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## Chapter 2 Linear Functions and Models

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### 2.1 Functions and Their Representations

1. function notation; dependent; independent
3. numerical representation
5. graphical representation
7. vertical line test

### Representations of a Function

1.  $f(x) = 0.03x$

3.

$x$ (feet)	1	1.5	2	4
$y$ (inches)	12	18	24	48

5.  $f(-3) = -15$

7.  $f(3) = 4$

9.  $I(2006) = 67.8$

The median income of a family in the year 2006 was \$67,800.

11.

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

### Definition of a Function

13.  $(1, 68), (3, 77), (5, 84), (7, 92)$

15.  $D$ : All real numbers  
 $R$ :  $y \geq 3$

17.  $D$ : All real numbers  
 $R$ :  $y \leq -3$

19.  $D$ : All real numbers

21.  $D$ :  $x \geq 4$

### Identifying a Function

23. no

### Tables, Graphs, and Calculators (Optional)

25. no

27. yes

29. no

### 2.2 Linear Functions

1. linear function

3. constant function

### Basic Concepts

1. yes;  $a = -\frac{1}{2}$ ,  $b = 3$

3. not a linear function

5. not a linear function

7. not a linear function

9. yes;  $f(x) = -x - 3$

11.  $f(-1) = 4$

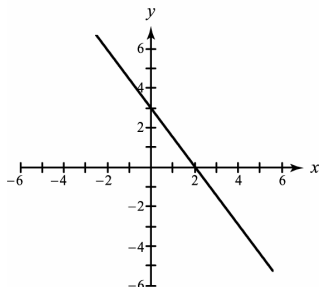
13.  $f(-3) = 0$

15.  $f(-2) = 1$

## Representations of Linear Functions

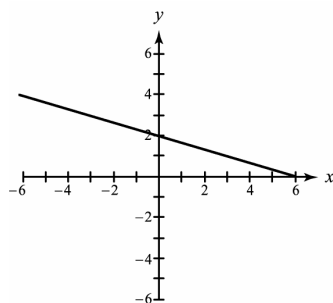
17.

$x$	-1	0	1
$f(x)$	$\frac{9}{2}$	3	$\frac{3}{2}$



19.

$x$	-1	0	1
$f(x)$	$\frac{7}{3}$	2	$\frac{5}{3}$



## Modeling Data with Linear Functions

21. 8 lbs

23.  $f(x) = 2x$ 25.  $f(x) = 1200 + 75x$ 27.  $f(x) = 1.5 + 0.2x$ , where  $x$   
represents years of age over 429.  $f(x) = 3500x$ 

## 2.3 The Slope of a Line

1.  $m = \frac{y_2 - y_1}{x_2 - x_1}$

3. negative

5. undefined

## Slope

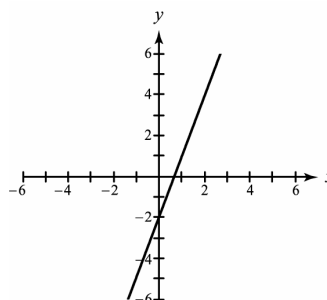
1. -2

3. -2

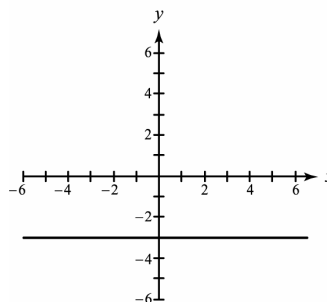
5. 1

7.  $\frac{5}{3}$ 

9.



11.



## Slope-Intercept Form of a Line

13.  $-\frac{1}{4}; \frac{3}{2}$ 

15. 0, 6

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

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

21.  $y = -3$

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

25. (a) 0

(b)  $f(x) = -4x$

27. (a) 0

(b)  $f(x) = \frac{1}{2}x - 1$

**Interpreting Slope in Applications**

29.  $m = -40$

Water is being drained from the tank  
a rate of 40 gallons per minute.

**2.4 Equations of Lines and Linear Models**

1.  $y_1 = m(x - x_1) + y_1$

3.  $x = h$

5. perpendicular

**Point-Slope Form**

1.  $y = 2\left(x - \frac{3}{2}\right) - 1$

3.  $y = 2(x - 1) - 4$  or  
 $y = 2(x - 2) - 2$

5.  $y = -2x + 8$

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

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

11.  $y = 2x - 2$

13.  $y = \frac{3}{4}x + 2$

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

**Horizontal and Vertical Lines**

17.  $x = -2$

19.  $y = -\frac{1}{2}$

21.  $y = 0$

23.  $x = 2$

**Parallel and Perpendicular Lines**

25.  $y = 4x + 2$

27.  $y = -\frac{1}{3}$

29.  $y = -5x - 4$

