PRACTICE EXAM 14: ASE A4 SIMULATION (40 QUESTIONS)

STEERING SYSTEMS DIAGNOSIS AND REPAIR (Questions 1–12)

1. Which statement correctly describes the difference between hydraulic power steering and electric power steering?

A. Hydraulic uses pump-generated fluid pressure, while electric uses a motor for assist

B. Hydraulic uses a belt-driven pump, while electric uses a 110-volt AC motor for assist

C. Hydraulic has no electrical components, while electric uses no mechanical linkage

D. Hydraulic requires no fluid service, while electric requires regular fluid replacement

2. A power steering pump whine differs from a power steering pump growl in that:

A. A whine indicates pump failure while a growl indicates normal operation of the pump

B. A whine occurs at parking speeds while a growl occurs only at highway speeds

C. A whine indicates air or low fluid while a growl indicates internal pump wear

D. A whine is caused by belt slip while a growl is caused by fluid contamination issues

3. What distinguishes a load-carrying ball joint from a follower ball joint?

A. Load-carrying joints are always larger in physical size than follower ball joints

B. Load-carrying joints support vehicle weight through the spring; followers do not

C. Load-carrying joints are on the upper arm; followers are on the lower control arm

D. Load-carrying joints wear faster than follower joints regardless of suspension design

4. Technician A says a clockspring is a rotating electrical connector that allows wiring to pass between the steering column and rotating steering wheel. Technician B says a clockspring must be centered during installation to prevent ribbon cable damage. Who is correct?

A. Technician A only

B. Technician B only

C. Neither Technician A nor B

D. Both Technicians A and B

5. A pitman arm differs from a tie rod end in that:

A. A pitman arm connects the steering gear output to the linkage; a tie rod connects linkage to the knuckle

B. A pitman arm is found only on rack and pinion steering; a tie rod is found only on recirculating ball steering

C. A pitman arm carries hydraulic pressure from the pump; a tie rod carries only mechanical force from gear

D. A pitman arm requires grease fittings; a tie rod end is always permanently sealed from factory

6. A slip-joint intermediate shaft and a collapsible intermediate shaft differ in that:

A. The slip joint allows rotation while the collapsible section allows length change only

B. The slip joint allows for length changes during articulation; the collapsible section absorbs crash energy

C. The slip joint is used only on cars; the collapsible section is used only on trucks

D. The slip joint requires periodic lubrication; the collapsible section is permanently lubricated always

7. A power steering high-pressure hose differs from a return hose in that:

A. The pressure hose is smaller in diameter to restrict fluid flow during normal operation

B. The pressure hose is longer to reach the gear while the return hose is shorter to reservoir

C. The return hose has crimped metal end fittings while the pressure hose has hose clamps

D. The pressure hose has crimped metal fittings rated for high pressure; return hose uses hose clamps

8. A steering angle sensor (SAS) differs from a steering torque sensor in that:

A. The SAS measures how hard the driver turns; the torque sensor measures how far the wheel has turned

B. The SAS is located at the wheels; the torque sensor is located at the rack and pinion assembly

C. The SAS measures steering wheel rotational position; the torque sensor measures driver input force

D. The SAS operates only at highway speeds; the torque sensor operates only at parking speeds

9. A scan tool DTC "steering torque sensor signal implausible" on a column-mounted EPS typically requires:

A. Complete steering column replacement because the torque sensor is integrated into the column

B. Only the torque sensor replacement as a separately serviceable component of the column

C. Battery disconnect for 30 minutes to reset and clear the torque sensor fault condition

D. An EPS module software update because the signal was misinterpreted by the control module

10. A recirculating ball gearbox differs from a rack and pinion gear in that:

A. The recirculating ball has no internal moving parts while the rack and pinion has a rack bar

B. The recirculating ball uses a worm and sector gear with internal balls; rack and pinion uses a pinion gear driving a linear rack

C. The recirculating ball is found only on FWD vehicles while rack and pinion is on RWD vehicles

D. The recirculating ball requires no fluid service while rack and pinion requires regular fluid service

11. A steering damper on a solid-axle truck differs from a shock absorber on a suspension in that:

A. The steering damper is larger in physical size than a suspension shock absorber normally

B. The steering damper is mounted vertically while a suspension shock is mounted horizontally

C. The steering damper controls horizontal steering motion; a suspension shock controls vertical wheel motion

D. The steering damper is always gas-charged while suspension shocks are always hydraulic fluid only

12. Electrohydraulic power steering (EHPS) differs from conventional hydraulic power steering in that:

A. EHPS uses an electrically driven pump motor; conventional hydraulic uses a belt-driven pump

B. EHPS uses electric motor assist at the column; conventional hydraulic uses a hydraulic ram at the gear

C. EHPS has no hydraulic fluid; conventional hydraulic has a reservoir filled with hydraulic oil

D. EHPS requires no electrical connections; conventional hydraulic uses a 12V pump drive motor

SUSPENSION SYSTEMS DIAGNOSIS AND REPAIR (Questions 13–24)

13. A MacPherson strut differs from a conventional SLA suspension in that:

A. A MacPherson strut has two control arms per side; an SLA has only one control arm per side

B. A MacPherson strut uses coil springs; an SLA can only use leaf springs or torsion bars

C. A MacPherson strut uses torsion bars only; an SLA uses coil springs exclusively on both sides

D. A MacPherson strut uses the strut as the upper locator; an SLA has separate upper and lower control arms

14. A stabilizer bar end link failure differs from a stabilizer bar bushing failure in that:

A. End link failure causes squeaking during articulation; bushing failure causes clunking over bumps

B. End link failure causes clunking over bumps; bushing failure causes squeaking during articulation

C. End link failure produces no symptoms while bushing failure causes severe handling problems

D. End link failure requires bar replacement; bushing failure requires only bushing replacement

15. Air suspension differs from conventional coil spring suspension in that:

A. Air suspension uses pressurized air as the spring medium; conventional uses a steel spring

B. Air suspension requires no maintenance; conventional springs require periodic replacement

C. Air suspension has no shock absorbers; conventional suspension always uses shock absorbers

D. Air suspension is found only on luxury vehicles; conventional coil springs are on all other types

16. An adaptive damper differs from a conventional shock absorber in that:

A. An adaptive damper has no internal fluid while a conventional shock uses hydraulic fluid

B. An adaptive damper is always larger in physical size than a conventional shock absorber

C. An adaptive damper is gas-charged while conventional shocks are always hydraulic only

D. An adaptive damper changes damping characteristics electronically; a conventional shock has fixed damping

17. A leaf spring center bolt differs from the U-bolts in a leaf spring installation in that:

A. The center bolt clamps the axle to the spring; the U-bolts locate the axle on the spring

B. The center bolt is torque-to-yield; the U-bolts can be reused multiple times during service

C. The center bolt locates the axle on the spring; the U-bolts clamp the axle to the spring pack

D. The center bolt carries vehicle weight; the U-bolts carry only lateral loads during operation

18. A torsion bar differs from a coil spring in that:

A. A torsion bar stores energy through vertical compression; a coil spring stores it through rotation

B. A torsion bar stores energy through twisting; a coil spring stores energy through vertical compression

C. A torsion bar is always longer than a coil spring in the same vehicle suspension application

D. A torsion bar is always made of aluminum; a coil spring is always made of steel for service life

19. Subframe centering pins are used during subframe service to:

A. Carry electrical current for the vehicle body ground during reassembly for safety purposes
B. Lubricate the subframe bushings during the installation of the assembly to the body
C. Prevent corrosion between the subframe and body during the installation phase of service
D. Align the subframe to its design position during mounting bolt torque application to body

20. A wear-indicator ball joint differs from a non-indicator ball joint in that:

A. A wear-indicator joint has a grease fitting that recedes as the joint wears to flush or below housing
B. A wear-indicator joint requires special tools to inspect while non-indicator joints use standard tools
C. A wear-indicator joint is always a follower while non-indicator joints are always load-carrying types
D. A wear-indicator joint cannot be greased while non-indicator joints require periodic grease service

21. A bounce test on a shock absorber differs from a visual inspection in that:

A. The bounce test identifies internal leaks while the visual inspection cannot see any issues
B. The bounce test requires specialized equipment while visual inspection requires only eyesight
C. The bounce test is always inconclusive while visual inspection provides definitive answers
D. The bounce test evaluates damping performance; visual inspection checks for external fluid leaks

22. A MagneRide damper differs from a conventional adaptive damper in that:

A. MagneRide uses air pressure to vary damping; conventional adaptive uses electronic valves
B. MagneRide uses magnetorheological fluid that changes viscosity in a magnetic field
C. MagneRide requires no electrical connection while conventional adaptive uses a control circuit

D. MagneRide is serviceable internally while conventional adaptive dampers must be replaced as units

23. A conventional shock absorber differs from a strut in that:

A. A shock absorber only damps vertical motion; a strut damps motion and locates the knuckle
B. A shock absorber uses hydraulic fluid; a strut uses compressed gas exclusively for damping
C. A shock absorber is always inverted while a strut is always upright in its installation
D. A shock absorber requires no mounting bushings while a strut requires upper and lower bushings

24. A panhard rod (track bar) differs from a control arm in that:

A. A panhard rod carries vertical loads while a control arm carries only lateral loads during operation
B. A panhard rod is found only on FWD vehicles while a control arm is found only on RWD vehicles
C. A panhard rod has no bushings while a control arm has rubber bushings at each pivot point
D. A panhard rod locates the axle laterally while a control arm locates it in multiple directions

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

25. Camber wear differs from toe wear in that:

A. Camber wear appears as feathered sawtooth patterns; toe wear appears as smooth edge wear
B. Camber wear appears as center tread wear; toe wear appears as both shoulders worn equally
C. Camber wear appears as smooth edge wear; toe wear appears as feathered sawtooth patterns
D. Camber wear appears only on the outside edge; toe wear appears only on the inside edge

26. Camber pull direction differs from caster pull direction in that:
A. Camber pull goes toward the less-positive side; caster pull goes toward the more-positive side
B. Camber pull goes toward the more-positive side; caster pull goes toward the less-caster side

C. Camber pull and caster pull both go toward the more-positive side of the vehicle alignment

D. Camber pull is insignificant while caster pull is the only significant alignment cause of pull

27. Static imbalance differs from dynamic imbalance in that:

A. Static imbalance is correctable in a single plane; dynamic imbalance requires correction in two planes

B. Static imbalance requires special equipment while dynamic imbalance can be detected by feel alone

C. Static imbalance is always measured in ounces; dynamic imbalance is always measured in grams

D. Static imbalance is found only on truck tires while dynamic imbalance is found only on car tires

28. Direct TPMS differs from indirect TPMS in that:

A. Direct TPMS measures pressure from wheel rotation speed; indirect TPMS uses actual pressure sensors

B. Direct TPMS is found only on luxury vehicles while indirect TPMS is on all economy vehicles

C. Direct TPMS requires no relearn after rotation while indirect TPMS requires a full relearn procedure

D. Direct TPMS uses actual pressure sensors at each wheel; indirect TPMS uses ABS wheel speed sensors

29. A wheel alignment primary angle differs from a secondary angle in that:

A. Primary angles are measured at the rear; secondary angles are measured at the front wheels only

B. Primary angles are found only on FWD; secondary angles are found only on RWD vehicles now

C. Primary angles are directly adjustable (camber, caster, toe); secondary angles are diagnostic (SAI, IA)

D. Primary angles are more important than secondary angles in every single alignment procedure done

30. A bent steering knuckle can be identified on the alignment rack by:

A. Camber readings within specification at both sides matching the expected tolerance range

B. Included angle readings that differ side-to-side beyond the specification tolerance value

C. Thrust angle readings exceeding 0.5° in either direction as measured at the alignment rack

D. Setback readings within specification at both sides as measured on the alignment rack fixture

31. Setback differs from thrust angle in that:

A. Setback measures fore-aft offset between wheels on the same axle; thrust angle measures rear direction relative to centerline

B. Setback is measured in degrees while thrust angle is measured in inches at the vehicle rear

C. Setback is found only on front-wheel-drive vehicles; thrust angle is found only on rear-wheel-drive vehicles

D. Setback cannot be measured on an alignment rack; thrust angle can only be measured at the rear wheels

32. Tire conicity differs from an alignment-caused pull in that:

A. Conicity affects only rear-wheel-drive vehicles while alignment pulls affect all vehicle types

B. Conicity always pulls to the right while alignment issues pull to the left at highway speed only

C. Conicity changes pull direction when tires are swapped side-to-side; alignment pulls remain constant

D. Conicity can be corrected with tire pressure adjustment; alignment pulls require wheel alignment service

33. Front camber differs from rear camber in that:

A. Front camber is always adjustable on all vehicles; rear camber is never adjustable on any vehicle

B. Front camber affects steering feel and outside-edge tire wear; rear camber affects tire wear only

C. Front camber is measured in inches; rear camber is measured in degrees during alignment service

D. Front camber requires no measurement; rear camber is the only measurement taken during alignment

34. An alignment with lane-keep assist calibration requirement differs from an alignment without it in that:

A. The alignment with lane-keep requires more time at the alignment rack than conventional alignments

B. The alignment with lane-keep uses different alignment specifications than conventional alignments do

C. The alignment with lane-keep requires a different alignment rack than conventional alignments need

D. The alignment with lane-keep requires calibration of the steering angle sensor and forward camera

35. A steering wheel holder tool is used during alignment to:

A. Lock the steering wheel at the centered position during front toe adjustment to prevent offset

B. Prevent the steering wheel from rotating during power steering fluid service during alignment

C. Hold the airbag module safely during alignment service on SRS-equipped vehicles alone

D. Align the steering column to the rack during column replacement after collision repair only

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

36. A tire with radial runout differs from a tire with lateral runout in that:

A. Radial runout produces steering wheel shimmy; lateral runout produces only fuel economy issues

B. Radial runout is the same as dynamic imbalance; lateral runout is the same as static imbalance

C. Radial runout is variation in the tire's roundness; lateral runout is variation in the tire's flatness

D. Radial runout occurs only on bias-ply tires; lateral runout occurs only on radial-ply tires today

37. A torque-to-yield axle nut differs from a conventional axle nut in that:

A. A torque-to-yield nut is reusable; a conventional nut is single-use and must be replaced every time

B. A torque-to-yield nut is single-use because it stretches during torque; a conventional nut is reusable

C. A torque-to-yield nut is always smaller in size than a conventional axle nut on any vehicle

D. A torque-to-yield nut requires no torque specification; a conventional nut has a specified torque value

38. A tire's aspect ratio differs from its section width in that:

A. Aspect ratio is sidewall height as a percentage of section width; section width is tire width in millimeters

B. Aspect ratio is measured in inches; section width is measured in millimeters at the tread area only

C. Aspect ratio is the tire's speed rating code; section width is the tire's load index number only

D. Aspect ratio changes with inflation pressure; section width is fixed regardless of pressure changes

39. A tire's load index differs from its speed rating in that:

A. Load index is a letter code; speed rating is a number code for the tire sidewall designation

B. Load index indicates maximum speed capability; speed rating indicates maximum load at rated pressure

C. Load index is measured in kilometers; speed rating is measured in pounds per square inch today

D. Load index indicates maximum load at rated pressure; speed rating indicates maximum sustained speed

40. A tire puncture repair using a combination plug/patch differs from an external string plug in that:

A. The combination plug/patch can repair sidewall damage; the external string plug cannot repair sidewalls at all

B. The combination plug/patch requires no special tools; the external string plug requires tire dismount

C. The combination plug/patch is applied from inside after dismount; the external string plug is temporary

D. The combination plug/patch is applied only in the shoulder area; the external string plug covers the tread

Practice Exam 14: Answer Key and Explanations

1. A — Hydraulic power steering uses a belt-driven pump to generate fluid pressure that assists steering through a hydraulic valve and piston in the gear. Electric power steering uses an electric motor (at the column, pinion, or rack) to provide assist directly through mechanical means. The core distinction is the energy source: fluid pressure vs. electric motor torque.

2. C — Power steering whine is typically caused by air in the system or low fluid level — both conditions produce the high-pitched harmonic sound as the pump struggles to maintain flow. Growling is lower-pitched and indicates internal pump wear (damaged vanes, scored cam ring). Distinguishing whine from growl points the diagnosis in the correct direction.

3. B — A load-carrying ball joint supports vehicle weight through its connection to the spring load path. A follower ball joint does not carry weight — it simply locates the knuckle. Identifying which joint is load-carrying on a given suspension determines the correct inspection technique (unload for load-carrying; direct inspection for follower).

4. D — Both technicians are correct. A clockspring is a rotating electrical connector that routes wiring between the fixed column and rotating steering wheel, maintaining the airbag, horn, and steering wheel controls connections. It must be centered during installation because off-center installation strains the internal ribbon cable, causing it to break.

5. A — A pitman arm connects the steering gear output to the linkage (specifically the center link on parallelogram systems or the drag link on solid axles). A tie rod connects the linkage to the knuckle at the wheel. The pitman arm is found primarily on recirculating ball systems, while tie rods are found on both rack and pinion and recirculating ball designs.

6. B — The slip-joint section of an intermediate shaft allows for length changes during normal suspension articulation (the shaft must change length slightly as the body flexes). The collapsible section is separate and shortens during a frontal collision to absorb crash energy. The two functions are distinct, though often in the same shaft assembly.

7. D — High-pressure hoses have crimped metal end fittings rated for 1,000+ psi operation. Return hoses have hose clamps because they operate at low pressure. Never substitute one for the other — a return hose installed in a pressure position will rupture immediately, potentially causing fire or injury. The construction difference is safety-critical.

8. C — The steering angle sensor (SAS) measures the rotational position of the steering wheel and reports it to the ABS, EPS, and stability control systems. The torque sensor measures how hard the driver is pushing on the steering wheel — the input force. Both are critical to EPS operation but measure fundamentally different parameters.

9. A — On column-mounted EPS (C-EPS) systems, the torque sensor is integrated into the column assembly and is not individually serviceable. A "signal implausible" DTC with reduced assist requires complete column replacement. Battery disconnect, software updates, and separate sensor replacement do not apply to integrated-sensor architectures.

10. B — A recirculating ball gearbox uses a worm gear driving a sector gear with small recirculating balls between them for reduced friction. A rack and pinion uses a small pinion gear driving a linear rack bar. The architectures are fundamentally different — parallelogram linkage on recirculating ball, direct-to-knuckle tie rods on rack and pinion.

11. C — A steering damper controls horizontal steering motion (bump steer, shimmy, death wobble) between the axle and the drag link. A suspension shock absorber controls vertical wheel motion over bumps and road irregularities. They operate in different planes and address different problems. Both use hydraulic damping but are not interchangeable.

12. A — Electrohydraulic power steering (EHPS) uses an electrically driven pump motor that provides hydraulic pressure on demand. Conventional hydraulic power steering uses a belt-driven pump tied to engine RPM. EHPS offers the advantages of electric control (variable assist, engine-off operation) while retaining the robust feel of hydraulic assist.

13. D — A MacPherson strut uses the strut itself as the upper locator of the knuckle, eliminating the upper control arm. An SLA (short-long arm) suspension uses separate upper and lower control arms for knuckle location. This architectural difference is fundamental and affects component identification, inspection, and service procedures.

14. B — End link failure produces clunking over bumps during straight-line driving (quiet during cornering when loaded). Bushing failure produces squeaking during suspension articulation and body roll. Distinguishing the two symptoms correctly guides component replacement and avoids replacing unrelated parts.

15. A — Air suspension uses pressurized air in rolling-lobe bellows as the spring medium. Conventional suspension uses steel coil springs (or leaf springs or torsion bars). Both systems typically use shock absorbers — air suspension has them in addition to air springs. The spring medium is the core distinction.

16. D — An adaptive damper changes its damping characteristics electronically in response to road conditions, driving style, or mode selection. A conventional shock has fixed damping tuned at the factory. Adaptive dampers require electrical connections, control modules, and scan tool diagnostics; conventional shocks are mechanical only.

17. C — The leaf spring center bolt locates the axle on the spring pack — it prevents fore-aft shift of the axle. The U-bolts clamp the axle housing to the spring pack, providing the clamping force that keeps the axle seated. Both functions are essential; failure of either component causes different but serious problems.

18. B — A torsion bar stores energy through twisting (the bar is anchored at one end and twists as the suspension moves at the other). A coil spring stores energy through vertical compression (the coils compress as load is applied). Both provide spring function but use different mechanical principles.

19. D — Subframe centering pins align the subframe to its design position during mounting bolt torque application. Without pins, the subframe can sit a few millimeters off design position, making alignment uncorrectable through normal adjustment range. Pins are inserted into specific holes in the body and subframe to lock position during torque.

20. A — A wear-indicator ball joint has a grease fitting (or similar feature) that projects above the housing when the joint is new and recedes as the joint wears. When the indicator is flush with or below the housing surface at curb height, the joint has reached its wear limit. Non-indicator joints require other inspection methods (pry test, play measurement).

21. D — A bounce test evaluates damping performance by pushing down on a corner and observing rebound behavior. A visual inspection checks for external fluid leaks, damaged mounts, and physical damage. Both tests are complementary: bounce test catches performance issues; visual inspection catches visible damage. Using both together is the correct diagnostic approach.

22. B — MagneRide dampers use magnetorheological fluid that changes viscosity in response to a magnetic field applied by an internal coil. Conventional adaptive dampers use electronic valves that

change fluid flow paths. Both systems produce variable damping, but the mechanical principle differs — MagneRide varies viscosity; valve-type varies flow.

23. A — A conventional shock absorber only damps vertical wheel motion; it does not locate the knuckle. A strut combines the shock absorber function with knuckle location through its upper mount. This architectural difference is why struts are replaced as complete assemblies, while shocks are simpler damping components only.

24. D — A panhard rod (track bar) locates the axle laterally (side-to-side). A control arm locates the wheel in multiple directions, typically fore-aft and vertically through its pivot geometry. Panhard rods are specific to solid-axle rear suspensions; control arms are found on independent suspensions for multiple load paths.

25. C — Camber wear produces smooth (flat) edge wear without feathering — the tire carries more load on one edge but doesn't scrub. Toe wear produces feathered sawtooth patterns because the tire is scrubbing as it rolls. Running a hand across the tread identifies the difference: smooth = camber; catchy/feathered = toe.

26. B — Camber pull goes toward the MORE-positive side — the side with more positive camber produces a pull to that side. Caster pull goes toward the LESS-caster side — the side with less caster has weaker self-centering force. The two rules are OPPOSITE in direction, which makes them commonly confused and heavily tested.

27. A — Static imbalance is correctable in a single plane — a weight added at one position balances the assembly. Dynamic imbalance requires correction in two planes (inner and outer rim edges) because the imbalance creates a wobbling force couple along the wheel's axis. Modern balancers detect both forms and correct them simultaneously.

28. D — Direct TPMS uses actual pressure sensors mounted inside each wheel, reporting real-time pressure values. Indirect TPMS uses ABS wheel speed sensors, detecting pressure loss through rotation speed differences (a low tire rolls faster). The two systems have completely different architectures, failure modes, and service procedures.

29. C — Primary alignment angles (camber, caster, toe) are directly adjustable and specified by the manufacturer. Secondary angles (SAI, included angle) are diagnostic — they cannot be adjusted but are

used to identify bent components like knuckles. Both categories matter, but they serve different roles during alignment service.

30. B — A bent steering knuckle shows up on the alignment rack as side-to-side included angle differences beyond tolerance (typically more than 0.5°). Included Angle = SAI + Camber; when camber is adjustable and within spec but included angles differ, the SAI built into the knuckle is off — indicating a bent knuckle.

31. A — Setback measures the fore-aft offset between wheels on the same axle (typically the front axle). Thrust angle measures the rear axle's direction relative to the vehicle centerline. The two measurements address different problems: setback usually indicates collision damage; thrust angle indicates rear toe asymmetry.

32. C — Conicity is a tire's inherent lead direction from manufacturing. When the tire is swapped side-to-side, the pull direction also changes. Alignment-caused pulls remain constant regardless of tire position. The tire swap test is the definitive diagnostic: if the pull changes direction, a tire has conicity.

33. B — Front camber affects steering feel (how the tire loads during cornering) and outside-edge tire wear when positive. Rear camber affects tire wear but does not directly affect steering feel because the rear wheels are not steered. Both are measured; both are diagnostic; but their effects on the driving experience differ.

34. D — An alignment on a lane-keep-assist-equipped vehicle requires calibration of the steering angle sensor (because the toe adjustment re-centers the wheel) and the forward camera (because the lane-keep system uses vehicle geometry references). The calibration requirement is the primary difference from conventional alignments.

35. A — A steering wheel holder tool locks the steering wheel at the centered position during front toe adjustment. Without it, the wheel can rotate during adjustment, producing an off-center wheel when the vehicle is driven straight. This tool is essential for professional alignment results and cannot be substituted with manual holding.

36. C — Radial runout is variation in the tire's roundness (bumps in the circumference). Lateral runout is variation in the tire's flatness (side-to-side wobble). Both produce vibration but at different frequencies and planes. Correction requires match-mounting or tire replacement — balancing cannot correct runout regardless of quantity applied.

37. B — A torque-to-yield axle nut is single-use because it is designed to stretch beyond its elastic limit during torque, achieving a precise clamping load. Reusing a TTY nut cannot produce proper preload — the stretch has already occurred. Always install new TTY nuts per specification; conventional nuts can be reused if undamaged.

38. A — Aspect ratio is sidewall height expressed as a percentage of section width (mm). Section width is the actual tire width measured in millimeters. In "215/60R17," the 215 is section width and the 60 is the aspect ratio — the sidewall is 60% of 215mm, approximately 129mm tall.

39. D — Load index indicates the maximum load the tire can carry at rated pressure. Speed rating indicates the maximum sustained speed the tire can safely handle at rated load. Both are separate numeric-letter codes on the sidewall; neither is interchangeable. A tire must meet both the load and speed requirements of the vehicle.

40. C — A combination plug/patch is applied from inside the tire after dismount — the plug seals the puncture channel and the patch seals the inner liner, providing a permanent repair. An external string plug is installed without dismount and is considered a temporary emergency repair only. Industry standard is the internal combination repair.