PRACTICE EXAM 4: T5 SIMULATION (50 QUESTIONS)

1. The progressive failure pattern of a heavy-duty truck kingpin with worn bushings typically begins with:

A. Sudden complete loss of steering control during normal vehicle operation

B. External leakage from the kingpin housing during normal operation

C. Wheel shimmy at low speed, then steering wander, then irregular tire wear

D. Loss of all forward gears requiring complete transmission replacement

2. A heavy-duty truck arrives with a complaint of "front-end vibration that increases with road speed." The most likely cause if tires and balance verify within specification is:

A. Worn wheel bearings, bent wheel rim, or damaged tone ring affecting wheel runout

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

3. The LEAST likely consequence of operating a heavy-duty truck with a worn drag link end is:

A. Steering wander during normal highway operation conditions during driving

B. Excessive front tire wear from inconsistent toe maintenance during operation

C. Increased steering effort during low-speed maneuvering during operation

D. Loss of vehicle steering control producing immediate accident risk during operation

4. The progressive damage pattern of a heavy-duty truck steering gear with internal wear typically follows:

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

B. Gradual free play increase, then leaking input shaft seal, then sector shaft sloppiness

C. External leakage from the steering gear body during normal operation conditions

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

5. A heavy-duty truck driver reports that "the steering pulls right consistently during all driving conditions, including hands-off the steering wheel." The most likely cause is:

A. Wheel alignment issue, tire condition, or asymmetric brake balance during operation

B. Steering column issue affecting wheel position relative to wheels during operation

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

6. The most likely cause of a heavy-duty truck that shows steering effort that varies between cold morning operation and warm operation is:

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

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

C. Power steering fluid contamination or low fluid level during operation

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

7. Technician A says heavy-duty truck steering wheel free play measurement is performed with the engine running. Technician B says steering wheel free play measurement is performed with the engine off and steering pump unpressurized. Who is correct?

A. Both Technician A and Technician B

B. Technician B only

C. Neither Technician A nor Technician B

D. Technician A only

8. The proper diagnostic priority when a heavy-duty truck shows a complaint of "increased steering effort that develops gradually over time" is to:

A. Replace the power steering pump as the most likely failure component during service

B. Verify pump pressure output, inspect for restriction, and inspect gear internal condition

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

D. Continue operation since gradual changes have minimal effect on operation during use

9. The most likely consequence of operating a heavy-duty truck with significantly worn kingpin bushings is:

A. Wheel shimmy, steering wander, irregular tire wear, and possible CVSA out-of-service status

B. Improved cornering response from reduced friction during normal operation

C. No effect on steering performance during normal operating conditions during use

D. Faster steering wheel return to center during normal operation conditions

10. The progressive damage pattern from operating with continuously low power steering fluid typically follows:

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

B. External leakage from the pump housing during normal operation conditions

C. Pump cavitation, then internal pump damage, then catastrophic pump failure

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

11. The LEAST likely cause of a heavy-duty truck that shows increased steering effort during low-speed maneuvering is:

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

B. Worn power steering pump unable to deliver pressure during operation

C. Restricted power steering supply hose limiting fluid flow to the gear

D. Low power steering fluid level resulting from a leak during operation

12. The proper procedure for testing power steering pump operation during diagnostic service is:

A. Replace the pump as preventive maintenance regardless of test results

B. Connect a pressure gauge in the supply line and measure pressure per service info

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

D. Listen for pump operation with a stethoscope at idle conditions during operation

13. The most accurate description of heavy-duty truck integral power steering operation is:

A. Mechanical linkage transfers steering force directly to the wheel spindles during operation

B. Vacuum boost provides primary steering force during normal vehicle operation

C. Hydraulic pressure provides assist within the steering gear housing during operation

D. Pneumatic pressure provides primary steering force during normal vehicle operation

14. The proper inspection procedure for heavy-duty truck steering gear input shaft seal during routine service includes:

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

B. Listen for seal leakage with a stethoscope during normal operation

C. Replace the seal as preventive maintenance regardless of condition

D. Inspect for leakage, fluid contamination at seal area, and shaft surface condition

15. The most likely cause of a heavy-duty truck that shows fluid contamination at the steering gear pitman arm seal area is:

A. Damaged seal allowing fluid leakage past the pitman arm sealing surface

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. Excessive transmission fluid level above the maximum fill mark indication

16. The proper procedure when a heavy-duty truck shows a complaint of "steering wheel rotates freely without turning the wheels" is to:

A. Continue operation since the symptom has minimal effect on safety during operation

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

C. Inspect pitman arm to gear connection, drag link integrity, and steering linkage systematically

D. Replace the steering gear immediately as the most likely failure component during service

17. The LEAST likely cause of a heavy-duty truck that shows steering wheel that does not return to center after turning is:

A. Worn kingpins or kingpin bushings allowing excessive friction during operation

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

C. Inadequate caster angle reducing self-centering force during normal operation

D. Worn or damaged steering gear sector shaft components affecting return spring action

18. The proper diagnostic approach when a heavy-duty truck shows a complaint of "intermittent steering wander during highway operation" is to:

A. Replace the steering gear as the most likely failure component during service

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

C. Continue operation since intermittent symptoms have minimal effect on safety

D. Verify alignment angles, kingpin condition, tie rod end condition, and tire condition

19. The progressive damage pattern of a heavy-duty truck leaf spring with broken center bolt typically follows:

A. Axle shift, then U-bolt loosening, then complete spring assembly displacement

B. External lubricant leakage requiring complete leaf spring replacement during service

C. Sudden complete suspension failure with no warning during operation conditions

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

20. A heavy-duty truck arrives with a complaint of "rear suspension produces metal-on-metal noise during compression and extension." The most likely cause is:

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

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

C. Worn shock absorbers, leaf spring bushings, or shackle bushings allowing contact

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

21. The LEAST likely cause of a heavy-duty truck that shows broken U-bolts on inspection is:

A. Improper U-bolt torque during recent installation procedures during service

B. Fatigue from repeated cycling without proper retorque service intervals

C. Improper installation procedures during recent service operations during work

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

22. The progressive damage pattern from operating with worn shock absorbers typically follows:

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

B. External leakage requiring complete suspension replacement during service procedures

C. Increased ride harshness, then tire cupping, then accelerated suspension component wear

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

23. The most likely cause of a heavy-duty truck rear suspension that produces a clunking noise during throttle transitions is:

A. Worn shackle bushings, U-bolts, or spring eye bushings allowing axle wrap-up movement

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

24. The proper diagnostic priority when a heavy-duty truck air ride suspension shows uneven ride height between sides is to:

A. Replace all air ride components as preventive maintenance during the same service

B. Verify ride height valve operation, air pressure delivery, and air bag integrity systematically

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

D. Continue operation since uneven ride height has minimal effect on operation during use

25. The most likely consequence of operating a heavy-duty truck with significantly worn shackle bushings is:

A. Improved ride comfort from reduced suspension friction during normal operation

B. No effect on suspension performance during normal operating conditions during use

C. Faster suspension response during normal operation conditions during driving

D. Axle movement under load, accelerated U-bolt wear, and possible spring failure

26. The progressive damage pattern from operating with insufficient leaf spring U-bolt torque typically follows:

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

B. Axle shift, then center bolt failure, then U-bolt failure, then spring displacement

C. External lubricant leakage requiring complete leaf spring replacement during service

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

27. The LEAST likely cause of a heavy-duty truck that shows a complaint of "rough ride and excessive bouncing on rough roads" is:

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

B. Worn or failed shock absorbers reducing damping during normal operation

C. Damaged or fatigued leaf springs reducing load support during normal operation

D. Worn or failed air ride components affecting ride height during operation

28. The proper procedure when a heavy-duty truck rear suspension shows audible squeaking during normal operation is:

A. Replace the entire rear suspension as preventive maintenance during the same service

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

C. Inspect leaf condition, lubricate per service info, and verify U-bolt torque

D. Continue operation since suspension squeaking has minimal effect on operation

29. The most likely cause of a heavy-duty truck that shows excessive body roll during cornering is:

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

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 shock absorbers, anti-roll bar bushings, or suspension components allowing excessive movement

30. The proper inspection procedure for heavy-duty truck leaf spring shackle bushings during service includes verification of:

A. Bushing wear, lubrication condition, and freedom from binding during operation

B. External paint condition and decal placement during the inspection process

C. Engine compatibility with the suspension during service procedures

D. Vehicle type compatibility with the suspension during service operations

31. The most likely cause of a heavy-duty truck air ride suspension that shows the truck riding low during normal operation is:

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

B. Damaged air bag, failed leveling valve, or insufficient air pressure during operation

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

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

32. The proper service action when a heavy-duty truck rear suspension shows a leaf spring with cracks visible during inspection is to:

A. Continue operation since minor leaf cracks have minimal effect on suspension function

B. Apply battery voltage to the leaf spring for diagnostic testing during service

C. Heat-treat the leaf during the same service event to restore service life

D. Replace the leaf spring assembly with matched components per service specifications

33. The most likely cause of a heavy-duty truck that shows tire wear pattern indicating excessive positive camber on the front axle is:

A. Bent or damaged steer axle, worn kingpins, or improper alignment setup

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

34. The progressive damage pattern from operating with improper toe setting typically follows:

A. Sudden complete tire failure with no warning during normal operation conditions

B. External lubricant leakage requiring complete suspension replacement during service

C. Feathered tire wear, then rapid tread wear, then tire failure if not corrected

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

35. The LEAST likely cause of a heavy-duty truck that shows a complaint of "vehicle pulls right during driving but tracks straight when hands off the steering wheel" is:

A. Brake imbalance affecting steering tracking during normal operation conditions

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

C. Worn steering column components affecting steering wheel position

D. Asymmetric tire condition or pressure affecting wheel pull during operation

36. The proper diagnostic approach when a heavy-duty truck shows alignment angles outside specification after recent service is to:

A. Continue operation since alignment angles have minimal effect on tire wear

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

C. Replace all alignment components as preventive maintenance during the same service

D. Investigate service-related damage, identify cause, and correct adjustable angles to spec

37. The most likely consequence of operating a heavy-duty truck with significantly negative caster angle on the steer axle is:

A. Reduced steering self-centering tendency, increased wander, and increased steering effort

B. Improved cornering response during normal vehicle operation conditions

C. No effect on steering performance during normal operating conditions during use

D. Improved fuel economy from reduced steering resistance during normal operation

38. The proper procedure when a heavy-duty truck shows tire wear pattern indicating dog-tracking is:

A. Continue operation since dog-tracking has minimal effect on operation during use

B. Verify thrust angle measurement and inspect for rear axle misalignment

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

D. Replace the rear axle assembly as preventive maintenance during the same service

39. The progressive damage pattern from operating with improper caster angle typically follows:

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

B. External lubricant leakage requiring complete steering replacement during service

C. Increased steering effort, then steering wander, then accelerated component wear

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

40. The LEAST likely cause of a heavy-duty truck that shows aggressive tire wear pattern across all front-axle tires is:

A. Improper toe setting causing tires to scrub during normal operation events

B. Worn tie rod ends allowing improper toe maintenance during normal operation

C. Worn kingpins affecting steer axle geometry during normal operation conditions

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

41. The proper inspection procedure for heavy-duty truck thrust angle includes:

A. Verification of rear axle alignment relative to vehicle centerline using alignment equipment

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

C. Listen for thrust angle issues with a stethoscope during normal operation

D. Estimate thrust angle visually using shop lighting during the inspection process

42. The most accurate description of heavy-duty truck included angle is:

A. Forward or rearward tilt of the kingpin as viewed from the side during inspection

B. Inward or outward tilt of the wheel as viewed from the front during inspection

C. Sum of camber angle and steering axis inclination measured during alignment service

D. Steering wheel position relative to wheel direction during normal operation

43. The most likely cause of a heavy-duty truck wheel hub that shows discoloration suggesting overheating during inspection is:

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

B. Improper bearing endplay, bearing damage, or contaminated lubricant during operation

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

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

44. The progressive damage pattern from operating with incorrect wheel bearing endplay typically follows:

A. Sudden complete bearing failure with no warning during normal operation conditions

B. External lubricant leakage requiring complete wheel hub replacement during service

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

D. Bearing wear, then heat buildup, then seal failure, then progressive hub damage

45. The LEAST likely cause of a heavy-duty truck wheel bearing wear is:

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

B. Improper torque application during recent wheel bearing service procedures

C. Contamination from failed wheel seal allowing dirt entry during operation

D. Excessive endplay or insufficient preload at the most recent service event

46. The proper service action when a heavy-duty truck wheel seal shows external leakage during inspection is to:

A. Continue operation since minor seal leakage has minimal effect on bearing service

B. Add additional lubricant to compensate for the leakage during normal operation

C. Replace the seal, inspect bearing condition, and verify proper endplay per RP 618

D. Apply silicone sealer to the seal area to stop the leakage during the same service

47. The most likely cause of a heavy-duty truck wheel that shows tire pressure 25 PSI below specification on inspection is:

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

B. Slow leak from valve stem, sidewall damage, or compromised tire-to-rim seal

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. The proper procedure when a heavy-duty truck shows mismatched tire sizes on the same axle is to:

A. Continue operation since size mismatch has minimal effect on tire performance

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

C. Add tire sealant to compensate for the size differences during the same service

D. Replace tires to match across the axle and prevent differential or driveline damage

49. The LEAST likely consequence of operating a heavy-duty truck with significantly mismatched tire sizes on the same axle is:

A. Differential gear damage from continuous unequal speed operation during driving

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

C. Premature tire wear from scrubbing during normal operation conditions

D. CVSA out-of-service determination during roadside inspection events

50. The proper procedure for verifying heavy-duty truck wheel runout during service is to:

A. Apply battery voltage to the wheel for diagnostic testing during measurement

B. Listen for runout-related noise with a stethoscope during normal operation

C. Use a dial indicator at the wheel to measure radial and lateral runout per service info

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

ANSWER KEY AND EXPLANATIONS

1. C — Wheel shimmy at low speed, then steering wander, then irregular tire wear. Worn kingpin bushings produce a predictable progression: wheel shimmy at low speed (loose pivot allows wheel oscillation), then steering wander (loose pivot disrupts directional stability), then irregular tire wear (changing toe and camber as the wheel pivots loosely). Recognition of early stages allows intervention before complete failure.

2. A — Worn wheel bearings, bent wheel rim, or damaged tone ring affecting wheel runout. Front-end vibration that increases with road speed when tires and balance are within specification typically indicates a rotating mass issue beyond the tire. Worn wheel bearings allow wheel oscillation, bent rims produce runout, and damaged tone rings affect wheel speed signal — all produce speed-dependent vibration.

3. D — Loss of vehicle steering control producing immediate accident risk during operation. A worn drag link end produces wandering, increased effort, and tire wear, but does not typically cause immediate complete loss of steering control. The other choices all describe direct consequences of drag link wear: wander from inconsistent input transmission, tire wear from inconsistent toe, and increased steering effort from sloppy linkage.

4. B — Gradual free play increase, then leaking input shaft seal, then sector shaft sloppiness. Heavy-duty steering gear internal wear progresses through gradual free play increase (worn sector shaft bearings), then leaking input shaft seal (worn shaft surface damages seal lip), then sector shaft sloppiness (advanced wear allowing significant movement). Recognition of early stages allows intervention before complete failure.

5. A — Wheel alignment issue, tire condition, or asymmetric brake balance during operation. Consistent steering pull, including hands-off the steering wheel, typically indicates an alignment angle issue, tire condition (asymmetric pressure or wear), or asymmetric brake balance. The hands-off symptom distinguishes this from steering column issues (which would show different patterns) and confirms the cause is in the wheels or brake balance.

6. C — Power steering fluid contamination or low fluid level during operation. Steering effort that varies between cold and warm operation typically indicates fluid issues. Cold fluid is more viscous (higher effort); warm fluid is less viscous (lower effort). Contamination or low fluid level magnifies the cold-warm difference because the fluid cannot maintain proper hydraulic transmission consistently across the temperature range.

7. D — Technician A only. Steering wheel free play measurement is performed with the engine running so that the hydraulic assist is active and the steering pump is at operating temperature.

Engine-off measurement produces inaccurate results because the system is not at operating conditions; Technician B's procedure is incorrect for heavy-duty applications.

8. B — Verify pump pressure output, inspect for restriction, and inspect gear internal condition. Increased steering effort developing gradually requires systematic verification of pump pressure output, inspection for restriction in supply lines, and inspection of gear internal condition. Each component can independently contribute to steering effort; systematic verification identifies the actual cause for targeted repair.

9. A — Wheel shimmy, steering wander, irregular tire wear, and possible CVSA out-of-service status. Significantly worn kingpin bushings produce multiple symptoms because they disrupt steering geometry: wheel shimmy from loose pivot, steering wander from loss of directional stability, irregular tire wear from changing toe and camber, and possible CVSA out-of-service determination during inspection if wear exceeds specification.

10. C — Pump cavitation, then internal pump damage, then catastrophic pump failure. Operating with continuously low power steering fluid produces a predictable progression: pump cavitation (drawing air with insufficient fluid supply), then internal pump damage (cavitation erodes pump components), then catastrophic pump failure (advanced damage destroys the pump). Recognition of early stages prevents the catastrophic phase.

11. A — A failed coolant temperature sensor reading falsely cold to the engine ECM. ECT sensor errors affect engine fuel mixture but do not affect power steering assist. The other choices all directly cause increased steering effort during low-speed maneuvering: worn pump cannot deliver adequate pressure, restricted hose limits fluid flow, and low fluid level causes pump cavitation.

12. B — Connect a pressure gauge in the supply line and measure pressure per service info. Power steering pump testing connects a pressure gauge in the supply line and measures pressure per manufacturer service information. The reading is compared to specification (typically 1,500–2,000 PSI on heavy-duty applications); pressure below specification indicates pump wear or other supply system issues.

13. C — Hydraulic pressure provides assist within the steering gear housing during operation. Integral power steering systems contain the hydraulic assist within the steering gear housing itself. The gear includes an internal piston, valve, and sector mechanism that work together; pump pressure is delivered to the gear, where the internal mechanism multiplies steering force during the application.

14. D — Inspect for leakage, fluid contamination at seal area, and shaft surface condition. Steering gear input shaft seal inspection requires checking for leakage, fluid contamination at the seal area, and shaft surface condition. Shaft surface condition is critical because worn or damaged shafts will damage new seals during installation, producing repeat failures and wasted service time.

15. A — Damaged seal allowing fluid leakage past the pitman arm sealing surface. Fluid contamination at the steering gear pitman arm seal area indicates a damaged pitman arm seal allowing fluid leakage. The seal must contain the gear's hydraulic pressure and prevent contamination entry; damaged seals produce visible leakage that requires service to prevent fluid loss and contamination of adjacent components.

16. C — Inspect pitman arm to gear connection, drag link integrity, and steering linkage systematically. A steering wheel that rotates freely without turning the wheels indicates a complete disconnection in the steering linkage somewhere between the steering wheel and the wheels. Systematic inspection of the pitman arm to gear connection, drag link integrity, and steering linkage components identifies the disconnection point.

17. B — A failed coolant temperature sensor reading falsely cold to the engine ECM. ECT sensor errors affect engine fuel mixture but do not affect steering wheel return to center. The other choices all directly cause steering return issues: worn kingpins create excessive friction, inadequate caster reduces self-centering force, and worn gear sector shaft components affect return spring action.

18. D — Verify alignment angles, kingpin condition, tie rod end condition, and tire condition. Intermittent steering wander during highway operation requires systematic verification of alignment angles, kingpin condition, tie rod end condition, and tire condition. Each component can independently cause wander; systematic inspection identifies the actual cause for targeted repair.

19. A — Axle shift, then U-bolt loosening, then complete spring assembly displacement. A broken leaf spring center bolt allows the leaf assembly to shift on the axle, leading to axle movement during operation. Continued operation produces U-bolt loosening as the axle shifts further, and eventually complete spring assembly displacement that risks catastrophic suspension failure during driving.

20. C — Worn shock absorbers, leaf spring bushings, or shackle bushings allowing contact. Metal-on-metal noise during compression and extension indicates components contacting each other due to worn cushioning components. Shock absorber bushings, leaf spring bushings, and shackle bushings all provide cushioning between components; wear allows direct metal-on-metal contact that produces the characteristic noise.

21. D — A failed coolant temperature sensor reading falsely cold to the engine ECM. ECT sensor errors affect engine fuel mixture but do not affect U-bolt failure patterns. The other choices all directly cause U-bolt failure: improper torque produces uneven loading, fatigue from cycling without retorque produces stress accumulation, and improper installation introduces stress concentration points that lead to failure.

22. C — Increased ride harshness, then tire cupping, then accelerated suspension component wear. Worn shock absorbers progress through increased ride harshness (loss of damping function), then tire cupping (suspension oscillation produces tire wear pattern), then accelerated suspension component wear (continued oscillation stresses other components). Recognition of early stages allows intervention before significant tire and component damage.

23. A — Worn shackle bushings, U-bolts, or spring eye bushings allowing axle wrap-up movement. Rear suspension clunking during throttle transitions indicates worn components allowing excessive axle wrap-up movement under torque application. Shackle bushings, U-bolts, and spring eye bushings all carry load during driving force transmission; wear allows axle rotation that produces the characteristic clunking sound.

24. B — Verify ride height valve operation, air pressure delivery, and air bag integrity systematically. Uneven air ride suspension ride height between sides requires systematic verification of ride height valve operation (controls pressure to that side), air pressure delivery (supply line condition, pressure adequacy), and air bag integrity (leaks, damage). Each component affects pressure on that side; systematic inspection identifies the actual cause.

25. D — Axle movement under load, accelerated U-bolt wear, and possible spring failure. Significantly worn shackle bushings allow excessive axle movement under load conditions, accelerating U-bolt wear and stressing leaf springs. The cumulative effects produce U-bolt failure and possibly leaf spring failure if the wear is allowed to progress without correction.

26. B — Axle shift, then center bolt failure, then U-bolt failure, then spring displacement. Insufficient leaf spring U-bolt torque produces a predictable progression: axle shift on the spring (insufficient clamping force), then center bolt failure (taking up load the U-bolts should carry), then U-bolt failure (cyclic stress), then spring displacement (complete loss of axle retention). Each stage progresses to the next without intervention.

27. A — A failed coolant temperature sensor reading falsely cold to the engine ECM. ECT sensor errors affect engine fuel mixture but do not affect ride quality. The other choices all directly cause rough ride and excessive bouncing: worn shock absorbers reduce damping, damaged leaf springs reduce load support, and worn air ride components affect ride height and pressure regulation.

28. C — Inspect leaf condition, lubricate per service info, and verify U-bolt torque. Audible squeaking during normal operation typically indicates inter-leaf friction from inadequate lubrication, leaf wear, or loose U-bolts. Inspection of leaf condition, lubrication per service information, and U-bolt torque verification addresses the common causes; voltage application and complete suspension replacement are excessive responses.

29. D — Worn shock absorbers, anti-roll bar bushings, or suspension components allowing excessive movement. Excessive body roll during cornering indicates loss of motion control. Worn shock absorbers allow excessive suspension movement, worn anti-roll bar bushings or links allow excessive axle roll, and worn suspension components compromise control of axle position. Each contributes to body roll during cornering loads.

30. A — Bushing wear, lubrication condition, and freedom from binding during operation. Leaf spring shackle bushing inspection requires verification of bushing wear (within service specification), lubrication condition (proper grease distribution), and freedom from binding (smooth movement

through the operating range). All three conditions affect proper suspension operation during driving force transmission.

31. B — Damaged air bag, failed leveling valve, or insufficient air pressure during operation. An air ride truck riding low during normal operation indicates inadequate pressure to maintain ride height. Damaged air bags lose pressure through leaks, failed leveling valves cannot maintain proper pressure, and insufficient air pressure (from supply system issues) prevents the air bags from supporting the truck at proper ride height.

32. D — Replace the leaf spring assembly with matched components per service specifications. Cracked leaf springs require replacement with matched components per service specifications because cracks compromise structural integrity and propagate during continued operation. Replacement is required; voltage application has no relevance to mechanical springs, and heat treatment cannot reliably restore cracked springs.

33. A — Bent or damaged steer axle, worn kingpins, or improper alignment setup. Tire wear pattern indicating excessive positive camber on the front axle points to causes that produce outward wheel tilt: bent or damaged steer axle (axle geometry changed), worn kingpins (allow wheel tilt), or improper alignment setup (camber set outside specification). Each cause produces the diagnostic wear pattern that points to camber as the issue.

34. C — Feathered tire wear, then rapid tread wear, then tire failure if not corrected. Improper toe setting produces feathered tire wear (alternating high-low ridges from scrubbing) initially, then rapid tread wear as the scrubbing accelerates wear rates, then tire failure if the condition is not corrected. Recognition of feathered wear allows intervention before significant tread loss occurs.

35. B — A failed coolant temperature sensor reading falsely cold to the engine ECM. ECT sensor errors affect engine fuel mixture but do not affect steering tracking. The other choices all directly cause vehicle pull during driving with straight tracking hands-off: brake imbalance affects pull during driving, worn steering column components affect steering wheel position, and asymmetric tire condition causes pull during driving.

36. D — Investigate service-related damage, identify cause, and correct adjustable angles to spec. Alignment angles outside specification after recent service typically indicate service-related damage during the work. Investigation focuses on identifying the cause (bent component, damaged adjuster, incorrect setup), correcting adjustable angles to specification, and replacing damaged non-adjustable components if needed.

37. A — Reduced steering self-centering tendency, increased wander, and increased steering effort. Significantly negative caster angle on the steer axle reduces the steering's natural self-centering tendency, producing increased wander during operation and increased steering effort because the driver must continuously correct the truck's position. Heavy-duty trucks require positive caster for proper directional stability.

38. B — Verify thrust angle measurement and inspect for rear axle misalignment. Tire wear pattern indicating dog-tracking requires thrust angle verification and inspection for rear axle misalignment. Thrust angle measures rear axle direction relative to vehicle centerline; misalignment causes the truck to track sideways, producing the characteristic tire wear pattern. The diagnostic approach addresses the rear axle alignment that causes the symptom.

39. C — Increased steering effort, then steering wander, then accelerated component wear. Improper caster angle produces a predictable progression: increased steering effort (excessive caster) or steering wander (insufficient caster), then progressive component wear from continuous corrective steering inputs. Recognition of early symptoms allows alignment correction before component wear accelerates.

40. D — A failed coolant temperature sensor reading falsely cold to the engine ECM. ECT sensor errors affect engine fuel mixture but do not affect tire wear patterns. The other choices all directly cause aggressive front-axle tire wear: improper toe causes scrubbing, worn tie rod ends affect toe maintenance, and worn kingpins compromise steer axle geometry.

41. A — Verification of rear axle alignment relative to vehicle centerline using alignment equipment. Thrust angle inspection requires verification of rear axle alignment relative to vehicle centerline using alignment equipment. The measurement determines whether the rear axle directs the vehicle straight ahead or at an angle; improper thrust angle causes dog-tracking and aggressive tire wear that requires alignment correction.

42. C — Sum of camber angle and steering axis inclination measured during alignment service. Included angle is the sum of camber angle and steering axis inclination (SAI), measured during alignment service. The included angle is a non-adjustable angle that helps identify damaged or bent components when it does not match the specification, even if camber appears within range during inspection.

43. B — Improper bearing endplay, bearing damage, or contaminated lubricant during operation. Wheel hub discoloration suggesting overheating indicates excessive heat generation in the hub assembly. Improper bearing endplay produces preload that generates heat, bearing damage causes friction and heat, and contaminated lubricant fails to lubricate properly. Each cause produces the characteristic discoloration that requires service for proper bearing operation.

44. D — Bearing wear, then heat buildup, then seal failure, then progressive hub damage. Incorrect wheel bearing endplay produces a predictable progression: bearing wear (from improper preload or excess endplay), then heat buildup (from increased friction or bearing oscillation), then seal failure (from heat damage to seal lip), then progressive hub damage (from contamination entry through failed seal). Recognition of early stages prevents progressive damage.

45. A — A failed coolant temperature sensor reading falsely cold to the engine ECM. ECT sensor errors affect engine fuel mixture but do not affect wheel bearing wear. The other choices all directly

cause accelerated bearing wear: improper torque produces incorrect preload, contamination causes abrasive wear, and incorrect endplay or preload damages bearing surfaces during operation.

46. C — Replace the seal, inspect bearing condition, and verify proper endplay per RP 618. Wheel seal external leakage requires seal replacement, bearing condition inspection (the leakage may indicate bearing damage), and verification of proper endplay per TMC RP 618. Continuing operation allows lubricant loss that damages bearings; sealer applications cannot reliably stop wheel seal leakage.

47. B — Slow leak from valve stem, sidewall damage, or compromised tire-to-rim seal. A tire 25 PSI below specification on inspection indicates a slow leak somewhere in the tire and rim assembly. Common sources include valve stem leaks, sidewall damage allowing slow air loss, and compromised tire-to-rim seal. Identification of the leak source allows targeted repair or replacement based on the specific cause.

48. D — Replace tires to match across the axle and prevent differential or driveline damage. Mismatched tire sizes on the same axle force the differential to operate continuously at uneven speeds, causing differential gear damage and potentially driveline damage. Replacement to match size across the axle prevents this damage; size matching is the standard service action for mismatched tires on the same axle position.

49. B — A failed coolant temperature sensor reading falsely cold to the engine ECM. ECT sensor errors affect engine fuel mixture but are unrelated to mismatched tire size operation. The other choices all directly result from operating with mismatched tire sizes: differential gear damage from continuous unequal speed, premature tire wear from scrubbing, and potential CVSA out-of-service determination during inspection.

50. C — Use a dial indicator at the wheel to measure radial and lateral runout per service info. Wheel runout verification uses a dial indicator at the wheel to measure both radial runout (variation in wheel radius) and lateral runout (variation in wheel side-to-side position) per service information. Both measurements are compared to specification; runout exceeding specification produces vibration and accelerated tire wear.