MICHIGAN DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY

Drinking Water and Environmental Health Division

DRINKING WATER OPERATOR CERTIFICATION
DISTRIBUTION (S-LEVEL) PRACTICE EXAM
ANSWER KEY

1. A
2. A
3. B
4. A
5. C
6. C
7. A

   Explanation:

   $\text{Chlorine Demand} = \text{Total Chlorine} - \text{Chlorine Residual}$

   $3.3 \text{ milligrams per liter (mg/L)} = 4.2 \text{ mg/L} - 0.9 \text{ mg/L}$

8. C

   Explanation:

   $\frac{150{,}000 \cancel{\text{gal}}}{1} \times \frac{8.34 \text{ lbs}}{1 \cancel{\text{gal}}} = 1{,}251{,}000 \text{ lbs of water}$

   $\frac{1{,}251{,}000 \text{ lbs}}{1{,}000{,}000} = 1.251 \text{ M lbs of water}$

   $10 \text{ ppm} \times 1.251 \text{ M lbs of water} = 12.51 \text{ lbs of pure chlorine}$

   $\text{Converted Percent} = 60\% \text{ available chlorine} \div 100 = 0.60$

   $12.51 \text{ lbs of pure chlorine} \div 0.60(\% \text{ avaible chlorine}) = 20.85 \text{ lbs of HTH}$

9. C
10. B
11. B
12. D
13. B

    Explanation:

    $$\frac{130\,\cancel{\text{ft}}}{1} \times \frac{1\text{ psi}}{2.31\,\cancel{\text{ft}}} = 130 \div 2.31 = 56.28\text{ psi}$$

14. C
15. C

    Explanation:

    $$0.785\frac{\text{cubic ft}}{\text{sec}} = 1\frac{\text{ft}}{\text{sec}} \times 0.785\text{ ft squared}$$

    Below is the area formula for the original.

    $$\text{A} = 0.785 \times 1\text{ft} \times 1\text{ft}$$

    Now we need to double diameter in the area formula.

    $$\text{Area} = 0.785 \times 2\text{ft} \times 2\text{ft} = 3.14\text{ square ft}$$

    Now insert the new area into Q=VA with the same flow and leaving velocity as V. Solving for V will reveal the ¼ the original value.

    $$0.785\frac{\text{cubic ft}}{\text{sec}} = \text{Velocity} \times 3.14\text{ ft squared}$$

    $$\frac{0.785}{3.14} = \text{Velocity} \times \frac{\cancel{3.14}}{\cancel{3.14}}$$

    $$\text{Velocity} = 0.25\text{ ft/sec}$$

16. B

Explanation:

$2.26 \text{ MGD} \times 1{,}000{,}000 = 2{,}260{,}000 \text{ gallons per day}$

$$\frac{2{,}260{,}000 \text{ gal}}{1 \text{ day}} \times \frac{1 \text{ day}}{24 \text{ hr}} \times \frac{1 \text{ hr}}{60 \text{ min}} = 1569 \text{ gal/min}$$

17. B

Explanation:

$$\frac{900 \text{ gal}}{1 \text{ min}} \times \frac{60 \text{ min}}{1 \text{ hr}} \times \frac{24 \text{ hr}}{1 \text{ day}} = 1{,}296{,}000 \text{ gal/day}$$

$$\frac{1{,}296{,}000 \text{ gal}}{1{,}000{,}000} = 1.296 \text{ M gal} = 1.3 \text{ MGD}$$

18. A

19. D

20. B

21. D

Explanation:

$\text{Volume} = 0.785 \times \text{diameter} \times \text{diameter} \times \text{height}$

$$\frac{9 \text{ in}}{1} \times \frac{1 \text{ ft}}{12 \text{ in}} = 0.75 \text{ ft}$$

$\text{Volume} = 0.785 \times 0.75\text{ft} \times 0.75\text{ft} \times 1\text{ft} = 0.44 \text{ cubic feet}$

$$\frac{0.44 \text{ cubic feet}}{1} \times \frac{7.48 \text{ gal}}{1 \text{ cubic feet}} = 3.3 \text{ gal}$$

22. D

Explanation:

$$\text{Flow Rate}(Q, \text{cubic feet per second}) = \text{Velocity}(\text{ feet per second}) \times \text{Area}(\text{Square Feet})$$

$$\text{Area} = 0.785 \times \text{diameter} \times \text{diameter}$$

$$\frac{10\ \cancel{\text{in}}}{1} \times \frac{1\ \text{ft}}{12\ \cancel{\text{in}}} = 0.83\ \text{ft}$$

$$\text{Area} = 0.785 \times 0.83\text{ft} \times 0.83\text{ft} = 0.54 \text{ square feet}$$

$$\text{Flow Rate} = 0.54 \text{ square feet } \times 2.5 \text{ feet per second} = 1.35 \text{ cubic feet per second}$$

$$\frac{1.35\ \cancel{\text{cubic feet}}}{1\ \cancel{\text{second}}} \times \frac{7.48\ \text{gal}}{1\ \cancel{\text{cubic feet}}} \times \frac{60\ \cancel{\text{second}}}{1\ \text{min}} = 606\ \text{gal/min}$$

23. A

24. C

25. B

26. D

27. D

28. A

29. A

30. A

31. B

32. C

33. D

34. A

Explanation:

$$\text{Volume} = 0.785 \times \text{diameter} \times \text{diameter} \times \text{height}$$

$$\text{Volume} = 0.785 \times 35\text{ft} \times 35\text{ft} \times 18\text{ft} = 17{,}309.25 \text{ cubic feet}$$

35. D

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