

CH.5, L3 – SOLVING SYSTEMS OF EQUATIONS WITH SUBSTITUTION

Objective: Given a system of equations, I will solve the system using substitution

Think About It: Martha is trying to solve the system of equations without graphing the system. She reasons that because $y = 2x$, she can substitute $2x$ into the second equation for y since they equal each other. This would create an equation with only one variable which Martha thinks she can solve.

$$\begin{cases} y = 2x \\ 4x = y + 8 \end{cases}$$

If this plan is valid for solving, solve the system by completing her steps and explaining any additional steps needed. If this plan is not valid, explain why and describe another method (besides graphing) that could be used to solve.

Key Point #1:

The _____ of a _____ in one equation can be _____ into another to make the equation a _____.

Keyword(s): *substitution*

Big Idea:

CFS:

1. System is solved with substitution
2. All steps are shown
3. Solution is written as an order pair (x, y)
4. Solution is checked

Interaction with New Material:

Ex. 1) Given the functions $f(x) = 10x + 7$ and $g(x) = 7x - 2$, determine the point where $f(x) = g(x)$.

Check:

$$f(x) = 10x + 7$$

$$g(x) = 7x - 2$$

Ex. 2) What is the solution to the system of equations?

$$\begin{cases} 3x - 4y = 2 \\ x = 3y + 1 \end{cases}$$

Check:

$$3x - 4y = 2$$

$$x = 3y + 1$$

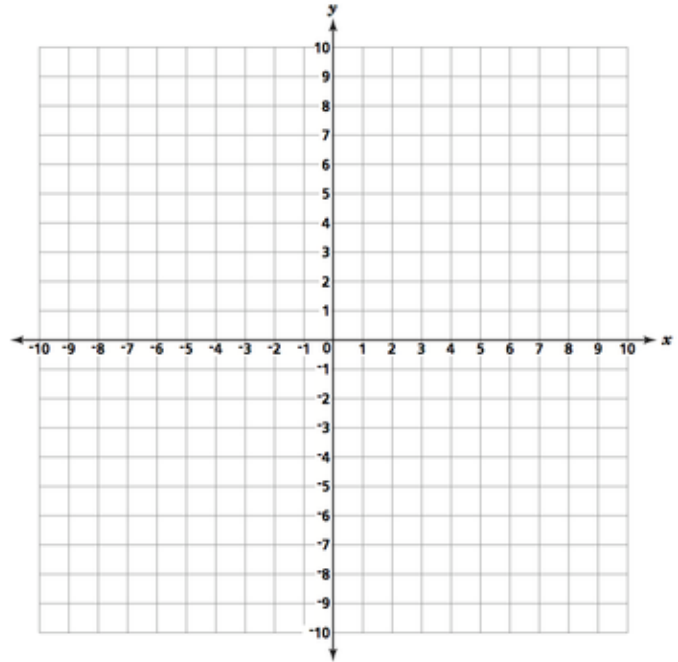
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Partner Practice:

1. Solve the system of equations using substitution and check your solution is correct by graphing the system **and** substituting your solution back into each equation.

$$\begin{cases} y = -4x + 6 \\ y = 3x - 8 \end{cases}$$

**Check:**

$$y = -4x + 6$$

$$y = 3x - 8$$

2. Determine the point where $g(x) = h(x)$ if $g(x) = 2x - 4$ and $h(x) = -x + 2$.

Check:

$$g(x) = 2x - 4$$

$$h(x) = -x + 2$$

CFS:

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3. Solve the system of two linear equations below algebraically using substitution.

$$4x + 6y = -22$$

$$y = 1 - 3x$$

Check:

$$4x + 6y = -22$$

$$y = 1 - 3x$$

4. SAT Problem!

$$x = y - 3$$

$$\frac{x}{2} + 2y = 6$$

Which ordered pair (x, y) satisfies the system of equations shown above?

- A) $(-3, 0)$
- B) $(0, 3)$
- C) $(6, -3)$
- D) $(36, -6)$

Check:

$$x = y - 3$$

$$\frac{x}{2} + 2y = 6$$

CFS:

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5. Solve the system of equations using substitution. Your solution should be an exact answer with a corresponding check.

$$y = \frac{1}{2}x + 3$$

$$2y = -5x - 18$$

Check:

$$y = \frac{1}{2}x + 3$$

$$2y = -5x - 18$$

6. Regent Problem!

Which system of equations has the same solution as the system below?

$$2x + 2y = 16$$

$$3x - y = 4$$

1 $2x + 2y = 16$

$$6x - 2y = 4$$

2 $2x + 2y = 16$

$$6x - 2y = 8$$

3 $x + y = 16$

$$3x - y = 4$$

4 $6x + 6y = 48$

$$6x + 2y = 8$$

CFS:

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7. Given the system of equations below, find the value of y when the x -component of the solution is tripled.

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

Check:

$$3x + 2y = 1$$

$$x - 5y = 6$$

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