1. The minimum qualifications for driver/operators is set by NFPA 1002, Standard for:

   A. *Fire Fighter Professional Qualifications.*
   B. *Fire Apparatus Driver/Operator Professional Qualifications.*
   C. *Fire Department Occupational Safety and Health Program.*
   D. *Comprehensive Occupational Medical Program for Fire Departments.*

2. The corrected vision, with contact lenses or spectacles, required by NFPA 1582 is:

   A. 20/20. B. 20/30. C. 20/40. D. 20/80.

Directions: Match each apparatus listed in Column A with the appropriate description in Column B.

Column A	Column B
3. Aerial apparatus	A. Apparatus with a permanently mounted fire pump and a rated discharge of 750 gpm or greater
4. Mobile water supply apparatus	B. Any pump with a rated capacity of 200 gpm or less
5. Fire department pumper	C. A fire apparatus with a permanently mounted, hydraulically-operated elevating device
	D. An apparatus that carries a minimum of 1000 gallons

6. The angle from the front point of ground contact of the front tire to any projection of the apparatus in front of the front axle is considered the:

   A. angle of return. B. angle of departure.
   C. angle of approach. D. lateral angle.

7. A fire apparatus with a **primary** purpose of transporting 1,000 or more gallons of water is considered to be a/an:

   A. attack pumper. B. aerial device.
   C. midi pumper. D. tanker/tender.

8. The type of pumper which is usually equipped with four-wheel drive and typically has a pump with a capacity of less than 500 gpm is known as a(n):

   A. midipumper. B. minipumper.
   C. tanker/tender. D. industrial foam pumper.

9. Tandem rear axles, tri-axles, or a tractor-trailer design should be considered for tank capacities greater than:

A. 1,000 gallons (4 000 L).
B✓ 1,500 gallons (6 000 L).
C. 2,000 gallons (8 000 L).
D. 2,500 gallons (10 000 L).

10. *Wildland fire apparatus are:*

A. used as support vehicles for pumpers that are attacking a fire.
B. intended to produce large quantities of foam solution to attack Class B fires.
C. designed to handle small fires that do not require the capacity needed for a larger pumper.
D✓ lightweight, highly maneuverable vehicles that can go places inaccessible to larger apparatus.

11. The correct method of extinguishing fires from a wildland fire apparatus is to:

A. walk in front of the apparatus while extinguishing fire with attack hose.
B. ride on the tailboard of the vehicle and discharge water as the vehicle is driven.
C. sit on an extended front bumper of the vehicle while discharging water as the vehicle is driven.
D✓ use short sections of attack hose while walking alongside the apparatus and extinguishing fire along the way.

12. Keeping apparatus in a state of usefulness or readiness is known as:

A. repair.
B✓ maintenance.
C. reliability.
D. trouble shooting.

13. Checking and documenting the oil level, radiator coolant, fuel level, tires, and visible and audible warning signals is normally considered to be part of _____ maintenance.

A✓ daily/weekly
B. quarterly
C. monthly
D. periodic

14. Which of the following is a result of over-throttling?

A. White smoke from the exhaust
B. Overheating of engine coolant
C✓ Additional fuel consumption
D. Oil thickening

15. *Improper tire pressures **may** cause:*

A. improper weight distribution.
B✓ poor handling.
C. low maintenance costs.
D. increased fuel mileage.

16. The two categories that lighting equipment can be divided into are:

A. fixed and raised.
B✓ portable and fixed.
C. fixed and vehicle-mounted.
D. portable and remote-controlled.

17. According to NFPA _____, some fire departments have a designated apparatus maintenance officer who meets the requirements of an Emergency Vehicle Technician.

A. 1001 B. 1002 C. 1071 D. 1074

18. Over-cleaning an apparatus can lead to:

A. shorter vehicle life.
B. poor public relations.
C. corrosion of steel components.
D. removal of lubrication from the chassis.

19. Which method below should be used when washing a newer apparatus?

A. Dry rubbing
B. After washing with automotive shampoo according to the shampoo instructions, allowing to air dry
C. Washing with automotive shampoo and cold water
D. Washing with soap and hot water

20. A new fire apparatus should be washed with:

A. a stream of cold water set so that the end of the hose is at least two feet away from the vehicle.
B. hot water.
C. automotive shampoo after rinsing with cold water.
D. a pressure washer.

21. A fire apparatus should be dried:

A. by air drying.
B. with old, soft towels.
C. with new, clean towels.
D. with a clean chamois.

22. The walk-around method of apparatus inspection involves starting at the:

A. driver's door.
B. officer's door.
C. front of the vehicle.
D. back of the vehicle.

23. The apparatus inspection should begin by approaching the vehicle and looking beneath the vehicle for spots that indicate:

A. a leaning vehicle.
B. leaking vehicle fluids.
C. poor cleaning procedures.
D. poor ventilation equipment.

24. The left side of an apparatus is also known as the:

A. curb side.
B. officer side.
C. street side.
D. firefighter side.

25. During a left- and right-rear side inspection, it is important to be sure that dual tires:

A. have tread separation.
B. are touching each other.
C. are touching the wheel wells.
D✓ do **not** come in contact with each other.

26. If the truck is parked and the speedometer is showing anything above 0, it is possible that:

A✓ the gauge is defective.
B. the truck is idling too fast.
C. the truck is in drive gear.
D. pressure is being applied to the gas pedal.

27. Steering wheel play should usually be no more than approximately _____ degrees in either direction.

A. 5 B✓ 10 C. 15 D. 20

28. The air pressure on apparatus equipped with air brakes should build to a sufficient level in order for the vehicle to operate within _____ seconds of starting.

A. 10 B. 15 C. 30 D✓ 60

29. Apparatus with air brakes should be equipped with an air pressure protection valve which prevents the operation of air horns when the pressure in the air reservoir drops below _____ psi (kPa).

A✓ 80 psi (552 kPa)
B. 100 psi (289 kPa)
C. 125 psi (862 kPa)
D. 150 psi (1 034 kPa)

30. During a test of the parking brake, the apparatus should come to a complete stop within about:

A. 10 feet (3 m).
B. 15 feet (4.5 m).
C✓ 20 feet (6 m).
D. 25 feet (7.5 m).

31. If the oil pressure gauge ***does not*** indicate any reasonable amount of oil pressure within _____ of starting the apparatus, the engine must be stopped immediately.

A. 1 to 2 seconds
B. 2 to 5 seconds
C✓ 5 to 10 seconds
D. 1 to 3 minutes

32. Once an automatic transmission apparatus is ready to move, depress the _____ and move it to the appropriate gear selection.

A. gear shift
B. clutch petal
C. start button lever
D✓ interlock on the shifter

33. It is important to know that the _____ influences automatic shifting on automatic transmission apparatus.

A. length of the clutch shifter
B. pressure placed upon the accelerator
C. pressure placed upon the clutch pedal
D. pressure placed upon the brake pedal

34. When driving an apparatus, remain in the highest gear that allows the apparatus to _____ and still have some power in reserve for acceleration.

A. lug
B. idle in neutral
C. keep up with traffic
D. reach 400 to 500 rpm

35. The apparatus engine temperature should be allowed to stabilize by idling it for _____ minutes before shutdown.

A. 1 to 2
B. 3 to 5
C. 5 to 8
D. 5 to 10

36. A braking system that has a snow-and-mud switch is known as a(n):

A. antilock braking system.
B. front brake-limiting valve system with an automatic traction control.
C. electromagnetic braking system.
D. antilock braking system with automatic traction control.

37. To prevent water hammer, it is important to close nozzles, hydrants, valves, and hose clamps:

A. quickly.
B. slowly.
C. partially.
D. completely.

38. The device that introduces foam concentrate into the water stream to make the foam solution is:

A. foam.
B. foam solution.
C. foam concentrate.
D. foam proportioner.

39. To aerate means to mix with:

A. air.
B. water.
C. foam solution.
D. foam concentrate.

40. The vacuum test requires a reading at the end of 5 minutes during which no more than _____ inches of vacuum should be lost.

A. 24
B. 22
C. 10
D. 12

41. Apparatus maintenance records serve many functions, such as:

A. filing warranty claims with the manufacturer.
B. documenting recurrent repairs.
C. indicating the type of cleaning solution to be used.
D. Both A and B are correct.

42. Before an apparatus response from the station, the driver/operator should:

A. tell passengers to buckle their seat belts, then proceed.
B. assume everyone is buckled in and proceed.
C. check all fluid levels.
D. assure that everyone is seated and belted.

43. When driving under winter conditions, the driver/operator should follow at a greater distance because the distance to stop on snow and ice is increased _____ times.

A. 3 to 15 B. 2 to 5 C. 10 to 20 D. 1 to 2

44. Before turning corners or approaching curves, the driver/operator should:

A. remain in the same gear and decelerate.
B. remain in the same gear and apply the brake.
C. shift a standard transmission into a lower gear.
D. shift an automatic transmission into a higher gear.

45. The distance a vehicle travels from the time the driver begins to apply the brakes until it comes to a complete stop is known as:

A. braking distance.
B. total reaction distance.
C. visual lead distance.
D. brake performance distance.

46. One common cause of fire apparatus skidding is:

A. changing lanes.
B. anticipating obstacles in the road.
C. weight shifts of heavy apparatus.
D. the brake limiting valve.

47. Apparatus are **most likely** to be involved in an accident at/on:

A. off/on ramps. B. intersections. C. freeways. D. bridges.

48. For safe operation and driving of fire apparatus, the driver should:

A. **not** exceed 10 miles per hour when leaving the station.
B. drive offensively and defensively.
C. use the clutch pedal as a footrest for seating stability.
D. remember that icy, wet downgrades increase braking distance by as much as 15 times.

49. You encounter a school bus with flashing signal lights while responding to a call. You must stop and proceed:

A. only after a proper signal is given by the bus driver or police officer.
B. slowly around the bus with all emergency warning devices on.
C. slowly and with caution.
D. *only after you have turned off all emergency warning devices.*

50. Most driving regulations pertain to environmental conditions that are:

A. snowy and icy. B. wet and rainy. C. dark and foggy. D. dry and clear.

51. A driver/operator of an emergency vehicle who **does not** obey state, local, or departmental driving regulations is:

A. protected under the Good Samaritan Law.
B. subject to criminal prosecution only.
C. exempt from any prosecution.
D. subject to criminal and civil prosecution.

52. Unless specifically exempt, when driving fire apparatus, the fire apparatus driver/operators are generally subject to any/all:

A. NFPA 1901 guidelines.
B. statutes, rules, regulations, and ordinances.
C. National Emergency Vehicle Response Commission Guidelines.
D. Department of Motor Vehicle registration rules.

53. Safety bars on fire apparatus are designed to:

A. be a substitute for safety belts.
B. keep equipment from falling off the apparatus.
C. allow firefighters to stand upright while the vehicle is in motion.
D. keep a firefighter from falling out of a jump seat.

54. You are responding to an emergency on a three-lane highway during moderately heavy traffic conditions. You are in the center lane. The vehicle ahead, which you are rapidly overtaking, stops! There is insufficient space to stop without striking the vehicle. Which of the following evasive tactics should be employed?

A. Slowly move to the right lane and proceed on the call.
B. Brake to reduce speed as you pass on the left side of the stopped vehicle.
C. Brake to reduce speed and pass the stopped vehicle on the right.
D. Accelerate and immediately move to the left lane when passing the stopped vehicle.

55. You have responded to an emergency on a limited-access highway. Your apparatus is not being used. Which of the following should be done?

A. Position the apparatus across the intersection to block traffic.
B. Use the apparatus as a barrier between the traffic flow and the responders on scene.
C. Position the apparatus off the highway in an area away from the incident.
D. Position the apparatus as close to the incident as possible so responders will have access to the apparatus.

56. In adverse weather in an area free of traffic, you can find out how slippery the road is and determine your approximate stopping distance by:

A. setting the brakes.
B. carefully applying the brakes.
C. pumping the brakes.
D. releasing the brakes.

57. The distance a vehicle travels from the point where the driver begins transferring his/her foot from the accelerator to the brake pedal until the apparatus comes to a complete stop is called the _____ distance.

A. braking B. driver-reaction C. total stopping D. total reaction

58. Which of the following hazardous conditions contribute to the adverse effects of weight transfer?

A. Abrupt steering
B. Driving on slippery roads
C. Driving on excessively steep slopes
D. Both A and C are correct.

59. The weight carried on most fire apparatus can contribute to _____ due to excessive weight transfer.

A. skidding
B. apparatus rollover
C. delay in the driver's brake reaction time.
D. Both A and B are correct.

60. If an apparatus begins to skid, the driver/operator should:

A. gradually apply the brakes, bringing the apparatus to a halt.
B. turn the apparatus steering wheel so the front wheels face the direction of the skid.
C. turn the apparatus steering wheel so the front wheels face the direction opposite to the direction of the skid.
D. quickly release pressure from the accelerator.

61. Engine brakes, which assist in braking, are activated when:

A. pressure is applied to the brake.
B. brief, rapid brake applications are made.
C. pressure is released from the accelerator.
D. engine rpm is increased.

62. At an intersection, if a driver/operator cannot account for all lanes of traffic, then he/she should:

A. stop, check the lanes of traffic, then proceed.
B. use the air horn and proceed without stopping.
C. cautiously proceed through the intersection because the warning devices and emergency situation give the apparatus the right of way.
D. move to the innermost lane and accelerate.

63. When at an intersection, apparatus should be brought to a complete stop if:

A. there are any obstructions that block the view of the intersection.
B. all lanes are stopped and cleared.
C. it is a controlled intersection.
D. law enforcement has cleared the intersection.

64. According to NFPA 1500, during response to emergency or nonemergency situations, the driver shall _____ at all unguarded railroad crossings.

A. use caution
B. proceed at a maximum of 5 mph
C. come to a complete stop
D. stop only when a train is in sight from either direction

65. **Directions:** Read each statement below; then choose your answer from alternatives A-D below.

Statement 1: You should always pass on the right side of vehicle when possible.

Statement 2: The apparatus should be brought to a complete stop if there are any obstructions that block the driver's view.

Statement 3: There is no need to slow the apparatus for a green light intersection.

A. Statement 1 is correct; statements 2 and 3 are incorrect.
B. Statements 1 and 2 are correct; statement 3 is incorrect.
C. Statements 1 and 3 are incorrect; statement 2 is correct.
D. Statements 1 and 2 are incorrect; statement 3 is correct.

66. Blind and heavily traveled intersections should be approached and crossed:

A. at a speed 10 mph below the posted speed limit.
B. at a maximum speed of 10 mph over the posted speed limit.
C. at a speed allowing for a stop before entering the intersection.
D. only after coming to a complete stop.

67. **Directions:** Read each statement below; then choose your answer from alternatives A-D below.

Avoiding conditions that lead to skidding is as important as knowing how to correct skids once they occur. The **most common** causes of skids are:

Statement 1: driving too fast for road conditions.

Statement 2: failing to properly appreciate weight shifts of heavy apparatus.

Statement 3: improper tire size.

A. Statements 1 and 3 are correct; statement 2 is incorrect.
B. Statements 1 and 2 are correct; statement 3 is incorrect.
C. Statement 1 is correct; statements 2 and 3 are incorrect.
D. Statement 1 is incorrect; statements 2 and 3 are correct.

68. A force imposed upon a fire apparatus by partially filled water tanks, due to stopping and turning, is considered a:

A. positive displacement.
B. accelerated/decelerated surge.
C. liquid surge.
D. condition of lugging.

69. The angle from the rear point of ground contact of the rear tire to any projection of the apparatus behind the rear axle is considered:

A. angle of return.
B. angle of departure.
C. angle of approach.
D. longitudinal approach.

70. Operating engines below the minimum coolant temperature may result in:

A. excessive cylinder wear.
B. inefficient operation.
C. decreased valve deposits.
D. decreased fuel consumption.

71. The _____ assists in both braking and saving the wear on the service brakes.

A. retarder
B. relief valve
C. air brakes
D. transfer valve

72. The engine brake and retarder are activated when:

A. the engine is first started.
B. the brake pedal is applied too hard.
C. the brake system fails.
D✓ pressure is released from the accelerator.

73. Which of the following is a valid exception to NFPA 1500 Standard requiring that all riders must be seat belted while apparatus is in motion?

A. While donning SCBA inside apparatus
B✓ While loading hose
C. Responding at slow speeds
D. While backing apparatus

74. On sharp curves or when turning corners, apparatus drivers should shift standard transmissions into a _____ gear _____ entering the curve or intersection.

A. lower, after
B. higher, before
C✓ lower, before
D. higher, after

75. When determining the size of a water tanker/tender, a department should consider the:

A. pump capacity.
B. travel time for response.
C. valve capacity.
D✓ bridge weight restrictions.

76. The NFPA standard that gives direction for establishing a driver/operator training program is NFPA:

A. 1450.
B✓ 1451.
C. 1560.
D. 1561.

77. The United States Government authority that establishes the basic requirements for licensing of drivers is the:

A. Transit Authority.
B✓ Department of Transportation.
C. National Traffic Safety Board.
D. American Highway Commission.

78. When stopping an apparatus, it **is not** necessary to consider the:

A. weight of the apparatus.
B✓ length of the apparatus.
C. condition of brakes.
D. condition of road surface.

79. When left idling, diesel engines should be set at:

A. slow idle.
B. low idle.
C✓ high idle.
D. regular idle.

80. The purpose of using a spotter is to assist:

A. in stopping cross traffic as the vehicle is pulled forward.
B. the driver by observing the area in the blind spot and warn the driver/operator of any obstacles around the apparatus.
C. the driver in lining up with a hydrant.
D. in determining best route to incident.

81. The purpose of the alley dock skill is to simulate:

A. backing a vehicle into a restricted area.
B. maneuvering around parked and stopped vehicles and tight corners.
C. steering a vehicle in a straight line.
D. turning a vehicle around in a confined space.

82. Because of the size of an apparatus, as well as the clearance needed when backing, the driver/operator should:

A. back up very slowly, assuring that everyone hears the back-up alarm.
B. assign a firefighter to clear the way and warn the driver/operator of any obstacle obscured by blind spots.
C. place traffic cones around the area where the backing up will occur.
D. turn on all emergency lights, check all mirrors, then proceed to back up in a slow, safe manner.

83. All fire apparatus should be equipped with _____ that warns others when the apparatus is backing up.

A. opti-com
B. four-way flashers
C. an alarm system
D. rear spotlights

84. Which of the following considerations has the highest tactical priority when positioning an apparatus at a fire scene?

A. Water supply
B. Department SOP
C. Exposures
D. Rescue

85. When positioning apparatus at an incident, the most desirable position is **usually**:

A. upwind and downhill.
B. downwind and downhill.
C. downwind and uphill.
D. upwind and uphill.

86. The purpose of the Serpentine Course is to simulate:

A. backing a vehicle into a restricted area.
B. maneuvering around parked and stopped vehicles and tight corners.
C. steering a vehicle in a straight line.
D. turning a vehicle around in a confined space.

87. When an apparatus driver is faced with a situation requiring evasive tactics, the driver should attempt to pass the overtaken vehicle on:

A. the left side
B. the right side
C. either the left or right side
D. the passenger side.

88. Many accidents involving apparatus are caused by the operator:

A. focusing too much on the traffic in front of the apparatus.
B. stopping at intersections.
C. misunderstanding the capabilities of the apparatus.
D. using warning devices.

89. The purpose of the confined space turnaround is to simulate:

A. backing a vehicle into a restricted area.
B. maneuvering around parked and stopped vehicles and tight corners.
C. steering a vehicle in a straight line.
D. reversing the direction of travel of a vehicle in a narrow street.

90. The confined space turnaround maneuver allows an operator to turn the apparatus _____ degrees.

A. 180
B. 90
C. 45
D. 270

91. Proper apparatus maintenance includes visually checking the tank water level:

A. daily.
B. quarterly.
C. periodically.
D. biweekly.

92. The changeover/transfer valve on a two-stage pump should be checked for proper operation:

A. monthly.
B. weekly.
C. periodically.
D. biweekly.

93. In the fire service, each pump impeller in a housing is commonly called a:

A. casing.
B. body.
C. pump.
D. stage.

94. Pumps that are commonly used as priming pumps are known as:

A. centrifugal.
B. piston.
C. rotary gear.
D. rotary valve.

95. The spiral chamber of a centrifugal pump in which the velocity given to water by the impeller is converted into pressure is called the:

A. body.
B. discharge housing.
C. casing.
D. volute.

96. A _____ valve is used to relieve pressure in hose lines after the discharge gates are closed.

A. discharge B. drain C. by-pass D. relief

97. Which of the following types of fire pumps must be primed using an external priming device?

A. Rotary vane
B. Piston
C. Centrifugal
D. Rotary-gear pump

98. When pumping from draft, which of the following conditions affect(s) a pump's ability?

A. Water temperature
B. Barometric pressure
C. Air temperature
D. All of the above are correct.

99. When priming, water enters the pump because:

A. atmospheric pressure forces it into the pump.
B. the pump pulls the water in from the static source.
C. the rotating motion of the centrifugal pump creates a vacuum.
D. All of the above are correct.

100. A _____ gauge is calibrated to read both positive and negative pressure.

A. compound B. pressure C. discharge D. centrifugal

101. Switch from pressure to volume operation when:

A. operating from a hydrant.
B. it is expected that more than half of the rated capacity of the pump will be required.
C. a higher than normal pressure will be required.
D. Both A and B are correct.

102. A relief valve:

A. closes as lines are shut down.
B. opens when pressure rises above the set pressure.
C. opens as lines are opened.
D. is always open when the pumper is in use.

103. An operator should prime a pump when operating:

A. from a static source.
B. from a hydrant.
C. as the middle pumper in a relay.
D. as a dual pumper.

104. Apparatus equipped with water tanks of 500 gallons or less must provide a tank-to-pump flow rate of _____ gpm. Those with tanks larger than 500 gallons must provide _____ gpm.

A. 500, 700 B. 250, 500 C. 200, 400 D. 500, 750

105. A device used to indicate water pressure in pounds-per-square-inch is a _____ gauge.

A. pressure B. static C. flowmeter D. residual

106. A "0" psi reading on most pressure gauges is actually _____ psi, pressure at sea level.

A. 10.3 B. 12.5 C. 13.9 D. 14.7

107. The _____ on an impeller are curved away from the direction of rotation so that the natural movement of water will carry it to the edge.

A. fins B. shrouds C. vanes D. volutes

108. The _____ is the major component of the centrifugal pump because it provides velocity to the water.

A. housing B. volute C. vane D. impeller

109. The device that controls pressure surges by changing engine speed to compensate for changes in flow is called a:

A. relief valve.
B. pressure governor.
C. transfer valve.
D. pressure relief valve.

110. Given a pump that is in gear and supplied by tank water with no discharges open, what principle of pressure is represented?

A. Pressure applied to a confined fluid from without is transmitted equally in all directions.
B. Pressure of a liquid on the bottom of a vessel is independent of the shape of the vessel.
C. Pressure of a liquid in an open vessel is proportional to its depth.
D. Fluid pressure is perpendicular to any surface on which it occurs.

111. An auxiliary cooling device:

A. causes pump water to mix with radiator fluid.
B. can cause over pressurization of radiator.
C. gets its water from the intake side of pump.
D. cools engine water when the apparatus pump is engaged.

112. You should switch from pressure to volume mode when:

A. a large discharge outlet is being used.
B. less than half of the rated capacity of the pump will be required.
C. a higher than normal pressure will be required.
D. more than half the rated capacity of the pump will be needed.

113. Which type of flowmeter is relatively maintenance free?

A. Spring probe B. Paddlewheel C. Pressure D. Gravity

114. Flowmeters should be accurate to a tolerance of _____ percent.

A. +/- 10 B. +/- 8 C. +/- 3 D. +/- 1

115. The _____ enables apparatus to be driven and discharge water on the fire at the same time.

A. power take-off
B. inverter
C. power transfer
D. transverter

116. As flow decreases, pressure will _____ provided pump speed in a centrifugal pump remains constant.

A. increase
B. decrease
C. remain constant
D. have no effect

117. Pressure control devices must operate within _____ with an increase of 30 PSI.

A. 16-20 seconds
B. 3-10 seconds
C. 10-15 seconds
D. 1 second

118. The water level of a reservoir is 150 feet above a fire hydrant. What is the static reading at the hydrant?

A. 43.4 psi B. 54.2 psi C. 65.1 psi D. 98.6 psi

119. The pressure remaining once water has begun flowing is known as _____ pressure.

A. residual B. static C. flow D. normal operating

120. Two 1-3/4 inch hose lines are being used. Each line is delivering 150 gpm. Supply is from the 750 gallon capacity booster tank on apparatus. How many minutes will the booster tank be able to supply to both lines without being refilled?

A. 5.0 minutes B. 3.5 minutes C. 2.5 minutes D. 7.0 minutes

121. When a hose is connected to a hydrant, the static pressure is 80 psi. When a 1-1/2 inch line flowing 100 gpm is placed in service, the pressure drops to 70 psi. The estimated remaining gpm available is _____ gpm.

A. 80 B. 100 C. 200 D. 300

122. What is the flow from a 2-inch nozzle with ideal nozzle pressure? ($gpm = 29.7 \times d^2 \times \sqrt{NP}$)

A. 1063 gpm B. 2212 gpm C. 531 gpm D. 1188 gpm

123. After flowing a 300 gpm line, a 6 percent drop was realized on the incoming pressure. Based on this, _____ additional line(s) of the same flow could be added.

A. one B. two C. three D. four

124. Available flow from hydrants is estimated by determining the percent drop between the static and _____ pressures.

A. residual B. flow C. intake D. discharge

125. The part of the total pressure not used to overcome friction or gravity while forcing water through fire hose, pipe, fittings, and adapters is known as:

A. static pressure.
B. friction loss.
C. residual pressure.
D. flow pressure.

126. A hydrant with the **largest** capacity will be one that is connected to a:

A. dead-end main.
B. secondary feeder.
C. primary feeder.
D. distributor main.

127. A fire hydrant with a green bonnet and cap will flow _____ gpm.

A. less than 500
B. 500 - 999
C. 1,000 - 1,499
D. greater than 1,500

128. A one-square-inch column contains water to a height of 100 feet. What is the pressure in psi at the base of the column?

A. 434 B. .434 C. 43.4 D. 4.34

129. _____ pressure is the difference between the pump discharge pressure and the incoming pressure from the hydrant.

A. Maximum discharge
B. Residual
C. Net pump discharge
D. Pump intake

131. Friction loss is **usually** expressed in terms of:

A. pounds per square inch per 50 feet of hose.
B✓ pounds per square inch per 100 feet of hose.
C. gallons per minute per 50 feet of hose.
D. gallons per minute per 100 feet of hose.

132. A 2-1/2 inch fog nozzle flowing 225 gpm at a pressure of 100 psi will have a reaction of approximately _____ pounds.

A✓ 114 B. 110 C. 124 D. 143

133. In drafting operations, pumping ability decreases when:

A. barometric pressure increases.
B. atmospheric pressure increases
C✓ atmospheric pressure decreases.
D. absolute pressure decreases.

134. _____ denotes a force-per-unit area, with the measurements of force in pounds and the measurement of area in square inches.

A. Flow B. Weight C. Force D✓ Pressure

135. A good method for determining lift in a fire department pump is that for each _____ of indicated vacuum, water will rise _____.

A. pound, one inch
B✓ inch, one foot
C. inch, one inch
D. pound, one foot

136. A ladder pipe with a 2-inch tip at 80 psi nozzle pressure will have approximately _____ pounds of nozzle reaction.

A✓ 500 B. 450 C. 55 D. 27

137. Approximately how much water will be delivered from a 1-1/4-inch smooth bore nozzle if the nozzle pressure is 50 psi?

A. 200 gpm B. 273 gpm C✓ 328 gpm D. 400 gpm

138. The flow from a 1-inch nozzle tip with a nozzle pressure of 50 psi is approximately _____ gpm.

A. 190 B✓ 210 C. 220 D. 230

139. What is the approximate friction loss in 400 feet of 2-1/2" hose flowing 300 gpm?

A. 21 psi B. 45 psi C✓ 72 psi D. 98 psi

140. What is the friction loss in 300 feet of 2-1/2" rubber-lined hose flowing 350 gpm?

A. 21 psi B. 24 psi C. 36 psi D✓ 74 psi

141. What is the friction loss in 400 feet of 3-inch hose with 2-1/2" couplings flowing 400 gpm?

A. 130 psi B✓ 51 psi C. 13 psi D. 512 psi

142. What is the approximate engine pump pressure that is necessary to deliver 600 gpm through a fog nozzle on a deck gun using three (3) 2-1/2" lines? The lines are 400 feet long and the deck gun is elevated 20 feet above the pumper. (Deck gun FL = 10 psi)

A. 130 psi B✓ 150 psi C. 170 psi D. 180 psi

143. If the friction loss in 300 feet of hose is 70 psi, what will the friction loss be in 450 feet of the same size hose, flowing the same amount of water?

A. 90 psi B. 96 psi C✓ 105 psi D. 128 psi

144. The formula $29.7d^2\sqrt{NP}$ can be used to estimate the:

A. velocity of water in feet-per-minute.
B. nozzle reaction for fog nozzles.
C. nozzle reaction for straight tip nozzles.
D✓ flow of water in gallons-per-minute.

145. The recommended nozzle pressure for 2-1/2" hand lines with solid bore tips is _____ psi.

A✓ 50 B. 80 C. 100 D. 150

146. The recommended nozzle pressure for solid bore master streams two inches or less is _____ psi.

A. 50 B✓ 80 C. 100 D. 150

147. The recommended pressure for fog nozzle (all types) is _____ psi.

A. 50 B. 80 C✓ 100 D. 150

148. The amount of work that a pump must do to produce a fire stream is called _____ pressure.

A. pump discharge
B. residual
C. maximum net
D. maximum discharge

149. What is the nozzle reaction from a 1-1/4" tip at 50 psi nozzle pressure?

A. 17 lbs.
B. 123 lbs.
C. 98 lbs.
D. 112 lbs.

150. When the flow through a hose line increases from 100 gpm to 400 gpm, the friction loss increases _____ times.

A. 2
B. 4
C. 12
D. 16

151. The pressure created by a column of water due to elevation is known as _____ pressure.

A. atmospheric
B. base
C. head
D. static

152. Nozzle reaction is explained by the law of physics that states:

A. a body in motion tends to stay in motion.
B. gravity acts equally in all directions at all times.
C. for every action there is an equal and opposite reaction.
D. a kinetic reaction occurs when an equal or greater force is applied.

153. What engine pump pressure is necessary to deliver 200 gpm through 200 feet of 2-1/2" hose to a fog nozzle at ground level?

A. 108 psi
B. 116 psi
C. 122 psi
D. 135 psi

154. A _____ is used to find the flow pressure at a discharge opening.

A. flow gauge
B. velocity gauge
C. pitot tube and gauge
D. compound gauge

155. Theoretically, the maximum distance a pump can lift water at sea level is _____ feet.

A. 33.8
B. 25.3
C. 20
D. 14.7

156. The formula for the nozzle reaction of a solid-stream nozzle is:

A. $NR = gpm/100$.
B. $NR = 1.57d^2NP$.
C. $NR = .0505\ Q\sqrt{NP}$.
D. $NR = 1.57d^2\sqrt{NP}$.

157. Using the "condensed Q" method as a "rule of thumb," the friction loss in 500 feet of 3-inch fire hose flowing 300 gpm is:

A. 12 psi. B. 55 psi. C. 50 psi. D✓ 45 psi.

158. Using the "condensed Q" "rule of thumb" formula, the friction loss in 600 feet of 3-inch hose flowing 500 gpm is approximately:

A. 100 psi. B. 125 psi. C✓ 150 psi. D. 175 psi.

159. The friction loss in 300 feet of 3" fire hose with 2-1/2" couplings flowing 500 gpm is approximately:

A✓ 60 psi. B. 50 psi. C. 150 psi. D. 20 psi.

160. To calculate friction loss in 2-1/2" fire hose when the flow is near 100 gpm, which of the following formulas should be used?

A. $FL = 2Q^2-Q$ B. $FL = 2Q^2$ C✓ $FL = CQ^2L$ D. $FL = 2Q^2 \div 1/2Q$

161. When a pumper is supplying four lines of 2-1/2" hose, each equipped with a 250 gpm fog nozzle at 100 psi, and each 300 feet long, the pump discharge pressure required is most nearly:

A. 244 psi. B✓ 138 psi. C. 158 psi. D. 190 psi.

162. What is the desired pump pressure when supplying two lines of 2-1/2" hose, one 200 feet long and one 300 feet long, each with a 250 gpm nozzle operating at 100 psi?

A. 125 psi B. 107 psi C✓ 137.5 psi D. 162 psi

163. The friction loss in 200 feet of 2-1/2" fire hose, with a flow of 90 gpm, is approximately:

A✓ 3.24 psi. B. 2.07 psi. C. 1.62 psi. D. 6.28 psi.

164. The total friction loss in 500 feet of 3" hose with 2-1/2" couplings with 300 gpm flowing is approximately:

A. 4 psi. B✓ 36 psi. C. 63 psi. D. 105 psi.

165. The recommended method of determining the exact friction loss of any appliance is to:

A. check NFPA 1091.
B✓ run tests with each appliance used by the department.
C. review manufacturer's specifications.
D. check NFPA 1901.

166. Which of the following formulas is used to determine the area of a circle?

A. $2\pi^2r$ B. πr^2 C. L x H x W D. $2\pi r$

167. Excessive engine temperatures during pumping operations can be controlled by using the:

A. tank-to-fill valve.
B. auxiliary cooler.
C. radiator cooler.
D. immersion bypass.

168. In an auxiliary cooling system, heat is transferred from the engine cooling water to the:

A. transmission cooler.
B. radiator.
C. tank water.
D. pump water.

169. The formula used to determine water flow from any solid stream nozzle when the nozzle pressure and tip diameter are known is:

A. CQ^2L B. $29.7\ d^2\ \sqrt{NP}$ C. 29.7 X D X $\sqrt{NP}$ D. $29.7d^2$ X .434

170. The transition from the water tank to an external water supply:

A. should be made prior to putting the pump into gear.
B. must be accomplished when attack lines are not operating.
C. must be made without disrupting the fire attack.
D. should be accomplished once the external supply is connected to the proper discharge.

171. A _____ indicates flow in gallons per minute.

A. compound gauge
B. vacuum gauge
C. flowmeter
D. bourdon tube

172. A straight stream is considered:

A. a deflected solid stream.
B. a non-deflected solid stream.
C. a pattern of an adjustable fog nozzle.
D. a pattern of a smooth orifice nozzle.

173. An operator obtains a reading of 17 inches of mercury on the intake gauge while drafting and flowing water. This indicates:

A. a lift of approximately 17 feet.
B. the pump is cavitating.
C. that the gauge is not working properly since it should be reading in psi.
D. a lift of approximately 39 feet.

174. Prior to changing from tank water to an external source:

A. make sure all air is bled from the intake.
B. engage the P.T.O.
C. put the pump into gear.
D. engage the transmission.

175. The driver/operator has set the apparatus up for the pumping operation. If the tachometer shows an rpm reading, but the speedometer does **not**, it could indicate that the:

A. transmission is in the wrong gear.
B. transmission is **not** engaged.
C. A and B are both correct.
D. pump is cavitating.

176. The device that can be used to determine pressure at the opening of a smooth bore orifice is a:

A. venturi meter.
B. pitot tube.
C. flow meter.
D. compound gauge.

177. Which primer utilizes the venturi principle?

A. Exhaust primer
B. Rotary-gear primer
C. Rotary-vane primer
D. Vacuum primer

178. The main feature of a relief valve is to:

A. relieve excessive pressure within the pump.
B. allow increase to pump discharge.
C. transfer excessive pressure back to the booster tank.
D. prevent the increase in pump discharge when **not** pumping.

179. An apparatus equipped with a 1,000 gallon tank that is supplying two preconnected handlines, one flowing 150 gpm and another flowing 100 gpm, will supply the lines for only _____ minutes.

A. two
B. three
C. four
D. six

180. When pumping from a tank and attack lines are being used intermittently, which of the following is a way the pump operator can ensure that the pump does **not** overheat?

A. Set the circulator valve to tank position.
B. Fully open the tank fill valve.
C. Make sure apparatus is in high idle.
D. Overheating is not a problem.

181. The maximum height to which water can be drafted is approximately _____ feet, as opposed to the theoretical lift of 33.8 feet.

A. 10 B. 25 C. 14.7 D. 30

182. For drafting purposes, "lift" is measured from the _____ of the pump.

A. bottom of the strainer to top
B. surface of water to the pump intake
C. surface of water to the pump discharge
D. bottom of the strainer to the center

183. Theoretically, the maximum lift for a pump at sea level is _____ feet.

A. 14.7 B. 25 C. 28.8 D. 33.8

184. A relief valve by-passes excess water from the discharge side of the pump to the:

A. pump intake. B. bleeder valve. C. water tank. D. bypass valve.

185. One gallon of water weighs _____ pounds.

A. 5.60 B. 7.12 C. 8.33 D. 9.12

186. One way to increase the efficiency of water shuttle operations is to:

A. decrease the time required to fill the tanker/tender.
B. increase the size of the dump tank.
C. decrease the required fire flow.
D. increase the size of the attack pumper.

187. The actual maximum height to which water will be lifted when the intake gauge reads 9 inches of mercury is _____ feet.

A. 9.0 B. 9.59 C. 10.17 D. 10.76

188. Which of the following conditions **is not** a factor in selecting the position of an apparatus on a working fire?

A. Department SOP
B. Method of attack
C. Exposures
D. Time of day

189. During an effective water shuttle operation requiring two pumpers, the pumper located near the emergency scene is called the:

A. fill site pumper.
B. dump site pumper.
C. source pumper.
D. shuttle tanker/tender.

190. In a working fire, which of the following apparatus has the highest priority for position?

A. Aerial apparatus B. Chief's car C. Tanker/tender D. Engine

191. Flowmeters can be used to assist the driver/operator in all of the following applications **except**:

A. diagnosing water flow problems.
B. determining the percentage of foam concentrate.
C. relay pumping.
D. standpipe operations.

192. Using the hand method, determine the total pressure loss due to friction in 600 feet of 2-1/2" hose when a fog nozzle is flowing 150 gpm at 100 psi.

A. 4.5 psi B. 145 psi C. 27 psi D. 127 psi

193. Using the Condensed "Q" Formula, determine the total pressure loss for each line:

Line 1 is 600 feet of 3-inch hose flowing 400 gpm.
Line 2 is 800 feet of 3-inch hose flowing 300 gpm.

A. Line 1 TPL = 96 psi. Line 2 TPL = 72 psi.
B. Line 1 TPL = 16 psi. Line 2 TPL = 9 psi.
C. Line 1 TPL = 48 psi. Line 2 TPL = 27 psi.
D. Line 1 TPL = 192 psi. Line 2 TPL = 144 psi.

194. Using the Condensed "Q" Formula, calculate the total pressure loss in 600 feet of 4-inch hose flowing 1,000 gpm.

A. 100 psi B. 75 psi C. 150 psi D. 120 psi

195. The first step in developing a pump chart is to:

A. enter the gallons-per-minute flowing for each nozzle or device.
B. list the nozzle pressure for each nozzle or device used.
C. identify all nozzles, devices, and layouts used by the department.
D. calculate the required pump discharge pressures for each layout.

196. Master stream nozzles are:

A. broken streams only.
B. straight streams only.
C. either solid or fog streams.
D. either broken or solid streams.

197. When calculating the time for a water shuttle operation, timing starts when:

A. water begins drafting from the tank.
B. the dump valve is opened on the tanker/tender.
C. the tanker/tender is empty.
D. the tanker/tender returns with a new tank of water.

198. Natural static water supply sources include:

A. lakes.
B. cisterns.
C. swimming pools.
D. private water tanks.

199. Which of the following **is not** a consideration or factor in determining the usability of a static water source?

A. Silt and debris
B. Depth of water
C. Water pressure
D. Freezing weather

200. Which of the following is an important consideration for a water shuttle operation?

A. The location of the dump site
B. The location of the fill site
C. The route of travel for the tanker/tenders
D. All of the above are correct.

201. One method of calculating the capacity of a water shuttle operation in gpm is to divide:

A. tank size -10% by trip time.
B. gpm available by the tank size.
C. travel time by the required flow.
D. tank size by the required flow.

202. The speedometer on an apparatus is primarily used to show speed of the vehicle, but may also indicate:

A. speed X 20 showing approximate rpm.
B. speed X .434 showing approximate pump pressure, engine speed, and rpm.
C. the pump is engaged and the transmission is set for pump operation.
D. engine and pump speed.

203. When a centrifugal pump loses prime at draft, check for:

A. tight intake connection.
B. a clogged strainer.
C. a tightly closed pump drain.
D. increased engine speed.

204. When lowering a barrel strainer into the water, it should have _____ inches of water around it.

A. 24 B. 18 C. 12 D. 36

205. When pumping from a hydrant, it is essential that the:

A. strainer be clean.
B. hydrant be fully open.
C. compound gauge always read 20 lbs. negative pressure.
D. tank fill valve fully open.

206. When priming a centrifugal pump, it is necessary to:

A. make the pump air tight.
B. decrease engine speed to 900 rpms.
C. make sure auxiliary cooler is open.
D. open bleeder valve.

207. A 5" diameter hose would be expected to flow approximately the same amount as:

A. two 2-1/2" hoses.
B. three 2-1/2" hoses.
C. four 2-1/2" hoses.
D. five 2-1/2" hoses.

208. While pumping to a standpipe connection on the 10th floor, how much friction loss should be added for elevation?

A. 50 psi
B. 45 psi
C. 40 psi
D. 35 psi

209. When making an intake connection at a hydrant, the intake hose should:

A. be as tight as possible.
B. have a slight curve.
C. be slightly higher than the pump intake.
D. place four full twists in the hose.

210. On a working fire, if the apparatus must position up a long, narrow driveway, it is **best** if:

A. the apparatus leaves all the supply hose at the end of the driveway.
B. the apparatus lays the supply hose in as it moves into position.
C. it has second apparatus bring its supply hose by reversing out.
D. It is best that no supply hose is laid.

211. The fog nozzle that has a number of constant flow settings, enabling the firefighter to select a flow rate that best suits the existing conditions is a(n):

A. automatic nozzle.
B. constant flow nozzle.
C. high-pressure nozzle.
D. manually adjustable nozzle.

212. The dump site pumper should _____ on the end of the hard intake hose for the ability to remove the most water from a portable tank.

A. remove the strainer
B. use a floating strainer
C. use a barrel strainer
D. use a low-level strainer

213. The driver/operator must **always** make sure that the _____ are completely open when filling or dumping is taking place to prevent damage to the tank.

A. compartment doors
B. vents
C. valves
D. hydrants

214. There are three methods commonly used to operate a dump site. Which one of the following choices **is not** a method of operation?

A. direct pumping
B. relay pumping
C. nurse tanker/tender
D. portable water tank

215. In a continuous shuttle operation, what is the approximate available gpm for fire flow if:

Tanker/tender A 3000 tanker/tender, trip time 12 minutes
Tanker/tender B 2500 tanker/tender, trip time 10 minutes
Tanker/tender C 1000 tanker/tender, trip time 10 minutes

A. 6501 gpm
B. 2166 gpm
C. 540 gpm
D. 203 gpm

216. Once the power take-off has been properly activated and the pump is engaged, the vehicle speedometer should show a speed of:

A. 0 mph.
B. 15 mph.
C. 20 mph.
D. slightly above 0 mph.

217. A fire hydrant with an orange bonnet and cap will flow _____ gpm.

A. less than 500
B. 1,000 - 1,499
C. 500 - 999
D. greater than 1,500

218. With a 1,000 gpm pumper, what is the pumping capacity of the pumper with a 20' lift?

A. 1,000 gpm
B. 750 gpm
C. 600 gpm
D. 400 gpm

219. When using 2-1/2 or 3 inch hoselines to supply the pumper directly off hydrant pressure, it is recommended that the lines be no longer than:

A. 100 feet.
B. 150 feet.
C. 200 feet.
D. 300 feet.

220. NFPA requires that a pump must pump its rated capacity at **not** more than _____ of lift.

A. 8 feet
B. 10 feet
C. 12 feet
D. 20 feet

221. The minimum depth of water required to pull a draft using a barrel strainer is:

A. 2 feet
B. 4 feet
C. 6 feet
D. 8 feet

222. A sudden stoppage of water moving through a hose or pipe may result in:

A. water surge.
B. water hammer.
C. nozzle hammer.
D. hydrant hammer.

223. *Which of the following statements regarding the positioning of pumping* apparatus **is correct**?

A. Establishing an external water supply is always a major consideration in deciding where to place the apparatus.
B. Any position downwind of the incident is acceptable.
C. No method of fire attack should be considered in the decision where to place the apparatus.
D. Lay your own supply line if incoming apparatus will have difficulty following you to the scene.

224. If an apparatus and crew arrive on scene where no fire conditions are evident, or there is a nothing-showing mode, it is advisable to position the apparatus:

A. near the main entrance.
B. at the hydrant.
C. at the nearest intersection.
D. in Level II staging.

225. Indications of cavitation include all of the following **except**:

A. fluctuating gauge readings.
B. noise.
C. increase in RPM will greatly increase pressure.
D. vibration.

226. Priming devices used on modern centrifugal fire pumps **most often** are:

A. positive displacement pumps.
B. used to boost pump pressure
C. used for supply from a hydrant.
D. used all the time.

227. During an extended period of pumping, a gradual increase in engine temperature is noted. The first step to reduce this condition would be:

A. decrease RPM.
B. increase pressure.
C. gradually open "engine cooler."
D. shut down operation.

228. A 2,000 gallon tanker/tender makes the round trip between the dump site and fill site in 12 minutes. The flow rating for that tanker/tender is _____ gpm.

A. 50 B. 97 C. 150 D. 167

229. The primary function of the fire department pumper is to

A. possess the ability to "pump and roll."
B. provide water at an adequate pressure for fire streams.
C. transport water to areas beyond a water system or where water supply is inadequate.
D. provide immediate suppression of flammable liquid fires and suppression of spill vapors on airport properties.

230. Using the inside/outside method, the _____ should position next to a building higher than five stories.

A. pumping apparatus
B. aerial apparatus
C. water tanker/tender
D. engine company

231. The drafting sites that should be given preference are those:

A. accessible from a paved surface.
B. requiring a large amount of lift.
C. requiring a large amount of suction hose.
D. far away from bridges and boat ramps.

232. Elevation pressure is **best** defined as the:

A. term used to describe either pressure loss and pressure gain.
B. position of an object above or below sea level.
C. center line of the pump or the bottom of a static water supply source above or below ground level.
D. part of the total pressure lost while forcing water through pipe fittings, fire hose, and adapters.

233. Altitude is best defined as a:

A. term used to describe either pressure loss and pressure gain.
B. position of an object above or below sea level.
C. center line of the pump or the bottom of a static water supply source above or below ground level.
D. part of the total pressure lost while forcing water through pipe, fittings, fire hose, and adapters.

234. Friction loss in hose, pipes, and appliances is:

A. pressure loss due to friction.
B. the term used to describe both pressure loss and pressure gain.
C. the position of an object above or below sea level.
D. *the center line of the pump or the bottom of a static water supply source above or* below ground level.

235. The type of fog nozzle that maintains approximately the same nozzle pressure even if the gallonage supplied to the nozzle changes is known as a(n):

A. automatic nozzle.
B. constant flow nozzle.
C. high-pressure nozzle.
D. manually adjustable nozzle.

236. When pulling up to a hydrant, turning the front wheels to a 45° angle:

A. will protect the driver in the event the truck is rear-ended.
B. will make it easier to position the apparatus, if needed.
C. will keep the vehicle out of the road.
D. is required only in icy conditions.

237. The formula for calculating the gpm flow rate for a tanker/tender is:

A. Tank size + 10% divided by Trip time
B. Tank size - 10% divided by Trip time
C. Tank size divided by Trip time - 10°
D. Tank size divided by Trip time +10°

238. The collapse zone of a building should be _____ the structure.

A. half the height of
B. half the distance to
C. one to one and one-half times the height of
D. two times the distance to

239. Tanker/tenders are commonly unloaded by:

A. dumping the water into portable tanks using gravity.
B. dumping the water into a portable tank using a jet-assisted dump valve.
C. pumping the water into a dump tank using two 3-inch lines.
D. A and B are both correct.

240. With dual pumping, _____ strong hydrant(s) may be used to supply two pumpers.

A. one B. two C. three D. four

241. Fire fighting foam consists of approximately _____ percent water.

A. 6-10 B. 3-6 C. 94-99.9 D. 40-60

242. An example of a polar solvent is:

A. fuel oil.
B. acetone.
C. kerosene.
D. motor oil.

243. When using an in-line eductor, the back pressure **must not** exceed _____ pressure.

A. 20-25 percent of the inlet
B. 65-70 percent of the inlet
C. 94-99 percent of the outlet
D. 40-50 percent of the outlet

244. The process that causes foam concentrate to move through an in-line foam eductor and into the water stream is called the _____ principle.

A. venturi B. siphon C. suction D. flow

245. **Directions:** Read the following statements and then select your answer from alternatives A-D below:

Statement 1: Foam can be rated for use on both Class A and Class B fires.

Statement 2: Foam solution is the completed product after air is introduced.

Statement 3: Foam works by separating, cooling, or suppressing.

A. All three statements are correct.
B. Statement 1 is correct; statements 2 and 3 are incorrect.
C. Statements 1 and 3 are correct; statement 2 is incorrect.
D. Statement 3 is correct; statements 1 and 2 are incorrect.

246. You are trying to generate foam using an in-line eductor and a five-gallon bucket of foam. The foam that is being generated is of very poor quality. Which of the following is a common reason for the failure?

A. Eductor and nozzle flow do **not** match
B. Air leak in the pump
C. Pressure relief is **not** set
D. Foam concentrate inlet to eductor is only 4 ft. above the surface of the foam concentrate.

247. The _____ is the **most** basic type of portable foam proportioner.

A. in-line eductor
B. high expansion foam eductor
C. around-the-pump proportioner
D. expansion proportioner

248. The kinds of liquids that are lighter than water and, therefore, float on water are those with a specific gravity:

A. less than 1.
B. greater than 1.
C. less than 10.
D. greater than 10.

249. **Directions**: Read each statement below and select your answer from alternatives A-D below.

There are several important operating rules that must be observed when using foam.

Statement 1: The eductor must control the flow through the system.

Statement 2: The pressure at the outlet of the eductor **must not** exceed 40 percent of the eductor inlet pressure.

Statement 3: *Foam solution concentration is only correct at the rated inlet pressure* of the eductor, usually 150-200 psi.

A. Statements 1 and 3 are correct; statement 2 is incorrect.
B. Statement 1 is incorrect; statements 2 and 3 are correct.
C. Statements 1 and 2 are correct; statement 3 is incorrect..
D. All three statements are correct.

250. **Directions**: Read each statement below and select your answer from alternatives A-D below.

Statement 1: The foam concentrate inlet to the eductor **should not be** more than three feet above the liquid surface of this foam concentrate.

Statement 2: If the inlet is too high, foam **may not be** inducted at all.

Statement 3: If the inlet is too high, foam may be very lean.

A. Statement 1 is correct; statements 2 and 3 are incorrect.
B. All statements are correct.
C. Statement 1 is incorrect; statements 2 and 3 are correct.
D. Statements 1 and 3 are incorrect; statement 2 is correct.

251. When using foam, the selection of a proportioner depends on:

A. the foam solution flow requirements and type of product burning.
B. available water pressure and type of product burning.
C. required ratio of foam and length and size of the attack line.
D. requirements and available water pressure.

252. Most alcohol-resistant foams are effective in controlling hydrocarbon fires when used at a _____ concentration.

A. three percent B. six percent C. ten percent D. thirty-six percent

Directions: Foam extinguishes fire in several ways. Match the terms in Column A with the appropriate definition in Column B.

Column A	Column B
253. Suppressing	A. Intervening between the fuel and the fire
254. Separating	B. Reducing the temperature of the fuel and adjacent surfaces
255. Cooling	C. Preventing air and flammable vapors from combining
	D. Establishing a perimeter for foam concentrate

Directions: Foams used today are of the mechanical type and must be proportioned and aerated before they are used. Match the terms in Column A with the appropriate description in Column B.

Column A	Column B
256. Foam proportioner	A. The completed product after the foam solution leaves the nozzle
257. Foam concentrate	B. The raw foam liquid as it sits in its storage container
258. Foam solution	C. The product once it is mixed and is extinguishing as an agent
259. Finished foam	D. The mixture of foam concentrate and water that is discharged from the proportioner and passed through the hose line
	E. The device that injects the correct amount of foam concentrate into the water stream

260. A **common** reason for eductor failure is:

A. too high of a foam concentration.
B. too low of a foam concentration.
C. improper cleaning and maintenance of equipment.
D. the wrong brand of foam is being used.

261. When positioning a pumper to supply a fire department connection, the driver must consider the:

A. size of the riser.
B. square footage of the building.
C. positioning requirements of other apparatus.
D. floor of the fire involvement.

262. When supplying a sprinkler system, unless otherwise indicated on the system, a good rule of thumb is to maintain a pump discharge pressure of _____ psi.

A. 125 B. 150 C. 175 D. 200

263. The purpose of the fire department check valve in a fire department connection is to:

A. prevent excess pressure from damaging the system.
B. prevent the domestic water supply from entering the riser.
C. prevent water from a sprinkler system from flowing back into the fire department connection.
D. prevent water flow into the main drain.

REFERENCE LIST FOR PUMPER DRIVER/OPERATOR - 8.0

	Publisher/Title/Edition	Reference Code
1.	NFPA 1002, Standard on Fire Apparatus Drive/Operator Professional Qualifications, 2009 Edition	NFPA 1002
2.	IFSTA Pumping Apparatus Driver/Operator Handbook, 2nd Edition, 1st Printing	PADO 2
3.	Delmar, Introduction to Fire Pump Operations, 2nd Edition	IFPO 2

264. Simple in-line foam eductors use this principle to operate:

A. injection
B. pressure balanced
C. bypass
D. venturi
E. direct injection

265. An operational **disadvantage** of an "around the pump" foam system is that it:

A. is complicated to use.
B. is difficult to operate.
C. limits discharge of pump to water only.
D. cannot take advantage of incoming pressures.

266. Apparatus typing as defined in National Incident Management System allows Incident Commanders to:

A. consider costs of operation.
B. determine logistics needs.
C. call for exact type of resource needed.
D. determine resource response time.

267. Centrifugal fire pumps are mainly used in the fire service today because:

A. they are less expensive.
B. they can take advantage of incoming pressure.
C. their pressure surges are easier to control.
D. they are less susceptible to cavitation.

268. Apparatus that are equipped with an aerial device, ground ladders, fire pump, water tank, as well as fire hose are known as:

A. quints.
B. minipumpers.
C. aerial apparatus.
D. pumping apparatus.

269. Specific gravity is **best** defined as:

A. static pressure.
B. atmospheric pressure.
C. the density of liquids in relation to water.
D. the viscosity of water in relation to solids.

270. A factor to be considered when determining the rate of application for fire fighting foam is:

A. the method of aspiration.
B. the type of foam concentrate used.
C. the quality of the foam concentrate.
D. the accurate proportioning of the foam concentrate in the solution.

271. Low-energy foam systems use _____ solely to impart pressure on the foam solution.

A. a fire pump
B. a fog nozzle
C. compressed air
D. a solid stream nozzle

272. _____ are controlled by monitoring the water flow and controlling the speed of a positive displacement foam concentrate pump.

A. Batch mixing
B. Installed in-line eductor systems
C. Bypass-type balanced pressure proportioners
D. Variable-flow, variable-rate direct injection systems

273. _____ have a variable-speed mechanism that drives a foam concentrate pump.

A. Batch mixing
B. Installed in-line eductor systems
C. Variable-flow variable-rate direct injection systems
D. Variable-flow demand-type balanced pressure proportioners

274. High-energy foam systems introduce:

A. water into the foam solution after discharge into the hoseline.
B. water into the foam solution prior to discharge into the hoseline.
C. compressed air into the foam solution after discharge into the hoseline.
D. compressed air into the foam solution prior to discharge into the hoseline.

275. A limitation of Compressed Air Foam System (CAFS) is that:

A. hose reaction can be erratic with a CAFS.
B. a CAFS-produced foam is less heat resistant than low-energy foam.
C. the reach of the fire stream is considerably shorter than streams from low-energy systems.
D. high-energy foam hoselines weigh more than hoselines containing low-energy foam solution.

276. When a vertical surface is near or within the area of a pool of ignitable liquid, the foam application technique that may be employed is the:

A. roll-on method.
B. bank-down method.
C. roll-down method.
D. direct-application method.

277. The foam application technique that directs the foam stream on the ground near the front edge of a burning liquid pool or spill is the:

A. roll-on method.
B. bank-down method.
C. rain-down method.
D. direct-application method.

278. When pumping to a standpipe system, a pump operator should always allow _____ friction loss for the standpipe system itself.

A. 5 psi per floor B. 5 psi C. 10 psi D. 25 psi

279. When supplying automatic sprinkler systems, unless otherwise indicated on the system, pressure should be built up slowly to a minimum of _____ psi at the fire department connection.

A. 100 B. 150 C. 200 D. 250

280. Pump discharge pressures in excess of _____ psi **are not** encouraged unless the standpipe system has been designed to withstand higher pressures.

A. 100 B. 200 C. 150 D. 175

281. The pump discharge pressure required to supply standpipes depends upon the:

A. width of the fire floor.
B. size and number of sprinkler heads in operation.
C. friction loss in the standpipe.
D. available residual pressure.

282. Approximately _____ psi should be added to the desired engine pressure for each floor above the standpipe connection that will have operating fire streams.

A. 25 B. 15 C. 5 D. 10

283. When using hose lines above ground, the usual pressure calculation is to add _____ psi for each story of the building below the fire floor.

A. 5 B. 10 C. 15 D. 2

284. The type of fog nozzle designed to flow a specific amount of water at a specific nozzle discharge pressure on all stream patterns is known as a(n):

A. automatic nozzle.
B. constant flow nozzle.
C. high-pressure nozzle.
D. manually adjustable nozzle.

285. In a relay pump operation, any adjustment of pressure at the source pumper is made to maintain the minimum _____ pressure at the next pumper in line.

A. discharge B. static C. intake D. flow

286. In a relay pumping operation, which of the following should be positioned nearest the water source?

A. The largest capacity pumper
B. The smallest capacity pumper
C. The pumper with the largest water tank
D. The pumper with the largest discharge hose

287. A dual-pumping operation is:

A. *two pumpers requiring the same gpm.*
B. two pumpers with equal discharge pressure.
C. mainly utilized during relay operations.
D✓ placing one pumper at a hydrant and a second pumper connected intake to intake.

288. Development of effective fire streams is dependent upon:

A. friction loss.
B. nozzle pressure.
C. elevation loss.
D✓ All of the above are correct.

289. The pressure that is created by the weight of air and varies depending on elevation is known as _____ pressure.

A. absolute B✓ atmospheric C. barometric D. head

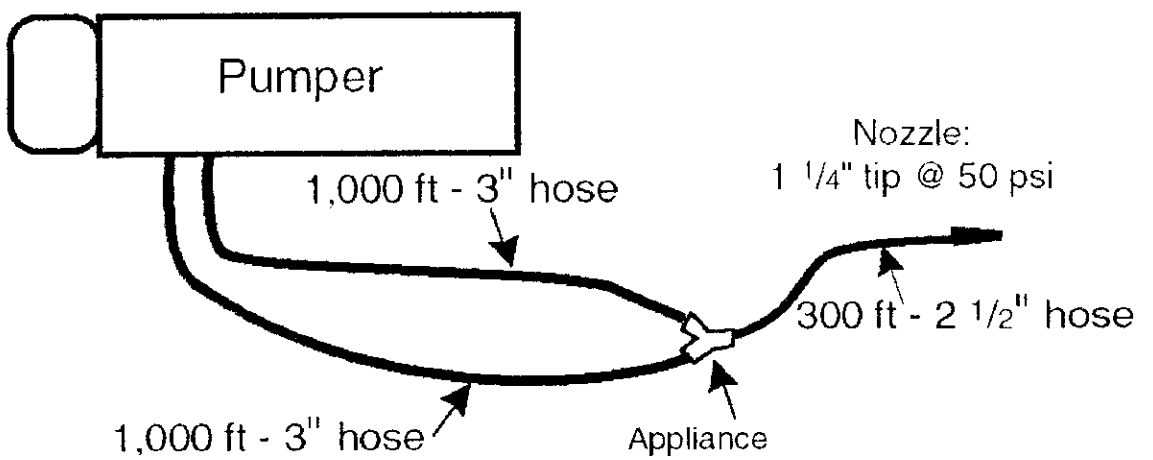
290. Quantity of water flowing, diameter of hose, and length of hose are all factors that influence:

A. engine pressure. B✓ friction loss.
C. critical velocity. D. discharge pressure.

291. *Pump discharge pressure (PDP) is equal to:*

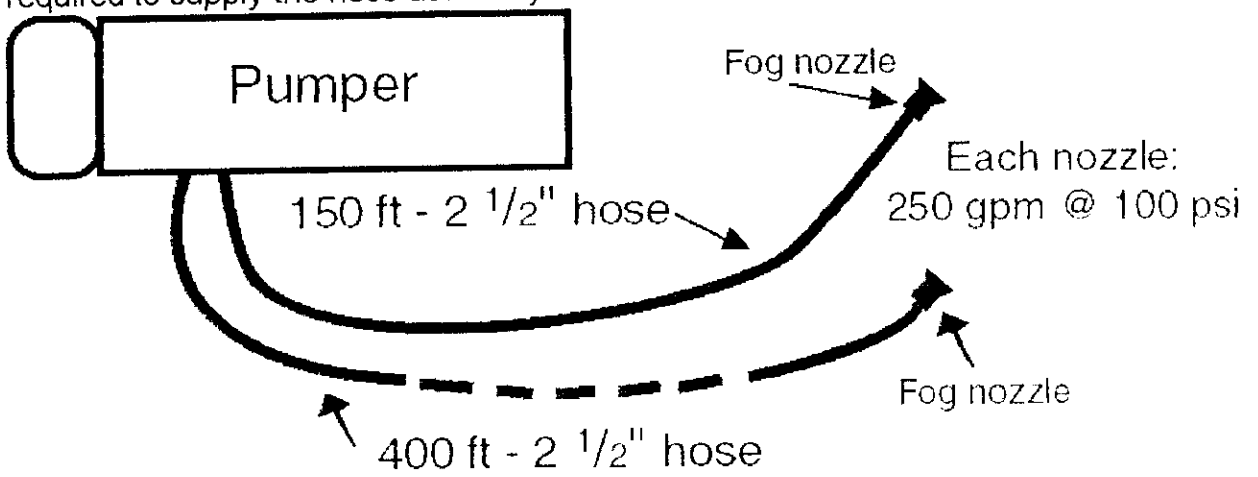
A. NP/FL. B. NP X TPL. C✓ NP + TPL. D. NF^2/NP.

292. Using the coefficient method, determine the pressure loss due to friction in the hose assembly.



A. 65 psi B. 120.20 psi C✓ 86.5 psi D. 21.5 psi

293. Using the hand method, determine the pump discharge pressure required to supply the hose assembly.



A. 170 psi. B. 150 psi. C. 120 psi. D. 100 psi.

294. Two methods of relay pumping are the _____ relay method and the _____ relay method.

A. *metropolitan, rural*
B. basic, high-volume
C. maximum distance, constant pressure
D. task force, strike team

295. In-line relay valves allow for:

A. maintaining a constant pressure.
B. draining of the relay line.
C. increasing the size of the hose used in the relay.
D. late-arriving pumpers to hook up without interrupting operations.

296. Relay pumping always begins with the:

A. Incident Commander.
B. source/supply pumper.
C. attack pumper.
D. largest diameter hose.

297. Relay operations should be shut down from the _____ first.

A. source pumper B. fire scene C. relay pumper D. largest pumper

298. When relay pumping, the intake relief valve should be set at:

A. 10 psi above the static pressure.
B. 50 psi above the static pressure.
C. 150 psi.
D. 200 psi.

299. The difference between dual pumping and tandem pumping is:

A. in dual pumping the pumpers are connected intake to discharge, whereas in tandem pumping they are connected intake to intake.
B. dual pumping operations are similar to the pressure mode in a multi-stage pump, whereas tandem pumping is similar to the volume mode.
C✓ in dual pumping the pumpers are connected intake to intake, whereas in tandem pumping they are connected intake to discharge.
D. there is no difference; dual and tandem pumping are alternative names for the same operation.

300. When relay pumping, if the intake pressure drops below 20 psi:

A. the throttle must be increased.
B✓ there is danger of a cavitation.
C. the relay valve is set too low.
D. high pump discharge pressure is needed.

301. Discharge manifolds may be used in relay operations to:

A✓ support more than one attack pumper.
B. maintain a constant pressure.
C. allow late-arriving pumpers to hook in while interrupting operations.
D. maximize operating pressure.

302. In the most basic sense, relay operations are based on:

A✓ fire flow needs and distance.
B. distance between pumpers.
C. two or more pumpers available.
D. type of water source used.

303. The residual pressure reading at the intake gauge of a pumper in a relay pumping operation **should not** fall below _____ psi.

A. 10
B✓ 20
C. 5
D. 14.7

304. A pressure governor operates by:

A✓ controlling truck engine speed depending on pump pressure.
B. passing excess water to ground.
C. circulating water to tank.
D. shutting truck engine completely off.

305. Centrifugal fire pumps may make use of:

A. air in suction lines.
B✓ positive intake pressures.
C. negative intake pressures.
D. hose size and length.

306. _____ consist of a small return (bypass) water line connected from the discharge side of the pump back to the intake side of the pump.

A. Batch mixing
B. Around-the-pump proportioners
C. Bypass-type balanced pressure proportioners
D. Variable-flow variable-rate direct injection systems

307. The barrel strainer must be submerged at least _____ below the surface of the water when using a static source for pumper service tests.

A. 1 foot (0.3 m)
B. 2 feet (0.6 m)
C. 3 feet (1 m)
D. 4 feet (1.2 m)

308. All gauges used for service tests must have been calibrated within _____ days of the testing.

A. 10 B. 20 C. 30 D. 60

309. The test that ensures the piping between the water tank and pump is sufficient to supply the minimum amount of water specified by NFPA 1901 is the:

A. pumping test.
B. pressure control test.
C. tank-to-pump flow test.
D. internal intake pressure relief valve test.

310. The primer that is environmentally friendly and does **not** require lubrication is a(n):

A. oil-less primer.
B. exhaust primer
C. vacuum primer.
D. positive displacement primer.

311. In a _____ hydrant, a small drain valve opens as the hydrant is closed.

A. wet-barrel B. dry-barrel C. dry D. high-pressure

312. A master stream is:

A. any fire stream that is too large to be controlled without mechanical aid.
B. a stream of water designed to produce a stream as compact as possible with little shower or spray.
C. a stream created when water is forced through a series of small holes on the discharge end of the nozzle.
D. a stream produced by deflecting water from the periphery of an inside circular stem in a periphery-deflected fog nozzle.

313. The purpose of the _____ is to provide circulating feed from several mains.

A. distributors
B. water source
C. distribution system
D. grid system

314. Dry barrel hydrants should be opened completely because:

A. they will not work when partially opened.
B. the drain valve would be completely closed.
C. a partially opened hydrant traps air.
D. the pressure is greatly reduced.

315. In a water distribution grid, the _____ supplies individual hydrants and blocks of consumers.

A. primary feeder
B. secondary feeder
C. distributor
D. service line

316. _____ is/are corrosion or mineral deposits on the interior surface of the interior surfaces of the piping and components of a water distribution system.

A. Encrustation
B. Sedimentation
C. Filtration
D. Hydrolyzation

317. The formula $(29.7)(d^2)(\sqrt{NP})$ can be used to estimate the:

A. velocity of water in feet-per-minute.
B. nozzle reaction for fog nozzles.
C. nozzle reaction for straight tip nozzles.
D. gallons-per-minute in a smooth bore nozzle.

318. To achieve rated capacity of a pump, it must be operated in the _____ position.

A. relay capacity B. series C. pressure D. parallel

319. _____ inches is considered the minimum size pipe to be used in residential areas.

A. Four B. Six C. Eight D. Ten

320. _____ -inch pipe is the recommended **minimum** size for fire hydrant supply mains in business and industrial areas.

A. Six B. Eight C. Ten D. Twelve

321. A _____ distribution system is a network of water mains.

A. distributor B. primary feeder C. district D. grid

322. As a standard practice, it is undesirable to reduce incoming supply pressure below _____ psi.

A. 10 B. 15 C. 20 D. 25

323. For business and industrial districts, water mains should be at least _____ inches.

A. 6 B. 8 C. 10 D. 12

324. The purpose of the diminishing clearance driving skill is to measure a driver's ability to:

A. maneuver around stopped vehicles.
B. steer apparatus in a straight line.
C. parallel park.
D. turn the vehicle 180 degrees.

325. Which of the following driving skills **would not** require using a spotter?

A. Confined space turnaround
B. Serpentine
C. Diminishing clearance
D. Alley dock

326. To effectively judge the ability of a vehicle to pass through areas of restricted horizontal and vertical openings, the operator must know:

A. vehicle dimensions.
B. department standard operating guidelines.
C. the vehicle's weight.
D. governed speed.

327. In emergency incidents that occur near railroad tracks, the driver/operator should:

A. always treat the tracks as an inactive line.
B. park the apparatus on the same side of the tracks as the incident.
C. park the apparatus in a manner that protects the fire hose crossing the tracks.
D. park apparatus on the opposite side of the incident

328. You have responded to an emergency on a highway. The apparatus should be parked at an angle so that the:

A. hazards from oncoming traffic are reduced.
B. apparatus shields the working firefighters.
C. operator is protected by the tailboard from oncoming traffic.
D. All of the above.

329. Studies have shown that an emergency vehicle going faster than _____ mph can possibly outrun its own audible warning devices.

A. 15 B. 70 C. 50 D. 35

330. At a speed of 60 mph, a siren is only audible up to _____ feet in front of the vehicle.

A. 12 B. 50 C. 100 D. 200

331. The use of warning devices is essential when responding to an alarm, and doing so:

A. negates all traffic laws.
B. allows passing stopped school buses.
C. negates most traffic laws.
D. does not allow the driver to disregard other drivers.

332. In case of an evasive maneuver, the apparatus driver should:

A. maintain total contact of one hand on the steering wheel while using the other to maintain balance in the seat.
B. maintain contact with one hand while the other hand operates the air horn warning device.
C. attempt to pass vehicle on the right.
D. always leave a way out.

333. When more than one emergency vehicle is responding along the same route, units should travel at least _____ feet apart.

A. 100 to 200 B. 200 to 300 C. 300 to 500 D. 600

334. While responding to an emergency where all lanes of traffic are blocked in the same direction as the responding apparatus, the apparatus driver should:

A. position the apparatus in the middle lane behind the blocked traffic, wait for one lane to clear, then proceed at a reduced rate of speed.
B. move the apparatus to the farthest point on the right, passing on the right shoulder at an extremely reduced rate of speed.
C. maintain the current lane position and wait for the lane to clear, then proceed through the intersection at a reduced rate of speed.
D. move the apparatus into the opposing lane of traffic and proceed through the intersection at an extremely reduced rate of speed.

335. At a wildland fire, in order to reduce the risk to engine crews and equipment, the safest place for an attack to begin is from a(n):

A. downwind area.
B. barrier point.
C. burned area.
D. unburned area.

336. Level I staging may be:

A. initiated by the Incident Commander or Operations Section Chief.
B. used in the initial response to an incident involving only one responding company.
C. used when mutual aid company's vehicles are responding to the same incident.
D. used in the initial response to a fire or other incident involving more than one responding company.

337. Level II staging may be:

A. initiated by the driver/operator.
B. used for the initial response to an incident involving only one responding company.
C. used when a large number of emergency vehicles are responding to the same incident.
D. used on any emergency response where two or more companies are dispatched.

338. Apparatus **should not** be driven against the normal flow of traffic on limited-access highways and turnpikes unless:

A. the road has been closed by police units.
B. another apparatus has been positioned to block oncoming traffic.
C. a traffic jam occurs, preventing apparatus from approaching the scene.
D. the driver/operator has been given an "all-clear" signal from apparatus already on the scene.

339. Being aware of all that is happening and is likely to happen ahead, at the sides, and to the rear of the apparatus are techniques of:

A. aggressive driving.
B. offensive driving.
C. defensive driving.
D. reactive driving.

340. The purpose of an inverter on an apparatus is to transform:

A. DC current into AC current.
B. AC current into DC current.
C. 12 volts to 24 volts.
D. 220 volts to 110 volts.

341. While conducting a pump capacity test, if the net pump pressure is correct but the nozzle flow (gpm) is too high, the:

A. discharge gate must be opened further.
B. discharge gate must be closed further.
C. throttle setting must be reduced.
D. Both B and C are correct.

342. The 50% pump capacity test is conducted at a net pump pressure of :

A. 150 psi for 20 minutes.
B. 150 psi for 10 minutes.
C. 250 psi for 10 minutes.
D. 250 psi for 20 minutes.

343. During a pump capacity test, a pumper should deliver _____ of its rated capacity at 250 psi pump pressure for 10 minutes.

A. 100% B✓ 50% C. 70% D. 40%

344. The two tests that **must** be performed by the manufacturer if the requirements of NFPA 1901 are included in the apparatus bid specifications are the:

A. road and brake tests.
B✓ road and hydrostatic tests.
C. brake and hydrostatic tests.
D. engine and hydrostatic tests.

345. Which of the following statements regarding ammeters/voltmeters listed below **is correct**?

A. An ammeter/voltmeter indicates the amount of current being drawn from the battery to operate electrical equipment.
B. An ammeter indicates the amount of current being supplied to the battery to charge it.
C✓ An ammeter/voltmeter indicates both the amount of current being drawn from the battery and being supplied to the battery.
D. An ammeter/voltmeter watches the system for added electrical loads.

346. Checking for voltage, electrolyte level, and corrosion are all steps in inspecting:

A. electronic components.
B. the voltage regulator.
C. electrical motors.
D✓ the battery.

347. Proper _____ is one of the **prime** objectives of good maintenance.

A. troubleshooting B✓ lubrication C. vacuum D. priming

348. When performing a capacity test, the desired net pump pressure should be _____ psi.

A. 100 B✓ 150 C. 200 D. 250

349. Inspecting all valves would be considered a part of _____ maintenance.

A✓ daily B. quarterly C. monthly D. bimonthly

350. One method of performing an apparatus/pretrip inspection is the:

A. 1-2-3 method.
B. oval method.
C✓ walk-around method.
D. approaching the apparatus method.

351. The manufacturer's manual will _____ the Society of Automotive Engineers (S.A.E.) number for the engine oil.

A. not suggest B✓ recommend C. require D. not mandate

352. The oil pressure gauge indicates the:

A. amount of oil in the crank case.
B. supply of oil being delivered.
C. amount of oil in the transfer case.
D. type of oil needed for the motor.

353. To _____ means to restore or replace that which has become inoperable.

A. service B. remove C. maintain D. repair

354. When performing road tests, the apparatus should be:

A. fully loaded as it would be once in service.
B. empty of equipment, with only one driver aboard.
C. empty of equipment, with only one driver and one passenger aboard.
D. empty of equipment, with one driver and multiple passengers aboard.

355. An ammeter/voltmeter indicates the:

A. top voltage available when the battery is fully charged.
B. amount of current flowing into the battery.
C. amount of current being taken from the battery.
D. Both B and C are correct.

356. Which of the following conditions could be found while doing routine maintenance on a battery?

A. Loose tie-downs
B. Corrosion around the battery connections
C. Coolant levels need filling
D. Both A and B are correct.

357. Batteries produce explosive _____ gas when being charged.

A. nitrogen B. hydrochloric C. sulfuric D. hydrogen

358. Shutting down a diesel engine immediately after full-load operation may result in:

A. high piston ring wear.
B. increased oil consumption.
C. fuel injector damage.
D. turbo seizure.

359. It is important to maintain _____ of fuel, since you cannot predict how long an apparatus may run during emergency operations.

A. at least one quarter of a tank
B. at least a half tank
C. at least three-fourths of a tank
D. a full tank

360. In a road acceptance test, a fully loaded pumper must be able to come to a full stop from 20 mph within:

A. 25 feet. B. 35 feet. C. 45 feet. D. 55 feet.

361. During an acceptance test, if a jurisdiction is above 2,000 feet elevation, a(an) _____ test **must** be performed.

A. pumping
B. engine overload
C. pressure control system
D. vacuum

362. In an acceptance test, a fully loaded pumper must be able to accelerate to _____ mph in 25 seconds.

A. 35
B. 40
C. 45
D. 50

363. In an acceptance test, a fully loaded pumper must be able to accelerate to 35 mph in _____ seconds.

A. 25
B. 35
C. 45
D. 50

You have completed the test!