LESSON 19

Graphing to Solve Systems of Equations

LEARNING OBJECTIVES

- Today I am: writing systems of equations.
- So that I can: model real-life situations.
- I'll know I have it when I can: determine which system of equations fits a given word problem.

Opening Exercise—Identifying the Correct System

1. For the situation below, determine which system of equations fits the scenario.

> Elise is four years older than Megan. If the sum of their ages is 16, how old are Elise and Megan?
>
> Let e = the age of Elise Let m = the age of Megan

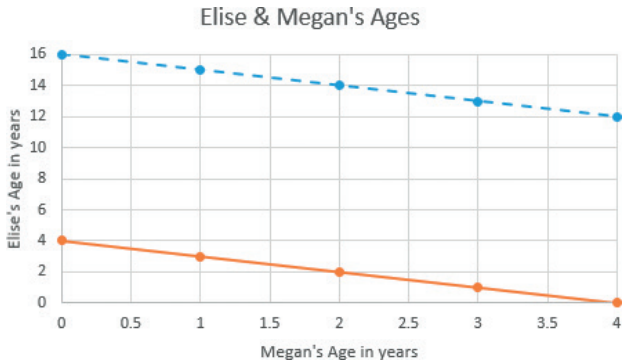
A. $e + m = 16$
$e + 4 = m$

B. $e + m = 16$
$e = 4 + m$

C. $e + m = 16$
$e + m = 4$

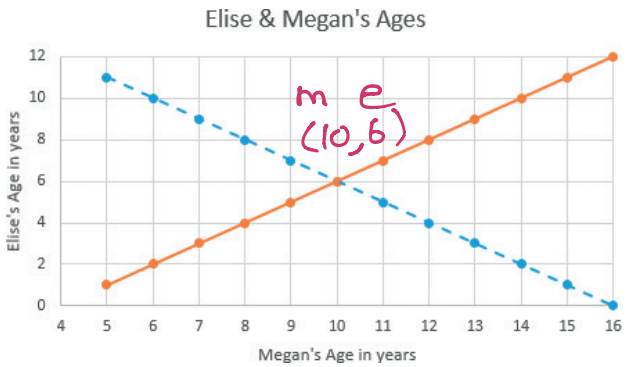
2. The graphs for the systems in Parts A, B and C of Exercise 1 are shown below, but are not in order. Match the correct graph to each system.

i.



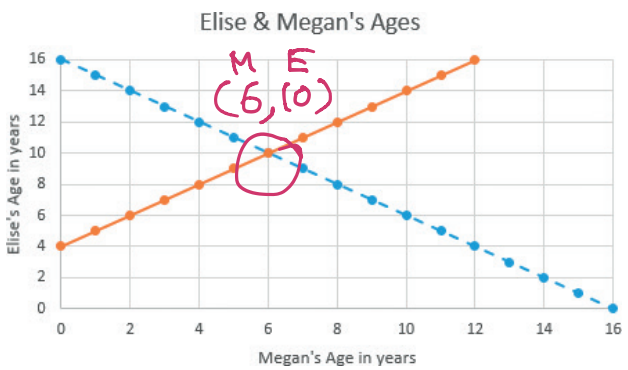
C

ii.



A

iii.



B

3. What are the ages of Elise and Megan?

Megan → 6 years old

Elise → 10 years old

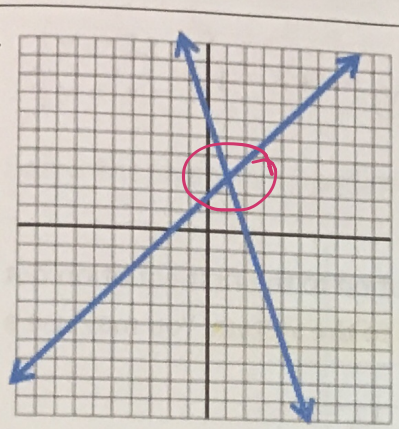
Graph Match Game

You will need: Systems of Equations cards

Direction:

- With your partner, sort the Systems of Equations cards and match up the sets.
- Each set contains one graph, two equations making up the system of equations, and one solution.
- Record your answers in the spaces below.

4.



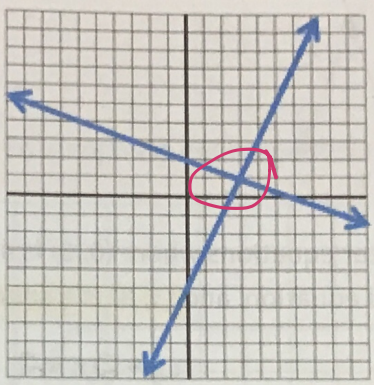
System of Equations:

$y = x + 2$

$y = -3x + 6$

Solution: (1 , 3)

5.



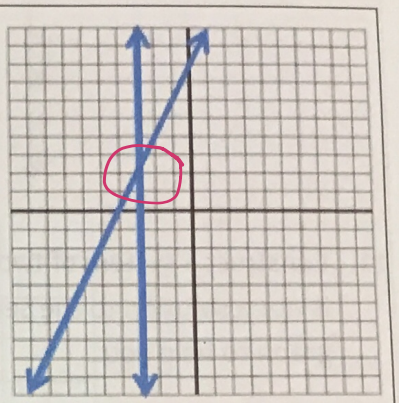
System of Equations:

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

$y = 2x - 5$

Solution: (3 , 1)

6.



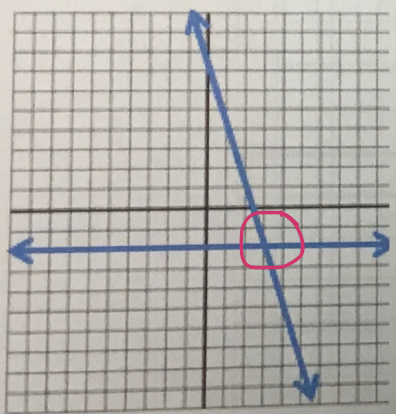
System of Equations:

$x = -3$

$y = 2x + 8$

Solution: (-3 , 2)

7.



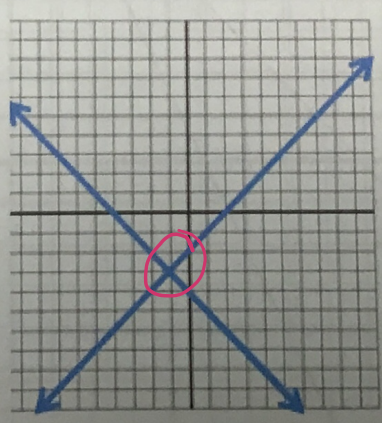
System of Equations:

$y = -2$

$y = -3x + 7$

Solution: (3 , -2)

8.



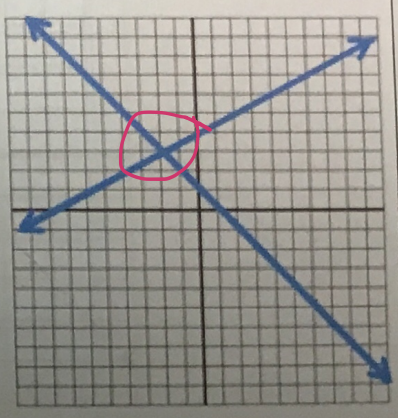
System of Equations:

$y = x - 2$

$y = -x - 4$

Solution: (-1 , -3)

9.



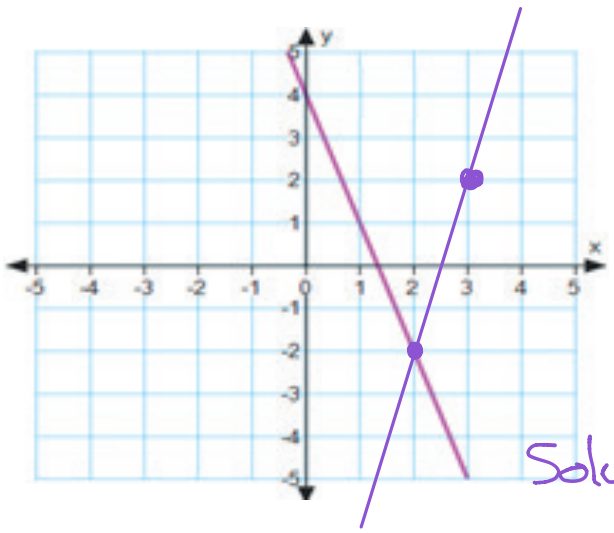
System of Equations:

$y = -x + 1$

$y = \frac{1}{2}x + 4$

Solution: (-2 , 3)

10. Consider two linear equations. The graph of the first equation is shown. A table of values satisfying the second equation is given. What is the solution to the system of the two equations?



x	−4	−2	0	x_1 2	x_2 4
y	−26	−18	−10	y_1 −2	y_2 6

b

$m = \frac{6+2}{6-(-2)} = \frac{8}{2} = 4$

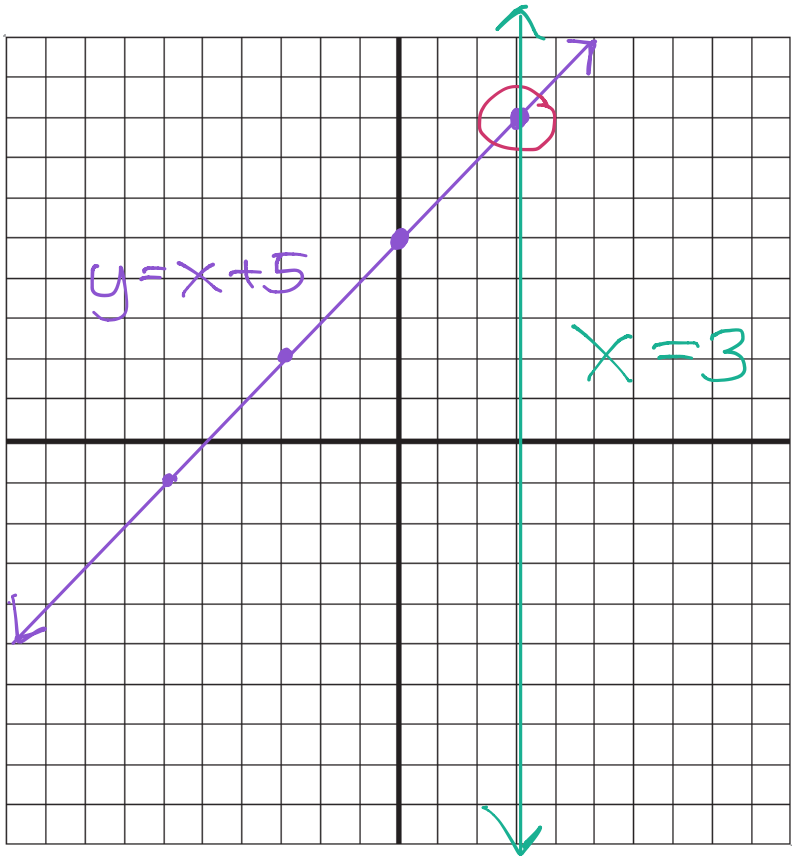
$b = -10$

$y = mx + b$

$y = 4x - 10$

Solution: $(2, -2)$

11. Construct a system of two linear equations where (0, 5) is a solution to the first equation but is not a solution to the second equation, and (3, 8) is a solution to the system. You may use a graph to help you.



Lesson Summary

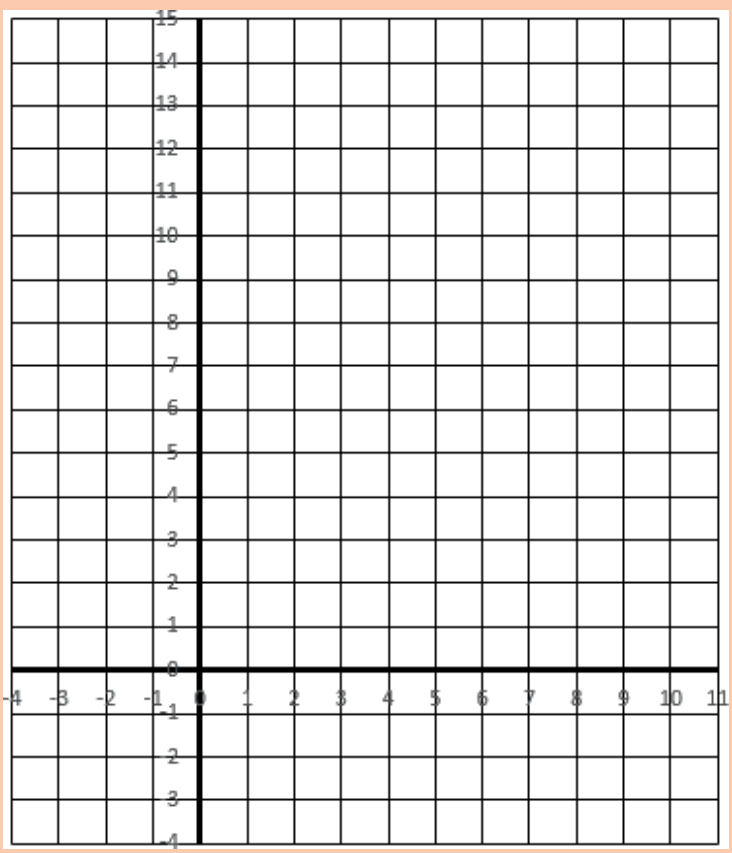
When writing systems of equations, be sure to define your variables, write your equations, solve your system of equations and then check if your answer makes sense.

Example: Adriana is thinking of two numbers. She says that one number is one more than twice the other number and the difference of the numbers is 7. What are Adriana's numbers?

Let x = one of the numbers and y = the other number.

$$\begin{cases} y = 2x + 1 \\ y - x = 7 \end{cases}$$

Solve the system of equations by graphing each equation.



The solution to the system of equations is _____.

12. Finish the Lesson Summary problem and find the solution to the problem.

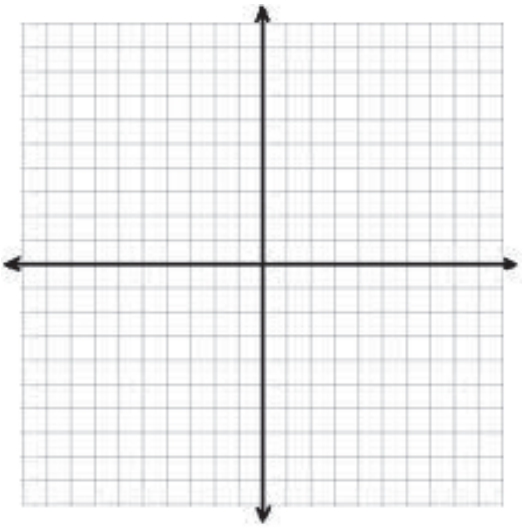
13. **Challenge** If the second equation was written as $x - y = 7$, what would be the solution? Does this work for Adriana's numbers?

NAME: _____ PERIOD: _____ DATE: _____

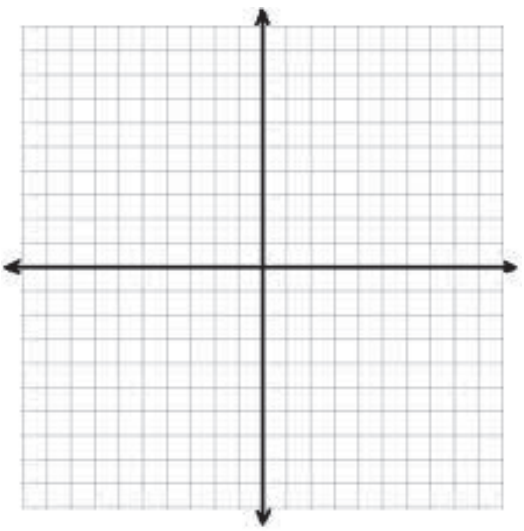
Homework Problem Set

Solve each system by graphing, and then check your answer.

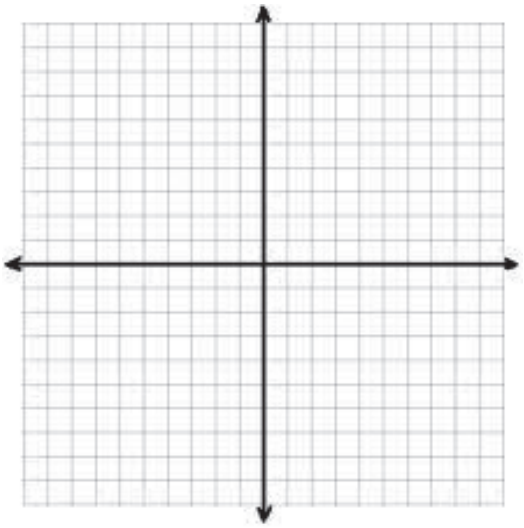
1. $\begin{cases} y = 4x - 1 \\ y = -\frac{1}{2}x + 8 \end{cases}$ Solution: _____



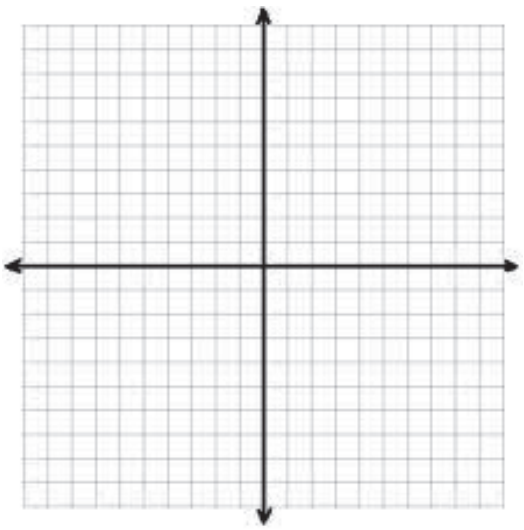
2. $\begin{cases} 2x + y = 4 \\ 2x + y = 9 \end{cases}$ Solution: _____



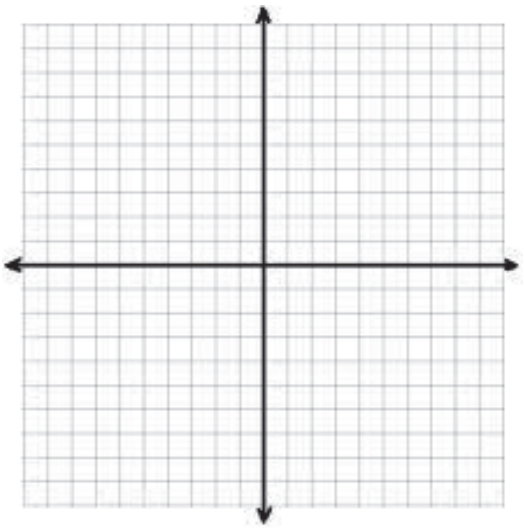
3. $\begin{cases} 3x + y = 5 \\ y = -1 \end{cases}$ Solution: _____



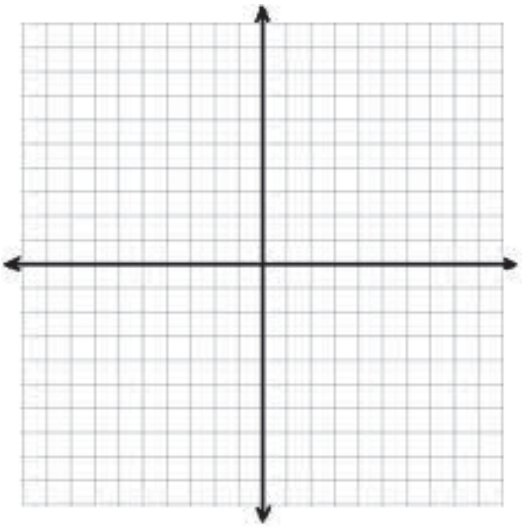
4. $\begin{cases} 3x - y = 5 \\ x + 3y = -5 \end{cases}$ Solution: _____



5. $\begin{cases} x = -4 \\ y = -\frac{3}{4}x \end{cases}$ Solution: _____



6. $\begin{cases} y = x \\ y = -x \end{cases}$ Solution: _____



7. For each question below, provide an explanation or an example to support your claim.

   A. Is it possible to have a system of linear equations that has no solution?

   B. Is it possible to have a system of linear equations that has more than one solution?

8. Construct a system of two linear equations where (0, 6) is a solution to the first equation but is not a solution to the second equation, and $(-2, 1)$ is a solution to the system.

9. For the situation below, determine which system of equations fits the scenario.

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At Melissa's Printing Company there are two kinds of printing presses. Model A can print 70 books per day and Model B can print 55 books per day. The company owns 14 total printing presses and this allows them to print 905 books per day. How many of each type of press do they have?

Let x = the number of presses that can print 70 books per day

Let y = the number of presses that can print 55 books per day

A. $x + y = 905$
$70x + 55y = 14$

B. $x + y = 905$
$70x + 55y = 905$

C. $x + y = 14$
$70x + 55y = 905$

REVIEW—Evaluate Expressions

Evaluate each expression by substituting the given values for the variables.

$$a = 3, b = -2, c = 0, d = \frac{1}{2}$$

10. $-a + b - c \cdot d$

11. $5b + 2a - 4d + c$

12. $15c \cdot d - a \cdot b$

13. $a \cdot b \cdot d + 5a$