Basic Math

Conversions

1. **A Large storage tank has a volume of 25 cu. Ft. How many gallons of water can this tank hold when full?**

2. **A water tower that is 15.4 yards tall shows a pressure of how many psi at the bottom?**

3. **A residential water softener holds 1 cubic foot of resin with a hardness removal capacity of 30,000 grains per cubic foot. The water being treated contains 15 gpg total hardness. The household uses 250 gallons per day. How many days can this softener run before total exhaustion?**

4. **A commercial softener holds 50 cubic feet of resin with a hardness removal capacity of 30,000 grains per cubic foot. The water being treated contains 25 gpg total hardness. How many gallons of water can be treated before the exchange capacity is exhausted?**

Math Strategies

4-Step Process for Word Problems:

1. **Write down given numbers with units.**
2. **Write down the correct formula.**
3. **Fill numbers into formula.**
4. **Calculate and convert to correct units.**

Disinfection formulas use million gallons (MG):

- **Move decimal 6 places to the left from gallons value**
  - **150,000 gallons ➔ 0.15 MG**

Change chlorine percentage to a decimal:

- **Move decimal 2 places to the left from percent value**
  - **15% ➔ 0.15**
  - **5% ➔ 0.05**

ALWAYS change to feet, NEVER leave in inches!

Volume

1. **A rectangular tank is 2 ft tall, 2 ft wide, and 4 ft long. How many gallons of water can this tank hold when full?**

2. **A rectangular tank is 96 in. tall, 36 in. wide, and 48 in. long. How many gallons of water can this tank hold when full?**

3. **A cylindrical tank is 2 ft. in diameter and 4 ft. to the overflow. How many gallons of water can this tank hold when full?**

4. **A cylindrical tank is 36 in. in diameter and 72 in. to the overflow. How many gallons of water can this tank hold when full?**

5. **A 6 in water main is 50 ft. long. How many cubic feet of water can this pipe hold when full?**

Disinfection 1

1. **Determine the chlorine dosage needed to achieve a 0.7 mg/l residual in a system with a demand of 9.3 mg/l.**

2. **Determine the chlorine dosage needed to achieve a 3.5 mg/l residual in a system with a demand of 8.0 mg/l.**

3. **Determine the demand if a residual of 0.5 mg/l is sustained in a system after dosing 3.2 mg/l chlorine.**

4. **Determine the demand if a residual of 0.8 mg/l is sustained in a system after dosing 9.6 mg/l chlorine.**

Disinfection 2

1. **Determine how much 100% chlorine must be added to 350,000 gallons of water to produce a 2.5 mg/l dosage.**

2. **Determine how much 100% chlorine must be added to 1,250,000 gallons of water to produce a 5.8 mg/l dosage.**

3. **Determine how much 100% chlorine must be added to 15,000 gallons of water to produce a 2.0 mg/l dosage.**

Disinfection 3

1. **How many pounds of 5% bleach are needed to equal 25 pounds of 100% chlorine?**

2. **How many pounds of 65% calcium hypochlorite are needed to equal 10 pounds of 100% chlorine?**

3. **How many pounds of 100% chlorine are needed to equal 50 pounds of 15% bleach?**

4. **How many pounds of 100% chlorine are needed to equal 63 pounds of 85% calcium hypochlorite?**

Disinfection 4

1. **Determine the dosage when you add 20 pounds of pure chlorine to a storage tank that holds 12,000 gallons of water.**

2. **Determine the dosage when you add 100 pounds of pure chlorine to a storage tank that holds 24,000,000 gallons of water.**

3. **Determine the dosage when you add 27 pounds of pure chlorine to a storage tank that holds 360,000 gallons of water.**

Basic Math Answer Key

Conversions:

1. $\frac{25 \text{ cu. Ft.}}{1} \quad \frac{7.48 \text{ gal.}}{1 \text{ cu. Ft.}}$ = 25 x 7.48 **= 187 Gal.**

2. $\frac{15.4 \text{ yards}}{1} \quad \frac{3 \text{ ft.}}{1 \text{ yard}} \quad \frac{1 \text{ psi}}{2.31 \text{ ft}}$ = 15.4 x 3 ÷ 2.31 **= 20 psi.**

3. $\frac{1 \text{ cu. Ft.}}{1} \quad \frac{30{,}000 \text{ grains}}{1 \text{ cu. Ft.}} \quad \frac{1 \text{ gallon}}{15 \text{ grains}} \quad \frac{1 \text{ day}}{250 \text{ gallons}}$ = 1 x 30,000 ÷ 15 ÷ 250 **= 8 days**

4. $\frac{50 \text{ cu. Ft.}}{1} \quad \frac{30{,}000 \text{ grains}}{1 \text{ cu. Ft.}} \quad \frac{1 \text{ gallon}}{25 \text{ grains}}$ = 50 x 30,000 ÷ 25 **= 60,000 gal.**

Volume:

1. 4 ft. x 2 ft. x 2 ft. =16 cu. Ft. x 7.48 **= 120 Gallons**
2. 4 ft. x 3 ft. x 8 ft = 96 cu. Ft. x 7.48 **= 718 Gallons**
3. 3.14 x 1 ft. x 1 ft. x 4 ft. = 12.45 cu. Ft. x 7.48 **= 93.9 Gallons**
4. 3.14 x 1.5 ft. x 1.5 ft. x 6 ft. = 42.4 cu. Ft. x 7.48 **= 317 Gallons**
5. 3.14 x 0.25 ft. x 0.25 ft. x 50 ft. **= 9.8 cubic feet**

Disinfection 1:

1. 9.3 mg/l + 0.7 mg/l **= 10 mg/l**
2. 8.0 mg/l + 3.5 mg/l **= 11.5 mg/l**
3. 3.2 mg/l = ? + 0.5 mg/l ➔ 3.2 mg/l – 0.5 mg/l **= 2.7 mg/l**
4. 9.6 mg/l = ? + 0.8 mg/l ➔ 9.6 mg/l – 0.5 mg/l **= 8.8 mg/l**

Disinfection 2:

1. 0.35 x 2.5 x 8.34 **= 4.3 Lbs.**
2. 1.25 x 5.8 x 8.34 **= 60.5 Lbs.**
3. 0.015 x 2.0 x 8.34 **= 0.25 Lbs.**

Disinfection 3:

1. 25 ÷ 0.05 **= 500 Lbs. Compound**
2. 10 ÷ 0.65 **= 15.4 Lbs. Compound**
3. 50 = ? ÷ 0.15 ➔ 50 x 0.15 **= 7.5 Lbs. Pure**
4. 63 = ? ÷ 0.85 ➔ 63 x 0.85 **= 53.6 Lbs. Pure**

Disinfection 4:

1. 20 ÷ (0.012 x 8.34) ➔ 20 ÷ (0.1) **= 200 mg/l**
2. 100 ÷ (24 x 8.34) ➔ 100 ÷ (200.16) **= 0.5 mg/l**

3. 27 ÷ (0.36 x 8.34) ➔ 27 ÷ (3) **= 9 mg/l**