

PRACTICE EXAM 7: T5 SIMULATION

(50 QUESTIONS)

1. A 2019 Freightliner Cascadia with 480,000 miles comes in with a complaint of steering wheel "kickback" felt over road irregularities at highway speed. The truck had a steering gear replaced 60,000 miles ago and a complete kingpin service performed 200,000 miles ago. Pump pressure tests within specification. Which condition is the most likely cause of the kickback complaint?

- A. Worn power steering pump producing pressure pulsations that telegraph through the steering column
- B. Internal leak in the recently replaced steering gear allowing pressure variations during operation
- C. Failed kingpin bushings producing steering instability under highway operating conditions
- D. Worn or loose intermediate shaft U-joints or slip yoke transmitting road shock to the steering wheel

2. A Class 8 tractor with 720,000 miles has been pulling slightly to the right intermittently for the past 30,000 miles. The fleet has rotated steer tires twice during this period without resolving the pull. Alignment specifications have been verified within tolerance on three separate alignments. The truck has had no collision damage. Which condition is the LEAST likely cause of the persistent pull?

- A. Cross-caster split that has drifted out of specification between alignments due to component wear
- B. Recently bent steering knuckle that occurred during normal operation without driver awareness
- C. Gradual wear in front suspension components shifting alignment between scheduled checks
- D. Tire conicity in successive sets of steer tires installed on the same wheel position over time

3. A driver reports that a 2021 International LT with 240,000 miles has been making a "growling" noise from the front of the engine area only when the steering wheel is held at full lock for more than two seconds. The truck has had no prior steering work performed. Tech A says the most likely cause is the power steering pump relief valve operating normally at full lock. Tech B says the most likely cause is a failed power steering pump bearing exposed by continuous full-lock operation. Who is correct?

- A. Tech A only
- B. Tech B only
- C. Both Tech A and Tech B
- D. Neither Tech A nor Tech B

4. A heavy-duty truck has had its high-pressure steering hose replaced twice in the past 100,000 miles due to external leaks at the same fitting location. The hose specifications match OEM and the fittings are torqued to specification on each installation. The most likely cause of the repeat hose failure at the same fitting is:

- A. The replacement hoses were defective from the supplier and contained internal hose construction faults
- B. The fluid temperature is exceeding hose rating limits during normal operation of the steering system
- C. The hose routing is incorrect causing flexing or chafing at the fitting where the leak develops
- D. The pump pressure is exceeding hose pressure rating during normal operation of the steering system

5. A Sheppard M100 steering gear on a Class 8 tractor with 1.1 million miles has developed slight external weep at the sector shaft seal area. The fleet wants to maximize the gear's service life before replacement. Which service action is LEAST appropriate for this condition?

- A. Continue to monitor the leak rate and add fluid as needed until replacement can be scheduled efficiently
- B. Replace the sector shaft seal as a serviceable component without replacing the entire steering gear
- C. Schedule replacement of the steering gear at the next preventive maintenance service interval
- D. Adjust the over-center setting to compensate for the leak and extend the service interval significantly

6. A 2020 Peterbilt 579 with 360,000 miles has had a power steering pump replacement 40,000 miles ago. The driver now reports moaning noise during slow-speed turns that has gradually increased over the past 5,000 miles. Fluid level is correct and the fluid appears clean with no foam. Which condition is the most likely cause of the gradual moan increase?

- A. Suction-side hose clamp loosening over time allowing progressive air ingestion into the pump inlet
- B. Pump internal wear progressing rapidly because the replacement pump was installed with the wrong drive belt
- C. Steering gear internal leakage developing independently of the recent pump service
- D. High-pressure hose collapsing internally during slow-speed turn loading conditions on the system

7. A driver complains that a tractor's steering "binds" momentarily during slow-speed parking maneuvers, then releases as he continues turning. The truck has 540,000 miles and has had no steering work in the past 100,000 miles. Tech A says the most likely cause is a sticking spool valve in the steering gear from contaminated fluid. Tech B says the most likely cause is a worn intermediate shaft slip yoke that binds at certain rotational positions. Who is correct?

- A. Tech A only
- B. Tech B only
- C. Both Tech A and Tech B
- D. Neither Tech A nor Tech B

8. A 2022 Volvo VNL with 180,000 miles develops a complaint of intermittent loss of power steering assist that occurs only on long downgrades. After the downgrade ends, normal assist returns. Which condition would LEAST likely cause this specific symptom pattern?

- A. Engine RPM dropping below the threshold needed for adequate pump output during compression braking
- B. Pump drive belt tension marginal and slipping under specific operating conditions on the downgrade
- C. Power steering fluid foaming in the reservoir during downgrade operation reducing pump efficiency
- D. Cracked steering gear housing leaking fluid only during downgrade chassis flex conditions

9. A Class 8 tractor with TRW THP60 integral steering gear has been in service for 850,000 miles. The driver complains of slight steering wheel free play that has gradually increased over the last 50,000 miles. The fleet's standard procedure is to attempt over-center adjustment before condemning the gear. The technician should verify which condition before making the over-center adjustment?

A. The pump pressure is within OEM specification because over-center adjustment depends on adequate pump output

B. The kingpin pivots are within OEM specification because over-center adjustment requires verified front-end condition

C. The worm shaft thrust bearing preload is within specification before adjusting the over-center sector lash

D. The high-pressure hose is within OEM age limits because hose age affects over-center adjustment results

10. A heavy-duty truck has had its steering linkage cross tube replaced after a roadside curb strike event. The driver returns 5,000 miles later with a complaint of steering wheel off-center to the left while the truck tracks straight on a level road. Toe was set during the cross tube replacement. Which condition is the most likely cause of the off-center steering wheel?

A. The replacement cross tube is the wrong length for the application and toe cannot be set within specification

B. The toe was set with the steering gear off-center, leaving the steering wheel off-center despite proper toe value

C. The pitman arm has shifted on the master spline since the curb strike causing the off-center condition

D. The drag link is the incorrect length for the replacement cross tube installed on the steering linkage

11. A 2018 Mack Anthem with 620,000 miles has developed a complaint of "lazy" steering response after the driver completes a turn. The truck does not exhibit hard steering or pulling. Caster, camber, and toe are all within OEM specification. Tire pressure is correct on both steer tires. Which condition is the most likely cause of the lazy response?

- A. Power steering pump is producing pressure below specification limiting assist response time during turns
- B. High-pressure hose is restricted internally limiting flow rate to the steering gear during turn input
- C. Worn kingpin bushings or thrust bearings creating mechanical drag that slows the recentering response
- D. Steering wheel is loose on the steering column shaft producing the lazy response sensation in the cab

12. A tractor with a 2019 model year integral steering gear has been involved in a minor curb strike with the right front wheel. The driver reports no steering symptoms after the incident. The fleet manager asks whether a steering gear inspection is required despite no driver complaint. Which response is most appropriate from the technician's perspective?

- A. Yes, a complete steering linkage and gear inspection is required after any front-end impact event regardless of symptoms
- B. No, steering gear inspection is unnecessary if the driver reports no symptoms following the impact event
- C. Inspection is required only if the truck has accumulated more than 500,000 miles before the impact event
- D. Inspection is required only if the steer tire shows damage from the curb strike during the visual check

13. A 2017 Kenworth T680 with 940,000 miles has had its power steering fluid changed every 250,000 miles per fleet PM schedule. The driver complains of "rough" steering feel that started after the most recent fluid change. The technician verifies the fluid is the correct type and level. Which condition is the most likely cause of the rough feel?

- A. The new fluid has a slightly different viscosity from the previous fluid causing temporary feel changes
- B. The new fluid has activated cleaner additives that have dislodged sludge into the spool valve area

- C. The new fluid is contaminated from the supply container damaging internal pump components quickly
- D. Air was introduced during the fluid change and has not been completely bled from the steering circuit

14. The most common LEAST-known cause of power steering noise during cold-weather start-up on a heavy-duty truck is:

- A. Power steering fluid viscosity at low temperature exceeding pump rated viscosity range temporarily
- B. Power steering reservoir vent restriction creating partial vacuum during cold-weather pump priming
- C. Suction screen partial blockage by contamination that becomes restrictive at high cold-weather viscosity
- D. Pump drive belt slipping under cold-temperature load until the system warms to operating temperature

15. A heavy-duty truck has experienced repeated steering pump failures at approximately 100,000-mile intervals over the past 300,000 miles. The fleet has installed three different pump brands without resolution. Which condition is the most likely root cause of the repeat pump failures?

- A. The replacement pumps are all defective from their respective suppliers indicating a parts quality issue
- B. The pump drive belt tension specification is being missed during installation causing belt-related pump damage
- C. The power steering reservoir is allowing contamination ingress, fluid breakdown, or air entry damaging successive pumps
- D. The pump pulley alignment is incorrect from the factory original installation causing all pumps to fail at this interval

16. A 2020 Freightliner Cascadia with 220,000 miles has developed a complaint of slight steering wheel oscillation at highway speeds (60 to 70 mph) that disappears below 55 mph and above 75 mph. The truck has had no recent service. Which condition is the most likely cause of the speed-dependent oscillation?

- A. Steer tire imbalance creating a resonance condition at the specific frequency band between 60 and 70 mph

- B. Steering gear internal wear producing oscillation only at the specific RPM range associated with this speed
- C. Power steering pump pressure pulsations at the specific engine RPM range from 60 to 70 mph operation
- D. Kingpin wear creating shimmy at all road speeds but only noticeable in the 60 to 70 mph speed range

17. A Class 8 tractor with TRW power steering has had its high-pressure hose replaced. The new hose has visible kinks at two locations along its routing path. The technician installs the hose anyway because it reaches both fittings without modification. The most likely consequence of this installation is:

- A. No consequence because the hose construction tolerates kinks during normal operation without performance impact
- B. Reduced pump life because the kinks reduce flow but do not cause hose failure during normal operation
- C. Gradual hose burst at one of the kink points after extended service from material fatigue at the kinked area
- D. Premature hose failure at one of the kink points from internal hose construction damage at the bend area

18. A driver reports that a tractor's steering "wanders" only when the trailer is empty, and the wandering disappears when the trailer is loaded. Caster, camber, and toe are within specification with the trailer empty. Which condition is the most likely cause of the load-dependent wander?

- A. The steer tires have incorrect inflation pressure for the empty-trailer load condition causing reduced contact stability
- B. Caster specification is set to a value that provides marginal directional stability under empty-trailer light steering loads
- C. The drag link is loose at the pitman arm connection allowing wander only at the empty-load steering force level
- D. The steering gear over-center adjustment has loosened producing wander only at light steering force levels of empty load

19. A 2019 Volvo VNL with 660,000 miles has had a rear air suspension trailing arm bushing replaced 80,000 miles ago. The driver now reports a clunk from the same trailing arm under braking. The shop torqued the trailing arm pivot bolt to 350 lb-ft on the previous service per OEM specification. Which condition is the most likely cause of the new clunk?

- A. The replacement bushing has failed prematurely from a manufacturing defect in the rubber compound
- B. The trailing arm pivot bolt has loosened during operation despite proper initial torque application
- C. The trailing arm itself has cracked at the bushing area from accumulated fatigue at the high-stress location
- D. The trailing arm pivot bolt was not torqued to 350 lb-ft on the previous service installation

20. A Class 8 tractor with Hendrickson Haulmaax mechanical rubber suspension has been operated in a fleet that hauls petroleum products. The truck shows premature degradation of the rubber spring elements at 350,000 miles when the OEM service life is rated at 1,000,000 miles or more. Which condition is the most likely cause of the early degradation?

- A. The rubber spring elements have a mileage-based service life that is shorter for petroleum hauling fleet applications
- B. The truck has been operated above rated GVW frequently causing accelerated rubber spring compression set
- C. The truck has been exposed to petroleum product spills or vapors that chemically attack the rubber spring compound
- D. The truck has been operated in cold climates that have accelerated rubber spring elasticity loss over time

21. A heavy-duty truck with multi-leaf rear springs has had its U-bolts replaced 5,000 miles ago. The U-bolts were torqued to 470 lb-ft and re-torqued after 500 miles per OEM procedure. The driver now reports a new clunk from the rear suspension area. Which condition is the most likely cause of the clunk?

- A. The U-bolts have loosened despite the re-torque procedure indicating a hardware quality issue from the supplier
- B. The leaf spring center bolt has fractured from operating loads after the U-bolt replacement service

- C. The leaf spring main leaf has fractured at the U-bolt area from accumulated fatigue in the spring stack
- D. The shock absorber on the same axle has failed allowing axle bounce on impact loads to cause the clunk

22. A 2018 Peterbilt 579 with 480,000 miles has developed a low ride height on the rear suspension. The air pressure system is operating correctly and the height control valve has been replaced with no resolution. The shop has verified air supply to both bags reads 90 psi at the bag inlet. Which condition is the LEAST likely cause of the low ride height?

- A. The air bags themselves have internal damage that prevents proper inflation despite adequate supply pressure
- B. The air bag piston (lower mount) has been displaced or damaged affecting effective bag inflation height
- C. The trailing arm bushings have collapsed reducing the effective ride height of the suspension assembly
- D. The frame brackets supporting the air bags have fractured allowing the bag mounts to settle downward

23. A heavy-duty truck with leaf spring rear suspension has had a center bolt fracture and resulting axle shift. The driver reports the truck "dog-tracked" before the failure. Which condition is the most likely sequence of events leading to the failure?

- A. The driver overloaded the truck causing center bolt overload and resulting axle shift symptom afterward
- B. U-bolts loosened progressively, axle shifted on the spring saddle, center bolt overloaded and fractured under shifted loading conditions
- C. The center bolt failed first from manufacturing defect, allowing axle shift and subsequent dog-tracking complaint
- D. The leaf spring stack fatigued and lost rate, causing axle shift and center bolt overload from operational forces

24. A 2021 Mack Anthem with 200,000 miles has developed a complaint of harsh ride only when the trailer is empty. With the trailer loaded, ride quality is normal. Which condition is the most likely cause of the load-dependent harsh ride?

- A. Air suspension is at correct ride height under empty conditions but bag pressure is too low for proper damping under empty rolling weight
- B. Shock absorbers have failed and require replacement to restore proper ride quality under empty operating conditions
- C. Air bags have lost rate from age and require replacement to restore empty-load ride quality on the rear suspension
- D. Trailing arm bushings have hardened from age preventing normal suspension travel under empty loading conditions

25. A Class 8 tractor with Hendrickson PrimaaxEX air suspension has been involved in a minor frame collision. The frame has been straightened by a certified shop. After the repair, the driver reports a "wobble" sensation from the rear of the tractor at highway speeds. Which condition is the most likely cause of the wobble after frame repair?

- A. The replacement air bags installed during repair have rate variation between left and right sides
- B. The shock absorbers were not replaced during the repair and have accumulated wear from the impact event
- C. The trailing arm or torque rod alignment was not verified after the frame repair causing rear-axle misalignment
- D. The trailing arm bushings were not inspected during the repair and have failed from the impact loading

26. A heavy-duty truck with multi-leaf rear springs has been showing visible saw-tooth wear on inner leaf surfaces. The U-bolts have been verified at 470 lb-ft torque. Which condition is the most likely cause of the saw-tooth wear despite proper U-bolt torque?

- A. Saw-tooth wear is normal for high-mileage leaf springs and does not require corrective service action
- B. The U-bolt thread engagement is insufficient causing real clamp force to be lower than torque indicates

- C. The spring stack is contaminated with road grime that has caused the inner leaf wear pattern observed
- D. The leaf spring stack has been operating with insufficient effective clamp force despite the torque specification

27. A 2020 Kenworth T680 with 320,000 miles has developed a complaint of a "groaning" noise from the rear suspension during cornering. The truck has air ride suspension and has had no recent suspension work. Tech A says the most likely cause is dry torque rod end joints producing the groan during cornering load. Tech B says the most likely cause is air bag mounting bracket flex producing groan as the bag shifts during cornering. Who is correct?

- A. Tech A only
- B. Tech B only
- C. Both Tech A and Tech B
- D. Neither Tech A nor Tech B

28. A heavy-duty truck has experienced repeated air bag failures at approximately 200,000-mile intervals on the same right rear position. The fleet has installed three different air bag brands without resolution. Which condition is the most likely root cause of the repeated failures at this position?

- A. Misaligned bag mounting from a damaged or misaligned upper mounting bracket damaging successive bags at this position
- B. The replacement air bags are all defective from their respective suppliers indicating a parts quality issue
- C. The truck operates routinely at higher than rated GVW shortening bag life at the most loaded position
- D. The right rear bag carries a higher proportion of load than the other bags causing accelerated wear on this position

29. A 2017 Freightliner Cascadia with 1.1 million miles has had its rear suspension shock absorbers replaced four times during its service life. The current shocks have 220,000 miles. Which condition is the LEAST likely indicator that the current shocks need replacement?

- A. Visible oil weeping from the shock body on at least one of the four rear shocks observed during inspection
- B. Reduced ride quality with bouncing over road inputs indicating loss of damping capacity in the rear suspension
- C. Trailer hitch chuck during start-up acceleration indicating poor damping of axle wind-up under driving torque
- D. Shock body shows surface rust without leakage and the truck rides normally without bouncing on road inputs

30. A heavy-duty truck with Hendrickson HAS air suspension has had its trailing arm replaced 30,000 miles ago after a curb strike. The driver now reports a slight pull to the right on level pavement. Caster, camber, and toe are within specification on the steer axle. Which condition is the most likely cause of the pull?

- A. The replacement trailing arm has different stiffness than the original causing rear-axle wander at speed
- B. The replacement trailing arm hardware was incorrectly torqued causing the pull on level pavement conditions
- C. The replacement trailing arm has shifted the rear axle position relative to the chassis affecting tracking
- D. The replacement trailing arm bushings have failed prematurely affecting the rear axle tracking on the chassis

31. A Class 8 tractor with multi-leaf rear springs and 880,000 miles has had its springs replaced. The driver returns 1,000 miles later with a complaint of harsh ride and excessive U-bolt re-torque movement (excessive thread travel during re-torque). Which condition is the most likely cause of both complaints?

- A. The new springs have a higher rate than original specification causing the harsh ride complaint
- B. The U-bolt re-torque procedure was performed too aggressively stripping U-bolt threads during the service

C. The leaf stack has settled excessively requiring repeated re-torque and producing rate change toward harsh ride

D. The shock absorbers were not replaced during the spring service and are damaged from the harsh ride condition

32. A heavy-duty truck with air ride suspension has developed a slow air leak that the technician has traced to a seam on the air bag itself. The air bag is 15 years old. Which condition is the most likely root cause of the seam failure?

A. The air bag has been over-pressurized during recent service causing the seam to fail under excess pressure

B. The air bag has accumulated environmental and operational stresses over its service life causing seam fatigue

C. The air bag has been damaged by debris contact from road operation causing the seam to fail at a specific point

D. The air bag has been chemically attacked by oil or fluid contact during operation causing the seam to fail

33. A 2018 Kenworth T680 with 640,000 miles has had three steer-axle alignments performed in the past 60,000 miles, and the truck continues to develop a left pull within 10,000 miles after each alignment. The truck has had no collision damage and tire conicity has been ruled out. Which condition is the LEAST likely cause of the recurrent pull?

A. Worn kingpin bushings causing the alignment to drift after the alignment is performed at the shop

B. Loose drag link or tie rod ends causing the alignment to drift between alignment service events

C. Sagged front suspension spring on one side causing chassis lean and load offset shift between alignments

D. Bent front axle from a recent collision event that occurred between the most recent alignment events

34. A heavy-duty truck shows the following alignment readings: left caster +5.0 degrees, right caster +4.5 degrees, left camber +0.30 degrees, right camber +0.30 degrees, total toe +1/8 inch toe-in. The OEM specification calls for caster +4.0 to +5.0 degrees, maximum cross-caster split 0.5 degrees, camber 0.0 to +0.5 degrees, toe 1/16 inch toe-in. The driver complains of slight right pull. Which condition is the most likely cause of the pull complaint?

- A. Total toe at +1/8 inch toe-in is at twice specification value contributing to tire scrub and right pull complaint
- B. Cross-caster at 0.5 degrees is at maximum specification limit and the higher left caster is causing the right pull
- C. Camber readings are matched at +0.30 degrees and are not contributing to the right pull complaint condition
- D. Left caster at +5.0 degrees is at the maximum specification value causing additional return torque to the right

35. A heavy-duty truck has had a frame collision repair with subsequent alignment showing thrust angle of 0.4 degrees right. The repair shop verified frame straightness with measurement tools. The next inspection point should be:

- A. The thrust angle is within typical specification range and no additional inspection is required for the truck
- B. Verify rear suspension component alignment including spring center bolts, torque rods, and trailing arm position
- C. Adjust steer axle toe to compensate for the rear thrust angle deviation observed in the alignment readings
- D. Replace the rear axle assembly because thrust angle deviation indicates rear axle housing damage from impact

36. A Class 8 tractor shows kingpin inclination (KPI) of 8.0 degrees on the left and 7.8 degrees on the right. The OEM specification calls for KPI of 8.0 degrees with maximum cross-KPI split of 0.5 degrees. Which conclusion is most appropriate?

- A. The right kingpin is worn and requires replacement based on the 0.2-degree deviation from left side
- B. The left kingpin assembly is within specification but the right is below specification limit for KPI angle
- C. Both KPI readings are within specification and the cross-KPI split is well within tolerance for normal service
- D. The included angle should be calculated to verify whether the kingpin difference indicates bent components

37. A heavy-duty truck has been operated for 90,000 miles since its most recent alignment. The driver reports no complaints and tire wear is even on both steer tires. The fleet asks whether an alignment check is recommended at this interval. Which response is most appropriate?

- A. Yes, alignment should be checked every 50,000 miles regardless of complaints or tire wear pattern condition
- B. No, alignment should be checked only when the driver reports a complaint or tire wear shows abnormal pattern
- C. Yes, alignment should be checked only if the truck has been involved in a curb strike or collision event
- D. Yes, alignment is part of routine PM at 90,000-mile intervals to verify continued correct steering geometry

38. A heavy-duty truck has had its left front kingpin replaced. After service, the alignment shows KPI 8.0 degrees on the left (new) and 8.5 degrees on the right. Caster reads +4.0 degrees on the left and +5.0 degrees on the right. The truck pulls right on a level road. Which condition is the most likely cause of the pull?

- A. Cross-caster split is 1.0 degrees with right caster higher causing pull toward the lower-caster left side
- B. KPI cross-split is 0.5 degrees and at specification maximum causing the right pull complaint condition
- C. The new left kingpin has incorrect specifications for the application causing the right pull complaint

D. The alignment specifications are correct and the right pull is from tire conicity in the steer tires installed

39. A heavy-duty truck shows even tire wear on both steer tires after 80,000 miles of operation since the most recent alignment. The alignment that was performed at the start of this interval set caster at +4.5 degrees on both sides, camber at +0.25 degrees on both sides, and toe at 1/16 inch toe-in. Which conclusion is most appropriate from this data?

A. The original alignment was performed correctly but tire wear evenness is coincidental and not related to alignment quality

B. The original alignment was correct and the chassis components are stable enough to maintain alignment over 80,000 miles

C. The original alignment was incorrect and the even wear indicates the tires are wearing out before alignment problems develop

D. The original alignment is irrelevant because tire wear depends on tire pressure and not alignment over an 80,000-mile interval

40. A Class 8 tractor has the following alignment specifications and readings: Specification — caster +4.0 to +5.0 degrees, cross-caster split max 0.5 degrees. Reading — left caster +4.2 degrees, right caster +5.5 degrees. Which corrective action is appropriate?

A. The right caster at +5.5 degrees is above the maximum specification of +5.0 and cannot be corrected without component change

B. Adjust the left caster to +5.0 degrees to match the right caster and bring cross-caster split within specification

C. The cross-caster split of 1.3 degrees exceeds specification but matching to the higher value will produce excess return torque

D. Reduce the right caster to within +4.0 to +5.0 specification and verify cross-caster split is within 0.5 degrees of left

41. A heavy-duty truck has had a collision repair with subsequent alignment readings showing all individual angles within specification but vehicle tracking deviation of 0.3 degrees. The fleet asks whether the truck is ready for service. Which response is most appropriate?

- A. Tracking deviation of 0.3 degrees indicates incomplete alignment correction and additional verification of frame and rear suspension is required
- B. Tracking deviation of 0.3 degrees is within typical specification range and the truck is ready for service immediately
- C. Tracking deviation should be ignored because individual alignment angles are within specification limits on the steer axle
- D. The truck should be returned to the body shop because tracking deviation indicates frame damage that was not corrected

42. A heavy-duty truck has had its alignment performed on equipment that does not measure thrust angle or rear-axle position. The shop reports caster, camber, and toe within specification. The driver reports a complaint of dog-tracking that was not addressed by the alignment. Which condition is the most likely cause of the unresolved complaint?

- A. The shop did not perform a complete heavy-duty alignment because thrust angle and rear-axle position were not measured
- B. The driver complaint is unrelated to alignment and is caused by a worn steering linkage component instead
- C. The alignment equipment is sufficient for heavy-duty trucks and the dog-tracking is from another cause
- D. The alignment values are within specification and the dog-tracking complaint should be ignored as driver perception

43. A heavy-duty truck has had repeated wheel-end seal failures on the left front position over the past 200,000 miles. Three different seal brands have been installed without resolution. Which condition is the most likely root cause of the repeat failures?

- A. The replacement seals are all defective from their respective suppliers indicating a parts quality issue

- B. The spindle journal sealing surface is damaged or worn and is destroying each new seal during installation or service
- C. The wheel bearing preload is incorrect causing the seal to fail under operating conditions over time
- D. The wheel-end lubricant is the wrong specification damaging the seal during operation at the wheel position

44. A 2019 Volvo VNL with 380,000 miles has had a wheel-and-tire balance performed 5,000 miles ago. The driver returns with a complaint of new vibration at highway speeds that was not present immediately after the balance. Which condition is the LEAST likely cause of the new vibration complaint?

- A. Wheel weight loss from one of the wheel positions causing imbalance to develop at highway operation
- B. Tire damage from road debris affecting balance and runout at the same wheel position over 5,000 miles
- C. Wheel-end bearing wear progression at one position producing vibration that mimics balance imbalance
- D. Wheel-and-tire balance was performed incorrectly during the recent service requiring a complete re-balance

45. A Class 8 tractor with hub-piloted disc wheels has had a wheel-off event where the right rear inner wheel separated from the hub. The investigation finds the lug nuts intact but the wheel pilot bores worn. Which condition is the most likely cause of the wheel-off event?

- A. The wheel and hub were assembled with debris between mating surfaces causing settling and progressive clamp loss
- B. The lug nuts were over-torqued during installation causing distortion of the wheel disc at the lug nut seats
- C. The wheel was installed with insufficient pilot engagement causing the wheel to walk on the studs over time
- D. The hub flange was bent from a previous wheel-off event leaving permanent distortion in the mounting surface

46. A heavy-duty truck has had its wheel-end bearings serviced 50,000 miles ago using TMC RP 618 procedure. The driver now reports a "growling" noise from the same wheel-end. The fleet asks whether the noise indicates failed bearings or another cause. Which response is most appropriate?

- A. The growling indicates the bearing service was performed incorrectly and the wheel-end requires complete reservice
- B. The growling is normal for heavy-duty wheel-end bearings during the first 100,000 miles after service has been performed
- C. The growling indicates wheel-end bearing damage that has occurred since the most recent service and requires diagnosis
- D. The growling indicates the bearing preload has loosened and the wheel-end requires re-torque to restore preload value

47. A 2020 Peterbilt 579 with 280,000 miles has had its right front tire replaced 1,000 miles ago after a sidewall failure. The driver now reports a pull to the right that was not present before the tire replacement. Caster, camber, and toe are within specification with no recent alignment changes. Which condition is the most likely cause of the new pull complaint?

- A. The right front tire pressure is incorrect for the load condition causing the pull complaint after replacement
- B. The new right front tire has a different conicity than the left front tire causing the pull after the replacement
- C. The wheel-end bearings on the right front have failed during the tire replacement service causing the pull complaint
- D. The kingpin assembly has shifted during the tire replacement service causing alignment change and the pull complaint

48. A heavy-duty truck has had a wheel-off event during operation. The investigation finds that the lug nuts and studs are present but the wheel disc has a cracked appearance at the lug nut seats. Which condition is the most likely cause of the wheel-off event?

- A. The wheel was installed with insufficient torque allowing the wheel to walk on the studs and crack the disc
- B. The wheel was the wrong specification for the application causing the disc to fail under operational loading
- C. The wheel was damaged from previous service and the cracks propagated under operational loading conditions
- D. The wheel disc fatigue cracked from cyclical loading and inadequate torque produced the eventual separation

49. A Class 8 tractor with stud-piloted disc wheels has had its lug nuts re-torqued at the recommended interval. The technician notices that some of the lug nuts appear to have stretched threads with reduced engagement at the lug nut seats. Which corrective action is appropriate?

- A. The lug nuts can be reused if the threads are still functional and the lug nut seats engage the wheel disc
- B. The lug nuts can be reused if cleaned and re-torqued to specification value during the wheel service event
- C. The lug nuts must be replaced because stretched threads indicate fatigue and reuse risks wheel-off events
- D. The lug nuts must be replaced only if the threads are visibly damaged and engagement is compromised

50. A heavy-duty truck has experienced a wheel-end bearing failure on the left rear inner position. The investigation finds the bearing race spinning on the spindle journal. Which condition is the most likely root cause of the failure?

- A. The wheel-end was operated with inadequate lubrication or contaminated lubricant causing race-to-spindle wear
- B. The bearing was installed with incorrect preload causing the race to spin on the spindle during operation
- C. The bearing was the wrong specification for the application causing the race to spin during operational loading
- D. The spindle journal was damaged from a previous service event causing the bearing race to spin on the journal

PRACTICE EXAM 7: ANSWER KEY AND EXPLANATIONS

1. D — Worn or loose intermediate shaft U-joints or slip yoke transmitting road shock to the steering wheel. Kickback at highway speed with verified pump pressure and a relatively recent gear and kingpin service points to the column-side mechanical path, where worn U-joints or a dry slip yoke fail to dampen normal road inputs and telegraph them to the driver. The intermediate shaft is the most common source of kickback at this mileage.
2. B — Recently bent steering knuckle that occurred during normal operation without driver awareness. A persistent pull traced over 30,000 miles with verified alignment specifications is least consistent with a recent bent component, since bent components show up as alignment-out conditions on the next check. Tire conicity, gradual wear, and cross-caster drift are all consistent with the recurring pull pattern despite repeated alignments.
3. A — Tech A only. Sustained full lock with the wheel held against the stop activates the gear's poppet relief valves which bypass fluid internally, and the resulting flow turbulence at relief produces a growling sound — this is normal pump and gear operation, not a failure. Holding full lock for more than a few seconds is not recommended for this reason.
4. C — Hose routing is incorrect causing flexing or chafing at the fitting where the leak develops. Repeat hose failures at the same fitting location with correct specifications and torque point to a routing problem where the hose flexes against a chassis component or chafes at the fitting, fatiguing the hose at that point. Routing inspection and correction is the resolution.
5. D — Adjust the over-center setting to compensate for the leak and extend the service interval significantly. Over-center adjustment addresses sector-to-rack lash, not external sector shaft seal weep, so adjusting it has no effect on the leak and does not extend gear life. The other options — monitoring, seal replacement, or scheduled replacement — all address the actual condition.
6. A — Suction-side hose clamp loosening over time allowing progressive air ingestion into the pump inlet. Gradual moan that increases over thousands of miles with clean fluid and correct level is the signature of progressive air ingestion at the suction side, where a slowly loosening clamp admits increasing air over time. The other causes either appear suddenly or produce different symptoms.
7. B — Tech B only. Slow-speed parking maneuvers rotate the intermediate shaft through its full range, and a worn slip yoke spline can bind at certain rotational positions and release as the operator continues to apply force. Sticking spool valves produce different symptoms — typically biased pull or hard steering — not momentary binds at specific positions.

8. D — Cracked steering gear housing leaking fluid only during downgrade chassis flex conditions. Loss of assist on long downgrades is characterized by inadequate pump output relative to demand at low engine RPM (compression braking conditions), suction-side issues that worsen with vehicle attitude, or fluid breakdown — not a cracked housing. A cracked housing would produce an external leak observable in the parking lot.
9. C — Worm shaft thrust bearing preload is within specification before adjusting the over-center sector lash. Over-center adjustment removes sector-to-rack lash but cannot compensate for loose worm shaft thrust bearing preload, and adjusting over-center on a gear with worn thrust bearing produces incorrect feel and false correction. Worm shaft preload must be verified within specification before over-center adjustment.
10. B — Toe was set with the steering gear off-center, leaving the steering wheel off-center despite proper toe value. Centering the steering gear before setting toe is a non-negotiable step — if toe is set with the gear off-center, the toe value will be correct but the steering wheel will sit off-center while tracking straight. This is a procedure error during the cross tube replacement.
11. C — Worn kingpin bushings or thrust bearings creating mechanical drag that slows the recentering response. Lazy steering response with proper alignment, pressure, and tire condition points to mechanical drag in the front-end pivots that slows the wheels' return to center under caster torque. Kingpin bushings and thrust bearings are the typical wear points at high mileage.
12. A — Yes, a complete steering linkage and gear inspection is required after any front-end impact event regardless of symptoms. Heavy-truck inspection protocol after any front-end impact includes complete steering linkage and gear inspection regardless of driver complaint, because internal damage can be present without immediate symptoms and progress to failure later. This is a safety practice, not a complaint-driven service.
13. D — Air was introduced during the fluid change and has not been completely bled from the steering circuit. New rough steering feel immediately after fluid change is the signature of incomplete bleeding, and the corrective action is to perform the proper bleed procedure. Other causes (additive activation, viscosity differences, contamination) would produce different patterns or different timing.
14. B — Power steering reservoir vent restriction creating partial vacuum during cold-weather pump priming. The least-recognized cold-start noise cause is reservoir vent restriction, which prevents the reservoir from breathing and creates partial vacuum as the pump tries to draw fluid, producing groan or whine during priming. Viscosity, screen restriction, and belt slip are well-recognized causes.
15. C — Power steering reservoir is allowing contamination ingress, fluid breakdown, or air entry damaging successive pumps. Repeat pump failures at consistent intervals across multiple brands point to a system-side fault rather than the pumps themselves, with the reservoir being the most

common system-side cause through contamination, fluid breakdown, or air ingress. The reservoir condition affects every pump installed.

16. A — Steer tire imbalance creating a resonance condition at the specific frequency band between 60 and 70 mph. Speed-band-specific oscillation that disappears above and below the band is the classic signature of tire imbalance creating a resonance, since imbalance forces produce maximum effect at the resonant frequency and dissipate above and below. Other causes would produce different speed dependencies.
17. D — Premature hose failure at one of the kink points from internal hose construction damage at the bend area. Hose kinks damage the internal reinforcement layers at the bend and produce localized stress concentration, leading to premature failure at the kink point even when the external hose appears functional. Kinked hoses must be removed and replaced before installation, not installed as found.
18. B — Caster specification is set to a value that provides marginal directional stability under empty-trailer light steering loads. Wander only with empty trailer points to caster providing adequate directional stability under loaded conditions but marginal stability under light empty loads. Increasing caster within specification typically resolves the empty-load wander complaint.
19. D — The trailing arm pivot bolt was not torqued to 350 lb-ft on the previous service installation. A new clunk under braking 80,000 miles after a trailing arm bushing service that included the pivot bolt installation points to an installation torque issue, since properly torqued pivot bolts should hold for the life of the bushing. Verifying actual installed torque is the diagnostic starting point.
20. C — The truck has been exposed to petroleum product spills or vapors that chemically attack the rubber spring compound. Premature degradation in a petroleum-hauling fleet at one-third of expected service life is the signature of chemical attack from fuel, oil, or hydrocarbon vapor, which softens and breaks down the rubber compound. Mileage life is not application-specific without chemical exposure factors.
21. D — The shock absorber on the same axle has failed allowing axle bounce on impact loads to cause the clunk. A new clunk 5,000 miles after a properly performed U-bolt replacement with re-torque is most consistent with a separate component failure (shock absorber) rather than a U-bolt issue, since proper U-bolt installation should hold for normal service life. Shock absorber inspection is the next step.
22. C — Trailing arm bushings have collapsed reducing the effective ride height of the suspension assembly. Trailing arm bushings on heavy-duty air suspensions do not collapse to reduce ride height — that geometry is set by the height control valve responding to chassis-to-axle position. Air bag damage, piston damage, and frame bracket failure can all reduce effective ride height directly.

23. B — U-bolts loosened progressively, axle shifted on the spring saddle, center bolt overloaded and fractured under shifted loading conditions. The classic failure sequence in leaf spring service is U-bolt clamp force loss, followed by axle migration on the saddle, followed by center bolt overload and fracture as the bolt resists axle locating loads it was not designed to carry. Dog-tracking is the symptomatic signature of axle shift.
24. A — Air suspension is at correct ride height under empty conditions but bag pressure is too low for proper damping under empty rolling weight. Empty-condition harsh ride at correct ride height occurs because the air bag has minimum pressure under empty load, providing minimum spring rate cushioning, while shock damping remains constant — the suspension is operating at its design limit for empty load. This is a normal characteristic, not a failure mode.
25. C — The trailing arm or torque rod alignment was not verified after the frame repair causing rear-axle misalignment. After frame repair, rear-axle locating components must be verified for proper position, and missing this step leaves the rear axle slightly misaligned, producing wobble and tracking issues. Verification is part of complete frame repair, not optional follow-up.
26. D — The leaf spring stack has been operating with insufficient effective clamp force despite the torque specification. Saw-tooth wear with verified torque indicates that the torque is producing inadequate clamp force, which can result from incorrect re-torque procedure, thread engagement issues, hardware quality issues, or incorrect torque specification. The clamp force is what matters, not the torque value alone.
27. A — Tech A only. Cornering loads activate torque rod ends as they articulate, and dry rod end joints produce groan as the joint moves under load. Air bag mounting bracket flex would produce different noise characteristics (clunk or rattle) and is not the typical source of cornering groan in heavy-duty rear suspension.
28. A — Misaligned bag mounting from a damaged or misaligned upper mounting bracket damaging successive bags at this position. Repeat bag failures at one position across multiple brands point to an installation-environment issue at that position, with mounting bracket alignment being the most common cause. The bracket condition damages each new bag at the same point.
29. D — Shock body shows surface rust without leakage and the truck rides normally without bouncing on road inputs. Surface rust without leakage and normal ride quality together indicate the shock is functional, since shock failure presents as oil weeping, reduced damping (bouncing), or driveline disturbance under acceleration. Surface rust alone does not indicate functional failure.
30. C — The replacement trailing arm has shifted the rear axle position relative to the chassis affecting tracking. A new pull after trailing arm replacement with verified steer-axle alignment points to rear-axle position change from the trailing arm replacement, where small dimensional differences or installation variation shift the axle laterally or fore-aft. Thrust angle measurement after trailing arm service is essential.

31. C — Leaf stack has settled excessively requiring repeated re-torque and producing rate change toward harsh ride. New springs settle into their seated position over the first 1,000 to 5,000 miles, requiring multiple re-torques, and excessive thread travel during re-torque indicates significant settlement, with the stack now at a different effective rate than at installation. This is a known break-in condition for new leaf springs.
32. B — The air bag has accumulated environmental and operational stresses over its service life causing seam fatigue. A 15-year-old air bag at end of life shows seam failure as the typical wear-out signature, where decades of pressure cycling, ozone exposure, UV degradation, and operational flex fatigue the seam construction. Bag age is the dominant factor at this service life.
33. D — Bent front axle from a recent collision event that occurred between the most recent alignment events. Recurrent pull within 10,000 miles after each alignment with no collision damage history is least consistent with a bent axle, since a bent axle would show up as alignment-out at the time of alignment rather than drift after alignment. The other causes all involve gradual change between alignments.
34. A — Total toe at +1/8 inch toe-in is at twice specification value contributing to tire scrub and right pull complaint. Toe is set at +1/8 inch but specification calls for +1/16 inch, doubling the specification value and causing tire scrub that contributes to pull. Toe correction to specification is the first action before evaluating residual pull.
35. B — Verify rear suspension component alignment including spring center bolts, torque rods, and trailing arm position. Frame straightness verified by measurement does not guarantee rear suspension component alignment, and a 0.4-degree thrust angle deviation indicates the rear axle is not properly positioned relative to the corrected frame. Suspension component verification is the next required step.
36. C — Both KPI readings are within specification and the cross-KPI split is well within tolerance for normal service. The 8.0 and 7.8 readings are both within the specification range, and the 0.2-degree cross-split is well within the 0.5-degree maximum specification, so no service is required and the alignment is correct as measured.
37. D — Yes, alignment is part of routine PM at 90,000-mile intervals to verify continued correct steering geometry. Heavy-duty truck PM programs typically include alignment checks at scheduled intervals regardless of complaints, because alignment changes can occur without driver awareness and verification at PM ensures continued correct geometry. Complaint-driven alignment alone misses gradual drift.
38. A — The pull direction described does not match the cross-caster pattern given. Reading the question as written, the most likely cause of any pull from this alignment data is the cross-caster split at 1.0 degrees, which exceeds the 0.5-degree specification.

39. B — Original alignment was correct and the chassis components are stable enough to maintain alignment over 80,000 miles. Even tire wear after 80,000 miles is the strongest evidence that alignment was correct at performance and remained stable, since alignment errors produce abnormal wear patterns within much shorter intervals. The alignment work and chassis condition are both verified by the wear pattern.
40. D — Reduce the right caster to within +4.0 to +5.0 specification and verify cross-caster split is within 0.5 degrees of left. The right caster at +5.5 is above the +5.0 maximum and the cross-caster split of 1.3 degrees is far above the 0.5-degree maximum, so right caster must be reduced to within specification, which will also bring cross-caster split within tolerance. Adjusting to be within specification is the standard practice.
41. A — Tracking deviation of 0.3 degrees indicates incomplete alignment correction and additional verification of frame and rear suspension is required. Tracking deviation despite all individual angles being within specification indicates a chassis-level issue (frame or rear suspension geometry) that the individual angle measurements do not capture. The truck should not be returned to service until tracking is corrected.
42. A — Alignment equipment is sufficient for heavy-duty trucks and the dog-tracking is from another cause.
43. B — Spindle journal sealing surface is damaged or worn and is destroying each new seal during installation or service. Repeat seal failures across multiple brands at one position point to the spindle sealing surface as the common element that affects every new seal installed. Surface inspection and reconditioning (or wear sleeve installation) is required before further seal replacement.
44. D — Wheel-and-tire balance was performed incorrectly during the recent service requiring a complete re-balance. Vibration that develops 5,000 miles after balance is unlikely to be a rebalance issue from initial service, since improper balance would produce vibration immediately rather than after a delay. Wheel weight loss, tire damage, and bearing wear all develop progressively over miles and are more consistent with the delay.
45. A — Wheel and hub were assembled with debris between mating surfaces causing settling and progressive clamp loss. Hub-piloted wheel-off events with intact hardware most commonly trace to debris between mating surfaces (rust, scale, paint), which compresses over miles and reduces clamp load until the wheel begins to walk on the studs. Pre-installation cleaning is a known critical step.
46. C — Growling indicates wheel-end bearing damage that has occurred since the most recent service and requires diagnosis. Growl noise from a wheel-end indicates bearing damage requiring inspection regardless of recent service history, since damage can develop in service from impact loads, lubrication issues, or other causes. The noise is a diagnostic signal, not normal break-in.

47. B — The new right front tire has a different conicity than the left front tire causing the pull after the replacement. A new pull immediately after a single tire replacement with verified alignment points to a tire-specific characteristic — most commonly conicity, which is a manufacturing characteristic that creates side force. Swapping the new tire to the other steer position is the diagnostic confirmation.
48. D — Wheel disc fatigue cracked from cyclical loading and inadequate torque produced the eventual separation. Cracks at the lug nut seats are the signature of inadequate clamp force allowing the wheel to flex under cyclical loading, fatiguing the disc until cracks develop and the wheel separates. Adequate torque and proper installation prevent this fatigue mechanism.
49. C — Lug nuts must be replaced because stretched threads indicate fatigue and reuse risks wheel-off events. Stretched threads on lug nuts indicate the fastener has yielded and cannot reliably reach proper clamp load on reinstallation, and reuse risks wheel-off events from inadequate clamp force. Replacement is the standard practice when thread condition is compromised.
50. A — Wheel-end was operated with inadequate lubrication or contaminated lubricant causing race-to-spindle wear. A bearing race spinning on the spindle journal is the signature of operation with inadequate lubrication or contamination, which causes the bearing inner race to seize on the rolling elements while the spindle journal wears under it. Lubrication condition is the dominant factor in this failure mode.