

# 4.1 Exercises

## Vocabulary and Core Concept Check

- COMPLETE THE SENTENCE** A linear function that models a real-life situation is called a \_\_\_\_\_.
- WRITING** Explain how you can use slope-intercept form to write an equation of a line given its slope and y-intercept.

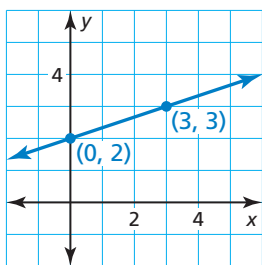
## Monitoring Progress and Modeling with Mathematics

In Exercises 3–8, write an equation of the line with the given slope and y-intercept. (See Example 1.)

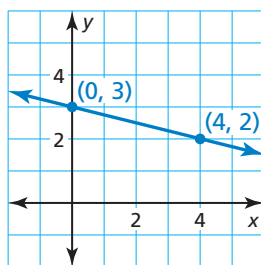
- |  |   |
|--|---|
| 3. slope: 2<br>y-intercept: 9              | 4. slope: 0<br>y-intercept: 5               |
| 5. slope: -3<br>y-intercept: 0             | 6. slope: -7<br>y-intercept: 1              |
| 7. slope: $\frac{2}{3}$<br>y-intercept: -8 | 8. slope: $-\frac{3}{4}$<br>y-intercept: -6 |

In Exercises 9–12, write an equation of the line in slope-intercept form. (See Example 2.)

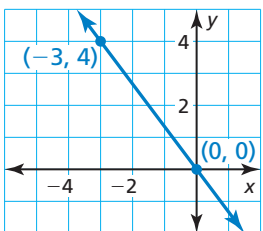
9.



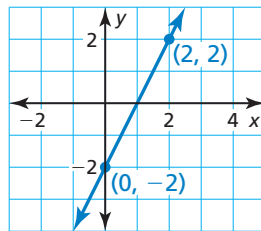
10.



11.



12.



In Exercises 13–18, write an equation of the line that passes through the given points. (See Example 3.)

- |                       |                       |
|-----------------------|-----------------------|
| 13. (3, 1), (0, 10)   | 14. (2, 7), (0, -5)   |
| 15. (2, -4), (0, -4)  | 16. (-6, 0), (0, -24) |
| 17. (0, 5), (-1.5, 1) | 18. (0, 3), (-5, 2.5) |

In Exercises 19–24, write a linear function  $f$  with the given values. (See Example 4.)

- |                            |                          |
|----------------------------|--------------------------|
| 19. $f(0) = 2, f(2) = 4$   | 20. $f(0) = 7, f(3) = 1$ |
| 21. $f(4) = -3, f(0) = -2$ |                          |
| 22. $f(5) = -1, f(0) = -5$ |                          |
| 23. $f(-2) = 6, f(0) = -4$ |                          |
| 24. $f(0) = 3, f(-6) = 3$  |                          |

In Exercises 25 and 26, write a linear function  $f$  with the given values.

25.

$x$	$f(x)$
1	-1
0	1
-1	3

26.

$x$	$f(x)$
-4	-2
-2	-1
0	0

27. **ERROR ANALYSIS** Describe and correct the error in writing an equation of the line with a slope of 2 and a y-intercept of 7.

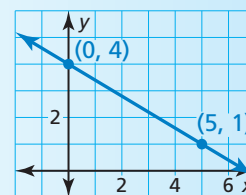


$$y = 7x + 2$$

28. **ERROR ANALYSIS** Describe and correct the error in writing an equation of the line shown.



$$\begin{aligned} \text{slope} &= \frac{1 - 4}{0 - 5} \\ &= \frac{-3}{-5} = \frac{3}{5} \\ y &= \frac{3}{5}x + 4 \end{aligned}$$



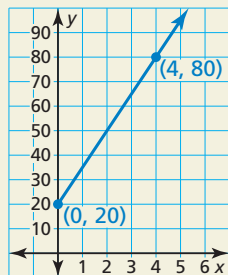
- 29. MODELING WITH MATHEMATICS** In 1960, the world record for the men's mile was 3.91 minutes. In 1980, the record time was 3.81 minutes. (See Example 5.)
- Write a linear model that represents the world record (in minutes) for the men's mile as a function of the number of years since 1960.
  - Use the model to estimate the record time in 2000 and predict the record time in 2020.

- 30. MODELING WITH MATHEMATICS** A recording studio charges musicians an initial fee of \$50 to record an album. Studio time costs an additional \$75 per hour.
- Write a linear model that represents the total cost of recording an album as a function of studio time (in hours).
  - Is it less expensive to purchase 12 hours of recording time at the studio or a \$750 music software program that you can use to record on your own computer? Explain.



- 31. WRITING** A line passes through the points  $(0, -2)$  and  $(0, 5)$ . Is it possible to write an equation of the line in slope-intercept form? Justify your answer.

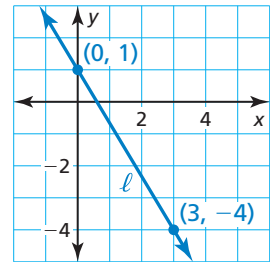
- 32. THOUGHT PROVOKING** Describe a real-life situation involving a linear function whose graph passes through the points.



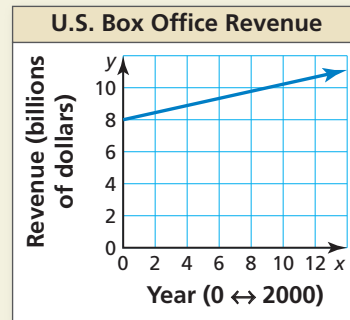
- 33. REASONING** Recall that the standard form of a linear equation is  $Ax + By = C$ . Rewrite this equation in slope-intercept form. Use your answer to find the slope and y-intercept of the graph of the equation  $-6x + 5y = 9$ .

- 34. MAKING AN ARGUMENT** Your friend claims that given  $f(0)$  and any other value of a linear function  $f$ , you can write an equation in slope-intercept form that represents the function. Your cousin disagrees, claiming that the two points could lie on a vertical line. Who is correct? Explain.

- 35. ANALYZING A GRAPH** Line  $\ell$  is a reflection in the  $x$ -axis of line  $k$ . Write an equation that represents line  $k$ .



- 36. HOW DO YOU SEE IT?** The graph shows the approximate U.S. box office revenues (in billions of dollars) from 2000 to 2012, where  $x = 0$  represents the year 2000.



- Estimate the slope and y-intercept of the graph.
- Interpret your answers in part (a) in the context of the problem.
- How can you use your answers in part (a) to predict the U.S. box office revenue in 2018?

- 37. ABSTRACT REASONING** Show that the equation of the line that passes through the points  $(0, b)$  and  $(1, b + m)$  is  $y = mx + b$ . Explain how you can be sure that the point  $(-1, b - m)$  also lies on the line.

## Maintaining Mathematical Proficiency

Reviewing what you learned in previous grades and lessons

Solve the equation. (Section 1.3)

38.  $3(x - 15) = x + 11$

39.  $-4y - 10 = 4(y - 3)$

40.  $2(3d + 3) = 7 + 6d$

41.  $-5(4 - 3n) = 10(n - 2)$

Use intercepts to graph the linear equation. (Section 3.4)

42.  $-4x + 2y = 16$

43.  $3x + 5y = -15$

44.  $x - 6y = 24$

45.  $-7x - 2y = -21$