PRACTICE EXAM 8: T4 SIMULATION (50 QUESTIONS)

1. A heavy-duty Class 8 tractor with 425,000 miles arrives with a complaint that "the air pressure builds normally for the first hour of operation, then begins cycling rapidly." Once the truck stops and the system cools for an hour, normal operation resumes. The most likely cause is:

A. Air introduced into the supply system that expands during operation thermal cycling

B. Failed governor producing intermittent unload signals during normal operation

C. Compressor wear that worsens with thermal expansion, exceeding system reserve at heat soak

D. Worn release bearing producing inconsistent pedal response during normal operation

2. The proper diagnostic priority when a fleet shows multiple Class 8 tractors with the same complaint of "brake chamber failure within 75,000 miles of replacement" by the same outside repair facility is to:

A. Investigate installation procedures and parts quality at the outside repair facility

B. Replace all brake chambers as preventive maintenance regardless of current condition

C. Apply battery voltage to brake components for diagnostic verification during service

D. Adjust the throttle linkage at the engine for proper brake coordination during shifts

3. The most accurate description of heavy-duty truck spring brake chamber operation is:

A. Air pressure applies parking brake force during normal driving operation conditions

B. Hydraulic pressure applied through the slave cylinder during parking brake engagement

C. Spring-loaded mechanism that applies force during normal service brake application

D. Spring force applies parking brakes when air pressure is released from the chamber

4. The LEAST likely cause of a heavy-duty truck air brake system that develops sudden complete pressure loss during normal operation is:

A. Catastrophic compressor failure preventing any pressure development during operation

B. Worn brake lining reaching minimum thickness gradually over extended service

C. Sudden hydraulic line failure or fitting separation during normal operation procedures

D. Major air system component failure or supply line catastrophic damage during operation

5. A heavy-duty truck arrives with a complaint of "brake fade combined with hot wheel hub on the same wheel position." The most likely common cause is:

A. Failed wheel seal allowing gear oil onto brake friction surfaces and dragging the brake

B. Worn brake lining affecting only the foundation brake during normal operation

C. Brake fade unrelated to wheel hub temperature requiring separate diagnostic procedures

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

6. The proper procedure when installing a new heavy-duty brake drum that has not been inspected for runout is:

A. Apply battery voltage to the drum for diagnostic testing during installation procedures

B. Install the new drum and immediately return the truck to service for testing

C. Verify drum runout meets specification before installation begins to ensure proper service

D. Resurface the drum regardless of condition to ensure proper foundation brake service life

7. A heavy-duty truck with hydraulic brakes shows a complaint of "spongy pedal that gets worse as the truck warms up." The most likely root cause is:

A. Worn brake lining affecting all engagement events equally during normal operation

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

C. Worn wheel cylinder seals affecting all engagement events during normal operation

D. Hydraulic fluid moisture content reducing boiling point and producing vapor at temperature

8. The most accurate description of automatic slack adjuster purpose is:

A. Sets external pedal free play during normal operating conditions during service procedures

B. Compensates for brake lining wear automatically without requiring manual periodic adjustment

C. Controls clutch brake engagement timing during pedal application during normal operation

D. Adjusts the throttle linkage at the engine for proper coordination during shifts

9. The proper measurement procedure for heavy-duty brake drum maximum allowable diameter is to:

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

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

C. Listen for drum diameter with a stethoscope at idle conditions during operation

D. Replace the drum as preventive maintenance regardless of measurement values

10. The LEAST likely consequence of operating a heavy-duty truck with a brake chamber pushrod stroke that exceeds CVSA out-of-service criteria is:

A. Inadequate brake force delivery during emergency braking situations during operation

B. Increased risk of brake failure during sustained heavy braking events during operation

C. Loss of all forward gears requiring complete transmission replacement during service

D. Out-of-service determination during roadside inspection events during operation

11. The proper service action when a heavy-duty pull-type spring brake chamber shows oil contamination from a failed wheel seal is to:

A. Clean the friction surfaces with brake cleaner and reinstall the assembly during service

B. Replace the wheel seal AND replace the contaminated brake components together

C. Continue operation since oil contamination clears with extended use during operation

D. Apply battery voltage to the brake components for diagnostic testing during service

12. A heavy-duty truck shows a fault code referencing the J1939 ABS data bus combined with reports of "ABS warning lamp permanently on" during operation. The proper first action is to:

A. Replace the ABS controller assembly as the primary repair component during service

B. Apply battery voltage to the ABS controller for diagnostic verification during service

C. Replace the entire ABS system as preventive maintenance during the same service

D. Verify ABS controller power, ground, and J1939 communication integrity systematically

13. The proper diagnostic sequence when a heavy-duty truck shows a complaint of "brakes pull right under heavy braking" is to:

A. Verify air pressure delivery balance and inspect for asymmetric foundation brake conditions

B. Replace the air system as preventive maintenance during the same service event

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

D. Listen for grinding with a stethoscope at idle without addressing the root cause

14. A heavy-duty AMT-equipped truck shows ABS warning during shift events but operates normally otherwise. The most likely cause is:

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

B. TCM software calibration issues requiring manufacturer reflash during service

C. J1939 communication interference between AMT TCM and ABS controller during shifts

D. Worn brake facings causing partial engagement during normal operations during shifts

15. The most accurate description of heavy-duty truck brake chamber wear progression is:

A. Sudden complete failure with no warning during normal operation events

B. Gradual diaphragm fatigue, then air leakage, then failure to develop force at the slack adjuster

C. Loss of all forward gears simultaneously during normal operation conditions

D. External case warpage requiring complete brake chamber replacement immediately

16. The proper torque application sequence for heavy-duty truck wheel hub mounting hardware is:

A. Random sequence with calibrated torque wrench at final specification

B. Outside corners working toward the center of the case during installation

C. Maximum torque applied to one bolt before moving to the next bolt

D. Star pattern in stages, building from initial torque to final specification per service info

17. A heavy-duty truck produces a hissing noise that is loudest at the driver-side foundation brake during pedal release. The most likely cause is:

A. Cracked or damaged brake chamber producing pressure loss during release operations

B. Worn synchronizer rings affecting only specific gear engagements during operation

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

D. Worn output shaft bearing producing noise only during driven operation

18. The LEAST likely cause of a heavy-duty AMT-equipped truck ABS system that fails to engage any modulator valve during emergency braking is:

A. Failed ABS controller preventing modulator valve activation during emergency braking

B. Damaged J1939 data bus preventing proper ABS controller communication during operation

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

D. ABS controller power or ground problem preventing proper system operation during operation

19. The proper service action when a heavy-duty truck shows lubricant contamination with water emulsion in the air brake supply tank during analysis is to:

A. Continue operation since water contamination has minimal effect during operation

B. Drain contaminated supply tank, identify water entry source, and refill with proper procedures

C. Apply battery voltage to the supply tank for diagnostic testing during service

D. Add lubricant additive to absorb the water during normal operation conditions

20. The most likely cause of a heavy-duty truck that produces harsh brake engagement during initial pedal application from a complete stop is:

A. Brake adjustment out of specification or worn lining affecting all engagement events

B. Worn brake facings preventing first gear engagement during launch operations

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

21. The proper diagnostic priority when a heavy-duty truck shows "intermittent low-pressure warning during heavy braking events" is to:

A. Verify air supply capacity, brake demand patterns, and inspect for pressure-related leaks

B. Replace the entire air system as preventive maintenance during the same service

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

D. Listen for the symptom with a stethoscope at idle without addressing root cause

22. A fleet maintenance manager reports three heavy-duty trucks with the same complaint of "ABS warning lamps illuminating randomly during normal operation" within the same delivery model year. The most likely common cause is:

A. Random failure of three controllers requiring complete replacement on each

B. Worn brake facings on all three units affecting ABS operation during driving

C. ABS controller calibration mismatch from a software update applied to the fleet

D. A failed coolant temperature sensor reading falsely cold on all three units

23. The most accurate description of an Eaton/Bendix dual-circuit air brake system is:

A. Single circuit supplying all service brakes during normal operation conditions

B. Independent primary and secondary circuits providing safety redundancy during operation

C. Three-circuit system with primary, secondary, and parking circuits during operation

D. Four-circuit system with separate circuits for each axle during operation

24. The LEAST likely cause of a heavy-duty truck that produces a knocking noise that varies with brake pedal application is:

A. Worn brake chamber producing noise during pressure changes during operation

B. Damaged brake hardware producing noise during pressure transitions

C. Worn slack adjuster producing noise during engagement transitions

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

25. The most likely cause of a heavy-duty truck spring brake chamber that fails to engage when the operator pushes the dash valve at all wheel positions is:

A. Failed parking brake control valve unable to release air from the chambers during operation

B. Worn brake facings reducing clamping force during all engagement events 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

26. The proper procedure when a heavy-duty truck spring brake chamber shows a complaint of "parking brakes drag during normal forward operation" is:

A. Continue operation since parking brake drag has minimal effect on safety during operation

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

C. Verify air pressure to chambers, inspect for restricted lines, and inspect for valve issues

D. Replace all spring brake chambers as preventive maintenance during the same service

27. Technician A says spring brake chambers contain a high-force spring that engages parking brakes when air pressure is released. Technician B says working on a spring brake chamber without caging the spring can cause serious injury or death. 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

28. The most likely cause of a heavy-duty truck parking brake that fails to fully release after the operator pulls the dash valve at one wheel position only is:

A. Failed parking brake control valve affecting all wheel positions equally during 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. Damaged or restricted air supply line to the affected wheel spring brake chamber

29. The proper diagnostic approach when a heavy-duty truck shows a complaint of "parking brake will not hold the truck on a 6% grade with full load" is to:

A. Verify spring brake force, foundation brake adjustment, and lining condition systematically

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

C. Continue operation since hold-grade ability has minimal effect on safety during operation

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

30. The most likely cause of a heavy-duty hydraulic brake system that shows brake pedal that drops to the floor with steady foot pressure on the engine off is:

A. Worn brake facings reducing clamping force during all engagement events during operation

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

C. Internal master cylinder seal bypass allowing fluid leakage past the seal during application

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

31. The proper diagnostic priority when a heavy-duty hydraulic brake system shows external fluid leakage at the master cylinder reservoir area is:

A. Continue operation since reservoir leakage has minimal effect on brake performance

B. Replace the master cylinder, inspect adjacent components, and bleed the system properly

C. Apply battery voltage to the master cylinder for diagnostic testing during service

D. Add silicone sealer to the leak area to stop the leakage during service procedures

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

A. Severely worn or contaminated brake lining reducing friction coefficient at the wheels

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

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

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

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

A. Air pressure powers a hydraulic actuator that develops fluid pressure for wheel cylinders

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

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

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

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

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

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

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

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

B. Service-related power, ground, or J1939 communication damage during recent work

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

36. Technician A says ABS modulator valves are activated by the ABS controller when wheel slip is detected during brake application. Technician B says ABS systems can apply brakes without driver pedal input during automatic stability control events. Who is correct?

A. Technician C only

B. Technician B only

C. Technician A only

D. Both Technician A and Technician B

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

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

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

38. The LEAST likely cause of an ABS system that activates during normal light brake applications when no wheel slip is occurring is:

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

B. Failed wheel speed sensor producing inconsistent signal during normal operation

C. Damaged tone ring producing inconsistent signal at one wheel position during operation

D. ABS controller calibration error following recent service procedures during operation

39. The proper procedure when a heavy-duty truck ABS controller shows a fault code that returns immediately after clearing during diagnostic service is to:

A. Continue clearing the fault code repeatedly until it remains cleared during service

B. Investigate the underlying cause rather than continuing to clear without correction

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

40. The most likely cause of an ABS system that fails to detect wheel slip during emergency braking on slick surfaces is:

A. Failed ABS controller hardware preventing modulator activation during operation

B. ABS controller power, ground, or J1939 communication problem during operation

C. Wheel speed sensors functioning normally but ABS calibration disabled during service

D. Wheel speed sensor air gaps exceeding specification at multiple wheel positions

41. A heavy-duty Class 8 tractor with 600,000 miles shows a complaint of "humming noise from the air dryer that has gradually worsened over the past 100,000 miles." The most likely cause is:

A. Sudden air dryer damage from a recent operating event during service

B. Progressive wear in compressor components introducing contamination to the dryer

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

D. Progressive desiccant material degradation from extended service in the application

42. The proper service action when a heavy-duty truck shows lubricant analysis with elevated wear metals AND moisture content in the air supply system is to:

A. Drain contaminated supply tank, inspect for both wear sources and water entry sources, and refill

B. Continue operation since lubricant contamination has minimal effect during operation

C. Apply battery voltage to the supply tank for diagnostic testing during service

D. Replace the supply tank assembly as preventive maintenance during the same service

43. The most likely consequence of returning a heavy-duty truck to service with a brake chamber pushrod stroke that exceeds CVSA out-of-service criteria is:

A. Improved brake service life from reduced chamber operation during normal operation

B. No effect on brake performance or vehicle safety during normal operation conditions

C. CVSA out-of-service determination during roadside inspection plus inadequate braking force

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

44. The proper diagnostic priority when a heavy-duty tandem-axle truck shows "noise that varies between forward and rear drive axle brake positions" is to:

A. Replace both brake assemblies as preventive maintenance during the same service

B. Isolate the noise source through systematic component testing on each axle position

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

D. Listen with a stethoscope without any disassembly during the inspection process

45. The LEAST likely cause of a heavy-duty truck that develops accelerated brake lining wear at all wheel positions is:

A. Improper torque application during recent brake service procedures during the work

B. Aggressive driver braking technique during normal operation conditions during operation

C. Operating with excessive load weight beyond truck rated capacity during operation

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

46. The proper measurement procedure for heavy-duty truck brake chamber pushrod free travel is to:

A. Apply 90–100 PSI to the brake chamber and measure stroke from released to applied position

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

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

D. Estimate stroke visually using shop lighting during the inspection process

47. The most accurate description of heavy-duty truck wheel bearing service per TMC RP 618 is:

A. Apply maximum torque without rotation requirement during the procedure

B. Use standard torque values without rotation during installation procedures

C. Tighten while rotating, back off, then retighten to specification per RP 618

D. Apply battery voltage to the bearings for diagnostic testing during installation

48. The proper service action when a heavy-duty truck shows ring gear runout exceeding service specification on the rear drive axle during inspection is:

A. Apply battery voltage to the ring gear for diagnostic testing during service

B. Investigate the cause (carrier damage, improper installation, ring gear damage) and correct

C. Continue operation since runout has minimal effect on drive axle operation during use

D. Listen for runout-related noise with a stethoscope during operation conditions

49. The most likely cause of a heavy-duty truck brake system that produces a clunking noise only during throttle transitions is:

A. Worn brake facings from extended service during normal operation

B. Insufficient brake fluid level affecting all operating conditions equally during operation

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

D. Excessive backlash in the rear drive axle ring and pinion allowing tooth separation

50. The proper procedure when a heavy-duty truck requires complete air brake system service is to:

A. Replace components only without disturbing the foundation brake setup procedure

B. Reset all foundation brake adjustments and verify air system integrity during reassembly

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

D. Reuse existing components regardless of condition during the rebuild process

ANSWER KEY AND EXPLANATIONS

1. C — Compressor wear that worsens with thermal expansion, exceeding system reserve at heat soak. Pressure problems that develop only after extended operation and resolve with cooling indicate compressor wear that worsens with thermal expansion. The compressor operates normally when cool because clearances are within tolerance; as components heat and expand, wear effects compound and cycling rate increases until the system reaches a marginal state.

2. A — Investigate installation procedures and parts quality at the outside repair facility. Multiple trucks from the same outside facility showing identical premature failure patterns indicate a systemic issue at that facility — typically improper installation procedures or substandard parts quality. The proper diagnostic priority is investigating the source of the common failure rather than blanket replacement on all units.

3. D — Spring force applies parking brakes when air pressure is released from the chamber. Spring brake chambers contain a high-force spring that mechanically applies parking brakes when air pressure is released. This fail-safe design ensures parking brake application occurs automatically if air pressure is lost during operation, providing safety in air system failure scenarios.

4. B — Worn brake lining reaching minimum thickness gradually over extended service. Worn brake lining reaching minimum thickness produces gradual brake performance degradation, not sudden complete pressure loss. The other choices all describe conditions that produce sudden complete pressure loss: catastrophic compressor failure, sudden line failure, and major component damage all directly cause immediate pressure loss.

5. A — Failed wheel seal allowing gear oil onto brake friction surfaces and dragging the brake. A failed wheel seal allowing gear oil onto brake friction surfaces causes both brake fade (oil-contaminated lining produces inconsistent friction) and hot wheel hub (the dragging brake from contaminated lining generates continuous heat). The single seal failure produces both symptoms simultaneously on the affected wheel position.

6. C — Verify drum runout meets specification before installation begins to ensure proper service. Installing a new brake drum requires verification that drum runout meets specification before installation. Drums with excessive runout produce vibration, uneven lining wear, and reduced brake performance. The verification ensures the new drum will perform correctly throughout its service life.

7. D — Hydraulic fluid moisture content reducing boiling point and producing vapor at temperature. Hydraulic brake fluid contaminated with moisture has reduced boiling point; as the brake system warms during operation, moisture in the fluid vaporizes into the lines, producing the spongy pedal that worsens with temperature. The vapor is compressible (unlike fluid), creating the spongy feel.

8. B — Compensates for brake lining wear automatically without requiring manual periodic adjustment. Automatic slack adjusters compensate for normal brake lining wear during operation by self-adjusting during brake applications. The mechanism activates as wear creates excess clearance, eliminating the need for periodic manual adjustment that manual slack adjusters require.

9. A — Use a brake drum micrometer at multiple positions across the friction surface. Brake drum maximum allowable diameter measurement requires a brake drum micrometer at multiple positions across the friction surface to detect both maximum diameter and ovality. Single-position measurements miss out-of-round conditions; multiple measurements provide accurate worst-case diameter.

10. C — Loss of all forward gears requiring complete transmission replacement during service. Loss of forward gears requiring transmission replacement is unrelated to brake chamber pushrod stroke. The other choices all describe direct consequences of excessive pushrod stroke: inadequate brake force during emergency braking, increased risk of brake failure during sustained heavy braking, and CVSA out-of-service determination during inspection.

11. B — Replace the wheel seal AND replace the contaminated brake components together. Oil-contaminated brake components require both seal replacement (to address the contamination source) and brake component replacement (to remove the contaminated friction surfaces). Cleaning contaminated brake components does not restore the original friction coefficient because oil penetrates the porous friction material.

12. D — Verify ABS controller power, ground, and J1939 communication integrity systematically. Combined J1939 ABS data bus fault and permanent ABS warning indicate communication failure that requires systematic verification of ABS controller power, ground, and J1939 communication integrity. The fault may be in the communication path rather than the controller itself; verification identifies the actual fault location before parts replacement.

13. A — Verify air pressure delivery balance and inspect for asymmetric foundation brake conditions. Brakes pulling right under heavy braking indicates asymmetric brake force between left and right sides. The proper diagnostic sequence verifies air pressure delivery balance (ensuring both sides receive equal pressure) and inspects for asymmetric foundation brake conditions (worn lining, contamination, or component issues on one side).

14. C — J1939 communication interference between AMT TCM and ABS controller during shifts. ABS warnings during shift events on AMT-equipped trucks typically indicate J1939 data bus communication interference between AMT TCM and ABS controller. The shift events produce data bus traffic that can interfere with ABS controller operation; the symptoms appear only during shifts because the communication conflict occurs only during high traffic periods.

15. B — Gradual diaphragm fatigue, then air leakage, then failure to develop force at the slack adjuster. Brake chamber wear progresses through gradual diaphragm fatigue (from cyclic flex), then air leakage (as the diaphragm develops cracks or pinholes), then failure to develop force at the slack

adjuster (as leakage exceeds chamber pressure capacity). Recognition of early stages allows intervention before complete failure.

16. D — Star pattern in stages, building from initial torque to final specification per service info. Wheel hub mounting hardware uses a star pattern in stages, building from initial torque to final specification per service information. The pattern ensures even clamping force around the hub without distortion. Random sequences and corner-first patterns produce uneven clamping that compromises wheel retention.

17. A — Cracked or damaged brake chamber producing pressure loss during release operations. Hissing noise loudest at one foundation brake during pedal release indicates pressure loss at that specific brake chamber. Cracked or damaged chambers produce audible leakage during pressure changes (release operations involve pressure decay through the exhaust port, but cracks add unintended leak paths).

18. C — A failed coolant temperature sensor reading falsely cold to the engine ECM. ECT sensor errors affect engine fuel mixture but do not affect ABS modulator engagement. The other choices all describe direct causes of failed ABS modulator activation: failed controller cannot command modulators, damaged J1939 prevents communication, and controller power/ground problems prevent operation.

19. B — Drain contaminated supply tank, identify water entry source, and refill with proper procedures. Water emulsion in air brake supply tank lubricant requires draining the contaminated supply, identifying the water entry source (failed dryer, condensation, or compromised seal), and refilling with proper procedures. Water destroys lubricant additive packages and accelerates wear; allowing operation with contaminated fluid causes progressive damage.

20. A — Brake adjustment out of specification or worn lining affecting all engagement events. Harsh brake engagement during initial pedal application from a complete stop typically indicates brake adjustment out of specification or worn lining. The harsh engagement from a stop is most apparent because the operator notices it during launch; the underlying cause affects all engagement events but is most noticeable from a stop.

21. A — Verify air supply capacity, brake demand patterns, and inspect for pressure-related leaks. Intermittent low-pressure warnings during heavy braking events require verification of air supply capacity (compressor output, governor operation), brake demand patterns (excessive demand from heavy use), and inspection for pressure-related leaks (leaks that worsen at higher pressures or higher temperatures).

22. C — ABS controller calibration mismatch from a software update applied to the fleet. Three trucks with the same random ABS warning symptom within the same model year and after a software update indicates controller calibration mismatch from the software update. Calibration issues can affect all units that received the update, producing identical symptoms. Random failure of three units is statistically unlikely.

23. B — Independent primary and secondary circuits providing safety redundancy during operation. The Eaton/Bendix dual-circuit air brake system uses independent primary and secondary circuits that provide safety redundancy. If one circuit fails (typically primary serves rear axle, secondary serves front axle), the other circuit remains operational, allowing the truck to be brought safely to a stop. This redundancy is mandated by FMVSS 121.

24. D — A failed coolant temperature sensor reading falsely cold to the engine ECM. ECT sensor errors affect engine fuel mixture but do not produce knocking noise during brake pedal application. The other choices all describe direct sources of brake-application-related knocking: worn brake chamber, damaged hardware, and worn slack adjuster all produce noise during pressure transitions.

25. A — Failed parking brake control valve unable to release air from the chambers during operation. Parking brake engagement requires air pressure release from the spring brake chambers when the dash valve is pushed. A failed control valve unable to release the air prevents parking brake engagement at all wheel positions; the spring brakes cannot apply because air pressure remains in the chambers.

26. C — Verify air pressure to chambers, inspect for restricted lines, and inspect for valve issues. Parking brake drag during forward operation indicates the spring brakes are not fully releasing despite operator dash valve operation. Verification of air pressure at the chambers, inspection for restricted lines, and valve issues identifies whether the issue is in pressure delivery or chamber operation.

27. B — Both Technician A and Technician B. Spring brake chambers contain a high-force spring (typically 1,500–2,500 pounds) that engages parking brakes when air pressure is released. Working on a spring brake without caging the spring can cause serious injury or death from the explosive release of the spring force; safe disassembly requires proper caging.

28. D — Damaged or restricted air supply line to the affected wheel spring brake chamber. Single-wheel parking brake release failure typically indicates damaged or restricted air supply line to that specific spring brake chamber. The other wheels release normally because their supply paths are intact; the affected wheel cannot receive the air pressure needed to overcome the spring force.

29. A — Verify spring brake force, foundation brake adjustment, and lining condition systematically. Parking brake hold-grade ability under full load on steep grades depends on adequate spring brake force, proper foundation brake adjustment, and adequate lining condition. If any of these is compromised, the parking brake cannot hold the truck on a steep grade. Systematic verification identifies the specific cause requiring service.

30. C — Internal master cylinder seal bypass allowing fluid leakage past the seal during application. Hydraulic brake pedal that drops to the floor with steady pressure on the engine off indicates fluid bypassing internal master cylinder seals under steady pressure. The bypass allows fluid to leak past the seal slowly, producing the gradual pedal drop. External fluid loss would show visible leakage or low reservoir level.

31. B — Replace the master cylinder, inspect adjacent components, and bleed the system properly. External fluid leakage at the master cylinder reservoir area requires master cylinder replacement, inspection of adjacent components (lines, fittings, brake booster if equipped), and proper system bleeding. Each step ensures the underlying problem is addressed and the system is restored to proper service condition.

32. D — 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. The other choices all directly cause hard pedal with reduced braking force: worn lining reduces friction, brake booster failure reduces pressure assist, and restricted hose reduces fluid flow.

33. A — Air pressure powers a hydraulic actuator that develops fluid pressure for 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.

34. C — 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.

35. B — Service-related power, ground, or J1939 communication damage during recent work. Multiple ABS faults appearing after recent service typically trace to service-related issues: damaged power or ground connections, J1939 communication damage during work, or component damage during the service. Investigation focuses on what changed during the recent service rather than blanket component replacement.

36. D — Both Technician A and Technician B. ABS modulator valves are activated by the ABS controller when wheel slip is detected during brake application, modulating fluid or air pressure to prevent wheel lockup. Modern ABS systems also include automatic stability control that can apply brakes without driver pedal input to maintain vehicle stability during emergency conditions.

37. C — 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.

38. A — A failed coolant temperature sensor reading falsely cold to the engine ECM. ECT sensor errors affect engine fuel mixture but do not affect ABS activation. The other choices all describe direct causes of inappropriate ABS activation: failed wheel speed sensor produces inconsistent signals, damaged tone ring produces inconsistent signals, and controller calibration error affects activation logic.

39. B — Investigate the underlying cause rather than continuing to clear without correction. ABS fault codes that return immediately after clearing indicate the underlying fault is still active. Continuing to clear without correction wastes service time and may mask conditions that need attention. The proper approach is to investigate why the fault is setting and correct the actual cause.

40. D — Wheel speed sensor air gaps exceeding specification at multiple wheel positions. Failure to detect wheel slip during emergency braking on slick surfaces typically indicates wheel speed sensors not generating accurate signals due to excessive air gaps at multiple wheel positions. The controller cannot detect slip without accurate wheel speed data; multiple sensor air gap problems compound the detection failure.

41. D — Progressive desiccant material degradation from extended service in the application. Progressive humming noise from the air dryer over 100,000 miles on a 600,000-mile tractor indicates progressive desiccant material degradation from extended service. The desiccant material chemically deteriorates over time; the noise pattern reflects the gradual deterioration. Cartridge replacement addresses the underlying cause.

42. A — Drain contaminated supply tank, inspect for both wear sources and water entry sources, and refill. Lubricant analysis showing both elevated wear metals AND moisture content requires draining the contaminated supply tank, inspecting for both wear sources (failed compressor components, internal corrosion) and water entry sources (failed dryer, damaged vent, condensation), and refilling with proper procedures.

43. C — CVSA out-of-service determination during roadside inspection plus inadequate braking force. A brake chamber pushrod stroke exceeding CVSA out-of-service criteria results in CVSA out-of-service determination during roadside inspection plus inadequate braking force during operation. Both consequences directly result from the excessive stroke; either condition alone is unacceptable for safe commercial operation.

44. B — Isolate the noise source through systematic component testing on each axle position. Tandem-axle truck noise that varies between forward and rear drive axle positions requires systematic isolation through component testing on each axle. The brake assemblies, bearings, and gear sets in each axle can produce noise; identifying which axle is the source requires isolation testing rather than blanket replacement or visual inspection alone.

45. 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 lining wear rates. The other choices all describe direct causes of accelerated lining wear: improper torque from recent service can affect adjustment, aggressive driver braking causes increased friction work, and overload operation increases braking effort.

46. A — Apply 90–100 PSI to the brake chamber and measure stroke from released to applied position. Brake chamber pushrod free travel is measured by applying 90–100 PSI to the chamber and measuring stroke from released to applied position. The measurement at full service application

pressure provides accurate stroke values for comparison to CVSA out-of-service criteria; lower-pressure measurements understate stroke.

47. C — Tighten while rotating, back off, then retighten to specification per RP 618. TMC RP 618 wheel bearing service includes tightening while rotating the wheel (to seat the bearings), backing off the adjusting nut, then retightening to specification. The rotation during initial torque ensures even bearing seating; the back-off prevents over-tightening; the final torque establishes proper preload or endplay per the recommended practice.

48. B — Investigate the cause (carrier damage, improper installation, ring gear damage) and correct. Ring gear runout exceeding service specification requires investigation of the cause (carrier damage, improper installation, ring gear damage) and correction. Excessive runout causes improper tooth contact, accelerated wear, and progressive damage. Continuing operation allows the damage to progress; identifying the cause guides the proper repair approach.

49. D — Excessive backlash in the rear drive axle ring and pinion allowing tooth separation. Clunking noise only during throttle transitions indicates excessive backlash between ring and pinion gears in the rear drive axle, allowing tooth separation under no load and re-contact when torque is applied. The clunk is the teeth slamming together as load direction reverses. The brake system itself is not the source; the noise is drive axle related.

50. B — Reset all foundation brake adjustments and verify air system integrity during reassembly. Complete air brake system service requires resetting all foundation brake adjustments and verifying air system integrity during reassembly. The service affects multiple components that require coordinated adjustment and verification; partial service without proper reset produces brake imbalance, incorrect pushrod stroke, and possible CVSA out-of-service status.