PRACTICE EXAM 19: ASE A4 SIMULATION (40 QUESTIONS)

STEERING SYSTEMS DIAGNOSIS AND REPAIR (Questions 1–12)

1. A power steering pump reservoir shows fluid that is foamy and cloudy with visible bubbles. What does this indicate?

A. The power steering pump has failed internally and requires replacement for the service repair

B. The power steering fluid has degraded from age and requires replacement with fresh manufacturer fluid

C. Air is trapped in the system — the foamy appearance indicates incomplete bleeding of the fluid circuit

D. Water contamination has entered the system requiring a complete flush with new manufacturer fluid

2. A rack and pinion gear has a torn bellows boot on one side only. Fluid is dripping from the affected boot. What does this indicate?

A. The inner tie rod seal on that side has failed allowing fluid to exit through the damaged boot

B. The internal rack piston seal has failed and is forcing fluid out of both sides of the rack assembly

C. The rack pressure spring has backed off allowing excess fluid to leak past the internal piston seal

D. The pinion input shaft seal has failed allowing fluid to migrate through the rack to the boot area

3. A technician inspects a power steering hose and finds a spot where the outer rubber cover is soft and mushy when pressed. What does this indicate?

A. The hose is performing normally — softness in the outer cover is not a cause for concern during service

B. The hose material has softened from heat — allow it to cool before making a determination about replacement

C. The hose outer cover is saturated with fluid — not a safety concern as long as external leak is not visible

D. The internal reinforcement has failed and fluid is saturating the outer cover — replace the hose immediately

4. A clockspring is being inspected. The ribbon cable is visible through the inspection window and appears stretched thin in one area. What does this indicate?

A. The clockspring is within normal service and the cable appearance is typical during normal inspection

B. The clockspring has been damaged from improper installation and requires replacement before service

C. The clockspring needs to be recentered using the manufacturer procedure to restore normal operation

D. The cable stretching is normal for an aged clockspring and does not indicate replacement is needed

5. A recirculating ball gearbox is being inspected. The input shaft shows significant axial play when pushed and pulled by hand. What does this indicate?

A. The input shaft bearings are within normal tolerance and the play is acceptable during service inspection

B. The gearbox requires additional fluid to compensate for the axial play during steering operation

C. The sector shaft adjuster needs tightening to eliminate the axial play at the input shaft position

D. The worm shaft bearing preload has loosened — requires adjustment or gearbox replacement service

6. A power steering fluid sample shows a strong burnt smell. The fluid color is dark brown. What does this indicate?

A. The fluid has been overheated severely and must be flushed — investigate the cause of overheating

B. The fluid is at the end of its normal service life and should be replaced as routine maintenance

C. The fluid is contaminated with coolant causing the burnt smell — replace fluid and inspect for cross-contamination

D. The fluid is normal — dark brown with burnt smell is acceptable for aged power steering fluid

7. A steering wheel has been removed for service. The splines on the steering shaft are visibly worn and damaged. The technician attempts to reinstall the wheel. What is the correct action?

A. Install the wheel and torque to specification — worn splines can be compensated by proper torque

B. Replace the steering column because the damaged splines cannot maintain proper wheel retention

C. Install the wheel with thread locker on the retaining nut to compensate for the damaged splines

D. Install a new steering wheel — the old wheel splines are causing the shaft damage during installation

8. A clockspring shows rotational resistance when turned by hand — it binds and releases intermittently. What does this indicate?

A. The clockspring is within normal operation and the resistance is typical during manual rotation test

B. The clockspring requires lubrication — apply manufacturer-approved lubricant to restore smooth operation

C. The clockspring has internal damage and requires replacement before reinstallation on the vehicle

D. The clockspring needs recentering using the manufacturer procedure to restore smooth rotation

9. A power steering pump is mounted to the engine with two bolts. During inspection, one bolt is found to be loose — finger-tight only. What is the correct action?

A. Tighten the loose bolt to specification and release the vehicle to the customer after verification

B. Apply thread locker to the loose bolt and tighten to compensate for the initial looseness during service

C. Inspect the pump mounting bracket for cracks before retorqueing — loose bolts indicate possible bracket damage

D. Inspect the pump for damage from vibration and retorque all bolts to specification — verify bracket integrity

10. A hydraulic rack and pinion leaks fluid at both bellows boots equally. The technician checks the fluid level and finds it at minimum. What does this indicate?

A. The internal high-pressure rack seal has failed — fluid is forced out through both bellows boots

B. Both inner tie rod seals have failed simultaneously — a rare but possible failure mode for the gear

C. The rack pressure spring has backed off allowing fluid to leak past the internal piston in both directions

D. The bellows boots themselves have torn simultaneously allowing fluid to exit the rack during operation

11. An intermediate shaft U-joint is inspected by rotating the shaft and feeling for smoothness. A notchy feel is detected as the shaft rotates through a specific position. What does this indicate?

A. The U-joint is within normal service and the notchy feel is typical for a used U-joint during operation

B. The U-joint needle bearings are worn or missing — the shaft should be replaced before any service is released

C. The U-joint requires lubrication — apply grease through the fitting to restore smooth rotation at all positions

D. The U-joint will break in over the next 1000 miles of service — monitor during next service interval

12. A steering damper is inspected for leakage. A wet stripe is visible down the damper body with oil drips forming at the bottom. What does this indicate?

A. The damper is operating normally — slight seepage is typical for in-service steering dampers

B. The damper seal has weeped slightly but is not a replacement criterion — monitor during next service

C. The damper is within normal tolerance — clean the area and continue service without replacement

D. The damper seal has failed — active external leakage with drips requires immediate replacement

SUSPENSION SYSTEMS DIAGNOSIS AND REPAIR (Questions 13–24)

13. A MacPherson strut assembly shows active fluid leakage down the strut body with oil streaks visible. The strut has been in service for 90,000 miles. What is the correct action?

A. The strut is within acceptable service life — the slight leakage does not yet warrant replacement during service

B. Clean the strut body and wait to see if the leakage continues during normal operation over time

C. Replace the strut as a pair on the same axle — active fluid leakage indicates seal failure requiring replacement

D. Replace only the seal on the leaking strut to restore damping function without complete strut replacement

14. A ball joint wear check at curb height shows the grease fitting has receded below the housing surface. What does this indicate?

A. The ball joint has reached its wear limit and requires immediate replacement before additional service

B. The ball joint is within acceptable wear limits and does not require replacement during this service visit

C. The wear indicator is defective and the joint must be inspected using alternate methods for wear evaluation

D. The vehicle must be lifted to obtain an accurate measurement of the ball joint wear indicator position

15. A stabilizer bar end link shows visible corrosion and play at the ball stud end. The axial play measures 0.080 inch. Specification is 0.030 inch maximum. What does this indicate?

A. The end link is within acceptable tolerance — the axial play is within the maximum specification value

B. The end link requires lubrication to reduce the axial play and restore normal operating characteristics

C. The end link has excessive wear and requires replacement — the play exceeds specification by a wide margin

D. The corrosion is only cosmetic and the end link can continue in service with normal monitoring

16. An air suspension bag shows external damage — a small crack is visible in the rolling lobe area. What is the correct action?

A. The air bag will continue to function normally as long as the crack has not progressed to a through-hole

B. Replace the air bag — any visible external damage indicates imminent failure and safety concern during service

C. Apply rubber cement to the crack to prevent progression and return the vehicle to service after drying

D. Replace all four air bags on the vehicle as a matched set because one has failed from environmental damage

17. A coil spring is being inspected. The spring shows visible rust with some pitting but no cracks. The spring rate tests within specification on a spring tester. What is the correct action?

A. Replace the spring because visible rust indicates imminent fracture during service at highway speed

B. Apply rust-preventive coating to the spring and continue in service — the spring rate is within specification

C. Replace the spring and the opposite spring on the same axle — rust always indicates replacement is needed

D. The spring is acceptable for continued service — spring rate is within specification and no cracks are present

18. A torsion bar front suspension has been in service for 8 years. The technician adjusts the preload adjuster to restore ride height. The adjuster turns freely but ride height does not respond. What is the MOST likely cause?

A. The torsion bar has lost spring rate and can no longer respond to preload adjustment effectively

B. The torsion bar preload adjuster bolt threads have stripped preventing proper clamping force

C. The torsion bar anchor at the frame has broken allowing the bar to rotate without applying preload

D. The lower control arm bushings have deteriorated preventing proper response to torsion bar adjustment

19. A leaf spring pack is being inspected. A visible crack extends across the main leaf about 1/3 the length of the leaf. What is the correct action?

A. Weld the cracked leaf and reinforce with a strap to restore the spring pack to service specifications

B. Monitor the crack during the next service interval and replace only if the crack progresses further

C. Replace only the cracked leaf while retaining the remaining leaves in the spring pack for continued service

D. Replace the complete leaf spring pack — a cracked main leaf compromises the entire spring structure

20. An adaptive damper produces a clicking noise during damping changes commanded by the scan tool. The damper wiring tests good. What does this indicate?

A. The damper is operating normally and the clicking is typical electronic valve actuation during service

B. The damper has internal failure — clicking during damping changes indicates damaged internal valves

C. The damper requires a software update for the suspension control module to eliminate the clicking noise

D. The damper requires recalibration using the manufacturer scan tool procedure to eliminate the clicking

21. A strut mount is inspected during strut replacement. The rubber isolator shows visible tears and has hardened. The strut has 80,000 miles. What is the correct action?

A. Replace the strut mount along with the new strut — deteriorated mounts compromise new strut function

B. Reuse the strut mount with the new strut since the mount has not completely failed during service

C. Apply silicone sealant to the torn rubber to restore the mount function without full replacement

D. Replace only the strut mount bearing while retaining the rubber isolator for continued service

22. A wheel bearing is being inspected on a vehicle with sealed cartridge-style hub assembly. The bearing produces a growling noise during a road test that increases with vehicle speed. What is the correct action?

A. Apply grease to the bearing through the inspection port to reduce the growling noise during service

B. Adjust the wheel bearing preload at the axle nut to eliminate the growling at highway speed conditions

C. Replace the complete hub assembly — sealed cartridge bearings are not serviceable with grease additions

D. Replace the wheel bearing seals only while retaining the bearing internals for continued service use

23. A subframe bushing is inspected and shows visible cracks in the rubber with the subframe able to shift 1/4 inch at the mount. What is the correct action?

A. The bushing is within tolerance — 1/4 inch of shift is acceptable for high-mileage vehicles during service

B. Replace the subframe bushings and perform a wheel alignment after the installation is completed

C. Apply rubber cement to the cracks to restore the bushing function without full replacement during service

D. Replace only the visible cracked portion while retaining the bushing structure for continued service use

24. A shock absorber bounce test produces 3 complete rebound cycles before the vehicle settles. What does this indicate?

A. The shock is operating within normal specifications — 3 cycles is typical for passenger vehicle shocks

B. The shock spring rate has changed requiring replacement of the coil spring along with the shock service

C. The shock absorber requires oil addition through the fill port to restore damping function during service

D. The shock absorber has failed internally and cannot control spring oscillation — requires replacement service

WHEEL ALIGNMENT DIAGNOSIS, ADJUSTMENT, AND REPAIR (Questions 25–35)

25. A tire shows inside-edge wear with a smooth pattern across the tread — no feathering. What does this indicate?

A. Excessive negative camber at that wheel causing the inside edge to carry more load than the outside

B. Excessive toe-out causing the tire to scrub inward as it rolls during normal highway driving conditions

C. Under-inflation causing both shoulders to wear while the center tread wears less during service use

D. Worn shock absorbers causing cupped wear around the tire circumference during normal driving

26. A tire shows outside-edge wear with a feathered sawtooth pattern — the tread blocks ramp up toward the inside. What does this indicate?

A. Excessive negative camber at that wheel causing smooth inside-edge wear across both shoulders at once

B. Excessive positive camber at that wheel causing smooth outside-edge wear during the normal driving cycle

C. Excessive toe-in causing the tire to scrub outward as it rolls during highway driving conditions normally

D. Under-inflation causing both shoulders to wear while the center wears less during normal service use

27. A tire shows center tread wear with minimal shoulder wear on both sides. What does this indicate?

A. The tire has excessive toe-in causing the tire to scrub during normal driving at highway speeds only

B. The tire is over-inflated causing the center of the tread to contact the road harder than the edges

C. The tire has excessive positive camber causing outside-edge wear with minimal center tread wear visible

D. Worn shock absorbers causing cupped wear around the tire circumference during the normal service

28. Cross-camber of 1.0° with the left side more positive than the right side will cause:

A. A vehicle pull to the left — camber pull goes toward the more-positive side of the vehicle during driving

B. A vehicle pull to the right — camber pull goes toward the less-positive side of the vehicle during driving

C. No pull because the cross-camber value is within normal tolerance for modern passenger vehicles

D. Tire wear asymmetry without any pull during straight-line driving at any operating speed condition

29. A vehicle has front caster of Left +2.5° and Right +4.0°. The vehicle will pull:

A. Toward the right side — the right has more caster than the left producing a pull in that direction

B. No pull occurs because caster imbalance does not affect pull direction during normal driving conditions

C. Toward the left side — caster pulls toward the less-caster side of the vehicle during highway operation

D. The pull direction depends on cross-camber not shown in the readings provided in the alignment printout

30. An included angle reading of 14.5° on one side and 13.0° on the other side indicates:

A. A bent steering knuckle on the side with the 14.5° reading — the difference of 1.5° exceeds tolerance

B. The alignment equipment requires calibration before the measurements are considered accurate for service

C. Tire pressure differences between the two sides causing the apparent included angle measurement shift

D. Ride height variation between the two sides producing the apparent included angle difference on rack

31. A setback reading of 1.0° at the front axle indicates:

A. Tire pressure differences between the two sides of the vehicle causing the apparent setback measurement

B. Ride height variation between the two sides of the vehicle causing the measurement during alignment

C. The alignment equipment requires calibration before the setback measurement is considered accurate

D. Collision damage or structural shift that has displaced one front wheel fore or aft of its design position

32. A thrust angle reading of +0.50° with total rear toe within specification indicates:

A. The front toe is causing the thrust angle reading and requires readjustment during alignment service

B. The left and right rear toe settings are asymmetric creating a non-zero thrust angle reading

C. The rear suspension is bent and requires replacement of the damaged component before alignment

D. The alignment equipment requires calibration before the thrust angle measurement is considered accurate

33. A tire swap test where the front tires are swapped left-to-right shows the pull direction reverses. This indicates:

A. Tire conicity — one tire has an inherent lead direction that reversed when moved to the other side

B. Alignment is out of specification — the pull will reverse when alignment is adjusted to specification

C. A brake caliper is dragging on one side — the pull reverses with brake component shift during testing

D. The steering gear has internal bypass producing direction-dependent pull regardless of tire position change

34. A vehicle's alignment shows: Front camber both sides within spec, Front caster both sides within spec, Front toe +0.10° total, Rear toe symmetric within spec, Thrust angle 0.02°. The steering wheel sits off-center during straight driving. What should be done?

A. Remove the steering wheel and reindex it on the splined shaft to correct the off-center condition

B. Adjust the rear toe to create a thrust angle offset that compensates for the wheel offset during driving

C. Split the front toe adjustment unequally between the two tie rods to re-center the steering wheel

D. Accept the off-center condition because all alignment angles are within specification tolerance ranges

35. Wheel runout compensation is performed:

A. After the alignment is complete to verify the accuracy of the final measurements during service

B. Only when the vehicle has abnormal tire wear indicating alignment-related issues need investigation

C. Only on vehicles with rear-wheel drive configurations during alignment service procedures only

D. Before any alignment measurements to correct for clamp offset errors between the clamp and wheel

WHEEL AND TIRE DIAGNOSIS AND SERVICE (Questions 36–40)

36. A wheel-and-tire assembly on a balancer shows 2.0 oz at the inner position and 1.8 oz at the outer position at 180° apart. What does this indicate?

A. The assembly is within acceptable residual balance tolerance — no additional correction is needed today

B. The assembly has dynamic imbalance requiring weights at both rim edges for proper correction service

C. The assembly has only static imbalance that can be corrected at a single plane position on the wheel

D. The assembly has radial runout requiring match-mounting to reduce the combined runout measurement

37. A direct TPMS sensor has stopped reporting data. The scan tool shows the sensor as "not communicating." The vehicle is 6 years old. What is MOST likely the cause?

A. The TPMS module has lost programming and requires reprogramming with the vehicle VIN identifier

B. The tire pressure is below the activation threshold for the sensor causing it to deactivate during service

C. The wheel speed sensor at the corner is affecting the TPMS direct sensor communication at that wheel

D. The TPMS sensor battery has reached end of life — typical life is 5–10 years on direct TPMS sensors

38. A tire sidewall reads "P225/60R17 98H." The "98" represents:

A. The tire's load index — maximum load capacity at the tire's rated inflation pressure during service

B. The tire's aspect ratio expressed as a percentage of the section width in millimeters during service

C. The tire's wheel diameter in inches that the tire is designed to fit around the rim during mounting

D. The tire's maximum speed rating expressed in hundreds of kilometers per hour during sustained use

39. A tire puncture is located in the tread area and measures 5/16 inch in diameter. The tire has 7/32 inch tread remaining. The industry-standard maximum repairable size is 1/4 inch. What is the correct action?

A. Repair using a combination plug/patch from inside the tire since the tread area is the repairable zone

B. Install an external string plug since the puncture is in the tread area and above the size specification

C. Replace the tire — the puncture exceeds the industry-standard maximum repairable size at 1/4 inch limit

D. Install an interior patch only without plugging the puncture channel through the tread to the surface

40. A wheel hub assembly installation requires an axle nut specification of "200 ft-lb + 90°." The technician torques to 200 ft-lb and skips the 90° rotation step. What is the likely consequence?

A. The axle nut will loosen during driving from vibration at highway operating speeds during normal service

B. The wheel bearing will have insufficient preload causing excessive play and eventual failure during service

C. The wheel bearing will have excessive preload from 200 ft-lb alone causing overheating during operation

D. The brake rotor will develop excessive runout from improper hub seating during the installation procedure

Practice Exam 19: Answer Key and Explanations

1. C — Foamy, cloudy fluid with visible bubbles in the reservoir is the classic signature of air trapped in the system. The bubbles are aerated fluid that has not been fully bled out after service. The correct repair is to perform a thorough bleeding procedure using the manufacturer's specified method — usually engine-off lock-to-lock cycling followed by idle-running bleeding.

2. A — When one bellows boot leaks fluid while the opposite boot stays dry, the inner tie rod seal on the leaking side has failed. The seal failure allows fluid to migrate out through that specific bellows. A rack internal seal failure would cause bilateral leakage; pinion and pressure spring issues produce different symptom patterns.

3. D — Soft and mushy outer rubber cover indicates the internal reinforcement (braid or steel wire layers) has failed and fluid is saturating the outer cover from inside. The hose integrity is compromised and it can rupture without warning — replacement is required immediately. No amount of external treatment can restore internal reinforcement.

4. B — A clockspring with a stretched ribbon cable has been damaged, typically from improper installation (installed off-center or steering wheel turned while uncentered). A stretched ribbon cable is at risk of imminent breakage and must be replaced. Recentering does not repair the damage; the damaged cable cannot carry full current reliably.

5. D — Significant axial play at the input shaft indicates the worm shaft bearing preload has loosened. This produces loose steering feel and can progress to more serious gearbox damage. The repair is either adjusting the worm shaft preload (if adjustable on that specific gearbox design) or gearbox replacement if the wear is excessive.

6. A — A strong burnt smell combined with dark brown fluid color indicates the fluid has been overheated severely. Overheating breaks down the fluid's additive package and causes oxidation. Always flush and replace the fluid, and critically, investigate the cause of overheating (restricted return, missing cooler, continuous full-lock operation).

7. B — Damaged steering shaft splines cannot maintain proper wheel retention. Torque, thread locker, and new wheels do not repair the underlying damaged shaft. The steering column must be replaced to

restore a safe and reliable steering wheel mounting. This is a safety-critical condition that cannot be "worked around."

8. C — A clockspring with intermittent binding and rotational resistance has internal damage — typically broken internal structure or a damaged ribbon cable. The clockspring cannot safely transmit steering wheel rotations to the internal cable. Replacement is required before reinstallation on the vehicle; lubrication and recentering will not fix internal damage.

9. D — A loose pump mounting bolt creates vibration and potential further damage. The correct response is inspecting both the pump and the mounting bracket for damage from the vibration, then retorqueing all bolts to specification. Simply tightening the loose bolt without inspection can miss consequential damage from the extended loose condition.

10. A — When fluid leaks equally from both bellows boots, the internal high-pressure rack seal has failed. The rack piston seal, which normally separates the two ends of the rack internally, has failed, allowing fluid to migrate to both ends and out through both bellows. This is the definitive signature of internal rack seal failure.

11. B — A notchy feel during shaft rotation indicates worn or missing needle bearings in the U-joint. The joint cannot rotate smoothly and will progressively fail. The intermediate shaft must be replaced — this is a safety-critical component that provides the connection between the column and the gear.

12. D — A wet stripe with active oil drips is active leakage requiring replacement. Unlike slight weepage or seepage, drips indicate the seal has failed and fluid is escaping the damper body. The damper cannot maintain internal pressure or damping force — replacement is mandatory before vehicle release.

13. C — Active fluid leakage down a strut body with visible oil streaks indicates seal failure. Struts are replaced in pairs on the same axle to maintain matched damping characteristics. Mileage alone does not determine replacement — active leakage is the criterion. Replacing only the seal is not a manufacturer-approved repair method for most struts.

14. A — When the wear indicator (grease fitting) on a load-carrying ball joint recedes BELOW the housing surface at curb height, the joint has reached its wear limit and requires immediate replacement. Only an indicator at or above the housing surface indicates acceptable wear. The curb-height (loaded) inspection position is critical for valid reading.

15. C — Axial play of 0.080 inch vs. a 0.030-inch specification represents nearly 3x the allowable wear. Combined with visible corrosion, the end link has exceeded its service life and must be replaced. No amount of lubrication or tightening can restore a worn ball-socket interface. Corrosion alone may not require replacement, but combined with excess play, it does.

16. B — Any visible external damage to an air suspension bag — crack, cut, or tear — indicates imminent failure. The air bag operates at significant pressure and the crack will progress to a through-hole. Replacement is the only safe action. Rubber cement and similar field repairs do not restore integrity. Pair replacement may be recommended on heavily aged systems but is not automatic.

17. D — A coil spring that has visible rust but no cracks and tests within spring rate specification is acceptable for continued service. The spring retains its engineered function. Rust alone is not a replacement criterion — cracks, broken coils, or out-of-spec spring rate are the actual replacement indicators. Unnecessary replacement wastes time and cost.

18. A — When the torsion bar preload adjuster turns freely but does not change ride height, the bar has lost its spring rate (the stored torsion ability has degraded). This is a common failure on high-mileage/high-age torsion bars. The bar itself must be replaced. Stripped threads or broken anchors produce different symptoms (typically adjuster won't turn or bar rotates without resistance).

19. D — A crack across 1/3 of a main leaf compromises the entire spring pack's structural integrity. The main leaf carries most of the load and provides the primary spring resistance. Welding and reinforcement are not manufacturer-approved repairs. The complete leaf spring pack must be replaced — replacing only the cracked leaf leaves the pack unbalanced and risks further failure.

20. B — A clicking noise during damping changes indicates damaged internal valves within the adaptive damper. The electronic valves normally produce no audible clicking during smooth operation. Clicking means internal mechanical failure of the valve components. Damper replacement is required — software updates and recalibration do not fix mechanical damage.

21. A — Strut mounts should be replaced along with new struts, especially when showing deterioration like tears and hardening. The mount's rubber isolator controls noise, vibration, and ride quality. Reusing a deteriorated mount with a new strut compromises the new strut's performance. This is standard industry practice and widely tested on A4.

22. C — Sealed cartridge-style hub assemblies are not serviceable with grease additions or seal replacement — they are replaced as complete units. A growling noise that increases with speed is the definitive failure signature. Attempting to grease through an inspection port or adjust preload on a sealed assembly is not possible with these designs.

23. B — A subframe bushing with cracks allowing 1/4 inch of shift requires replacement — the bushing is no longer constraining the subframe to its design position. Wheel alignment is required after bushing replacement because subframe position affects all alignment angles. Rubber cement and partial replacement are not approved repair methods.

24. D — A properly functioning shock absorber produces ONE complete rebound cycle before settling. Three cycles indicates failed damping — the shock cannot control spring oscillation. Shock absorbers are sealed units; they cannot be refilled with oil. Spring rate and shock rate are separate; replacing the spring doesn't fix a bad shock. Shock replacement is indicated.

25. A — Inside-edge wear with a smooth (flat, non-feathered) pattern is the specific signature of excessive negative camber. The tire's inner edge carries more load than the outer, but the tire doesn't scrub — so wear is flat, not feathered. Toe-out produces inside-edge wear WITH feathering; camber produces smooth edge wear; this is the key distinction.

26. C — Outside-edge feathering with tread blocks ramped up toward the inside is the signature of excessive toe-in. The tire scrubs outward as it rolls, creating the feathered pattern. Running a hand across the tread catches in one direction, smooth in the other. Toe-in produces outside-edge feathering; toe-out produces inside-edge feathering.

27. B — Center tread wear with minimal shoulder wear is the signature of over-inflation. The over-inflated tire bulges at the center of the tread, contacting the road harder in the middle than at the shoulders. Camber and toe issues produce edge wear, not center wear. Worn shocks cause circumferential cupping, not center wear.

28. A — Camber pull direction goes toward the MORE-positive side. With left camber at +0.5° and right at -0.5°, the left side is more positive by 1.0°, so the vehicle pulls to the left. Memorize the rule: camber pulls toward the more-positive side; caster pulls toward the less-caster side. These opposite directions are commonly confused.

29. C — Caster pull direction goes toward the LESS-caster side. With left caster at 2.5° and right at 4.0°, the left side has less caster, so the pull goes to the left. The side with less caster has weaker self-centering force, causing the vehicle to drift toward that side. This is the opposite of camber pull direction.

30. A — Side-to-side included angle difference of 1.5° exceeds the typical 0.5° tolerance and is the classic signature of a bent steering knuckle. Included Angle = SAI + Camber, and SAI is built into the knuckle casting. When camber is adjustable but the included angles differ significantly, the knuckle casting itself is bent.

31. D — Setback of 1.0° at the front axle is far beyond typical tolerance (usually ±0.25°) and indicates collision damage that has shifted a subframe, bent a control arm, or displaced a mounting point. Setback of this magnitude warrants investigation for frame damage, subframe shift, or mount damage. Tire pressure and equipment issues don't produce this offset.

32. B — Thrust angle of 0.50° with total rear toe within specification means the left and right rear toe settings are asymmetric — one rear wheel toes in more than the other, creating the thrust offset. Total toe being in spec does not guarantee symmetry. The vehicle will crab down the road; equalizing rear toe is the repair.

33. A — When a tire swap reverses the pull direction, the pull is caused by tire conicity — an inherent lead direction from manufacturing. Alignment, brake drag, and steering gear issues produce pulls that stay in the same direction regardless of tire position. The swap test is the definitive tire-vs-alignment diagnostic.

34. C — When all alignment angles are within specification but the steering wheel sits off-center, the correct repair is splitting the front toe adjustment unequally between left and right tie rods to re-center the wheel while maintaining correct total toe. This is standard alignment procedure. Reindexing, rear toe adjustment, or accepting the offset are all incorrect responses.

35. D — Wheel runout compensation is performed BEFORE any alignment measurements to correct for clamp offset errors between the clamping device and the wheel's rotation axis. Without compensation, every measurement is offset by a fraction of a degree, making the entire alignment invalid. This is the mandatory first step before initial measurements.

36. B — Weights at both inner and outer rim edges 180° apart is the classic signature of dynamic (two-plane) imbalance. The offset mass distribution along the wheel's axis creates a wobbling force couple that modern balancers correct with weights at each rim edge simultaneously. Static imbalance alone requires only single-plane correction.

37. D — Direct TPMS sensor batteries have a typical service life of 5–10 years. On a 6-year-old vehicle with a sensor reporting "not communicating," battery failure is the most likely cause. Replacement and relearn restore function. Module programming, wheel speed sensors, and pressure thresholds are less common causes.

38. A — The "98" in a tire size code is the load index — a coded value representing the maximum load the tire can carry at rated pressure. Load index 98 = 1,653 lb. Load index, aspect ratio, wheel diameter, and speed rating each have distinct meaning and positions in the tire code and cannot be interchanged.

39. C — The industry-standard maximum repairable tread puncture diameter is 1/4 inch. A 5/16-inch puncture exceeds this limit regardless of tread depth remaining. The tire must be replaced — both internal and external repairs fail at oversize punctures because the tire's structural integrity cannot be restored. Safety, not cost, drives this standard.

40. B — Torque-plus-angle specifications must be completed in full. Torquing to 200 ft-lb without the additional 90° rotation leaves the bearing under-preloaded — the nut has not stretched to its final preload. Excessive play develops, leading to premature bearing failure. Always complete both stages of the specification for correct preload.