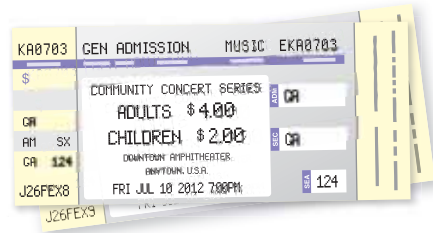


Essential Question How can you describe the graph of the equation $ax + by = c$?

1 ACTIVITY: Using a Table to Plot Points

Work with a partner. You sold a total of \$16 worth of tickets to a school concert. You lost track of how many of each type of ticket you sold.

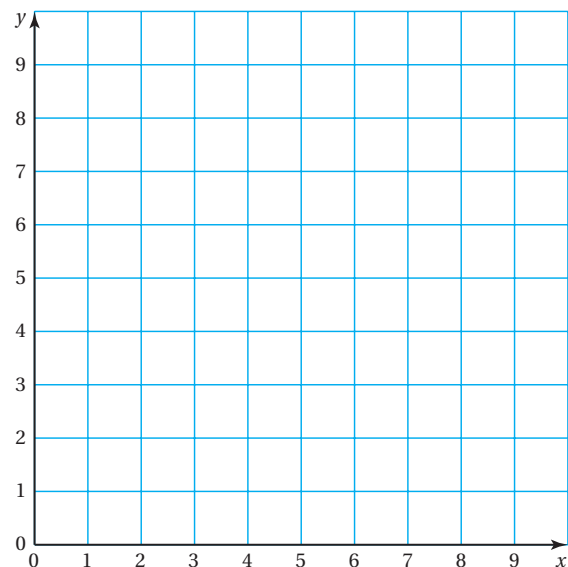


$$\frac{\$4}{\text{Adult}} \cdot \text{Number of Adult Tickets} + \frac{\$2}{\text{Child}} \cdot \text{Number of Child Tickets} = \$16$$

- Let x represent the number of adult tickets.
Let y represent the number of child tickets.
Write an equation that relates x and y .
- Copy and complete the table showing the different combinations of tickets you might have sold.

| | | | | | |
|------------------------------|--|--|--|--|--|
| Number of Adult Tickets, x | | | | | |
| Number of Child Tickets, y | | | | | |

- Plot the points from the table. Describe the pattern formed by the points.
- If you remember how many adult tickets you sold, can you determine how many child tickets you sold? Explain your reasoning.



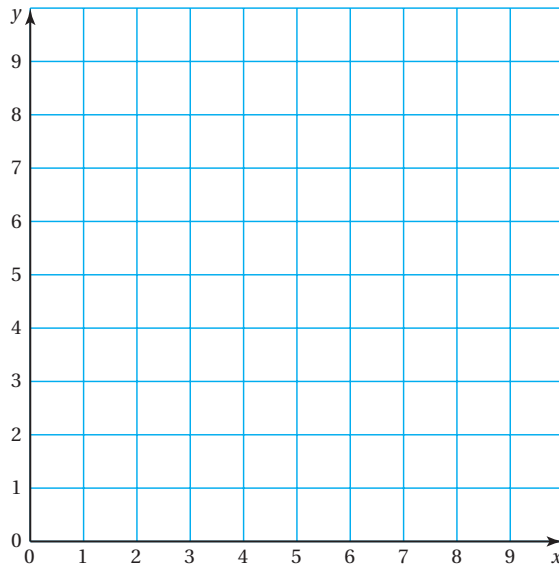
2 ACTIVITY: Rewriting an Equation

Work with a partner. You sold a total of \$16 worth of cheese. You forgot how many pounds of each type of cheese you sold.



$$\frac{\$4}{\text{lb}} \cdot \text{Pounds of Swiss} + \frac{\$2}{\text{lb}} \cdot \text{Pounds of Cheddar} = \$16$$

- Let x represent the number of pounds of Swiss cheese. Let y represent the number of pounds of Cheddar cheese. Write an equation that relates x and y .
- Write the equation in slope-intercept form. Then graph the equation.



What Is Your Answer?

- IN YOUR OWN WORDS** How can you describe the graph of the equation $ax + by = c$?
- Activities 1 and 2 show two different methods for graphing $ax + by = c$. Describe the two methods. Which method do you prefer? Explain.
- Write a real-life problem that is similar to those shown in Activities 1 and 2.

Practice

Use what you learned about graphing linear equations in standard form to complete Exercises 3 and 4 on page 72.

Key Vocabulary

standard form, p. 70

Study Tip

Any linear equation can be written in standard form.

Key Idea
Standard Form of a Linear Equation

 The **standard form** of a linear equation is

$$ax + by = c$$

 where a and b are not both zero.

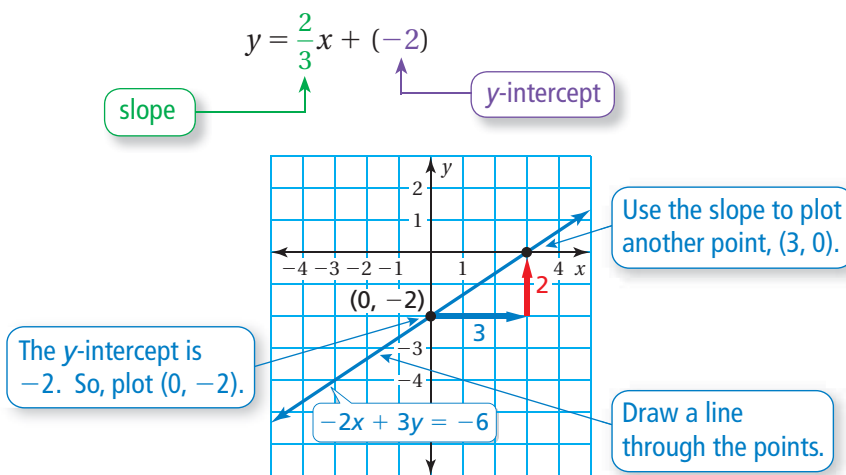
EXAMPLE 1 Graphing a Linear Equation in Standard Form
Graph $-2x + 3y = -6$.

Step 1: Write the equation in slope-intercept form.

$$-2x + 3y = -6 \quad \text{Write the equation.}$$

$$3y = 2x - 6 \quad \text{Add } 2x \text{ to each side.}$$

$$y = \frac{2}{3}x - 2 \quad \text{Divide each side by 3.}$$

Step 2: Use the slope and y -intercept to graph the equation.

On Your Own
Graph the linear equation.

1. $x + y = -2$

2. $-\frac{1}{2}x + 2y = 6$

3. $-\frac{2}{3}x + y = 0$

4. $2x + y = 5$

Now You're Ready
 Exercises 5–10

EXAMPLE 2 Graphing a Linear Equation in Standard Form

Graph $x + 3y = -3$ using intercepts.

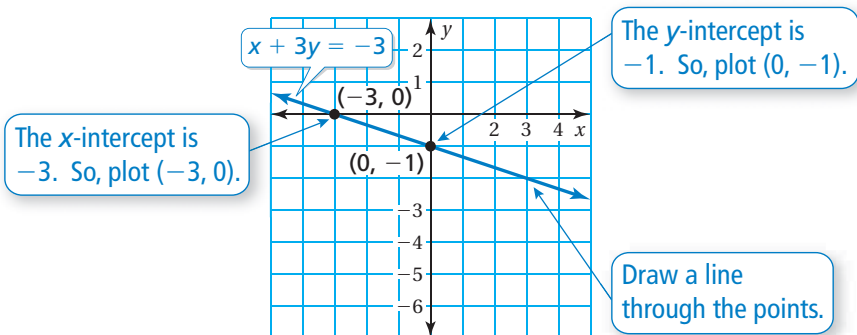
Step 1: To find the x -intercept, substitute 0 for y .

$$\begin{aligned} x + 3y &= -3 \\ x + 3(0) &= -3 \\ x &= -3 \end{aligned}$$

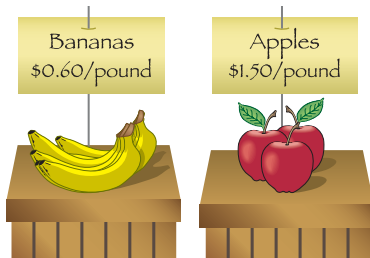
To find the y -intercept, substitute 0 for x .

$$\begin{aligned} x + 3y &= -3 \\ 0 + 3y &= -3 \\ y &= -1 \end{aligned}$$

Step 2: Graph the equation.



EXAMPLE 3 Real-Life Application

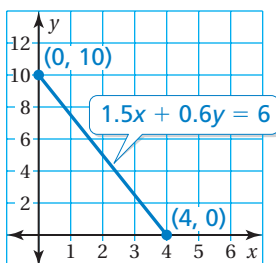


You have \$6 to spend on apples and bananas. (a) Graph the equation $1.5x + 0.6y = 6$, where x is the number of pounds of apples and y is the number of pounds of bananas. (b) Interpret the intercepts.

a. Find the intercepts and graph the equation.

| x -intercept | y -intercept |
|---------------------|---------------------|
| $1.5x + 0.6y = 6$ | $1.5x + 0.6y = 6$ |
| $1.5x + 0.6(0) = 6$ | $1.5(0) + 0.6y = 6$ |
| $x = 4$ | $y = 10$ |

b. The x -intercept shows that you can buy 4 pounds of apples if you don't buy any bananas. The y -intercept shows that you can buy 10 pounds of bananas if you don't buy any apples.



Now You're Ready
Exercises 16–18

On Your Own

Graph the linear equation using intercepts.

5. $2x - y = 8$ 6. $x + 3y = 6$

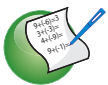
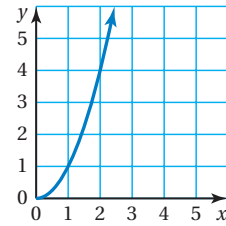
7. **WHAT IF?** In Example 3, you buy y pounds of oranges instead of bananas. Oranges cost \$1.20 per pound. Graph the equation $1.5x + 1.2y = 6$. Interpret the intercepts.

2.4 Exercises



Vocabulary and Concept Check

- VOCABULARY** Is the equation $y = -2x + 5$ in standard form? Explain.
- REASONING** Does the graph represent a linear equation? Explain.



Practice and Problem Solving

Define two variables for the verbal model. Write an equation in slope-intercept form that relates the variables. Graph the equation.

$$3. \quad \frac{\$2.00}{\text{pound}} \cdot \text{Pounds of peaches} + \frac{\$1.50}{\text{pound}} \cdot \text{Pounds of apples} = \$15$$

$$4. \quad \frac{16 \text{ miles}}{\text{hour}} \cdot \text{Hours biked} + \frac{2 \text{ miles}}{\text{hour}} \cdot \text{Hours walked} = 32 \text{ miles}$$

Write the linear equation in slope-intercept form.

1 5. $2x + y = 17$

6. $5x - y = \frac{1}{4}$

7. $-\frac{1}{2}x + y = 10$

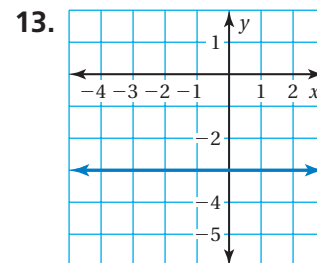
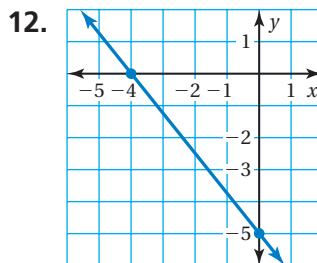
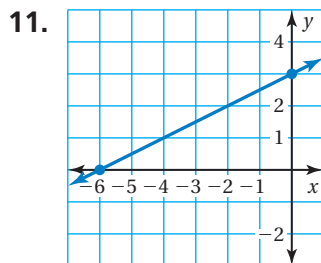
Graph the linear equation.

8. $-18x + 9y = 72$

9. $16x - 4y = 2$

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

Use the graph to find the x - and y -intercepts.



14. **ERROR ANALYSIS** Describe and correct the error in finding the x -intercept.

15. **BRACELET** A charm bracelet costs \$65, plus \$25 for each charm.

- Write an equation in standard form that represents the total cost of the bracelet.
- How much does the bracelet shown cost?

✗

$$\begin{aligned}
 -2x + 3y &= 12 \\
 -2(0) + 3y &= 12 \\
 3y &= 12 \\
 y &= 4
 \end{aligned}$$

Graph the linear equation using intercepts.

2 16. $3x - 4y = -12$

17. $2x + y = 8$

18. $\frac{1}{3}x - \frac{1}{6}y = -\frac{2}{3}$

19. **SHOPPING** The amount of money you spend on x CDs and y DVDs is given by the equation $14x + 18y = 126$. Find the intercepts and graph the equation.



20. **SCUBA** Five friends go scuba diving. They rent a boat for x days and scuba gear for y days. The total spent is \$1000.
- Write an equation in standard form that represents the situation.
 - Graph the equation and interpret the intercepts.

21. **WAGES** You work at a restaurant as a host and a server. You earn \$9.45 for each hour you work as a host and \$7.65 for each hour you work as a server.
- Write an equation in standard form that models your earnings.
 - Graph the equation.

| Basic Information | |
|-----------------------|------------------------|
| Pay to the Order of: | John Doe |
| # of hours worked as | host: x |
| # of hours worked as | server: y |
| Earnings for this pay | period: \$160.65 |

22. **REASONING** Does the graph of every linear equation have an x -intercept? Explain your reasoning. Include an example.



23. **Critical Thinking** For a house call, a veterinarian charges \$70, plus \$40 an hour.
- Write an equation that represents the total fee y charged by the veterinarian for a visit lasting x hours.
 - Find the x -intercept. Will this point appear on the graph of the equation? Explain your reasoning.
 - Graph the equation.



Fair Game Review what you learned in previous grades & lessons

Copy and complete the table of values. (*Skills Review Handbook*)

24.

| | | | | | |
|----------|----|----|---|---|---|
| x | -2 | -1 | 0 | 1 | 2 |
| $2x + 5$ | | | | | |

25.

| | | | | | |
|-----------|----|----|---|---|---|
| x | -2 | -1 | 0 | 1 | 2 |
| $-5 - 3x$ | | | | | |

26. **MULTIPLE CHOICE** Which value of x makes the equation $4x - 12 = 3x - 9$ true? (*Section 1.3*)
- (A) -1 (B) 0 (C) 1 (D) 3