Answers

5.4 Enrichment and Extension

1. \(a = 1, b = -1\)  
2. \(a = \frac{1}{2}, b = -2\)

3. \(a = -1, b = 6\)  
4. \(a = 1, b = 2\)

5. \(a = 3, b\) is any number except 1.

6. \(a = \frac{1}{3}, b = 3\)

7. \(a = -2, b = 11\)

8. \(a = 12, b = -4\)

9. Check students’ work.

5.4 Puzzle Time

PAY HIM

Extension 5.4 Start Thinking!

For use before Extension 5.4

Sample answer: The graph shows the linear equations related to each side of the equation. The x-coordinate of the point of intersection is the solution of the equation.

Extension 5.4 Warm Up

For use before Extension 5.4

1. \(m = -8\)

2. \(x = 6\)

3. \(p = 3\)

4. \(x = 7\)

5. \(r = 3\)

6. \(x = -5\)

Extension 5.4 Practice

1. \(x = 4\)

2. \(x = -3\)

3. \(x = 1\)

4. \(x = -1\)

5. no; You cannot have \(-38\) CDs.

6. \(x = 8\)

7. \(x = -2.5\)

8. no; The graph of the system \(y = 50 - 6x\) and \(y = 75 - 6x\) is a pair of parallel lines.

9. a. \(\frac{1}{3}x = x - 20\)

b. $30  
c. $10  
d. Sample answer: the cost of the lemonade

Technology Connection

1. \((3, 7)\)

2. \((2.5, -3)\)

3. \((-1, 0)\)

4. \((-12, -4)\)

Chapter 6

6.1 Start Thinking!

For use before Activity 6.1

Answers will vary depending on the cost of milk. For example, if one milk costs $0.25, then the entries in the mapping diagram would be $0.25, $0.50, $0.75, and $1.00. A mapping diagram maps one value to another.

6.1 Warm Up

For use before Activity 6.1

1. \(x = 11.4\)

2. \(x = -11\frac{1}{4}\)

3. \(x = 7.34\)

4. \(x = -7\frac{1}{4}\)

5. \(x = -26\frac{1}{4}\)

6. \(x = -\frac{3}{5}\)

6.1 Start Thinking!

For use before Lesson 6.1

The output is 15. Observe students playing the Guess the Function Game.

6.1 Warm Up

For use before Lesson 6.1

1. Add 4; missing entries are 8, 9, and 10.

2. Multiply by 5; missing entries are 20, 25, and 30.

6.1 Practice A

1. As each input increases by 1, the output increases by 3.

<table>
<thead>
<tr>
<th>Input</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>3</td>
<td>9</td>
</tr>
<tr>
<td>4</td>
<td>12</td>
</tr>
<tr>
<td>5</td>
<td>15</td>
</tr>
<tr>
<td>6</td>
<td>18</td>
</tr>
</tbody>
</table>

2. As each input increases by 1, the output increases by 2.

<table>
<thead>
<tr>
<th>Input</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>-2</td>
</tr>
<tr>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>6</td>
<td>8</td>
</tr>
</tbody>
</table>
Answers

3. (0, 1), (2, 2), (4, 3), (6, 4)
4. (1, 9), (4, 4), (7, −1), (10, −6)

5. Input | Output
---|---
1 | 2
3 | 5
6 | 9
10 | 12

6. Input | Output
---|---
0 | 5
3 | 7
6 | 8
9 | 9

As each input increases by 3, the output decreases by 5.

7. a. $3.75, $4.00, $4.25, $4.50
b. Every input has exactly one output. So, the relation is a function.
c. For each additional ticket purchased, the price per ticket decreases $2.
d. $30

6.1 Practice B
1. (1, 2), (5, 6), (9, 4), (13, 8)
2. (3, 1), (4, −1), (5, 1), (6, −1)

3. Input | Output
---|---
0 | −3
4 | 0
6 | 12
7 | 13

4. Input | Output
---|---
1 | 3
2 | 0
3 | 5
7 | 4

As each input increases by 2, the output increases by 2 (or each output is 1 more than the input).

5. a. Sample answer:

<table>
<thead>
<tr>
<th>Input</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>6</td>
<td>5</td>
</tr>
</tbody>
</table>

b. Sample answer:

<table>
<thead>
<tr>
<th>Input</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>6</td>
<td>5</td>
</tr>
</tbody>
</table>

6.1 Enrichment and Extension
1. function; Each input is paired with exactly one output.
2. function; Each input is paired with exactly one output.
3. not a function; The input 1 has two outputs, 2 and 4.
4. not a function; The input 3 has two outputs, 1 and 5.

5. a. Sample answer:

<table>
<thead>
<tr>
<th>Input</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>6</td>
<td>5</td>
</tr>
</tbody>
</table>

b. Sample answer:

<table>
<thead>
<tr>
<th>Input</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>6</td>
<td>5</td>
</tr>
</tbody>
</table>
Answers

6. a. Sample answer:
<table>
<thead>
<tr>
<th>Input</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>3</td>
<td>7</td>
</tr>
</tbody>
</table>

   b. Sample answer:
<table>
<thead>
<tr>
<th>Input</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>3</td>
<td>7</td>
</tr>
</tbody>
</table>

7. a. Sample answer: (3, 3)
   b. Sample answer: (2, 3)

8. a. Sample answer: (7, 10)
   b. Sample answer: (4, 1)

9. a. Sample answer: (0, 0)
   b. Sample answer: (5, 0)

6.1 Puzzle Time
TULIPS

6.2 Start Thinking!
For use before Activity 6.2
7; yx
If the length is 7 meters and the width is x meters, then the area y is the product of the length and width.

6.2 Warm Up
For use before Activity 6.2
1. (4, 1)  2. (1, 3)

6.2 Start Thinking!
For use before Lesson 6.2
Sample answer: The cost y of buying x apples at $0.59 per apple can be represented by the equation y = 0.59x. The variable x represents the number of apples and y represents the total cost.

Input, x  Output, y
| 0 | 0 |
| 1 | 0.59 |
| 2 | 1.18 |
| 3 | 1.77 |

6.2 Warm Up
For use before Lesson 6.2
1. y = 10x
2. y = x + 16
3. y = \frac{x}{2}
4. y = x - 10

6.2 Practice A
1. y = x + 10
2. y = 3x
3. y = x - 8
4. y = 2x
5. y = -3
6. y = 24
7. y = 39
8. y = 3

6.2 Practice B
1. y = x + 4
2. y = \frac{-x}{2}
3. y = 5x
4. y = x - 2
5. y = 2
6. y = -3

9. a. d = 6h  b. d = 12 miles
10. x = 4  11. x = -4
12. a. P = 1.50b - 90  b. b = 60 bags
13. A = \left(\frac{P}{4}\right)^2
Answers

6.2 Enrichment and Extension
1. \( f(x) = 2x \)  
2. \( f(x) = x - 1 \)

3. \( f(x) = 4x + 7 \)  
4. \( f(x) = \frac{3}{4}x + 5 \)

5. \( f(0) = 0, f(2) = 16, f(4) = 32 \)
6. \( f(0) = 7, f(2) = 9, f(4) = 11 \)
7. \( f(0) = 5, f(2) = 3, f(4) = 1 \)
8. \( f(0) = 8, f(2) = 14, f(4) = 20 \)
9. \( f(0) = 9, f(2) = 5, f(4) = 1 \)
10. \( f(0) = 0, f(2) = 1, f(4) = 2 \)

11. \( f(0) = 6, f(2) = \frac{13}{2}, \text{ or } 6 \frac{1}{2}, f(4) = 7 \)
12. \( f(0) = 3, f(2) = 6.2, f(4) = 9.4 \)
13. \( f(0) = 1, f(2) = 5, f(4) = 17 \)

14. Sample answer: \( f(x) = 2 \)

6.2 Puzzle Time
YOU DON’T HAVE TO TELL ME IT IS ALL OVER TOWN

6.3 Start Thinking!
For use before Activity 6.3
Answers will vary. Check students’ sketches, tables, and graphs.

6.3 Warm Up
For use before Activity 6.3
1. \( y = \frac{1}{3}x + 2 \)  
2. \( y = -3x + 7 \)

6.3 Start Thinking!
For use before Lesson 6.3
Sample answer: A linear function has a graph in which the points fall on a line. The function \( y = x - 2 \) is an example of a linear function.

6.3 Warm Up
For use before Lesson 6.3
1. \( y = 4x \)

2. The variable \( x \) represents the side length of a square; the variable \( y \) represents the perimeter.

6.3 Practice A
1. \( y = -2x + 1 \)  
2. \( y = \frac{3}{2}x \)

3. \( y = -3x \)  
4. \( y = \frac{x}{5} \)

5. a. independent variable: \( x \)  
   dependent variable: \( y \)

   b. \( y = \frac{1}{16}x \); It costs about $0.06 for 1 fluid ounce of brewed coffee.

   c. 

   d. $2

6. a. independent variable: \( x \)  
   dependent variable: \( y \)

   b. \( y = 3x \)

   c. 

   d. 6 ft

6.3 Practice B
1. \( y = -\frac{1}{4}x - 1 \)  
2. \( y = -1 \)

3. \( y = -2x \)  
4. \( y = \frac{2}{5}x + 3 \)
5. **a.** independent variable: $x$
   dependent variable: $y$
   
   **b.** $y = 0.75x$; It takes 0.75 minute to make 1 burrito.
   
   **c.**
   
   ![Graph](image)
   
   **d.** 5.25 min

6. **a.** independent variable: $x$
   dependent variable: $y$
   
   **b.** $y = 64x$
   
   **c.**
   
   ![Graph](image)
   
   **d.** 320 mi
   
   **e.** $r = 64 \text{ mi/h}$
   
   **f.** $6 \frac{1}{4} \text{ h}$

### 6.3 Enrichment and Extension

1. At iteration 0, you have a completely shaded box. To go from iteration 0 to iteration 1, you split the box into 9 smaller blocks, keep the box in the upper left corner, and delete every other box thereafter.
   
2. Each of the smaller boxes in iteration 1 is similar to the original box in iteration 0.
   
3. | Iteration | Number of Squares |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
<td>25</td>
</tr>
<tr>
<td>3</td>
<td>125</td>
</tr>
<tr>
<td>4</td>
<td>625</td>
</tr>
</tbody>
</table>

4. At each iteration, the number of squares multiplies by 5; After the first iteration, the iteration number tells you how many factors of 5 to multiply together to determine the number of squares.

5. no; There is no number that can be added to the number of squares each time to produce the next amount of squares.

6. The pattern will repeat an infinite number of times. Part of the area of the original box will always remain. So, you can keep applying the procedure of deleting some boxes and keeping others.

### 6.3 Puzzle Time

**FROSTBITE**

### 6.4 Start Thinking!

*For use before Activity 6.4*

The height of a plane during take-off is linear. The others are nonlinear. Check students’ graphs.

### 6.4 Warm Up

*For use before Activity 6.4*

1. 220 cm; 24 cm²
2. 224 cm; 20 cm²
3. 256 ft; 192 ft²
4. 240 in.; 91 in²

### 6.4 Start Thinking!

*For use before Lesson 6.4*

Sample answer: The cost of admission for $x$ people is linear. The length of time you wait in line at each ride is nonlinear.

### 6.4 Warm Up

*For use before Lesson 6.4*

1. linear
2. nonlinear
3. nonlinear
4. linear
6.4 Practice A

1. linear

2. nonlinear

3. nonlinear; The graph is not a line.

4. linear; The graph is a line.

5. nonlinear; The rate of change is not constant.

6. linear; The rate of change is constant.

7. nonlinear; The rate of change is not constant.

8. a. Sample answer: 1
   b. 1.5
   c. $y = 0.25x - 0.5$; It costs $0.25 for 1 ounce of cereal.

6.4 Practice B

1. nonlinear

2. linear

3. linear; The graph is a line.

4. nonlinear; The graph is not a line.

5. nonlinear; The equation cannot be written in slope-intercept form.

6. linear; The equation can be written in slope-intercept form.

7. linear; The rate of change is constant.

8. a. nonlinear; Commission does not show constant change.
   b. $600

9. nonlinear; The equation cannot be written in slope-intercept form.

6.4 Enrichment and Extension

1. Sample answer: Taylor earns $10 for allowance each week. The amount of money she earns in $x$ weeks is a linear function.

   Aiden earns $1 per chore that he completes each week. Some weeks he does all of his chores, but other weeks he does not. The amount of money he earns in $x$ weeks is a nonlinear function.

2. Sample answer: The cost of buying one song is $0.99. The cost of buying $x$ songs is a linear function.

   The length of each song on a CD is different. If you graph the song length versus the track number, it is likely a nonlinear function.

3. Sample answer: Maddie is allowed to watch one hour of television per day. The amount of time she is allowed to watch television in $x$ days is a linear function.

   Hayden is allowed to watch television each day after he finishes his homework. Assuming that his homework takes different amounts of time to finish each day, the amount of time he spends watching television is a nonlinear function.

4. Sample answer: The cost of a plane ticket is $350. The cost for $x$ people is a linear function.

   An airplane’s altitude versus time during a flight is a nonlinear function.

5. Sample answer: The perimeter of a square with side length $x$ is a linear function.

   The area of a square with side length $x$ is a nonlinear function.

6. Sample answer: The cost of a medium drink at the food court is $2. The cost of $x$ medium drinks is a linear function.

   The number of cars parked at a shopping mall throughout the day is a nonlinear function.

7. nonlinear

8. Sample answer: The initial temperature is room temperature, about 70 degrees. After 1 minute, the oven is turned on and takes about 9 minutes to preheat. The oven door is opened around minute 12 and again at minute 22. So the cookies took 10 minutes to bake. The oven was turned off around minute 23.

9. Sample answer: Once the oven reaches the desired temperature, the heating element shuts off. When it cools a certain amount, about 25 degrees, the heating element turns on again, and so on.

10. 400; 13
Answers

6.4 Puzzle Time
YOUR NAME

6.5 Start Thinking!
For use before Activity 6.5

Sample answer: The graph of a linear function shows a constant rate of change. For example, \( y = 2x + 1 \). The graph of a nonlinear function does not have a constant rate of change. For example, \( y = 2x^2 + 1 \).

6.5 Warm Up
For use before Activity 6.5

1.

2.

3.

6.5 Start Thinking!
For use before Lesson 6.5

6.5 Warm Up
For use before Lesson 6.5

1. The speed of the car accelerates for a while, then is at a constant rate, then accelerates again, then is at a constant rate before slowing to a stop.

2. Sales increase for a period of time, then they level out for a while before increasing again.

6.5 Practice A

1. Sample answer: The speed of the wind increases at an increasing rate, then decreases at a constant rate, increases at an increasing rate, decreases at a constant rate, and then increases at an increasing rate.

2. Sample answer: The grass grows at a constant rate, then is cut (thus decreasing the height). This is repeated.

3. Sample answer: The height of the airplane decreases at an increasing rate and then decreases at a decreasing rate.

4. Sample answer: The number of gallons of gasoline in the tank increases at a constant rate.

5. a. Sample answer: The number of cars in the parking lot is increasing at an increasing rate.
    b. Sample answer: The number of cars in the parking lot is decreasing at an increasing rate.

6. 7.

8. 6.5 Practice B

1. Sample answer: The number of customers increases at a constant rate and then decreases at a constant rate.

2. Sample answer: The height increases at an increasing rate and then increases at a decreasing rate.

3. Sample answer: The cost of the postage remains constant, then jumps, remains constant, then jumps, and repeats this pattern.
Answers

4. **Sample answer:** The height of the water decreases at a constant rate, remains the same, decreases at a constant rate, remains the same, and then decreases at a constant rate.

5. **a. Sample answer:** The Demand curve remains constant. The Supply curve decreases at an increasing rate.
   **b.** The left side represents a surplus. The right side represents a shortage. **Sample answer:** On the left side supply is greater than the demand. On the right side demand is greater than the supply. **c. Sample answer:** The equilibrium point moves up and left, so a shortage occurs sooner.

6.5 Enrichment and Extension

1–6. Sample answers are given.

1. discrete data; Only integers between 1 and 31 make sense.

2. discrete data; There will be one fixed amount of money each year.

3. discrete data; Only positive integers make sense.

4. continuous data; It makes sense to use any number for the weight of people.

5. continuous data; It makes sense to use any number for the distance.

6.5 Puzzle Time

PIANO

Technology Connection

1–2. **Sample answer:** Yes, the point (4, 7) disappears and is replaced by the point (4, 8).

3. **Sample answer:** Yes, the point (4, 8) disappears and is replaced by the point (4, 12).

4. **Sample answer:** The graph does not add the new value. You must make a new graph to incorporate the new data point.

5. **Sample answer:** no; You must select the data you want for a new graph.

6. **Sample answer:** A scatter plot using 1 color for \((x, y)\) and another for \((x, y2)\). The second set of points is 2 units above the first set.

7. **Sample answer:** Scatter plots that connect the points with smooth curves or straight lines are a good choice of \(xy\)-plots.

Chapter 7

7.1 Start Thinking!

*For use before Activity 7.1*

**Sample answer:** no; The lengths of the sides can be any two lengths that have the given product; Yes; because the sides of a square are the same length, the area is the square of the side length. For example, if the area is 64 square meters, then the length of each side would be 8 meters.

7.1 Warm Up

*For use before Activity 7.1*

1. 144

2. 81

3. 324

4. 2.56

5. 6.25

6. \(\frac{4}{9}\)

7.1 Start Thinking!

*For use before Lesson 7.1*

Shelley; the solutions are 20 and \(-20\).

7.1 Warm Up

*For use before Lesson 7.1*

1. 9 in.

2. 13 cm

3. 1 yd

4. 1.5 m

7.1 Practice A

1. \(s = 14\) in.

2. \(r = 6\) m

3. \(\pm 4\)

4. 0

5. 11

6. \(\frac{1}{6}\)

7. \(\frac{17}{7}\)

8. \(-0.8\)

9. 13

10. 3

11. \(\sqrt{64} > 5\)

12. \(0.6 < \sqrt{0.49}\)

13. \(r = 4\) ft

14. \(x = 11\) widgets

15. \(s = 10\) in.

7.1 Practice B

1. \(s = \frac{13}{15}\) cm

2. \(r = 11\) yd

3. \(\pm 15\)

4. \(\pm 20\)

5. \(-22\)

6. \(\frac{5}{8}\)

7. 2.5

8. \(\pm 1.3\)

9. 4.8

10. 6

11. \(\frac{49}{9} > 2\)

12. \(\frac{2}{5} = \sqrt[12]{75}\)

13. \(r = 12\) m

14. \(s = 24\) m