Final Study Guide

True/False

*Indicate whether the statement is true or false.*

___ 1. An electronic power steering gear uses a hydraulic power steering pump.
___ 2. A stabilizer bar reduces body sway when a front wheel strikes a road irregularity.
___ 3. A short-and-long-arm (SLA) front suspension system has a lower control arm that is longer than the upper control arm.
___ 4. Disc brakes require higher operating pressure than drum brakes.
___ 5. Two pistons are used in modern master cylinders.
___ 6. Gas fade is the result of oil or grease getting onto the braking surface.
___ 7. During moderate to heavy brake application, the vehicle's momentum and weight combine to cause the rear wheels to lift (weight transfer) and the front wheels to be forced down. This is why front brake systems are larger than the rear units.
___ 8. Semimetallic or organic friction materials have different coefficients of friction.
___ 9. A dial indicator is used to measure integral wheel bearing hub endplay.
___ 10. Tapered roller bearings and their matching inner races must be replaced as a set.
___ 11. A bearing may overheat if the wheel bearing–adjusting nut is not adjusted properly to provide the correct bearing preload.
___ 12. When servicing an integral wheel bearing hub, the hub nut should be tightened with an impact wrench.
___ 13. The wheel bearings are permanently mounted to the vehicle steering knuckle's spindle.
___ 14. The tire placard is always mounted in the glove compartment.
___ 15. A letter between A through L after the tire size indicates the load range of the tire.
___ 16. A tire with an A traction rating has the highest traction rating.
___ 17. A tire with a T speed rating has a maximum rated speed of 130 mph.
___ 18. The coil springs installed in the cylinder bore assist the piston in developing hydraulic pressure.
___ 19. The diagonally split hydraulic system is the oldest type of split braking system.
___ 20. Unequal fluid levels in the master cylinder reservoir chambers on front disc/rear drum brake vehicles are a sign of drum brake misadjustment.
___ 21. Hydraulic brake system leaks can be internal and external.
___ 22. A low brake pedal could be caused by worn brake shoes or a defective brake shoe adjuster.
___ 23. Struts perform the same function as shock absorbers; however, struts may also support the top of the steering knuckle.
___ 24. When turning the front wheels to the right or left, strut chatter may indicate a binding upper strut mount.
25. Different types of flares are not interchangeable.
26. A brake failure warning switch is only used on split (dual) braking systems.
27. The metering valve is most necessary during heavy brake application.
28. Fluid can return through the metering valve when the brakes are released.
29. The proportioning valve is located in the hydraulic line to the rear drum brakes.
30. Some current vehicles have aluminum steering knuckles to reduce unsprung weight.
31. In some front suspension systems, torsion bars perform the same functions as coil springs.
32. When measuring ball joint wear on a short-and-long arm front suspension system with the coil springs between the lower control arms and the chassis, a floor jack should be placed under the frame to lift the suspension.
33. Intake manifold vacuum decreases and increases as the engine is accelerated and decelerated.
34. Loss of hydraulic power from the Hydro-Boost means the driver loses all braking ability.
35. The Hydro-Boost power braking system uses DOT Rated hydraulic brake fluid.
36. Some semi-independent rear suspensions have a solid inverted U-section channel connected between the trailing arms.
37. In a MacPherson strut-type rear suspension, the struts are bolted to the top of the spindles.
38. In a rear-wheel drive vehicle with a live-axle rear suspension, the acceleration torque tends to rotate the front of the differential downward.
39. Rear axle tramp occurs during hard braking.
40. Some independent rear suspension systems have a ball joint that attaches the lower control arm to the bottom of the knuckle.
41. In a multilink rear suspension system, dual upper links connect the top of the strut to the chassis.
42. Drum brakes do a better job of resisting brake fade than disc brakes.
43. The bearing rollers rotate between two surfaces, the inner cone and the outer cup.
44. The brake calipers have at least two large hydraulic pistons.
45. Some brake drums are finned for heat dissipation.
46. The backing plate is bolted to the axle flange on the front axle.
47. The largest tapered roller bearing is installed on the outboard side of the hub.
48. Every drum brake assembly has two brake shoes.
49. A self-powered test light should be used for testing the electrical system on a vehicle equipped with air bags.
50. A worn flexible coupling in the steering column may cause a rattling noise while the vehicle is driven.
51. Worn tie-rod ends may cause excessive steering effort.
52. Binding idler arm bushings may cause a rattling noise when the vehicle is driven straight ahead.
53. In a rack and pinion steering gear, the tie rods are connected to the rack.
54. Integral parking brakes apply the service brake shoes or pads.
55. The caliper of a rear disc parking brake is activated by a mechanism that mechanically moves the caliper piston.
56. Equalizers are used to balance the forces applied to each rear parking brake during application.
57. The cable that runs from the brake control mechanism to the equalizer is known as the rear cable.
58. Power steering belt tension should be measured before testing power steering pump pressure.
59. A press-on type power steering pump pulley may be installed by tapping on the pulley with a soft hammer.
60. Most ABS will only allow partial operation of the service brakes if the ABS has a fault.
61. During ABS operation, the driver and, possibly, the passengers may be aware of the fact.
62. The main problem with differential-mounted ABS speed sensors is directly related to normal operation of the differential.
63. A hard code is one that is present at the time of testing.
64. The best way to test a wheel speed sensor is with a digital oscilloscope.
65. In a rack and pinion steering gear, the rack maintains the tie rods in parallel position in relation to the lower controls arms.
66. Rack and pinion steering gears have become commonplace on both passenger cars and light trucks.
67. In an electronic variable orifice (EVO) steering system, power steering assist is highest when driving at cruising speeds.
68. Setback occurs when one wheel is driven rearward in relation to the opposite wheel.
69. The thrust line is an imaginary line positioned at a 90 degree angle to the rear wheel centerline and projected forward.
70. The included angle is the SAI angle minus the positive camber angle.
71. Severe steering pull during hard braking may be caused by unequal SAI angles on the two sides of the front suspension.
72. Steering wheel kickback is reduced when the SAI line intersects the true vertical tire and wheel centerline at the road surface.
73. Front-wheel drive cars have a greater SAI angle to provide directional stability.

Multiple Choice
Identify the choice that best completes the statement or answers the question.

74. Technician A says that most front-wheel-drive cars have a frame that is separate from the body. Technician B says that SUVs and trucks have a unitized body that combines the frame and body into one unit. Who is correct?
   a. A only                      c. Both A and B
   b. B only                      d. Neither A nor B

75. A parallelogram steering linkage is defined as having tie rods that are parallel to the:
   a. Lower control arm           c. Center link
   b. Upper control arm           d. Steering arms
76. The steering axis inclination (SAI) angle:
   a. Helps to return the wheels to the straight-ahead position
   b. Increases steering effort
   c. Both A and B
   d. Neither A nor B

77. Shock absorbers help to:
   a. Maintain vehicle ride height
   b. Improve steering wheel return rate
   c. Control spring oscillations
   d. Improve wheel and tire position

78. A unitized vehicle body may have which of these special features:
   a. It provides a steel box around the passenger compartment
   b. Special steel panels are inserted in the doors to protect occupants in a side collision
   c. A steel cradle is mounted under the front of the unitized body to support the engine and transaxle
   d. All of the above

79. If the outside front wheel is turned at a 20 degree angle, the inside front wheel turning angle should be:
   a. Greater than 20 degrees
   b. Less than 20 degrees
   c. 20 degrees
   d. None of the above

80. The advantages of four-wheel steering include the following:
   a. It allows a shorter turning circle at low speeds
   b. It facilitates parking in small spaces
   c. It reduces vehicle sideslip at higher speeds
   d. All of the above

81. What are the alignment angles that may be adjustable on the front suspension system?
   a. Toe, SAI, and Caster
   b. Caster, Camber, and Toe
   c. Camber, Toe, and Included Angle
   d. Caster, Camber, and Set-Back

82. Technician A says servo action is accomplished by the opposing forces of the two disc pads per wheel. Technician B says drum brakes require higher pressure because their shape is similar to that of the drum. Who is correct?
   a. A only
   b. B only
   c. Both A and B
   d. Neither A nor B

83. Mass is being discussed. Technician A says that the mass of an object is equal to the weight of an object. Technician B says that mass is the amount of matter that an object contains. Who is correct?
   a. A only
   b. B only
   c. Both A and B
   d. Neither A nor B

84. Technician A says the parking brake should slow the vehicle as well as the rear axle service brake. Technician B says a vehicle parked on a slight (less than 25 degrees) slope requires about 125-foot pounds of force applied to the pedal or lever. Who is correct?
   a. A only
   b. B only
   c. Both A and B
   d. Neither A nor B

85. Brake fade is being discussed. Technician A says a layer of gas between mating friction surfaces could cause brake fading. Technician B says heat is the greatest cause of brake fade. Who is correct?
   a. A only
   b. B only
   c. Both A and B
   d. Neither A nor B

86. Technician A says reducing the amount of force needed to move an object lowers the coefficient of friction. Technician B says coefficient of friction is the relationship of tensile force to weight. Who is correct?
   a. A only
   b. B only
   c. Both A and B
   d. Neither A nor B
87. Hydraulic theory is being discussed. **Technician A** says a small piston can move a larger piston and generate a large output force. **Technician B** says when output forces increase, output movement decreases. Who is correct?
   a. A only  
   b. B only  
   c. Both A and B  
   d. Neither A nor B

88. All of the following are types of brake fade EXCEPT:
   a. gas.  
   b. drum.  
   c. mechanical.  
   d. lining.

89. Technician A says that friction between the vehicle’s tires and the road is one factor in stopping the vehicle. Technician B says that a car with locked brakes stops in the shortest time possible. Who is correct?
   a. A only  
   b. B only  
   c. Both A and B  
   d. Neither A nor B

90. Which of the following should you do when servicing tapered roller-type wheel bearings?
   a. Reinstall the old hub seal  
   b. Spin the bearings with compressed air  
   c. Leave metal burrs in the hub seal recess  
   d. Clean, inspect, and repack the bearings

91. All of these statements about lip seals are true EXCEPT:
   a. They keep lubricant in the bearing  
   b. They keep dirt out of the bearing  
   c. They may have a spring-loaded lip  
   d. They can be installed in any direction

92. **Technician A** says the purpose of a bearing may be to support and guide a pivot. **Technician B** says the purpose of a bearing may be to support a load and reduce friction. Who is correct?
   a. A only  
   b. B only  
   c. Both A and B  
   d. Neither A nor B

93. All of these statements about the rolling elements in a tapered roller bearing are true EXCEPT:
   a. They have precision machined surfaces  
   b. They have the same diameter at each end  
   c. They are evenly spaced by the separator  
   d. They are mounted between the inner and outer races

94. The front wheel bearings are being replaced on a front-wheel-drive vehicle with the wheel bearings pressed into the steering knuckle. **Technician A** says the vehicle should be driven a short distance in the shop before the front hub nuts are torqued to specifications. **Technician B** says the hub nut torque supplies the correct wheel bearing adjustment. Who is correct?
   a. A only  
   b. B only  
   c. Both A and B  
   d. Neither A nor B

95. A front-wheel-drive vehicle has a clicking noise in the front of the vehicle when cornering below 20 mph. The front end of the vehicle is lifted and supported on safety stands. With the right front lower control arm lifted with a floor jack, the clicking noise is heard, but with both front wheels dropped downward, the noise disappears. **Technician A** says the right-front outer drive axle joint is worn. **Technician B** says a worn inner drive axle joint could cause a vibration during acceleration. Who is correct?
   a. A only  
   b. B only  
   c. Both A and B  
   d. Neither A nor B

96. A spring-loaded seal compensates for ALL of these conditions EXCEPT:
   a. Wear in seal bore and housing  
   b. Seal lip wear  
   c. Shaft movement  
   d. Bore eccentricity
97. When two separate tapered roller bearings are located in a front hub assembly on a front-wheel-drive vehicle, the wheel bearing endplay adjustment is provided by:
   a. Wheel lug nut torque  
   b. Ball joint nut torque  
   c. The bearing race adjuster sleeve  
   d. Hub nut torque

98. If a lower tire profile is desired, then the tire's aspect ratio:
   a. must be higher (larger).  
   b. must be the same size.  
   c. must be lower (smaller).  
   d. any of the above as the customer desires.

99. Technician A says a bias ply tire will have a more rigid sidewall than a radial ply tire. Technician B says the design of a radial ply tire may cause the sidewalls to bulge even with recommended pressure. Who is correct?
   a. A only  
   b. B only  
   c. Both A and B  
   d. Neither A nor B

100. Technician A says placing a smaller-than-recommended tire on the front axle will cause RWAL problems. Technician B says placing two different size tires on the same axle may cause the ABS to think one wheel is locking. Who is correct?
   a. A only  
   b. B only  
   c. Both A and B  
   d. Neither A nor B

101. Technician A says a dial indicator should be used to check tire and wheel lateral runout. Technician B says a dial indicator should be used to check tire and wheel radial runout. Who is correct?
   a. A only  
   b. B only  
   c. Both A and B  
   d. Neither A nor B

102. Bearing removal is being discussed. Technician A says blocks should be used to support the hub. Technician B says a large blunt pin punch should be used to drive the bearing out. Who is correct?
   a. A only  
   b. B only  
   c. Both A and B  
   d. Neither A nor B

103. Tire construction is being discussed. Technician A says a radial ply tire has the cords parallel to the tread. Technician B says strengthening belts are added between the radial plies and the tread. Who is correct?
   a. A only  
   b. B only  
   c. Both A and B  
   d. Neither A nor B

104. Tire load ratings are being discussed. Technician A says bias ply tires can carry a larger load than radials. Technician B says a light vehicle may use 8-ply bias ply tires. Who is correct?
   a. A only  
   b. B only  
   c. Both A and B  
   d. Neither A nor B

105. Technician A says worn ball joints may cause the toe angle to change during braking. Technician B says damaged or worn strut bushings may also cause the toe angle to change during braking. Who is correct?
   a. A only  
   b. B only  
   c. Both A and B  
   d. Neither A nor B

106. Which of the following conditions is most likely to cause steering problems during braking on a factory-equipped vehicle?
   a. Wheel rim width  
   b. Wheel offset  
   c. Tire inflation  
   d. Wheel runout

107. Technician A says the first check of the suspension should be with the vehicle supported on a lift. Technician B says the first suspension condition to be inspected should be the springs. Who is correct?
   a. A only  
   b. B only  
   c. Both A and B  
   d. Neither A nor B
108. Technician A says lateral wheel shimmy may be caused by dynamic wheel imbalance. Technician B says dynamic wheel imbalance may cause tire thumping. Who is correct?
   a. A only
   b. B only
   c. Both A and B
   d. Neither A nor B

109. Technician A says tire thumping may be caused by a heavy spot in the tire. Technician B says cupped tire tread may cause tire thumping. Who is correct?
   a. A only
   b. B only
   c. Both A and B
   d. Neither A nor B

110. Technician A says when the tire is supporting the vehicle weight, the tire rolling diameter is measured from the top of the tire to the road surface. Technician B says the free diameter of a tire is less than the rolling diameter. Who is correct?
   a. A only
   b. B only
   c. Both A and B
   d. Neither A nor B

111. All of the following are types of tire designs EXCEPT:
   a. Bias-ply
   b. Belted bias radial ply
   c. Belted radial ply
   d. Belted bias-ply

112. When the tread wear indicator is visible across the tread, the tire should be:
   a. Repaired
   b. Balanced
   c. Rotated
   d. Replaced

113. The maximum lateral tire runout is:
   a. 0.015 inch
   b. 0.035 inch
   c. 0.075 inch
   d. 0.100 inch

114. Radial tire runout should be measured with a:
   a. Machinist's rule
   b. Dial indicator
   c. Micrometer
   d. Depth gauge

115. The tire pressure monitoring system is being discussed. Technician A says that the tire pressure monitoring system must be reinitialized after a wheel pressure sensor has been replaced. Technician B says that the tire pressure monitoring system must be reinitialized after the tires have been rotated on some vehicles. Who is correct?
   a. A only
   b. B only
   c. Both A and B
   d. Neither A nor B

116. Brake pedal pressure is increased by all of following EXCEPT:
   a. the lever action of the brake pedal assembly.
   b. the size of the master cylinder pistons.
   c. power-assist units.
   d. the size of the brake rotor.

117. Technician A says the master cylinder reservoir may be a one-piece unit with the cylinder body. Technician B says the master cylinder reservoir may be a separate plastic container. Who is correct?
   a. A only
   b. B only
   c. Both A and B
   d. Neither A nor B

118. Technician A says dragging brakes may be caused by insufficient brake pedal free play. Technician B says free play is defined as the distance the brake pedal moves before the master cylinder primary piston moves. Who is correct?
   a. A only
   b. B only
   c. Both A and B
   d. Neither A nor B
119. Pressure bleeding is being discussed. Technician A says to pump the brake pedal several times during the bleed procedure. Technician B says to hold the metering valve open during the bleed procedure. Who is correct?
   a. A only  
   b. B only  
   c. Both A and B  
   d. Neither A nor B

120. Technician A says one piston of a dual master cylinder may supply pressure to one front wheel and one rear wheel. Technician B says a piston may supply pressure only to the brakes on one axle. Who is correct?
   a. A only  
   b. B only  
   c. Both A and B  
   d. Neither A nor B

121. The quick take-up master cylinder is a kind of ____ master cylinder designed for some types of front-wheel drive cars.
   a. step bore  
   b. single piston  
   c. cast iron  
   d. none of the above

122. Brake fluid flushing is being discussed. Technician A says all manufacturers require fluid to be flushed at certain intervals. Technician B says to flush the system with clean water before adding fresh brake fluid. Who is correct?
   a. A only  
   b. B only  
   c. Both A and B  
   d. Neither A nor B

123. Technician A says the brake warning light will remain on with the ignition in the RUN position if the parking brake is partially applied. Technician B says a low brake fluid level in the master cylinder may cause the brake warning light to come on. Who is correct?
   a. A only  
   b. B only  
   c. Both A and B  
   d. Neither A nor B

124. Filling a master cylinder is being discussed. Technician A says to fill the master cylinder to the fill mark on the reservoir. Technician B says some master cylinders may have markings on the inside of the reservoir. Who is correct?
   a. A only  
   b. B only  
   c. Both A and B  
   d. Neither A nor B

125. Pushrod adjustment is being discussed. Technician A says a loss of braking power can result if the pushrod adjustment is too short. Technician B says a noise from the brake booster can result if the pushrod adjustment is too short. Who is correct?
   a. A only  
   b. B only  
   c. Both A and B  
   d. Neither A nor B

126. A vehicle has brakes that are dragging. Technician A says the fluid level may be too high. Technician B says the pushrod may be misadjusted. Who is correct?
   a. A only  
   b. B only  
   c. Both A and B  
   d. Neither A nor B

127. Technician A says that flushing the brakes is the removal of air from the system and that not all the wheels are necessarily flushed. Technician B says that bleeding the system is the complete replacement of all system brake fluid with new fluid. Who is correct?
   a. A only  
   b. B only  
   c. Both A and B  
   d. Neither A nor B

128. The main function of a shock absorber or strut is to:
   a. Prevent wheel shimmy  
   b. Reduce lateral wheel movement  
   c. Prevent fore-and-aft wheel movement  
   d. Control spring action
129. Shock absorbers and struts provide all of these functions EXCEPT:
   a. Improving ride quality   c. Maintaining proper curb riding height
   b. Improving tire tread life   d. Improving directional stability

130. Technician A says shock absorbers should be replaced if there is a slight oil film on the lower tube. Technician B says shock absorbers should be replaced if they have severe dents in the lower tube. Who is correct?
   a. A only   c. Both A and B
   b. B only   d. Neither A nor B

131. Worn-out shock absorbers or struts may cause:
   a. Steering pull   c. Excessive steering free play
   b. Suspension bottoming   d. Lateral chassis oscillations

132. All of the following statements about shock absorber design and operation are true EXCEPT:
   a. A nitrogen gas charge in a shock absorber prevents oil foaming
   b. The oil flow through the orifices and valves is matched to the spring’s strength and deflection rate
   c. A typical shock absorber may have 70 percent of the total control on the extension cycle
   d. During jounce wheel travel, the piston is moving upward in the shock absorber bore of the lower tube housing

133. Technician A says the assembly shown in the following figure is used to connect a flexible brake hose to rigid steel tubing. Technician B says the clip in the following figure keeps the connection from leaking. Who is correct?
   a. A only   c. Both A and B
   b. B only   d. Neither A nor B

134. Technician A says metric and English fittings may be interchanged. Technician B says a double flare fitting may be used to replace an ISO fitting. Who is correct?
   a. A only   c. Both A and B
   b. B only   d. Neither A nor B

135. Brake warning lights are being discussed. Technician A says a pressure differential in the brake system will switch on the light. Technician B says a typical switch for this light is tripped by vacuum. Who is correct?
   a. A only   c. Both A and B
   b. B only   d. Neither A nor B

136. Technician A says the proportioning valve is an integral part of the master cylinder on SOME late model vehicles. Technician B says the valve may be installed in the wheel cylinders. Who is correct?
   a. A only   c. Both A and B
   b. B only   d. Neither A nor B
137. The results of a metering valve pressure test are being discussed. Technician A says the valve is functioning properly when it closed at 25 psi. Technician B says the valve is functioning properly when it reopened at 275 psi. Who is correct?
   a. A only  
   b. B only  
   c. Both A and B  
   d. Neither A nor B

138. Technician A says moisture found under the boot of a metering valve requires that the valve be replaced. Technician B says to test a metering valve it must be held open by a special tool. Who is correct?
   a. A only  
   b. B only  
   c. Both A and B  
   d. Neither A nor B

139. Which of the following materials are used for brake fluid lines?
   a. Double-walled aluminum  
   b. Single-walled stainless steel  
   c. Double-walled steel  
   d. Both A and B

140. All of the following are types of tubing fittings EXCEPT:
   a. swivel  
   b. floating  
   c. fixed  
   d. banjo

141. Technician A says that some vehicles are equipped with aluminum stabilizer bars to reduce unsprung weight. Technician B says that some vehicles are equipped with hollow stabilizer bars to reduce unsprung weight. Who is correct?
   a. A only  
   b. B only  
   c. Both A and B  
   d. Neither A nor B

142. Technician A says when a vehicle is carrying a continually heavy load, the vehicle should be equipped with heavy-duty coil springs. Technician B says automatic load leveling is a function of variable rate springs. Who is correct?
   a. A only  
   b. B only  
   c. Both A and B  
   d. Neither A nor B

143. Technician A says in a torsion bar front suspension, the front end of the torsion bar is always attached to the upper control arm. Technician B says in a torsion bar front suspension, a torsion bar adjustment mechanism is mounted where the rear end of the torsion bar is attached to the chassis. Who is correct?
   a. A only  
   b. B only  
   c. Both A and B  
   d. Neither A nor B

144. Technician A says damaged jounce or rebound bumpers may be caused by worn-out shock absorbers. Technician B says damaged jounce or rebound bumpers may be caused by sagged coil springs. Who is correct?
   a. A only  
   b. B only  
   c. Both A and B  
   d. Neither A nor B

145. Technician A says a ball joint stud could become broken if there is an out-of-round taper in the steering knuckle mounting hole. Technician B says a ball joint stud could become broken if the ball joint nut was incorrectly torqued. Who is correct?
   a. A only  
   b. B only  
   c. Both A and B  
   d. Neither A nor B

146. Power-assist brakes are being discussed. Technician A says this system helps the driver in applying braking force. Technician B says the system also aids in reducing wheel lockup. Who is correct?
   a. A only  
   b. B only  
   c. Both A and B  
   d. Neither A nor B
147. When vacuum-operated power-assist brakes are applied, atmospheric pressure is admitted to how many sides of the brake diaphragm?
   a. One
   b. Two
   c. Zero or none
   d. All of the above, depending on the design

148. Technician A says, with the brakes off, the vacuum in the front chamber helps hold the diaphragm in the released position. Technician B says air pressure in the rear chamber counteracts the opposing vacuum to hold the diaphragm in the released position. Who is correct?
   a. A only
   b. B only
   c. Both A and B
   d. Neither A nor B

149. Technician A says the tool shown (highlighted) is used to adjust the booster's vacuum valve. Technician B says the tool is used to set the depth of the booster's diaphragm. Who is correct?
   a. A only
   b. B only
   c. Both A and B
   d. Neither A nor B

150. Technician A says lever-type vacuum power-assist brake system gives the driver a "feel" for the braking effort. Technician B says this "feel" is similar to that of a nonpower boost brake system. Who is correct?
   a. A only
   b. B only
   c. Both A and B
   d. Neither A nor B

151. Technician A says dragging brakes may be caused by an improperly adjusted pushrod. Technician B says a leaking control valve in the vacuum booster could cause the brakes to be slightly applied at all times. Who is correct?
   a. A only
   b. B only
   c. Both A and B
   d. Neither A nor B

152. Technician A says a hydraulic power booster unit is installed in the same place as a vacuum booster. Technician B says the function of the hydraulic power booster is to multiply the force of the driver’s foot on the brake pedal. Who is correct?
   a. A only
   b. B only
   c. Both A and B
   d. Neither A nor B

153. Where are the components of the PowerMaster hydraulic booster system located?
   a. At the master cylinder.
   b. Under the vehicle floorboards.
   c. On the engine, next to the power steering pump.
   d. At various places under the hood.
154. A vehicle equipped with a vacuum brake booster has no power-assisted stops with the engine off. Which of the following is the most likely cause?
   a. A leak in the booster diaphragm
   b. A leak in the hose from the intake manifold
   c. A leaking check valve
   d. A leak in the hydraulic system

155. Rear axle tramp occurs during:
   a. Cornering at high speeds
   b. High-speed driving
   c. Deceleration
   d. Hard acceleration

156. Rear axle tramp is caused by:
   a. A bent rear control arm
   b. Improper rear wheel alignment
   c. Irregular rod surfaces
   d. Drive line torque transmitted through the drive shaft

157. The adjustment link in a multilink rear suspension:
   a. Reduces fore-and-aft rear wheel movement
   b. Absorbs engine torque transmitted through the drive shaft
   c. Provides a rear wheel caster adjustment
   d. Provides a rear wheel toe adjustment

158. Excessive rear chassis lateral movement may be caused by:
   a. Worn track bar bushings
   b. Worn stabilizer bar bushings
   c. A bent trailing arm
   d. A bent lower control arm

159. A MacPherson strut rear suspension system is being discussed. Technician A says worn stabilizer bar bushings cause lateral wheel movement. Technician B says worn stabilizer bar bushings may cause excessive tire tread wear. Who is correct?
   a. A only
   b. B only
   c. Both A and B
   d. Neither A nor B

160. Reduced curb riding height on the rear suspension causes all of these problems EXCEPT:
   a. Increased positive camber on the rear wheels
   b. Harsh ride quality
   c. Increased positive caster on the front wheels
   d. Fast steering wheel return

161. The left-rear upper spring insulator is broken on a MacPherson strut suspension system. The most likely result of this problem is:
   a. Harsh ride quality
   b. Increased left-rear positive camber
   c. Increased toe-out on the left-rear wheel
   d. A rattling noise on irregular road surfaces

162. The jounce bumpers on the rear struts are severely damaged. Technician A says the rear struts may be worn out. Technician B says the rear spring may be worn. Who is correct?
   a. A only
   b. B only
   c. Both A and B
   d. Neither A nor B

163. Technician A says friction heat is dissipated by the pads and rotors. Technician B says this heat is dissipated by the airflow. Who is correct?
   a. A only
   b. B only
   c. Both A and B
   d. Neither A nor B
164. Technician A says the rotor hub contains the wheel bearing assembly. Technician B says the bearings on the nondriving wheels of many vehicles have tapered roller bearings. Who is correct?
   a. A only  
   b. B only  
   c. Both A and B  
   d. Neither A nor B

165. The item indicated by the letter A is used to:
   a. indicate pad wear.  
   b. alert the driver when the brakes are applied.  
   c. reduce pad wear.  
   d. turn on the brake warning light.

166. Technician A says sometimes different friction materials are specified for the inboard and outboard brake pads. Technician B says it is possible to identify the friction material of a new brake pad by observing a printed code on the edge of the pad. Who is correct?
   a. A only  
   b. B only  
   c. Both A and B  
   d. Neither A nor B

167. Sliding calipers are being discussed. Technician A says the pads and pistons move when the brakes are applied. Technician B says the caliper stays stationary as the brakes are released. Who is correct?
   a. A only  
   b. B only  
   c. Both A and B  
   d. Neither A nor B

168. Technician A says the inboard brake pad of a sliding caliper is attached to the piston. Technician B says the outboard pad of a sliding caliper is set into the caliper housing. Who is correct?
   a. A only  
   b. B only  
   c. Both A and B  
   d. Neither A nor B

169. If the brakes require more pedal effort when stopping and the booster is okay, the problem is most likely:
   a. worn brake pads.  
   b. a sticking caliper piston.  
   c. a loose caliper piston.  
   d. both A and B.

170. Technician A says on some vehicles the disc brake pads can be visually inspected without removing the calipers. Technician B says disc brake pad thickness can be measured without removing the calipers. Who is correct?
   a. A only  
   b. B only  
   c. Both A and B  
   d. Neither A nor B

171. All of the following statements about disc brake pad replacement are true EXCEPT:
   a. always replace both brake pads as a set.  
   b. when reusing pads, always reverse them to equalize wear.  
   c. pads that are soaked with grease or brake fluid should be discarded.  
   d. if any hardware is bent or worn, replace it.
172. Disc brake caliper components should be cleaned in:
   a. denatured alcohol or clean DOT-3 or DOT-4 brake fluid.
   b. gasoline or kerosene.
   c. carbon tetrachloride.
   d. acetone or paint thinner.

173. Check rotor thickness variation by measuring with a micrometer calibrated in:
   a. thousandths of an inch.
   b. ten-thousandths of an inch.
   c. hundreds of an inch
   d. centimeters.

174. All of the following statements about hard spots in the rotor are true EXCEPT:
   a. hard spots are caused by high heat generated when braking.
   b. hard spots will appear dull red or brown.
   c. hard spots can be removed by grinding.
   d. hard spots are likely to reappear once the rotor is heated again.

175. All of the following statements about rotor refinishing are true EXCEPT:
   a. for cuts greater than 0.015 inch, take two or more shallow cuts rather than one very deep cut.
   b. the first cut should only be a portion of the total anticipated depth of cut.
   c. the finishing cut removes more metal than the rough cut.
   d. areas not touched by the cutting bits will be darker than those that have.

176. Technician A says if the roller or race shows any signs of wear or damage, the bearing must be replaced. Technician B says a replacement bearing always comes with both a roller and race. Who is correct?
   a. A only
c. Both A and B
   b. B only
d. Neither A nor B

177. Technician A says modern, low-cost vehicles may be equipped with drum brakes on all four wheels. Technician B says some modern vehicles use drum brakes on the rear axles. Who is correct?
   a. A only
c. Both A and B
   b. B only
d. Neither A nor B

178. Technician A says an inspection of the braking system should include the wheel assemblies. Technician B says a brake inspection includes components of the steering and suspension systems. Who is correct?
   a. A only
c. Both A and B
   b. B only
d. Neither A nor B

179. Technician A says the following figure shows the correct method for checking wheel cylinder leaks. Technician B says the following figure shows the wheel cylinder boot being replaced. Who is correct?

   a. A only
c. Both A and B
   b. B only
d. Neither A nor B
180. Technician A says if it is possible to reverse the shoes accidentally, the lining materials will be identical. Technician B says improper shoe placement could cause excessive brake wear. Who is correct?
   a. A only
   b. B only
   c. Both A and B
   d. Neither A nor B

181. Technician A says the following illustration shows the mechanism for a leading-trailing brake self-adjuster. Technician B says the following illustration shows a duo-servo brake assembly. Who is correct?
   a. A only
   b. B only
   c. Both A and B
   d. Neither A nor B

182. On a duo-servo brake adjuster, what actually engages the starwheel to cause it to turn?
   a. A lever or pawl
   b. The cable itself
   c. The primary shoe
   d. The secondary shoe

183. Technician A says the disadvantage of a brake design that uses the parking brake to adjust the shoes is that if the driver does not use the parking brake, the service brakes will not get adjusted. Technician B says the parking brake adjuster only works when the parking brake is applied and released while the vehicle is moving. Who is correct?
   a. A only
   b. B only
   c. Both A and B
   d. Neither A nor B

184. Which of the following will cause pulsation in the brake pedal when the brakes are applied?
   a. Loose lining
   b. Grease on linings
   c. Out-of-round drum
   d. All of the above

185. Grabbing brakes are usually caused by:
   a. glazed or worn linings.
   b. grease on linings.
   c. oil or brake fluid on linings.
   d. all of the above.

186. Technician A says it is okay to replace both front brakes without replacing the rear brakes. Technician B says it is okay to replace the brakes on one side of an axle without replacing the other side. Who is correct?
   a. A only
   b. B only
   c. Both A and B
   d. Neither A nor B
187. All of the following statements about brake drum measuring and condition are true EXCEPT:
   a. drums with out-of-roundness of more than 0.006 inch must be turned or replaced.
   b. if the maximum diameter of the bottom of the deepest groove exceeds new drum diameter by more than 0.060 inch, the drum is ruined.
   c. drums that are smooth and true but exceed the new diameter by 0.090 inch or more should be reused without turning.
   d. even slightly rough drum surfaces should be turned.

188. The starwheel adjusting screw threads should be lubricated with:
   a. brake lubricant.
   b. brake fluid.
   c. penetrating oil.
   d. any of the above.

189. Technician A says dripping fluid under the wheel cylinder dust boot means that the wheel cylinder should be overhauled or replaced. Technician B says on some vehicles the wheel cylinder can be overhauled while mounted to the backing plate. Who is correct?
   a. A only
   b. B only
   c. Both A and B
   d. Neither A nor B

190. Technician A says the active steering column is designed to provide crash protection for the 5th percentile smaller female driver. Technician B says the active steering column is designed to provide crash protection for the 50th percentile large male driver. Who is correct?
   a. A only
   b. B only
   c. Both A and B
   d. Neither A nor B

191. Technician A says a clock spring electrical connector contains a conductive ribbon. Technician B says the clock spring electrical connector must be centered when it is mounted in the steering column. Who is correct?
   a. A only
   b. B only
   c. Both A and B
   d. Neither A nor B

192. Technician A says when installing an outer tie-rod end, the slot in the tie-rod sleeve must be directly above the opening in the sleeve clamp. Technician B says excessive front wheel toe change and wear on the front tire treads may be caused by a loose tie-rod end. Who is correct?
   a. A only
   b. B only
   c. Both A and B
   d. Neither A nor B

193. Technician A says with one end of the steering damper disconnected, the damper should offer equal resistance to movement as it is extended and compressed. Technician B says a steering damper is used on small front-wheel drive vehicles. Who is correct?
   a. A only
   b. B only
   c. Both A and B
   d. Neither A nor B

194. Technician A says a bent center link will affect front wheel toe. Technician B says a bent center link will affect front wheel camber. Who is correct?
   a. A only
   b. B only
   c. Both A and B
   d. Neither A nor B

195. Outer tie-rod replacement and toe adjustment on a parallelogram steering linkage are being discussed. Technician A says to adjust the front wheel toe, and turn the tie-rod sleeves with a pair of vise grips. Technician B says after an outer tie-rod end is replaced, the front wheel toe must be measured. Who is correct?
   a. A only
   b. B only
   c. Both A and B
   d. Neither A nor B
196. In a parallelogram steering linkage:
   a. The idle arm is parallel to the pitman arm
   b. The outer tie-rod ends are parallel to the idler arm
   c. The pitman arm is parallel to the center link
   d. The center link is supported by the pitman arm and idler arm

197. A typical air bag deployment time is:
   a. 40 milliseconds
   b. 1 second
   c. 4 seconds
   d. 1.5 seconds

198. Technician A says the parking brake is part of the hydraulic braking system. Technician B says the parking brake is usually operated through a cable-and-lever system. Who is correct?
   a. A only
   b. B only
   c. Both A and B
   d. Neither A nor B

199. Technician A says most parking brake systems use a cable to connect the parking brake lever or pedal to the braking assemblies. Technician B says the cable assemblies are nonadjustable and must be replaced when the brake no longer works. Who is correct?
   a. A only
   b. B only
   c. Both A and B
   d. Neither A nor B

200. Technician A says an auxiliary drum parking brake has a separate drum brake assembly on the inside of the rear disc brake hub and rotor. Technician B says auxiliary drum parking brakes are often used with rear standard drum brakes. Who is correct?
   a. A only
   b. B only
   c. Both A and B
   d. Neither A nor B

201. Technician A says to adjust the service brakes before adjusting the parking brake. Technician B says to clean the threads of the adjusting nut before adjusting the parking brake. Who is correct?
   a. A only
   b. B only
   c. Both A and B
   d. Neither A nor B

202. On parking brakes with vacuum release motors, vacuum loss could be caused by:
   a. leaking hoses.
   b. loose hose connections.
   c. crossed hoses.
   d. all of the above.

203. Technician A says the parking brake shown should be adjusted with the parking brake applied. Technician B says each wheel cable must be adjusted separately. Who is correct?
   a. A only
   b. B only
   c. Both A and B
   d. Neither A nor B
**204.** Technician A says the caliper in the following figure has an integral parking brake. Technician B says the caliper in the following figure is used on the front axles. Who is correct?

![Caliper Diagram]

- a. A only  
- b. B only  
- c. Both A and B  
- d. Neither A nor B

**205.** Technician A says the test depicted in the illustration is for a ground side brake warning lamp switch. Technician B says the test shown can be used to check continuity of the switch in both the ON and OFF positions. Who is correct?

![Test Diagram]

- a. A only  
- b. B only  
- c. Both A and B  
- d. Neither A nor B
206. Technician A says the tool in the following figure is being used to connect the parking brake cable into the backing plate. Technician B says the tool is being used to disconnect the parking brake cable from the backing plate. Who is correct?

- A only
- B only
- Both A and B
- Neither A nor B

207. The following statements about parking brakes are all true EXCEPT:

- The parking mechanism may have internal or external moveable friction components.
- Drum parking brakes on a four-wheel disc brake system use hydraulics to apply the brakes.
- Many parking brake systems use both levers and pedals to apply the brake.
- Most drum parking brakes use one or two levers within the drum brake assembly to apply and equalize the force between the two shoes.

208. Technician A says the parking brake should hold the vehicle on a 30-degree slope. Technician B says the parking brake should be able to stop a vehicle moving 5 mph within 100 feet. Who is correct?

- A only
- B only
- Both A and B
- Neither A nor B

209. When testing power steering pump pressure, the pressure gauge valve should be closed for no more than:

- 5 seconds
- 30 seconds
- 45 seconds
- 60 seconds

210. Technician A says that when testing power steering pump pressure, the pressure gauge should be connected in the power steering return hose. Technician B says if the power steering pump pressure is less than specified, the pressure relief valve may be sticking. Who is correct?

- A only
- B only
- Both A and B
- Neither A nor B

211. A loose power steering belt may cause all of these problems EXCEPT:

- Excessive wear on internal pump parts
- Erratic steering effort
- A squealing noise during acceleration
- Low pump pressure
212. Technician A says each manufacturer uses the same speed sensors to ease diagnostics. Technician B says each manufacturer and sometimes different ABS systems use different diagnostic procedures. Who is correct?
   a. A only  c. Both A and B
   b. B only  d. Neither A nor B

213. Technician A says the first step in road testing for an ABS problem is to check the red brake warning light. Technician B says if the red lamp is lit, the brakes may not be operating properly. Who is correct?
   a. A only  c. Both A and B
   b. B only  d. Neither A nor B

214. ABS DTCs are being discussed. Technician A says a hard code is reset each time the engine is started. Technician B says the module will record the number of engine starts since the last soft code set. Who is correct?
   a. A only  c. Both A and B
   b. B only  d. Neither A nor B

215. RWAL systems are being discussed. Technician A says the system uses four-wheel speed sensors. Technician B says some systems uses a RED brake warning light for both service brakes and ABS. Who is correct?
   a. A only  c. Both A and B
   b. B only  d. Neither A nor B

216. The figure represents a(n):
   a. digital waveform signal for a speed sensor.
   b. code flash sequence for an ABS warning light.
   c. output waveform signal to the ABS hydraulic solenoid(s).
   d. on/off command signal.

217. Technician A says the first code retrieved should be the first repair made. Technician B says the last code in a code series is the first repair since that one was the last set. Who is correct?
   a. A only  c. Both A and B
   b. B only  d. Neither A nor B

218. The Kelsey-Hayes RWAL was introduced on (the):
   a. 1987 Ford pickups.
   b. 1988 Chevrolet and GMC pickups.
   c. 1988 Dodge pickups.
   d. all of the above.
219. Yaw sensors are being discussed. Technician A says most yaw sensors produce a DC voltage signal. Technician B says most yaw sensors contain mercury. Who is correct?
   a. A only
e. Both A and B
   b. B only
   d. Neither A nor B

220. All of the following are types of wheel speed sensors EXCEPT:
   a. magneto-resistive.
e. magneto-reductive.
   b. PM generator.
d. Hall effect.

221. Technician A says a yaw sensor detects motion. Technician B says a PM sensor detects motion. Who is correct?
   a. A only
e. Both A and B
   b. B only
   d. Neither A nor B

222. Delphi DBC-7 systems are used mainly on ______ vehicles.
   a. Ford Motor Company
e. Toyota
   b. General Motors
d. DaimlerChrysler

223. A Delphi Chassis ABS-VI is being bled. Technician A says to use a scan tool to position the modulator pistons. Technician B says the pistons can be positioned manually. Who is correct?
   a. A only
e. Both A and B
   b. B only
   d. Neither A nor B

224. Technician A says a power rack and pinion steering gear requires a breather tube to allow air to flow from one bellows boot to the other during a turn. Technician B says in a rack and pinion steering gear, a breather tube is connected between the bellows boots and the power steering pump return hose. Who is correct?
   a. A only
e. Both A and B
   b. B only
   d. Neither A nor B

225. Technician A says the steering system's ability to isolate road shock from the steering wheel is reduced when the number of friction points is reduced. Technician B says a steering system has increased road feel when the number of friction points is reduced. Who is correct?
   a. A only
e. Both A and B
   b. B only
   d. Neither A nor B

226. In a center take-off power rack and pinion steering gear, the tie rods are attached to:
   a. The ends of the rack
e. A moveable sleeve
   b. Rack studs
d. Rack couplings

227. The component in a rack and pinion steering gear that compares to the center link in a parallelogram steering linkage is the:
   a. Rack
e. Pinion
   b. Inner tie-rod ends
d. Outer tie-rod ends

228. The inside of both bellows boots are contaminated with power steering fluid on a rack and pinion steering gear. Technician A says if fluid is leaking past a rack seal into one boot, oil may flow through the breather tube to the opposite boot. Technician B says that there should be fluid in the bellows boot, and this is a normal condition. Who is correct?
   a. A only
e. Both A and B
   b. B only
   d. Neither A nor B

229. An electronic power steering (EPS) system is being discussed. Technician A says if the engine stalls and the ignition switch is on, the EPS remains operational. Technician B says if the steering wheel is turned and held fully in one direction, the power module reduces current flow through the steering gear motor to prevent motor overheating. Who is correct?
   a. A only
e. Both A and B
   b. B only
   d. Neither A nor B
230. What effect will an incorrect rear wheel thrust angle have on the front suspension?
   a. It will affect steering wheel position  c. Cause camber tire wear
   b. Steering shimmy  d. Affect front steering axis inclination

231. All of these statements about improper caster are true EXCEPT:
   a. May cause pull while braking  c. May cause front wheel shimmy
   b. May cause feathered tire tread wear  d. May cause excessive steering effort

232. Technician A says a tire pressure check is not required before a wheel alignment. Technician B says a front wheel bearing play should be checked before a wheel alignment. Who is correct?
   a. A only  c. Both A and B
   b. B only  d. Neither A nor B

233. Technician A says wheel alignment angles are designed to provide improved ride qualities. Technician B says wheel alignment angles are designed to provide minimum tire tread wear and predictable directional control. Who is correct?
   a. A only  c. Both A and B
   b. B only  d. Neither A nor B

234. Technician A says excessive toe-out (negative) on a front wheel causes rapid wear on the inside edge of the tire tread. Technician B says excessive positive camber on a front wheel causes premature wear on the outside edge of the tire tread. Who is correct?
   a. A only  c. Both A and B
   b. B only  d. Neither A nor B

235. Technician A says the fuel tank should be full when performing a wheel alignment. Technician B says after the front struts are replaced, a wheel alignment should be performed. Who is correct?
   a. A only  c. Both A and B
   b. B only  d. Neither A nor B

236. Steering pull to the right occurs only when braking. The most likely cause of this problem is:
   a. Excessive positive camber on the left-front wheel
   b. Excessive positive caster on the right-front wheel
   c. Excessive toe-out on the right-front wheel
   d. A loose strut rod bushing on the right-front suspension

237. A vehicle with a rack and pinion steering system has a complaint of tire squealing when cornering. The most likely cause of this problem is:
   a. A bent steering arm
   b. Worn steering gear mounting bushings
   c. Sagged coil springs
   d. Loose stabilizer bar bushings

238. The right-front wheel setback is excessive on a MacPherson strut front suspension system. The most likely cause of this problem is:
   a. A broken stabilizer bar
   b. A bent engine cradle
   c. A binding right-upper strut mount.
   d. Broken insulators on the right coil spring

239. A vehicle exhibits excessive tire squeal during cornering. Technician A says that there may be an incorrect toe-out-on-turns angle. Technician B says that a steering arm may be bent. Who is correct?
   a. A only  c. Both A and B
   b. B only  d. Neither A nor B
240. Technician A says the SAI line is tilted inward in relation to the true vertical tire centerline viewed from the front. Technician B says on a short-and-long arm front suspension, the SAI line is an imaginary line running through the centers of the upper and lower ball joints viewed from the front. Who is correct?
   a. A only  
   b. B only  
   c. Both A and B  
   d. Neither A nor B

241. During a wheel alignment, a technician suspects that the front cradle on a front-wheel-drive vehicle may have shifted. If the cradle was shifted from the right to the left, what effect would it have?
   a. Right camber will become more positive and left camber will become more negative evenly  
   b. Left camber will become more positive and right camber will become more negative evenly  
   c. Right caster will become more positive and left caster will become more negative evenly  
   d. Left caster will become more positive and right caster will become more negative evenly

242. Diagonal wear lines on the rear tires could be caused by what?
   a. Toe angle error  
   b. Camber angle error  
   c. Wheel offset  
   d. Ride height error

243. During a road test on a front-wheel drive vehicle, it is determined that the vehicle pulls right after a right turn, and pulls left after a left turn. The most likely cause of this condition is:
   a. A binding upper strut bearing  
   b. Excessive lower ball joint play  
   c. Excessive positive caster  
   d. A misaligned subframe/cradle assembly

244. Technician A says front wheel toe should be measured with the front wheels in the straight-ahead position. Technician B says excessive front wheel toe-in causes steering pull to the right. Who is correct?
   a. A only  
   b. B only  
   c. Both A and B  
   d. Neither A nor B

245. Technician A says on many rear-wheel drive cars, the front wheels are set to a slight toe-in position. Technician B says the driving forces on a rear-wheel drive car tend to move the front wheels to a toe-in position. Who is correct?
   a. A only  
   b. B only  
   c. Both A and B  
   d. Neither A nor B

246. Technician A says steering pull when braking may be caused by unequal SAI angles on the front suspension. Technician B says front tire tread wear may be caused by unequal SAI angles on the front suspension. Who is correct?
   a. A only  
   b. B only  
   c. Both A and B  
   d. Neither A nor B

247. If the SAI angle is 12 degrees, and the camber is 1 degree +, the included angle is:
   a. 10 degrees  
   b. 11 degrees  
   c. 13 degrees  
   d. 14 degrees

248. Excessive toe-out on the right-rear wheel causes all of these problems EXCEPT:
   a. Feathered tire tread wear  
   b. Steering pull to the left  
   c. Incorrect thrust angle  
   d. Incorrect right-rear camber angle
Final Study Guide
Answer Section

TRUE/FALSE

1. ANS: F   PTS: 1
2. ANS: T   PTS: 1
3. ANS: T   PTS: 1
4. ANS: T   PTS: 1
5. ANS: T   PTS: 1
6. ANS: F   PTS: 1
7. ANS: T   PTS: 1
8. ANS: T   PTS: 1
9. ANS: T   PTS: 1
10. ANS: T  PTS: 1
11. ANS: T  PTS: 1
12. ANS: F  PTS: 1
13. ANS: F  PTS: 1
14. ANS: F  PTS: 1
15. ANS: T  PTS: 1
16. ANS: F  PTS: 1
17. ANS: F  PTS: 1
18. ANS: F  PTS: 1
19. ANS: F  PTS: 1
20. ANS: F  PTS: 1
21. ANS: T  PTS: 1
22. ANS: T  PTS: 1
23. ANS: T  PTS: 1
24. ANS: T  PTS: 1
25. ANS: T  PTS: 1
26. ANS: T  PTS: 1
27. ANS: F  PTS: 1
28. ANS: T  PTS: 1
29. ANS: T  PTS: 1
30. ANS: T  PTS: 1
31. ANS: T  PTS: 1
32. ANS: F  PTS: 1
33. ANS: T  PTS: 1
34. ANS: F  PTS: 1
35. ANS: T  PTS: 1
36. ANS: T  PTS: 1
37. ANS: T  PTS: 1
38. ANS: F  PTS: 1
39. ANS: F  PTS: 1
40. ANS: T  PTS: 1
41. ANS: F  PTS: 1
42. ANS: F  PTS: 1
43. ANS: T  PTS: 1
44. ANS: F  PTS: 1
45. ANS: T  PTS: 1
46. ANS: F  PTS: 1
47. ANS: F  PTS: 1
48. ANS: T  PTS: 1
49. ANS: F  PTS: 1
50. ANS: T  PTS: 1
51. ANS: F  PTS: 1
52. ANS: F  PTS: 1
53. ANS: T  PTS: 1
54. ANS: T  PTS: 1
55. ANS: T  PTS: 1
56. ANS: T  PTS: 1
57. ANS: F  PTS: 1
58. ANS: T  PTS: 1
59. ANS: F  PTS: 1
60. ANS: F  PTS: 1
61. ANS: T  PTS: 1
62. ANS: T  PTS: 1
63. ANS: T  PTS: 1
64. ANS: T  PTS: 1
65. ANS: T  PTS: 1
66. ANS: T  PTS: 1
67. ANS: F  PTS: 1
68. ANS: T  PTS: 1
69. ANS: T  PTS: 1
70. ANS: F  PTS: 1
71. ANS: T  PTS: 1
72. ANS: F  PTS: 1
73. ANS: T  PTS: 1

MULTIPLE CHOICE

74. ANS: D  PTS: 1
75. ANS: A  PTS: 1
76. ANS: C  PTS: 1
77. ANS: C  PTS: 1
78. ANS: D  PTS: 1
79. ANS: A  PTS: 1
80. ANS: D  PTS: 1
81. ANS: B  PTS: 1
82. ANS: D  PTS: 1
83. ANS: B   PTS: 1
84. ANS: D   PTS: 1
85. ANS: C   PTS: 1
86. ANS: C   PTS: 1
87. ANS: C   PTS: 1
88. ANS: B   PTS: 1
89. ANS: A   PTS: 1
90. ANS: D   PTS: 1
91. ANS: D   PTS: 1
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