

## 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.

$$\left( \begin{array}{c} \text{amount} \\ \text{of} \\ \text{solution} \end{array} \right) \times \left( \begin{array}{c} \text{percent} \\ \text{acid} \end{array} \right) = \left( \begin{array}{c} \text{amount} \\ \text{of} \\ \text{acid} \end{array} \right)$$

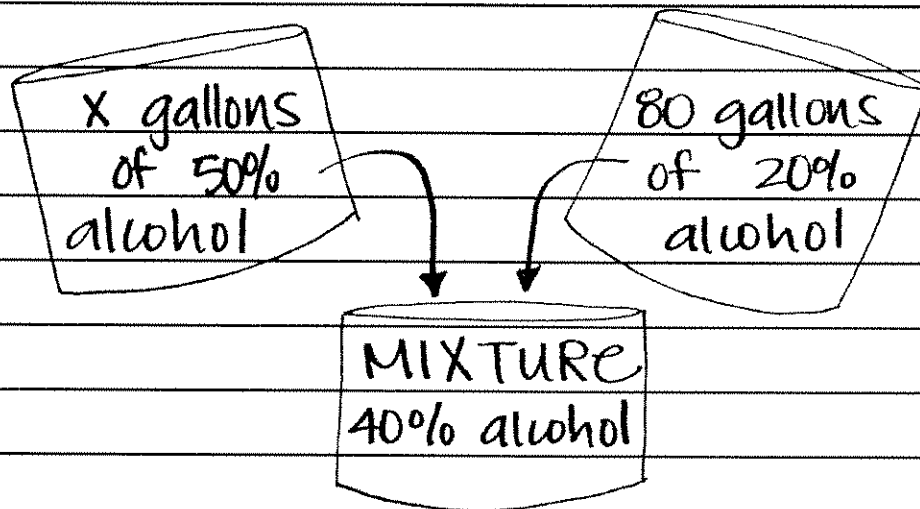
note: Percents must be converted to decimals first!

$$\hookrightarrow (200 \text{ gallons}) \times (0.30) = \underline{\hspace{2cm}} \text{ gallons}$$

$\hookrightarrow$  This means that there are  $\underline{\hspace{2cm}}$  gallons of pure acid and  $\underline{\hspace{2cm}}$  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.

↪		Amount of solution	Percent alcohol	amount of alcohol
	Solution I			
	50% alcohol			
	Solution II			
	20% alcohol			
	Final mixture			
	40% alcohol			

Now that the table is filled out, we can write an equation to solve for x:

Recall:

$$\left( \begin{array}{c} \text{Amount Alcohol} \\ \text{of Sol'n I} \end{array} \right) + \left( \begin{array}{c} \text{Amount Alcohol} \\ \text{of Sol'n II} \end{array} \right) = \left( \begin{array}{c} \text{Final} \\ \text{mixture} \end{array} \right)$$

So our equation becomes

$$0.50x + 0.20(80) = 0.40(x + 80)$$

↪ 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?

	Amount of Solution	Percent Acid	Amount of Acid
Solution I 20% acid			
Solution II 12% acid			
Final Mixture 14% acid			