PRACTICE EXAM 14: ASE T3 DRIVE TRAIN SIMULATION

1. A heavy-duty truck has a complaint of clutch chatter that occurs only during the first launch of the day on cold mornings. The chatter does not return after the truck has been driven for a few minutes. The MOST likely cause is:

A. Worn cushion springs in the clutch disc that have lost compression

B. Heat-checked flywheel friction surface producing chatter during engagement

C. Moisture condensation on the clutch friction surfaces that burns off

D. Improperly torqued clutch cover bolts allowing pressure plate flex

2. Technician A says that the pressure plate cover on a heavy-duty clutch must be torqued in a cross-pattern sequence to prevent distortion. Technician B says any tightening sequence is acceptable as long as final torque values are reached. Who is correct?

A. Technician A only

B. Both Technician A and Technician B

C. Technician B only

D. Neither Technician A nor Technician B

3. A driver complains of a high-pitched whine from the rear of the truck that varies with vehicle speed. The whine disappears when the transmission is shifted to neutral with the engine running. The MOST likely source is:

A. The clutch release bearing in continuous contact with pressure plate fingers

B. The pilot bearing experiencing relative motion at the flywheel area

C. The transmission input shaft bearing under engine torque transmission

D. The drive axle ring and pinion gear set in the carrier housing

4. The PRIMARY function of the wheel hub bearing adjustment procedure on a heavy-duty drive axle is to:

A. Establish the lubricant level inside the wheel hub cavity assembly

B. Establish the correct preload or endplay required for proper bearing operation

C. Set the brake drum clearance between the drum and brake shoes

D. Match the wheel hub rotational speed to the vehicle's road speed sensor

5. A heavy-duty drive axle has been rebuilt and the technician is performing the final tooth contact pattern check. After applying marking compound and rotating under load, the contact pattern appears centered on the tooth face approximately one-third from the toe end. The correct interpretation is:

A. The pattern is too high on the tooth and requires increased pinion shim thickness

B. The pattern is too low on the tooth and requires reduced pinion shim thickness

C. The pattern is correct and the gear set is properly adjusted for service

D. The pattern requires increased backlash to move contact toward the heel end

6. The MOST important reason for using DOT 3 or DOT 4 brake fluid in heavy-duty hydraulic clutch systems is:

A. The fluid specification matches the elastomeric seal compatibility requirements

B. The fluid provides better lubrication than other hydraulic oils available

C. The fluid is widely available at low cost from any auto parts store

D. The fluid resists boiling at the high temperatures of clutch operation

7. A driver complains that his Class 8 tractor produces a clunking noise that occurs when the truck changes from acceleration to coasting conditions, and vice versa. The noise is NOT present during steady-state driving. The MOST likely cause is:

A. A failing transmission output shaft bearing during normal operation

B. Worn universal joint bearings with clearance at the cross journals

C. Excessive ring gear backlash beyond the OEM specification limits

D. Worn ring and pinion gear contact pattern in the drive axle carrier

8. Technician A says that the differential lockout on a drive axle is engaged through an electric solenoid energized by a dash switch. Technician B says the differential lockout uses air pressure to engage a sliding clutch in the differential case. Who is correct?

A. Technician A only

B. Both Technician A and Technician B

C. Neither Technician A nor Technician B

D. Technician B only

9. A heavy-duty drive axle is being inspected during overhaul. The technician finds the side gear thrust washers measure 0.045 inches when the OEM specification is 0.052 inches minimum. The correct action is to:

A. Replace the thrust washers because they are below the minimum specification

B. Reuse the thrust washers if they show no visible scoring or damage

C. Sand the thrust washer surfaces flat and reinstall them in original positions

D. Install thicker washers from a different axle model to compensate for wear

10. The MOST common cause of repeat universal joint failure on a heavy-duty truck is:

A. Use of incorrect grease formulations during chassis lubrication service

B. Manufacturing defects in the replacement universal joints from suppliers

C. Incorrect driveline working angles producing speed fluctuation that destroys joints

D. Operating the vehicle at speeds above the manufacturer's recommended maximum

11. A heavy-duty truck has a complaint of jumping out of fifth gear under load. All other gears hold properly. The MOST efficient diagnostic action is to:

A. Replace the entire transmission with a remanufactured unit to ensure reliability

B. Inspect the fifth-gear clutching collar, mating gear, and shift fork specifically

C. Check the transmission fluid level and verify it meets the OEM viscosity grade

D. Adjust all shift detent springs to higher tension to prevent collar movement

12. The standard wheel hub bolt pattern for North American Class 8 drive wheels is:

A. 8 studs on a 9.50-inch bolt circle for medium-duty applications

B. 6 studs on a 7.25-inch bolt circle for light commercial applications

C. 12 studs on a 13.00-inch bolt circle for severe-duty applications

D. 10 studs on an 11.25-inch bolt circle for heavy-duty applications

13. A driver complains of a clunking noise from the driveline that occurs only during torque direction changes. The truck has 320,000 miles on the original universal joints. The MOST likely cause is:

A. Worn universal joint cross bearings allowing clearance during torque reversal

B. Loose driveshaft strap bolts at the transmission output yoke connection

C. A failed pinion seal allowing oil to escape from the carrier housing assembly

D. Worn clutching teeth on the transmission's main shaft sliding collars

14. The PRIMARY purpose of the air filter in a heavy-duty transmission air shift system is to:

A. Cool the compressed air before it reaches the shift valve assemblies

B. Reduce air pressure from the supply tank to the operating range needed

C. Remove moisture and contaminants from the air supply to the shift system

D. Provide a backup air supply during periods of system pressure loss

15. A heavy-duty truck has driveline vibration that worsens significantly when the truck is loaded with freight. When empty, the vibration is minimal. This load-sensitive pattern indicates:

A. Driveshaft imbalance from accumulated debris inside the tubing assembly

B. Driveline working angles that change with suspension position under load

C. Universal joint balance weights that have shifted from original positions

D. Center support bearing rubber that has hardened from age and heat exposure

16. Technician A says that an Eaton Fuller 13-speed transmission combines a five-speed main section with a low-range overdrive splitter that adds three additional ratios. Technician B says the 13-speed combines a five-speed main section with a three-speed range auxiliary section. Who is correct?

A. Technician A only

B. Both Technician A and Technician B

C. Technician B only

D. Neither Technician A nor Technician B

17. The MOST important reason for marking the orientation of a driveshaft to its yokes before removal is to:

A. Identify which u-joint should be replaced first during the rebuild procedure

B. Ensure the slip joint is reassembled with correct internal spline alignment

C. Allow the technician to detect any twisting damage during the operation

D. Preserve the factory balance relationship when the driveshaft is reinstalled

18. A heavy-duty drive axle is being rebuilt. The technician is establishing pinion depth and finds the pinion head stamped "+3" indicating a depth variation. This number means:

A. The pinion has been used for 3,000 hours and requires immediate replacement

B. The pinion is 0.003 inches longer than nominal, requiring reduced shim thickness

C. The pinion bearing preload should be set 3 inch-pounds above the standard spec

D. The pinion gear has 3 fewer teeth than the standard production specification

19. The MOST important diagnostic tool for AMT (automated manual transmission) service is:

A. A pneumatic tester for verifying air system pressure throughout the truck

B. A standard digital multimeter for checking electrical circuit voltages only

C. The OEM-approved scan tool for reading fault codes and live data

D. A mechanical pressure gauge for measuring hydraulic clutch system pressure

20. A heavy-duty drive axle has been rebuilt. During the final tooth contact pattern check, the contact appears low on the tooth face near the flank (bottom). This indicates:

A. The pinion is too deep and requires reduced shim thickness behind the head

B. Backlash is excessive and requires reduction by side bearing adjustment

C. The pinion is too shallow and requires increased shim thickness behind the head

D. The ring gear is installed backwards on the differential case mounting flange

21. A heavy-duty truck has a complaint of overheating localized to the differential carrier housing. The lubricant level is correct, the lubricant specification matches OEM requirements, and the brakes show no signs of dragging. The MOST likely cause is:

A. Excessive vehicle weight beyond gross axle weight rating during operation

B. Driver operating style with frequent hard braking and aggressive acceleration

C. External heat conducted from a damaged exhaust system passing near the axle

D. Internal bearing preload error or ring and pinion mesh problem causing friction

22. The transmission case vent on a heavy-duty manual transmission allows the case to:

A. Allow lubricant to circulate from the case to an external cooler unit

B. Equalize internal pressure as air expands and contracts with temperature

C. Provide an inspection point for checking transmission fluid level

D. Return vaporized lubricant to the case after operation cooling

23. A heavy-duty Class 8 tractor with a long wheelbase has a vibration that appears at exactly 50 mph and disappears at 45 or 55 mph. The MOST likely cause is:

A. Imbalance in the rear section of the two-piece driveshaft assembly

B. Worn universal joint at the drive axle pinion yoke connection point

C. Center support bearing rubber mount producing speed-specific resonance

D. Loose pinion nut on the drive axle allowing pinion shaft movement

24. The MOST important reason for using a clutch alignment tool during heavy-duty clutch installation is to:

A. Center the clutch disc so the input shaft can pass through the hub splines

B. Compress the cushion springs to allow easier pressure plate cover installation

C. Hold the pressure plate cover in alignment while the bolts are tightened

D. Prevent damage to the pilot bearing during the clutch installation procedure

25. A heavy-duty truck has a complaint of repeated wheel seal failures at the same wheel position. Three previous seals have failed within 30,000 miles each. The technician should investigate:

A. The driver's habits regarding cornering speed and braking pattern intensity

B. The lubricant brand and viscosity used during the previous wheel hub service

C. The wheel mounting torque procedure used during recent service operations

D. The hub bore for damage or scoring that prevents proper seal seating

26. Technician A says that a no-slip differential requires driver activation through a dash switch. Technician B says a no-slip differential uses spring-loaded driven clutches that automatically engage and disengage based on wheel-speed differences. Who is correct?

A. Technician A only

B. Technician B only

C. Both Technician A and Technician B

D. Neither Technician A nor Technician B

27. A heavy-duty drive axle is being inspected. The lubricant drained from the axle has a milky white appearance with normal lubricant separated underneath. This indicates:

A. Water contamination in the axle, likely through a failed vent or seal

B. Normal lubricant condition for an axle approaching its service interval

C. The wrong type of lubricant was installed during the previous service

D. The lubricant has reached the end of its useful life from oxidation only

28. The function of the slip joint in a driveshaft assembly is to:

A. Multiply torque between the transmission output and drive axle pinion

B. Reduce the rotational speed of the driveshaft to prevent resonance

C. Accommodate axial distance changes between transmission and drive axle

D. Provide a coupling point for the center support bearing assembly

29. A driver complains that his AMT-equipped Class 8 tractor exhibits harsh shifts following a recent clutch replacement. The MOST likely cause is:

A. The new clutch friction material requires bedding in over the first 5,000 miles

B. The wrong clutch model was installed and does not match the transmission rating

C. Air contamination in the hydraulic clutch system requires complete bleeding

D. Clutch actuator calibration was not performed through the OEM scan tool

30. A heavy-duty Class 8 tractor has been operating with the inter-axle differential lockout engaged on dry highway pavement at 65 mph. After 15 minutes, the driver reports unusual driveline noise. The MOST likely consequence of continued operation is:

A. Reduced fuel economy from increased rolling resistance during operation

B. Tire scrub and driveline binding leading to potential component damage

C. Improved traction at the rear axle during normal highway driving conditions

D. Slight increase in axle lubricant temperature without significant other effects

31. The MOST common cause of failure when installing a new universal joint on a driveshaft is:

A. Misalignment of a needle bearing during cup installation causing binding

B. Using the wrong grade of chassis lubricant in the u-joint grease fitting

C. Overtightening the u-joint strap bolts beyond manufacturer specification

D. Installing the joint without marking driveshaft orientation before removal

32. The PRIMARY function of an inter-axle differential (power divider) on a tandem-axle truck is to:

A. Provide engine braking force through hydraulic retarder mechanism action

B. Multiply torque between the forward-rear and rear-rear drive axles

C. Allow torque transmission to both axles while accommodating speed differences

D. Act as a final reduction stage in heavy-duty vocational truck applications

33. A heavy-duty truck has a complaint of clutch slippage during heavy acceleration on grades. The friction facings measure within wear limits and free travel is correctly adjusted. The MOST likely cause is:

A. Pilot bearing failure from inadequate lubrication during recent service

B. Pressure plate spring tension and clamping force capacity reduced over time

C. Air contamination in the hydraulic clutch system requiring complete bleeding

D. Transmission input shaft endplay outside the OEM specification range

34. The MOST important reason for replacing flywheel mounting bolts during flywheel service on modern heavy-duty engines is:

A. The original bolts cost less to replace than the labor to inspect them

B. The OEM warranty requires new bolts as part of the standard service procedure

C. The original bolts may have collected debris that affects torque accuracy

D. The bolts are torque-to-yield design and cannot be safely reused after installation

35. Technician A says that a heavy-duty Class 8 tractor uses a 6x4 configuration with two driven rear axles. Technician B says that a 6x2 configuration drives both rear axles equally for improved traction. Who is correct?

A. Technician A only

B. Both Technician A and Technician B

C. Neither Technician A nor Technician B

D. Technician B only

36. A heavy-duty truck has been operating for an extended period with insufficient transmission oil. The MOST likely consequence is:

A. Improved fuel economy from reduced internal friction losses during operation

B. Rapid wear on upper bearings and gears not reached by oil splash

C. External seal leakage from increased internal case pressure during operation

D. Clutch damage from oil contamination passing through the input shaft seal

37. A heavy-duty drive axle has a complaint of growling noise that is present in both drive and coast operating conditions, with the pitch varying with vehicle speed. The MOST likely source is:

A. Ring and pinion drive-side tooth contact pattern problems requiring adjustment

B. Worn synchronizer assemblies inside the transmission affecting operation

C. A failed pinion seal allowing oil to escape from the carrier housing assembly

D. Wheel bearings or side bearings that have failed and require replacement

38. Technician A says that pinion depth must be set with the differential case removed because the gauge tooling requires unobstructed access to the pinion area. Technician B says pinion depth must be set first because every subsequent adjustment depends on correct pinion position. Who is correct?

A. Technician A only

B. Technician B only

C. Both Technician A and Technician B

D. Neither Technician A nor Technician B

39. A driver complains that his clutch pedal feels noticeably lighter than normal and the truck experiences slippage under load. The pedal effort has decreased by approximately 40 percent compared to specification. The MOST likely cause is:

A. A failed pressure plate diaphragm spring or release lever assembly

B. Air entering the hydraulic clutch system during a recent fluid level top-off

C. Wear of the clutch disc friction facings reducing the required clamping force

D. Lubrication of the external clutch linkage pivots reducing system friction

40. The PRIMARY purpose of the cushion springs in a heavy-duty clutch disc is to:

A. Absorb engine combustion pulses before they reach the transmission

B. Soften initial clutch engagement by allowing controlled facing compression

C. Maintain disc thickness as friction material wears throughout service

D. Hold the friction facings against the splined hub during disengagement

41. A heavy-duty truck has been operating with the engine running rough and producing torsional pulses for an extended period. The MOST likely effect on the clutch disc over time is:

A. Premature wear on the pressure plate springs from constant pulse loading

B. Cushion spring failure from absorbing continuous engine combustion irregularities

C. Damper spring failure from continuously absorbing the engine torsional pulses

D. Accelerated wear on the clutch release bearing from constant engagement

42. Technician A says that hypoid drive axle gear sets generate extreme contact pressures with significant face-sliding action. Technician B says hypoid axles require extreme-pressure (EP) gear oil to prevent metal-to-metal contact. Who is correct?

A. Technician A only

B. Technician B only

C. Neither Technician A nor Technician B

D. Both Technician A and Technician B

43. A heavy-duty drive axle is being inspected and the technician finds the pinion bearings show smooth, polished roller surfaces with no visible damage and rotate smoothly under finger pressure. The correct action is to:

A. Reinstall the bearings since they meet the criteria for continued service

B. Install new bearings only if the technician has them available in the shop

C. Replace only the bearing races while reusing the existing roller assemblies

D. Replace the bearings because the polished appearance indicates excessive wear

44. A heavy-duty truck has clutch chatter that occurs during every launch from a stop, regardless of operating temperature or load condition. The MOST likely cause is:

A. Pilot bearing failure from inadequate lubrication during service life

B. Worn or collapsed cushion springs in the clutch disc assembly

C. Air contamination in the hydraulic clutch system requiring bleeding

D. Insufficient clutch free travel measurement at the pedal face position

45. Which of the following describes the proper installation orientation of a clutch disc with damper springs on one side?

A. Damper springs facing the flywheel with the flat side against the pressure plate

B. Either orientation works because the disc is symmetrical about its centerline

C. Flat side facing the flywheel with the damper springs facing the pressure plate

D. Damper springs facing the bell housing with the flat side toward the engine

46. The torque capacity rating of a heavy-duty clutch should be:

A. Less than the engine's peak torque to allow controlled slippage under shock loads

B. Exactly equal to the engine's peak torque output with no additional safety margin

C. Twice the engine's peak torque output to handle all possible operating conditions

D. Greater than the engine's peak torque output by an application-appropriate margin

47. A heavy-duty truck has a complaint of driveline vibration that has appeared gradually over the past few months and continues to worsen. The vibration is consistent regardless of vehicle load. The MOST likely cause is:

A. Driveshaft balance weights gradually loosening and shifting from original positions

B. Universal joint working angles changing due to suspension component wear

C. Center support bearing rubber producing speed-specific resonance issues

D. Pinion seal failure allowing oil to migrate onto the driveshaft surface

48. The PRIMARY reason that heavy-duty truck driveshafts use hollow tubing rather than solid construction is:

A. Hollow tubing is significantly less expensive to manufacture in long lengths

B. Hollow tubing allows oil to circulate through the driveshaft for cooling purposes

C. Hollow tubing provides similar torsional stiffness with significantly reduced weight

D. Hollow tubing is required by federal regulations for commercial driveline components

49. A heavy-duty truck has clutch slippage that occurs only when the engine is hot. The friction facings are within wear limits and free travel is correct. The MOST likely cause is:

A. Worn cushion springs that have lost flexibility through normal service life

B. Pressure plate diaphragm spring losing tension as operating temperature increases

C. Air contamination in the hydraulic system worsening with operating heat

D. Incorrect clutch torque capacity rating for the engine application installed

50. Technician A says that the inter-axle driveshaft on a tandem-axle truck connects the transmission to the forward-rear axle pinion yoke. Technician B says that the inter-axle driveshaft connects the rear of the forward-rear axle to the front of the rear-rear axle pinion yoke. Who is correct?

A. Technician A only

B. Both Technician A and Technician B

C. Neither Technician A nor Technician B

D. Technician B only

PRACTICE EXAM 14: ANSWER KEY AND EXPLANATIONS

1. C — Moisture condensation on the clutch friction surfaces that burns off. Cold-morning chatter that disappears after a few minutes of operation is the classic cold-condensation symptom — overnight temperature changes condense moisture on the clutch surfaces, producing chatter until the heat of operation evaporates the moisture. The symptom does not return because the surfaces stay warm during the day.

2. A — Technician A only. Pressure plate cover bolts must be torqued in a cross-pattern sequence to prevent distortion of the cover. Tightening bolts in random order or sequentially around the pattern warps the cover, which in turn distorts the pressure plate's clamping geometry and produces uneven engagement.

3. D — The drive axle ring and pinion gear set in the carrier housing. A whine that varies with vehicle speed and disappears when the transmission shifts to neutral indicates the source rotates only when the driveline is transmitting torque rearward. The ring and pinion are downstream of the transmission and produce this exact pattern.

4. B — Establish the correct preload or endplay required for proper bearing operation. Wheel hub bearing adjustment establishes the precise amount of preload (slight bearing compression) or endplay (slight axial freedom) required for proper bearing operation. Incorrect adjustment produces either bearing overheating from too much preload or hub wobble from excessive endplay.

5. C — The pattern is correct and the gear set is properly adjusted for service. A contact pattern centered on the tooth face approximately one-third of the distance from the toe end is the textbook correct pattern indicating proper pinion depth and backlash. No adjustment is required when the pattern matches this specification.

6. A — The fluid specification matches the elastomeric seal compatibility requirements. The elastomeric seals in clutch master and slave cylinders are chemically formulated to resist DOT 3 or DOT 4 brake fluid specifically. Using incompatible fluids causes seal swelling, hardening, or dissolution that destroys the hydraulic system within days.

7. B — Worn universal joint bearings with clearance at the cross journals. Clunking that occurs only during torque direction changes is the classic symptom of worn u-joint bearings. The clearance between the cross journals and worn cup bearings takes up audibly when the driver transitions between accelerating and coasting.

8. D — Technician B only. Differential lockouts on heavy-duty axles use system air pressure routed through a cab dash switch to engage a sliding clutch in the differential case. Electric solenoid actuation is not the standard method for these heavy-duty applications.

9. A — Replace the thrust washers because they are below the minimum specification. The OEM minimum is an absolute limit — washers measuring 0.045 inches against a 0.052-inch minimum are below specification and must be replaced. Reinstalling sub-minimum washers allows side gears to shift axially during operation, producing noise and accelerated gear wear.

10. C — Incorrect driveline working angles producing speed fluctuation that destroys joints. When u-joints repeatedly fail in a vehicle, the underlying cause is almost always a geometric problem — incorrect driveline working angles produce excessive speed fluctuation that wears out u-joints regardless of how new they are. Replacement without addressing the angles guarantees the next failure.

11. B — Inspect the fifth-gear clutching collar, mating gear, and shift fork specifically. When jumping out occurs in only one specific gear, the cause is concentrated on the components used in that gear ratio. Replacing the entire transmission for a localized issue is wasteful and unnecessary, and adjusting all detent springs ignores the actual root cause.

12. D — 10 studs on an 11.25-inch bolt circle for heavy-duty applications. The 10-on-11.25 pattern is the dominant standard for North American Class 8 drive wheels and applies to virtually all heavy-duty applications. Knowing the standard helps a technician verify wheel-to-hub compatibility during service.

13. A — Worn universal joint cross bearings allowing clearance during torque reversal. Clunking that appears specifically during torque direction changes is the classic symptom of worn u-joint bearings. The clearance between the cross journals and worn cup bearings takes up audibly when torque direction reverses.

14. C — Remove moisture and contaminants from the air supply to the shift system. The air filter conditions the supply air by removing water, oil, and particulate contamination before it reaches the precision shift valves and actuators. Contaminated air causes slow shifts, sticking valves, and seal damage in the air shift system.

15. B — Driveline working angles that change with suspension position under load. Working-angle vibration is the only driveline vibration that responds to load, because changing load alters suspension position and therefore u-joint operating angles. Balance and runout problems produce vibration consistent with vehicle speed regardless of load condition.

16. A — Technician A only. The Eaton Fuller 13-speed combines a five-speed main section with a deep-reduction (low-range) splitter that adds three additional ratios when activated, producing the thirteen-speed designation. Technician B's description of a three-speed range section is incorrect — that architecture would produce a different gear count.

17. D — Preserve the factory balance relationship when the driveshaft is reinstalled. A balanced driveshaft has its mass distribution matched to specific yoke orientations established at the factory. Reinstalling the driveshaft in a rotated position destroys this balance relationship and can introduce vibration that was not present before service.

18. B — The pinion is 0.003 inches longer than nominal, requiring reduced shim thickness. The pinion depth variation number stamped on the pinion head represents thousandths of an inch deviation from nominal length. A "+3" pinion is longer than nominal, requiring a thinner shim to position it correctly relative to the ring gear centerline.

19. C — The OEM-approved scan tool for reading fault codes and live data. AMT diagnosis requires the OEM scan tool to read DTCs, monitor live actuator and sensor data during operation, and perform required calibrations after service. No mechanical tool can substitute for the electronic diagnostic capability the scan tool provides.

20. A — The pinion is too deep and requires reduced shim thickness behind the head. Contact biased low on the pinion teeth (near the flank) indicates the pinion is positioned too deep into the ring gear. Reducing pinion shim thickness pulls the pinion away from the ring gear, shifting the contact pattern up toward the center of the tooth face.

21. D — Internal bearing preload error or ring and pinion mesh problem causing friction. When external causes have been ruled out (correct lubricant, proper level, no brake drag), localized axle overheating points to internal friction sources. Excessive bearing preload or incorrect gear mesh produces continuous friction that generates measurable heat in the carrier housing.

22. B — Equalize internal pressure as air expands and contracts with temperature. The transmission case vent allows internal pressure to equalize with atmospheric pressure as the lubricant heats up and cools down during operation. A blocked vent causes pressure buildup that forces oil out through seals and gaskets.

23. C — Center support bearing rubber mount producing speed-specific resonance. Vibration that appears at one specific speed and disappears as speed moves above or below it is the classic signature of resonance, which occurs when a deteriorated component reaches its natural frequency at a specific operating speed. The center support bearing rubber mount is the most common source of this pattern.

24. A — Center the clutch disc so the input shaft can pass through the hub splines. The alignment tool keeps the disc centered relative to the pilot bearing while the cover bolts are torqued, ensuring the input shaft can pass cleanly through the disc hub when the transmission is reinstalled. Without proper alignment, the input shaft cannot mate to the disc and the splines suffer immediate damage.

25. D — The hub bore for damage or scoring that prevents proper seal seating. When a correctly-installed seal of the correct part number repeatedly fails, the cause is typically a damaged hub bore

that prevents proper sealing pressure. Continuing to install new seals without correcting the bore guarantees continued failures.

26. B — Technician B only. No-slip differentials operate automatically based on wheel-speed differences using spring-loaded driven clutches that lock during straight-line driving and disengage during turns. They require no driver activation and have no dash switch.

27. A — Water contamination in the axle, likely through a failed vent or seal. Milky white appearance in drained gear oil is the classic visual indicator of water contamination — water emulsifies with the lubricant to produce the milky color, and the heavier oil separates underneath in the drain pan. The water source must be identified and corrected before refilling.

28. C — Accommodate axial distance changes between transmission and drive axle. As the suspension cycles, the distance between the transmission output and drive axle input changes slightly. The slip joint allows the driveshaft to lengthen and shorten through its splined connection while continuing to transmit torque through the engaged splines.

29. D — Clutch actuator calibration was not performed through the OEM scan tool. AMT shift quality complaints that appear immediately after clutch replacement are nearly always calibration-related rather than mechanical. The TCM operates with engagement parameters from the worn clutch until calibration teaches it the new clutch's behavior.

30. B — Tire scrub and driveline binding leading to potential component damage. Power divider lockouts engaged on dry pavement at highway speed force the forward-rear and rear-rear axles to rotate at identical speeds despite natural speed differences. The resulting binding causes severe tire scrub, driveline stress, and component damage within minutes of operation.

31. A — Misalignment of a needle bearing during cup installation causing binding. A displaced needle bearing trapped under the cross journal causes the new u-joint to bind during operation and fail almost immediately. This is why every u-joint installation requires verification of free cross rotation by hand before returning the driveshaft to service.

32. C — Allow torque transmission to both axles while accommodating speed differences. The inter-axle differential splits driveshaft torque between the forward-rear and rear-rear axles while permitting speed differences from cornering and tire diameter variations. Without this accommodation, driveline binding would destroy components during normal operation.

33. B — Pressure plate spring tension and clamping force capacity reduced over time. With facings within wear limits and free travel correctly adjusted, the most likely remaining cause of load-dependent slippage is fatigued pressure plate springs that no longer generate full clamping force. Springs lose tension over service life and produce slippage specifically when high torque is demanded.

34. D — The bolts are torque-to-yield design and cannot be safely reused after installation. Modern heavy-duty diesel engine flywheel mounting bolts are torque-to-yield design, engineered to be

installed once, stretched to a specific yield point, and replaced at any future service. Reusing these bolts can cause flywheel separation at highway speeds — a catastrophic failure mode.

35. A — Technician A only. A 6x4 configuration uses six total wheel positions with both rear axles powered, making it the standard linehaul Class 8 configuration. The 6x2 configuration powers only one of the two rear axles, sacrificing some traction for improved fuel economy and reduced tire wear — Technician B has this backwards.

36. B — Rapid wear on upper bearings and gears not reached by oil splash. Splash lubrication systems depend on rotating gears dipping into the oil and distributing it throughout the case. An underfilled transmission cannot deliver oil to upper bearings and gears, causing rapid wear in those components from inadequate lubrication.

37. D — Wheel bearings or side bearings that have failed and require replacement. Growling that varies with vehicle speed and is consistent under both drive and coast conditions indicates a bearing failure (which has no drive or coast bias) rather than a gear tooth issue. Side bearings and wheel bearings both produce this pattern and must be inspected.

38. C — Both Technician A and Technician B. Pinion depth must be set with the differential case removed because the gauge tooling requires unobstructed access to the pinion area. The setup is established before the case is reinstalled — both statements describe the same correct sequence from different perspectives.

39. A — A failed pressure plate diaphragm spring or release lever assembly. A noticeably lighter pedal combined with slippage indicates the pressure plate has lost clamping force — typically through a broken or collapsed diaphragm spring or release lever assembly. The clutch can no longer generate design clamping force and the pedal feels light because there is less spring resistance to overcome.

40. B — Soften initial clutch engagement by allowing controlled facing compression. Cushion springs are wavy washers between the friction facings that flex during initial clutch engagement, smoothing the application of torque. They differ from torsional damper springs (which absorb engine vibrations) and serve only the engagement-cushioning function.

41. C — Damper spring failure from continuously absorbing the engine torsional pulses. The torsional damper springs in the clutch disc hub absorb engine combustion pulses to prevent driveline rattle. Continuous exposure to abnormally severe torsional pulses (from a rough-running engine) accelerates damper spring fatigue and eventual failure.

42. D — Both Technician A and Technician B. Hypoid gears generate extreme contact pressures with significant face-sliding action, and they require extreme-pressure (EP) gear oil to prevent metal-to-metal contact between the meshing teeth. Both statements describe the same critical relationship between hypoid gear geometry and required lubrication.

43. A — Reinstall the bearings since they meet the criteria for continued service. Smooth, polished roller surfaces with no visible damage and smooth rotation under finger pressure are the hallmarks

of bearings still serviceable for continued use. Replacing bearings that meet inspection criteria is wasteful and unnecessary.

44. B — Worn or collapsed cushion springs in the clutch disc assembly. Cushion springs cushion initial engagement, and when worn or collapsed they no longer absorb the engagement shock — producing chatter on every launch regardless of conditions. Pilot bearing failure, air contamination, or free travel issues produce different symptom patterns.

45. C — Flat side facing the flywheel with the damper springs facing the pressure plate. Heavy-duty clutch discs are directional and must be installed with the flat side against the flywheel and the damper spring side facing the pressure plate. Reversing the orientation places the damper springs against the flywheel, which causes immediate interference and clutch failure.

46. D — Greater than the engine's peak torque output by an application-appropriate margin. Clutch torque capacity must always exceed the engine's peak torque, with the safety margin selected based on application — modest for highway service, larger for severe-duty vocational applications. Matching exactly leaves no margin for shock loading or component aging.

47. A — Driveshaft balance weights gradually loosening and shifting from original positions. Vibration that develops gradually over months without load sensitivity is typical of progressive imbalance — balance weights working loose, accumulated debris on the shaft, or other slow changes to the mass distribution. Working-angle issues respond to load, ruling out that cause.

48. C — Hollow tubing provides similar torsional stiffness with significantly reduced weight. A hollow steel tube of appropriate diameter has approximately the same torsional stiffness as a solid shaft but weighs significantly less and offers better critical-speed characteristics. This combination of properties is the engineering reason for the universal use of hollow tubing in truck driveshafts.

49. B — Pressure plate diaphragm spring losing tension as operating temperature increases. Heat-related slippage that appears only when the engine is hot points to a temperature-sensitive component — most commonly a pressure plate spring that loses tension as it heats up. The reduced clamping force allows slippage under load that resolves when the system cools.

50. D — Technician B only. The inter-axle driveshaft connects the rear of the forward-rear axle's power divider to the front of the rear-rear axle's pinion yoke, carrying torque between the two drive axles. The main driveshaft (not the inter-axle driveshaft) connects the transmission to the forward-rear axle.