

Content and Language Objective:

Students will develop their understanding of finding solutions for systems equations using a method other than graphing and be able to explain in their own words why the process is more accurate than graphing.

Mr. Orr

Title: Solving Systems of Equations Using Substitution

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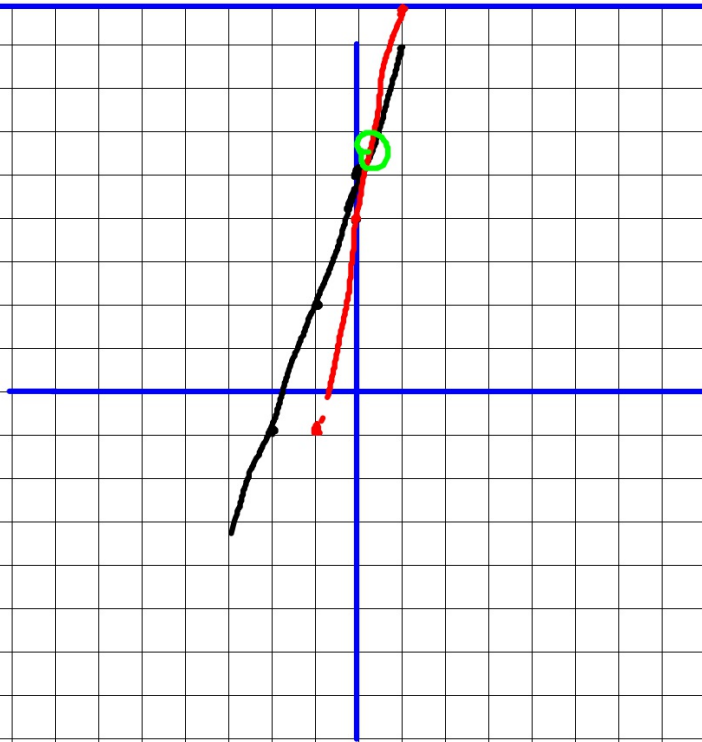
Warm - Up

1. $\frac{x}{11} = \frac{3}{5}$ $\frac{5x}{5} = \frac{33}{5} = \boxed{33/5 = x}$

2. Convert from point-slope form to y-intercept form. $y = 5 + 4(x - 3)$
 $y = 5 + 4x - 12$
 $y = 4x - 7$

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$$y = 3x + 5$$

$$y = 5x + 4$$

slope

y-intercept

What do you notice about your graphs? It can be difficult to ID the intercept of these two lines

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Sometimes when we are graphing systems of equations we find it difficult to find the solution because it doesn't give us an exact point of intersection like we saw in the graph we just worked with.

Substitution is another method we can use to find our solutions.

In order to use substitution at least one of your equations has to have a variable isolated.

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In the following equations both equations have the variable y isolated, so we can use substitution

$$\begin{array}{r} 7x - 5 = 5x + 3 \\ -5x \quad -5x \end{array}$$

$$\begin{array}{r} 2x - 5 = 3 \\ +5 \quad +5 \end{array}$$

$$\begin{array}{r} 2x = 8 \\ \frac{2x}{2} = \frac{8}{2} \\ x = 4 \end{array}$$

$$\begin{array}{l} y = 5x + 3 \\ y = 7x - 5 \end{array}$$

$$5 \cdot 4 + 3 = 20 + 3 = 23$$

$$7 \cdot 4 - 5 = 28 - 5 = 23$$

Intercept is where
 $x = 4$.

$$(4, 23)$$

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Let's use substitution to solve the equation we saw earlier with our graph.

$$\begin{array}{r} 5x + 4 = 3x + 5 \\ -3x \quad -3x \end{array}$$

$$\begin{array}{r} 2x + 4 = 5 \\ -4 \quad -4 \end{array}$$

$$\frac{2x}{2} = \frac{1}{2}$$

$$\underline{x = \frac{1}{2}}$$

$$\begin{array}{l} y = 3x + 5 \\ y = 5x + 4 \end{array}$$

$$3 \cdot \frac{1}{2} + 5 = \frac{3}{2} + 5 = \frac{3}{2} + \frac{10}{2} = \frac{13}{2}$$

$$5 \cdot \frac{1}{2} + 4 = \frac{5}{2} + \frac{8}{2} = \frac{13}{2}$$

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Try it on your own.

$(2, 19)$

$$\begin{array}{r} y = 6x + 7 \\ y = 5x + 9 \\ \hline 6x + 7 = 5x + 9 \\ -5x \quad -5x \\ \hline 1x + 7 = 9 \\ -7 \quad -7 \\ \hline 1x = 2 \\ \hline x = 2 \end{array}$$

$$\begin{array}{l} y = 6(2) + 7 \\ y = 12 + 7 \\ y = 19 \end{array}$$

$$\begin{array}{l} y = 5(2) + 9 \\ y = 10 + 9 \\ y = 19 \end{array}$$

