

# PRACTICE EXAM 12: ASE A4 SIMULATION

## (40 QUESTIONS)

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### STEERING SYSTEMS DIAGNOSIS AND REPAIR (Questions 1–12)

1. A customer brings in a 2017 sedan complaining that the steering wheel no longer returns to center after a turn. The vehicle tracks straight but will not self-center. The steering fluid level is correct and the EPS has no DTCs. What is MOST likely the cause?

- A. The steering angle sensor has drifted and requires calibration by a scan tool
- B. The power steering pump is worn and producing insufficient pressure at low speed
- C. The EPS control module firmware requires updating from the manufacturer
- D. Front caster is below specification, reducing self-centering torque at the wheel

2. A 2021 truck with column-mounted EPS has had its battery replaced. Since then, the EPS warning light has been on with reduced assist. Scan tool shows no stored DTCs. What is the correct action?

- A. Replace the EPS control module because the DTCs were cleared during the battery change
- B. Disconnect the battery for an additional 30 minutes to allow the EPS module to reset
- C. Perform the manufacturer-specified EPS initialization procedure after the battery service
- D. Verify battery voltage is above 12.6 volts before attempting any additional diagnosis

3. A technician is performing a dry park test on a vehicle with rack and pinion steering. An assistant rocks the steering wheel back and forth slightly while the technician inspects the linkage. Which component is being isolated by this test?

- A. Worn inner or outer tie rod ends and loose linkage connections between parts
- B. Worn upper strut mount bearings that cause noise during steering rotation only
- C. Worn rack-and-pinion internal seals that produce fluid leaks during steering use

D. Worn steering column U-joints in the intermediate shaft during rotation of wheel

4. A pickup truck arrives with a "death wobble" complaint at 45 mph after hitting a bump. The technician replaces the steering damper. Two weeks later, the customer returns with the same complaint. What was missed in the original diagnosis?

- A. The power steering pump output pressure required testing before repair began
- B. Track bar bushings, tie rod ends, and front ball joints were not inspected thoroughly
- C. The EPS control module requires reprogramming to prevent wobble in the system
- D. The front wheel bearings should have been replaced along with the steering damper

5. A customer complains that their power steering system feels normal when cold but becomes increasingly hard to turn as the vehicle warms up during highway driving. The fluid level is correct. Which is the MOST likely cause?

- A. Air is trapped in the system — the fluid aerates at operating temperature from heat
- B. The steering angle sensor calibration has drifted from warm temperature operation
- C. The EPS module requires a firmware update to address warm operation issues
- D. The power steering pump internal clearances have worn, bypassing fluid when warm

6. A technician is installing a new clockspring on a vehicle. The part arrives with a centering tab or tape that must be removed after installation. What is the purpose of this tab?

- A. It locks the clockspring at the centered position during shipping and installation
- B. It ensures the proper electrical contact between the clockspring and the airbag circuit
- C. It provides a grounding path for the airbag system during the testing of the vehicle
- D. It prevents the clockspring from rotating during the first drive cycle of the vehicle

7. A power steering hose routes near the exhaust manifold on a rear-wheel-drive pickup truck. The hose is 2 inches from the manifold at its closest point. The customer reports a burning smell after hard driving. What is the correct action?

- A. Replace the hose with an identical part and route along the same path of the original
- B. Apply heat-resistant wrap to the hose to protect it from heat in the engine compartment
- C. Reroute the hose away from the exhaust heat source to prevent damage during service
- D. Verify the exhaust system has no leaks that might be causing the burning smell

8. A customer reports their vehicle's power steering pump is noisy only during cold weather starts. The noise disappears after about 2 minutes of driving. The fluid is at specification and appears clean. What is the MOST likely cause?

- A. The power steering pump requires replacement due to internal wear at cold startup
- B. Cold fluid is more viscous and creates noise until it warms to operating temperature
- C. The serpentine belt is glazed and slips on the pump pulley during cold operation
- D. The pressure relief valve is sticking during cold operation before warm-up cycle

9. An EPS-equipped vehicle has a scan tool DTC for "Steering angle sensor not calibrated." The vehicle has had no recent service. What is MOST likely the cause?

- A. The EPS control module has failed and requires complete replacement before service
- B. The steering angle sensor has failed internally and requires immediate replacement
- C. The ABS control module has lost communication with the SAS during driving
- D. The battery was disconnected for an extended period, clearing SAS calibration

10. A recirculating ball gearbox has been adjusted per specification. The steering wheel feels tight at the center position but loose at full lock. What does this indicate?

- A. The sector shaft adjustment is set too tight and must be loosened slightly
- B. The worm shaft bearing preload is set too tight at the input side of the gear
- C. The sector teeth are worn — the gear operates at center 95% of the time normally
- D. The pitman arm is loose on the sector shaft and requires retorquing to specification

11. A technician is servicing the power steering system on a Honda vehicle. The reservoir fluid has been topped off with generic universal power steering fluid from a quick-lube shop 3 months ago. The customer complains of whining and reduced assist. Which is the correct action?

- A. Flush the system with Honda-specified PSF and inspect for seal damage that may require rack replacement
- B. Add additional generic PSF to top off the system to the full mark and monitor for improvement
- C. Replace the power steering pump because the generic fluid has worn the pump internally
- D. Drain and refill with OE Honda PSF while verifying that no internal damage has occurred

12. A hydraulic rack and pinion is being replaced. After installation and bleeding, the technician notices the steering wheel is 180° off-center when the road wheels point straight ahead. What went wrong?

- A. The power steering fluid was not bled completely during the initial system bleeding
- B. The intermediate shaft was installed 180° out of phase during the installation procedure
- C. The steering angle sensor requires calibration to correct the off-center condition
- D. The rack was installed with its internal centering offset from factory specification

### **SUSPENSION SYSTEMS DIAGNOSIS AND REPAIR (Questions 13–24)**

13. A customer complains of clunking from the front suspension at highway speed while driving over expansion joints. The clunking disappears at speeds below 40 mph. What is MOST likely the cause?

- A. Worn front lower ball joints causing noise during suspension travel at any speed
- B. Worn control arm bushings allowing fore-aft shift during bump impacts at speed
- C. A worn strut bearing causing friction during steering wheel rotation only
- D. Failed strut dampers unable to control high-frequency bump input at highway speed

14. A MacPherson strut is being replaced on the front axle of a vehicle. The new strut is installed on only the left side. The opposite strut has 80,000 miles on it. What is the correct action?

- A. Replace the right strut also — struts are replaced in pairs on the same axle
- B. Leave the right strut in service and perform an alignment after the left replacement
- C. Inspect the right strut and replace only if external fluid leakage is observed
- D. Replace the right strut with a used strut from a matching vehicle to save cost

15. An air suspension vehicle has all four corners dropped after sitting overnight. The compressor runs for approximately 10 minutes upon startup to restore ride height. The corners then remain stable during the day. Which is MOST likely the cause?

- A. The compressor has failed internally and cannot produce sufficient pressure for service
- B. The air suspension module has a software fault requiring reprogramming from the manufacturer
- C. Multiple slow leaks at the air springs or plumbing affecting all four corners from aging
- D. The ride height sensors have failed simultaneously on all four corners of the vehicle

16. A ball joint wear indicator is being inspected at curb height. The grease fitting is flush with the housing surface. Specification states the indicator should be at or above the housing surface. What does this indicate?

- A. The joint is operating normally — flush alignment is within specification tolerance
- B. The joint requires additional grease — the fitting has receded from lubrication loss
- C. The inspection must be performed with the vehicle on a lift with wheels hanging
- D. The joint has reached its wear limit and requires replacement before further service

17. A pickup truck with torsion bar suspension sits 1.5 inches below ride height specification on both sides. The customer has not added cargo or modifications. Which is the correct action?

- A. Replace both torsion bars because the preload adjustment range is exceeded from aging
- B. Adjust both torsion bar preload adjusters at curb weight on the ground to raise ride height
- C. Adjust the torsion bar preload adjusters with the vehicle on a lift for better access
- D. Swap the torsion bars left-to-right to redistribute the preload across the vehicle

18. A leaf spring rear suspension shows visible play at the rear shackle bushings on one side. The customer reports clunking on bumps and direction changes. What is the correct repair?

- A. Replace the shackle bushings on both sides of the axle to maintain matched wear rate
- B. Replace only the affected side shackle bushings to save cost and material
- C. Install new grease fittings in the shackle to lubricate the bushings from within
- D. Tighten the shackle retaining bolts to eliminate the play during the inspection

19. A subframe centering procedure uses alignment pins through the subframe and body. After pin insertion, the subframe mounting bolts should be:

- A. Left loose or hand-snug to prevent damage to the pins during subframe positioning
- B. Torqued to final specification immediately after the pins are inserted at once
- C. Torqued to final specification while the pins are still inserted for positive location
- D. Removed from the subframe completely to allow floating during the centering process

20. An adaptive damping system has a fault code for "front right damper circuit short to ground." The technician verifies the wiring is not damaged. What is the correct repair approach?

- A. Replace the suspension control module because the output driver has failed short
- B. Reset the fault code and road test to see if the condition returns during normal operation
- C. Replace only the front right damper since the short is at the damper end of circuit
- D. Replace both front dampers as a pair since dampers are serviced in matched pairs

21. A multi-link rear suspension has had its upper lateral link replaced. The rear toe cannot be adjusted within specification after the repair. Which is MOST likely the cause?

- A. The rear shock absorbers require replacement before the toe adjustment can succeed
- B. The alignment equipment requires recalibration after the rear suspension component service
- C. The wrong part was installed — the new link has incorrect length from original specification

D. The rear subframe must be centered with pins before the alignment can be completed

22. A stabilizer bar end link is being replaced on a vehicle. The new link has a ball stud at each end with rubber bushings. The correct torque practice is:

A. Torque the fasteners at ride height with the suspension loaded to the curb weight

B. Torque the fasteners on a two-post lift with wheels hanging freely during service

C. Apply thread locker and torque to 1.5x specification to prevent loosening in use

D. Leave the fasteners snug to allow the link to self-position during road driving

23. A coil spring is being compressed with a proper spring compressor. The strut mount retaining nut has been removed. The technician observes the spring has expanded slightly — perhaps 0.5 inch. What does this indicate?

A. The service is complete and the upper mount can be removed from the strut

B. The spring rate has changed from aging and requires replacement immediately

C. The strut shaft is damaged and cannot support the compressor load during service

D. The compressor has slipped or is not engaged deeply enough to fully capture the spring

24. A customer complains of a harsh ride that has developed progressively over the past 2 months. Tire pressures are correct and ride height is within specification at all four corners. What is MOST likely the cause?

A. The tires have worn unevenly and developed a rougher riding pattern over time

B. Shock absorbers or struts have failed internally and lost their damping capability

C. The stabilizer bar bushings have deteriorated causing increased suspension harshness

D. The alignment has drifted out of specification causing asymmetric tire contact patch

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

25. A vehicle has front alignment readings: Left camber  $+0.1^\circ$ , Right camber  $+1.4^\circ$ , both within spec tolerance. The customer complains of a pull to the right at highway speed. What is the cause?

- A. Cross-camber of  $1.3^\circ$  with the more-positive side producing a rightward pull direction
- B. Cross-caster between left and right sides is causing the pull at highway speed only
- C. The positive camber readings are causing inside-edge tire wear producing the pull
- D. Front toe setting is out of specification — both readings show positive individual camber

26. A vehicle has front caster readings of Left  $+3.5^\circ$  and Right  $+4.7^\circ$ . Camber readings are within specification on both sides. The vehicle pulls to the left at highway speed. Why?

- A. The caster is outside specification on both sides and must be adjusted to correct
- B. Cross-camber is creating the pull direction despite caster imbalance being present
- C. Caster is higher on the right — the vehicle pulls toward the less-caster (left) side
- D. Normal road crown compensation causes the pull and the alignment is not at fault

27. Excessive toe-in at the front wheels produces which tire wear pattern?

- A. Inside-edge wear with a smooth pattern across both sides of tire tread surface area
- B. Center tread wear with minimal shoulder wear visible on either edge of the tire
- C. Cupped or scalloped pattern around the tire circumference at highway speed driving
- D. Outside-edge wear with feathering ramping up from outside toward the inside edge

28. A vehicle with MacPherson strut front suspension has a camber reading  $1.2^\circ$  more negative than specification on one side only. No factory adjustment is available. What is the correct action?

- A. Leave the camber out of specification and document the condition on the alignment printout

- B. Install an aftermarket camber adjustment kit or inspect/repair the underlying cause
- C. Swap the strut assemblies from left to right to equalize the camber between sides
- D. Reduce the tire pressure on the affected side to compensate for the negative camber

29. Thrust angle on a vehicle reads  $+0.5^\circ$ . Total rear toe is within specification. What does this indicate?

- A. The left and right rear toe settings are asymmetric creating a non-zero thrust angle
- B. The rear alignment is correct because total rear toe is within the specification value
- C. The front toe must be readjusted to compensate for the rear thrust angle offset
- D. The alignment equipment requires calibration before accurate measurements are taken

30. A vehicle is on an alignment rack. The technician has performed wheel runout compensation. What is the next correct step?

- A. Perform the front caster sweep before any other alignment angles are measured
- B. Adjust the front toe to center the steering wheel before any other alignment work
- C. Take initial measurements of all alignment angles to establish current baseline values
- D. Lock the turn plates and slip plates to prevent motion during the measurement cycle

31. A vehicle has had an alignment performed. The steering wheel was re-centered during the front toe adjustment. The vehicle has lane-keep assist. Which calibration is required?

- A. Only the ABS module requires calibration after alignment service is completed
- B. The steering angle sensor and typically the ADAS forward camera require calibration
- C. Only the tire pressure monitoring system requires a reset after the alignment work
- D. No calibration is needed because the alignment only affected the physical toe setting

32. A FWD vehicle with torsion beam rear suspension has rear toe reading out of specification on one side only. Adjustment is not possible — torsion beam suspensions typically have no rear toe adjustment. What is the correct action?

- A. Adjust the front toe to compensate for the rear asymmetry and document on the printout
- B. Install aftermarket adjustable torsion beam mounts to create rear toe adjustment capability
- C. Rotate the tires to equalize wear patterns caused by the rear toe being out of specification
- D. Inspect the torsion beam and trailing arm for bent or damaged conditions — replace as needed

33. A steering angle sensor has been replaced during service. After installation, the SAS warning light stays illuminated. What is the next correct step?

- A. Perform the manufacturer-specified SAS calibration procedure using an OE scan tool
- B. Drive the vehicle at highway speed for 30 minutes to allow automatic relearn cycle
- C. Disconnect the battery for 30 minutes to force a module reset and automatic relearn
- D. Replace the new SAS because it is defective and is producing the warning condition

34. A vehicle's alignment printout shows included angles of Left  $13.0^\circ$  and Right  $13.8^\circ$ . Camber is within specification on both sides. Specification is  $13.0^\circ \pm 0.5^\circ$ . What does this indicate?

- A. The alignment equipment requires calibration before accurate measurements can be taken
- B. Tire pressures are different between the two sides causing apparent included angle shift
- C. The right steering knuckle is likely bent from an impact — the included angle difference exceeds tolerance
- D. The ride height is different between the two sides causing the included angle difference

35. A vehicle's alignment is completed. The printout shows: Front camber both sides within spec, front caster both sides within spec, front toe  $+0.10^\circ$  total within spec, rear toe symmetric within spec, thrust angle  $0.02^\circ$ . What does the thrust angle confirm?

- A. The steering wheel will be off-center when the vehicle is driven straight on level road
- B. The rear toe settings are essentially symmetric and the thrust line matches centerline
- C. The front toe has been adjusted correctly to center the steering wheel during driving
- D. The vehicle has no setback at either axle based on the thrust angle measurement

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

36. A direct TPMS sensor has stopped reporting data to the vehicle. The scan tool shows the sensor as "not responding." The tire pressure gauge reading is correct. What is MOST likely the cause?

- A. The TPMS sensor battery has failed — typical battery life is 5–10 years on direct sensors
- B. The tire pressure is low enough that the sensor has deactivated to conserve battery power
- C. The TPMS module has lost communication with this specific wheel's sensor temporarily
- D. The wheel speed sensor at that corner has failed affecting TPMS direct sensor communication

37. A vehicle's direct TPMS has been serviced — tires were rotated front-to-rear. After the rotation, the dashboard display shows each tire pressure at the wrong wheel position. What is the correct action?

- A. Perform a scan tool reset of the TPMS module to clear the old position memory
- B. Drive the vehicle at highway speed for 30 continuous minutes to trigger auto-relearn
- C. Replace all four sensors with new units programmed to the vehicle's VIN identifier
- D. Perform the vehicle-specific TPMS relearn procedure to teach the module new positions

38. A wheel-and-tire assembly has been balanced on a modern balancer. The readings show 0.25 oz at the inner position and 0.25 oz at the outer position, located at opposite 180° rim positions. What is the correct action?

- A. The assembly requires additional balancing — both readings exceed the residual specification
- B. The assembly has only static imbalance that can be corrected in a single weight position
- C. The assembly is within acceptable residual balance tolerance — no additional correction needed
- D. The assembly has dynamic imbalance requiring weights at both rim edges for correction

39. A tire sidewall reads "P225/50R17 94V." What does the "V" at the end of the code indicate?

- A. The tire's aspect ratio expressed as a percentage of the section width in millimeters

- B. The tire's maximum sustained speed rating for continuous operation at rated pressure
- C. The tire's load index specifying maximum load at the rated inflation pressure value
- D. The tire's construction type indicating vertical or voided tread pattern for water channeling

40. A wheel hub assembly replacement is being performed. The axle nut specification is 240 ft-lb + 45°. The technician torques to 240 ft-lb and skips the 45° rotation. What is the likely consequence?

- A. The wheel bearing will have insufficient preload causing excessive play and eventual failure
- B. The brake rotor will develop excessive runout from insufficient hub seating during installation
- C. The axle nut will loosen during driving due to vibration at highway speed operation
- D. The axle seal will fail from insufficient compression against the hub mating surface face

## Practice Exam 12: Answer Key and Explanations

1. D — Positive caster produces self-centering torque at the steering wheel (the contact patch trails the steering axis, like a shopping cart wheel). When caster drops below specification, that self-centering force is reduced or lost. The vehicle still tracks straight because alignment is otherwise correct, but the wheel won't return to center after a turn — a classic low-caster symptom.

2. C — Battery disconnect clears certain EPS learned values, and the system operates in reduced-assist mode until the manufacturer-specified initialization procedure is performed. This procedure may involve scan tool commands or specific steering-wheel cycling sequences. Skipping initialization after battery service is one of the most common causes of post-service EPS warnings.

3. A — The dry park test isolates free-play in the steering linkage. While an assistant rocks the wheel, the technician can visually identify which joint (inner tie rod, outer tie rod, idler arm, ball stud) is actually moving independently of the others. Strut bearings and column U-joints produce different noise patterns tested by different methods.

4. B — Death wobble on solid-axle vehicles is almost always caused by combined wear in track bar bushings, tie rod ends, and front ball joints working together. The steering damper only masks the symptom temporarily. Replacing just the damper without addressing the underlying component wear guarantees the problem returns within weeks as the new damper wears out.

5. D — Worn power steering pumps often show their wear most dramatically as the system warms up. Fluid thins at operating temperature, and the worn clearances (vanes, cam ring) cannot maintain proper output pressure with thinner fluid. The symptom of "normal cold, hard when warm" is a classic signature of a pump approaching end of life.

6. A — The centering tab or tape locks the clockspring at its centered position during shipping and installation, preventing accidental rotation that would put the internal ribbon cable at one of its travel limits. The tab is removed after the steering wheel is installed — removing it before installation risks uncentering the clockspring during handling.

7. C — High-pressure hoses are rated for pressure, not sustained exposure to exhaust heat. A hose routed 2 inches from an exhaust manifold will gradually degrade and eventually rupture or weep fluid onto the hot surface — creating both a fire hazard and the burning smell the customer reports. The permanent fix is rerouting away from the heat source.

8. B — Cold fluid has higher viscosity and produces more turbulence as the pump tries to pump it through the system, creating a temporary noise. As the fluid warms and thins, the noise disappears. This is normal behavior for most hydraulic power steering systems in cold weather, not an indication of pump failure or belt issues.

9. D — Extended battery disconnect clears certain learned values, including SAS calibration, even without service activity. The SAS then reports as "not calibrated" until the manufacturer's calibration procedure is performed. This can happen after long vehicle storage, a dead battery, or any extended power loss — not just during formal service.

10. C — Worn sector teeth at the center position produce the "tight at center, loose at lock" pattern. The gearbox operates 95% of driving time at or near center, wearing those teeth first. Away from center, the teeth are still good. Attempting to adjust out the looseness tightens the center position excessively — gearbox replacement or rebuild is the correct repair.

11. A — Generic universal PSF can damage Honda rack seals over time. The 3-month gap between fluid addition and symptoms fits the timeline of seal degradation. The correct action is flushing with OE Honda PSF, but also inspecting for seal damage that may have already occurred — the rack may require replacement if internal seals are compromised.

12. B — Most intermediate shafts can physically install in two orientations 180° apart. When the shaft is installed out of phase, the steering wheel ends up rotated 180° from straight ahead with the road wheels straight — exactly the symptom described. Reference-marking before disassembly prevents this; the fix is always repeat disassembly and proper indexing.

13. D — Failed strut dampers lose high-frequency response before losing low-frequency capability. At highway speed over expansion joints, the damper cannot control rapid rebound, producing a clunk. At lower speeds, the inputs are slower and the damper can still manage them. Speed-dependent clunking over expansion joints is the specific signature of worn struts.

14. A — Struts must be replaced in pairs on the same axle to maintain matched damping characteristics. A new strut paired with an 80,000-mile strut produces asymmetric damping that the chassis cannot balance, resulting in uneven ride and handling. This is standard industry practice — single-side strut replacement produces customer complaints within weeks.

15. C — Multiple slow leaks across all four air springs is a common aging pattern on air-suspension vehicles. The 10-minute startup recovery and stable daytime operation indicates small, bilateral leaks that the running system can compensate for. Individual component failures (compressor, module, sensors) produce different, more isolated symptom patterns.

16. D — When the wear indicator (grease fitting) is flush with the housing surface on a load-carrying ball joint, the joint has reached its wear limit and requires replacement. Only an indicator that projects above the housing is acceptable. Inspection must be performed at curb height with the joint loaded — a lift unloads the joint and produces false readings.

17. B — Torsion bar ride height adjustment must be performed with the vehicle at curb weight on level ground, with all suspension components in their normal loaded positions. Adjustment on a lift with wheels hanging produces incorrect preload. Replacement is only needed if the adjustment range is exhausted; swapping bars left-to-right causes eventual fracture.

18. A — Shackle bushings and related leaf spring hardware should be replaced in pairs on the same axle to maintain matched wear rates. Replacing only one side leaves the other side about to fail, producing a repeat service visit within months. Lubrication fittings on shackles are rare and don't address existing bushing wear; tightening doesn't eliminate worn rubber.

19. C — During subframe centering, the alignment pins position the subframe correctly while the mounting bolts are torqued to final specification. The bolts must be tightened while the pins are still in place — once bolts are tight, the subframe is locked in the pin-aligned position. Pins are removed after torque is complete.

20. D — Adaptive dampers must be replaced in pairs on the same axle regardless of which side shows the fault. Asymmetric damping characteristics from mismatched-age dampers cannot be compensated by the control module and produce unpredictable handling. The standard practice is pair replacement for all electronically controlled damping systems.

21. C — When a replacement link won't allow toe adjustment within specification, the most common cause is the wrong part — either incorrect part number, incorrect length, or aftermarket substitute with different geometry. Subframe centering and equipment calibration are less common issues; shock replacement doesn't affect toe adjustment range.

22. A — Stabilizer end link fasteners with rubber bushings must be torqued at ride height with the suspension loaded. Torquing with wheels hanging preloads the bushings in a twisted position, accelerating wear. Thread locker applied beyond specification damages threads; hand-snug fasteners will loosen during operation. Ride-height torque is the correct practice.

23. D — When a properly engaged spring compressor is in place, the compressed spring stays fully captured when the strut mount nut is removed — no expansion. A 0.5-inch expansion indicates the compressor has slipped or is not engaged deeply enough. The service must be stopped and the compressor re-engaged before proceeding; continuing risks catastrophic spring release.

24. B — Progressive ride harshness over weeks or months with correct tire pressure and correct ride height points to shock or strut failure — internal damper damage means they can no longer absorb energy smoothly. Bushings, bar bushings, and alignment issues produce different symptom patterns. Shock/strut replacement is the indicated repair.

25. A — Cross-camber (side-to-side camber difference) of  $1.3^\circ$  is significant enough to produce a clear pull toward the more-positive side (right in this case). Individual values within tolerance don't guarantee no pull — cross-camber drives pull behavior. Memorize: camber pulls toward the more-positive side (more positive camber = more pull to that side).

26. C — Caster imbalance produces pull toward the LESS-caster side (opposite of camber pull direction). With left caster at  $3.5^\circ$  and right at  $4.7^\circ$ , the left side has less caster, so the pull goes left. Caster pulls toward the less-caster side because that side has weaker self-centering force. This is the opposite relationship from camber and is a core A4 rule.

27. D — Excessive toe-in causes the tires to scrub outward as they roll, producing outside-edge wear with feathering that ramps up from outside toward the inside. Running a hand across the tread feels catchy in one direction, smooth in the other. Toe-in signature: outside-edge feathering. Toe-out signature: inside-edge feathering.

28. B — When a MacPherson strut vehicle has no factory camber adjustment and reading is out of spec, correct actions are installing aftermarket camber adjustment hardware (offset bolts, slotted plates) or inspecting and repairing the underlying cause (bent strut, failed mount). Leaving the reading out of spec, compensating with pressure, or swapping sides are all unacceptable approaches.

29. A — Thrust angle of  $0.5^\circ$  with total rear toe within specification means the left and right rear toe readings are asymmetric — one rear wheel toes in more than the other, creating the thrust offset. Total toe being in spec doesn't guarantee symmetry. The vehicle will crab, and the steering wheel will sit off-center during straight driving.

30. C — After wheel runout compensation, the next step is taking initial measurements of all alignment angles (camber, caster, toe, thrust angle, SAI, included angle) to establish the starting baseline before making any adjustments. The caster sweep is typically part of the initial measurement process; toe adjustment and turn plate locking come later in the procedure.

31. B — Alignment that re-centered the steering wheel invalidates the SAS's learned zero-point, and ADAS forward cameras on lane-keep-equipped vehicles typically require calibration after alignment because the system depends on accurate geometry references. Both the SAS and the forward camera typically need calibration after this type of service.

32. D — Torsion beam rear suspensions have no rear toe adjustment. An out-of-spec reading on one side means the beam is bent or the trailing arm is damaged — requiring component replacement, not adjustment. Compensating at the front, installing aftermarket adjustable mounts, or tire rotation all miss the actual problem (bent component).

33. A — After any SAS replacement, the manufacturer-specified calibration procedure must be performed using an OE scan tool (or equivalent capable of SAS calibration). Highway drives and battery disconnects do not substitute for the formal calibration procedure. Replacing the new SAS before attempting calibration assumes defect without diagnosis.

34. C — Side-to-side included angle difference of  $0.8^\circ$  exceeds the typical  $0.5^\circ$  tolerance — the signature of a bent steering knuckle. Included angle = SAI + camber; when camber is equal side-to-side but included angles differ, the knuckle casting itself is bent. The right knuckle requires replacement before valid alignment is possible.

35. B — Thrust angle of  $0.02^\circ$  (essentially zero) confirms the rear toe settings are symmetric and the thrust line matches the geometric centerline. This is the specific function of the thrust angle reading: it validates rear axle symmetry. Thrust angle does not directly confirm steering wheel position, front toe accuracy, or setback.

36. A — Direct TPMS sensor batteries have a typical service life of 5–10 years. "Not responding" from one sensor with normal actual tire pressure is almost always battery failure — the sensor can no longer transmit. Replacement and relearn are the repair. Low pressure would show a different fault pattern; wheel speed sensors don't affect direct TPMS communication.

37. D — Direct TPMS systems must undergo a vehicle-specific relearn procedure after tire rotation to update which sensor ID is assigned to which wheel position. Without the relearn, the module continues to associate each sensor with its previous position, producing the "wrong position" display. Highway drives and module resets don't substitute for the specific procedure.

38. C — Weights of 0.25 oz at both rim edges is within the acceptable residual balance tolerance for passenger vehicles (typically 0.25–0.5 oz). No additional correction is needed. Recognizing when measurements are within tolerance — even when not zero — is as important as identifying abnormal readings during balance service.

39. B — The letter at the end of the tire size code is the speed rating. "V" = 149 mph maximum sustained speed. Speed ratings are not interchangeable — always replace tires with at least the same speed rating as OE, never lower. The aspect ratio, load index, and construction details are separate elements of the tire code.

40. A — Torque-plus-angle axle nut specifications must be completed in full. Torquing to 240 ft-lb without the additional 45° rotation means the nut has not stretched to its final preload, leaving the bearing under-preloaded. Excessive play develops, leading to premature bearing failure. The complete specification is mandatory, not optional.