**Problem Solving Part I - Mixture Problems**

**Review:** A **Percent** is parts per hundred.

**Example 1:**
- A 50% alcohol solution has 50% alcohol and 50% water.
- A 60% alcohol solution has 60% alcohol and 40% water.

**Example 2:** A chemist has 200 gallons of a 30% acid solution. How many gallons of pure acid is in the solution?

We can use the following formula to solve this problem.

\[
\text{(amount of solution)} \times \text{(percent of acid)} = \text{(amount of acid)}
\]

**Note:** Percents must be converted to decimals first!

\[
(200 \text{ gallons}) \times (0.30) = \underline{\text{gallons}}
\]

This means that there are \underline{gallons} of pure acid and \underline{gallons} of water.
A mixture problem:

Example 3: How many gallons of 50% alcohol must be mixed with 80 gallons of 20% alcohol to get a mixture that is 40% alcohol?

Since there are $x$ gallons in the first solution and 80 gallons in the second solution, and we are mixing the two solutions to make one big mixture, there must be $(x + 80)$ gallons in the mixture.

We must organize all of this information into a table in order to solve the problem.
Now that the table is filled out, we can write an equation to solve for \( x \):

Recall:

\[
\left( \frac{\text{Amount Alcohol}}{\text{of Sol'n I}} \right) + \left( \frac{\text{Amount Alcohol}}{\text{of Sol'n II}} \right) = \left( \frac{\text{Final mixture}}{\text{of Final}} \right)
\]

So our equation becomes

\[
0.50 x + 0.20 (80) = 0.40 (x + 80)
\]

Solve for \( x \):
Problem Solving Part I Practice Problem

How many liters of a 20% acid solution must be mixed with 12 liters of a 12% acid solution to get a mixture that is 14% acid?

<table>
<thead>
<tr>
<th>Amount of Solution</th>
<th>Percent Acid</th>
<th>Amount of Acid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solution I</td>
<td>20% acid</td>
<td></td>
</tr>
<tr>
<td>Solution II</td>
<td>12% acid</td>
<td></td>
</tr>
<tr>
<td>Final Mixture</td>
<td>14% acid</td>
<td></td>
</tr>
</tbody>
</table>