

$2x + 3y = -4$	mult by 2	$4x + 6y = -8$
$5x - 2y = 9$	mult by 3	<u>$15x - 6y = 27$</u>
	Adding	$19x = 19$
	Solve	$x = 1$

Now plug that value for x back into either of the original equations. Using the top equation:

$$2(1) + 3y = -4$$

$$3y = -6$$

$$y = -2$$

The answer is the ordered pair (1, -2). If you chose to get rid of the x's first, you would have gotten the same answer.

The other method used to solve systems of equations is SUBSTITUTION. The strategy is to solve one of the equations in terms of the other, substitute that into the OTHER equation and solve the resulting equation, then play Mr. Plug-in as in the last problem.

The algorithm for SUBSTITUTION

1. Solve one of the equations for one of the variables.
2. Substitute that expression in the OTHER equation.
3. Solve the resulting equation.
4. Plug that value into either of the original equations to find the other variable.

Let's redo the first example using this method.

EXAMPLE: $3x + 10y = 2$
 $x - 2y = 6$

First, determine which equation has the easiest variable to solve for, x and the second equation is cake.

$$3x + 10y = 2$$

$$x - 2y = 6, \quad \text{solving for x, } x = 6 + 2y$$

Everywhere you see an x in the OTHER equation, substitute $6 + 2y$. The other equation is:

$3x + 10y = 2$	Substitute $6 + 2y$
$3(6 + 2y) + 10y = 2$	Simplify
$18 + 6y + 10y = 2$	
$18 + 16y = 2$	
$16y = -16$	
$y = -1$	Solve

Plug that back into either of the original equations, you find $x = 4$. JUST LIKE BEFORE.

Generally I'll use LINEAR COMBINATIONS to solve systems of equations. I only consider SUBSTITUTION when one of the coefficients of one of the variables is 1, as in the first example. When the coefficients are not 1, as in example 2, I'll use linear combination.

Try this one both ways: $2x + y = 11$
 $3x - 2y = -1$

Solution (3, 5)