

FYI

ELIMINATION METHOD – PART I: You have learned to solve systems of equations by two methods, visually by **graphing** and algebraically by **substitution**. There is another algebraic method that can take advantage of the “cardinal rule” of solving equations, that is “**ALWAYS DO THE SAME THING TO BOTH SIDES**” of an equation. It is called the **ELIMINATION METHOD**.

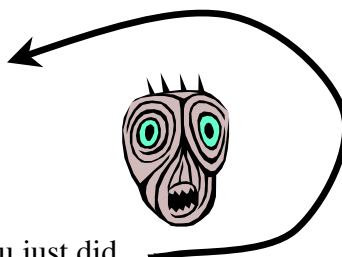
In equations, as in life (cuz after all, math is life!), the fewer the variables the easier things are to solve. When you have a pair of two-variable equations, you can **ELIMINATE** one of the variables to obtain one single-variable equation. One way to do this is to **ADD** the equations together, as shown below:

Solve the system:

$$\begin{array}{r} 2x + y = 5 \\ x - y = 1 \end{array}$$

To eliminate the **y** terms, simply **ADD** the two equations:

$$\begin{array}{r} 2x + y = 5 \\ x - y = 1 \\ \hline 3x = 6 \\ x = 2 \end{array}$$

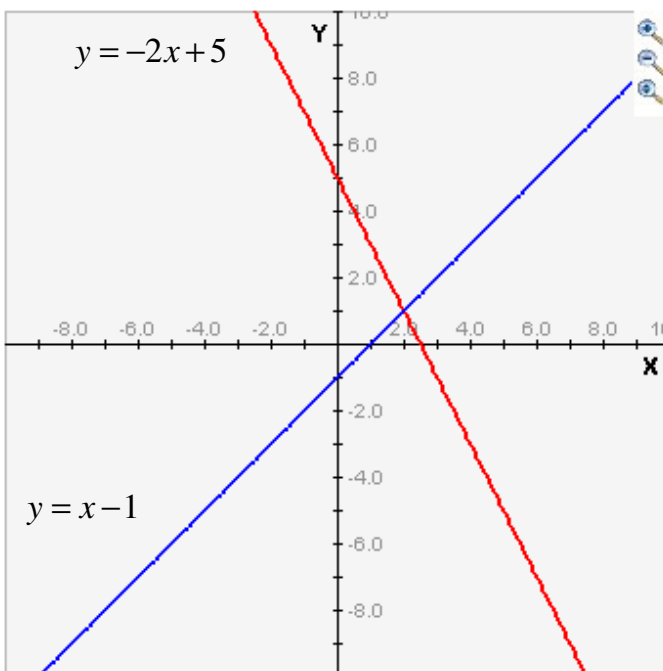


Take a **good, hard look** at what you just did. Since each side, “ $x - y$ ” and “1”, are equal, they are **interchangeable** with one another. In effect, you added the **SAME THING** to both sides of the equation $2x + y = 5$, and obtained the result of $3x = 6$, (or after solving), $x = 2$.

Just as with the **SUBSTITUTION METHOD**, simply substitute the x -value back into either (or both) of the original equations to get the y -value.

$$\begin{array}{r} (2) - y = 1 \\ -y = -1 \\ y = 1 \end{array}$$

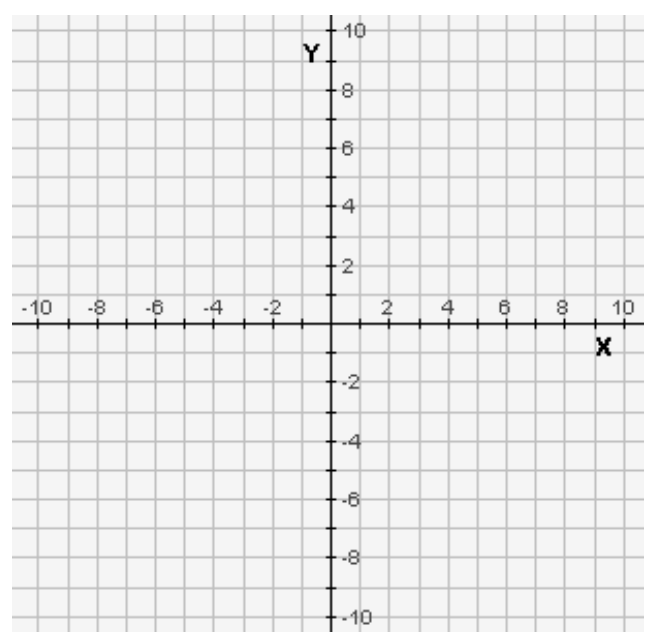
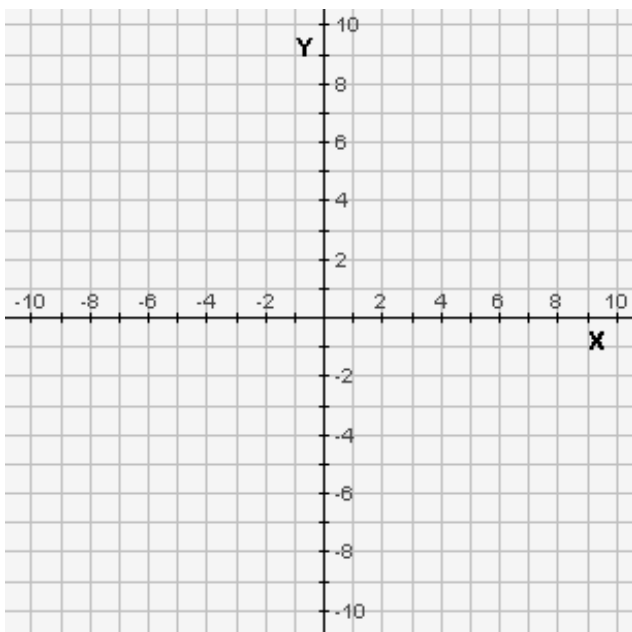
Solution (2, 1)



1. Solve the following pairs of equations using the **ELIMINATION** method. Check your solutions using both of the original equations and by graphing.

a)
$$4x + 2y = 14$$
$$x - 2y = 1$$

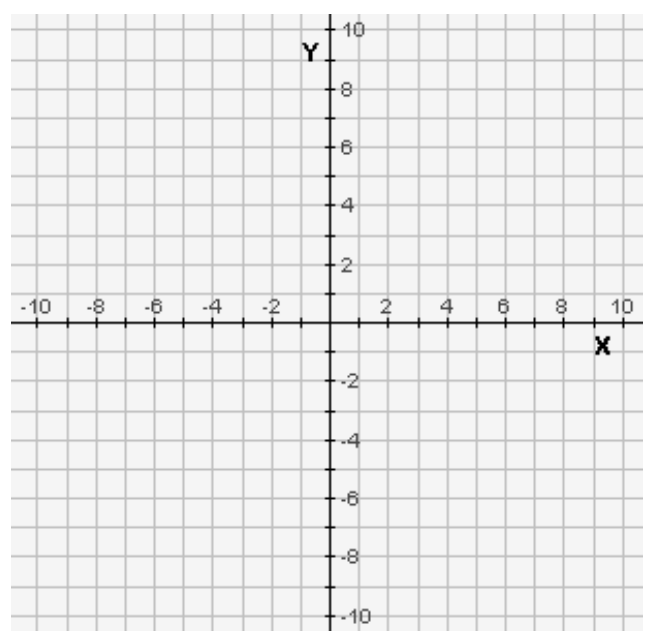
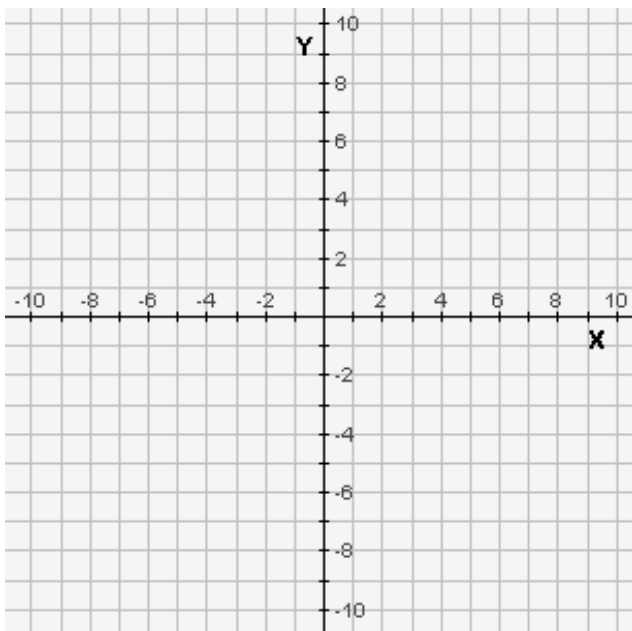
b)
$$x + 3y = 13$$
$$-x + 2y = 2$$



2. Solve the following pairs of equations using the **ELIMINATION** method. Check your solutions using both of the original equations and by graphing.
SPECIAL TIP: If you can **ADD** equations to each other, you can also **SUBTRACT** one from the other. This may help you with b) below!

a) $5x + 3y = 25$
 $7x - 3y = -1$

b) $5x + y = 20$
 $2x + y = 8$



FYI

ELIMINATION METHOD – PART II:

Suppose you want to solve this system of equations:

$$3x + 2y = 11$$

$$2x - 5y = 20$$

Hmmm.... adding or subtracting won't eliminate either variable.
So what is an algebra-tician to do??

Remember folks, you can always keep an equation in balance by...

DOING THE SAME THING TO BOTH SIDES. So what if you multiply both sides of the top equation by 5 and multiply both sides of the bottom equation by 2?

Do the new equations get you anywhere?

$$15x + 10y = 55$$

$$4x - 10y = 40$$

YUP! Now we can simply add the equations together as follows:

$$15x + 10y = 55$$

$$4x - 10y = 40$$

$$\hline 19x = 95$$

$$x = 5$$



Once again, take a good, hard look at what you just did (above). At first, you didn't seem to have anything to work with. Then, you "flexed" your algebra muscle and transformed both equations by multiplying both sides of each equation by a given factor. You were up to the task because of your knowledge of common factors and multiples (keep workin' those diamond problems!).

Don't stop now! Substitute the x -value back into the original equations to obtain the corresponding y -value!

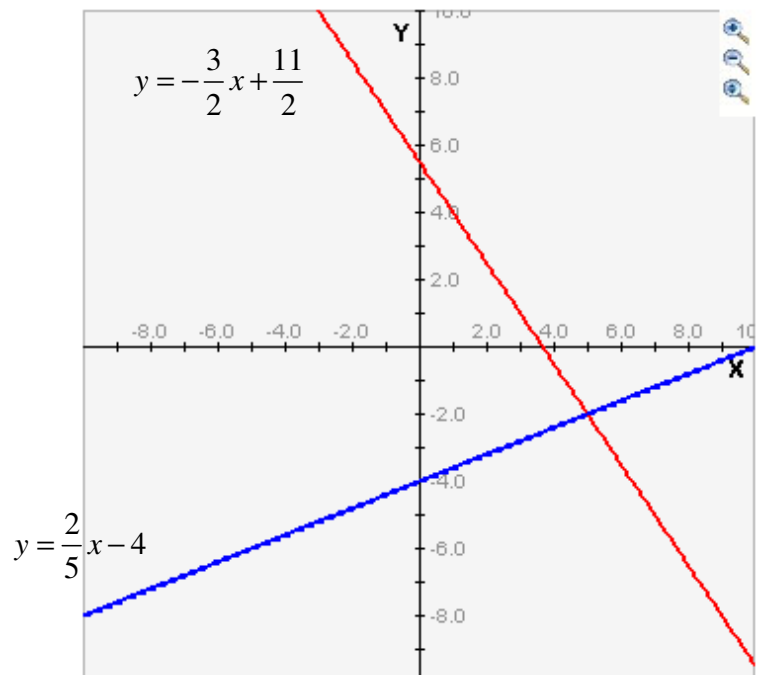
$$3(5) + 2y = 11$$

$$15 + 2y = 11$$

$$2y = -4$$

$$y = -2$$

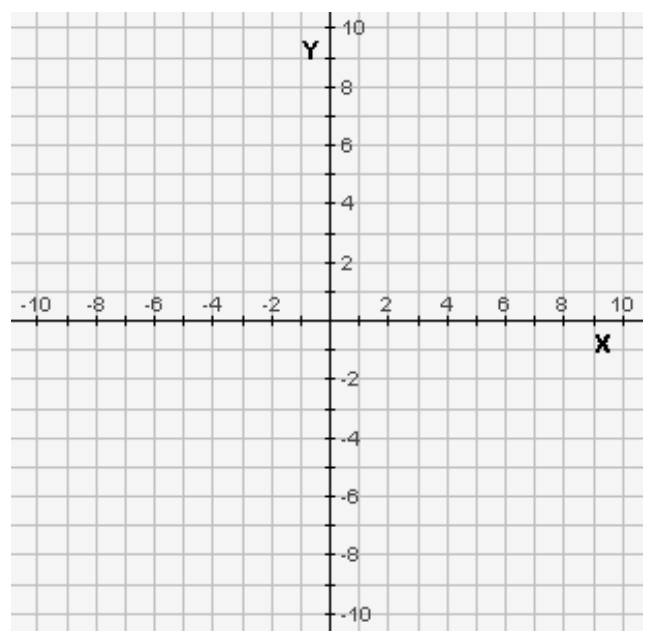
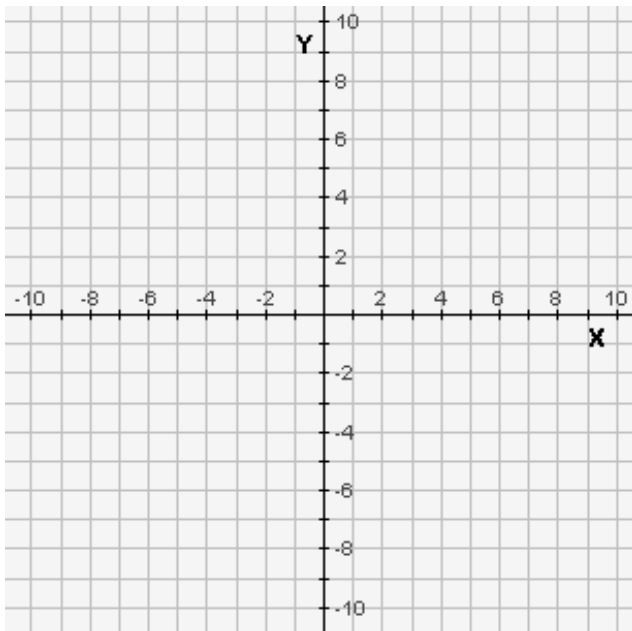
Solution (5, -2)



3. Solve the following systems using the **ELIMINATION** method. Then, graph the systems below to check your algebraic solution.

a)
$$\begin{aligned} 2x + 3y &= -1 \\ 5x - 2y &= -12 \end{aligned}$$

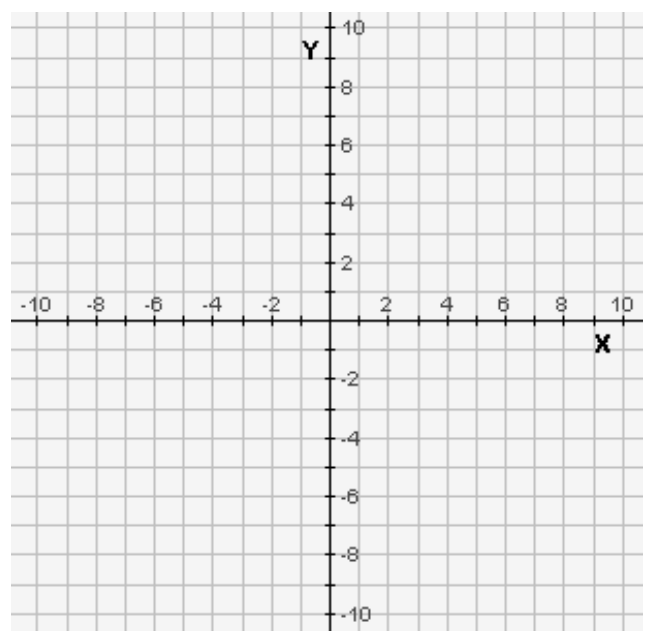
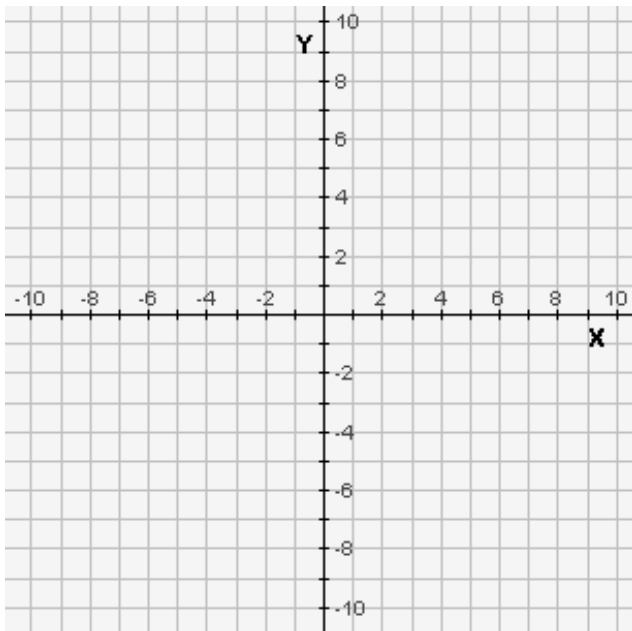
b)
$$\begin{aligned} 2x + 3y &= 17 \\ x + 3y &= 16 \end{aligned}$$



4. Solve the following systems using the **ELIMINATION** method. Then, graph the systems below to check your algebraic solution.

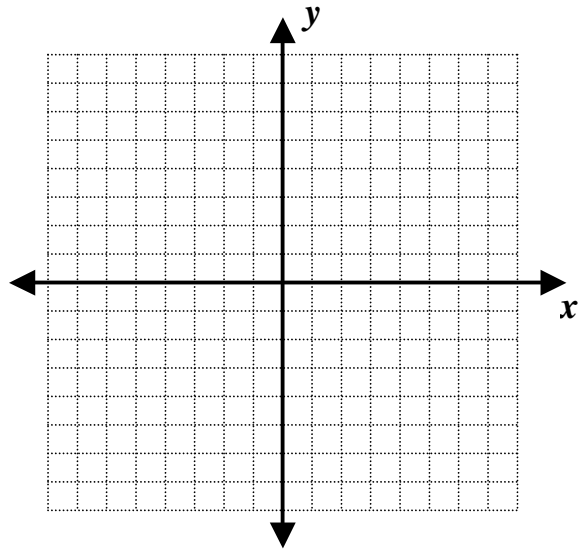
a) $9x - 5y = 4$
 $3x + 2y = 5$

b) $7x + 15y = 32$
 $x - 3y = 20$



Write an equation in **slope-intercept form** for a line passing through the given points. Graph the line.

5. $(-6, -2), (2, -3)$



6. Convert the equation above to standard form.

7. **Estimate** or provide a precise answer (no calculator – show work or explain the estimate):

a) Eighteen is what percent of 25?

b) Eighteen percent of 25 is what?

c) Twenty-five is what percent of 18?

8. Write the equations of the horizontal and vertical lines passing through the point $(6, -4)$.

9. Solve each of the following diamond problems:

