

Sec 7-3: Solving systems of equations using ELIMINATION

Solving by elimination may involve:

- Just adding or subtracting the two equations
- Multiplying one of the equations by a constant then adding or subtracting.
- Multiplying both equations by a constant then adding or subtracting.

Would either variable be eliminated if you either added or subtracted the two equations?

$$\begin{array}{l} 3(4x + y = 33) \\ 5x - 3y = 37 \end{array}$$

Sometimes you need to multiply one of the equations by a constant in order to be able to cancel one of the variables.

$$\begin{array}{r} 12x + 3y = 99 \\ + 5x - 3y = 37 \\ \hline 17x = 136 \end{array} \quad (8, 1)$$

$$x = 8 \rightarrow y = 1$$

Solve using Elimination.

$$10m - 7n = -24$$

$$\begin{array}{r} 5(2m - 8n = -18) \\ 10m - 7n = -24 \\ -10m - 40n = -90 \\ \hline 33n = 66 \\ 33 \overline{) 66} \\ 33 \overline{) 33} \\ \hline n = 2 \end{array}$$

$$\begin{array}{r} 10m - 7(2) = -24 \\ 10m - 14 = -24 \\ 10m = -10 \\ \hline 10 \overline{) -10} \\ m = -1 \end{array}$$

Solve using Elimination.

$$\begin{array}{l} 2 \cdot (5x + 6y = 75) \\ 3 \cdot (3x - 4y = -31) \end{array}$$

Sometimes you need to multiply BOTH equations by a constant before you can eliminate one of the variables.

$$\begin{array}{r} 10x + 12y = 150 \\ + 9x - 12y = -93 \\ \hline 19x = 57 \\ \hline 19 \overline{) 57} \\ x = 3 \end{array}$$

$$\begin{array}{r} 5(3) + 6y = 75 \\ 15 + 6y = 75 \\ \hline 6y = 60 \\ \hline 6 \overline{) 60} \\ y = 10 \end{array}$$

Solve using Elimination.

$$\begin{array}{l} 15 + 16 \checkmark \\ 3 \left\{ \begin{array}{l} 15x - 8y = 31 \\ 10x + 6y = -2 \end{array} \right. \\ 4 \left\{ \begin{array}{l} 10x + 6y = -2 \\ 10 - 12 \end{array} \right. \end{array}$$

$$4 \begin{array}{r} 15x - 8y = 93 \\ 10x + 6y = -8 \end{array}$$

$$+ \begin{array}{r} 10x + 6y = -8 \\ 10x + 6y = -8 \end{array}$$

$$\hline 85x = 85$$

$$\frac{85x}{85} = \frac{85}{85}$$

$$x = 1$$

$$(1, -2)$$

$$10(1) + 6y = -2$$

$$10 + 6y = -2$$

$$-10 \quad -10$$

$$\frac{6y}{6} = \frac{-12}{6}$$

$$y = -2$$