Solving Systems by Elimination

If we have a system of equations and both equations are in $y = mx + b$ like: $y = \frac{2}{3}x + 4$, $y = -4x - 3$

We should solve the system by using the _____ method!!

If we have a system of equations and one equation is solved for a variable like: $y = -4x$, $2y + 5x = -3$

We should solve the system by using the _____ method!!

However if we have a system of equations that looks like: $3x - 5y = 8$, $2x + 5y = -3$

We should solve the system by using the _____ method!!

With the Elimination Method we **ELIMINATE** one of the variables in order to have an equation with only one variable.

To see the process of Elimination in action, let's look at an equation with one variable and circle each time it happens.

$$3(x - 4) = 2x - 7$$

Notice both times we eliminate (cross out) a term the coefficients/numbers are:

_____ in terms of **NUMBER**

_____ in terms of **SIGN**

Ok so here we go....

1. Eliminate $6x-5y=-9$ $2x+5y=17$	Solve for other variable	Check
2. $7x+2y=17$ $-7x+y=-16$	Solve for other variable	Check on Calculator

Check this Out:

$$2x+8=20 \qquad -3(2x+8)=-3(20) \qquad \frac{2x+8}{2}=\frac{20}{2}$$

What does x equal in each equation? Why is this true?

3. Eliminate	Solve for the other Variable
$6x-3y=3$ $6x-5y=-3$	
4. $5x + y = 9$ $10x-7y=-18$	
5. Test Worthy Question $2x+3y=3$ $5x-2y=17$	

Solving Systems by Elimination

If we have a system of equations and both equations are in $y = mx + b$ like: $y = \frac{2}{3}x + 4$, $y = -4x - 3$

We should solve the system by using the graphing method!!

If we have a system of equations and one equation is solved for a variable like: $y = -4x$, $2y + 5x = -3$

We should solve the system by using the Substition method!!

However if we have a system of equations that looks like: $3x - 5y = 8$, $2x + 5y = -3$

We should solve the system by using the Elimation method!!

With the Elimination Method we **ELIMINATE** one of the variables in order to have an equation with only one variable.

To see the process of Elimination in action, let's look at an equation with one variable and circle each time it happens.

$3(x - 4) = 2x - 7$

$3x - 12 = 2x - 7$

$-2x \quad\quad -2x$

$x - 12 = -7$

$+12 \quad\quad +12$

$x = 5$

Notice both times we eliminate (cross out) a term the coefficients/numbers are:

Same in terms of **NUMBER**

Opposite in terms of **SIGN**

Ok so here we go....

(1, 3)

1. Eliminate	Solve for other variable	Check
$6x-5y=-9$ $2x+5y=17$ $8x = 8$ $\frac{8x}{8} = \frac{8}{8}$ $x = 1$	$6x-5y=-9$ $6(1)-5y=-9$ $6-5y=-9$ $-6 \quad -6$ $-5y=-15$ $\frac{-5y}{-5} = \frac{-15}{-5}$ $y=3$	$6x-5y=-9$ $6(1)-5(3)=-9$ $6-15=-9$ $-9=-9$ ✓ $2x+5y=17$ $2(1)+5(3)=17$ $2+15=17$ $17=17$ ✓
2.	Solve for other variable	Check on Calculator
$7x+2y=17$ $-7x+y=-16$ $3y = 1$ $\frac{3y}{3} = \frac{1}{3}$ $y = \frac{1}{3}$	$7x+2y=17$ $7x+2(\frac{1}{3})=17$ $7x+\frac{2}{3}=17$ $-\frac{2}{3} \quad -\frac{2}{3}$ $7x = 16\frac{1}{3}$ $\frac{7x}{7} = \frac{16\frac{1}{3}}{7}$ $x = 2\frac{1}{3}$	$(2\frac{1}{3}, \frac{1}{3})$

Check this Out:

$$2x+8=20 \qquad -3(2x+8)=-3(20) \qquad \frac{2x+8}{2}=\frac{20}{2}$$

What does x equal in each equation? Why is this true?

$x=6$ in every equation.

Each starts out with $2x+8$ on left $= 20$ on right. The second 2 equations do the same thing to both sides so the value for x doesn't change.

3. Eliminate

$6x-3y=3$

$-1\cdot(6x-5y=-3)$

$6x - 3y = 3$

$-6x + 5y = 3$

$\frac{2y}{2} = \frac{6}{2}$

$y = 3$

$(2, 3)$

Solve for the other Variable

$6x - 3y = 3$

$6x - 3(3) = 3$

$6x - 9 = 3$

$+9 \quad +9$

$\frac{6x}{6} = \frac{12}{6}$

$x = 2$

4.

$7\cdot(5x + y = 9)$

$10x-7y=-18$

$35x + 7y = 63$

$10x - 7y = -18$

$\frac{45x}{45} = \frac{45}{45}$

$x = 1$

$(1, 4)$

$5x + y = 9$

$5(1) + y = 9$

$5 + y = 9$

$-5 \quad -5$

$y = 4$

5. Test Worthy Question

$5(2x+3y=3)$

$-2(5x-2y=17)$

$10x + 15y = 15$

$-10x + 4y = -34$

$\frac{19y}{19} = \frac{-19}{19}$

$y = -1$

$(3, -1)$

$2x + 3y = 3$

$2x + 3(-1) = 3$

$2x + -3 = 3$

$+3 \quad +3$

$\frac{2x}{2} = \frac{6}{2}$

$x = 3$