PRACTICE EXAM 2: T4 SIMULATION (50 QUESTIONS)

1. A driver reports the air pressure gauge takes nearly 5 minutes to reach cut-out pressure during cold morning start-up but operates normally once the system reaches working pressure. The most likely cause is:

A. Excessive moisture frozen in the supply line restricting air flow during cold conditions

B. Worn compressor unable to deliver adequate volume during normal operation

C. Air dryer purge valve stuck closed during the cold start-up sequence

D. Failed governor signaling unload before reaching cut-out pressure during operation

2. Technician A says the air dryer desiccant cartridge should be replaced based on visible saturation observed during inspection. Technician B says the air dryer desiccant cartridge should be replaced per manufacturer service interval regardless of visual condition. Who is correct?

A. Both Technician A and Technician B

B. Technician A only

C. Neither Technician A nor Technician B

D. Technician B only

3. All of the following can cause excessive air pressure leakage in a heavy-duty truck air brake system EXCEPT:

A. A failed coolant temperature sensor reading falsely cold to the engine ECM

B. Cracked or damaged air supply lines from chassis vibration during operation

C. Worn O-rings or gaskets at valve and fitting connections during operation

D. Damaged brake chamber diaphragm allowing pressure loss during application

4. The proper diagnostic sequence when a heavy-duty truck shows a complaint of "low-pressure warning light coming on during steep grades" is to:

A. Replace the low-pressure warning switch as the most likely failure component

B. Apply battery voltage to the warning system for diagnostic testing during service

C. Verify air pressure during grade descent and inspect for excessive demand sources

D. Disconnect the warning system to eliminate the symptom during operation

5. The maximum allowable air pressure leak rate on a heavy-duty tractor with engine off and brakes applied is:

A. 5 PSI in 1 minute per FMVSS 121 specifications during operation

B. 10 PSI in 1 minute per FMVSS 121 specifications during operation

C. 1 PSI in 1 minute per FMVSS 121 specifications during operation

D. 3 PSI in 1 minute per FMVSS 121 specifications during operation

6. A LEAST likely cause of an air brake system that produces a continuous hissing sound from the brake chamber area is:

A. Cracked or damaged brake chamber housing allowing pressure loss during operation

B. A failed coolant temperature sensor reading falsely cold to the engine ECM

C. Damaged brake chamber diaphragm allowing pressure loss during application

D. Loose or damaged air line fittings at the brake chamber connections during operation

7. Technician A says the air pressure cut-out specification on most heavy-duty applications is approximately 100 to 125 PSI. Technician B says the cut-out specification is the same on all air brake-equipped heavy-duty trucks regardless of manufacturer. Who is correct?

A. Technician A only

B. Both Technician A and Technician B

C. Technician C only

D. Neither Technician A nor Technician B

8. The proper service action when a heavy-duty truck air brake system shows excessive oil contamination throughout the system is to:

A. Continue operation since oil contamination has minimal effect on system function

B. Add air system cleaner additive to dissolve the oil contamination during service

C. Replace the compressor and clean or replace contaminated downstream components

D. Apply battery voltage to the system for diagnostic testing during the service event

9. The most likely consequence of operating a heavy-duty truck with a stuck-open air dryer purge valve is:

A. Improved compressor service life from reduced operating cycle frequency

B. Faster system pressure build-up during normal vehicle operation conditions

C. Increased moisture removal capability throughout the air brake system operation

D. Continuous loss of compressed air preventing the system from reaching cut-out

10. The proper procedure when an air brake system shows that pressure builds normally but drops rapidly when the engine is shut off is to:

A. Continue operation since rapid pressure drop has minimal effect during operation

B. Perform a leak test per FMVSS 121 procedures to identify the leak source location

C. Apply battery voltage to the system for diagnostic testing during the service event

D. Replace the air compressor as the most likely failure component during service

11. The LEAST likely cause of an air brake system that fails to maintain pressure during overnight parked conditions is:

A. Major air leak in the supply system exceeding FMVSS 121 acceptable rates

B. Damaged or worn check valves allowing reverse flow during the parked period

C. Failed brake chamber diaphragm allowing pressure loss during the parked period

D. A failed coolant temperature sensor reading falsely cold to the engine ECM

12. The proper procedure for testing the operation of the low-pressure warning device on a heavy-duty truck is to:

A. Reduce system pressure with engine off until the warning device activates

B. Apply battery voltage to the warning device for diagnostic testing during service

C. Listen for warning device operation with a stethoscope during normal operation

D. Replace the warning device as preventive maintenance regardless of condition

13. The most accurate description of an air brake system safety valve operation is:

A. Filters compressed air before delivery to the brake chambers during operation

B. Maintains pressure differential between primary and secondary circuits during operation

C. Releases excess pressure when system pressure exceeds the safety threshold value

D. Modulates pressure to the trailer service brake circuit during normal operation

14. Technician A says the air compressor unloader valve is opened by the governor during cut-out to relieve compressor pumping work. Technician B says the air compressor unloader valve allows fresh air into the compressor cylinders during the loaded operation cycle. Who is correct?

A. Both Technician A and Technician B

B. Technician A only

C. Technician C only

D. Neither Technician A nor Technician B

15. The proper diagnostic priority when a heavy-duty truck shows excessive water accumulation in the supply reservoir despite recent air dryer service is to:

A. Continue operation since water accumulation has minimal effect after dryer service

B. Add desiccant additive to the reservoir to absorb the moisture during service

C. Replace the supply reservoir as the most likely failure component during service

D. Verify air dryer installation, purge valve operation, and compressor condition

16. The most likely cause of a heavy-duty truck air brake system that shows compressor cycling more frequently than normal during operation is:

A. Air leakage in the supply system or excessive demand from accessories during operation

B. Worn ring and pinion gears in the rear drive axle assembly during operation

C. A failed coolant temperature sensor reading falsely cold to the engine ECM

D. Failed catalytic converter creating excessive exhaust restriction during operation

17. The proper service action when a heavy-duty truck air brake system shows the air dryer body is hot during normal operation is to:

A. Continue operation since some heat is normal during compressor cycling events

B. Apply additional cooling to the air dryer body during normal operation conditions

C. Investigate compressor cycling rate and air system demand for excessive operation

D. Replace the air dryer immediately as the most likely failure component during service

18. The LEAST likely consequence of operating a heavy-duty air brake system with a failed governor stuck in the loaded position is:

A. System pressure exceeding the safety valve setting requiring valve relief operation

B. A failed coolant temperature sensor reading falsely cold to the engine ECM

C. Continuous compressor operation accelerating compressor wear during operation

D. Excessive heat buildup in the compressor and air dryer during continuous operation

19. The proper procedure when a heavy-duty truck shows a complaint of "audible air leak from the front of the truck" is to:

A. Locate the leak source through systematic inspection of supply system components

B. Apply additional air pressure to compensate for the leak during normal operation

C. Apply battery voltage to the leaking component for diagnostic testing during service

D. Continue operation since the leak has minimal effect on overall system function

20. The most likely consequence of operating a heavy-duty truck with an air pressure leak rate of 5 PSI per minute is:

A. Improved compressor service life from increased operating cycle frequency

B. No effect on the air brake system during normal operating conditions

C. Faster system pressure build-up during initial start-up procedures

D. Excessive compressor cycling, reduced reserve capacity, and CVSA out-of-service status

21. A driver reports that the brake pedal feels normal but stopping distance has increased over the past several weeks. The most likely cause is:

A. Brake adjustment out of specification or worn lining requiring foundation brake service

B. A failed coolant temperature sensor reading falsely cold to the engine ECM

C. Excessive transmission fluid level above the maximum fill mark indication

D. Worn ring and pinion gears in the rear drive axle assembly during operation

22. Technician A says brake chamber pushrod stroke must be measured at full service application pressure for accurate results. Technician B says brake chamber pushrod stroke can be accurately measured at any pressure during inspection. Who is correct?

A. Both Technician A and Technician B

B. Technician B only

C. Technician A only

D. Neither Technician A nor Technician B

23. All of the following can cause excessive brake chamber pushrod stroke EXCEPT:

A. Worn brake lining beyond the service specification limits during inspection

B. A failed coolant temperature sensor reading falsely cold to the engine ECM

C. Failed automatic slack adjuster unable to compensate for normal lining wear

D. Brake drum diameter exceeding the maximum allowable specification during use

24. The proper service action when a heavy-duty foundation brake shows uneven lining wear between the leading and trailing shoes is to:

A. Apply battery voltage to the brake assembly for diagnostic testing during service

B. Continue operation since uneven wear is normal in foundation brake operation

C. Replace only the more worn shoe to maintain lining service life economy

D. Inspect for cam-related issues, return spring wear, and shoe contact patterns

25. The most likely cause of a heavy-duty foundation brake that shows premature lining wear on one wheel position only is:

A. Dragging brake from failed slack adjuster, return spring, or seized cam roller

B. A failed coolant temperature sensor reading falsely cold to the engine ECM

C. Excessive transmission fluid level above the maximum fill mark indication

D. Worn ring and pinion in the rear drive axle assembly during operation

26. Technician A says brake drum machine-to dimensions are typically cast onto the drum surface during manufacturing. Technician B says brake drum maximum-allowable dimensions represent the limit before drum replacement is required. Who is correct?

A. Technician A only

B. Technician B only

C. Both Technician A and Technician B

D. Neither Technician A nor Technician B

27. The proper diagnostic priority when a heavy-duty truck shows a complaint of "brake fade during long downhill descents" is to:

A. Continue operation since brake fade is normal during heavy braking conditions

B. Inspect lining condition, drum condition, and verify proper brake adjustment

C. Apply battery voltage to the brake system for diagnostic testing during service

D. Replace the brake chambers as the most likely failure components during service

28. The LEAST likely cause of brake chamber pushrod stroke exceeding service specification is:

A. Worn brake lining beyond the service specification limits during inspection

B. Brake drum diameter exceeding the maximum allowable specification during use

C. Failed automatic slack adjuster unable to compensate for normal lining wear

D. A failed coolant temperature sensor reading falsely cold to the engine ECM

29. The proper procedure when measuring heavy-duty brake drum diameter is to:

A. Use a brake drum micrometer at multiple positions across the friction surface

B. Apply battery voltage to the drum for diagnostic testing during measurement

C. Estimate diameter visually using shop lighting during the inspection process

D. Listen for drum operation with a stethoscope during normal brake application

30. The most likely cause of a heavy-duty foundation brake that shows audible scraping during brake application is:

A. Brake lining worn to the rivet heads contacting the brake drum during application

B. A failed coolant temperature sensor reading falsely cold to the engine ECM

C. Worn ring and pinion gears in the rear drive axle assembly during operation

D. Excessive transmission fluid level above the maximum fill mark during operation

31. The proper service action when a heavy-duty foundation brake shows brake shoe lining contaminated with grease from a failed wheel seal is to:

A. Continue operation since grease contamination has minimal effect on lining performance

B. Clean the contaminated lining with brake cleaner and reinstall during the same service

C. Replace the wheel seal AND replace the contaminated brake lining components together

D. Apply additional brake adjustment to compensate for reduced friction coefficient

32. The most accurate description of S-cam foundation brake operation is:

A. The S-cam rotates to spread the brake shoes apart against the brake drum surface

B. The S-cam compresses the brake shoes against the brake drum during application

C. The S-cam releases hydraulic pressure to apply the brake shoes during application

D. The S-cam modulates air pressure to the brake chamber during normal operation

33. Technician A says brake shoe return springs pull the shoes away from the drum when air pressure is released from the brake chamber. Technician B says brake shoe return springs are not required on automatic slack adjuster equipped foundation brakes. Who is correct?

A. Both Technician A and Technician B

B. Technician B only

C. Technician C only

D. Technician A only

34. The proper procedure when servicing heavy-duty foundation brake shoes is to:

A. Inspect drum condition, replace shoes as a matched set per axle, and verify slack adjuster operation

B. Apply battery voltage to the foundation brake for diagnostic testing during service

C. Replace one shoe at a time to maintain consistent lining thickness across all wheel positions

D. Clean existing shoes with solvent and reinstall during the same service event

35. The LEAST likely cause of premature brake lining wear across all wheel positions on a heavy-duty truck is:

A. Aggressive driver braking technique during normal operation conditions

B. Improperly adjusted brakes producing dragging conditions during operation

C. A failed coolant temperature sensor reading falsely cold to the engine ECM

D. Operation with excessive load weight beyond the truck rated capacity during service

36. The most likely cause of a heavy-duty truck parking brake that requires excessive force to release after the operator pulls the dash valve is:

A. Insufficient air pressure to the spring brake chambers during release operation

B. A failed coolant temperature sensor reading falsely cold to the engine ECM

C. Worn ring and pinion gears in the rear drive axle assembly during operation

D. Excessive transmission fluid level above the maximum fill mark indication

37. The proper procedure when a heavy-duty truck spring brake chamber must be removed from service for repair is to:

A. Continue operation with the chamber in place since removal is dangerous

B. Cage the spring brake using the manual caging bolt before any disassembly steps

C. Apply battery voltage to the chamber for diagnostic testing before removal

D. Apply maximum air pressure to compress the spring before disassembly procedures

38. Technician A says the spring brake chamber design provides automatic parking brake application if air pressure is lost during operation. Technician B says the spring brake chamber design eliminates the need for separate emergency brake systems on heavy-duty trucks. Who is correct?

A. Technician A only

B. Technician C only

C. Neither Technician A nor Technician B

D. Both Technician A and Technician B

39. The LEAST likely cause of a heavy-duty truck parking brake that fails to fully release during normal operation is:

A. Insufficient air pressure to the spring brake chambers during release attempts

B. Failed parking brake control valve unable to direct air to the chambers properly

C. Damaged air supply line to the spring brake chamber preventing full pressure

D. A failed coolant temperature sensor reading falsely cold to the engine ECM

40. The proper diagnostic approach when a heavy-duty truck parking brake spontaneously applies during highway operation is to:

A. Continue operation since spontaneous parking brake application has minimal effect

B. Apply additional air pressure to release the parking brakes during normal operation

C. Investigate air pressure loss source, valve operation, and supply line integrity

D. Replace the parking brake control valve as the most likely failure component

41. The most likely cause of a heavy-duty hydraulic brake system that shows a low pedal that gradually firms up after multiple pedal applications is:

A. Insufficient brake fluid level in the master cylinder reservoir during operation

B. Air contamination in the hydraulic system requiring proper bleeding procedures

C. A failed coolant temperature sensor reading falsely cold to the engine ECM

D. Worn ring and pinion in the rear drive axle assembly during operation

42. Technician A says hydraulic brake fluid moisture content increases over time even in sealed systems. Technician B says periodic brake fluid replacement is required to maintain proper boiling point and prevent corrosion. Who is correct?

A. Technician A only

B. Technician C only

C. Neither Technician A nor Technician B

D. Both Technician A and Technician B

43. The proper service action when a heavy-duty hydraulic brake system shows external fluid leakage at a wheel cylinder is to:

A. Replace the wheel cylinder, inspect adjacent components, and bleed the system properly

B. Apply silicone sealer to the leak area to stop the leakage during the same service

C. Continue operation since minor leakage has minimal effect on brake performance

D. Add additional brake fluid to compensate for the leakage during normal operation

44. The LEAST likely cause of a hydraulic brake system that produces a hard pedal with reduced braking force is:

A. Restricted brake hose limiting fluid flow to one or more wheel cylinders

B. Brake booster failure (vacuum or hydraulic) reducing pedal-to-line pressure assist

C. A failed coolant temperature sensor reading falsely cold to the engine ECM

D. Severely worn or contaminated brake lining reducing friction coefficient

45. The most accurate description of air-over-hydraulic brake operation is:

A. Mechanical linkage transfers pedal force directly to the wheel cylinders during application

B. Air pressure applies force to a hydraulic actuator that develops fluid pressure in wheel cylinders

C. Vacuum boost provides primary force to the wheel cylinders during normal operation

D. Pneumatic pressure applies directly to the wheel cylinders without hydraulic conversion

46. The proper diagnostic priority when a heavy-duty air-over-hydraulic brake system shows weak braking performance is to:

A. Replace the hydraulic master cylinder as the most likely failure component during service

B. Apply battery voltage to the system for diagnostic testing during the same service

C. Listen for system operation with a stethoscope during normal brake application

D. Verify air supply pressure, actuator operation, and hydraulic system integrity systematically

47. The most likely cause of an ABS system fault that affects all wheel speed sensor inputs simultaneously is:

A. ABS controller power, ground, or J1939 data bus communication problem

B. Mechanical failure of all wheel speed sensors at the same time during operation

C. A failed coolant temperature sensor reading falsely cold to the engine ECM

D. Worn ring and pinion gears in the rear drive axle assembly during operation

48. Technician A says ABS wheel speed sensors typically operate using magnetic principles with a tone ring at the wheel hub. Technician B says ABS wheel speed sensors require periodic lubrication during scheduled maintenance service. Who is correct?

A. Both Technician A and Technician B

B. Technician B only

C. Technician A only

D. Neither Technician A nor Technician B

49. The proper service action when a heavy-duty truck shows an ABS warning lamp that activates only during heavy brake application events is to:

A. Continue operation since intermittent warning has minimal effect on brake function

B. Connect a scan tool to retrieve fault codes and inspect wheel speed sensor air gaps

C. Apply battery voltage to the ABS controller for diagnostic testing during service

D. Replace the ABS controller as the most likely failure component during service

50. The LEAST likely consequence of operating a heavy-duty truck with a non-functional ABS system is:

A. Increased risk of wheel lockup during emergency braking on slick surfaces during operation

B. Loss of automatic stability control function during normal vehicle operation

C. Potential CVSA out-of-service determination during roadside inspection events

D. Improved braking performance from elimination of ABS modulation during application

ANSWER KEY AND EXPLANATIONS

1. B — Worn compressor unable to deliver adequate volume during normal operation. Slow pressure build-up indicates inadequate compressor output relative to system capacity. While cold-weather effects can slow build-up slightly, persistent slow build-up that occurs each cold morning typically traces to compressor wear that becomes most apparent when the system starts from low pressure.

2. D — Technician B only. Air dryer desiccant cartridges should be replaced per manufacturer service interval regardless of visual condition because desiccant material degrades chemically over time even when the cartridge appears visually normal. Visual inspection cannot reliably indicate desiccant saturation; service intervals are based on tested degradation patterns.

3. A — A failed coolant temperature sensor reading falsely cold to the engine ECM. ECT sensor errors affect engine fuel mixture but do not produce air pressure leakage. Cracked supply lines, worn O-rings or gaskets, and damaged brake chamber diaphragms all directly cause air leakage through compromised sealing surfaces or component damage.

4. C — Verify air pressure during grade descent and inspect for excessive demand sources. Low-pressure warnings during steep grades typically indicate excessive demand exceeding compressor recovery during sustained heavy braking. Verification under operating conditions identifies whether the issue is excessive demand, compressor capacity, or air leakage that becomes apparent under load.

5. D — 3 PSI in 1 minute per FMVSS 121 specifications during operation. The federal standard establishes 3 PSI per minute as the maximum acceptable leak rate with engine off and brakes applied. The applied-brake leak test verifies sealing of the entire service brake circuit including chambers; rates exceeding this specification indicate brake system faults requiring service.

6. B — A failed coolant temperature sensor reading falsely cold to the engine ECM. ECT sensor errors affect engine fuel mixture but do not produce hissing from brake chambers. Cracked chamber housings, damaged diaphragms, and loose fittings all directly cause audible air leakage at the brake chamber location through compromised sealing.

7. A — Technician A only. Cut-out specification on most heavy-duty applications is approximately 100 to 125 PSI, varying by manufacturer and application. The specification is not uniform across all heavy-duty trucks because different applications require different operating ranges; service information must be consulted for each specific truck.

8. C — Replace the compressor and clean or replace contaminated downstream components. Excessive oil contamination indicates compressor wear allowing oil past piston rings into the air stream. The compressor requires service to address the source, and downstream components (air

dryer, valves, brake chambers) must be cleaned or replaced because contamination affects their operation.

9. D — Continuous loss of compressed air preventing the system from reaching cut-out. A stuck-open purge valve continuously releases compressed air to atmosphere, exceeding the compressor's ability to maintain system pressure. The system cannot reach cut-out pressure, leading to constant compressor cycling and eventual failure to maintain adequate pressure for safe brake operation.

10. B — Perform a leak test per FMVSS 121 procedures to identify the leak source location. Rapid pressure drop after engine shutdown indicates a leak in the supply system. The standardized leak test isolates whether the leak is in supply (engine off), service circuit (brakes applied), or specific components, guiding the technician to the actual leak source.

11. D — A failed coolant temperature sensor reading falsely cold to the engine ECM. ECT sensor errors affect engine fuel mixture but do not affect air pressure during overnight parked conditions. Major leaks, damaged check valves, and failed diaphragms all directly cause pressure loss through their effect on system sealing during static conditions.

12. A — Reduce system pressure with engine off until the warning device activates. The proper test method is to reduce pressure (typically by fanning the brake pedal) with engine off and observe the pressure reading when the warning device activates. The warning must activate at or above 60 PSI per FMVSS 121; activation outside this range indicates a faulty switch or warning system.

13. C — Releases excess pressure when system pressure exceeds the safety threshold value. The safety valve provides a backup to the governor by releasing excess pressure if the governor fails to unload the compressor at cut-out. The valve is set above normal cut-out pressure (typically 150 PSI) and protects the system from over-pressurization that could damage components.

14. B — Technician A only. The unloader valve is opened by the governor at cut-out pressure to vent the compressor cylinder pressure to atmosphere, eliminating compression work during the unloaded cycle. The unloader does not allow fresh air into the cylinders during loaded operation; that function is performed by the intake valves during the normal compressor cycle.

15. D — Verify air dryer installation, purge valve operation, and compressor condition. Excessive moisture after recent dryer service indicates either improper installation, a failed purge valve preventing proper drying cycle operation, or excessive moisture input from a worn compressor. Systematic verification identifies the specific cause requiring service.

16. A — Air leakage in the supply system or excessive demand from accessories during operation. Frequent compressor cycling indicates pressure loss between cut-out and cut-in occurring faster than normal, either from system leakage or excessive accessory air consumption (suspension air bags, seat air, transmission air shifts). The cause must be identified to address the underlying problem.

17. C — Investigate compressor cycling rate and air system demand for excessive operation. A hot air dryer body indicates excessive operating cycles, typically from compressor cycling more than normal due to leakage or excessive demand. Investigation of the underlying cause is required; the heat is a symptom, not the root cause.

18. B — A failed coolant temperature sensor reading falsely cold to the engine ECM. ECT sensor errors affect engine fuel mixture but are unrelated to a stuck-loaded governor. Pressure exceeding safety valve setting, continuous compressor operation accelerating wear, and excessive heat buildup all directly result from the compressor running continuously when the governor fails to signal unload.

19. A — Locate the leak source through systematic inspection of supply system components. Audible leaks require direct identification of the leak source through systematic inspection — listening, soap solution application, and visual inspection of fittings, lines, and components. Without identifying the source, the leak cannot be properly repaired.

20. D — Excessive compressor cycling, reduced reserve capacity, and CVSA out-of-service status. A 5 PSI per minute leak rate exceeds the FMVSS 121 maximum (2 PSI per minute brakes released, 3 PSI per minute brakes applied) and would result in CVSA out-of-service determination during inspection. The excessive leakage also causes constant compressor cycling and reduces the system's reserve capacity for emergency braking.

21. A — Brake adjustment out of specification or worn lining requiring foundation brake service. Increased stopping distance over weeks indicates progressive brake performance degradation from adjustment drift or lining wear. The gradual nature of the change matches the progressive wear pattern of foundation brake components; sudden changes would indicate different causes.

22. C — Technician A only. Brake chamber pushrod stroke must be measured at full service application pressure (typically 90–100 PSI) for accurate results because chamber stroke increases with applied pressure until the foundation brake reaches full application. Measurement at lower pressure understates the actual stroke and can mask out-of-service conditions.

23. B — A failed coolant temperature sensor reading falsely cold to the engine ECM. ECT sensor errors affect engine fuel mixture but do not affect brake chamber pushrod stroke. Worn lining, failed slack adjuster, and excessive drum diameter all directly cause excessive pushrod travel through their effect on the foundation brake clearance.

24. D — Inspect for cam-related issues, return spring wear, and shoe contact patterns. Uneven leading-trailing shoe wear indicates a foundation brake issue affecting how the shoes engage the drum. Return spring wear, cam roller condition, and shoe contact patterns all influence relative wear; systematic inspection identifies the specific cause of the wear pattern.

25. A — Dragging brake from failed slack adjuster, return spring, or seized cam roller. Premature wear at one wheel position indicates that wheel is doing more braking work than the others, typically

from a dragging condition that keeps the brake partially applied. The drag generates heat and wear that progresses faster than normal at that wheel only.

26. C — Both Technician A and Technician B. Brake drum machine-to dimensions are typically cast onto the drum during manufacturing as a reference for resurfacing. Maximum-allowable dimensions represent the limit before drum replacement is required because exceeding this dimension compromises the drum's ability to safely transmit braking force.

27. B — Inspect lining condition, drum condition, and verify proper brake adjustment. Brake fade during long descents typically indicates inadequate brake capacity from worn or contaminated lining, glazed or oversized drums, or improper adjustment. Inspection of these foundation brake conditions identifies the specific cause; engine braking should also be evaluated for proper operation.

28. D — A failed coolant temperature sensor reading falsely cold to the engine ECM. ECT sensor errors affect engine fuel mixture but do not affect brake chamber pushrod stroke. Worn lining, excessive drum diameter, and failed automatic slack adjuster all directly cause excessive pushrod travel through their effect on foundation brake clearance.

29. A — Use a brake drum micrometer at multiple positions across the friction surface. Brake drum diameter is measured with a brake drum micrometer at multiple positions (typically 4 or more) across the friction surface to detect both maximum diameter and ovality. Multiple measurements identify worn-out-of-round conditions that single measurements would miss.

30. C — Brake lining worn to the rivet heads contacting the brake drum during application. Audible scraping during application indicates metal-to-metal contact, typically from lining worn through to expose the rivet heads or backing plate. Continued operation damages the drum surface and requires both lining and drum service to restore proper braking.

31. C — Replace the wheel seal AND replace the contaminated brake lining components together. Grease-contaminated brake lining cannot be cleaned effectively because the contamination penetrates the porous lining material. Both the source (wheel seal) and the contaminated components (lining) must be replaced to restore proper brake function and prevent recurrence.

32. A — The S-cam rotates to spread the brake shoes apart against the brake drum surface. The S-cam profile, when rotated by the slack adjuster, forces the brake shoes outward against the drum friction surface. The "S" shape of the cam provides progressive shoe spreading throughout the application stroke for consistent braking force.

33. D — Technician A only. Brake shoe return springs pull the shoes away from the drum when air pressure is released, providing the running clearance between the lining and drum during normal driving. Return springs are required on all foundation brakes regardless of slack adjuster type; automatic slack adjusters do not eliminate the need for return springs.

34. A — Inspect drum condition, replace shoes as a matched set per axle, and verify slack adjuster operation. Foundation brake service requires drum inspection (replace if beyond specification), matched-set shoe replacement per axle (to maintain balanced braking), and verification of slack adjuster operation. Single-shoe replacement creates unequal braking; cleaning and reinstalling worn shoes is not acceptable practice.

35. C — A failed coolant temperature sensor reading falsely cold to the engine ECM. ECT sensor errors affect engine fuel mixture but do not affect brake lining wear rates. Aggressive driver braking, dragging brakes from improper adjustment, and overload operation all directly cause accelerated lining wear through increased friction work or heat.

36. A — Insufficient air pressure to the spring brake chambers during release operation. Parking brake release requires adequate air pressure (typically 65 PSI minimum) to overcome the spring force in the spring brake chambers. Insufficient pressure prevents full release; the operator may have to wait for the air system to build pressure before the parking brakes fully release.

37. B — Cage the spring brake using the manual caging bolt before any disassembly steps. Caging mechanically compresses the parking brake spring, preventing it from extending dangerously when the chamber is removed. Working on a non-caged spring brake chamber risks serious injury or death from the explosive release of the spring force.

38. D — Both Technician A and Technician B. The spring brake chamber design provides automatic parking brake application if air pressure is lost (the spring engages mechanically when air pressure is released). This design also serves as the emergency brake function on heavy-duty trucks, eliminating the need for separate emergency brake systems on most applications.

39. D — A failed coolant temperature sensor reading falsely cold to the engine ECM. ECT sensor errors affect engine fuel mixture but do not affect parking brake operation. Insufficient air pressure, failed control valve, and damaged supply lines all directly prevent the spring brakes from fully releasing through inadequate pressure to overcome the spring force.

40. C — Investigate air pressure loss source, valve operation, and supply line integrity. Spontaneous parking brake application during operation indicates rapid air pressure loss from the spring brake chambers. The cause must be identified — leak in supply lines, failed control valve, or major system pressure loss — to prevent recurrence and ensure safe operation.

41. B — Air contamination in the hydraulic system requiring proper bleeding procedures. A low pedal that firms up after multiple applications indicates air in the hydraulic system that compresses during initial application but partially redistributes during subsequent applications. Proper bleeding is required to remove the air and restore solid pedal feel.

42. D — Both Technician A and Technician B. Hydraulic brake fluid moisture content increases over time even in sealed systems because brake fluid is hygroscopic and absorbs moisture through

hoses, seals, and reservoir vents. Periodic fluid replacement is required to maintain proper boiling point and prevent the corrosion that contaminated fluid causes throughout the system.

43. A — Replace the wheel cylinder, inspect adjacent components, and bleed the system properly. External fluid leakage at a wheel cylinder requires cylinder replacement plus inspection of adjacent components (brake shoes, drum, lining for fluid contamination). Proper bleeding restores hydraulic system integrity after the repair.

44. C — A failed coolant temperature sensor reading falsely cold to the engine ECM. ECT sensor errors affect engine fuel mixture but do not affect hydraulic brake pedal feel. Restricted brake hose, brake booster failure, and worn lining all directly cause hard pedal with reduced braking force through their effect on hydraulic flow or friction.

45. B — Air pressure applies force to a hydraulic actuator that develops fluid pressure in wheel cylinders. Air-over-hydraulic systems use compressed air to power a hydraulic actuator (sometimes called a hydraulic boost or air-pack), which develops fluid pressure for the wheel cylinders. This combination provides the high force capability of air systems with the actuation method of hydraulic brakes.

46. D — Verify air supply pressure, actuator operation, and hydraulic system integrity systematically. Air-over-hydraulic system diagnosis requires verification of all three subsystems because weakness in any one reduces braking capacity. Air supply pressure, hydraulic actuator operation, and hydraulic system condition (fluid level, leaks, lining condition) must all be inspected for complete diagnosis.

47. A — ABS controller power, ground, or J1939 data bus communication problem. Multiple wheel speed sensor faults simultaneously indicate a common cause rather than multiple sensor failures. Common causes include power or ground problems affecting all sensor circuits, or J1939 data bus communication issues preventing the controller from processing sensor inputs.

48. C — Technician A only. ABS wheel speed sensors operate using magnetic principles with a tone ring (also called an exciter ring) at the wheel hub. The sensor generates an AC signal proportional to wheel speed as the tone ring teeth pass the sensor. ABS wheel speed sensors do not require periodic lubrication; they are sealed sensors that do not have lubricated moving parts.

49. B — Connect a scan tool to retrieve fault codes and inspect wheel speed sensor air gaps. Intermittent ABS warnings during heavy braking often indicate wheel speed sensor air gap issues that become apparent under load conditions when wheel deflection occurs. Scan tool fault codes plus air gap inspection identify the specific affected sensor for targeted repair.

50. D — Improved braking performance from elimination of ABS modulation during application. Operating with non-functional ABS does not improve braking; it eliminates the safety benefits ABS provides. Increased wheel lockup risk, loss of stability control, and potential out-of-service

status all directly result from non-functional ABS during operation, particularly on slick surfaces or during emergency braking.