

PRACTICE EXAM 23: ASE A4 SIMULATION

(40 QUESTIONS)

STEERING SYSTEMS DIAGNOSIS AND REPAIR (Questions 1–12)

1. A power steering pressure test produces: idle pressure 75 psi, relief pressure (valve closed) 1,150 psi, full-lock pressure 800 psi. Specification is 50–100 psi at idle and 1,200 psi at relief. What does this test indicate?

- A. All three readings are within specification and the system is operating normally during the service check
- B. The idle pressure is below specification indicating a worn pump requiring replacement during service visit
- C. The relief pressure exceeds specification indicating a stuck relief valve requiring replacement during service
- D. The rack has internal bypass — pump reaches relief pressure but rack cannot reach same pressure at lock

2. A voltage drop test on an EPS power feed reads 0.85 V with the steering wheel at full lock on a parking surface. Specification is under 0.5 V. What does this indicate?

- A. The EPS power supply circuit is functioning within specification tolerance for normal service operation today
- B. The EPS power circuit has excessive resistance — wiring, connections, or ground path needs repair service
- C. The battery voltage is too low causing the EPS module to draw excessive current during the test procedure
- D. The alternator is not providing adequate charging voltage during the commanded test procedure today

3. A recirculating ball gearbox input shaft rotational torque reads 14 in-lb. Specification is 6–10 in-lb. What is the correct action?

- A. Loosen the sector shaft adjuster until the reading reaches 6–10 in-lb as specified during the adjustment procedure
- B. Tighten the sector shaft adjuster further to increase torque to 16 in-lb and verify the reading is within spec
- C. Leave the setting as measured because 14 in-lb exceeds the minimum specification and is acceptable for service
- D. Replace the gearbox because the sector teeth cannot produce proper preload at the current setting during service

4. A rack and pinion pressure spring preload reads 8 in-lb. Specification is 4–6 in-lb. What is the correct action?

- A. The preload is within the acceptable service tolerance and does not require adjustment during service today
- B. Tighten the adjuster further to increase preload to 10 in-lb to ensure adequate preload during service operation
- C. Loosen the pressure spring adjuster until the reading reaches 4–6 in-lb as specified during the adjustment
- D. Replace the rack assembly because the pressure spring cannot produce proper preload at the current setting

5. A torque sensor produces: Channel A 2.48 V and Channel B 2.52 V at rest. Specification states the two channels must read within 0.10 V of each other at rest. What is the correct interpretation?

- A. The readings are outside specification by a small margin — recalibrate the torque sensor using scan tool procedure
- B. The readings are within the 0.10 V specification tolerance and the sensor is operating normally during the test
- C. The readings differ too much — replace the rack and pinion assembly due to integrated torque sensor failure

D. The readings differ enough to trigger a DTC — the EPS module will likely throw a fault during normal operation

6. A steering damper is being tested by stroking slowly by hand. The technician notes moderate resistance for the first half of the stroke, then no resistance for the second half. What does this indicate?

A. The damper is operating normally and the varied resistance is typical for aged dampers during service testing

B. The damper requires additional fluid through the fill port to restore consistent resistance during the service

C. The damper is within tolerance but approaching end of service life — monitor at next service interval

D. The damper has failed internally and requires replacement — consistent resistance should be felt throughout stroke

7. A power steering fluid temperature reads 240°F during heavy steering use at highway speed. Specification maximum is 250°F. What is the correct interpretation?

A. The fluid temperature is within specification but approaching the maximum limit — investigate potential causes

B. The fluid temperature exceeds specification and requires immediate replacement of the fluid during the service

C. The fluid temperature is below specification and the system is operating normally during the service today

D. The fluid temperature is above specification and indicates a failed cooler requiring replacement during service

8. A hydraulic power steering pump output pressure reads 1,220 psi at relief. Specification is 1,200 psi. What is the correct interpretation?

A. The pressure exceeds specification and requires pump replacement during the service visit to correct issue

B. The relief valve is stuck in the closed position causing the pressure to exceed the normal specification value

C. The reading is within normal tolerance — 20 psi above specification is acceptable for modern pumps during service

D. The pressure is too high and requires adjustment of the relief valve setting during the service visit today

9. A voltage drop test on the EPS ground circuit reads 0.15 V with the steering wheel at full lock. Specification is under 0.3 V. What does this indicate?

A. The ground circuit has excessive resistance — repair the ground connection before returning to service today

B. The ground circuit is functioning within specification and is acceptable for normal EPS operation during service

C. The ground is within acceptable range but should be monitored at next service interval for future issues

D. The ground circuit is below specification and requires additional grounding straps to be installed for service

10. A power steering pump pressure test shows 600 psi when the shut-off valve is closed. Specification is 1,200 psi at relief. What does this indicate?

A. The pump is producing pressure within normal tolerance during the static test of the system today

B. The relief valve has failed in the closed position preventing the pressure from exceeding the specification limit

C. The high-pressure hose has a restriction preventing the pressure from building during the test procedure

D. The pump is worn or the relief valve is stuck open — pump or relief valve replacement is required today

11. A clockspring centering procedure requires rotating the clockspring clockwise to its stop, then counterclockwise 2.5 turns. After the procedure, the clockspring is installed. The steering wheel is then rotated lock-to-lock and shows 3 turns to the right and 2 turns to the left. What is the MOST likely cause?

- A. The clockspring centering procedure was performed correctly and the uneven turn counts are normal during service
- B. The rack and pinion has been installed off-center causing the uneven steering wheel rotation during the procedure
- C. The clockspring was centered but the steering wheel was installed with the road wheels turned to the right
- D. The centering procedure was performed incorrectly and the clockspring is not centered after the installation

12. A recirculating ball gearbox has been adjusted. The technician verifies the preload by turning the input shaft 360° in both directions. The torque reading varies from 6 in-lb to 9 in-lb throughout the rotation. Specification is 6–10 in-lb. What does this indicate?

- A. The gearbox is within specification tolerance — the torque variation through rotation is acceptable during service
- B. The preload is too high at the high point — the gearbox will bind at that position during normal service operation
- C. The preload is too low at the low point — the gearbox will have free play at that position during service operation
- D. The preload variation indicates uneven wear — the gearbox should be replaced during this service visit today

SUSPENSION SYSTEMS DIAGNOSIS AND REPAIR (Questions 13–24)

13. A ball joint wear indicator at curb height shows the grease fitting receding 1/16 inch below the housing surface. Specification states the indicator must be at or above the housing. What is the correct action?

- A. The ball joint is within acceptable wear limits for service — monitor at the next service interval during visit
- B. Add grease to the ball joint to extend its service life before any replacement is needed during service today

C. Replace the ball joint immediately — the indicator is below the housing surface indicating wear beyond limits

D. The ball joint has reached its wear limit and requires replacement — the indicator position is below specification

14. A ride height measurement at the left front reads 14.2 inches. Specification is 14.5 inches \pm 0.5 inches. The right front reads 14.7 inches. Side-to-side tolerance is 0.5 inches. What is the correct interpretation?

A. Both readings are within individual specification tolerance and the side-to-side difference is acceptable during service

B. The left front is below specification tolerance and requires suspension inspection before continuing any alignment service

C. The right front is above specification tolerance and requires suspension inspection before continuing any service

D. The side-to-side difference exceeds tolerance and requires suspension inspection before continuing any alignment service

15. A torsion bar ride height measures 36.5 inches. Specification is 36.0 inches \pm 0.25 inches. What is the correct action?

A. The ride height is within specification tolerance — no adjustment is needed during the service visit today

B. Tighten the torsion bar adjuster to raise ride height further to the next specification increment for service

C. Loosen the torsion bar adjuster to lower ride height to specification at curb weight on level ground

D. Replace the torsion bars because the preload adjustment range is exceeded at the current ride height today

16. A shock absorber bounce test produces 1 complete rebound cycle before the vehicle settles at each corner. What does this indicate?

- A. The shock absorbers are functioning normally — one rebound cycle is the correct response for healthy shocks
- B. The shock absorbers are over-damped and will produce a harsh ride during normal driving conditions today
- C. The shock absorbers are under-damped and will produce excessive bounce during normal driving conditions today
- D. The shock absorbers require replacement because a single rebound indicates inadequate damping capability

17. A coil spring rate tests at 295 lb/in at 2 inches of compression. Specification is 310 lb/in \pm 15 lb/in. What is the correct interpretation?

- A. The spring is below specification and requires replacement to restore correct spring rate during the service
- B. The spring is within acceptable tolerance — 15 lb/in below nominal is at the lower spec limit during service
- C. The spring rate increases under additional compression — further testing is required for accurate assessment
- D. The spring rate is within the 15 lb/in tolerance range on the low side — acceptable for continued service use

18. A spring compressor is being used during strut disassembly. The manufacturer specifies 7 coils of engagement minimum. The current engagement is 6 coils. What is the correct action?

- A. The engagement is acceptable — 6 coils is within normal tolerance for most spring compressors during service use
- B. Adjust the compressor to engage at least 7 coils as specified before proceeding with the strut disassembly work
- C. Proceed with the disassembly — the spring will remain captured during service with minimal expansion observed
- D. The engagement is too deep — reduce to exactly 7 coils for the manufacturer-specified engagement during service

19. An air suspension ride height sensor output reads 3.2 V at ride height. Specification is 4.5–4.8 V. What does this indicate?

- A. The sensor output is below specification — the sensor has failed or the linkage arm has broken at the corner
- B. The sensor output is within tolerance — 3.2 V is the correct reading for the service position during operation
- C. The sensor requires calibration to bring the output within the specification range during the service visit today
- D. The ride height is above specification — adjust ride height to lower position before checking the sensor output

20. An adaptive damper command signal from the module reads 1.5 A. The actual damper current draw reads 1.45 A. Specification states actual current must be within 0.1 A of commanded. What is the correct interpretation?

- A. The actual current is too close to the commanded value — indicating a shorted circuit in the damper today
- B. The actual current is too far below commanded value — the damper requires replacement during service today
- C. The actual current is within the 0.1 A specification tolerance — the damper is functioning normally during test
- D. The actual current exceeds the commanded value — the damper has an internal short requiring replacement today

21. A wear-indicator ball joint shows the grease fitting projecting 3/16 inch above the housing surface at curb height. Specification states the indicator must be at or above the housing surface. What does this indicate?

- A. The ball joint has reached its wear limit and requires replacement before continuing service on the vehicle today
- B. The ball joint is within acceptable wear limits — the indicator projects above the housing surface as specified

C. The wear indicator requires cleaning for an accurate reading — remove debris before making a service decision

D. The ball joint inspection must be performed on a lift with wheels hanging for accurate reading during service

22. A torque-to-yield subframe bolt is being torqued. Specification is 85 ft-lb + 90°. The technician torques to 85 ft-lb and skips the 90° rotation. What is the likely consequence?

A. The bolt will loosen during driving from vibration at highway speed during normal operation of the vehicle today

B. The bolt will be over-torqued and may fail from excessive clamping force during the normal service operation

C. The bolt will fail during the next service interval from insufficient clamping applied during the initial torque

D. The subframe will not be properly clamped — insufficient clamping force can allow subframe shift during driving

23. A stabilizer bar end link axial play measures 0.025 inch. Specification is 0.030 inch maximum. What is the correct action?

A. Replace the end link — the axial play is at specification limit and will progress to failure during service today

B. Tighten the ball stud retaining nut to reduce the axial play below the measurement during the service today

C. The end link is within the 0.030 inch specification tolerance — acceptable for continued service during this visit

D. The end link requires lubrication to reduce the axial play before the vehicle is returned to service today

24. A leaf spring U-bolt torque specification is 120 ft-lb. The technician torques to 140 ft-lb to "ensure adequate clamping." What is the likely consequence?

- A. The excessive torque may stretch the U-bolt threads beyond their designed clamping range — loose U-bolts in service
- B. The U-bolt will be properly clamped and the 20 ft-lb over-specification is safe during the normal service operation
- C. The U-bolt will bind during torque — the technician should stop at 120 ft-lb per specification during the service
- D. The U-bolt will operate normally — over-torque is a common practice to ensure adequate clamping during service

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

25. A vehicle has front camber readings: Left $+0.3^\circ$, Right -0.4° . Camber specification is $0^\circ \pm 0.75^\circ$. Cross-camber specification is 0.75° maximum. What is the interpretation?

- A. Both individual readings are within specification and cross-camber is within tolerance at 0.7° for the service
- B. Both readings are within individual specification but cross-camber exceeds tolerance at 0.7° for the service
- C. The left reading exceeds specification tolerance and requires correction during the alignment service today
- D. The cross-camber of 0.7° is at specification limit — adjustment is needed to reduce the cross-camber value

26. A vehicle has front caster readings: Left $+3.2^\circ$, Right $+4.8^\circ$. Cross-caster specification is 0.5° maximum. What is the interpretation and expected effect?

- A. The cross-caster is within tolerance and the vehicle will track straight without any directional pull during service
- B. Cross-caster of 1.6° exceeds tolerance — the vehicle will pull toward the left (less-caster side) during driving
- C. Cross-caster of 1.6° exceeds tolerance — the vehicle will pull toward the right (more-caster side) during driving

D. The caster readings are within acceptable range for the vehicle and no adjustment is needed during the service

27. A thrust angle measurement reads $+0.18^\circ$. Specification is $0^\circ \pm 0.25^\circ$. Total rear toe is within specification. What is the correct interpretation?

A. The thrust angle is within specification tolerance — the vehicle will track along the thrust line without crabbing today

B. The thrust angle is out of specification and requires rear toe adjustment during the alignment service today

C. The thrust angle exceeds tolerance and indicates collision damage requiring frame inspection during service

D. The alignment equipment requires recalibration before the thrust angle can be considered accurate during test

28. A vehicle has SAI readings of Left 12.9° and Right 13.1° . Specification is $13.0^\circ \pm 0.5^\circ$. Camber is within specification on both sides. What does this indicate?

A. The alignment equipment requires calibration before continuing the alignment service procedures during visit

B. The ride height varies between the two sides producing the apparent SAI measurement difference on alignment

C. The steering knuckles are straight — both SAI values are within tolerance and the 0.2° difference is acceptable

D. The tire pressures differ between the two sides causing the apparent SAI measurement difference during test

29. A front toe measurement reads $+0.15^\circ$ total. Specification is $+0.10^\circ \pm 0.05^\circ$. What is the correct interpretation?

A. The total toe exceeds specification by 0.05° and requires reduction during the alignment service adjustment today

- B. The total toe is below specification and requires an increase adjustment at both tie rods during alignment service
- C. The total toe is within specification tolerance and no adjustment is required during the alignment service today
- D. The total toe is at the upper specification limit and is acceptable for continued service during the alignment work

30. A setback reading is $+0.35^\circ$. Specification is $\pm 0.25^\circ$. What does this indicate?

- A. The setback is within specification tolerance — no investigation is required during the alignment service today
- B. The setback exceeds specification — investigate for collision damage or structural shift before continuing alignment
- C. The setback is acceptable for older vehicles with higher mileage — monitor at the next service interval today
- D. The alignment equipment requires recalibration before the setback reading is considered accurate during the service

31. A front toe measurement shows Left $+0.07^\circ$ and Right $+0.08^\circ$. Specification is $+0.10^\circ$ total $\pm 0.05^\circ$. What is the correct interpretation?

- A. The total toe exceeds specification — 0.15° total is above the specification tolerance during alignment today
- B. The individual readings are too low — each tie rod requires adjustment to increase toe during the service today
- C. The total toe is below the specification minimum and requires adjustment on both tie rods during alignment
- D. The total toe is $+0.15^\circ$ and within the specification tolerance — the asymmetry between sides is acceptable

32. An included angle measurement on one side shows 14.5° . The opposite side shows 13.1° . Specification is $13.0^\circ \pm 0.5^\circ$. Camber is within specification on both sides. What does this indicate?

- A. The alignment equipment requires recalibration before continuing the alignment service procedures during visit
- B. A steering knuckle is bent — included angle difference of 1.4° exceeds tolerance indicating knuckle damage
- C. The tire pressures differ between the two sides producing the apparent included angle measurement difference
- D. The ride height varies between the two sides causing the included angle difference during the alignment service

33. A rear toe measurement shows Left $+0.10^\circ$ and Right -0.05° . The total rear toe is $+0.05^\circ$. What does the thrust angle indicate?

- A. The thrust angle is non-zero because the left and right rear toe settings are asymmetric creating a thrust offset
- B. The thrust angle is zero because total rear toe is within acceptable specification tolerance during the service
- C. The thrust angle cannot be calculated from the rear toe readings provided during the alignment service today
- D. The thrust angle is positive indicating the rear axle thrust line is aligned with the geometric centerline of vehicle

34. A wheel runout compensation procedure has been skipped during alignment. What is the likely consequence on the measurements?

- A. The alignment measurements will be accurate — compensation only affects caster readings during the procedure
- B. The alignment measurements will be accurate for toe but affected for camber and caster during the alignment
- C. All alignment measurements will be offset by the clamp offset error — compensation is required for accurate readings
- D. The alignment equipment will not allow measurements to be taken without compensation completing during test

35. A vehicle has front camber Left $+0.5^\circ$, Right $+0.3^\circ$. The vehicle pulls to the left. Based on cross-camber alone:

- A. The pull should be toward the right because the right side has less positive camber — not matching the complaint
- B. The pull is consistent with cross-camber of 0.2° — the more-positive left side produces the leftward pull today
- C. The pull should be toward the right because camber pulls toward the less-positive side during highway driving
- D. The 0.2° cross-camber is too small to produce a noticeable pull — the pull is caused by another factor today

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

36. A wheel-and-tire assembly shows 1.5 oz inner and 1.5 oz outer weights required at 180° apart. The total imbalance is evenly distributed. What does this indicate?

- A. The assembly has dynamic imbalance requiring weights at both rim edges for correction during the service today
- B. The assembly has only static imbalance that can be corrected at a single plane position during the service
- C. The assembly has radial runout requiring match-mounting to reduce the combined runout during the service today
- D. The assembly is within acceptable residual balance tolerance and no correction is needed during the service today

37. A wheel balance test shows 0.3 oz inner and 0.4 oz outer. Residual balance specification is 0.5 oz maximum at each plane. What is the correct interpretation?

- A. The assembly exceeds residual balance specification — additional correction is required during the service today
- B. The assembly is within residual balance specification — 0.3 and 0.4 oz are both below the 0.5 oz maximum for spec

C. The assembly has dynamic imbalance requiring weights at both rim edges for correction during the service today

D. The assembly has static imbalance only — correct at a single plane position during the balance service today

38. A wheel hub axle nut specification reads "240 ft-lb + 60°." The technician torques to 240 ft-lb + 45° (falls short by 15°). What is the likely consequence?

A. The axle nut will be over-torqued from the 45° rotation — excessive preload causing bearing failure during service

B. The axle nut will loosen during driving from insufficient clamping during the normal service operation today

C. The wheel bearing will have excessive preload causing immediate failure from overheating during the service

D. The wheel bearing will have insufficient preload — premature failure from inadequate clamping during service

39. A tire sidewall marking reads "DOT XXXX 4521." The last four digits represent:

A. The tire's manufacturing date — 45th week of 2021 based on the DOT week and year coding specification

B. The tire's load index — 4521 indicating maximum load capacity during the normal operating conditions today

C. The tire's speed rating expressed as a maximum sustained speed rating during the normal operation conditions

D. The tire's size code — 4521 represents diameter and aspect ratio in a specific industry format during service

40. A direct TPMS sensor reports the tire pressure as 32 psi. The placard specification is 32 psi. The tire gauge reads 36 psi at the wheel. What does this indicate?

A. The TPMS sensor is operating normally — the 4 psi difference is within normal tolerance for direct sensors today

- B. The tire pressure has changed since the TPMS reading was taken — the readings will reconcile during driving today
- C. The TPMS sensor has failed internally — reporting incorrect pressure compared to actual measured pressure value
- D. The tire pressure gauge requires calibration before making a determination about the TPMS sensor accuracy today

Practice Exam 23: Answer Key and Explanations

1. D — The pump builds within specification at relief (1,150 psi is close to 1,200 psi spec), idle is normal at 75 psi, but the rack cannot reach relief pressure at full lock (only 800 psi). This pattern — pump proven healthy, rack failing to reach relief — confirms internal bypass in the rack. The pump is good; the rack has internal seal failure. Rack replacement is required.
2. B — A voltage drop of 0.85 V under full-lock load exceeds the 0.5 V specification. This confirms excessive resistance in the EPS power supply circuit — corroded connections, undersized wire, or damaged harness. The circuit fails the test. Repair wiring and connections under voltage drop testing, not module or battery replacement.
3. A — When over-center preload reads above specification (14 in-lb vs. 6–10 in-lb spec), the sector shaft adjuster must be loosened to bring the reading within the 6–10 in-lb range. Over-tight preload causes binding, hard steering, and accelerated gear wear. Always bring preload within spec — never higher.
4. C — Rack pressure spring preload of 8 in-lb exceeds the 4–6 in-lb specification. Loosen the adjuster to bring preload within the 4–6 in-lb range. Over-tight preload causes binding, center-feel stickiness, and accelerated wear on the rack assembly. Always bring adjustments within spec, never intentionally above the range.
5. B — Torque sensor channels at 2.48 V and 2.52 V differ by only 0.04 V — well within the 0.10 V specification. The sensor is operating normally. Recognizing in-spec readings — even when values aren't identical — is a core A4 skill. No recalibration, rack replacement, or fault is indicated.
6. D — A properly functioning steering damper produces consistent resistance throughout its entire stroke. Moderate resistance followed by no resistance indicates internal failure — fluid has leaked past

the piston in the non-resistant portion of the stroke, or an internal valve has failed. Replacement is required; partial function is not acceptable service operation.

7. A — Fluid temperature at 240°F is within the 250°F specification maximum but approaching the limit. This is not yet a failure but is a warning sign that warrants investigation of potential causes — restricted cooler, inadequate airflow, excessive hold time at full lock. Addressing the cause now prevents reaching the failure threshold.

8. C — 1,220 psi at relief is within normal measurement tolerance of the 1,200 psi specification (a 20 psi difference on a hydraulic system is typical variation). The pump is operating within acceptable range. Recognizing that small variations are normal — and not every slightly-off number requires action — is a core A4 skill.

9. B — A voltage drop of 0.15 V on the EPS ground circuit is well within the 0.3 V specification. The ground circuit is functioning properly. No additional grounding or repair is needed. Recognizing in-spec measurements is as important as identifying out-of-spec conditions during voltage drop testing.

10. D — Failure to reach relief pressure (600 psi vs. 1,200 psi spec) against a closed valve confirms the pump is worn or the relief valve is stuck open. Either condition requires component repair — pump replacement or rebuild. This test is definitive for distinguishing these failures from downstream issues (rack, hose).

11. C — When the clockspring is correctly centered but the steering wheel shows asymmetric turn counts (3 right, 2 left), the steering wheel was installed with the road wheels pointing toward the side with more rotation. The wheel must be reinstalled with the road wheels straight — not turned. The clockspring centering was correct; the wheel installation was the issue.

12. A — Over-center preload that varies between 6–9 in-lb throughout rotation is within the 6–10 in-lb specification at all points. Some variation is normal due to manufacturing tolerances in sector and worm gears. The gearbox is functioning correctly. Recognizing in-spec variation is a key diagnostic skill versus interpreting variation as a fault.

13. D — When the wear indicator (grease fitting) on a load-carrying ball joint recedes below the housing surface at curb height (1/16 inch below), the joint has reached its wear limit and requires replacement. Specification states the indicator must be at or above the housing. The reading is out of specification and requires replacement.

14. A — Left front at 14.2" is within the 14.5 ± 0.5 " range (14.0–15.0" acceptable). Right front at 14.7" is also within range. Side-to-side difference of 0.5" is at the tolerance limit but not exceeding it. Both readings and the difference are within specification — service can proceed.

15. C — Torsion bar ride height of 36.5" exceeds the 36.0 ± 0.25 " specification (35.75–36.25" acceptable). The preload must be loosened to reduce ride height. Adjustment is performed at curb weight on level ground. Replacement is unnecessary unless adjustment range is exhausted.

16. A — A properly functioning shock produces ONE complete rebound cycle before settling. This is the correct response — the shock is damping the spring oscillation within one cycle. Multiple cycles indicate failed damping; no rebound indicates over-damping. One cycle is the normal, healthy response.

17. D — Spring rate of 295 lb/in is within the 310 ± 15 lb/in tolerance range (295–325 lb/in acceptable). The spring is at the lower edge of tolerance but is within specification. The spring is acceptable for continued service. Recognizing in-spec readings, even at the edge of tolerance, is a core skill.

18. B — The manufacturer specifies minimum 7 coils of engagement. Current engagement is 6 coils — below the minimum specification. This is an unsafe condition. Adjust the compressor to engage at least 7 coils before proceeding. Inadequate engagement risks the spring slipping or releasing unexpectedly during removal of components.

19. A — Ride height sensor output of 3.2 V is below the 4.5–4.8 V specification at ride height. This indicates the sensor has failed or the linkage arm has broken — both are common failures on aging air suspension systems. Replace the sensor and inspect the linkage arm. The low reading is out of range from failure, not from adjustment.

20. C — Actual current of 1.45 A vs. commanded 1.5 A differs by only 0.05 A, within the 0.1 A specification tolerance. The damper is functioning normally — commanded and actual values match within acceptable range. No replacement or repair is indicated.

21. B — When the wear indicator (grease fitting) projects ABOVE the housing surface at curb height (3/16 inch above), the joint is within acceptable wear limits. Specification states the indicator must be at or above the housing. The projecting indicator at 3/16 inch above is well within specification; the joint is healthy.

22. D — Torque-to-yield subframe bolts require completion of the full torque-plus-angle specification. Torquing to only the first-stage value without the 90° angle leaves the bolt under-clamped. The subframe is not properly clamped to the body, allowing it to shift under load — producing alignment drift and potential suspension issues over time.

23. C — End link axial play of 0.025 inch is below the 0.030 inch specification maximum. The end link is within tolerance and acceptable for continued service. Recognizing in-spec measurements is a core skill — not every end link showing measurable play requires replacement.

24. A — Overtorquing U-bolts beyond specification (140 ft-lb vs. 120 spec) stretches the threads beyond their designed clamping range. The excessive torque reduces long-term clamping force and can cause the U-bolts to loosen in service. The specification is not arbitrary — it's the correct clamping load based on the fastener design.

25. D — Cross-camber is the side-to-side camber difference: $+0.3^\circ$ minus $(-0.4^\circ) = 0.7^\circ$. This is close to the 0.75° maximum specification. The reading is just below specification limit (0.7° vs. 0.75° max), so the cross-camber is within tolerance. Adjustment is needed only if the value exceeds specification.

26. B — Cross-caster of 1.6° ($+4.8^\circ$ minus $+3.2^\circ$) far exceeds the 0.5° maximum specification. Caster pull direction goes toward the LESS-caster side — the left side has less caster, so the vehicle pulls to the left. The cross-caster is out of spec and causing the described pull direction.

27. A — Thrust angle of $+0.18^\circ$ is within the $0^\circ \pm 0.25^\circ$ specification tolerance (range -0.25° to $+0.25^\circ$). The vehicle will track along the thrust line without crabbing. Recognizing in-spec readings — even when not zero — is essential for efficient alignment service.

28. C — SAI readings of 12.9° and 13.1° are both within the $13.0^\circ \pm 0.5^\circ$ specification (12.5 – 13.5° acceptable). The 0.2° difference between sides is well within the typical 0.5° tolerance. Both knuckles are straight; no bent component is indicated. This is a normal result.

29. C — Total toe of $+0.15^\circ$ is within the $+0.10^\circ \pm 0.05^\circ$ specification (0.05° to 0.15° acceptable). The reading is at the upper limit but still within tolerance. No adjustment is required. Recognizing in-spec readings at the edge of tolerance is a core alignment skill.

30. B — Setback of $+0.35^\circ$ exceeds the $\pm 0.25^\circ$ specification. This indicates collision damage or structural shift — one front wheel has been displaced fore or aft of its designed position. Setback of this magnitude warrants investigation for frame, subframe, or mount damage before continuing alignment service.

31. D — Total toe is $+0.07^\circ + +0.08^\circ = +0.15^\circ$, which is within the $+0.10^\circ \pm 0.05^\circ$ specification (range 0.05° to 0.15°). The reading is at the upper limit but acceptable. The individual left-right difference of 0.01° is within normal tolerance. No adjustment is needed.

32. B — Included angle difference of 1.4° (14.5° minus 13.1°) far exceeds the 0.5° typical tolerance. With camber within specification on both sides, this is the signature of a bent steering knuckle. Camber may have been adjusted to compensate for the damage, but the underlying included angle variation confirms a bent knuckle requiring replacement.

33. A — Total rear toe is $+0.10^\circ + (-0.05^\circ) = +0.05^\circ$. But the individual readings are asymmetric — left toes in more than right. This asymmetry creates a non-zero thrust angle regardless of total toe. The total being within spec doesn't guarantee symmetry; thrust angle depends on symmetry, not total.

34. C — Wheel runout compensation corrects for the clamp offset error between the clamping device and the wheel's rotation axis. Without compensation, every alignment measurement — camber, caster, toe, and all secondary angles — is offset by a fraction of a degree. Compensation is required for any accurate reading.

35. D — Cross-camber of 0.2° is generally too small to produce a noticeable pull — typical measurement tolerance is $0.3\text{--}0.4^\circ$. The described leftward pull is likely caused by another factor (caster imbalance, tire conicity, brake drag, road crown). Always verify the measurement interpretation matches the actual vehicle behavior.

36. A — Weights at both inner and outer rim edges 180° apart, especially when evenly distributed, is the signature of dynamic (two-plane) imbalance. The offset mass distribution creates a force couple that modern balancers correct with weights at each rim edge simultaneously. Static imbalance alone requires only single-plane correction.

37. B — Weights of 0.3 oz inner and 0.4 oz outer are both below the 0.5 oz residual specification. The assembly is within acceptable residual balance tolerance — no additional correction is needed. Recognizing in-spec readings is as important as identifying abnormal readings during balance service.

38. D — Completing only 45° of the specified 60° angle rotation leaves the bearing under-preloaded. The torque-plus-angle specification exists to ensure precise clamping force; falling short of the specified angle produces insufficient preload. The bearing develops play and fails prematurely. Always complete the full specification.

39. A — The 4-digit DOT date code represents the manufacturing week and year. "4521" means the 45th week of 2021. This allows technicians to verify tire age during inspection. Tires older than 6–10 years are often recommended for replacement due to rubber aging, regardless of tread depth.

40. C — When a TPMS sensor reports an incorrect pressure reading compared to actual measured pressure (32 psi vs. 36 psi actual), the sensor has failed internally. Sensor battery failures typically show as "not reporting." Module resets and pressure changes would not produce a 4 psi discrepancy. The sensor must be replaced.