

# Graphs and Functions

## 3A Tables and Graphs

- 3-1 Ordered Pairs
- 3-2 Graphing on a Coordinate Plane
- LAB Graph Points
- 3-3 Interpreting Graphs

## 3B Functions

- 3-4 Functions
- 3-5 Equations, Tables, and Graphs
- LAB Use Multiple Representations

### Chapter

- Use functions to represent, analyze, and solve problems.
- Translate among representations of functions.

## Why Learn This?

You can often use functions to describe the relationship between two quantities mathematically. For example, you can use a function to show how the altitude of a plane changes over time.



### Learn It Online

Chapter Project Online [go.hrw.com](http://go.hrw.com),

keyword MT10 Ch3



# Are You Ready?

## Vocabulary

Choose the best term from the list to complete each sentence.

1. An    ? states that two expressions have the same value.
2. Any number that can be written as a fraction is a    ?.
3. A    ? serves as a placeholder for a number.
4. An    ? can be a whole number or its opposite.

algebraic expression  
equation  
integer  
rational number  
variable

Complete these exercises to review skills you will need for this chapter.

## Whole Number Operations

Simplify each expression.

- |                 |                  |                  |                 |
|-----------------|------------------|------------------|-----------------|
| 5. $5 + 12$     | 6. $18 - 9$      | 7. $25 \cdot 11$ | 8. $56 \div 4$  |
| 9. $8 \cdot 40$ | 10. $102 \div 3$ | 11. $250 - 173$  | 12. $107 + 298$ |

## Decimal Operations

Simplify each expression.

- |                     |                       |                     |                     |
|---------------------|-----------------------|---------------------|---------------------|
| 13. $1.25 + 3.7$    | 14. $52.7 - 12.9$     | 15. $3.2 \cdot 1.2$ | 16. $5.7 \div 0.3$  |
| 17. $2.84 \div 1.3$ | 18. $17.5 \cdot 12.1$ | 19. $17.5 - 12.45$  | 20. $2.75 + 13.254$ |

## Operations with Fractions

Simplify each expression.

- |  |  |  |                                      |
|--|--|--|--------------------------------------|
| 21. $\frac{2}{3} - \frac{1}{2}$            | 22. $\frac{13}{18} + \frac{19}{24}$      | 23. $\frac{7}{8}\left(\frac{6}{11}\right)$ | 24. $\frac{9}{10} \div \frac{9}{13}$ |
| 25. $\frac{5}{6}\left(\frac{8}{15}\right)$ | 26. $\frac{11}{12} \div \frac{121}{144}$ | 27. $\frac{1}{6} + \frac{5}{8}$            | 28. $\frac{19}{20} - \frac{4}{5}$    |

## Integer Operations

Simplify each expression.

- |                      |                   |                |                      |
|----------------------|-------------------|----------------|----------------------|
| 29. $-15 + 7$        | 30. $25 - (-23)$  | 31. $20(-13)$  | 32. $\frac{-108}{9}$ |
| 33. $\frac{161}{-7}$ | 34. $-13 + (-28)$ | 35. $-72 - 18$ | 36. $-31(14)$        |

## Study Guide: Preview

## Where You've Been

## Previously, you

- located and named integers on a number line.
- graphed data to demonstrate familiar relationships.
- interpreted graphs, tables, and equations.

## In This Chapter

## You will study

- locating ordered pairs of rational numbers on a coordinate plane.
- generating different representations of data using tables, graphs, and equations.
- using functions to describe relationships among data.

## Where You're Going

## You can use the skills learned in this chapter

- to identify different types of functions.
- to make predictions based on analysis of data.

## Key Vocabulary/Vocabulario

coordinate plane	plano cartesiano
domain	dominio
function	función
ordered pair	par ordenado
origin	origen
quadrant	cuadrante
range	recorrido o rango
x-axis	eje de las x
y-axis	eje de las y

## Vocabulary Connections

To become familiar with some of the vocabulary terms in the chapter, consider the following. You may refer to the chapter, the glossary, or a dictionary if you like.

1. The word **origin** means “beginning.” How do you think this might apply to graphing?
2. The root of the word **quadrant** is *quad*, which means “four.” What do you think a quadrant of a graph might be?
3. The word *ordered* means “arranged according to a rule.” Do you think it matters which number comes first in an **ordered pair**? Explain.

## Reading Strategy: Read a Lesson for Understanding

You need to be actively involved as you work through each lesson in your textbook. To begin with, find the lesson's objective, which can be found at the top of the first page. As you progress through the lesson, keep the objective in mind while you work through examples and answer questions.

### Lesson Features

**Learn** to write rational numbers in equivalent forms.

**EXAMPLE 1** Simplifying Fractions

**Remember!**

$\frac{0}{a} = 0$  for  $a \neq 0$

$\frac{a}{a} = 1$  for  $a \neq 0$

$\frac{-7}{8} = \frac{7}{-8} = -\frac{7}{8}$

**Simplify.**

**A**  $\frac{9}{55}$

$\frac{9}{55} = \frac{9}{55}$

**B**  $\frac{-24}{32}$

$\frac{-24}{32} = -\frac{24 \div 8}{32 \div 8} = -\frac{3}{4}$

**Think and Discuss**

- 1. Explain** how you can be sure that a fraction is in simplest form.
- 2. Give** the sign of a fraction if the denominator is negative.

### Reading Tips

Identify the objective of the lesson and look through the lesson to get a feel for how the objective is met.

Work through each example. The examples help to demonstrate the lesson objectives.

Check your understanding of the lesson by answering the *Think and Discuss* questions.

### Try This

Use Lesson 3-1 in your textbook to answer each question.

1. What is the objective of the lesson?
2. What questions or problems did you have when you read the lesson?
3. Write your own example problem similar to Example 2.
4. What skill is being practiced in the first *Think and Discuss* question?

# 3-1

## Ordered Pairs

**Learn** to write solutions of equations in two variables as ordered pairs.

**Vocabulary**  
ordered pair

The company that makes team uniforms for a soccer league charges a \$20 fee for team artwork and \$10 for each jersey. Dominic's team has 14 players, and Alyssa's team has 12 players. Find the cost for a set of jerseys for each team.

Let  $y$  be the total cost of a set of jerseys and  $x$  be the number of jerseys needed.



$$\text{total cost of jerseys} = \$20 + \$10 \cdot \text{number of jerseys}$$

$$y = \$20 + \$10 \cdot x$$

Dominic's team:  $y = \$20 + (\$10 \cdot 14)$      Alyssa's team:  $y = \$20 + (\$10 \cdot 12)$   
 $y = \$160$       $y = \$140$

An **ordered pair**  $(x, y)$  is a pair of numbers that can be used to locate a point on a coordinate plane. A solution of a two-variable equation can be written as an ordered pair.

The ordered pair  $(14, 160)$  is a solution because  $160 = \$20 + (\$10 \cdot 14)$ .  
 The ordered pair  $(12, 140)$  is a solution because  $140 = \$20 + (\$10 \cdot 12)$ .

### EXAMPLE 1

#### Deciding Whether an Ordered Pair Is a Solution of an Equation

Determine whether each ordered pair is a solution of  $y = 3x + 2$ .

#### Helpful Hint

The order in which a solution is written is important. Always write  $x$  first, then  $y$ .

**A**  $(2, 5)$       $y = 3x + 2$   
 $5 \stackrel{?}{=} 3(2) + 2$      *Substitute 2 for  $x$  and 5 for  $y$ .*  
 $5 \neq 8$  **X**     *Simplify.*  
 $(2, 5)$  is *not* a solution.

**B**  $(3, 11)$       $y = 3x + 2$   
 $11 \stackrel{?}{=} 3(3) + 2$      *Substitute 3 for  $x$  and 11 for  $y$ .*  
 $11 = 11$  **✓**     *Simplify.*  
 $(3, 11)$  is a solution.



## EXAMPLE 2 Creating a Table of Ordered Pair Solutions

### Helpful Hint

A table of solutions can be set up vertically or horizontally.

Use the given values to make a table of solutions.

**A**  $y = 8x$  for  $x = 1, 2, 3, 4$

$x$	$8x$	$y$	$(x, y)$
1	$8(1)$	8	(1, 8)
2	$8(2)$	16	(2, 16)
3	$8(3)$	24	(3, 24)
4	$8(4)$	32	(4, 32)

**B**  $n = 4m - 3$  for  $m = -4, -3, -2, -1$

$m$	-4	-3	-2	-1
$4m - 3$	$4(-4) - 3$	$4(-3) - 3$	$4(-2) - 3$	$4(-1) - 3$
$n$	-19	-15	-11	-7
$(m, n)$	(-4, -19)	(-3, -15)	(-2, -11)	(-1, -7)

## EXAMPLE 3 Consumer Math Application

In most states, the price of each item is not the total cost. Sales tax must be added. If sales tax is 6%, the equation for total cost is  $c = 1.06p$ , where  $p$  is the price before tax.

**A** How much will Dominic's \$160 set of jerseys cost after sales tax?  
 $c = 1.06(160)$  *The price of Dominic's set of jerseys before tax is \$160.*  
 $c = 169.6$  *Multiply.*

After tax, Dominic's \$160 set of jerseys will cost \$169.60, so (160, 169.60) is a solution of the equation.

**B** How much will Alyssa's \$140 set of jerseys cost after sales tax?  
 $c = 1.06(140)$  *The price of Alyssa's set of jerseys before tax is \$140.*  
 $c = 148.4$  *Multiply.*

After tax, Alyssa's \$140 set of jerseys will cost \$148.40, so (140, 148.40) is a solution of the equation.

### Think and Discuss

- 1. Describe** how to find a solution of a two-variable equation.
- 2. Explain** why an equation with two variables has an infinite number of solutions.
- 3. Give** two equations using  $x$  and  $y$  that have (1, 2) as a solution.





## GUIDED PRACTICE

See Example 1 Determine whether each ordered pair is a solution of  $y = 2x - 4$ .

1. (3, 2)                      2. (-4, 5)                      3. (6, 8)                      4. (2, 0)

See Example 2 Use the given values to make a table of solutions.

5.  $y = 2x$  for  $x = 1, 2, 3, 4$                       6.  $y = 4x - 1$  for  $x = -4, -3, -2, -1$

See Example 3 7. The cost of a small frozen yogurt is \$2.50 plus \$0.15 per topping. The equation that gives the total cost  $c$  of a small frozen yogurt is  $c = 0.15n + 2.50$ , where  $n$  is the number of toppings. What is the cost of a small frozen yogurt with 3 toppings?

## INDEPENDENT PRACTICE

See Example 1 Determine whether each ordered pair is a solution of  $y = 4x + 3$ .

8. (2, 9)                      9. (4, 20)                      10. (5, 23)                      11. (6, 28)

See Example 2 Use the given values to make a table of solutions.

12.  $y = 2x - 1$  for  $x = 1, 2, 3, 4$                       13.  $y = 3x + 9$  for  $x = -4, -3, -2, -1$   
14.  $y = 4x - 5$  for  $x = 2, 4, 6, 8$                       15.  $y = 3x - 4$  for  $x = 2, 4, 6, 8$

See Example 3 16. The fine for speeding in one town is \$90 plus \$7 for every mile over the speed limit. The equation that gives the total cost  $c$  of a speeding ticket is  $c = 90 + 7m$ , where  $m$  is the number of miles over the posted speed limit. Rhonda was issued a ticket for going 63 mi/h in a 50 mi/h zone. What was the total cost of the ticket?

## PRACTICE AND PROBLEM SOLVING

## Extra Practice

See page EP6.

Determine whether each ordered pair is a solution of  $y = x + 3$ .

17. (4, 7)                      18. (-3, 0)                      19. (5, 8)                      20. (2, 6)

Determine whether each ordered pair is a solution of  $y = 3x - 5$ .

21. (-2, 2)                      22. (4, 8)                      23. (3, 4)                      24. (6, 12)

25. **Multi-Step** A wireless phone company charges a monthly fee of \$39.99 plus \$0.49 per minute for usage that exceeds the included minutes. Write an equation for the monthly cost  $c$  in terms of the number of exceeded minutes  $m$ . Solve the equation to find the cost when the number of exceeded minutes is 29. Write your answer as an ordered pair.

26. **Geometry** The perimeter  $P$  of a square is four times the length of one side  $s$ , or  $P = 4s$ . Is (14, 55) a solution of this equation? If not, find a solution that uses one of the given values.



### History



In 1513, Ponce de León went in search of the legendary Fountain of Youth, which people believed would give them eternal youth. While searching, he discovered Florida, which he named Pascua de Florida.

Use the given values to make a table of solutions.

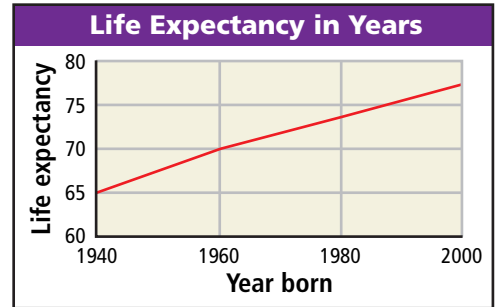
27.  $y = 2x - 2$  for  $x = 1, 2, 3, 4$

28.  $y = 3x - 1$  for  $x = -4, -3, -2, -1$

29.  $y = x + 7$  for  $x = 1, 2, 3, 4$

30.  $y = 3x + 2$  for  $x = 2, 4, 6, 8, 10$

**31. History** The life expectancy of Americans has been rising steadily since 1940. An ordered pair can be used to show the relationship between your birth year and life expectancy.



a. Write an ordered pair that shows the approximate life expectancy of an American born in 1980.

b. The data on the chart can be approximated by the equation  $L = 0.2n - 323$ , where  $L$  is the life expectancy and  $n$  is the year of birth. Use the equation to find an ordered pair that shows the approximate life expectancy for an American born in 2020.

**32. Critical Thinking** Two solutions of an equation are (6, 5) and (8, 5). What could the equation be? Explain.

**33. What's The Error?** A student thinks that (1, 2) is a solution to  $y = 2x - 3$ . While checking the solution, the student gets  $1 = 2(2) - 3$ . What is wrong with this calculation? Explain the error.

**34. Write About It** Write an equation that has (2, 6) as a solution. Explain how you found the equation.

**35. Challenge** In the NBA, a shot made from beyond the arc is worth 3 points. A shot made on or in front of the arc is worth 2 points. If  $x$  equals the number of 3-point baskets scored and  $y$  equals the number of 2-point baskets scored, find the possible solutions of the equation  $36 = 3x + 2y$ .



## Test Prep and Spiral Review

**36. Multiple Choice** Which ordered pair is a solution of  $2y - 3x = 8$ ?

- (A) (6, 13)      (B) (19, 4)      (C) (10, 4)      (D) (4, 0)

**37. Multiple Choice** Which ordered pair is NOT a solution of  $y = 3x - 2$ ?

- (F) (0, -2)      (G) (-2, -8)      (H) (2, 4)      (J) (2, 0)

Solve. (Lesson 2-7)

38.  $y + 10.2 = -33$

39.  $-\frac{x}{3.2} = -4$

40.  $2.6m = -23.4$

Multiply or divide. Write each answer in simplest form. (Lessons 2-4 and 2-5)

41.  $\frac{2}{3} \cdot \frac{9}{10}$

42.  $\frac{4}{5} \cdot \frac{3}{8}$

43.  $\frac{1}{3} \div \frac{2}{3}$

44.  $\frac{11}{15} \div \frac{5}{22}$



# 3-2

# Graphing on a Coordinate Plane

**Learn** to graph points on the coordinate plane.

## Vocabulary

coordinate plane

x-axis

y-axis

quadrant

x-coordinate

y-coordinate

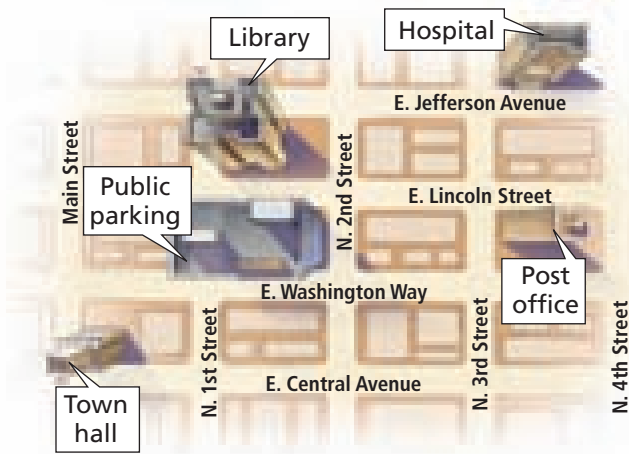
origin

### Helpful Hint

The sign of a number indicates which direction to move.  
Positive: up or right  
Negative: down or left

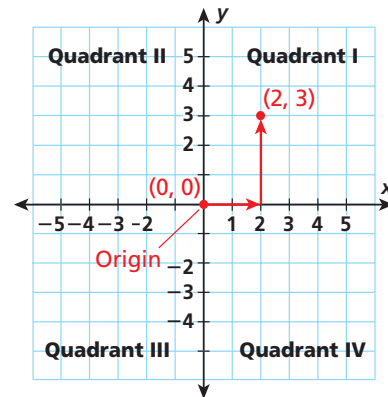
Interactivities Online ►

Mary left a message for Pedro that read, “Meet me at the corner of East Lincoln Street and North Third Street.” On the map, you can identify a location by the intersection of two streets. Finding points on a coordinate plane is like finding a location on a map.



The **coordinate plane** is formed by two number lines, the **x-axis** and the **y-axis**. They intersect at right angles and divide the plane into four **quadrants**. The **x-coordinate** is the first number in an ordered pair. The **y-coordinate** is the second number of an ordered pair.

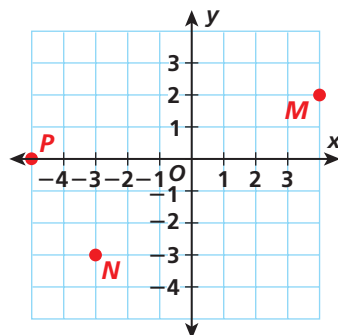
To plot an ordered pair, begin at the **origin**, the point  $(0, 0)$ . It is the intersection of the x-axis and the y-axis. The x-coordinate tells how many units to move left or right; the y-coordinate tells how many units to move up or down.



*move right 2 units* **(2,3)** *move up 3 units*

## EXAMPLE 1 Finding the Coordinates and Quadrants of Points on a Plane

Give the coordinates and quadrant of each point.



Point  $M$  is  $(4, 2)$ ; in Quadrant I.

*4 units right, 2 units up*

Point  $N$  is  $(-3, -3)$ ; in Quadrant III.

*3 units left, 3 units down*

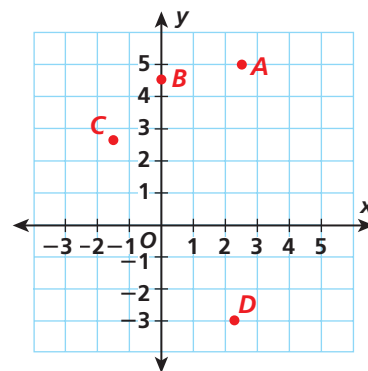
Point  $P$  is  $(-5, 0)$ ; it has no quadrant because  $P$  is on the x-axis.

*5 units left, 0 units up*

## EXAMPLE 2 Graphing Points on a Coordinate Plane

Graph each point on a coordinate plane.

- A**  $A(2.5, 5)$       **B**  $B(0, 4\frac{1}{2})$   
*right 2.5, up 5*    *right 0, up  $4\frac{1}{2}$*
- C**  $C(-1\frac{1}{2}, 2.7)$     **D**  $D(2.3, -3)$   
*left  $1\frac{1}{2}$ , up 2.7*    *right 2.3, down 3*



You can find the horizontal or vertical distance between two points on the coordinate plane by subtracting their  $x$ - or  $y$ -coordinates. Because distance cannot be negative, find the absolute value of the difference.

### DISTANCE BETWEEN POINTS

Given two points  $(x_1, y_1)$  and  $(x_2, y_2)$ :

$$\text{Horizontal distance} = |x_2 - x_1|$$

$$\text{Vertical distance} = |y_2 - y_1|$$

## EXAMPLE 3 Finding Horizontal and Vertical Distances

### Helpful Hint

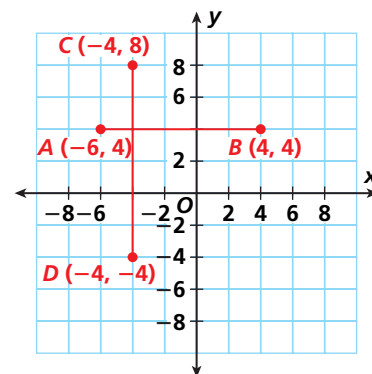
The order of the points does not matter when you find the distance between them. For Example 1A:

$$|4 - (-6)| = |10| = 10$$
$$|-6 - 4| = |-10| = 10$$

Find the distance between each pair of points.

- A**  $A$  and  $B$   
*Use the  $x$ -coordinates.*  
Distance =  $|4 - (-6)|$   
 $= |10|$   
 $= 10$   
The points are 10 units apart.

- B**  $C$  and  $D$   
*Use the  $y$ -coordinates.*  
Distance =  $|-4 - 8|$   
 $= |-12|$   
 $= 12$   
The points are 12 units apart.



### Think and Discuss

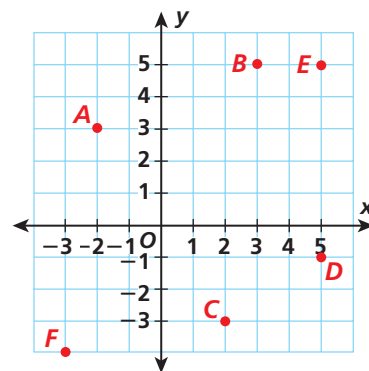
- 1. Explain** how you could find the distance between the points  $(5, 7)$  and  $(5, -8)$  on the coordinate plane.



## GUIDED PRACTICE

See Example 1 Give the coordinates and quadrant of each point.

- |      |      |
|------|------|
| 1. A | 2. B |
| 3. C | 4. D |
| 5. E | 6. F |

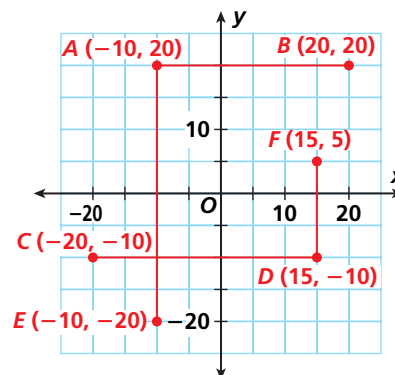


See Example 2 Graph each point on a coordinate plane.

- |                 |                         |                          |                             |
|-----------------|-------------------------|--------------------------|-----------------------------|
| 7. $A(3.5, 4)$  | 8. $B(6, 1\frac{1}{3})$ | 9. $C(-1, 6)$            | 10. $D(2.7, -5\frac{1}{2})$ |
| 11. $E(4.5, 7)$ | 12. $F(6, -2)$          | 13. $G(3, 7\frac{1}{2})$ | 14. $H(1.5, -4)$            |

See Example 3 Find the distance between each pair of points.

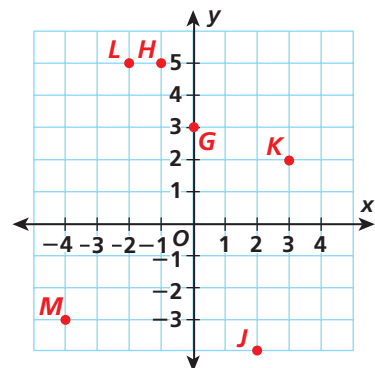
- |             |             |
|-------------|-------------|
| 15. A and B | 16. C and D |
| 17. A and E | 18. F and D |



## INDEPENDENT PRACTICE

See Example 1 Give the coordinates and quadrant of each point.

- |       |       |
|-------|-------|
| 19. G | 20. H |
| 21. J | 22. K |
| 23. L | 24. M |

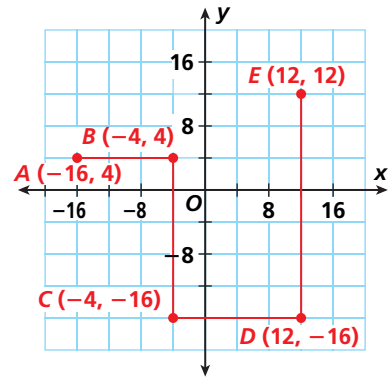


See Example 2 Graph each point on a coordinate plane.

- |                            |                   |                 |                  |
|----------------------------|-------------------|-----------------|------------------|
| 25. $A(2\frac{1}{3}, 6.5)$ | 26. $B(0.7, 4.2)$ | 27. $C(-1, -7)$ | 28. $D(-2.7, 0)$ |
| 29. $E(4\frac{1}{3}, 7)$   | 30. $F(-2, 5)$    | 31. $G(0, 3)$   | 32. $H(6.5, 3)$  |

See Example 3 Find the distance between each pair of points.

- 33.  $A$  and  $B$
- 34.  $B$  and  $C$
- 35.  $C$  and  $D$
- 36.  $D$  and  $E$



### PRACTICE AND PROBLEM SOLVING

#### Extra Practice

See page EP6.

Find the distance between each pair of points.

- 37.  $(5, -4)$  and  $(5, 10)$
- 38.  $(12, 18)$  and  $(30, 18)$
- 39.  $(-8, -7)$  and  $(-22, -7)$
- 40.  $(-4, -12)$  and  $(-4, 15)$
- 41. **Recreation** Monica and Derrick started riding their bikes from the same point. Monica rode 6 kilometers east and 2 kilometers south. Derrick rode 1 kilometer north, 4 kilometers west, and 3 kilometers south.
  - a. Show Monica's and Derrick's paths on a coordinate grid. Let the origin represent their starting point.
  - b. How far apart are Monica and Derrick at the end of their rides?
- 42. **Write About It** The point  $(0, 0)$  on the coordinate plane is called the origin. Explain why this is.
- 43. **Challenge** Write a problem whose solution is a geometric shape on the coordinate plane.

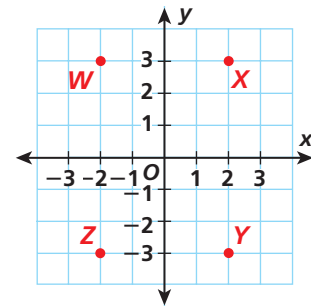
### Test Prep and Spiral Review

44. **Multiple Choice** What is the distance from point  $X$  to point  $Y$ ?

- (A) 3 units
- (B) 4 units
- (C) 6 units
- (D) 9 units

45. **Multiple Choice** Which ordered pair shows the coordinates for point  $W$  on the grid?

- (F)  $(2, 3)$
- (G)  $(-2, 3)$
- (H)  $(2, -3)$
- (J)  $(-2, -3)$



Solve and graph each inequality. (Lesson 1-10)

- 46.  $y + 4 > 1$
- 47.  $4p \leq 12$
- 48.  $f - 3 \geq 2$
- 49.  $4 < \frac{w}{3}$

Determine whether each ordered pair is a solution of  $y = 4x - 3$ . (Lesson 3-1)

- 50.  $(-3, -9)$
- 51.  $(0, -3)$
- 52.  $(-4, -19)$
- 53.  $(5, 23)$

Use with Lesson 3-2



On a graphing calculator, the **WINDOW** menu settings determine which points you see and the spacing between those points. In the standard viewing window, the  $x$ - and  $y$ -values each go from  $-10$  to  $10$ , and the tick marks are one unit apart. The boundaries are set by **Xmin**, **Xmax**, **Ymin**, and **Ymax**. **Xscl** and **Yscl** give the distance between the tick marks.

### Activity

Plot the points  $(2, 5)$ ,  $(-2, 3)$ ,  $(-\frac{3}{2}, 4)$ , and  $(1.75, -2)$  in the standard window. Then change the minimum and maximum  $x$ - and  $y$ -values of the window to  $-5$  and  $5$ .

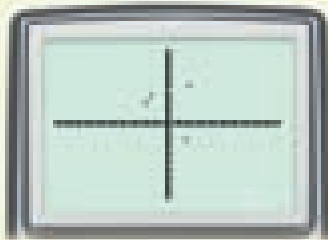
Press **WINDOW** to check that you have the standard window settings.

To plot  $(2, 5)$ , press **2nd** **DRAW** **PRGM** **POINTS** **ENTER**.

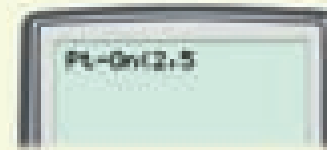
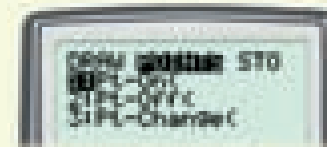
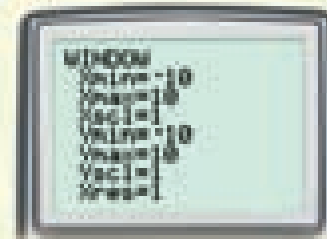
Then press **2** **,** **5** **ENTER**. After you see the grid with a point at

$(2, 5)$ , press **2nd** **QUIT** **MODE** to quit. Repeat the steps above to graph  $(-2, 3)$ ,  $(-\frac{3}{2}, 4)$ , and  $(1.75, -2)$ .

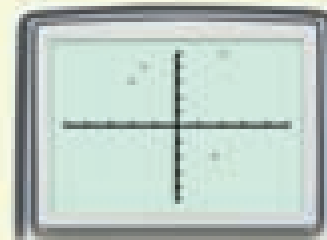
This is the graph in the standard window.



Press **WINDOW**. Change the **Xmin**, **Xmax**, **Ymin**, and **Ymax** values as shown.



Repeat the steps above to graph the points in the new window.



### Think and Discuss

1. Compare the two graphs above. Describe and explain any differences you see.

### Try This

Graph the points  $(-3, -8)$ ,  $(2, 3)$ ,  $(3.5, 6)$ ,  $(4, 9)$ , and  $(-5.5, 11)$  in each window.

1. standard window
2. **Xmin** =  $-10$ ; **Xmax** =  $10$ ; **Ymin** =  $-15$ ; **Ymax** =  $15$ ; **Yscl** =  $3$

# 3-3

## Interpreting Graphs

**Learn** to interpret information given in a graph and to make a graph to model a situation.

### Vocabulary

continuous graph

discrete graph

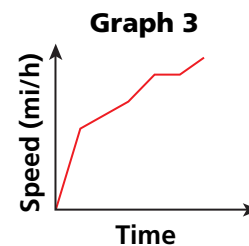
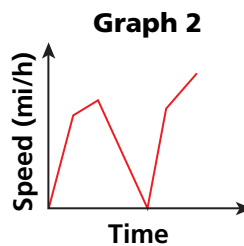
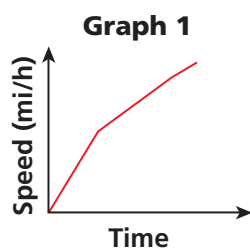
Graphs can be used to model a variety of situations. For example, a graph can show the relationship between a snowboarder's speed during a race and the time since the race began. Trends in the graph indicate whether the snowboarder's speed is increasing or decreasing.

To relate a graph to a given situation, use key words in the description.



### EXAMPLE 1 Matching Situations to Graphs

The graphs show the speeds of three snowboarders during a race. Tell which graph corresponds to each situation.



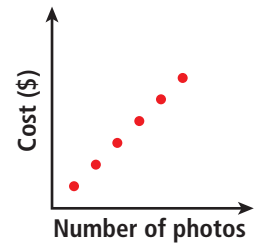
- A** Jordan gets off to a good start and continues through the course, picking up speed.  
Graph 1—The racer's speed increases throughout the race.
- B** Ethan gets off to a good start and picks up speed. Toward the end of the race, he nearly falls and his speed stops increasing. He rights himself and finishes the race, reaching his greatest speed.  
Graph 3—The racer's speed increases for most of the race. Then his speed remains constant for a short period, indicating the point where he nearly fell. The racer then picks up speed to finish the race.
- C** Xavier gets off to a good start but falls around the middle of the race. He gets up and finishes the race, gaining speed through the finish line.  
Graph 2—The racer's speed increases until about halfway through the race, when it drops to 0. A speed of 0 indicates that the racer has stopped or fallen. After this, the racer's speed increases through the finish line.



A **continuous graph** is a graph made up of connected lines or curves. The graphs in Example 1 are continuous graphs.

A **discrete graph** is a graph made up of distinct, or unconnected, points. The graph on photo printing costs is an example of a discrete graph.

Cost of Photo Printing



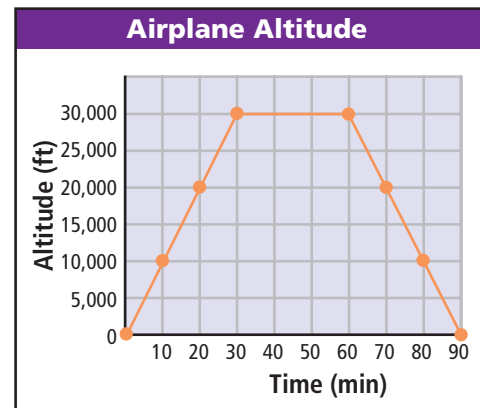
## EXAMPLE 2 Creating a Graph of a Situation

Create a graph for each situation. Tell whether the graph is continuous or discrete.

**A** The table shows the altitude of an airplane over time.

Graph points for the data in the table.

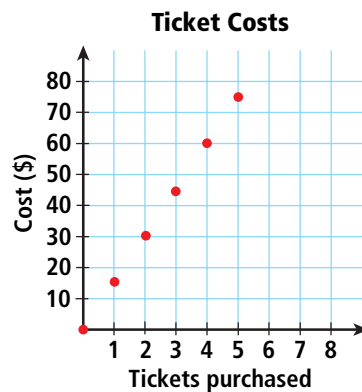
Time (min)	Altitude (ft)
0	0
10	10,000
20	20,000
30	30,000
60	30,000
70	20,000
80	10,000
90	0



Since every value of time has a corresponding altitude, connect the points.

The graph is continuous.

**B** Tickets to a concert cost \$15 each.



The cost (y-axis) increases by \$15 for each ticket purchased (x-axis).

Because each person can only buy whole tickets or none at all, the graph is distinct points.

The graph is discrete.

### Helpful Hint

The plane's altitude cannot change from 0 ft to 10,000 ft without the plane traveling through all the altitudes in between. Therefore, the graph showing the altitude is continuous.

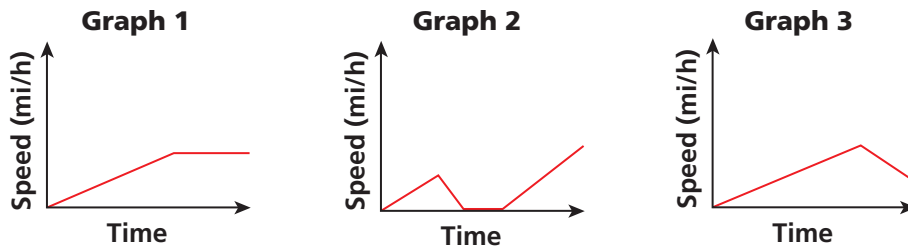
### Think and Discuss

- 1. Give** a situation that, when graphed, would include a horizontal segment.



## GUIDED PRACTICE

See Example 1 The graphs give the speeds in mi/h of three people who are riding snowmobiles. Tell which graph corresponds to each situation.



- David begins his ride slowly but then stops to talk with some friends. After a few minutes, he continues his ride, gradually increasing his speed.
- Amber steadily increases her speed through most of her ride. Then she slows down as she nears some trees.
- Kai steadily increases his speed for the first part of his ride. He then keeps a constant speed as he continues his ride.

See Example 2 Create a graph for each situation. Tell whether the graph is continuous or discrete.

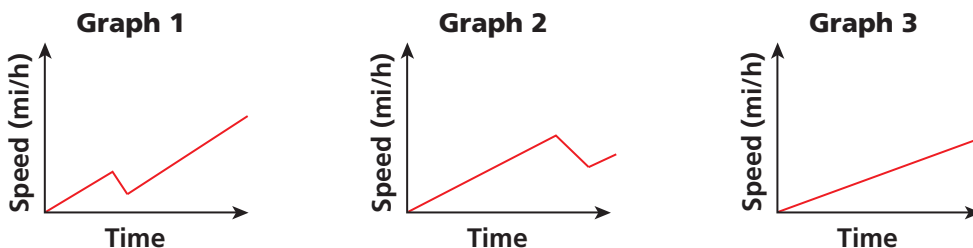
- The table shows the speed of a ride at an amusement park at various times.

Time	3:20	3:21	3:22	3:23	3:24	3:25
Speed (mi/h)	0	14	41	62	8	0

- A Web site charges \$0.90 for each song a customer downloads. Melanie can download no more than 3 songs.

## INDEPENDENT PRACTICE

See Example 1 The graphs give the speeds in mi/h of three dogs during an obstacle course race. Tell which graph corresponds to each situation.



- Brandy increases her speed throughout the race.
- Bruno starts well but soon has to slow down to run around cones. After this, he steadily increases his speed.
- Max gets off to a fast start and picks up speed. He slows down near the end of the race for a tunnel but then increases his speed right afterward.



See Example 2 Create a graph for each situation. Tell whether the graph is continuous or discrete.

9. The table shows the relationship between the number of targets a person hits in a game of laser tag and that person's score.

Targets hit	0	1	2	3	4	5	6
Score	0	8	16	24	32	40	48

10. The table shows the temperature of a fish tank during an experiment.

Time (h)	0	1	2	3	4	5
Temperature (°F)	82	80	78	76	74	72

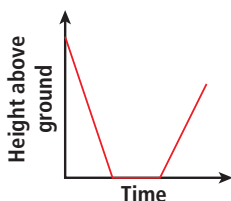
## PRACTICE AND PROBLEM SOLVING

### Extra Practice

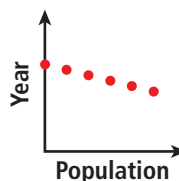
See page EP6.

Write a possible situation for each graph.

11.



12.



Tell whether each situation would be represented by a continuous graph or a discrete graph.

13. A bookstore has 12 copies of a bestseller. Each copy is on sale for \$16.00.
14. The volume of water in a swimming pool steadily decreases by 20 gallons per minute for a period of 3 hours.
15. The table shows the number of passengers on a subway after various stops.

Stop	1	2	3	4	5	6
Passengers	22	30	36	32	32	18

16. **Security** Create a graph that illustrates the information in the table about the movement of an electronic security gate.

Time (s)	0	10	20	30	40	50	60	70
Gate Opening (ft)	0	6	12	12	6	10	3	0

17. **Physical Science** Explain what the data set tells about the flight of a model rocket. Make a graph.

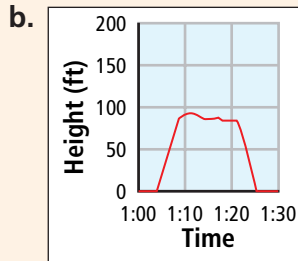
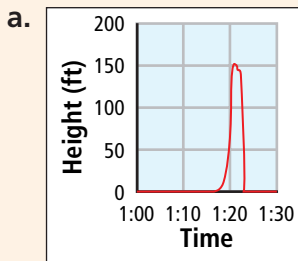
Height of Model Rocket								
Time	1:00	1:01	1:02	1:03	1:04	1:05	1:06	1:07
Average Height (ft)	0	147	153	155	152	148	0	0



18. **Write About It** Give an example of a situation from your own life that could be modeled by a continuous graph.

19. Use the chart to choose the correct geyser name to label each graph.

Yellowstone National Park Geysers			
Geyser Name	Old Faithful	Grand	Riverside
Duration (min)	1.5 to 5	10	20



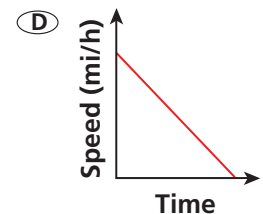
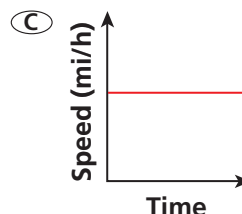
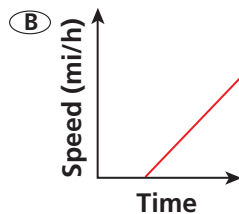
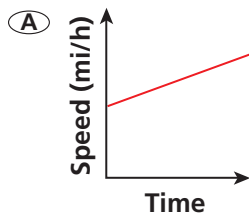
Old Faithful is the most famous geyser at Yellowstone National Park.

20. **Challenge** Old Faithful erupts to heights between 105 ft and 184 ft. It erupted at 7:34 A.M. for 4.5 minutes. Later it erupted for 2.5 minutes. It then erupted a third time for 3 minutes. Use the table to determine how many minutes followed each of the three eruptions. Sketch a possible graph of height over time.

Old Faithful Eruption Information	
Duration	Time Until Next Eruption
2.5 min	70 min
3 min	72 min
3.5 min	74 min
4 min	82 min
4.5 min	93 min

## Test Prep and Spiral Review

21. **Multiple Choice** Which graph most likely represents a car approaching a stop sign?



22. **Short Response** Lisa climbed up to the diving board, dove into the water, swam 10 meters, and returned to the surface of the water. Draw a graph to represent her distance from the surface of the water.

Add or subtract. (Lesson 2-6)

23.  $\frac{5}{7} + \frac{2}{3}$

24.  $\frac{4}{9} + \left(-1\frac{3}{4}\right)$

25.  $\frac{3}{5} - \frac{7}{10}$

26.  $2\frac{7}{9} - 1\frac{8}{11}$

Graph each point on a coordinate plane. (Lesson 3-2)

27.  $A(-3, 4)$

28.  $B(2, -7)$

29.  $C(-5, -1)$

30.  $D(0, 1)$

## Quiz for Lessons 3-1 Through 3-3



### 3-1 Ordered Pairs

Determine whether each ordered pair is a solution of  $y = 2x - 7$ .

1. (14, 21)      2. (3, 13)      3. (10, 13)      4. (1.5, -4)

When dining out, it is customary to give a tip to the server. The amount of the tip is generally 15 to 20 percent of the total bill. The equation for the cost  $c$  of a meal, including a 15 percent tip, is  $c = 1.15a$ , where  $a$  is the total amount shown on the bill. Find the total cost of each meal to the nearest cent.

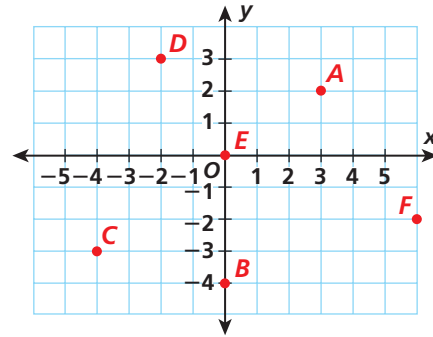
5.  $a = \$35.20$       6.  $a = \$40.00$       7.  $a = \$22.35$       8.  $a = \$15.50$



### 3-2 Graphing on a Coordinate Plane

Give the coordinates and quadrant of each point.

9. A      10. B  
 11. C      12. D  
 13. E      14. F



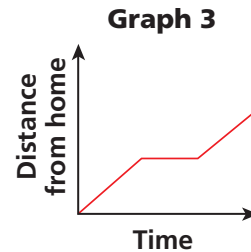
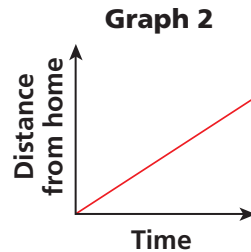
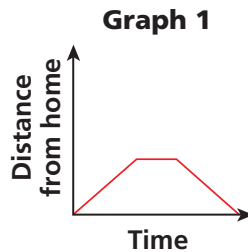
Graph each point on a coordinate plane.

15.  $A(-3, -4)$       16.  $B(4, 0)$       17.  $C(-2, 2)$       18.  $D(5, -3)$



### 3-3 Interpreting Graphs

Tell which graph corresponds to each situation below.



19. Gwendolyn started from home and walked to a friend's house. She stayed with her friend for a while and then walked to another friend's house farther from home.
20. Francisco started from home and walked to the store. After shopping, he walked back home.
21. Celia walks to the library at a steady pace without stopping.

# Focus on Problem Solving



## Make a Plan

- Prioritize and sequence information

Some problems contain a lot of information. Read the entire problem carefully to be sure you understand all of the facts. You may need to read it over several times—perhaps aloud so that you can hear yourself say the words.

Then decide which information is most important (prioritize). Is there any information that is absolutely necessary to solve the problem? This information is most important.

Finally, put the information in order (sequence). Use comparison words like *before*, *after*, *longer*, *shorter*, and so on to help you. Write down the sequence before you try to solve the problem.

 Read each problem below, and then answer the questions that follow.

- 1 Five friends are standing in line for the opening of a movie. They are in line according to their arrival. Tiffany arrived 3 minutes after Cedric. Roy took his place in line at 8:01 P.M. He was 1 minute behind Celeste and 7 minutes ahead of Tiffany. The first person arrived at 8:00 P.M. Blanca showed up 6 minutes after the first person. List the time of each person's arrival.
  - a. Whose arrival information helped you determine each arrival time?
  - b. Can you determine the order without the time?
  - c. List the friends' order from the earliest to arrive to the last to arrive.
- 2 There are four children in the Putman family. Isabelle is half the age of Maxwell. Joe is 2 years older than Isabelle. Maxwell is 14. Hazel is twice Joe's age and 4 years older than Maxwell. What are the ages of the children?
  - a. Whose age must you figure out first before you can find Joe's age?
  - b. What are two ways to figure out Hazel's age?
  - c. List the Putman children from oldest to youngest.



# 3-4

# Functions

**Learn** to represent functions with tables, graphs, or equations.

A set of ordered pairs is called a **relation**. The **domain** of a relation is the set of  $x$ -values of the ordered pairs. The **range** of a relation is the set of  $y$ -values of the ordered pairs.

A **function** is a special type of relation that pairs each *input*, or domain value, with exactly one *output*, or range value.

## Vocabulary

**relation**

**domain**

**range**

**function**

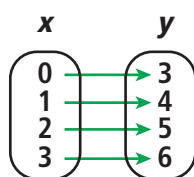
**independent variable**

**dependent variable**

**vertical line test**

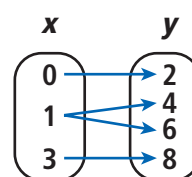
### Function

Each input gives only one output.



### Not a Function

One input gives more than one output.



Some functions can be written as equations in two variables. The **independent variable** represents the input of a function. The **dependent variable** represents the output of a function.

**Function Rule**

$$y = 2x + 9$$

↑ **Dependent variable**     ↑ **Independent variable**

Functions can also be represented in tables and graphs. If the domain of a function has infinitely many values, it is impossible to represent all of the values in a table, but a table can be used to show some of the values and to help in creating a graph.

## EXAMPLE 1

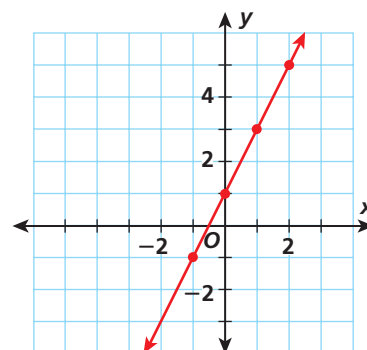
### Finding Different Representations of a Function

Make a table and a graph of  $y = 2x + 1$ .

Make a table of inputs and outputs. Use the table to make a graph.

[Interactivities Online](#) ▶

$x$	$2x + 1$	$y$
-2	$2(-2) + 1$	-3
-1	$2(-1) + 1$	-1
0	$2(0) + 1$	1
1	$2(1) + 1$	3
2	$2(2) + 1$	5



Because a function has exactly one output for each input, you can use the **vertical line test** to test whether a graph is a function. If no vertical line intersects the graph at more than one point, then the relation is a function. If any vertical line intersects the graph at more than one point, then the relation is not a function.

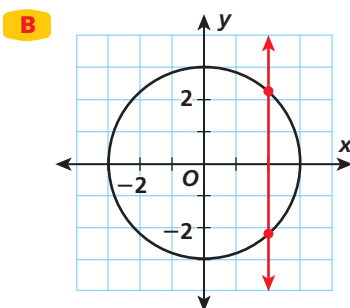
## EXAMPLE 2 Identifying Functions

Determine if each relation represents a function.

**A**

$x$	$y$
0	5
1	4
2	3
3	2

Each input  $x$  has only one output  $y$ .  
The relation is a function.

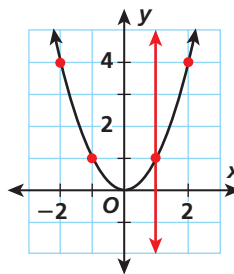


Use the vertical line test. The vertical line shown intersects the graph at two points. The relation is not a function.

**C**  $y = x^2$

Make an input-output table and use it to graph  $y = x^2$ .

$x$	$y$
-2	$(-2)^2 = 4$
-1	$(-1)^2 = 1$
0	$(0)^2 = 0$
1	$(1)^2 = 1$
2	$(2)^2 = 4$



No vertical line will intersect the graph at more than one point. The relation is a function.

### Think and Discuss

- Describe** the domain and range for  $y = 2$ .
- Describe** how to tell if a relation is a function.
- Identify** the function, the domain, the range, the independent variable, the dependent variable, an input, and the output.

$x$	$y = 3x - 4$	$y$
-1	$3(-1) - 4$	-7
0	$3(0) - 4$	-4
1	$3(1) - 4$	-1





## GUIDED PRACTICE

See Example 1 Make a table and a graph of each function.

1.  $y = 2x - 4$

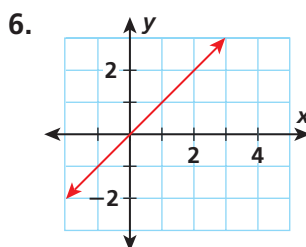
2.  $y = 3x + 4$

3.  $y = 4x - 3$

4.  $y = -x + 1$

See Example 2 Determine if each relation represents a function.

5. $x$	$y$
-1	-7
9	1
12	8
15	-7



7.  $y = 1.5x - 0.5$

## INDEPENDENT PRACTICE

See Example 1 Make a table and a graph of each function.

8.  $y = 2x + 5$

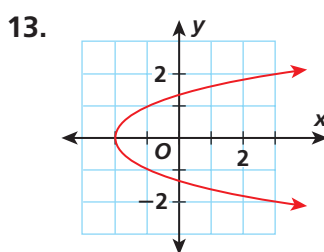
9.  $y = 3(x + 1)$

10.  $y = -(3 - x)$

11.  $y = 2(1 - 2x)$

See Example 2 Determine if each relation represents a function.

12. $x$	$y$
2	4
5	5
8	6
2	7



14.  $y = -2x + 1$

## PRACTICE AND PROBLEM SOLVING

## Extra Practice

See page EP7.

Give the domain and the range of each function.

15. $x$	$y$
1	27
4	39
8	50
14	62

16. $x$	$y$
100	5.4
120	3.5
150	2.7
170	0.2

17. $x$	$y$
30	60
40	50
50	40
60	30

18. $x$	$y$
20	12
25	15
35	21
40	24

19. **Sports** A distance runner trains by running 750 meters at a time. Her coach records the distance covered by the runner every 20 seconds. The results of one run are presented in the table.

Time $x$ (s)	0	20	40	60	80	100
Distance $y$ (m)	0	150	300	450	600	750

- Does the relation represent a function?
- Graph the data to verify your answer for part a.
- Is the graph of the relation discrete or continuous? Explain.



## Home Economics



In 1879, Thomas Edison used a carbonized piece of sewing thread to form a light bulb filament that lasted 13.5 hours before burning out.

20. **Business** The function  $y = 50x - 750$  gives the daily profit of a company that manufactures  $x$  items. Make a table of the function to determine how many items the company must manufacture in order to break even. (*Hint:* When the company breaks even,  $y = 0$ .)

21. **Home Economics** The cost of using a 60-watt light bulb is given by the function  $y = 0.0036x$ . The cost is in dollars, and  $x$  represents the number of hours the bulb is lit.

- How much does it cost to use a 60-watt light bulb 8 hours a day for a week?
- What is the domain of the function?
- What do the independent and dependent variables of the function represent? How does a change in the independent variable affect the value of the dependent variable?
- If the cost of using a 60-watt bulb was \$1.98, for how many hours was it used?

22. **What's the Question?** The following set of points defines a function:  $\{(3, 6), (-4, 1), (5, -5), (9, -6), (10, -2), (-2, 10)\}$ . If the answer is 6, 1, -5, -6, -2, and 10, what is the question?



23. **Write About It** Can you tell if a relation is a function by just looking at the range? Explain why or why not.



24. **Challenge** Create a table of values for  $y = \frac{1}{x}$  using  $x = -3, -2, -1, -0.5, -0.25, 0.5, 1, 2$ , and 3. Sketch the graph of the function. What happens when  $x = 0$ ?



## Test Prep and Spiral Review

25. **Multiple Choice** Which relation does NOT represent a function?

(A)  $(0, 8), (3, 8), (1, 6)$

(C)  $y = 3x + 17$

(B)

$x$	4	6	8
$y$	2	1	9

(D)  $(0, 3), (2, 3), (2, 0)$

26. **Gridded Response** For the function  $y = 1.3x - 5.4$ , find  $y$  when  $x = 9$ .

Evaluate each expression for the given value of the variable. (Lesson 1-6)

27.  $7 - t$  for  $t = -16$

28.  $f - (-31)$  for  $f = 76$

29.  $-28 - g$  for  $g = 32$

30.  $65 + b$  for  $b = -101$

31.  $89 - d$  for  $d = -15$

32.  $62 - (-m)$  for  $m = 71$

Solve. Check your answer. (Lesson 2-7)

33.  $n + 10.7 = -23$

34.  $-6.8x = 47.6$

35.  $-\frac{2}{3}m = -\frac{1}{9}$



# 3-5

# Equations, Tables, and Graphs

**Learn** to generate different representations of the same data.

Many functions can be modeled as equations, tables, or graphs. Each representation shows the same data, but in a different way. For example, you can use an equation, a table, or a graph to show a submersible's depth over time.



## EXAMPLE 1 Using Equations to Generate Different Representations of Data

### Helpful Hint

The number of minutes  $m$  is the independent, or input, variable. The depth  $d$  is the dependent, or output, variable.

Make a table and sketch a graph of the path of a submersible diving at 50 ft per minute. The depth of the submersible is represented by the equation  $d = -50m$ , where  $d$  is the depth and  $m$  is the number of minutes.

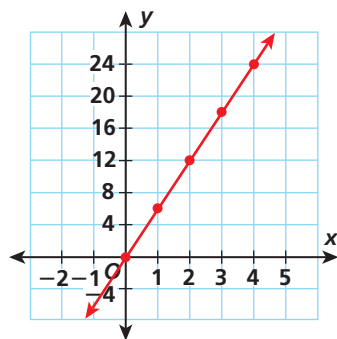
Equation	Table	Graph																		
$d = -50m$ <p><i>An equation shows how the variables are related.</i></p>	<table border="1"> <thead> <tr> <th><math>m</math></th> <th><math>-50m</math></th> <th><math>d</math></th> </tr> </thead> <tbody> <tr> <td>0</td> <td><math>-50(0)</math></td> <td>0</td> </tr> <tr> <td>1</td> <td><math>-50(1)</math></td> <td>-50</td> </tr> <tr> <td>2</td> <td><math>-50(2)</math></td> <td>-100</td> </tr> <tr> <td>3</td> <td><math>-50(3)</math></td> <td>-150</td> </tr> <tr> <td>4</td> <td><math>-50(4)</math></td> <td>-200</td> </tr> </tbody> </table> <p><i>A table identifies values that make the function true.</i></p>	$m$	$-50m$	$d$	0	$-50(0)$	0	1	$-50(1)$	-50	2	$-50(2)$	-100	3	$-50(3)$	-150	4	$-50(4)$	-200	<p><i>A graph is a visual image of the values in the table. In this case, the graph is continuous, so draw a line through the points.</i></p>
$m$	$-50m$	$d$																		
0	$-50(0)$	0																		
1	$-50(1)$	-50																		
2	$-50(2)$	-100																		
3	$-50(3)$	-150																		
4	$-50(4)$	-200																		

To write an equation from data in a table, you need to look for a pattern in the data. Look for the changes in the input values and the changes in the output values. Then see how the changes are related.

## EXAMPLE 2 Using Tables to Generate Different Representations of Data

Use the table to make a graph and to write an equation.

x	0	1	2	3	4
y	0	6	12	18	24



Look for a pattern in the values:

$$6 = 6 \cdot 1 \quad \text{Each value of } y \text{ is six}$$
$$12 = 6 \cdot 2 \quad \text{times the value of } x.$$

$$18 = 6 \cdot 3$$

$$y = 6 \cdot x$$

To find an equation from a graph, it might be easier to first create a table of values from the graph. Then you can look for a pattern in the values as in Example 2.

## EXAMPLE 3 Using Graphs to Generate Different Representations of Data

Use the graph to make a table and to write an equation.

Use the coordinates of several points from the graph.

x	y
-2	-1
-1	0
0	1
2	3

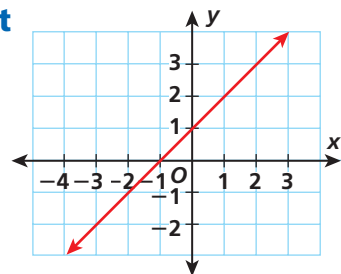
$$-1 = -2 + 1$$

$$0 = -1 + 1$$

$$1 = 0 + 1$$

$$3 = 2 + 1$$

$$y = x + 1$$



Each value of  $y$  is one more than the value of  $x$ .

### Think and Discuss

1. **Which** representation of data do you think gives the most accurate information? Justify your answer.
2. **Which** representation of data do you think shows the relationship most quickly? Justify your answer.



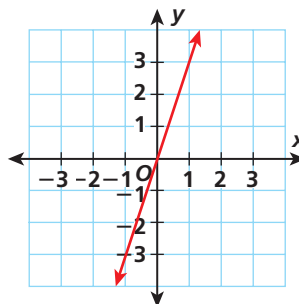
## GUIDED PRACTICE

- See Example 1 1. The amount of water in a pool being filled is represented by the equation  $g = 15m$ , where  $g$  is the number of gallons of water in the pool and  $m$  is the number of minutes since filling began. Make a table and sketch a graph of the equation.

- See Example 2 2. Use the table to make a graph and to write an equation.

$x$	0	2	5	9	12
$y$	3	5	8	12	15

- See Example 3 3. Use the graph to make a table and to write an equation.



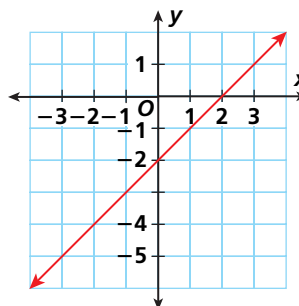
## INDEPENDENT PRACTICE

- See Example 1 4. The amount of sand in the bottom half of an hourglass is represented by the equation  $h = 0.1s$ , where  $h$  is the height of the sand in centimeters and  $s$  is the number of seconds since the top half began draining. Make a table and sketch a graph of the equation.

- See Example 2 5. Use the table to make a graph and to write an equation.

$x$	0	2	4	6	8
$y$	12	10	8	6	4

- See Example 3 6. Use the graph to make a table and to write an equation.



## PRACTICE AND PROBLEM SOLVING

## Extra Practice

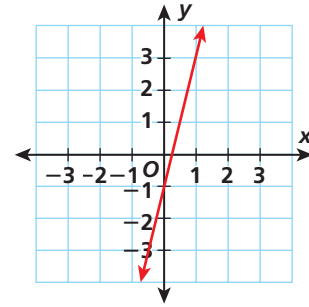
See page EP7.

7. **Travel** The distance Jackson can drive on a tank of gas is represented by the function  $d = 20g$ , where  $d$  is the distance in miles and  $g$  is the number of gallons of gas in the tank. Make a table and sketch a graph of the data.

8. Choose the representation that does not show the same relationship as the other two.

$$y = 4x + 1$$

<b>x</b>	0	3	6	9	12
<b>y</b>	1	13	25	37	49



9. **Conservation** A faucet is leaking water at the rate of 2.5 gallons per hour. Let  $x$  be the number of hours the faucet leaks and  $y$  be the total number of gallons leaked. Write an equation and make a table.
10. **Physical Science** The weight of an object on Saturn's moon Titan is about 0.14 of its weight on Earth.
- Write and graph an equation that describes this relationship.
  - Estimation** Use your graph to estimate the weight on Titan of a space probe that weighs 703 pounds on Earth.
11. **Write a Problem** Write a problem that involves the equation  $y = 2x + 3$ .
12. **Write About It** Tell how you can use data from a table to write an equation.
13. **Challenge** Graph the function  $y = |x|$ . Be sure to include negative values of  $x$ . How does the graph differ from the others in this lesson?



## Test Prep and Spiral Review

14. **Multiple Choice** Jeff began the week with \$30.00. He took a city bus to and from school, paying \$0.75 for each trip. Let  $x$  be the number of trips he took and  $y$  be the amount of money he had left at the end of the week. Which equation represents the relationship in the situation?
- (A)  $y = 0.75x + 30$                       (C)  $x = 3 - 0.75y$
- (B)  $y = 30 - 0.75x$                       (D)  $y = 0.75x - 30$
15. **Extended Response** The equation  $y = 2.5x - 2000$  represents the profit made by a manufacturer that sells a product for \$2.50 each, where  $y$  is the profit and  $x$  is the number of units sold. Construct a table to find the number of units that must be sold for the manufacturer to break even. The break-even point is where profit is equal to 0. Explain the data in the table.

Simplify. (Lesson 1-7)

16.  $-3(-9)$

17.  $7(-3)$

18.  $\frac{2(-6)}{4}$

19.  $\frac{-8(-5)}{-10}$

Solve. Check your answer. (Lesson 2-8)

20.  $5p - 2 = 0$

21.  $\frac{s}{4} + 8 = 12$

22.  $12 - 3x = -6$

# Use Multiple Representations

Use with Lesson 3-5

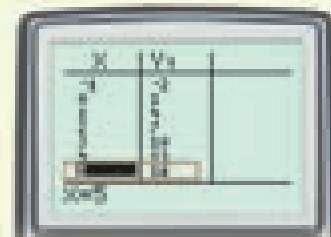
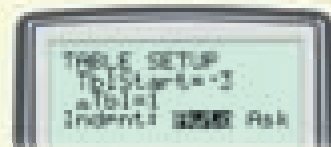
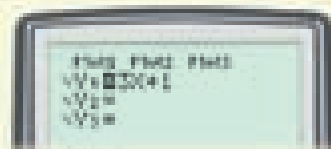


You can use a graphing calculator to generate a table and a graph from an equation.

## Activity 1

Use a graphing calculator to make a table of values for the function  $y = 3x + 1$ . Then, use the table to find the value of  $y$  when  $x = 5$ .

- To enter an equation in the calculator, press **Y=**. Then, enter the function rule. In this case, press 3 **X,T,θ,n** + 1.
- Next, adjust the table settings. Press **2nd** **WINDOW**. The Table Start value (**TblStart**) sets the first value of  $x$  to be displayed in the table. The Table Step value (**ΔTbl**) sets the difference between  $x$ -values in the table. For this example, set the Table Start value to  $-3$  and the Table Step value to 1.
- Display the table by pressing **2nd** **TABLE** **GRAPH**. Notice that the first  $x$ -value in the table is  $-3$  and that the difference between  $x$ -values in the table is 1.
- Find the value of  $y$  when  $x = 5$ . The greatest value of  $x$  in the previous table screen is 3. To see the row for  $x = 5$ , scroll down by pressing the down arrow key. The table shows that  $y = 16$  when  $x = 5$ .



## Think and Discuss

- Other than using a graphing calculator, how else could you find the value of  $y$  when  $x = 5$  in Activity 1? Which method is easiest?
- How could you use the table to find the value of  $y$  when  $x = -5$ ?

## Try This

Use a graphing calculator to make a table of values for each function. Then, use the table to find the value of the function for the given value of  $x$ .

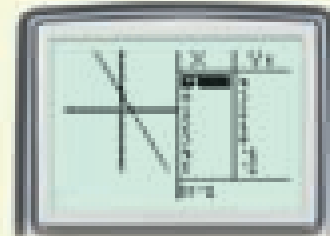
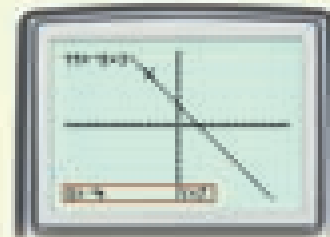
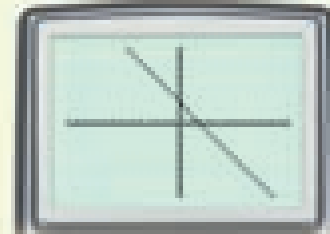
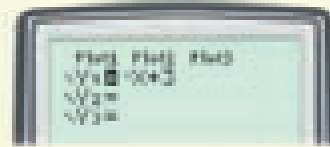
- $y = 4x + 6$ ;  $x = 6$
- $y = 3x - 5$ ;  $x = 10$
- $y = -3x$ ;  $x = 4$
- $y = -2x - 4$ ;  $x = -2$

## Activity 2

Use a graphing calculator to graph the function  $y = -x + 3$ . Then, use the graph to find the value of  $y$  when  $x = -4$ .

- 1 Enter the equation in the calculator, as shown in Activity 1. Be sure to use the  $(-)$  key instead of the subtraction key to enter the negative sign.
- 2 Next, select the square window to display the graph. In a square window, the distance between tick marks on the  $x$ -axis is the same as the distance between tick marks on the  $y$ -axis. Press **ZOOM** and select **5: ZSquare**. When you press **ENTER**, the graph of the equation is displayed.
- 3 Use the Trace feature to find the value of  $y$  when  $x = -4$ . Press **TRACE**. Enter the value  $-4$  for  $x$ , and press **ENTER**. The calculator shows that  $y = 7$  when  $x = -4$ . It also displays an X at the point  $(-4, 7)$ .

You can also use a graphing calculator to display a table and a graph on the same screen. To do so, press **MODE**. Use the down arrow key to move the cursor to the last row. Then select **G-T**, which stands for Graph-Table. Press **ZOOM** and select **5: ZSquare**. The table and the graph of  $y = -x + 3$  appear together.



## Think and Discuss

1. How could you check whether the calculator graphed the function correctly?
2. **Make a Conjecture** How could you use a graphing calculator to determine whether the graph of a function is a line?

## Try This

Use a graphing calculator to graph each function. Then, use the graph to find the value of the function for the given value of  $x$ .

1.  $y = x - 5$ ;  $x = 3$
2.  $y = 2x + 4$ ;  $x = -2$
3.  $y = -0.25x$ ;  $x = 2$
4.  $y = -x + 3$ ;  $x = -5$
5. Use a graphing calculator to show a table and a graph of  $y = x + 6$  on the same screen.

## Quiz for Lessons 3-4 Through 3-5



### 3-4 Functions

Make a table and a graph of each function.

1.  $y = x + 7$

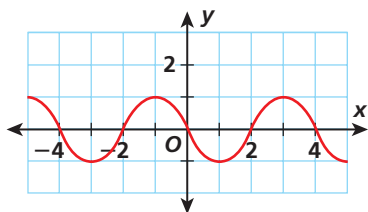
2.  $y = 4x + 2$

3.  $y = \frac{2}{3}x + \frac{1}{3}$

4.  $y = 5.2x$

Determine if each relation represents a function.

5.



6.

$x$	$y$
0	9
1	8
2	7
3	8

7.  $y = 4x - 8$

8.  $y = x^2$

9. The table shows the costs of various numbers of tickets to an amusement park.

Tickets	1	2	5	10	20
Cost (\$)	20	36	85	160	300

- Graph the data in the table.
- Does the relation in the table represent a function? Explain how you know.
- What is the domain of the relation in the table? What is the range?



### 3-5 Equations, Tables, and Graphs

Use each table to make a graph and to write an equation.

10.

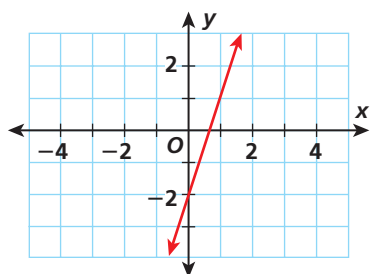
$x$	2	4	6	8
$y$	13	19	25	31

11.

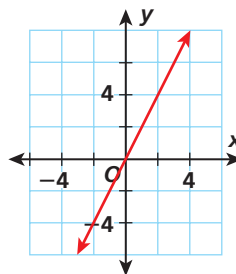
$x$	3	6	9	12
$y$	3.5	5	6.5	8

Use each graph to make a table and to write an equation.

12.

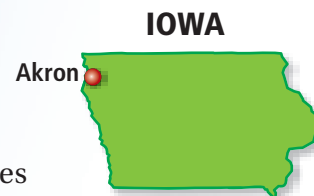


13.



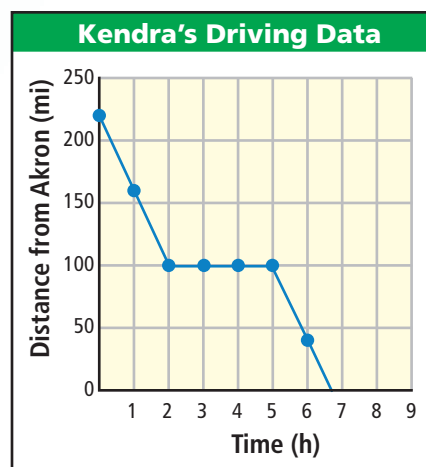
14. The number of tons of plankton that a blue whale eats during the summer is represented by the equation  $p = 8d$ , where  $d$  is the number of days. Make a table and sketch a graph of the equation.

**Loess Hills Scenic Byway** Winding its way along the western edge of Iowa, the Loess Hills Scenic Byway gives motorists a view of a remarkable landscape. Highlights along the 220-mile route include unusual landforms such as rippled hills and steep ridges that are found in only two places on Earth: western Iowa and along the Yellow River in China.



1. Scott starts at the Iowa-Missouri border and drives at an average speed of 40 mi/h to the end of the Loess Hills Scenic Byway in Akron, Iowa. His distance from Akron is given by the equation  $y = 220 - 40x$ , where  $y$  is the distance from Akron in miles and  $x$  is the time in hours. Complete the table of data for Scott's drive.
2. Graph the data from the table on a coordinate plane.
3. How far is Scott from Akron after 5 hours? Explain how you determined your answer.
4. When  $y = 0$ , the equation becomes  $0 = 220 - 40x$ . Solve this equation for  $x$ . What does the solution represent?
5. Kendra makes the same drive as Scott. The graph shows her data. Describe Kendra's drive in words. What do you think happened after 2 hours?

Scott's Driving Data	
Time (h)	Distance from Akron (mi)
0	■
1	■
2	■
3	■





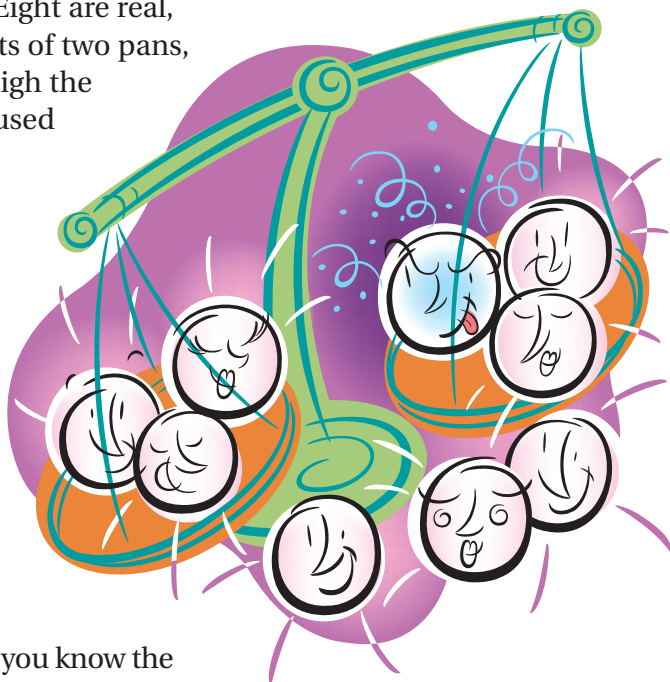
# Game Time

## Find the Phony!

Suppose you have nine identical-looking pearls. Eight are real, and one is fake. Using a balance scale that consists of two pans, you must find the bogus pearl. The real pearls weigh the same, and the fake weighs less. The scale can be used only twice. How can you find the phony?

First you must split the pearls into equal groups. Place any three pearls on one side of the scale and any other three on the other side. If one side weighs less than the other, then the fake pearl is on that side. But you are not done yet! You still need to find the imitation, and you can use the scale only once more. Take any of the two pearls from the lighter pan, and weigh them against each other. If one pan is lighter, then that pan contains the fake pearl. If they balance, then the leftover pearl of the group is the fake.

If the scale balances during the first weighing, then you know the fake is in the third group. Then you can choose two pearls from that group for the second weighing. If the scale balances, the fake is the one left. If it is unbalanced, the false pearl is the lighter one.



## You Play Detective

Suppose you have 12 identical gold coins in front of you. One is counterfeit and weighs slightly more than the others. How can you identify the counterfeit in three weighings?

## Sprouts

You and a partner play against each other to try to make the last move in the game. You start with three dots. Player one draws a path to join two dots or a path that starts and ends at the same dot. A new dot is then placed somewhere on that path. No dot can have more than three paths drawn from it, and no path can cross another.

A complete copy of the rules is available online.

 **Learn It Online**  
Game Time Extra [go.hrw.com](http://go.hrw.com),  
keyword MT10 Games 



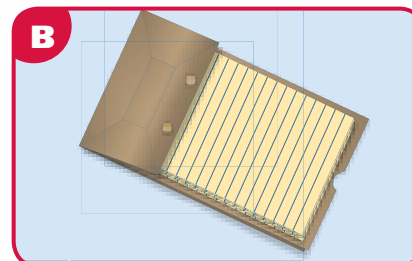
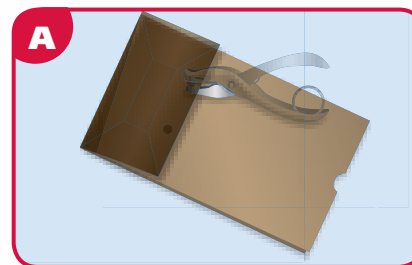


## PROJECT Clipboard Solutions for Graphs and Functions

Make your own clipboard for taking notes on graphs and functions.

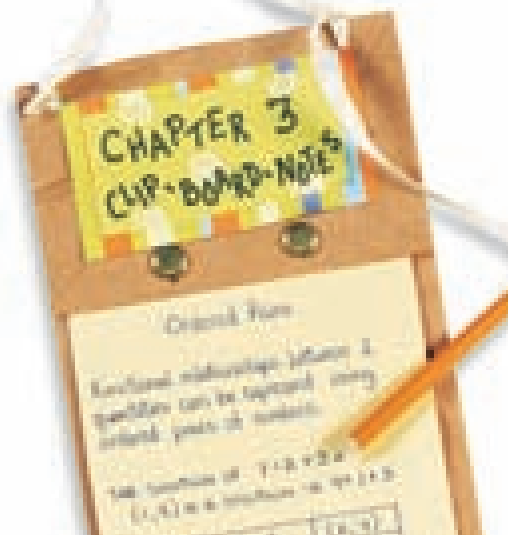
### Directions

- 1 Fold the bag flat and hold it with the flap at the top. Punch two holes at the bottom of the flap, about 3 inches apart. The holes should go through only the flap, not the entire bag. **Figure A**
- 2 Slide about ten sheets of lined paper under the flap and mark where the holes should be punched. Then punch holes through the sheets.
- 3 Fasten the sheets under the flap using brass fasteners. **Figure B**
- 4 Punch holes in the upper left and upper right corners of the flap. Tie one end of the string to the left-hand hole. Thread the string through the right-hand hole and tie it there, leaving some slack at the top of the bag. Tie the golf pencil to the end of the string. **Figure C**
- 5 Slide a piece of card stock into the bag to make it more sturdy.



### Taking Note of the Math

Summarize each lesson of the chapter on a separate page of the clipboard. Use any extra pages to write down sample problems.



## Vocabulary

continuous graph	130	independent variable	136	vertical line test	137
coordinate plane	124	ordered pair	120	x-axis	124
dependent variable	136	origin	124	x-coordinate	124
discrete graph	130	quadrant	124	y-axis	124
domain	136	range	136	y-coordinate	124
function	136	relation	136		

Complete the sentences below with vocabulary words from the list above.

- The \_\_\_?\_\_\_ of a relation is the set of  $y$ -values of the ordered pairs.
- A(n) \_\_\_?\_\_\_ is a mathematical relation in which each input corresponds to exactly one output.
- The \_\_\_?\_\_\_ is the point  $(0, 0)$  on a coordinate plane.
- The \_\_\_?\_\_\_ is a method for testing whether or not a graph represents a function.
- The coordinate plane is formed by the intersection of two number lines called the \_\_\_?\_\_\_ and the \_\_\_?\_\_\_.

## EXAMPLES

## 3-1 Ordered Pairs (pp. 120–123)

- Determine whether  $(8, 3)$  is a solution of the equation  $y = x - 6$ .

$$y = x - 6$$

$$3 \stackrel{?}{=} 8 - 6$$

$$3 \neq 2 \quad \times$$

$(8, 3)$  is not a solution.

- Use the values to make a table of solutions.

$$y = 5x - 1 \text{ for } x = 1, 2, 3$$

$x$	$5x - 1$	$y$	$(x, y)$
1	$5(1) - 1$	4	$(1, 4)$
2	$5(2) - 1$	9	$(2, 9)$
3	$5(3) - 1$	14	$(3, 14)$

Substitute 8 for  $x$  and 3 for  $y$ .

## EXERCISES

Determine whether each ordered pair is a solution of the given equation.

6.  $(27, 0)$ ;  $y = 81 - 3x$     7.  $(4, 5)$ ;  $y = 5x$

8.  $(-3, 7)$ ;  $y = 2x + 13$     9.  $(2, 4)$ ;  $y = 3x$

Use the values to make a table of solutions.

10.  $y = 3x + 2$  for  $x = 0, 1, 2, 3, 4$

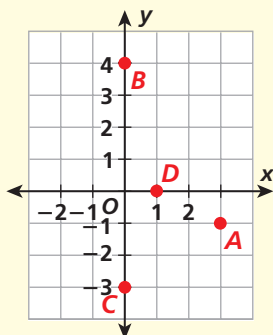
11.  $y = \frac{7}{8}x + 5$  for  $x = 0, 2, 4, 6$

12.  $y = 2.2x - 1.7$  for  $x = -4, -3, -2, -1$

## EXAMPLES

### 3-2 Graphing on a Coordinate Plane (pp. 124–127)

- Graph  $A(3, -1)$ ,  $B(0, 4)$ ,  $C(0, -3)$ , and  $D(1, 0)$  on a coordinate plane.



- Find the distance between points  $B$  and  $C$  in the graph above.

Use the  $y$ -coordinates to find the vertical distance.

$$\begin{aligned} \text{Distance} &= |-3 - 4| \\ &= |-7| = 7 \end{aligned}$$

The points are 7 units apart.

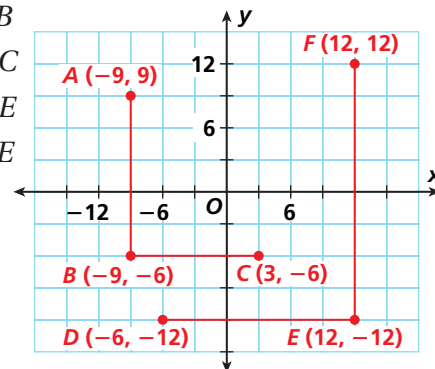
## EXERCISES

Graph each point on a coordinate plane.

13.  $A(3, 2)$    14.  $B(-1, 0)$    15.  $C(0, -5)$   
 16.  $D(1, -3)$    17.  $E(0, 4)$    18.  $F(-3, -5)$   
 19.  $G(5, 0)$    20.  $H(7, 8)$    21.  $J(0, 0)$

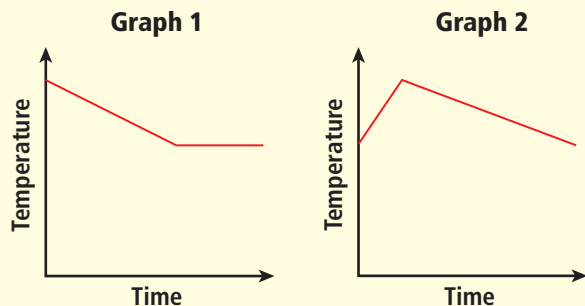
Find the distance between each pair of points.

22.  $A$  and  $B$   
 23.  $B$  and  $C$   
 24.  $D$  and  $E$   
 25.  $F$  and  $E$



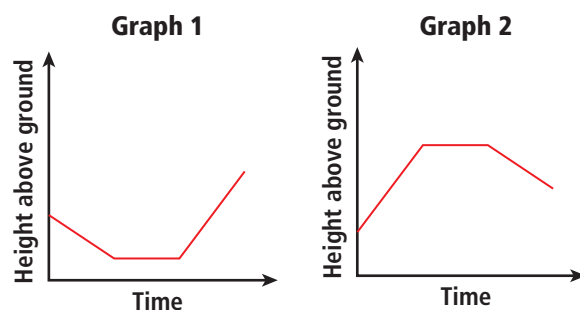
### 3-3 Interpreting Graphs (pp. 129–133)

The graphs show the temperature of the liquids in two mugs over time. Tell which graph corresponds to which situation.



- Water at room temperature is heated quickly in a microwave. Then the water slowly cools to room temperature. Graph 2—The temperature of the water rises sharply and then gradually decreases.
- Hot water in a mug slowly cools to room temperature, and then remains at room temperature. Graph 1—The temperature of the water gradually decreases and then remains constant.

The graphs show the height above ground of two elevators over time. Tell which graph corresponds to which situation.



26. An elevator starts at the third floor, then makes a stop at the first floor, and goes up to the fifth floor.
27. An elevator starts at the second floor, then makes a stop at the sixth floor, and goes down to the fourth floor.

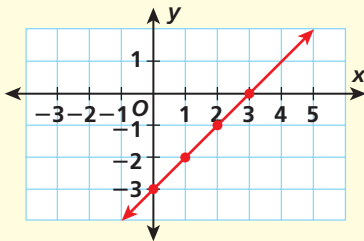


## EXAMPLES

### 3-4 Functions (pp. 136–139)

- Make a table and a graph of  $y = x - 3$ .

$x$	$x - 3$	$y$
0	$0 - 3$	-3
1	$1 - 3$	-2
2	$2 - 3$	-1
3	$3 - 3$	0



## EXERCISES

Make a table and a graph of each function.

28.  $y = 7x - 4$

29.  $y = 6x + 1$

30.  $y = -2x + 3$

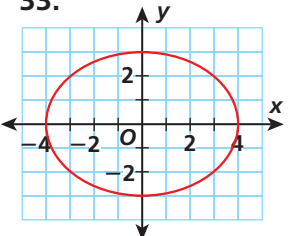
31.  $y = -3x + 4$

Determine if each relation represents a function.

32.

$x$	1	2	3	4	5
$y$	17	19	21	23	25

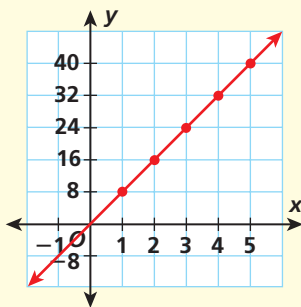
33.



### 3-5 Equations, Tables, and Graphs (pp. 140–143)

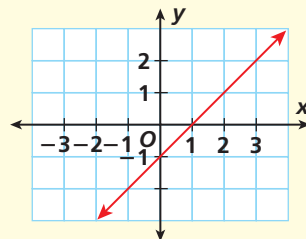
- Use the table to make a graph and to write an equation.

$x$	1	2	3	4	5
$y$	8	16	24	32	40



Each value of  $y$  is 8 times the corresponding value of  $x$ , so the equation is  $y = 8x$ .

- Use the graph to make a table and to write an equation.



$x$	$y$
-1	-2
0	-1
1	0
2	1

$$\begin{aligned} -2 &= -1 - 1 \\ -1 &= 0 - 1 \\ 0 &= 1 - 1 \\ 1 &= 2 - 1 \end{aligned}$$

Each value of  $y$  is one less than the corresponding value of  $x$ , so the equation is  $y = x - 1$ .

Use each table to make a graph and to write an equation.

34.

$x$	1	2	3	4	5
$y$	2.3	4.6	6.9	9.2	11.5

35.

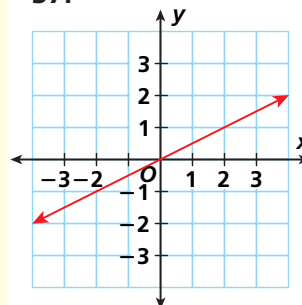
$x$	1	2	3	4	5
$y$	$\frac{1}{2}$	1	$1\frac{1}{2}$	2	$2\frac{1}{2}$

36.

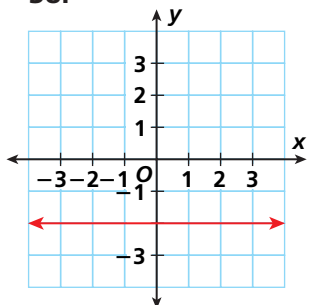
$x$	1	2	3	4	5
$y$	1	2	3	4	5

Use each graph to make a table and to write an equation.

37.



38.



# Chapter Test

## CHAPTER 3

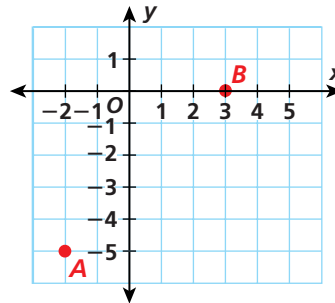
Determine whether the ordered pair is a solution of the given equation.

1. (6, 5) for  $y = 5x - 25$       2. (-3, 10) for  $y = -3x - 1$       3. (2, 4) for  $y = 5x - 6$

Give the coordinates for each point.

4. A

5. B



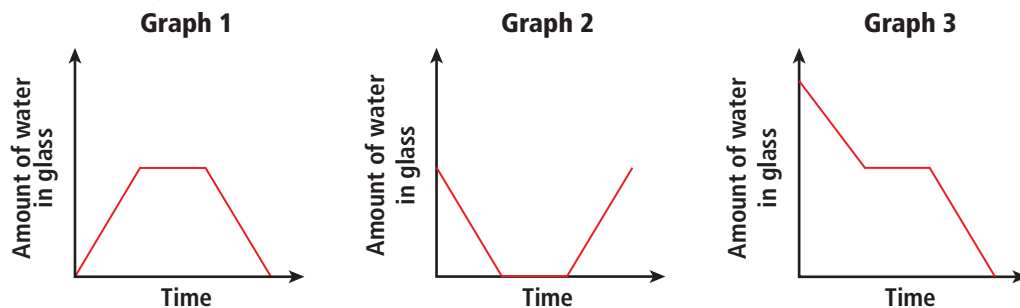
6. The equation that gives the cost  $c$  of mailing a large envelope is  $c = 0.17w + 0.63$ , where  $w$  is the weight in ounces. What is the cost of mailing a 6-ounce envelope?

7. The cost of renting a sailboat at a lake is \$20 per hour plus \$12 for lifejackets. The total cost is represented by the equation  $c = 20h + 12$ , where  $h$  is the number of hours and  $c$  is the total cost. How much does it cost to rent a sailboat for 3.5 hours?

8. Use the table to graph the speed of the car over time.

Time (s)	0	5	10	15
Speed (mi/h)	0	20	30	35

Tell which graph corresponds to each situation below.



9. Grant drinks half a glass of water, pauses to take a breath, and then drinks the rest of the water in the glass.
10. Marcia fills a glass half full with water, walks outside with it, and then drinks all the water.

Make a table and a graph of each function.

11.  $y = 5x - 3$

12.  $y = 9x + 2$

13.  $y = -2x - 5$

14.  $y = \frac{3}{5}x - \frac{2}{3}$

Use each table to make a graph and to write an equation.

15.

x	4	5	6	7
y	12	15	18	21

16.

x	$\frac{1}{2}$	1	$1\frac{1}{2}$	2
y	$3\frac{1}{2}$	7	$10\frac{1}{2}$	14



## Gridded Response: Write Gridded Responses

When responding to a test item that requires you to place your answer in a grid, you must fill out the grid on your answer sheet correctly, or the item will be marked as incorrect.

### EXAMPLE 1

4	0	0		
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
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<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Gridded Response: Divide.  $3000 \div 7.5$

$$\begin{aligned}
 3000 \div 7.5 &= \frac{3000 \left(\frac{10}{10}\right)}{7.5 \left(\frac{10}{10}\right)} && 7.5 \text{ has 1 decimal place, so multiply by } \frac{10}{10}. \\
 &= \frac{30,000}{75} && \text{Divide.} \\
 &= 400 && \text{Simplify.}
 \end{aligned}$$

- Write your answer in the answer boxes at the top of the grid.
- Put only one digit in each box. Do not leave a blank box in the middle of an answer.
- Shade the bubble for each digit in the column beneath it.

### EXAMPLE 2

7	/	6		
<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Gridded Response: Solve.  $x - \frac{1}{2} = \frac{2}{3}$

$$\begin{aligned}
 x - \frac{1}{2} + \frac{1}{2} &= \frac{2}{3} + \frac{1}{2} && \text{Add } \frac{1}{2} \text{ to both sides of the equation.} \\
 x &= \frac{4}{6} + \frac{3}{6} && \text{Find a common denominator.} \\
 x &= \frac{7}{6}, 1\frac{1}{6}, \text{ or } 1.1\bar{6} && \text{Add.}
 \end{aligned}$$

- Mixed numbers and repeating decimals cannot be gridded, so you must grid the answer as  $\frac{7}{6}$ .
- Write your answer in the answer boxes at the top of the grid.
- Put only one digit or symbol in each box. On some grids, the fraction bar and the decimal point have a designated box. Do not leave a blank box in the middle of an answer.
- Shade the bubble for each digit or symbol in the column beneath it.



You cannot grid a negative number in a gridded response item because the grid does not include the negative sign. If you get a negative answer to a test item, recalculate the problem because you probably made a math error.

Read each statement and then answer the questions that follow.

**Item A**

A student correctly evaluated an expression and got  $\frac{9}{13}$  as a result. Then the student filled in the grid as shown.

9	/	1	3
○	●	○	○
○	○	○	○
0	0	0	0
1	1	1	○
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
●	9	9	9

1. What error did the student make when filling in the grid?
2. Explain how to fill in the answer correctly.

**Item B**

A student added 0.21 and 0.49 and got an answer of 0.7. This answer is displayed in the grid.

0	.	7
○	○	○
○	○	○
0	●	0
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7
8	8	8
9	9	9

3. What errors did the student make when filling in the grid?
4. Explain how to fill in the answer correctly.

**Item C**

A student found  $-0.65$  as the answer to  $-5 \cdot (-0.13)$ . Then the student filled in the grid as shown.

-	0	.	6	5
○	○	○	○	○
○	○	○	○	○
0	●	0	0	0
1	1	1	1	1
2	2	2	2	2
3	3	3	3	3
4	4	4	4	4
5	5	5	5	●
6	6	6	●	6
7	7	7	7	7
8	8	8	8	8
9	9	9	9	9

5. What error does the grid show?
6. Another student got an answer of  $-0.65$ . Explain why the student knew this answer was wrong.

**Item D**

A student found that  $x = 5\frac{1}{2}$  was the solution to the equation  $2x - 3 = 8$ . Then the student filled in the grid as shown.

5	1	/	2
○	○	○	○
○	○	○	○
0	0	0	0
1	○	1	1
2	2	2	2
3	3	3	3
4	4	4	4
●	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

7. What answer does the grid show?
8. Explain why you cannot fill in a mixed number.
9. Write the answer  $5\frac{1}{2}$  in two forms that could be entered in the grid correctly.



## Cumulative Assessment, Chapters 1–3

### Multiple Choice

1. A cell phone company charges \$0.21 per minute for phone calls. Which expression represents the cost of a phone call of  $m$  minutes?

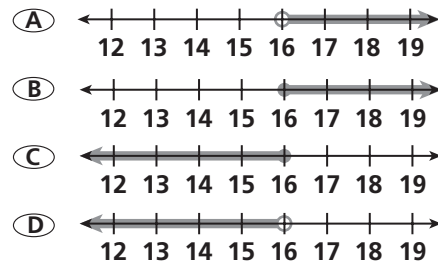
(A)  $0.21m$                       (C)  $0.21 - m$   
(B)  $0.21 + m$                       (D)  $0.21 \div m$

2. Laurie had \$88 in her bank account on Sunday. The table below shows her account activity for the past 5 days. What is the balance in her account on Friday?

Day	Deposit	Withdraw
Monday	\$25	
Tuesday		\$58
Wednesday		\$45
Thursday	\$32	
Friday	\$91	

- (F) \$91                      (H) \$133  
(G) \$103                      (J) \$236
3. Which equation has a solution of  $x = -5$ ?
- (A)  $2x + 8 = -2$       (C)  $\frac{1}{5}x - 6 = -10$   
(B)  $\frac{1}{5}x + 10 = 5$       (D)  $-2x + 10 = -5$
4. You volunteer to bring in 7 gallons of juice for a class party. There are 28 students in the class. You plan to give each student an equal amount of juice. Which equation can you use to determine the amount of juice per student?
- (F)  $7x = 28$                       (H)  $28 + x = 7$   
(G)  $\frac{x}{28} = 7$                       (J)  $28x = 7$

5. In order to apply for a driver's permit in Ohio, you have to be at least 16 years old. Which graph correctly represents the possible ages of Ohioans who can apply for a driver's permit?



6. Which ordered pair is NOT a solution of  $y = 2x - 6$ ?

(F) (6, 6)                      (H) (3, 0)  
(G) (0, -6)                      (J) (-3, 0)

7. Which ordered pair is located on the  $x$ -axis?

(A) (0, -3)                      (C) (-3, 0)  
(B) (3, -3)                      (D) (1, -3)

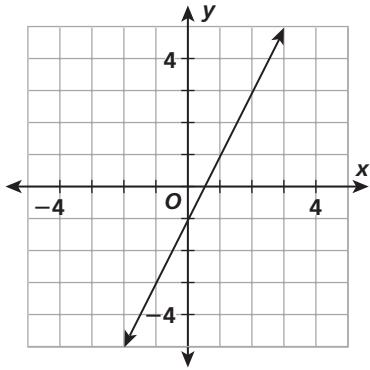
8. Which number is closest to 0 on a number line?

(F)  $-\frac{7}{8}$                       (H)  $\frac{9}{16}$   
(G) -0.68                      (J) 0.54

9. A snack package has 4 ounces of mixed nuts,  $1\frac{1}{2}$  ounces of wheat crackers,  $5\frac{3}{4}$  ounces of pretzels, and  $2\frac{1}{8}$  ounces of popcorn. What is the total weight of the snacks?

(A)  $13\frac{3}{8}$  ounces                      (C)  $12\frac{5}{8}$  ounces  
(B)  $13\frac{1}{8}$  ounces                      (D)  $9\frac{3}{8}$  ounces

10. The graph of the line  $y = 2x - 1$  is shown below.



Which list includes only points on this line?

- Ⓕ  $(-1, -2), (0, 0), (1, 2), (2, 4)$   
 Ⓖ  $(-2, -3), (0, -1), (2, 1), (4, 3)$   
 Ⓗ  $(-4, 7), (-2, 3), (0, -1), (2, 3)$   
 Ⓙ  $(0, -1), (1, 1), (2, 3), (3, 5)$



Sometimes remembering the rules of integers can help you eliminate one or two of the answer choices.

### Gridded Response

11. In 2004, the minimum wage for workers was \$5.85 per hour. To find the amount of money someone could make at minimum wage in  $x$  hours, use the equation  $y = 5.85x$ . How much money could a person who worked 5 hours at minimum wage earn?
12. Solve the equation  $\frac{4}{9}x = \frac{1}{3}$  for  $x$ .
13. The sum of two consecutive integers is 53. What is the smaller of the two numbers?
14. The function  $d = -16t^2 + 35$  represents the height of a stone after  $t$  seconds when dropped from a bridge 35 feet over a river. What is the height in feet of the stone after 1 second?

### Short Response

- S1. Consider the set of coordinate points  $\{(-1, 1), (0, 2), (1, 3), (2, 4), (3, 5), (4, 6), (5, 7)\}$ .

- Determine the domain and the range of the set.
- Is the set a function? Explain why or why not.
- Write an equation that will relate  $x$  and  $y$ .

- S2. Pablo leaves for school on his bike at 7:15 and arrives at 7:20. The table shows his rate of speed at one-minute intervals. Represent the information in the table with a line graph.

Time (min)	7:15	7:16	7:17	7:18	7:19	7:20
Speed (mi/h)	0	20	15	3	0	10

- S3. A craft club charges \$12.95 to join. Members of the club pay \$3.50 each month for a craft kit. Find a function that describes the situation, and then find the total charges for a member who buys a year's worth of craft kits. Show your work.

### Extended Response

- E1. A train travels at a rate of 50 miles per hour from Baton Rouge, Louisiana, to Orlando, Florida. To find the distance  $y$  traveled in  $x$  hours, use the equation  $y = 50x$ .
- Make a table of ordered pairs using the domain  $x = 1, 2, 3, 4,$  and  $5$ .
  - Graph the solutions from the table of ordered pairs.
  - Maria leaves Baton Rouge at 5:30 A.M. on a train. She needs to be in Orlando by 6:30 P.M. If Baton Rouge is 602 miles from Orlando, will Maria make it on time? Explain.