PRACTICE EXAM 14: ASE T4 BRAKES SIMULATION

1. A technician disassembles a wheel bearing assembly and finds the bearing rollers have a gray, satin appearance with no spalling, pitting, or scoring. The bearing should be:

A. Replaced as a precaution because age alone is concerning

B. Considered in good condition and reinstalled with fresh lubricant if no other defects are found

C. Replaced because gray rollers always indicate failure

D. Lightly polished to restore original surface

2. The hub of a heavy-truck wheel-end assembly typically contains:

A. Only the bearing components

B. Only the brake drum mounting flange

C. The bearing cones, races, lubricant, and the brake mounting flange

D. Only the wheel mounting studs

3. A wheel bearing race that shows brinelling (small indentations) on its surface was MOST likely damaged by:

A. Impact loading while the bearing was stationary, often during shipping or improper handling

B. Normal operating wear over years of service

C. Improper bearing torque during the most recent service

D. Excessive ABS activity at this wheel

4. A heavy-truck wheel bearing requires periodic adjustment using the TMC RP 618 procedure. The final endplay specification after adjustment is approximately:

A. 0.020 to 0.040 inches

B. Maximum tightness with no clearance at all

C. 0.060 to 0.080 inches

D. 0.001 to 0.005 inches measured with a dial indicator

5. A technician removes a wheel hub for service and finds the inner wheel seal has been leaking. Lubricant has reached the brake friction surfaces. The recommended action for the contaminated friction material is:

A. Clean and reuse the same friction material

B. Replace the contaminated friction material because lubricant exposure permanently degrades the friction coefficient

C. Allow the material to air-dry and reinstall

D. Apply heat to drive off the lubricant contamination

6. A technician inspects a brake spider and finds wear at the camshaft bushing locations. The recommended action is:

A. Replace the bushings as part of the brake service to ensure proper camshaft support and prevent abnormal shoe wear

B. Continue to use the worn bushings since brake service does not include them

C. Apply grease to the bushings to extend service life

D. Bypass the bushings with a different mounting method

7. A wheel speed sensor produces an AC voltage signal proportional to wheel rotation speed. As wheel speed increases, the signal:

A. Decreases in both frequency and amplitude

B. Stays constant

C. Increases in both frequency (Hz) and amplitude (volts)

D. Becomes a DC voltage

8. A heavy-truck wheel speed sensor circuit typically uses how many wires per sensor?

A. Three wires per sensor

B. Four wires per sensor

C. Single wire only

D. Two wires per sensor — one for signal, one for ground/reference

9. A technician installs a new wheel bearing using the TMC RP 618 procedure. The pre-seating torque applied to the adjusting nut while rotating the hub is approximately:

A. 50 lb-ft

B. 200 lb-ft while rotating to fully seat the bearing

C. 1,000 lb-ft until rotation stops

D. Hand-tight only

10. A heavy-truck brake S-cam profile is designed to:

A. Convert camshaft rotation into shoe spread force, with the cam profile providing increasing mechanical advantage as the shoe spreads

B. Reduce friction at the wheel end

C. Modulate ABS pressure

D. Generate engine vacuum

11. A technician installs a wheel hub and discovers the new wheel seal has the same outer diameter as the bore. To install correctly, the technician should:

A. Use a hammer and punch directly on the seal lip

B. Heat the seal to expand it for installation

C. Use a seal driver tool that contacts only the seal's outer metal case, not the rubber sealing lip

D. Lubricate the seal bore with petroleum jelly to allow easy installation

12. The wheel bearing inner race (cone) and outer race (cup) on a tapered roller bearing are designed to:

A. Be interchangeable between bearings

B. Run dry without lubrication

C. Be reused multiple times after cleaning

D. Be replaced together as a matched set when bearing service is performed

13. A heavy-truck wheel bearing greases is specified as:

A. NLGI GC-LB grade for wheel bearing and chassis service

B. NLGI GA-LA for general purpose only

C. SAE 5W-30 motor oil

D. Lithium soap grease without specific grade requirements

14. A technician disassembles a wheel hub and finds that the seal wear sleeve has visible grooves from sealing lip contact. The wear sleeve:

A. Should be reused after polishing the grooves out

B. Should be replaced along with the new seal because the grooves prevent proper sealing

C. Will heal itself with the new seal in place

D. Indicates the previous seal was installed correctly

15. The brake friction material on a heavy-truck S-cam drum brake is bonded or riveted to:

A. The brake shoe table

B. The cam follower roller

C. The slack adjuster

D. The brake shoe table or backing — bonded shoes use heat and pressure adhesion, riveted shoes use mechanical fasteners

16. A wheel speed sensor with damaged wiring will typically produce:

A. Continuous false ABS activation

B. Improved sensor signal

C. Weak or intermittent signal output, producing ABS warning lamp illumination and stored DTC

D. Activation of the parking brake

17. A typical heavy-truck wheel bearing service includes all of these steps EXCEPT:

A. Refilling the master cylinder with brake fluid as part of the bearing service

B. Replacing the wheel seal

C. Replacing the bearings as cup-and-cone matched sets

D. Properly torquing the spindle nut and verifying endplay

18. A heavy-truck wheel bearing endplay of 0.015 inches indicates:

A. The bearing is properly adjusted

B. The bearing should be tightened more

C. Normal operation

D. The bearing has excessive endplay and requires readjustment to specification

19. A technician inspects a wheel hub during service and finds the bearing race shows uniform discoloration to gold or amber color. This finding indicates:

A. Normal service condition with proper lubrication

B. Slight overheating of the bearing — additional inspection is needed before reinstallation

C. Manufacturing defect requiring warranty replacement

D. Contamination from incorrect grease

20. The spindle nut on a heavy-truck wheel bearing should be tightened with:

A. A pneumatic impact wrench at maximum torque

B. Hand tools only without any specification

C. A torque wrench following the manufacturer's specified procedure (typically including pre-seating, back-off, and final torque steps)

D. A pipe wrench for maximum mechanical advantage

21. The brake camshaft on an S-cam foundation brake rotates approximately how many degrees during a full brake application?

A. 45 degrees

B. 180 degrees

C. 270 degrees

D. Approximately 75 to 90 degrees, depending on chamber type and slack adjuster geometry

22. A technician finds metallic debris in the wheel bearing grease during inspection. This finding indicates:

A. Internal bearing damage that has been progressing — the bearing must be replaced

B. Normal break-in particles

C. Grease that has been properly aged

D. Manufacturing residue that is not significant

23. A wheel bearing pre-load adjustment that produces excessive bearing tightness will:

A. Improve bearing service life

B. Generate excessive heat during operation, leading to lubricant breakdown and accelerated bearing failure

C. Reduce noise during operation

D. Improve braking performance

24. A heavy-truck wheel speed sensor that has been damaged by impact during wheel-end service will produce:

A. Continuous false ABS activation

B. Improved ABS function

C. ABS warning lamp illumination and stored DTC for that sensor

D. Activation of the parking brake automatically

25. A technician installs new wheel bearings using the TMC RP 618 procedure. After pre-seating with 200 lb-ft while rotating, and complete back-off, the next step is to:

A. Re-tighten to approximately 50 lb-ft while rotating to establish the measurement baseline

B. Apply final torque immediately without further procedure

C. Install the cotter pin at the pre-seating torque

D. Back off the nut an additional full turn before measurement

26. A typical heavy-truck wheel hub is sealed with:

A. Two seals — one inner and one outer

B. A single seal at the inboard side only

C. Multiple seals at random positions

D. The wheel seal at the inboard side and the spindle nut/cotter pin assembly at the outboard side, with a hub cap covering the assembly

27. A technician inspecting a brake shoe finds the lining has been worn down past the wear indicator pin, and metal-to-drum contact has occurred. The drum:

A. Should be inspected for damage and likely replaced if scoring exists

B. Can be returned to service without inspection

C. Should be inspected for damage; if drum scoring is present and exceeds the discard limit, the drum must be replaced as part of the service

D. Should be machined to remove the scoring

28. The brake shoe hold-down springs on a heavy-truck S-cam brake serve to:

A. Apply braking force during pedal application

B. Hold the shoes against the brake spider during normal operation, allowing controlled movement when brakes are applied

C. Modulate ABS pressure

D. Generate engine vacuum

29. A wheel bearing cup that has been pressed into a hub bore should be:

A. Pressed in squarely and fully seated against the bore shoulder using the proper installation tool

B. Tapped in lightly with a hammer

C. Heated before installation to expand the bore

D. Lubricated with petroleum jelly to ease installation

30. A heavy-truck brake shoe return spring's primary function is to:

A. Apply the brakes during pedal application

B. Modulate brake pressure

C. Generate ABS signals

D. Pull the shoes away from the drum after brake release, ensuring complete brake release

31. The brake camshaft on an S-cam foundation brake is connected to:

A. The chamber pushrod directly

B. The slack adjuster, which converts pushrod force into camshaft rotation

C. The wheel speed sensor for feedback

D. The compressor for synchronization

32. A technician disassembles a wheel hub and finds the wheel seal is intact but the wear sleeve is scored and damaged. The recommended action is:

A. Reuse the wear sleeve after polishing

B. Reuse the wear sleeve and install a new seal

C. Replace both the wear sleeve and the seal as a complete service

D. Continue to use the assembly without service

33. A heavy-truck wheel speed sensor's tone ring is mounted on:

A. The hub or wheel-end rotating component, where its teeth pass the stationary sensor tip

B. The brake spider — non-rotating

C. The chamber housing

D. The compressor body

34. A wheel bearing that has been overheated during operation will show:

A. No visible changes

B. Improved service life

C. Brighter, more polished surfaces

D. Discoloration (gold to blue) and possible damage to the rolling elements; the bearing must be replaced

35. The brake shoe anchor pin on an S-cam foundation brake is:

A. The pivot point about which the shoe rotates during application — must be inspected for wear during brake service

B. The point where the chamber pushrod connects to the shoe

C. A safety device that prevents brake failure

D. An ABS sensor mounting point

36. A technician notices that during brake assembly, the new brake shoes appear to have a slight angular cant when installed. The cause is MOST likely:

A. Manufacturing defect in the shoes

B. Incorrect shoe orientation

C. Excessive wear at the brake spider's shoe support surfaces or anchor pin wear, allowing the shoe to seat at an angle

D. Normal installation appearance

37. A heavy-truck wheel hub assembly typically includes:

A. The hub, bearings, seal, and brake drum mounting (or rotor mounting for disc brakes)

B. Only the wheel bearings

C. Only the brake drum

D. Only the wheel mounting studs

38. The wheel bearing service interval on most heavy-truck applications is:

A. Every brake service

B. Every 5,000 miles regardless of design

C. Calendar-based at 6 months

D. Determined by the manufacturer — often 100,000 to 250,000 miles for sealed/oil-bath designs

39. A typical heavy-truck wheel-end seal has what type of construction?

A. Solid metal with no rubber components

B. Composite construction with a rubber sealing element bonded to a metal case, often spring-loaded

C. Single-piece rubber that fits over the spindle

D. No specific construction — any seal will work

40. A technician removes a wheel hub and discovers significant rust and corrosion inside the hub cavity. The cause is MOST likely:

A. Normal aging of the metal

B. Excessive grease application

C. Water or moisture entering through a failed seal

D. Improper torque on the spindle nut

41. A wheel speed sensor that has accumulated metal debris on its tip will produce:

A. Weakened signal output, possibly triggering ABS faults — the debris disrupts the magnetic gap with the tone ring

B. Stronger signal output

C. Improved ABS function

D. No effect on system function

42. The brake shoe table on an S-cam drum brake shoe:

A. Houses the wheel speed sensor

B. Mounts the brake chamber

C. Connects to the master cylinder

D. Provides the friction surface where the brake lining is bonded or riveted to the shoe

43. A technician adjusts a manual slack adjuster after brake service. The free-play adjustment is:

A. Always set to maximum tightness

B. Set so that the shoes contact the drum, then backed off approximately 1/2 to 3/4 turn to provide running clearance

C. Set to leave 1 inch of slack

D. Not adjusted on manual slack adjusters

44. The wheel bearing cone (inner race) on a tapered roller bearing typically:

A. Is installed by interference fit on the spindle, requiring a press for installation

B. Slips on and off the spindle without resistance

C. Is bonded to the spindle with epoxy

D. Slides on the spindle with a slip fit (clearance), enabling routine installation and removal during service

45. A technician inspects a brake drum during a wheel-end service and finds the inner diameter is 0.060 inches over nominal. The maximum discard diameter is stamped at 0.120 inches over nominal. The drum:

A. Is within service limits and may be returned to service

B. Has reached the discard limit

C. Is below the new specification

D. Cannot be returned to service

46. A heavy-truck wheel-end assembly's spindle nut typically includes:

A. No retaining mechanism

B. A wire tie only

C. Magnetic locking

D. A castle nut and cotter pin, or other specified locking mechanism, to prevent the spindle nut from loosening in service

47. A technician notices excessive endplay on a wheel bearing during routine inspection. The bearing measures 0.020 inches of endplay. The recommended action is:

A. Continue to operate the vehicle until the next PM

B. Readjust the bearing to manufacturer's specification (typically 0.001 to 0.005 inches) using the proper procedure

C. Tighten the spindle nut to maximum torque

D. Replace the wheel hub assembly

48. The brake shoe cam-follower roller on an S-cam foundation brake is located:

A. At the anchor pin

B. Inside the chamber

C. At the upper end of each brake shoe, where it contacts and rolls on the S-cam profile

D. Behind the chamber diaphragm

49. A heavy-truck wheel bearing service requires the bearing to be cleaned with:

A. A solvent in a parts tank, allowing the bearing to soak; never spin the bearing with compressed air

B. Compressed air to spin the bearing for visual inspection

C. Water from a parts washer

D. Steam cleaning at high pressure

50. A technician replaces wheel bearings on a non-drive axle and finds the new bearings have a slightly different cup geometry than the originals. The recommended action is:

A. Install the new bearings without verification

B. Modify the hub bore to fit the new bearings

C. Verify the new bearings match the application specification before installation; using incorrect bearings will result in early failure

D. Use anti-seize compound to compensate for the difference

PRACTICE EXAM 14 — ANSWER KEY AND EXPLANATIONS

1. B — Considered in good condition and reinstalled with fresh lubricant if no other defects are found. A gray, satin appearance with no spalling, pitting, or scoring is the signature of a healthy bearing operating normally on the recommended lubricant. This is a positive finding suggesting the bearing has reached normal break-in condition and can return to service.

2. C — The bearing cones, races, lubricant, and the brake mounting flange. The hub assembly is the primary rotating component at the wheel end, integrating the bearing race seats, lubricant cavity, and the mounting surface for the brake drum (or rotor on disc brake applications). All of these elements work together to support the wheel during rotation.

3. A — Impact loading while the bearing was stationary, often during shipping or improper handling. Brinelling marks (small indentations in the race) are caused by impact loading on a stationary bearing, most often during shipping, handling, or dropping. The bearing was damaged before installation, even though it appeared visually normal — and brinelled bearings will fail prematurely.

4. D — 0.001 to 0.005 inches measured with a dial indicator. The standard endplay specification for most commercial vehicle wheel bearings after final adjustment is 0.001 to 0.005 inches. This small clearance must be measured with a dial indicator — it is too small to verify by feel or torque readings alone, and it ensures proper bearing operation without overheating.

5. B — Replace the contaminated friction material because lubricant exposure permanently degrades the friction coefficient. Lubricant contamination of brake friction material permanently reduces the coefficient of friction. Cleaning with solvents or air-drying cannot restore performance — the contaminated material must be replaced. The wheel seal must also be replaced as part of the same service.

6. A — Replace the bushings as part of the brake service to ensure proper camshaft support and prevent abnormal shoe wear. Worn camshaft bushings allow the camshaft to deflect during brake application, producing uneven shoe spread and accelerated lining wear. Replacing the bushings during brake service ensures proper camshaft support and prevents the brake from deteriorating prematurely.

7. C — Increases in both frequency (Hz) and amplitude (volts). Wheel speed sensors produce AC pulse signals as tone ring teeth pass the sensor tip. Higher rotational speed produces both more

pulses per second (higher frequency) and stronger pulse amplitude (higher voltage), allowing the ECU to track wheel speed accurately across the operating range.

8. D — Two wires per sensor — one for signal, one for ground/reference. Most heavy-truck wheel speed sensors use a two-wire configuration: one signal wire carrying the AC pulse and one return wire to ground or a reference point. The ECU processes the differential signal between these two wires to calculate wheel speed. Some advanced sensors use three or more wires.

9. B — 200 lb-ft while rotating to fully seat the bearing. The TMC RP 618 procedure specifies approximately 200 lb-ft of torque on the adjusting nut while rotating the hub. This seats the bearings fully against their races and expels excess grease before the technician backs off and applies the final adjustment to achieve the proper endplay.

10. A — Convert camshaft rotation into shoe spread force, with the cam profile providing increasing mechanical advantage as the shoe spreads. The S-cam profile is shaped like an "S" so that as the camshaft rotates, the cam profile lifts the cam-follower rollers progressively higher. This provides increasing mechanical advantage as the brake shoes spread further from the drum, producing the designed braking torque.

11. C — Use a seal driver tool that contacts only the seal's outer metal case, not the rubber sealing lip. The seal driver must contact only the seal's outer metal case. Driving force on the rubber sealing lip damages the lip and causes immediate seal failure. The proper seal driver applies pressure to the metal case, ensuring squareness and proper seating without damaging the sealing element.

12. D — Be replaced together as a matched set when bearing service is performed. Tapered roller bearing cups and cones must always be replaced as matched sets. Running a new component against a worn surface produces accelerated wear that fails the new component prematurely. Both halves of the bearing pair must be installed together for proper service life.

13. A — NLGI GC-LB grade for wheel bearing and chassis service. The NLGI GC-LB classification covers greases formulated specifically for the combined severe service conditions of wheel bearings and chassis — high temperature tolerance, heavy shock loading, and water resistance. GC-LB is the industry standard for heavy-truck wheel bearing applications.

14. B — Should be replaced along with the new seal because the grooves prevent proper sealing. A grooved wear sleeve cannot provide a smooth, consistent sealing surface for the new seal lip. The grooves create paths for lubricant leakage and contamination ingress. Both the wear sleeve and the seal must be replaced as a complete sealing system.

15. D — The brake shoe table or backing — bonded shoes use heat and pressure adhesion, riveted shoes use mechanical fasteners. Brake friction material is attached to the shoe table either through bonding (heat and pressure adhesion) or riveting (mechanical fasteners). Both methods are common and acceptable, with the choice depending on the manufacturer's specification for the particular application.

16. C — Weak or intermittent signal output, producing ABS warning lamp illumination and stored DTC. Damaged wiring in a wheel speed sensor circuit weakens or interrupts the electrical signal between the sensor and the ECU. The weakened or missing signal triggers ABS warning lamp illumination and a stored DTC for the affected sensor.

17. A — Refilling the master cylinder with brake fluid as part of the bearing service. Wheel bearing service does not include master cylinder fluid service — these are separate maintenance tasks. The other steps listed (replacing bearings as matched sets, replacing the seal, and proper torque/endplay adjustment) are all standard wheel bearing service requirements.

18. D — The bearing has excessive endplay and requires readjustment to specification. The standard endplay specification is 0.001 to 0.005 inches. A reading of 0.015 inches is significantly above this range, indicating the bearing is too loose. Continued operation with excessive endplay produces hub wobble, accelerated wear, and potential safety issues — readjustment is required.

19. B — Slight overheating of the bearing — additional inspection is needed before reinstallation. Gold or amber discoloration on bearing races indicates the bearing has experienced elevated temperatures. The bearing should be inspected closely for additional damage; if no other defects are present, it may return to service, but the cause of the heating should be identified and corrected.

20. C — A torque wrench following the manufacturer's specified procedure (typically including pre-seating, back-off, and final torque steps). The spindle nut must be tightened with a torque wrench following the manufacturer's specified procedure, which typically includes pre-seating, back-off, and final torque steps. Using improper tools or skipping procedures produces incorrect bearing adjustment and early failure.

21. D — Approximately 75 to 90 degrees, depending on chamber type and slack adjuster geometry. The brake camshaft typically rotates approximately 75 to 90 degrees during a full brake application, depending on chamber type (Type 20, 24, 30, etc.) and the slack adjuster's lever arm length. Greater rotation produces greater shoe spread and braking torque.

22. A — Internal bearing damage that has been progressing — the bearing must be replaced. Metallic debris in wheel bearing grease indicates progressive internal damage. The debris is typically broken-off fragments from rollers, cages, or races. Continued operation accelerates the damage, leading to bearing seizure or catastrophic failure. Bearing replacement is required.

23. B — Generate excessive heat during operation, leading to lubricant breakdown and accelerated bearing failure. Excessive bearing pre-load produces continuous friction at the contact surfaces. Heat generated by this friction breaks down the lubricant, accelerates wear, and eventually causes bearing seizure. Proper endplay adjustment is essential to avoid this failure mode.

24. C — ABS warning lamp illumination and stored DTC for that sensor. A damaged wheel speed sensor produces ABS warning lamp illumination and a stored DTC for the affected sensor. The

ABS ECU detects the missing or weakened signal during its monitoring routine and stores the appropriate diagnostic code, alerting the technician to the specific sensor needing replacement.

25. A — Re-tighten to approximately 50 lb-ft while rotating to establish the measurement baseline. After the initial 200 lb-ft pre-seating and complete back-off, the TMC RP 618 procedure calls for re-tightening to approximately 50 lb-ft while rotating the hub. This establishes the measurement baseline, after which the adjusting nut is backed off the specified amount to achieve the final endplay.

26. D — The wheel seal at the inboard side and the spindle nut/cotter pin assembly at the outboard side, with a hub cap covering the assembly. The wheel seal is located at the inboard side of the hub to retain lubricant and exclude contamination. The spindle nut, cotter pin, and hub cap are at the outboard side. This arrangement ensures sealing at the lubricant cavity and proper assembly of the bearing components.

27. C — Should be inspected for damage; if drum scoring is present and exceeds the discard limit, the drum must be replaced as part of the service. Metal-to-drum contact damages both the shoes and the drum. The drum must be inspected for scoring, and if the scoring depth exceeds machining capability or the drum diameter exceeds the discard limit, the drum must be replaced.

28. B — Hold the shoes against the brake spider during normal operation, allowing controlled movement when brakes are applied. Hold-down springs maintain proper shoe position against the brake spider during normal driving, preventing the shoes from rattling or moving randomly. They allow the shoes to spread when brakes are applied and return to position when brakes are released.

29. A — Pressed in squarely and fully seated against the bore shoulder using the proper installation tool. Bearing cups must be pressed in squarely and fully seated against the hub bore shoulder. Improper pressing or partial seating compromises bearing geometry and produces early failure. The proper installation tool ensures squareness and complete seating.

30. D — Pull the shoes away from the drum after brake release, ensuring complete brake release. Brake shoe return springs ensure the shoes retract from the drum after brake release. Without functioning return springs, the shoes can remain partially in contact with the drum, producing brake drag, heat buildup, and accelerated wear.

31. B — The slack adjuster, which converts pushrod force into camshaft rotation. The brake camshaft is mechanically connected to the slack adjuster, which translates the linear pushrod force from the chamber into rotational force at the camshaft. The slack adjuster's lever arm length determines the mechanical advantage of this conversion.

32. C — Replace both the wear sleeve and the seal as a complete service. A scored wear sleeve cannot provide a smooth sealing surface for any seal — new or used. Both components must be replaced together to ensure the wheel-end seal functions properly. This is a matched-component replacement, similar to bearings.

33. A — The hub or wheel-end rotating component, where its teeth pass the stationary sensor tip. The tone ring is mounted on a rotating component (hub or rotor) so that its teeth pass the stationary sensor tip during wheel rotation. As the teeth pass, they induce pulses in the sensor that the ECU processes to calculate wheel speed.

34. D — Discoloration (gold to blue) and possible damage to the rolling elements; the bearing must be replaced. An overheated bearing shows characteristic discoloration ranging from gold to blue depending on the temperature reached. The discoloration indicates the steel has lost its temper and structural integrity, and the bearing must be replaced regardless of apparent surface condition.

35. A — The pivot point about which the shoe rotates during application — must be inspected for wear during brake service. The brake shoe anchor pin is the lower pivot point about which the shoe rotates during application. Wear at the anchor pin allows the shoe to shift position, producing uneven application and accelerated wear. Inspection during brake service is essential.

36. C — Excessive wear at the brake spider's shoe support surfaces or anchor pin wear, allowing the shoe to seat at an angle. New shoes that show angular cant during installation indicate wear at the brake spider or anchor pin. The shoe is being supported on a worn surface, allowing it to settle at an angle. This must be corrected to ensure proper shoe-to-drum contact.

37. A — The hub, bearings, seal, and brake drum mounting (or rotor mounting for disc brakes). The complete wheel-end assembly includes the hub (containing bearing races and lubricant cavity), the bearings themselves, the wheel seal, and the brake mounting (drum or rotor). All components work together as an integrated system.

38. D — Determined by the manufacturer — often 100,000 to 250,000 miles for sealed/oil-bath designs. Wheel bearing service intervals vary based on hub design (sealed/oil-bath vs. grease) and operating conditions. Modern sealed designs often go 100,000 to 250,000 miles between services. Always follow the manufacturer's specified interval rather than generic intervals.

39. B — Composite construction with a rubber sealing element bonded to a metal case, often spring-loaded. Modern wheel-end seals use composite construction with a rubber sealing element bonded to a metal case, often including a spring (garter spring) that provides constant lip pressure. This design provides effective sealing under varying conditions and pressures.

40. C — Water or moisture entering through a failed seal. Significant rust and corrosion inside the hub cavity is the signature of water entering through a failed seal. Once water enters, it corrodes the bearing races, contaminates the lubricant, and accelerates bearing failure. The seal must be replaced and any corroded components must be replaced.

41. A — Weakened signal output, possibly triggering ABS faults — the debris disrupts the magnetic gap with the tone ring. Metal debris on the sensor tip disrupts the magnetic coupling between the sensor and the tone ring. The disrupted gap produces weakened or inconsistent signal pulses, which the ABS ECU detects as a fault and stores as a DTC.

42. D — Provides the friction surface where the brake lining is bonded or riveted to the shoe. The brake shoe table is the curved surface that supports the friction lining. The lining is bonded or riveted to the table, and the table provides the structural backing that transmits the brake force to the drum during application.

43. B — Set so that the shoes contact the drum, then backed off approximately 1/2 to 3/4 turn to provide running clearance. Manual slack adjuster adjustment requires tightening the slack adjuster until the shoes contact the drum, then backing off approximately 1/2 to 3/4 turn to provide proper running clearance. This ensures the shoes can release fully without dragging while maintaining proper application response.

44. C — Slides on the spindle with a slip fit (clearance), enabling routine installation and removal during service. The wheel bearing cone is designed with a slip fit on the spindle, allowing routine installation and removal during service. This contrasts with the cup, which is pressed into the hub bore. The slip fit on the cone enables technicians to remove and replace bearings without specialized equipment.

45. A — Is within service limits and may be returned to service. A drum at 0.060 inches over nominal is well within the maximum discard limit of 0.120 inches over nominal. The drum can be returned to service, provided other inspection criteria (cracks, scoring, heat damage) are also met.

46. D — A castle nut and cotter pin, or other specified locking mechanism, to prevent the spindle nut from loosening in service. The spindle nut requires a positive locking mechanism to prevent it from loosening during operation. A castle nut and cotter pin combination is the most common, though other mechanisms (such as locking nuts with safety washers) are also used. The locking mechanism is essential for safe operation.

47. B — Readjust the bearing to manufacturer's specification (typically 0.001 to 0.005 inches) using the proper procedure. Excessive endplay must be corrected through proper readjustment procedure. The bearing should be readjusted to the manufacturer's specification (typically 0.001 to 0.005 inches) using the TMC RP 618 procedure. Continued operation with excessive endplay produces accelerated wear and potential safety issues.

48. C — At the upper end of each brake shoe, where it contacts and rolls on the S-cam profile. Cam-follower rollers are positioned at the top of each brake shoe, where they ride on the S-cam profile. As the camshaft rotates during application, the rollers ride up the cam surface and force the shoes outward against the drum.

49. A — A solvent in a parts tank, allowing the bearing to soak; never spin the bearing with compressed air. Cleaning a wheel bearing requires a solvent soak in a parts tank. Compressed air must never spin the bearing because the rollers can accelerate fast enough to disintegrate the cage and launch rollers at hazardous velocity.

50. C — Verify the new bearings match the application specification before installation; using incorrect bearings will result in early failure. Different cup geometry between original and new bearings indicates a potential mismatch with the application specification. Installing incorrect bearings results in geometry that does not match the hub or spindle, producing early failure. The application specification must be verified before installation.