Name _____ Class _____ Date _____

3-3

Solving Systems Graphically

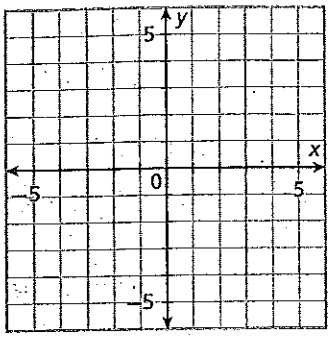
COMMON CORE

CC.8.EE.8a
CC.8.EE.8c

Essential question: *How can you solve a system of equations by graphing?*

1 EXPLORE Investigating Systems of Equations

A Graph the system of linear functions: $\begin{cases} y = 3x - 2 \\ y = -2x + 3 \end{cases}$



B Explain how to tell whether the ordered pair $(2, -1)$ is a solution of the equation $y = 3x - 2$ without using the graph.

_____

_____

C Explain how to tell whether the ordered pair $(2, -1)$ is a solution of the equation $y = -2x + 3$ without using the graph.

_____

_____

D Explain how to use the graph to tell whether the ordered pair $(2, -1)$ is a solution of either equation.

_____

_____

E Find an ordered pair that is a solution of both equations. Test the coordinates in each equation to verify your hypothesis.

The point _____ is a solution of both equations.

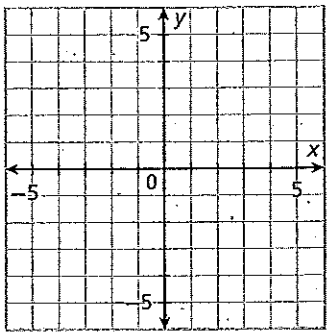
An ordered pair (x, y) is a solution of an equation in two variables if substituting the x- and y-values into the equation results in a true statement. A **system of equations** is a set of equations that have the same variables. An ordered pair is a solution of a system of equations if it is a solution of every equation in the system.

Since the graph of a function represents all ordered pairs that are solutions of the related equation, if a point lies on the graphs of two functions, the point is a solution of both related equations.

2 EXAMPLE Solving Systems Graphically

Solve each system by graphing.

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



Start by graphing each function.

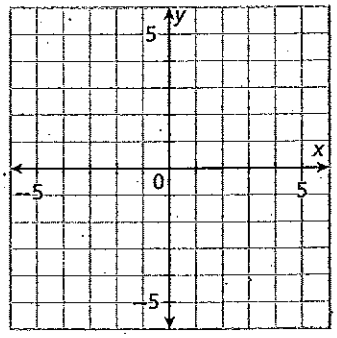
Identify if there are any ordered pairs that are solutions of both equations.

The solution of the system appears to be

_____.

To check your answer, you can substitute the values for x and y into each equation and make sure the equations are true statements.

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



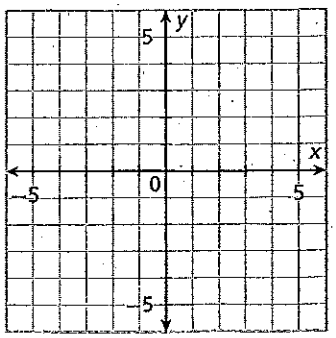
Start by graphing each function.

Identify if there are any ordered pairs that are solutions of both equations.

The graphs are parallel, so there is no ordered pair that is a solution of both equations. The system has

_____.

C $\begin{cases} y = 3x - 3 \\ y = 3(x - 1) \end{cases}$



Start by graphing each function.

Identify if there are any ordered pairs that are solutions of both equations.

The graphs overlap, so every ordered pair that is a solution of one equation is also a solution of the other equation. The system has

_____.

3 EXAMPLE Solving a Real-World Problem by Graphing

Keisha and her friends visit the concession stand at a football game. The stand charges $2 for a hot dog and $1 for a drink. The friends buy a total of 8 items for $11. Tell how many hot dogs and how many drinks they bought.

A Let x represent the number of hot dogs they bought and y represent the number of drinks they bought.

Write an equation representing the **number of items they purchased.**

Number of hot dogs	+	Number of drinks	=	Total items
	+		=	

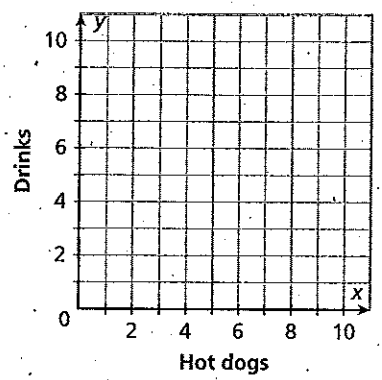
Write an equation representing the **money spent on the items.**

Cost of 1 hot dog times number of hot dogs	+	Cost of 1 drink times number of drinks	=	Total cost
	+		=	

B Write your equations in slope-intercept form.

_____

C Graph the solutions of both equations.



D Use the graph to identify the solution of the system of equations. Check your answer by substituting the ordered pair into both equations.

The point _____ is a solution of both equations.

E Interpret the solution in the original context.

Keisha and her friends bought _____ hot dog(s) and _____ drink(s).

REFLECT

3. **Conjecture** Why do you think the graph is limited to the first quadrant?

_____

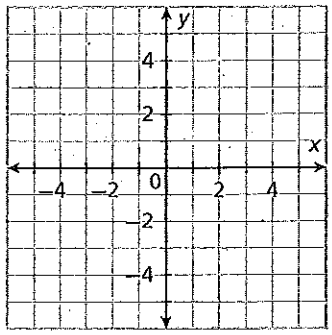
_____

© Houghton Mifflin Harcourt Publishing Company

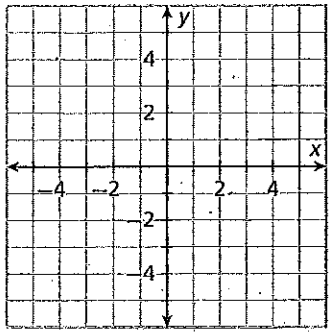
PRACTICE

Solve each system by graphing.

1. $\begin{cases} 2x - 4y = 10 \\ x + y = 2 \end{cases}$ _____

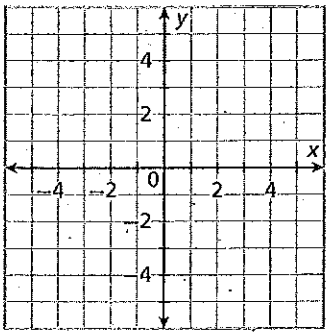


2. $\begin{cases} 2x - y = 0 \\ x + y = -6 \end{cases}$ _____



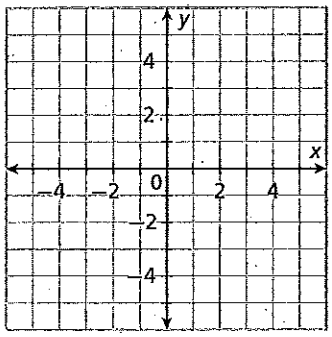
Graph each system and tell how many solutions the system has.

3. $\begin{cases} x - 3y = 2 \\ -3x + 9y = -6 \end{cases}$



_____ solutions

4. $\begin{cases} 2x - y = 5 \\ 2x - y = -1 \end{cases}$



_____ solutions

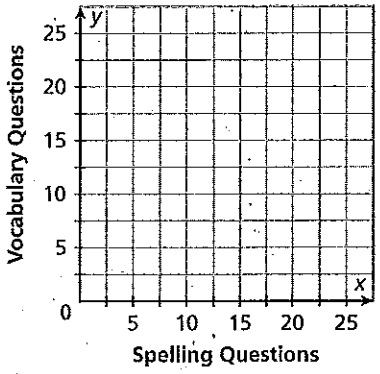
Mrs. Morales wrote a test with 15 questions covering spelling and vocabulary. Spelling questions (x) are worth 5 points and vocabulary questions (y) are worth 10 points. The maximum number of points possible on the test is 100.

5. Write an equation in slope-intercept form to represent the number of questions on the test.

_____

6. Write an equation in slope-intercept form to represent the total points on the test.

_____



7. Graph the solutions of both equations.

8. Use your graph to tell how many of each question type are on the test.

_____ spelling questions; _____ vocabulary questions