Chapter 16 Test

Name: ____________________________ Date: ____________________________

Directions: Write the correct letter on the blank before each question.

Objective 1: Explain the way vaporization and steam relate to the extinguishing properties of water.

1. Characteristics of water that make it valuable for fire extinguishment include: (944)
   A. low coefficient of friction.
   B. a single application method.
   C. a greater heat-absorbing capacity than other agents.
   D. an ability to change to steam with little energy required.

2. The primary way water extinguishes fire is by: (944)
   A. absorbing heat.
   B. excluding oxygen.
   C. saturating dry fuel.
   D. neutralizing the chemical reaction.

3. The energy required to raise the temperature of a substance by one degree is called: (944)
   A. Specific Heat.
   B. British Thermal Unit (Joule).
   C. Latent Heat of Vaporization.
   D. Standard International Heat Unit.

4. Latent Heat of Vaporization is: (944)
   A. the temperature at which a substance turns to steam.
   B. the temperature at which the rate of vaporization begins to decrease.
   C. the amount of heat required to raise the temperature of a substance by one degree.
   D. the amount of heat required to convert a unit mass of a liquid into a vapor without temperature change.
5. As water is vaporized into steam, it expands approximately ____ its original volume. (944)
   A. 700 times
   B. 1,000 times
   C. 1,700 times
   D. 2,200 times

6. Which statement about water streams is MOST accurate? (946)
   A. Water in a solid stream absorbs heat more rapidly.
   B. A solid stream has greater surface area to absorb heat.
   C. A stream broken into small droplets has a greater surface area.
   D. A stream broken into small droplets absorbs heat less efficiently.

7. Which of the following statements about vaporization and steam is MOST accurate? (947)
   A. Steam produced in the upper layer of hot smoke and fire gases may cause the upper layer to expand downward.
   B. Steam produced on contact with hot surfaces is more likely to result in complete vaporization of the fire stream.
   C. Steam produced in the upper layer of hot smoke and fire gases will cause the upper layer to contract toward the ceiling.
   D. Steam produced on contact with hot surfaces has little effect on the total volume of the upper layer of hot smoke and fire gases.

Objective 2:
Identify the factors that create pressure loss or gain.

8. Which of the following statements about friction loss is MOST accurate? (948)
   A. Friction increases pressure at the nozzle.
   B. The larger the hose, the higher the friction loss.
   C. Friction has little effect on the rate of water flow.
   D. The longer the hose lay, the higher the friction loss.

9. The loss of water pressure in a hoseline is the most common example of: (948)
   A. breakover.
   B. friction loss.
   C. vaporization.
   D. water hammer.
10. Friction loss may be overcome by: (948)
   A. curving the hoseline.
   B. decreasing hose size.
   C. increasing pump pressure.
   D. inserting in-line gauges in the layout.

11. Which of the following statements about water pressure is MOST accurate? (948)
   A. Gravity has little effect on nozzle pressure.
   B. If the nozzle is above the fire pump, nozzle pressure is decreased.
   C. If the nozzle is below the fire pump, nozzle pressure is decreased.
   D. Adjusting pump pressure has little effect in overcoming elevation loss/gain.

Objective 3:
Describe the impact water hammer has on fire streams.

12. Which of the following statements about water hammer is MOST accurate? (949)
   A. The effects of water hammer are greater at lower flow rates.
   B. Water hammer is caused by air and turbulence in hose lines.
   C. Water hammer creates a startling noise, but no real damage.
   D. Water hammer can damage water mains, plumbing, fire hose, hydrants, and fire pumps.

13. To prevent water hammer: (949)
   A. use ball valve controls.
   B. bleed air from hoselines.
   C. flush debris from nozzles.
   D. close control valves slowly.
Objective 4: Explain fire stream patterns and their possible limiting factors.

14. A fire stream is a stream of water or extinguishing agent after it:
    (949)
    A. is fully vaporized by the heat of the fire.
    B. comes in contact with the desired target.
    C. is pressurized by the pump and passes into the fire hose.
    D. leaves the fire hose nozzle until it reaches the desired target.

15. Which of the following is a factor that may affect a fire stream? (949)
    A. Steam conversion rate
    B. Location of control zones
    C. Compartment temperature
    D. Wind direction and velocity

16. Which of the following BEST describes a use of a fire stream? (949-950)
    A. Scattering heavy weight fuel loads
    B. Dispersing hot smoke and fire gases from a heated area
    C. Creating a protective curtain between bystanders and fire personnel
    D. Pressure-washing soot and debris from apparatus and equipment

17. Which of the following statements about fire streams is MOST accurate? (950)
    A. The type of nozzle determines the critical flow rate.
    B. The relief valve influences the reach of a fire stream.
    C. Hydrant pressure determines the shape of the fire stream.
    D. The size of the nozzle opening and the nozzle pressure determine the quantity of water flowing from the nozzle.

18. Fire stream pattern types are defined by the specific pattern or shape of the water after it leaves the nozzle and the size of the:
    (950)
    A. type of apparatus generating the nozzle pressure.
    B. volume of water flowing from the nozzle per minute.
    C. water source that is used for the specific fire stream.
    D. specific type of fuel that the fire stream is being used on.
19. Which of the following BEST describes the rate of discharge of a low-volume stream? (950)
   A. Less than 40 gpm (160 L/m)
   B. 40 to 350 gpm (160 L/m to 1 400 L/m)
   C. 100 to 250 gpm (380 L/m to 950 L/m)
   D. More than 350 gpm (1 400 L/min)

20. Which size fire stream flows 40 to 350 gpm (160 L/min to 1 400 L/min)? (950)
   A. Master stream
   B. Handline stream
   C. Low-volume stream
   D. High-volume stream

21. Which of the following hoseline sizes are used to supply a handline stream? (950)
   A. 1½- to 3-inch (38 mm to 77 mm) hoselines
   B. 2½- to 3-inch (65 mm to 77 mm) hoselines
   C. 3½ - to 5-inch (88 mm to 125 mm) hoselines
   D. ¾-inch (20 mm), 1-inch (25 mm), or 1½-inch (38 mm) hoselines

22. Which stream is created by apparatus-mounted appliances? (951)
   A. Master stream
   B. Handline stream
   C. Low-volume stream
   D. High-volume stream

23. To extinguish by cooling, the fire stream must: (951)
   A. be fully vaporized into steam.
   B. fully saturate the fuel source.
   C. absorb heat faster than fire generates heat.
   D. absorb over 50 percent of heat generated by the fire.
24. Which of the following statements about fire stream types is MOST accurate? (951)
   A. The pattern type must be correctly matched to the pattern size.
   B. The pattern must supply at least 50 percent of the critical flow rate.
   C. The pattern must be compact enough for the water to reach the burning material.
   D. The pattern must maintain its shape at least 50 percent of the reach of the fire stream.

25. Which fire stream pattern is produced by a fixed orifice, smooth bore nozzle? (951)
   A. Fog-stream
   B. Solid stream
   C. Broken-stream
   D. Straight stream

26. Which nozzle produces a compact stream with little shower or spray? (951)
   A. Cellar nozzle
   B. Piercing nozzle
   C. Smooth bore nozzle
   D. Constant gallonage fog nozzle

27. How may gravity, friction of air, and wind act on a solid fire stream? (951)
   A. They may alter the rate of vaporization.
   B. They may decrease the reach of the stream.
   C. They may make the stream more conductive to electricity.
   D. They may cause the steam to remain compact for too long.

28. Which of the following fire stream patterns produces less steam conversion and less heat absorption per gallon (liter)? (951)
   A. Fog-stream
   B. Solid stream
   C. Broken-stream
   D. Straight stream
29. Which of the following statements about fire streams is MOST accurate? (951)
   A. Solid streams are more likely to conduct electricity.
   B. Fog-streams are less affected by wind than are solid streams.
   C. Broken-streams have less reach and penetration than fog-streams.
   D. Wide angle fog patterns have the greater forward velocity than other patterns.

30. Additional personnel will be required to safely handle smooth bore nozzles at nozzle pressures greater than: (954)
   A. 50 psi (350 kPa).
   B. 65 psi (450 kPa).
   C. 75 psi (525 kPa).
   D. 100 psi (700 kPa).

31. Which of the following BEST describes a fog-stream? (954)
   A. A semi-solid stream
   B. A compact stream with little shower or spray
   C. A fine spray composed of tiny water droplets
   D. A fire stream broken into coarsely divided droplets

32. Which of the following fire stream patterns can be used for hydraulic ventilation? (954)
   A. Fog-stream
   B. Solid stream
   C. Broken-stream
   D. Straight stream

33. Which of the following statements about fog-streams is MOST accurate? (955)
   A. Fog-streams may be used to cool the hot fire gas layer.
   B. Fog-streams have the greatest reach of all fire streams.
   C. Fog-streams are less affected by wind than are other streams.
   D. Fog-streams have greater reach and penetration than broken-streams.
34. Which of the following fire stream patterns is usually produced by a fog nozzle? (955)
   A. Solid stream
   B. Cellar stream
   C. Broken-stream
   D. Straight stream

35. Which of the following stream patterns is used to extinguish fires in attics, cocklofts, basements, and other confined spaces? (955)
   A. Solid stream
   B. Cellar stream
   C. Broken-stream
   D. Straight stream

36. Which statement about broken-streams is MOST accurate? (956)
   A. A broken-stream has less reach and penetration than a fog-stream.
   B. Broken-streams may have sufficient continuity to conduct electricity.
   C. The effects of a broken-stream cannot be created by another stream type.
   D. Coarse droplets absorb less heat per gallon (liter) than a solid stream does.

37. Which statement about fire stream limiting factors is MOST accurate? (956)
   A. Gravity causes fire streams to separate and lose shape.
   B. Surface tension can cause fire streams to overshoot the target.
   C. Friction with air has greater effect on solid streams than on fog-streams.
   D. Fire streams have an effective forward velocity of 40 to 60 feet per second (12.2 to 18.3 meters per second).

38. In actual operation, fire stream angles between ___ provide maximum reach. (956)
   A. 15 to 19 degrees
   B. 20 to 24 degrees
   C. 30 to 34 degrees
   D. 45 to 49 degrees
Objective 5: 
Describe the three types of fire stream nozzles.

_______ 39. Which of the following nozzle categories was established by NFPA® 1963, Standard for Fire Hose Connections? (957)
A. Bresnan 
B. Piercing 
C. Rockwood 
D. Straight tip

_______ 40. Which of the following statements about fire steam nozzles is most accurate? (957)
A. Fog nozzles do little to shape the fire stream. 
B. Smooth bore and fog nozzles are used only on handlines. 
C. Broken-stream delivery devices are used to apply water in confined spaces. 
D. Smooth bore nozzles are designed to give water a fan shape before discharge.

_______ 41. Which of the following statements about smooth bore nozzles is MOST accurate? (958)
A. Smooth bore nozzles operate at high nozzle pressures. 
B. Smooth bore nozzles are very prone to clogging with debris. 
C. Hoselines may kink as smooth bore nozzles use less pressure. 
D. Smooth bore nozzles may be adjusted, resulting in different patterns.

_______ 42. Which of the following statements about fog nozzles is MOST accurate? (959)
A. Fog nozzles cannot be used to apply foam. 
B. Fog nozzles must be turned off before flow can be adjusted. 
C. Fog nozzles do not allow selection of different stream patterns. 
D. Fog nozzles can provide protection to firefighters with a wide fog pattern.

_______ 43. Which of the following types of fog nozzles provides a constant discharge rate throughout a range of patterns? (959)
A. Basic 
B. Constant pressure 
C. Constant gallonage 
D. Constant/select gallonage
44. Which statement about constant-pressure fog nozzles is MOST accurate? (961)
   A. The operator can vary the flow rate while maintaining constant nozzle pressure.
   B. The operator can vary flow rate but must also change the nozzle pressure.
   C. Constant-pressure fog nozzles for handlines are only designed for low-flow rates.
   D. Constant-pressure fog nozzles are reliable when the operating pressure is less than 100 psi (700 kPa).

45. Which of the following is a characteristic of nozzles designed to operate at pressures less than 100 psi (700 kPa)? (961)
   A. Have more nozzle reaction
   B. Produce droplets of smaller size
   C. Produce lower-density fog patterns
   D. Produce fire streams with greater velocity

46. Which type of nozzle can be used to effectively control fires in concealed spaces? (962)
   A. Piercing
   B. Stacked tip
   C. Smooth bore
   D. Adjustable fog (xx)

47. Which of the following statements about cellar nozzles is MOST accurate? (962)
   A. Cellar nozzle standards are established by NFPA® 1963.
   B. Cellar nozzles can be used to apply compressed air foam.
   C. Cellar nozzles are driven into place with a mallet, sledge hammer, or flathead axe.
   D. Cellar nozzles are lowered into confined spaces through a hole cut in an overhead surface.
Objective 6:
Compare the different types of nozzle control valves.

48. When used with a smooth bore nozzle, a nozzle control valve that causes turbulence when partially open which can affect the quality of a fire stream is the: (963)
   A. ball valve.
   B. slide valve.
   C. standpipe valve.
   D. rotary control valve.

49. Which of the following nozzle control valves also controls the discharge pattern of the fire stream? (963)
   A. Ball valve
   B. Slide valve
   C. Standpipe valve
   D. Rotary control valve

50. Which of the following statements about slide valves is MOST accurate? (963)
   A. Slide valves permit water to flow without creating turbulence.
   B. Slide valves use an exterior barrel guided by a screw and sliding along an interior barrel.
   C. Slide valves control both the flow of water and the discharge pattern of the fire stream.
   D. Slide valves use a ball with a smooth waterway that rotates 90 degrees to control the flow of water.

Objective 7:
Describe the factors in operating and maintaining handline nozzles.

51. Which of the following statements about smooth bore nozzle reaction is MOST accurate? (964)
   A. Lean backward to control nozzle as action increases.
   B. Nozzle valves should be opened slowly to minimize water hammer.
   C. Increasing discharge pressure and flow rate increases nozzle reaction.
   D. Additional personnel are required for operating smooth bore nozzles on all hoselines.
52. Which of the following statements about operating fog nozzles on handlines is MOST accurate? (966)
   A. Fog nozzle flow rates may be adjusted quickly with no nozzle reaction.
   B. Adjustable fog nozzles must be turned off for the operator to adjust the flow.
   C. As the fog pattern widens, the nozzle reaction decreases and the nozzle is easier to handle.
   D. Fog nozzles are more difficult to handle than smooth bore nozzles.

53. Which of the following statements about maintaining nozzles is MOST accurate? (966)
   A. Nozzles should be inspected after each use, and at least weekly.
   B. Nozzles should be stored with the control bale in the open position.
   C. Nozzles should be thoroughly cleaned once per year with soap, water, and a soft bristle brush.
   D. Maintenance, care and cleaning should be performed according to manufacturer’s recommendations.