

Solving a System Algebraically by **Elimination** (Tougher)

ex) $2x + 3y = 6$
 $-2(x + 4y = 8)$

$$\begin{array}{r} 2x + 3y = 6 \\ -2x - 8y = -16 \\ \hline -5y = -10 \\ \frac{-5}{-5} \quad \frac{-10}{-5} \\ y = 2 \end{array}$$

If there is no matching pair you must multiply one equation by a number to make one pair the same.

Still need **opposite sign!

$$\begin{array}{l} x + 4(2) = 8 \\ x + 8 = 8 \\ x = 0 \\ (0, 2) \end{array}$$

ex) $5x - 9y = -3$
 $-3(4x - 3y = 6)$

$$\begin{array}{r} 5x - 9y = -3 \\ -12x + 9y = -18 \\ \hline -7x = -21 \\ \frac{-7}{-7} \quad \frac{-21}{-7} \\ x = 3 \end{array}$$

$$\begin{array}{l} 5(3) - 9y = -3 \\ 15 - 9y = -3 \\ -9y = -18 \\ y = 2 \\ (3, 2) \end{array}$$

ex) $3x + 2y = 4$
 $2(x - y = 3)$

$$\begin{array}{r} 3x + 2y = 4 \\ 2x - 2y = 6 \\ \hline 5x = 10 \\ x = 2 \end{array}$$

$$\begin{array}{l} (2) -y = 3 \\ -y = 1 \\ y = -1 \\ (2, -1) \end{array}$$

$$\text{ex) } \begin{cases} 3(2x + 5y = 11) \\ 2(-3x + 8y = -1) \end{cases}$$

$$\begin{array}{r} \cancel{6x} + 15y = 33 \\ -\cancel{6x} + 16y = -2 \\ \hline 31y = 31 \\ y = 1 \end{array}$$

If one equation can not be multiplied to make a matching pair you must multiply both equations by different numbers to create a pair that is the same.

$$\begin{aligned} 2x + 5(1) &= 11 \\ 2x + 5 &= 11 \\ 2x &= 6 \\ x &= 3 \end{aligned} \quad (3, 1)$$

$$\text{ex) } \begin{cases} 4(7x - 3y = 2) \\ 3(5x + 4y = -17) \end{cases}$$

$$\begin{array}{r} 28x - \cancel{12y} = 8 \\ 15x + \cancel{12y} = -51 \\ \hline 43x = -43 \\ x = -1 \end{array}$$

$$\begin{aligned} 7(-1) - 3y &= 2 \\ -7 - 3y &= 2 \\ -3y &= 9 \\ y &= -3 \end{aligned} \quad (-1, -3)$$