## 5 Step Approach:

1. **Identify the problem and list what is known and unknown**
2. **Select an appropriate formula to solve the problem**
3. **Arrange the formula to solve for the unknown**
4. **Plug the known values into the formula and solve for the unknown value**
5. **Convert answer to the appropriate units**

## Example 1

The chlorination system is feeding the system at a dose of 1.5 mg/L. Find the system flow in gpm if the chlorine scale shows that 10 pounds were used in the last 24 hours.

**Step 1 – Identify the problem and list what is known and what is unknown**

Known Unknown

**Step 2 – Select the appropriate formula**

**Step 3 – Arrange formula to solve for unknown**

**Step 4 – Plug the known values in and solve for unknown**

**Step 5 – Convert answer to the appropriate units**

## Example 2

The Fluoridation system is feeding the system at a dose of 0.7 mg/L. How many pounds of fluoride are added per day if it is added to a flow of 560 gpm?

**Step 1 – Identify the problem and list what is known and what is unknown**

Known

Unknown

**Step 2 – Select the appropriate formula**

**Step 3 – Arrange formula to solve for unknown**

**Step 4 – Plug the known values in and solve for unknown**

**Step 5 – Convert answer to the appropriate units**

## Example 3

What is the flow velocity in ft/sec for a 6 inch pipe that is full and has 125 gpm of water flowing through it?

**Step 1 – Identify the problem and list what is known and what is unknown**

Known

Unknown

**Step 2 – Select the appropriate formula**

**Step 3 – Arrange formula to solve for unknown**

**Step 4 – Plug the known values in and solve for unknown**

**Step 5 – Convert answer to the appropriate units**

## Example 4

A settling tank that is 50 ft long by 20 ft wide and 12 ft deep is used to treat a flow of 2.5 MGD. What is the detention time?

**Step 1 – Identify the problem and list what is known and what is unknown**

Known

Unknown

**Step 2 – Select the appropriate formula**

**Step 3 – Arrange formula to solve for unknown**

**Step 4 – Plug the known values in and solve for unknown**

**Step 5 – Convert answer to the appropriate units**

Solve the following problems using the 5-step approach and the formula given:

**lb/day = (Flow, MGD) x (Dose, mg/L) x (8.34 lb/gal)**

1. The chlorination system is feeding the system at a dose of 1.2 mg/L. Find the system flow in gpm if the chlorine scale shows that 10 pounds were used in the last 24 hours.

2. The chlorination system is feeding the system at a dose of 2.7 mg/L. Find the system flow in gpm if the chlorine scale shows that 20 pounds were used in the last 24 hours.

3. The chlorination system is feeding the system at a dose of 2.0 mg/L. Find the system flow in gpm if the chlorine scale shows that 15 pounds were used in the last 24 hours.

Solve the following problems using the 5-step approach and the formula given:

**lb/day = (Flow, MGD) x (Dose, mg/L) x (8.34 lb/gal)**

4. The Fluoridation system is feeding the system at a dose of 0.8 mg/L. How many pounds of fluoride are added per day if it is added to a flow of 580 gpm?

5. The Fluoridation system is feeding the system at a dose of 0.75 mg/L. How many pounds of fluoride are added per day if it is added to a flow of 520 gpm?

6. The Fluoridation system is feeding the system at a dose of 0.9 mg/L. How many pounds of fluoride are added per day if it is added to a flow of 590 gpm?

Solve the following problems using the 5-step approach and the formula given:

**Q = Velocity x Area**

7. What is the flow velocity in ft/sec for an 8-inch pipe that is full and has 125 gpm of water flowing through it?

8. What is the flow velocity in ft/sec for a 10-inch pipe that is full and has 95 gpm of water flowing through it?

9. What is the flow velocity in ft/sec for an 18-inch pipe that is full and has 2,100 gpm of water flowing through it?

Solve the following problems using the 5-step approach and the formula given:

$$\textbf{Detention Time} = \frac{\textbf{Volume}}{\textbf{Flow Rate}}$$

10. A settling tank that is 60 ft long by 30 ft wide and 12 ft deep is used to treat a flow of 3.4 MGD. What is the detention time in minutes?

11. A settling tank that is 52 ft long by 21 ft wide and 14 ft deep is used to treat a flow of 2.0 MGD. What is the detention time in minutes?

12. A settling tank that is 54 ft long by 22 ft wide and 13 ft deep is used to treat a flow of 2.9 MGD. What is the detention time in minutes?

**Answers**

1. 694 gpm
2. 617 gpm
3. 624 gpm
4. 5.6 lb/day
5. 4.7 lb/day
6. 6.4 lb/day
7. 0.8 fps
8. 0.4 fps
9. 2.6 fps
10. 68 min
11. 82 min
12. 57 min