

## Word Problems

Basic strategy: Ignore everything in the problem until you get to the actual thing that the question is asking for - THOSE ARE YOUR VARIABLES! Only then should you pay attention to the other details and numbers provided in the question!

Example 1: Today, Mike is twice as old as Sarah. However, 3 years ago, Mike was three times as old as Sarah. How old are Mike and Sarah today?

$x = \text{Mike's age today,}$        $y = \text{Sarah's age today}$

Today: Mike  $\rightarrow x$ ,  
Sarah  $\rightarrow y$   
 $\Rightarrow x = 2y$

3 years ago: Mike  $\rightarrow x - 3$   
Sarah  $\rightarrow y - 3$   
 $\Rightarrow x - 3 = 3(y - 3)$

$$\left. \begin{array}{l} \Rightarrow x = 2y \\ x - 3 = 3(y - 3) \end{array} \right\} \rightarrow 2y - 3 = 3(y - 3)$$

$$2y - 3 = 3y - 9$$

$$-y = -6 \Rightarrow y = 6$$

$$\text{But } x = 2y \Rightarrow x = 12$$

$\Rightarrow$  Mike is 12, Sarah is 6

Example 2: Two friends are playing a guessing game. One friend tells the other that he is thinking of two numbers. He gives the hint that one number is 10 more than the other number, and that the sum of twice the smaller number and three times the larger number is 55. What are the two numbers?

Let  $x = \text{smaller \#},$        $y = \text{larger \#}$

$$y = x + 10$$

$$2x + 3y = 55 \rightarrow 2x + 3(x + 10) = 55 \rightarrow 5x = 25$$

$$2x + 3x + 30 = 55 \rightarrow \underline{x = 5}$$

$$y = 15$$

$\Rightarrow$  The two #'s are 5 and 15

Example 3: Alice, Bob, and Charles have a total of \$80 combined. Bob has twice as much money as Alice, and Charles has \$5 less than Bob. How much money do they each have?

$x = \text{Alice } \$, \quad y = \text{Bob } \$, \quad z = \text{Charles } \$$

$$x + y + z = 80$$

$$y = 2x$$

$$z = y - 5$$

$$x + 2x + z = 80 \rightarrow 3x + z = 80$$

$$\rightarrow 3x + y - 5 = 80$$

$$\rightarrow 3x + 2x - 5 = 80$$

$$\rightarrow 5x = 85$$

$$\boxed{x = 17}$$

$$y = 2(17) = \boxed{34}, \quad z = y - 5 = 34 - 5 = \boxed{29}$$

Alice has \$17, Bob has \$34, Charles has \$29.