

5.1

Solving Systems of Linear Equations by Graphing

For use with Exploration 5.1

Essential Question How can you solve a system of linear equations?

1

EXPLORATION: Writing a System of Linear Equations

Work with a partner. Your family opens a bed-and-breakfast. They spend \$600 preparing a bedroom to rent. The cost to your family for food and utilities is \$15 per night. They charge \$75 per night to rent the bedroom.

- a. Write an equation that represents the costs.

Cost, C
(in dollars)

=

\$15 per
night

•

Number of
nights, x

+

\$600

- b. Write an equation that represents the revenue (income).

Revenue, R
(in dollars)

=

\$75 per
night

•

Number of
nights, x

- c. A set of two (or more) linear equations is called a **system of linear equations**. Write the system of linear equations for this problem.

2

EXPLORATION: Using a Table or Graph to Solve a System

Go to *BigIdeasMath.com* for an interactive tool to investigate this exploration.

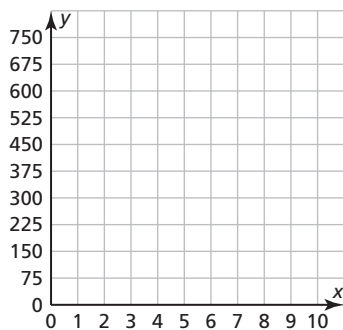
Work with a partner. Use the cost and revenue equations from Exploration 1 to determine how many nights your family needs to rent the bedroom before recovering the cost of preparing the bedroom. This is the *break-even point*.

- a. Complete the table.

x (nights)	0	1	2	3	4	5	6	7	8	9	10	11
C (dollars)												
R (dollars)												

5.1 Solving Systems of Linear Equations by Graphing (continued)**2 EXPLORATION:** Using a Table or Graph to Solve a System (continued)

- b. How many nights does your family need to rent the bedroom before breaking even?
- c. In the same coordinate plane, graph the cost equation and the revenue equation from Exploration 1.



- d. Find the point of intersection of the two graphs. What does this point represent? How does this compare to the break-even point in part (b)? Explain.

Communicate Your Answer

3. How can you solve a system of linear equations? How can you check your solution?
4. Solve each system by using a table or sketching a graph. Explain why you chose each method. Use a graphing calculator to check each solution.
- | | | |
|----------------------|---------------|-----------------|
| a. $y = -4.3x - 1.3$ | b. $y = x$ | c. $y = -x - 1$ |
| $y = 1.7x + 4.7$ | $y = -3x + 8$ | $y = 3x + 5$ |

5.1

Notetaking with Vocabulary

For use after Lesson 5.1

In your own words, write the meaning of each vocabulary term.

system of linear equations

solution of a system of linear equations

Core Concepts

Solving a System of Linear Equations by Graphing

Step 1 Graph each equation in the same coordinate plane.

Step 2 Estimate the point of intersection.

Step 3 Check the point from Step 2 by substituting for x and y in each equation of the original system.

Notes:

5.1 Notetaking with Vocabulary (continued)**Extra Practice**

In Exercises 1–6, tell whether the ordered pair is a solution of the system of linear equations.

1. $(3, 1)$; $x + y = 4$
 $2x - y = 3$

2. $(1, 3)$; $x - y = -2$
 $2x + y = 5$

3. $(2, 0)$; $y = x - 2$
 $y = -3x + 6$

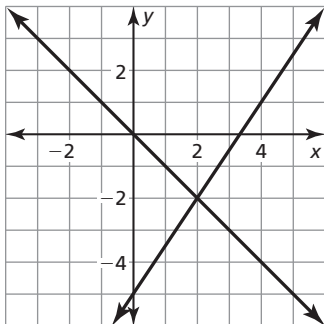
4. $(-1, -2)$; $x - 2y = 3$
 $2x - y = 0$

5. $(-2, 3)$; $3x - 2y = -12$
 $2x + 4y = 9$

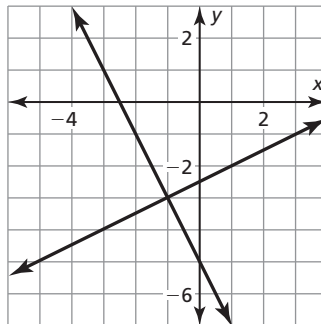
6. $(4, -3)$; $2x + 2y = 2$
 $3x - 3y = 21$

In Exercises 7–9, use the graph to solve the system of linear equations. Check your solution.

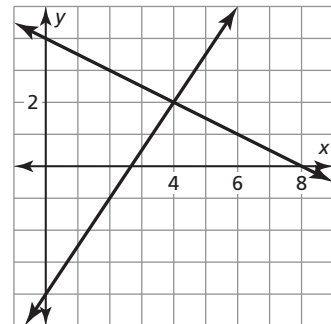
7. $3x - 2y = 10$
 $x + y = 0$



8. $x - 2y = 5$
 $2x + y = -5$



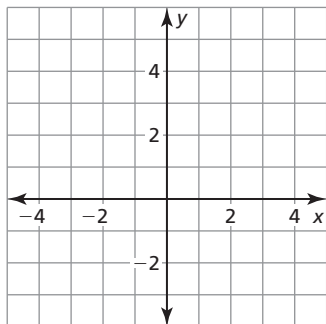
9. $x + 2y = 8$
 $3x - 2y = 8$



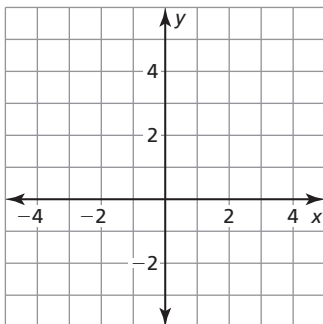
5.1 Notetaking with Vocabulary (continued)

In Exercises 10–15, solve the system of linear equations by graphing.

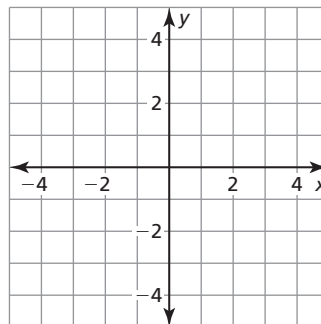
10. $y = -x + 3$
 $y = x + 5$



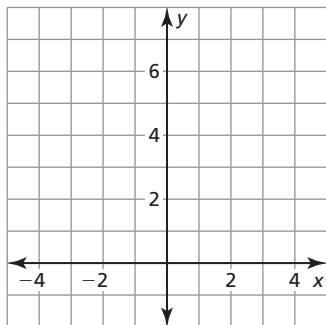
11. $y = \frac{1}{2}x + 2$
 $y = -\frac{1}{2}x + 4$



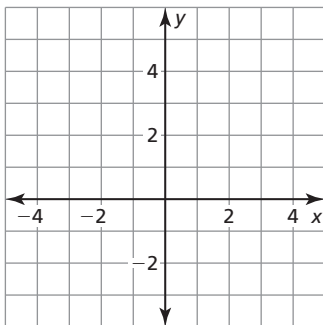
12. $3x - 2y = 6$
 $y = -3$



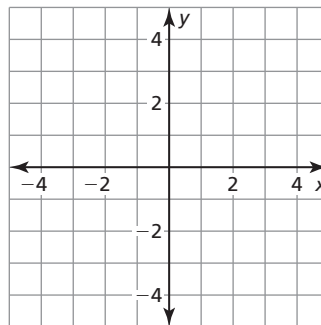
13. $y = 4x$
 $y = -4x + 8$



14. $y = \frac{1}{4}x + 3$
 $y = \frac{3}{4}x + 5$



15. $3x - 4y = 7$
 $5x + 2y = 3$



16. A test has twenty questions worth 100 points. The test consists of x true-false questions worth 4 points each and y multiple choice questions worth 8 points each. How many of each type of question are on the test?

