS warning lamp check, all brake system components. A certified inspection certificate (CVI) is issued and carried in the vehicle.

Q25. Answer: D

ABS warning lamp on during driving = active ABS fault code. Lamp sequence: illuminates at key-on for bulb check, then extinguishes after a short self-test if no faults. Continuous illumination during operation indicates an unresolved stored fault. After ABS repairs, fault codes must be cleared using a service tool or diagnostic software. If the lamp re-illuminates, a new fault was introduced during the repair (wiring disturbed, sensor reconnected incorrectly) or the existing fault was not actually repaired.

Q26. Answer: C

Tractor protection valve: isolates tractor if trailer breaks away. If the trailer supply line is severed or pressure drops below the control valve threshold (typically 45 PSI), the tractor protection valve closes, preventing tractor air from draining through the broken connection. This allows the tractor to maintain air pressure and braking capability. The trailer spring brakes also apply simultaneously.

Q27. Answer: D

VCR retention: minimum 6 months. The driver's report must be signed, defects noted and corrected, and the signed copy retained by the carrier for 6 months. If a defect was noted, the mechanic's certification of repair must also be retained. Drivers must receive a copy of the previous trip's VCR before departure.

Q28. Answer: B

Pinion bearing preload = rolling torque measured in inch-pounds. With the pinion installed (without the ring gear meshed), a low-range torque wrench measures the force required to rotate the pinion. This determines if the bearings are preloaded correctly. Typical spec: 15–25 in-lb for new bearings. Insufficient preload = bearing wear and noise. Excessive = bearing failure.

Q29. Answer: A

5V reference high: one sensor shorting its reference to battery voltage. If a sensor has an internal short between its power supply pin (connected to the ECM's 5V reference) and battery positive, it raises the entire shared 5V reference above specification. Since multiple sensors share this reference, all will output incorrect signals. Disconnect sensors from the 5V reference one at a time — when the reference drops back to 5V, you have found the shorted sensor.

Q30. Answer: B

Oscilloscope: captures the waveform over time — reveals intermittent faults. A DMM reads average/RMS voltage and misses brief dropouts. An oscilloscope displays the actual PWM waveform — a dropout, missing pulse, or duty cycle change appears instantly on screen. Essential for intermittent electronic faults on PWM-controlled circuits.

Q31. Answer: A

Oil level rising + diesel smell = fuel dilution. Diesel leaking past injector return seals or a cylinder into the crankcase thins the oil, increases its volume (raising the level), and smells strongly of fuel. Causes: injector return seal failure, injector stuck open, fuel pump seal failure, or cranking without start (flooding). Diluted oil has severely reduced lubrication ability.

Q32. Answer: B

Critical viewing area crack = vehicle out of service. A crack in the driver's primary viewing area (typically the area swept by the wipers directly in front of the driver) impairs visibility and violates safety standards. The vehicle must not be operated until the windshield is repaired or replaced.

Q33. Answer: A

CVSA drum brake lining OOS: 1.6mm (1/16 inch) or less at the shoe centre. A drum-brake shoe lining worn to 1/16 inch (1.6mm) or less at the thinnest point = out of service. (Air disc brake pads: 1/8 inch / 3.2mm.) At 4mm the lining is still serviceable; always check manufacturer specs alongside CVSA standards. Steering-axle and two-pad shoes have higher limits.

Q34. Answer: D

Battery discharge through "off" switch = switch not isolating. Common causes: corroded or worn contacts in the isolator switch that no longer make a complete break, or a bypass circuit that bypasses the switch (alarm system, GPS tracker, fridge). Test with a clamp-on ammeter on the cable between switch and battery with switch OFF.

Q35. Answer: A

Exceeding component pressure ratings causes premature seal and fitting failure. Air brake system components (air dryer, tanks, valves, hoses, brake chambers) are rated for specific maximum working pressures — typically 150–175 PSI for standard components. The governor cut-out should not be set above the system's lowest-rated component maximum. Higher pressure also does not improve braking significantly — brake chamber output is already adequate at specification. Always verify governor settings against OEM specification.

Q36. Answer: C

Slow cranking diagnostic: voltage drop across every part of the starter circuit. A good battery can still deliver inadequate voltage to the starter if wiring resistance is high. Test each segment: B+ cable from battery to solenoid, solenoid contacts (input vs. output), battery cable from solenoid to starter, and ground from starter to battery. Any segment with >0.2V drop is suspect. Also: check engine for hydrostatic lock (remove glow plugs and crank). Oil viscosity: wrong grade can significantly increase cranking resistance.

Q37. Answer: A

120Ω between CAN-H and CAN-L = one terminator missing. Two 120Ω resistors in parallel = 60Ω, so a healthy network reads about 60Ω. Reading 120Ω means only one terminator is connected. During the wiring repair, a termination resistor was likely disconnected. Locate and reconnect the missing end-of-line terminator.

Q38. Answer: D

NSC Standard 14 tire requirements: tread depth, condition (cords, cuts, bulges), inflation, and compatibility. Steering axle tires have higher tread depth requirements (4/32 in) than other axles (2/32 in) due to their safety-critical role. Exposed cords or fabric = out of service immediately. Bulges indicate internal structural failure and separation risk. Mismatched tires on duals (different diameter) cause the larger tire to carry more than its share of load. All requirements are checked at pre-trip. Radial and bias-ply tires must not be mixed on the same axle, and dual-position tires must be equal size.

Q39. Answer: D

Caging bolt mechanically compresses the spring and holds the brake off. Each spring brake chamber has an emergency caging bolt for exactly this purpose — mechanically compressing the large power spring to allow the brake to release when air cannot. Once caged, the vehicle can be safely towed or driven for service. A caged spring brake has NO spring braking ability — label and remember.

Q40. Answer: C

Unequal push-rod travel with automatic slack adjusters = slack adjuster not adjusting. Automatic slack adjusters (ASA) self-adjust during each brake application to maintain push-rod stroke within the chamber's limit (e.g., 1¾ in / 44 mm for a Type 20 chamber). An ASA that is seized, worn, or installed incorrectly will not maintain adjustment. When one side is over-stroke but the other is correct, the ASA on the over-stroke side is the prime suspect. Important: never manually adjust an ASA — it indicates a mechanical failure.

Q41. Answer: A

Water separator = protects injectors. It removes water from fuel before it reaches the injection system. Water in diesel fuel causes injector corrosion, microbiological growth, and reduced lubricity. The separator bowls water at the bottom — drain it regularly. Most have a sensor that triggers a warning light when water level is high.

Q42. Answer: D

Trailer spring brakes not releasing: check the supply line and trailer emergency (relay) valve first. When trailer air lines are disconnected, the trailer emergency valve detects loss of supply signal and applies the trailer spring brakes (fail-safe). When reconnecting, some trailer emergency valves may not reset automatically if supply pressure rises too slowly or if the valve is sticking — verify it is receiving the supply signal and passing it to the spring brake chambers. Also verify: emergency line gladhand (blue) is connected first, then service line (red). Gladhand seals may be damaged, preventing pressure.

Q43. Answer: B

Fifth wheel: coupling device connecting the tractor to the trailer kingpin. The kingpin on the trailer slides into and locks into the fifth wheel jaw. The fifth wheel bears the vertical load of the front of the trailer (pin weight) and transmits braking and traction forces. Proper lubrication prevents excessive wear on both the fifth wheel and kingpin.

Q44. Answer: D

TDG shipping document requirements: specific mandatory information for dangerous goods transport. The Transportation of Dangerous Goods Regulations (SOR/2001-286) require: proper shipping name (not trade name), UN number, primary hazard class, packing group (if applicable), total quantity (in appropriate units), 24-hour emergency response phone number, consignor's name and address, consignee's name and address, and any special provisions. The document must be in English or French and readily accessible to the driver.

Q45. Answer: B

Never increase fuse rating as a fix. The fuse protects the wiring, not the component. A blown fuse means the circuit is drawing more current than the wire can safely carry. Increasing the rating allows wiring to overheat and potentially start a fire. Diagnose why the circuit draws excess current — short circuit, overloaded component, damaged wiring.

Q46. Answer: C

ABS activating every stop = excessive brake force or imbalance. ABS should only activate during emergency/panic braking. If it activates on normal stops, check brake adjustment, tyre condition, and brake balance — a brake may be overadjusted or dragging, or the load imbalanced. The system is working but the underlying cause needs correction.

Q47. Answer: B

GL-4 for manual transmissions (brass synchronizers), GL-5 for differentials. GL-5 gear oil contains high concentrations of extreme pressure (EP) additives — typically sulfur-phosphorus compounds — that are activated under high loads in hypoid gear sets (differentials). These additives are chemically aggressive to brass and bronze, which are used in synchronizer rings in manual transmissions. Brass synchronizer corrosion from GL-5 causes sluggish, difficult shifting. Always use the OEM-specified oil type. Note: some manual transmissions specify ATF or a transmission-specific fluid.

Q48. Answer: B

Orange = high voltage (above 60 V DC / 30 V AC) per ISO 6469-3 and SAE practice. HV cables outside protective barriers must have an orange outer covering. Never cut, probe, or disconnect orange cabling until the manufacturer's high-voltage disable procedure is completed: remove the service disconnect (service plug), wait the specified capacitor bleed-down time, then verify absence of voltage with a CAT III meter. PPE for HV work includes Class 0 insulating rubber gloves rated 1,000 V AC with leather protectors — ordinary shop gloves give no protection.

Q49. Answer: B

Speed-related vibration, not load-related = rotating component. Driveshaft imbalance or worn/incorrectly-phased U-joints produce vibrations that increase with speed regardless of engine load. Check driveshaft runout, balance, U-joint condition, and operating angles.

Q50. Answer: C

Coolant always below thermostat rating = thermostat stuck open. A properly functioning thermostat holds coolant in the engine block until operating temperature is reached, then opens to allow radiator flow. A stuck-open thermostat allows premature and continuous circulation through the radiator — the engine never fully warms up. Symptoms: poor heater output, excessive warm-up time, P0128 code, increased fuel consumption.

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