CH.5, L8 – ALGEBRAICALLY DETERMINING THE NUMBER OF SOLUTIONS

Objective: Given a system of equations, SWBAT determine if the system has one, no, or an infinite number of solutions algebraically

Think About It: Three systems of equations have been graphed below. Determine the number of solutions to the system and solve the systems algebraically using either substitution or elimination.

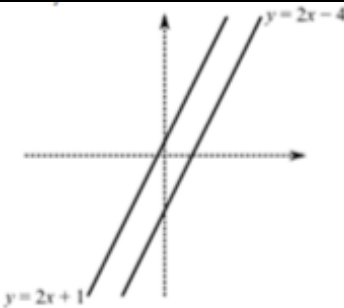|	System 1	System 2	System 3
Equations	$\begin{cases} y = x + 2 \\ y = -x + 4 \end{cases}$	$\begin{cases} y = \dfrac{2}{3}x + 1 \\ y = \dfrac{2}{3}x - 1 \end{cases}$	$\begin{cases} 2x - 3y = -3 \\ 4x - 6y = -6 \end{cases}$
Graphically			
Algebraically			

Big Idea:

1. Most efficient method to solve system is identified
2. All steps are shown
3. Number of solutions is determined and justified

Partner Practice:

1. Given the different graphs and work shown below, determine the number of solutions each situation will have.

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a)

$y = 3x + 1 \quad 4y = 12x + 3$

$4y = 12x + 3$

$4(3x + 1) = 12x + 3$

$12x + 4 = 12x + 3$

$\underline{-12x \qquad = -12x}$

$4 = 3$

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b)

$y = 5x - 1 \quad 2y = 3x + 12$

$2y = 3x + 12$

$2(5x - 1) = 3x + 12$

$10x - 2 = 3x + 12$

$\underline{-3x \qquad -3x}$

$7x - 2 = 12$

$\underline{+2 \quad +2}$

$7x = 14$

$\frac{7x}{7} = \frac{14}{7}$

$x = 2$

$y = 5x - 1$

$y = 5(2) - 1$

$y = 9$

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c)

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d)

$y = 2x - 4$

$y = 2x + 1$

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2. How many solutions does the following system of equations have? Solve the system to prove your answer.

$$\begin{cases} y = 2x + 3 \\ -4x + 2y = 6 \end{cases}$$

Method: _____

1. Most efficient method to solve system is identified
2. All steps are shown
3. Number of solutions is determined and justified

3. How many solutions will there be to the following system of equations? Explain your answer.

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

Method: _____

4. How many solutions does the following system of equations have? Explain your answer and prove it is correct by solving the system.

$$\begin{cases} y = -2x + 4 \\ 3y + 6x = 12 \end{cases}$$

Method: _____

CFS: 3
1. Most efficient method to solve system is identified
2. All steps are shown
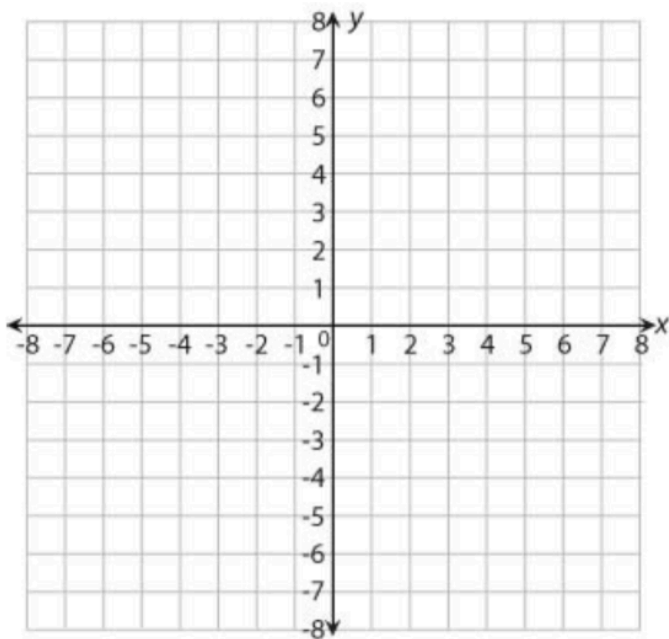3. Number of solutions is determined and justified

5. What value of b will result in the system having no solution? Solve your system to prove your answer is correct.

$$\begin{cases} 6x - 4y = 24 \\ y = -b(x + 1) \end{cases}$$

Method: _____

6. Does the line that passes through the points (0,1) and (2,3) intersect the line that passes through the points (2,5) and (-2,1)? Explain.

Method: _____

CFS: 4
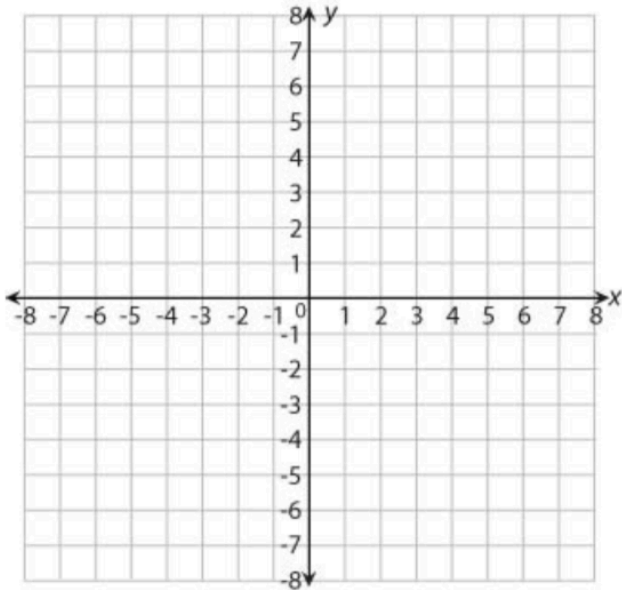1. Most efficient method to solve system is identified
2. All steps are shown
3. Number of solutions is determined and justified

7. Consider the following two lines. Will they ever intersect? Explain how you know.

   Line A: passes through the points (2,5) and (7,11)
   Line B: passes through the points (0,0) and (7,9)

Method: _____

8. Two equations form a system of linear equations. The first equation in the system is defined as $2x + 3y = 3$. The second equation in the system, when graphed, will pass through the points (3, -4) and (-6, 2). Determine the number of solutions the system has.   If there is one solution, calculate and check it.

Method: _____
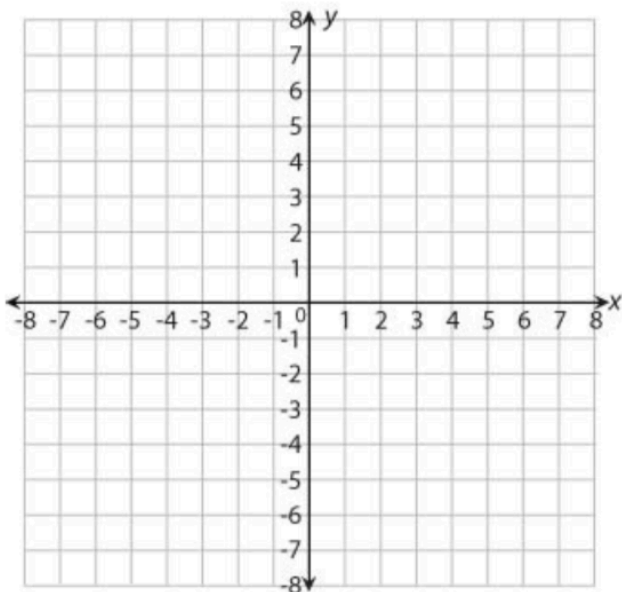
CFS: 5
1. Most efficient method to solve system is identified
2. All steps are shown
3. Number of solutions is determined and justified

9. Write a system of equations not in slope-intercept form that will have an infinite number of solutions and explain what you could do to the system to change the number of solutions to be zero.

Method: _____

CFS:
1. Most efficient method to solve system is identified
2. All steps are shown
3. Number of solutions is determined and justified