

Solving Systems of Equations means that there are at least 2 variables that you have to solve. Just like you were solving for x , now you have to solve for x and y . There are 3 ways to solve Systems of equations. They are by *Substitution*, *Elimination*, and *Graphing*. You may prefer 1 of these ways to the other, but we will talk about all 3 of them.

Substitution: When you do *substitution*, you solve for one variable and then plug it in to the other and solve for the second variable.

Ex.1 Solve the Systems of Equation for $\begin{cases} y=6x-11 \\ -2x-3y=-7 \end{cases}$

Since $y=6x-11$, you know what y is already! y is just $6x-11$. So you "plug y into the other equation and solve for x . If you do not understand, look below:

$$y = 6x - 11$$

$$-2x - 3y = -7$$

$$-2x - 3(6x - 11) = -7$$

Then distribute the -3 . $-2x - 3(6x) - 3(-11) = -7$

$$-2x - 18x + 33 = -7$$

Combine the x 's $-20x + 33 = -7$

Bring 33 to the other side. $-20x = -7 - 33$

$$-20x = -40$$

$$x = 2$$

Now that you know x , plug x into the other equation to get y

$$y = 6x - 11$$

$$y = 6(2) - 11 \rightarrow y = 12 - 11 \rightarrow y = 1$$

So x is 2 and y is 1. Write the solution set like this

$$\{2, 1\}$$

Solving Systems of Equations – Elimination

Sometimes, it is very complicated to solve using *Substitution*. If this is the case, you will find it easier to use ***Elimination***.

Ex.1 Find the solutions of the Systems of Equations of
$$\begin{cases} -4x - 2y = -12 \\ 4x + 8y = -24 \end{cases}$$

To solve this, merely add the x's together.

$$\begin{cases} -4x - 2y = -12 \\ \underline{4x + 8y = -24} \end{cases}$$

$$0x + 6y = -36$$

$$6y = -36$$

$$y = -6$$

Then plug y in to find x

$$-4x - 2(-6) = -12$$

$$-4x = -24 \rightarrow x = 6 \quad \{6, -6\}$$

Ex.2 Solve the Systems of Equations of
$$\begin{cases} 5x + y = 9 \\ 10x - 7y = -18 \end{cases}$$

In this problem, it is harder because the variables aren't opposites. So you have to make them opposites. Make the first 5x into the opposite of 10x

$$\begin{cases} -2(5x + y = 9) \\ 10x - 7y = -18 \end{cases} \rightarrow \begin{cases} -10x - 2y = -18 \\ 10x - 7y = -18 \end{cases} \quad \text{Then you add them}$$

$$0x - 9y = -36 \rightarrow y = 4$$

Plug 4 into y

$$5x + 4 = 9 \rightarrow 5x = 5$$

$$x = 1$$

$$\{1, 4\}$$