PRACTICE EXAM 5: A3 SIMULATION — MANUAL DRIVE TRAIN AND AXLES

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1. A clutch flywheel removed during inspection shows visible heat checks (small cracks) on the friction surface. The MOST appropriate action is to:

A. Apply hard-facing material to the heat-checked area

B. Reuse the flywheel after polishing with emery cloth

C. Resurface the flywheel if material removal stays within specification, or replace the flywheel

D. Apply silicone sealant to the heat checks

2. The proper procedure for installing a new clutch friction disc is to:

A. Verify the disc is installed with the marked side facing the correct direction, align the splines properly, and apply a light coat of grease to the splines per manufacturer's specification

B. Install the disc in any orientation since the disc is symmetric

C. Apply heavy grease to the entire friction surface

D. Drive the disc onto the splines with a hammer

3. A vehicle has been brought in with a complaint that the clutch pedal feels heavy and requires excessive force to depress. The MOST likely cause is:

A. Air in the clutch hydraulic system

B. A worn clutch friction disc

C. A failed pilot bearing

D. A binding clutch linkage, worn pivot points, or worn pressure plate diaphragm spring producing increased apply force

4. The proper purpose of the clutch flywheel is to:

A. Generate hydraulic pressure for the clutch system

B. Provide the friction surface that the friction disc engages, and provide the rotational mass that smooths engine power pulses

C. Drive the input shaft directly during clutch operation

D. Filter contaminants from the clutch fluid

5. A manual transmission has been disassembled for overhaul. The technician finds visible wear on the synchronizer cone surface that exceeds the manufacturer's specification. The MOST appropriate action is to:

A. Apply hard-facing material to the worn surface

B. Reuse the synchronizer with assembly lubricant applied

C. Reuse the synchronizer cone with a different gear

D. Replace the synchronizer assembly with a new component

6. The proper procedure for inspecting manual transmission shift forks during overhaul is to:

A. Replace the shift forks as a precautionary measure

B. Apply hard-facing material to any worn areas

C. Inspect each fork for wear, alignment, bending, and proper engagement with the corresponding clutch sleeve, comparing wear to specification

D. Visually inspect for visible damage only

7. A manual transmission has been disassembled. The technician finds visible wear on the gear teeth where the synchronizer engages, but the gear teeth themselves remain within specification. The MOST appropriate action is to:

A. Replace the synchronizer assembly only, after verifying the gear teeth are within specification

B. Replace the entire transmission as a precautionary measure

C. Apply hard-facing material to the worn area

D. Reuse the synchronizer with a different gear

8. The proper purpose of the manual transmission's shift detent mechanism is to:

A. Generate hydraulic pressure for shift control

B. Filter contaminants from the transmission fluid

C. Drive the differential ring gear directly

D. Hold each gear position firmly engaged through spring-loaded detent balls or notches that prevent unintended shift movement

9. A vehicle has been brought in with a complaint of noise from the manual transmission output area. The technician finds the output shaft bearing is worn. The MOST likely additional symptom that may be present is:

A. Improved shift quality from the bearing wear

B. A whining or rumbling noise that varies with vehicle speed and may be more pronounced at certain speeds where the bearing approaches its critical frequency

C. A complete loss of all gears

D. Reverse gear failure only

10. The proper procedure for replacing a manual transmission output shaft bearing is to:

A. Apply hard-facing material to the worn bearing

B. Apply additional grease to the worn area

C. Remove the rear extension housing or output shaft, replace the bearing using the manufacturer's specified procedure, and verify proper preload during reassembly

D. Reuse the bearing with assembly lubricant

11. A vehicle's universal joint that has been removed for inspection shows visible bearing roller damage. The MOST appropriate action is to:

A. Replace the universal joint with a new component

B. Reuse the joint with assembly lubricant

C. Apply additional grease to the damaged area

D. Apply hard-facing material to the worn rollers

12. The proper procedure for installing a new universal joint is to:

A. Apply hard-facing material to the joint

B. Heat the joint to expand the bearing cups

C. Drive the joint in with a hammer

D. Press the joint in squarely using a proper installation tool, verify free rotation without binding, install the snap rings or retainers, and apply specified grease through the grease fitting

13. A vehicle's CV joint has been removed for service. The technician finds the joint contains visible water contamination from a damaged boot. The MOST appropriate action is to:

A. Reuse the joint after draining the water and applying new grease

B. Replace the entire CV joint or halfshaft, since water contamination causes accelerated wear that has likely damaged the joint internally

C. Apply additional grease to compensate for the contamination

D. Reuse the joint with a new boot only

14. The proper procedure for installing a new CV joint boot is to:

A. Apply RTV silicone to the boot mating surfaces

B. Heat the boot to expand it before installation

C. Pack the joint with the manufacturer-specified grease, install the boot squarely with proper orientation, and secure with the appropriate clamp type per manufacturer's specification

D. Drive the boot in with a hammer

15. A two-piece driveshaft has been removed for service. The technician finds the center support bearing has visible play when manipulated by hand. The MOST appropriate action is to:

A. Replace the center support bearing assembly including the rubber mount

B. Reuse the bearing after applying assembly lubricant

C. Apply additional grease to the bearing

D. Reuse the bearing in a different position

16. The proper procedure for installing a two-piece driveshaft is to:

A. Apply hard-facing material to the splines

B. Verify proper driveshaft phasing, install the center support bearing to specification, torque the universal joint and yoke fasteners to specification, and verify free rotation

C. Drive the driveshaft into position

D. Apply maximum torque to all fasteners

17. A vehicle's driveshaft has been removed and the slip yoke spline shows visible wear. The MOST appropriate action is to:

A. Apply hard-facing material to the worn splines

B. Reuse the yoke after applying anti-seize compound

C. Reuse the yoke in a different position

D. Replace the slip yoke if wear exceeds the manufacturer's specification, since worn splines allow excessive driveline play

18. The proper purpose of the manual transmission's main shaft (output shaft) is to:

A. Generate hydraulic pressure for the transmission system

B. Filter contaminants from the transmission fluid

C. Carry the gears that engage with the countershaft gears, and transmit the resulting output torque to the driveshaft or transaxle

D. Drive the differential ring gear directly

19. A drive axle has been disassembled for overhaul. The technician finds the differential side gears show visible pitting on the gear teeth. The MOST appropriate action is to:

A. Replace the side gears and the matching pinion gears as a complete set, since the differential gears are matched components

B. Reuse the side gears after polishing the pitted areas

C. Apply hard-facing material to the worn teeth

D. Reuse the side gears with new pinion gears only

20. The proper procedure for verifying differential pinion gear and side gear backlash is to:

A. Apply maximum torque to the carrier bolts

B. Mount a dial indicator on a side gear, hold the pinion gears stationary, rock the side gear back and forth, and read the total backlash against the manufacturer's specification

C. Apply compressed air to the differential

D. Visually inspect for proper gear mesh

21. A drive axle ring gear and pinion contact pattern shows the contact is too low on the ring gear teeth (toward the bottom of the tooth profile). The MOST likely cause is:

A. The pinion is too deep into the ring gear

B. A failed pilot bearing

C. Air in the clutch hydraulic system

D. The ring gear is too close to the pinion (insufficient backlash)

22. The proper procedure for adjusting drive axle ring gear backlash to specification when backlash is too tight is to:

A. Apply maximum torque to the carrier bolts

B. Replace the ring and pinion as a precautionary measure

C. Move the ring gear away from the pinion by adjusting the carrier bearing shims, increasing backlash to the specified range

D. Apply compressed air to the differential

23. A vehicle's drive axle has been overhauled. The technician notices the ring gear bolts have been previously installed with thread locker. The MOST appropriate action is to:

A. Clean the bolt threads, apply fresh thread locker per the manufacturer's specification, and torque to the specified value

B. Reuse the bolts with the existing thread locker

C. Apply additional thread locker over the existing

D. Replace all bolts with new bolts of a different specification

24. The proper purpose of the differential pinion gears (in the differential carrier) is to:

A. Generate hydraulic pressure for the differential

B. Drive the ring gear during operation

C. Filter contaminants from the differential fluid

D. Allow the differential side gears to rotate at different speeds during cornering, while still distributing torque to both side gears

25. A vehicle equipped with a transfer case has been disassembled for service. The technician finds visible wear on the chain drive sprocket teeth. The MOST appropriate action is to:

A. Apply hard-facing material to the worn teeth

B. Replace the sprockets and chain as a complete matched set, since chain wear and sprocket wear typically occur together

C. Reuse the sprocket after polishing the teeth

D. Apply additional grease to compensate

26. The proper procedure for installing a new transfer case shift fork is to:

A. Apply hard-facing material to the fork

B. Apply maximum torque to the shift fork hardware

C. Verify proper alignment with the corresponding clutch sleeve, install the fork squarely, secure with the proper hardware torqued to specification, and verify free shift travel

D. Drive the fork into position

27. A vehicle equipped with a viscous coupling AWD system has been disassembled. The technician finds the coupling fluid has changed from clear to dark and contains visible debris. The MOST appropriate action is to:

A. Replace the viscous coupling as a complete assembly, since the coupling cannot be serviced internally and contaminated fluid indicates internal wear

B. Drain the coupling and refill with new fluid

C. Apply additional fluid to dilute the contamination

D. Apply hard-facing material to the worn components

28. The proper purpose of the transfer case planetary gearset (in transfer cases that use planetary reduction for low range) is to:

A. Generate hydraulic pressure for the transfer case

B. Filter contaminants from the transfer case fluid

C. Drive the AWD system input shaft directly

D. Provide the gear reduction for low range operation, with multiple gear ratios available depending on which planetary member is held

29. A vehicle equipped with an electronically controlled AWD coupling has been disassembled for service. The technician finds the coupling clutch pack has visible wear with friction discs that are blue from heat. The MOST appropriate action is to:

A. Apply hard-facing material to the friction discs

B. Reuse the discs after polishing

C. Replace the AWD coupling clutch pack assembly, since heat damage compromises the friction discs beyond reuse

D. Apply additional fluid to compensate for the wear

30. The proper procedure for verifying transfer case fluid level after service is to:

A. Apply compressed air to the fluid passage

B. Bring the transfer case to the manufacturer's specified temperature, remove the fill plug, and verify the fluid level reaches the specified point in the fill hole

C. Use a scan tool to read fluid level data

D. Visually inspect through the inspection cover

31. A vehicle's drive axle has been overhauled. The technician notices the carrier bearing shim selection has been used to set both the carrier bearing preload and the ring gear backlash. After setting backlash, the carrier bearing preload is below specification. The MOST appropriate action is to:

A. Reuse the carrier bearing as set with the lower preload

B. Apply maximum torque to the carrier bearing shims

C. Replace the carrier bearings as a precautionary measure

D. Adjust the carrier shim distribution between the two sides to achieve both proper carrier bearing preload and specified ring gear backlash

32. The proper procedure for verifying a drive axle is properly assembled before installation is to:

A. Verify pinion preload, carrier bearing preload, ring gear backlash, contact pattern, and pinion seal installation, then ensure all fasteners are torqued to specification

B. Visually inspect for visible damage only

C. Replace any uncertain components as a precautionary measure

D. Apply compressed air to the differential

33. A vehicle equipped with a manual transmission has been brought in with a complaint of grinding noise during shifts. The technician finds clutch pedal free play is excessive. The MOST appropriate first action is to:

A. Replace the clutch assembly as the most direct repair

B. Adjust clutch pedal free play to specification, then verify the grinding noise persists before proceeding to internal transmission diagnosis

C. Replace the transmission as a precautionary measure

D. Replace the transmission fluid as the only required step

34. The proper purpose of the manual transmission's reverse idler gear is to:

A. Generate hydraulic pressure for shift control

B. Filter contaminants from the transmission fluid

C. Reverse the rotation direction of the output shaft when reverse gear is engaged, by adding a third gear in the train between the input and output gears

D. Drive the differential ring gear directly

35. A vehicle has been brought in with a complaint of clunk during torque reversals (drive to reverse, reverse to drive). The technician finds excessive backlash in the rear drive axle ring gear and pinion. The MOST appropriate action is to:

A. Reuse the assembly with existing backlash

B. Apply hard-facing material to the gear teeth

C. Apply additional thread locker to the ring gear bolts

D. Adjust the ring gear backlash to specification or replace the ring and pinion if adjustment is not possible

36. The proper procedure for installing a new pinion seal in a drive axle is to:

A. Inspect the pinion seal bore for damage, install the new seal squarely using a proper seal driver, apply assembly lubricant to the seal lip, and torque the pinion nut to specification to set proper preload

B. Drive the seal in with a hammer and flat punch

C. Apply RTV silicone to the seal outer diameter

D. Heat the seal to expand it before installation

37. A vehicle equipped with a transfer case using a chain drive has been brought in for service. The technician finds the chain has approximately 1/2 inch of slack between the sprockets when measured manually. The manufacturer specifies maximum slack of 1/4 inch. The MOST appropriate action is to:

A. Reuse the chain after manual stretching to specification

B. Replace the chain and matching sprockets as a complete set, since the chain has stretched beyond the maximum specification

C. Apply hard-facing material to the chain links

D. Apply additional grease to compensate for the stretch

38. The proper procedure for verifying transfer case shift mechanism operation during overhaul is to:

A. Apply compressed air to the shift mechanism

B. Replace the shift mechanism as a precautionary measure

C. Verify the shift fork alignment, the clutch sleeve engagement, the synchronizer operation (if equipped), and the proper travel limits, comparing each to manufacturer's specification

D. Visually inspect for visible damage only

39. A vehicle equipped with a manual transmission and rear-wheel drive has the following findings: complaint of vibration at highway speeds, recently replaced rear universal joints, driveshaft balance verified within specification, and proper driveshaft phasing confirmed. The MOST likely remaining cause is:

A. A failed pilot bearing

B. Improperly aligned u-joint working angles, where the angles at each joint are not equal and produce cyclical loading at highway speeds

C. Air in the clutch hydraulic system

D. A worn input shaft bearing

40. The proper procedure for verifying u-joint working angles are equal is to:

A. Measure the angle of the transmission output, the driveshaft, and the pinion using an inclinometer, calculate the working angle at each joint, and verify they are within manufacturer's specification (typically equal angles produce minimum vibration)

B. Apply compressed air to the joints

C. Replace the universal joints as a precautionary measure

D. Visually estimate the angles

PRACTICE EXAM 5: A3 SIMULATION — ANSWER KEY, EXPLANATIONS, AND TASK REMEDIATION

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1. C — Resurface the flywheel if material removal stays within specification, or replace the flywheel. Heat checks indicate thermal damage to the flywheel surface. Resurfacing within specification removes the damaged surface; replacement is required when the resurfacing would exceed the maximum material removal limit. *ASE Task Reference: A3 Domain A — Clutch Diagnosis and Repair. Review subsection 3.1.*

2. A — Verify the disc is installed with the marked side facing the correct direction, align the splines properly, and apply a light coat of grease to the splines per manufacturer's specification. Friction disc installation requires correct orientation, proper spline alignment, and proper spline lubrication. Each step ensures proper engagement and prevents damage during operation. *ASE Task Reference: A3 Domain A — Clutch Diagnosis and Repair. Review subsection 3.1.*

3. D — A binding clutch linkage, worn pivot points, or worn pressure plate diaphragm spring producing increased apply force. A heavy clutch pedal indicates excessive force is required to overcome system resistance. Linkage binding, worn pivot points, or worn diaphragm spring all increase the force needed for clutch operation. *ASE Task Reference: A3 Domain A — Clutch Diagnosis and Repair. Review subsection 3.1.*

4. B — Provide the friction surface that the friction disc engages, and provide the rotational mass that smooths engine power pulses. The flywheel performs two essential functions: providing the friction surface for clutch engagement and providing rotational mass that smooths the discrete power pulses of engine combustion. *ASE Task Reference: A3 Domain A — Clutch Diagnosis and Repair. Review subsection 3.1.*

5. D — Replace the synchronizer assembly with a new component. Synchronizer cone wear that exceeds specification cannot be corrected through assembly lubricant or alternative gear pairing. The synchronizer must be replaced to restore proper shift quality. *ASE Task Reference: A3 Domain B — Transmission Diagnosis and Repair. Review subsection 3.2.*

6. C — Inspect each fork for wear, alignment, bending, and proper engagement with the corresponding clutch sleeve, comparing wear to specification. Shift fork inspection requires multiple checks: wear, alignment, bending, and engagement verification. Each fork must function

correctly for proper shift operation. *ASE Task Reference: A3 Domain B — Transmission Diagnosis and Repair. Review subsection 3.2.*

7. A — Replace the synchronizer assembly only, after verifying the gear teeth are within specification. When synchronizer wear is identified but the gear teeth are within specification, only the synchronizer needs replacement. Verification of the gear teeth ensures that no related damage has occurred. *ASE Task Reference: A3 Domain B — Transmission Diagnosis and Repair. Review subsection 3.2.*

8. D — Hold each gear position firmly engaged through spring-loaded detent balls or notches that prevent unintended shift movement. The shift detent mechanism uses spring-loaded balls or notches to hold each gear position firmly engaged, preventing unintended shifts during operation. Without detents, gears could disengage under operational forces. *ASE Task Reference: A3 Domain B — Transmission Diagnosis and Repair. Review subsection 3.2.*

9. B — A whining or rumbling noise that varies with vehicle speed and may be more pronounced at certain speeds where the bearing approaches its critical frequency. Output shaft bearing wear typically produces noise that varies with vehicle speed. The noise may peak at specific speeds where the bearing approaches its critical operating frequency. *ASE Task Reference: A3 Domain B — Transmission Diagnosis and Repair. Review subsection 3.2.*

10. C — Remove the rear extension housing or output shaft, replace the bearing using the manufacturer's specified procedure, and verify proper preload during reassembly. Output shaft bearing replacement requires the manufacturer's specified procedure to ensure proper installation. Preload verification during reassembly ensures correct bearing operation. *ASE Task Reference: A3 Domain B — Transmission Diagnosis and Repair. Review subsection 3.2.*

11. A — Replace the universal joint with a new component. Universal joints with bearing roller damage cannot be reliably reused. Replacement is required to ensure proper joint operation and to prevent immediate failure. *ASE Task Reference: A3 Domain C — Driveshaft and Universal Joint/CV Joint Diagnosis and Repair. Review subsection 3.3.*

12. D — Press the joint in squarely using a proper installation tool, verify free rotation without binding, install the snap rings or retainers, and apply specified grease through the grease fitting. Universal joint installation requires square pressing with proper tools, free rotation verification, snap ring installation, and proper greasing. Each step is critical for proper joint operation. *ASE Task Reference: A3 Domain C — Driveshaft and Universal Joint/CV Joint Diagnosis and Repair. Review subsection 3.3.*

13. B — Replace the entire CV joint or halfshaft, since water contamination causes accelerated wear that has likely damaged the joint internally. Water contamination of CV joints causes accelerated wear of the internal components. Replacement is required to address the contamination damage; surface cleaning cannot restore the worn internal surfaces. *ASE Task Reference: A3 Domain C — Driveshaft and Universal Joint/CV Joint Diagnosis and Repair. Review subsection 3.3.*

14. C — Pack the joint with the manufacturer-specified grease, install the boot squarely with proper orientation, and secure with the appropriate clamp type per manufacturer's specification. CV joint boot installation requires manufacturer-specified grease, proper orientation, and the correct clamp type per specification. Each element ensures the boot will perform throughout its service life. *ASE Task Reference: A3 Domain C — Driveshaft and Universal Joint/CV Joint Diagnosis and Repair. Review subsection 3.3.*

15. A — Replace the center support bearing assembly including the rubber mount. A center support bearing with visible play cannot maintain proper driveshaft support. Replacement of the assembly including the rubber mount restores proper operation. *ASE Task Reference: A3 Domain C — Driveshaft and Universal Joint/CV Joint Diagnosis and Repair. Review subsection 3.3.*

16. B — Verify proper driveshaft phasing, install the center support bearing to specification, torque the universal joint and yoke fasteners to specification, and verify free rotation. Two-piece driveshaft installation requires phasing verification, proper bearing installation, proper torque, and rotation verification. Each step prevents post-installation issues. *ASE Task Reference: A3 Domain C — Driveshaft and Universal Joint/CV Joint Diagnosis and Repair. Review subsection 3.3.*

17. D — Replace the slip yoke if wear exceeds the manufacturer's specification, since worn splines allow excessive driveline play. Slip yoke spline wear that exceeds specification produces excessive driveline play, which causes clunks and vibration. Replacement is required when wear exceeds the limit. *ASE Task Reference: A3 Domain C — Driveshaft and Universal Joint/CV Joint Diagnosis and Repair. Review subsection 3.3.*

18. C — Carry the gears that engage with the countershaft gears, and transmit the resulting output torque to the driveshaft or transaxle. The main shaft (output shaft) carries the gears that engage with the countershaft and transmits the resulting output torque to the driveshaft or transaxle. This is the shaft that delivers transmission output. *ASE Task Reference: A3 Domain B — Transmission Diagnosis and Repair. Review subsection 3.2.*

19. A — Replace the side gears and the matching pinion gears as a complete set, since the differential gears are matched components. Differential side gears and pinion gears are matched components that wear together. Pitting on side gear teeth indicates the pinion gears have likely also worn, and replacement of the matched set ensures proper operation. *ASE Task Reference: A3 Domain D — Drive Axle Diagnosis and Repair. Review subsection 3.4.*

20. B — Mount a dial indicator on a side gear, hold the pinion gears stationary, rock the side gear back and forth, and read the total backlash against the manufacturer's specification. Side gear and pinion gear backlash is measured by holding the pinion gears stationary and rocking the side gear, with the dial indicator reading the total movement. The reading must match specification. *ASE Task Reference: A3 Domain D — Drive Axle Diagnosis and Repair. Review subsection 3.4.*

21. D — The ring gear is too close to the pinion (insufficient backlash). A contact pattern too low on the ring gear teeth indicates the ring gear is too close to the pinion (insufficient backlash).

Adjusting backlash to specification corrects the pattern. *ASE Task Reference: A3 Domain D — Drive Axle Diagnosis and Repair. Review subsection 3.4.*

22. C — Move the ring gear away from the pinion by adjusting the carrier bearing shims, increasing backlash to the specified range. When backlash is too tight, moving the ring gear away from the pinion through carrier shim adjustment increases backlash to the specified range. The shim distribution between the two sides must maintain proper carrier bearing preload. *ASE Task Reference: A3 Domain D — Drive Axle Diagnosis and Repair. Review subsection 3.4.*

23. A — Clean the bolt threads, apply fresh thread locker per the manufacturer's specification, and torque to the specified value. Ring gear bolt installation requires clean threads, fresh thread locker per specification, and proper torque. Reusing existing thread locker is not adequate for proper bolt retention. *ASE Task Reference: A3 Domain D — Drive Axle Diagnosis and Repair. Review subsection 3.4.*

24. D — Allow the differential side gears to rotate at different speeds during cornering, while still distributing torque to both side gears. The differential pinion gears (in the carrier) rotate when the side gears rotate at different speeds, allowing speed differential during cornering while still distributing torque to both side gears. This is the fundamental differential function. *ASE Task Reference: A3 Domain D — Drive Axle Diagnosis and Repair. Review subsection 3.4.*

25. B — Replace the sprockets and chain as a complete matched set, since chain wear and sprocket wear typically occur together. Chain drive components wear as a system. Sprocket wear typically corresponds to chain stretch, and replacement of the matched set ensures proper mesh and life. *ASE Task Reference: A3 Domain E — Four-Wheel Drive/All-Wheel Drive Component Diagnosis and Repair. Review subsection 3.5.*

26. C — Verify proper alignment with the corresponding clutch sleeve, install the fork squarely, secure with the proper hardware torqued to specification, and verify free shift travel. Shift fork installation requires alignment verification, square installation, proper hardware torque, and travel verification. Each step ensures proper shift operation. *ASE Task Reference: A3 Domain E — Four-Wheel Drive/All-Wheel Drive Component Diagnosis and Repair. Review subsection 3.5.*

27. A — Replace the viscous coupling as a complete assembly, since the coupling cannot be serviced internally and contaminated fluid indicates internal wear. Viscous couplings are sealed assemblies that cannot be serviced internally. Contaminated fluid indicates internal wear that requires complete coupling replacement. *ASE Task Reference: A3 Domain E — Four-Wheel Drive/All-Wheel Drive Component Diagnosis and Repair. Review subsection 3.5.*

28. D — Provide the gear reduction for low range operation, with multiple gear ratios available depending on which planetary member is held. The transfer case planetary gearset (in transfer cases that use planetary reduction) provides the gear reduction for low range operation. The same gearset can produce different ratios depending on which member is held during low range

operation. *ASE Task Reference: A3 Domain E — Four-Wheel Drive/All-Wheel Drive Component Diagnosis and Repair. Review subsection 3.5.*

29. C — Replace the AWD coupling clutch pack assembly, since heat damage compromises the friction discs beyond reuse. Heat damage to friction discs (visible blue discoloration) compromises the discs beyond reuse. Replacement of the clutch pack assembly addresses the underlying damage. *ASE Task Reference: A3 Domain E — Four-Wheel Drive/All-Wheel Drive Component Diagnosis and Repair. Review subsection 3.5.*

30. B — Bring the transfer case to the manufacturer's specified temperature, remove the fill plug, and verify the fluid level reaches the specified point in the fill hole. Transfer case fluid level verification requires the unit to reach specified temperature (since fluid expands with heat) and fill plug removal to physically check the level against specification. *ASE Task Reference: A3 Domain E — Four-Wheel Drive/All-Wheel Drive Component Diagnosis and Repair. Review subsection 3.5.*

31. D — Adjust the carrier shim distribution between the two sides to achieve both proper carrier bearing preload and specified ring gear backlash. Carrier bearing preload and ring gear backlash are interdependent — adjusting one affects the other. The proper procedure adjusts the shim distribution between the two sides to achieve both specifications simultaneously. *ASE Task Reference: A3 Domain D — Drive Axle Diagnosis and Repair. Review subsection 3.4.*

32. A — Verify pinion preload, carrier bearing preload, ring gear backlash, contact pattern, and pinion seal installation, then ensure all fasteners are torqued to specification. Pre-installation verification requires comprehensive checks of all setup specifications. Each check confirms a different aspect of proper assembly. *ASE Task Reference: A3 Domain D — Drive Axle Diagnosis and Repair. Review subsection 3.4.*

33. B — Adjust clutch pedal free play to specification, then verify the grinding noise persists before proceeding to internal transmission diagnosis. Excessive clutch pedal free play prevents complete clutch disengagement, producing grinding during shifts. Adjusting free play to specification often resolves the symptom; further diagnosis is only required if the symptom persists. *ASE Task Reference: A3 Domain A — Clutch Diagnosis and Repair. Review subsection 3.1.*

34. C — Reverse the rotation direction of the output shaft when reverse gear is engaged, by adding a third gear in the train between the input and output gears. The reverse idler gear adds a third gear to the train when reverse is engaged, which reverses the rotation direction of the output shaft. This is how reverse gear is achieved in a manual transmission. *ASE Task Reference: A3 Domain B — Transmission Diagnosis and Repair. Review subsection 3.2.*

35. D — Adjust the ring gear backlash to specification or replace the ring and pinion if adjustment is not possible. Excessive backlash that exceeds specification must be corrected through adjustment. If adjustment cannot bring backlash within specification, the ring and pinion must be replaced. *ASE Task Reference: A3 Domain D — Drive Axle Diagnosis and Repair. Review subsection 3.4.*

36. A — Inspect the pinion seal bore for damage, install the new seal squarely using a proper seal driver, apply assembly lubricant to the seal lip, and torque the pinion nut to specification to set proper preload. Pinion seal installation requires bore inspection, square installation, lip lubrication, and proper pinion nut torque. Each step ensures proper sealing and bearing preload. *ASE Task Reference: A3 Domain D — Drive Axle Diagnosis and Repair. Review subsection 3.4.*

37. B — Replace the chain and matching sprockets as a complete set, since the chain has stretched beyond the maximum specification. Chain stretch beyond specification cannot be corrected. Replacement of the chain and matching sprockets is required because chain wear typically corresponds to sprocket wear. *ASE Task Reference: A3 Domain E — Four-Wheel Drive/All-Wheel Drive Component Diagnosis and Repair. Review subsection 3.5.*

38. C — Verify the shift fork alignment, the clutch sleeve engagement, the synchronizer operation (if equipped), and the proper travel limits, comparing each to manufacturer's specification. Transfer case shift mechanism verification during overhaul requires multiple checks against specification. Each check addresses a different aspect of shift system operation. *ASE Task Reference: A3 Domain E — Four-Wheel Drive/All-Wheel Drive Component Diagnosis and Repair. Review subsection 3.5.*

39. B — Improperly aligned u-joint working angles, where the angles at each joint are not equal and produce cyclical loading at highway speeds. Vibration after recent service with new joints, verified balance, and proper phasing points to working angle issues. Unequal working angles produce cyclical loading that manifests as vibration at highway speeds. *ASE Task Reference: A3 Domain C — Driveshaft and Universal Joint/CV Joint Diagnosis and Repair. Review subsection 3.3.*

40. A — Measure the angle of the transmission output, the driveshaft, and the pinion using an inclinometer, calculate the working angle at each joint, and verify they are within manufacturer's specification (typically equal angles produce minimum vibration). U-joint working angle verification requires inclinometer measurements at each shaft, calculation of working angles, and comparison to specification. Equal working angles typically produce minimum vibration. *ASE Task Reference: A3 Domain C — Driveshaft and Universal Joint/CV Joint Diagnosis and Repair. Review subsection 3.3.*