



Certification Boulevard

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Test Your Knowledge of Water Supply & Other Topics

- What is the velocity in cubic feet per second (cfs) of a 1.5-mgd stream of water?
 - 1.55 cfs
 - 8.34 cfs
 - 2.32 cfs
 - 92.84 cfs
- Given the following data, calculate the approximate horsepower delivered by this pump:
 - Flow is 675 gpm
 - TDH is 95 feet
 - Pump efficiency is 88 percent
 - Motor efficiency is 95 percent
 - 13.5 HP
 - 19 HP
 - 25 HP
 - 7.5 HP
- What is the flow velocity in a six-inch pipe compared to the flow velocity in a 12-inch pipe, assuming both pipes are flowing an identical volume of water?
 - The same
 - Twice the velocity
 - Three times the velocity
 - Four times the velocity
- When pumping water, the total dynamic head is the sum of what three main components?
 - “A” kit
 - “B” kit
 - “C” kit
 - None of the above
- Which repair kit is designed for use with chlorine tank cars?
 - Water weighs more than liquid chlorine.
 - Liquid chlorine weighs 2.5 times more than water.
 - Water weighs 1.5 times more than liquid chlorine.
 - Liquid chlorine weighs 1.5 times more than water.
- What is the weight relationship of chlorine liquid compared to water?
 - Water weighs more than liquid chlorine.
 - Liquid chlorine weighs 2.5 times more than water.
 - Water weighs 1.5 times more than liquid chlorine.
 - Liquid chlorine weighs 1.5 times more than water.
- What will the pressure gauge read on the suction of a pump if the pump is located at floor elevation of the tank and the tank has 25 feet of static water level?
 - About 58 psi
 - About 9.5 psi
 - About 11 psi
 - About 17 psi
- True or False:** When alkalinity is high, the pH is always high.
- Which has a lower pH—sodium hydroxide or aluminum sulfate?
 - Aluminum sulfate
 - Sodium hydroxide
 - They are both the same
- A potable water flow meter reads 83 gpm for 13 hours per day and 47 gpm for the remaining 11 hours per day. What is the total daily flow in mgd?
 - 0.64740 mgd
 - 0.09576 mgd
 - 0.03102 mgd
 - 0.1870 mgd

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Looking for Answers? Check the Archives

Are you new to the water and wastewater field? Want to boost your knowledge about topics you'll face each day as a water/wastewater professional?

All past editions of *Certification Boulevard* back through the year 2000 are available on the Florida Water Environment Association's Web site at www.fwea.org. Click the "Site Map" button on the home page, then scroll down to the Certification Boulevard Archives, located below the Operations Research Committee.

SEND US YOUR QUESTIONS

Readers are welcome to submit questions or exercises on water or wastewater treatment plant operations for publication in *Certification Boulevard*. Send your question (with the answer) or your exercise (with the solution) by e-mail to roy.pelletier@cityoforlando.net, or by mail to:

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Certification Boulevard Answer Key

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1. **C. 2.32 cfs**

$$= 1,000,000 \text{ gpd} \div 86,400 \text{ sec/day} \div 7.48 \text{ gal/cu.ft.} \times 1.5 \text{ mgd} \\ = 2.32 \text{ cfs}$$

OR

$$= 1.55 \text{ cfs per mgd} \times 1.5 \text{ mgd} \\ = 2.32 \text{ cfs}$$

2. **B. 19 HP**

Horsepower

$$= (\text{gpm} \times \text{TDH, feet} \times 8.34 \text{ lbs/gal}) \div 33,000 \\ \text{foot lbs/second} \div \% \text{ pump eff} \div \% \text{ motor} \\ \text{eff} \\ = (675 \text{ gpm} \times 95 \text{ TDH} \times 8.34 \text{ lbs/gal}) \div \\ 33,000 \div 0.88 \div 0.95 \\ = 19.38 \text{ HP}$$

Note: TDH = total dynamic head

3. **D. Four times the velocity**

Cross section of a 6-inch pipe = πr^2

$$= 3.14 \times (3 \text{ in.} \div 12 \text{ in.})^2 = 0.196 \text{ ft}^2$$

Cross section of a 12-inch pipe = πr^2

$$= 3.14 \times (6 \text{ in.} \div 12 \text{ in.})^2 = 0.785 \text{ ft}^2$$

$$= 0.785 \text{ ft}^2 \div 0.196 \text{ ft}^2 = 4.0$$

4. **Suction lift, discharge head, and friction losses**

TDH: (total dynamic head) A combination of various components: 1) Static head, which is a combination of suction lift and discharge head, and friction head, which includes velocity head. All components are expressed in feet. Static head is the actual vertical distance measured from the minimum water level in the basin to the highest point in the discharge piping. Friction head is the additional head created in the discharge system due to resistance to flow within its components.

5. **C. "C" kit**

The "A" kit contains equipment for fixing a leak on a 150-pound cylinder. The "B" kit is for one-ton cylinders. The "C" kit is for tank cars and tank trucks.

6. **D. Liquid chlorine weighs 1.5 times more than water.**

Chlorine is a clear, amber-colored liquid about 1.5 times heavier than water. Gaseous chlorine is greenish-yellow, about 2.5 times heavier than air. Uses include water purification; sanitation of industrial waste; disinfection of wastewater treatment effluent; swimming pools; bleaching of pulp and textiles; and manufacture of carbon tetrachloride, glycol and numerous other organic compounds, and phosgene gas.

7. **C. About 11 psi**

- Each foot of water generates 0.433 psi
- 25 feet of water \times 0.433 psi = 10.82 psi

8. **False**

There is not necessarily a correlation between high alkalinity and high pH; sometimes the pH may be high, sometimes not.

9. **A. Aluminum sulfate**

- Aluminum sulfate (Alum) is an acid with a

pH typically below 4.0.

- Sodium hydroxide (Caustic) is an alkaline with a pH typically greater than 12.

10. **B. 0.09576 mgd**

$$= (83 \text{ gpm} \times 13 \text{ hrs/day} \times 60 \text{ mins/hr}) + (47 \\ \text{gpm} \times 11 \text{ hrs/day} \times 60 \text{ mins/day}) \\ = 64,740 \text{ gpd} + 31,020 \text{ gpd} = 95,760 \text{ gpd} \div \\ 1,000,000 \\ = 0.09576 \text{ mgd}$$