Chapter 8 Quiz

Name: ____________________________ Date: _______________________

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

________ 1. Flowmeters measure and display water flow in gallons or liters per minute, and the number requires: (282)
   A. no further calculation.
   B. the driver/operator to look at calculations on a chart.
   C. the driver/operator to perform additional calculations.
   D. that the driver/operator input variables into a calculator.

________ 2. The number displayed by a flowmeter reflects water pressure that will be discharged through the nozzle if the hoseline: (282)
   A. is functioning at its rated capacity.
   B. has been charged for at least five minutes.
   C. has been charged for at least ten minutes.
   D. is functioning within 25% of its rated capacity.

________ 3. Which type of flowmeter has only one simple moving part and therefore tends to require little maintenance? (282)
   A. Flapper
   B. Butterfly
   C. Paddlewheel
   D. Spring probe

________ 4. With the proper calibration, a flowmeter should be accurate to a tolerance of plus or minus: (282)
   A. 1 percent.
   B. 3 percent.
   C. 5 percent.
   D. 10 percent.
5. What effect will a kink or a partially closed valve in the hose layout have on the flowmeter? (283)
   A. Will have no effect on the flowmeter’s reading
   B. Will cause the flowmeter to immediately shut down
   C. Will cause the flowmeter to malfunction, giving incorrect readings
   D. Will cause the flowmeter to register a change in the meter’s reading

6. When a line is shut down during standpipe operations and the driver/operator is operating an apparatus equipped with a flowmeter, the driver/operator should: (283)
   A. allow the system to self-adjust.
   B. lower the pressure accordingly.
   C. increase the pressure accordingly.
   D. monitor the system for excess flow.

7. A guideline when making initial calculations for a customized pump chart is to: (285)
   A. exceed maximum discharge pressure by 10% to account for errors.
   B. disregard residual pressure at the intake of the pumper being supplied.
   C. ensure the length of the wyed hoseline layout is the distance between the pumper and the wye.
   D. ensure the length of the wyed hoseline layout is one-half the distance from the pumper and the wye.

8. Which statement about the condensed Q method is MOST accurate? (287)
   A. The formula cannot be used with metric measurements.
   B. The method may be used for operations with any size hose.
   C. The method provides the most accurate readings of any method.
   D. The formula can be used with both customary and metric measurements.
9. Which statement about the gpm flowing method is MOST accurate? (288)

A. It can only be used on 3-inch hose.
B. It can only be used on small diameter hose.
C. It is not applicable to the metric system of measurement.
D. It is applicable to both the customary and metric systems of measurement.

Directions: Write a brief answer to the questions below.

10. List two items of information that may be provided by a monitoring device when an apparatus is equipped with a flowmeter. (282-283)

11. Describe manual and electronic hydraulic calculators. (284)
12. Explain how a driver/operator would use a pump chart. (285)

13. What is the condensed Q formula for 3-inch hose? (287)

14. What is the condensed Q formula for 4-inch hose? (287)

15. What is the condensed Q formula for 5-inch hose? (288)
Chapter 8 Test

Name: ___________________________ Date: ___________________________

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

Objective 1: Describe flowmeters and flowmeter applications.

________ 1. Flowmeters reflect water pressure that will be discharged through the nozzle: (282)
   A. in ideal conditions.
   B. if the hoseline is functioning at its rated capacity.
   C. if the hoseline is functioning at least 75% of its rated capacity.
   D. after the hoseline has been operational for more than two to three minutes.

________ 2. Flowmeters are especially advantageous when automatic nozzles are employed with handlines or master stream devices because automatic nozzles may lead driver/operators to: (282)
   A. allow the discharge pressure to vary excessively.
   B. allow the discharge pressure to quickly overtake the water supply.
   C. supply excessive discharge pressures, creating a high gallon (liter) per minute flow.
   D. supply insufficient discharge pressures, creating a low gallon (liter) per minute flow.

________ 3. Which statement about the flowmeter is MOST accurate? (282)
   A. It is generally accurate within 10 percent of actual water flow. 
   B. It is generally accurate within 25 percent of actual water flow.
   C. It serves as a check to verify calculations based on friction loss, elevation pressure, and length of hoseline.
   D. It relieves you from relying on calculations based on friction loss, elevation pressure, and length of hoseline.
4. Which type of flowmeter is mounted at the top of a straight section of discharge pipe so that only a small portion of the device extends into the waterway? (282)
   A. Bypass
   B. Paddlewheel
   C. Front mount
   D. Spring probe

5. Which type of flowmeter uses a sensor to measure the speed at which it spins and translates the information into a flow measurement? (282)
   A. Bypass
   B. Paddlewheel
   C. Front mount
   D. Spring probe

6. Which type of flowmeter employs a stainless steel spring probe to detect water movement in discharge piping? (282)
   A. Bypass
   B. Paddlewheel
   C. Front mount
   D. Spring probe

7. Which type of flowmeter has only one simple moving part and tends to require little maintenance? (282)
   A. Bypass
   B. Paddlewheel
   C. Front mount
   D. Spring probe

8. A flowmeter should be accurate to a tolerance of plus or minus: (282)
   A. 1 percent.
   B. 3 percent.
   C. 6 percent.
   D. 10 percent.
9. Each discharge equipped with a flowmeter must have a digital readout display mounted within: (282)
   A. 2 inches (50 mm) of the control valve for that discharge.
   B. 6 inches (150 mm) of the control valve for that discharge.
   C. 8 inches (200 mm) of the control valve for that discharge.
   D. 12 inches (300 mm) of the control valve for that discharge.

10. Which is MOST likely to be the cause if a driver/operator receives a message from an attack team that the volume of water at the nozzle has suddenly decreased without a corresponding change at the flowmeter? (283)
    A. A hoseline may have burst.
    B. The water supply has been compromised.
    C. An object has fallen on top of the hoseline.
    D. The attack team is improperly using appliances.

11. Why are flowmeters useful in relay pumping operations? (283)
    A. A volume of water flowing from a receiving pumper can be increased substantially.
    B. A receiving pumper can refill at a much quicker pace and the driver/operator can focus on tasks.
    C. All pumpers in the operation can refill with the use of fewer personnel.
    D. The driver/operator may feed a supply line without having to know the volume of water flowing from receiving pumper.

12. When a line from a standpipe operation is shut down, the pressure: (283)
    A. must be entirely shut down and the system restarted.
    B. must be increased, or the standpipe system will not flow enough water through remaining hoselines.
    C. must be lowered accordingly, or the standpipe system will attempt to flow excess water through remaining hoselines.
    D. can remain the same, as the standpipe system will automatically adjust and the remaining hoselines will flow correctly.
13. The driver/operator must consider that when a standpipe or hoseline is charged, there: (284)
   A. may be residual pressure that will cause flow before nozzle is opened.
   B. is no flow through the system or hose layout until the nozzle is opened.
   C. will be a significant delay from the time the nozzle is opened until full flow.
   D. can be significant flow through the system even when the nozzle is unopened.

Objective 2:
Distinguish between manual and electronic hydraulic calculators.

14. Which statement about manual hydraulic calculators is MOST accurate? (284)
   A. Consists of a graph in which the intersections of variables provide pump discharge pressure
   B. Consists of multiple charts in which the user finds rates of flow, size of hose, and length of hose layout
   C. Consists of index cards that are cross-referenced to rates of flow, size of hose, and length of hose layout
   D. Consists of a slide or dial that can be moved to cover or reveal rates of flow, size of hose, and length of hose layout

15. Which statement about electronic hydraulic calculators is MOST accurate? (284)
   A. Once pump discharge pressure is determined, it must also be manually verified.
   B. After variables have been entered, the user must enter the correct formula to arrive at pump discharge pressure.
   C. Once variables have been entered, the calculator applies preprogrammed formulas to arrive at pump discharge pressure.
   D. Once variables have been entered, the correct formula is shown and the user must manually arrive at pump discharge pressure.
16. Electronic hydraulic calculators may be handheld or may be: (284)
   A. permanently affixed to the inside of the driver’s door.
   B. integrated into the mobile data communications device.
   C. permanently affixed to a location near the pump operator’s panel.
   D. located at the station and calculations are provided over the radio as they are needed.

Objective 3:
Describe how pump charts are used in the fire service.

17. Which statement about pump charts is MOST accurate? (284)
   A. They contain information that must be updated at least monthly for accuracy.
   B. They contain guidelines for determining pump discharge pressure, but not actual numbers.
   C. They contain information specific to a jurisdiction’s equipment and common hose layout operations.
   D. They contain generic information regarding the most common hose layouts used by departments.

18. When developing a customized pump chart, column headings should include information such as flow, nozzle pressure, and: (284)
   A. number of personnel.
   B. type of fire strategy used.
   C. average range of fire streams.
   D. distance in feet for hose layouts.

19. Which is a guideline for initial calculations when developing a customized pump chart? (284)
   A. Develop a main scenario and use it as a basis.
   B. Include friction loss for all handline appliances.
   C. Include friction loss for master stream appliances.
   D. Pump discharge pressure can exceed test pressure for calculations.
20. A guideline when developing a customized pump chart is to: (285)
   A. round pump discharge pressure calculations to the nearest 5 psi (35 kPa).
   B. round pump discharge pressure calculations to the nearest 10 psi (70 kPa).
   C. round pump discharge pressure calculations to the nearest 20 psi (140 kPa).
   D. use exact numbers from the pump chart rather than rounding pump discharge pressure calculations.

21. A driver/operator uses a pump chart by locating the nozzle or the layout in question on the chart, accounting for the number of feet (meters) in the layout, and: (285)
   A. reading across the row to find the required pump discharge pressure.
   B. multiplying the number of feet by the diameter of the hose used in layout.
   C. plotting where each column intersects to find the required pump discharge pressure.
   D. inserting the required numbers into an electronic calculator to come up with correct pump discharge pressure.

Objective 4:
Explain how the condensed Q formula is used on the fireground.

22. The condensed Q formula may be used for operations in which the friction loss can be determined for: (287)
   A. any handline hose.
   B. any diameter of hose.
   C. 1½ - or 2½ -inch hose.
   D. 3, 4, or 5- inch hose.

23. The condensed Q formula $FL = Q^2$ is used with: (287)
   A. 2½ -inch hose.
   B. 3-inch hose.
   C. 4-inch hose.
   D. 5-inch hose.
24. Using the condensed Q formula, what is the total pressure loss in 500 feet of 4-inch hose flowing 1,000 gallons per minute? (288)
   A. 20 psi
   B. 60 psi
   C. 100 psi
   D. 500 psi

25. Using the condensed Q formula for 5-inch hose, what is \( Q^2 \) divided by? (288)
   A. 5
   B. 10
   C. 15
   D. 20

Objective 5:
Describe the gpm flowing method.

26. Which statement about the gpm flowing method is MOST accurate? (288)
   A. It is only applicable to fog streams.
   B. It is only applicable to solid streams.
   C. It is applicable to both solid and fog streams.
   D. It is applicable only when flows are greater than 250 gpm (1,000 L/min).

27. The gpm flowing method may be used: (288)
   A. for various diameter hose.
   B. only on small diameter hose.
   C. for 3-inch hose manufactured within the past 5 years.
   D. for 5-inch hose manufactured within the past 7 years.
Chapter 8 Quiz Answers

1. A
2. A
3. D
4. B
5. D
6. B
7. C
8. A
9. C
10. Answers may vary; students should include at least two of the following:
    - Flow through any specific discharge
    - Total water flow through pump in “real time”
    - Total water flowed through pump for duration of incident
    - Amount of foam being flowed
11. Answers may vary; students should include points from the following:
    - Manual: Consists of a slide or dial that can be moved to cover or reveal rates of flow, size of hose, and length of hose layout in order to come to a conclusion to a problem
    - Electronic: Specially programmed to allow driver/operator to input variables of each hose layout, calculator then applies preprogrammed formulas to arrive at pump discharge pressure
12. Answers may vary; students should include points from the following:
    - Locate the nozzle or the layout in question on the chart
    - Account for the number of feet (meters) in the layout
    - Plot where each column intersects to find the required pump discharge pressure
13. 3-inch hose FL = $Q^2$
14. 4-inch hose FL = $Q^2/5$
15. 5-inch hose FL = $Q^2/15$
Chapter 8 Test Answers

Objective 1
1. B  
2. D  
3. D  
4. B  
5. B  
6. D  
7. D  
8. B  
9. B  
10. A  
11. D  
12. C  
13. B

Objective 2
14. D  
15. C  
16. C

Objective 3
17. C  
18. D  
19. C  
20. A  
21. C

Objective 4
22. D  
23. B  
24. C  
25. C  
26. C  
27. A