

### Solving Linear Systems by Elimination Method

Sometimes the Substitution Method is awkward or tedious. Another way to solve systems of equations is to eliminate one variable. This is known as the **ELIMINATION METHOD**. *Look for MATCHES*

$$\begin{array}{r} 1. \quad 2x + 3y = 8 \\ 5x - 3y = -1 \\ \hline 7x = 7 \\ \frac{7x}{7} = \frac{7}{7} \\ x = 1 \end{array}$$

$$\begin{array}{r} 2(1) + 3y = 8 \\ 2 + 3y = 8 \\ -2 \quad -2 \\ 3y = 6 \\ \frac{3y}{3} = \frac{6}{3} \\ y = 2 \end{array}$$

The point of intersection is  $(1, 2)$ .

$$\begin{array}{r} 2. \quad (5x + 2y = 6) \times 2 \Rightarrow 10x + 4y = 12 \\ -3x - 4y = 2 \\ \hline 7x = 14 \\ \frac{7x}{7} = \frac{14}{7} \\ x = 2 \end{array}$$

$$\begin{array}{r} 5(2) + 2y = 6 \\ 10 + 2y = 6 \\ -10 \quad -10 \\ 2y = -4 \\ \frac{2y}{2} = \frac{-4}{2} \\ y = -2 \end{array}$$

The point of intersection is  $(2, -2)$

- Look for Opposite coefficients of either x or y.  $\begin{matrix} -2 & \rightarrow 2 \\ 5 & \rightarrow -5 \end{matrix}$   
(You may need to multiply one or both equations!)
- Add the equations together.  
This should **ELIMINATE** one variable... if not, check your work!
- Solve for the remaining variable.
- Remember that the solution must be a point  $(x, y)$ .
- Substitute this value into one of the original equations.
- Solve for the remaining variable.
- Write your solution as a point.

$$\begin{array}{r} 3. \quad (3x + 6y = 12) \times 4 \Rightarrow 12x + 24y = 48 \\ 4x + 7y = 11 \times 3 \Rightarrow -12x - 21y = -33 \\ \hline \text{Least Common Multiple of } 3 \text{ & } 4? \\ 12 \\ 3y = 15 \\ \frac{3y}{3} = \frac{15}{3} \\ y = 5 \end{array}$$

$$\begin{array}{r} 3x + 6(5) = 12 \\ 3x + 30 = 12 \\ -30 \quad -30 \\ 3x = -18 \\ \frac{3x}{3} = \frac{-18}{3} \\ x = -6 \end{array}$$

The point of intersection is  $(-6, 5)$ .

→ The solution to a system of equations is the point of intersection of the graphs.