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

<table>
<thead>
<tr>
<th>Known</th>
<th>Unknown</th>
</tr>
</thead>
</table>

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

<table>
<thead>
<tr>
<th>Known</th>
<th>Unknown</th>
</tr>
</thead>
</table>

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:

\[
\text{lb/day} = (\text{Flow, MGD}) \times (\text{Dose, mg/L}) \times (8.34 \text{ lb/gal})
\]

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:

\[ \text{lb/day} = \text{(Flow, MGD)} \times \text{(Dose, mg/L)} \times (8.34 \text{ lb/gal}) \]

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:

\[ Q = \text{Velocity} \times \text{Area} \]

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:

\[
\text{Detention Time} = \frac{\text{Volume}}{\text{Flow Rate}}
\]

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