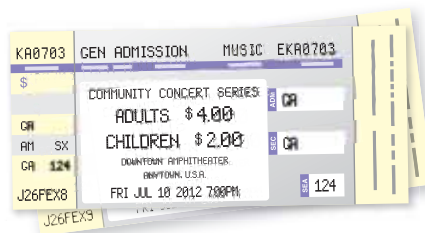


Essential Question How can you describe the graph of the equation $ax + by = c$?

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.

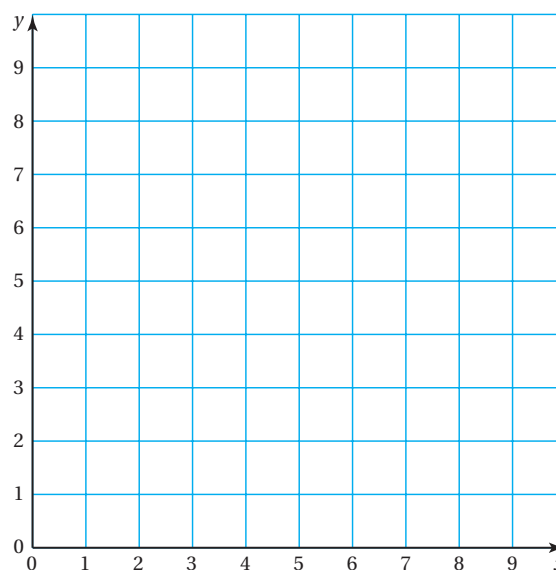


$$\frac{\$4}{\text{Adult}} \cdot \text{Number of Adult Tickets} + \frac{\$2}{\text{Child}} \cdot \text{Number of Child Tickets} = \$16$$

- 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

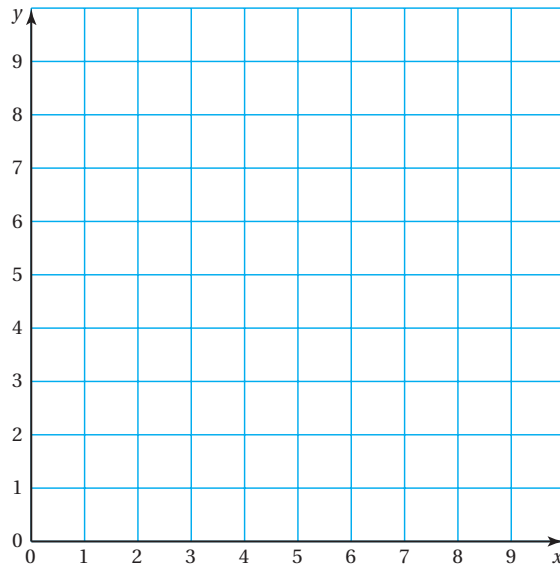
ACTIVITY: Rewriting an Equation

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.

2.4 Lesson

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

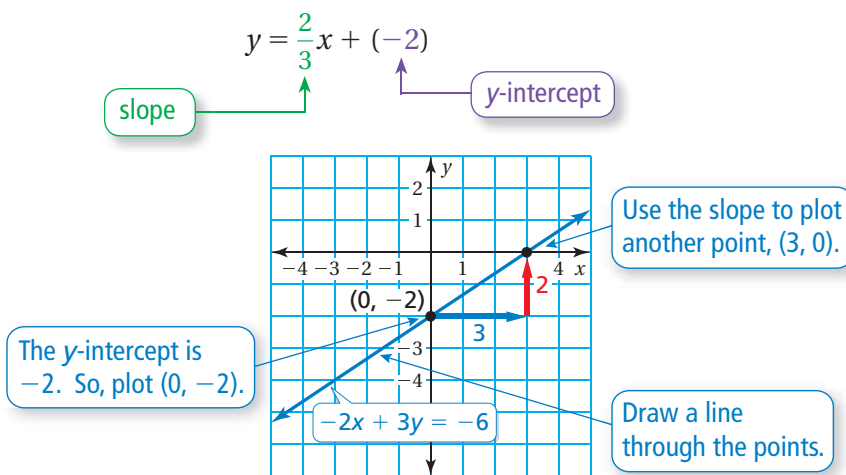
Step 1: Write the equation in slope-intercept form.

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

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

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

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.

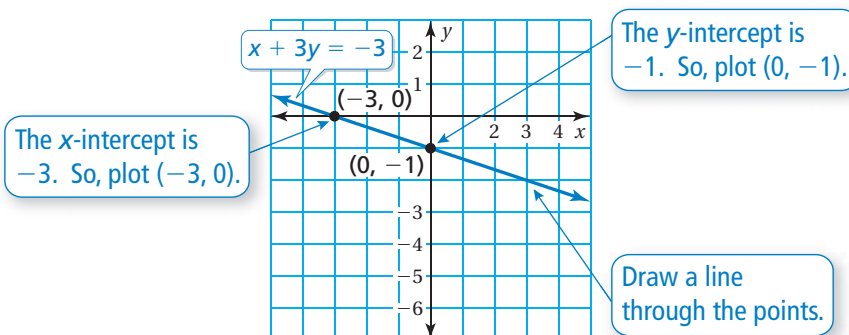
Step 1: To find the x -intercept, substitute 0 for y .

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

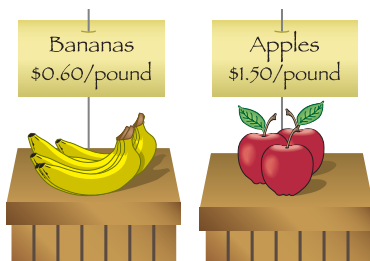
To find the y -intercept, substitute 0 for x .

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

Step 2: Graph the equation.



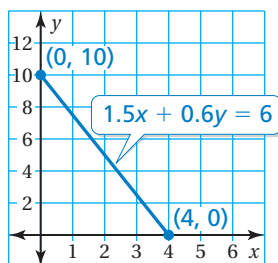
EXAMPLE 3 Real-Life Application



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.

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.

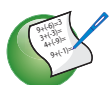
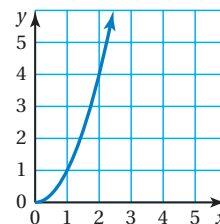
Now You're Ready
Exercises 16–18

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

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

Write the linear equation in slope-intercept form.

1 5. $2x + y = 17$

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

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

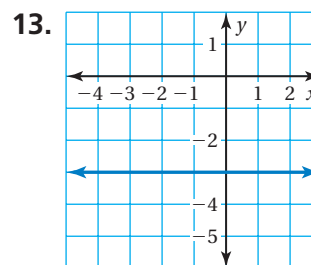
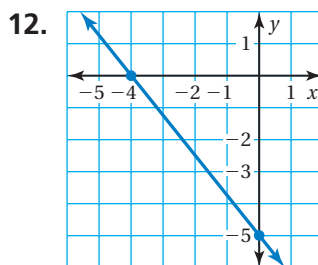
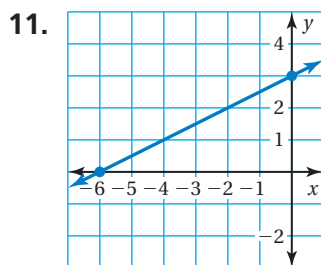
Graph the linear equation.

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

9. $16x - 4y = 2$

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

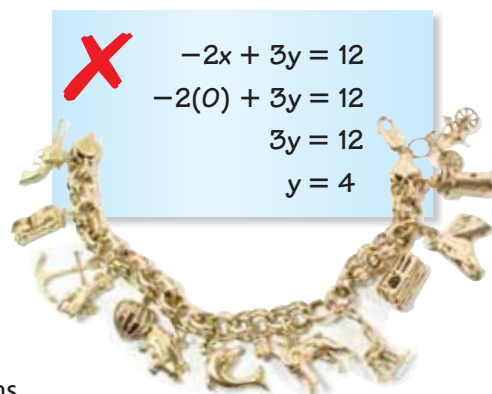
Use the graph to find the x - and y -intercepts.



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