

Additional Practice

3.11

1. Which equation represents the line that passes through points $(-8, 12)$ and $(4, 6)$?

A. $y = \frac{1}{2}x + 8$

B. $y = -\frac{1}{2}x + 8$

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

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

2. Lin is writing an equation of the line that passes the point $(4, 24)$ and has a slope of 3. Her unfinished work is shown:

Lin's work:

$$y = 3x + b \qquad m = 3$$

$$24 = 3(4) + b$$

$$24 = 3(4) + b$$

$$24 = 12 + b$$

$$12 = b$$

Equation: $y = 3x + 12$

Finish Lin's work by solving the equation for b and writing the final equation for the line in the form $y = mx + b$. Show your thinking.

3. Write the equation of the line that passes through each pair of points. Show or explain your thinking.

a $(4, 18)$ and $(8, 34)$

Sample response:
Slope: $\frac{34 - 18}{8 - 4} = \frac{16}{4} = 4$
 $18 = 4(4) + b$
 $18 = 16 + b$
 $2 = b$

Equation: $y = 4x + 2$

b $(-4, 14)$ and $(2, 2)$

Sample response:
Slope: $\frac{2 - 14}{2 - (-4)} = \frac{-12}{6} = -2$
 $14 = -2(-4) + b$
 $14 = 8 + b$
 $6 = b$

Equation: $y = -2x + 6$

4. Diego is finding the slope of the line that passes through the points $(10, 8)$ and $(14, 10)$. His work is shown. Review his work. Find and fix any errors.

Diego's work:

$$\text{Slope} = \frac{10 - 8}{10 - 14} = \frac{2}{-4} = -\frac{1}{2}$$

Diego did not correctly subtract the x -coordinates for the two points in the same order as the y -coordinates. The slope should be $\frac{10 - 8}{14 - 10} = \frac{2}{4} = \frac{1}{2}$.

5. A cooler of water is draining. After 4 minutes, there are 16 qt remaining. After 6 minutes, there are 8 quarts remaining. Write an equation for the amount of water remaining y in the cooler after x minutes.

$y = -4x + 32$; **Sample response:**

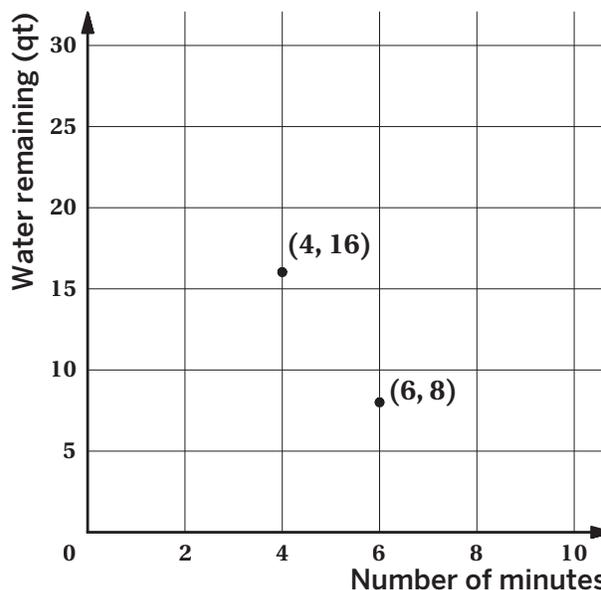
Slope: -4

$8 = -4(6) + b$

$8 = -24 + b$

$32 = b$

Equation: $y = -4x + 32$



6. The table gives the x - and y -coordinates of points on a line. Without graphing, write an equation for the line that passes through the points. Show or explain your thinking.

x	-4	4	8
y	14	2	-4

$y = -\frac{3}{2}x + 8$; **Sample response:**

Slope: $-\frac{3}{2}$

$2 = -\frac{3}{2}(4) + b$

$2 = -6 + b$

$8 = b$

Equation: $y = -\frac{3}{2}x + 8$

7. Consider line m with the two labeled points as shown. Kiran missed today's lesson and does not understand how he can write the equation of the line without seeing the vertical intercept. Help Kiran understand how to write the equation for the line in the form $y = mx + b$.

Sample response: First, calculate the slope of the line by determining the ratio of the difference in the y -coordinates to the difference in the x -coordinates:

$\frac{-4 - 7}{4 - 3} = -\frac{11}{1} = -11$. The slope is -11 .

Next, substitute the slope and the coordinates of one of the points into the equation $y = mx + b$. Then solve for b .

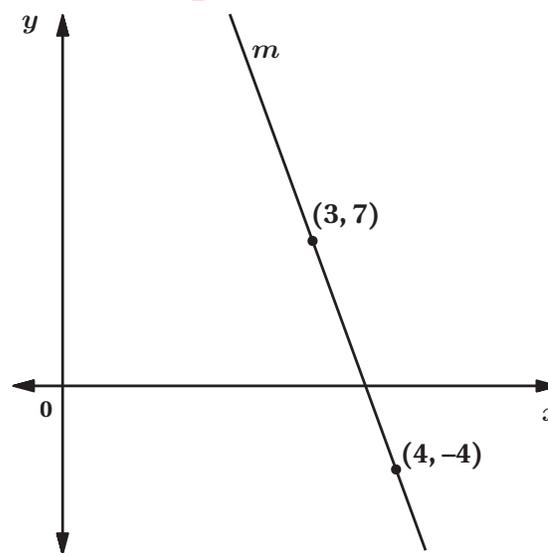
$7 = -11(3) + b$

$7 = -33 + b$

$40 = b$

Finally, write the equation in the form $y = mx + b$ using the slope and the y -intercept:

$y = -11x + 40$.



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1. Which equation represents the line that passes through points $(-8, 12)$ and $(4, 6)$?

A. $y = \frac{1}{2}x + 8$
 B. $y = -\frac{1}{2}x + 8$
 C. $y = \frac{1}{2}x - 2$
 D. $y = -\frac{1}{2}x - 2$

2. Lin is writing an equation of the line that passes through the point $(4, 24)$ and has a slope of 3. Her unfinished work is shown:

Lin's work:
 $y = 3x + b$
 $24 = 3(4) + b$

$m = 3$

$24 = 3(4) + b$
 $24 = 12 + b$
 $12 = b$

Equation: $y = 3x + 12$

Finish Lin's work by solving the equation for b and writing the final equation for the line in the form $y = mx + b$. Show your thinking.

3. Write the equation of the line that passes through each pair of points. Show or explain your thinking.

a. $(4, 18)$ and $(8, 34)$

Sample response:
 Slope: $\frac{34 - 18}{8 - 4} = \frac{16}{4} = 4$
 $18 = 4(4) + b$
 $18 = 16 + b$
 $2 = b$

Equation: $y = 4x + 2$

b. $(-4, 14)$ and $(2, 2)$

Sample response:
 Slope: $\frac{2 - 14}{2 - (-4)} = \frac{-12}{6} = -2$
 $14 = -2(-4) + b$
 $14 = 8 + b$
 $6 = b$

Equation: $y = -2x + 6$

4. Diego is finding the slope of the line that passes through the points $(10, 8)$ and $(14, 10)$. His work is shown. Review his work. Find and fix any errors.

Diego's work:

Slope = $\frac{10 - 8}{10 - 14} = \frac{2}{-4} = -\frac{1}{2}$

Diego did not correctly subtract the x -coordinates for the two points in the same order as the y -coordinates. The slope should be $\frac{10 - 8}{14 - 10} = \frac{2}{4} = \frac{1}{2}$.

Unit 3 Lesson 11

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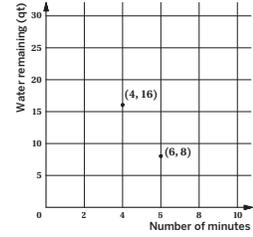
Name: _____ Date: _____ Period: _____

5. A cooler of water is draining. After 4 minutes, there are 16 qt remaining. After 6 minutes, there are 8 quarts remaining. Write an equation for the amount of water remaining y in the cooler after x minutes.

$y = -4x + 32$; Sample response:

Slope: -4
 $8 = -4(6) + b$
 $8 = -24 + b$
 $32 = b$

Equation: $y = -4x + 32$



6. The table gives the x - and y -coordinates of points on a line. Without graphing, write an equation for the line that passes through the points. Show or explain your thinking.

x	-4	4	8
y	14	2	-4

$y = -\frac{3}{2}x + 8$; Sample response:

Slope: $-\frac{3}{2}$
 $2 = -\frac{3}{2}(4) + b$
 $2 = -6 + b$
 $8 = b$

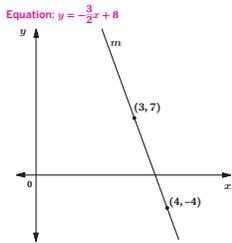
Equation: $y = -\frac{3}{2}x + 8$

7. Consider line m with the two labeled points as shown. Kiran missed today's lesson and does not understand how he can write the equation of the line without seeing the vertical intercept. Help Kiran understand how to write the equation for the line in the form $y = mx + b$.

Sample response: First, calculate the slope of the line by determining the ratio of the difference in the y -coordinates to the difference in the x -coordinates:
 $\frac{-4 - 7}{4 - 3} = \frac{-11}{1} = -11$. The slope is -11 .

Next, substitute the slope and the coordinates of one of the points into the equation $y = mx + b$. Then solve for b .
 $7 = -11(3) + b$
 $7 = -33 + b$
 $40 = b$

Finally, write the equation in the form $y = mx + b$ using the slope and the y -intercept:
 $y = -11x + 40$.



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Additional Practice

Practice Problem Analysis

Problem	DOK	Standard(s)
1	1	8.EE.B.6
2	1	8.EE.B.6
3	2	8.EE.B.6
4	2	8.EE.B.6
5	2	8.EE.B.6
6	2	8.EE.B.6
7	3	8.EE.B.6

Notes:

Additional Practice

3.12

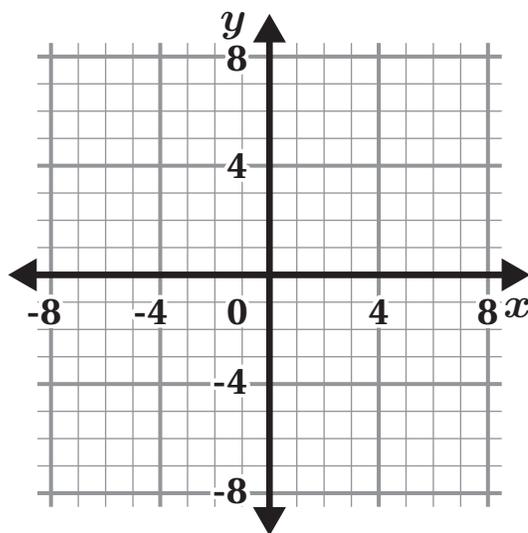
1. Select *all* of the ordered pairs that are solutions to the linear equation $3x - 2y = 4$.

- A. (0, -2)
- B. (2, -1)
- C. (-2, -5)
- D. (-4, 6)
- E. (4, 4)

2. The graphs of a linear equation passes through the points (-1, 2) and (2, 8).

Select all the points that are also solutions to this equation. Use the graph if it helps with your thinking.

- A. (0, -4)
- B. (1, 6)
- C. (-1, 2)
- D. (-2, 3)
- E. (-4, 4)



3. Match each equation with its three solutions.

Equation

Solutions

- | | |
|---------------------------|--|
| a. $2x + y = 5$ | <input checked="" type="checkbox"/> c. (9, 3), (5, -1), (8, 2) |
| b. $y = \frac{1}{2}x - 1$ | <input checked="" type="checkbox"/> d. (3, 2), (0, 0), (-6, -4) |
| c. $x - y = 6$ | <input checked="" type="checkbox"/> a. (1, 3), (-2, 9), (3, -1) |
| d. $2x = 3y$ | <input checked="" type="checkbox"/> e. (-4, -1), (4, 1), (16, 4) |
| e. $y = \frac{1}{4}x$ | <input checked="" type="checkbox"/> b. (2, 0), (4, 1), (-2, -3) |

4. Kiran is determining if the ordered pair $(2, -1)$ is a solution to the equation $3x + y = 5$. His work is shown. Is he correct? Explain your thinking.

Kiran's work:

$$3x + y = 5$$

$$3(-1) + 2 = 5$$

$$-3 + 2 = 5$$

$$-1 \neq 5$$

The point $(2, -1)$ is *not* a solution to the equation.

Explanations vary. Kiran's work is incorrect. He substituted the x -value of 2 in for the y -value of the equation and the y -value of -1 into the x -value of the equation.

5. Determine whether the following statement is *true* or *false*. Explain your thinking. The ordered pairs $(10, 28)$, $(-12, -17)$, and $(14, 45)$ all lie on the line whose equation is $y = \frac{5}{2}x + 13$.

Explanations vary. False. Substituting each point into the equation $y = \frac{5}{2}x + 13$ makes a false statement for point $(14, 45)$.

$$28 = \frac{5}{2}(10) + 13$$

$$28 = 25 + 13$$

$$28 = 28 \text{ True}$$

$$-17 = \frac{5}{2}(-12) + 13$$

$$-17 = -30 + 13$$

$$-17 = -17 \text{ True}$$

$$45 = \frac{5}{2}(14) + 13$$

$$45 = 35 + 13$$

$$45 = 48 \text{ False}$$

Problems 6–7: Complete each table.

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

x	y
-10	8
-5	4

7. $x + 2y = 7$

x	y
-1	4
3	2

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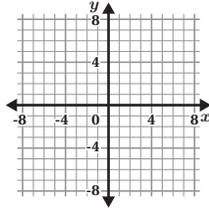
Additional Practice

3.12

1. Select *all* of the ordered pairs that are solutions to the linear equation $3x - 2y = 4$.

- A. (0, -2)
- B. (2, -1)
- C. (-2, -5)
- D. (-4, 6)
- E. (4, 4)

2. The graphs of a linear equation passes through the points $(-1, 2)$ and $(2, 8)$.
Select all the points that are also solutions to this equation. Use the graph if it helps with your thinking.



- A. (0, -4)
- B. (1, 6)
- C. (-1, 2)
- D. (-2, 3)
- E. (-4, 4)

3. Match each equation with its three solutions.

- | Equation | Solutions |
|---------------------------|-------------------------------------|
| a. $2x + y = 5$ | c. (9, 3), (5, -1), (8, 2) |
| b. $y = \frac{1}{2}x - 1$ | d. (3, 2), (0, 0), (-6, -4) |
| c. $x - y = 6$ | a. (1, 3), (-2, 9), (3, -1) |
| d. $2x = 3y$ | e. (-4, -1), (4, 1), (16, 4) |
| e. $y = \frac{1}{4}x$ | b. (2, 0), (4, 1), (-2, -3) |

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Name: _____ Date: _____ Period: _____

4. Kiran is determining if the ordered pair $(2, -1)$ is a solution to the equation $3x + y = 5$. His work is shown. Is he correct? Explain your thinking.

Kiran's work:

```

3x + y = 5
3(-1) + 2 = 5
-3 + 2 = 5
-1 = 5
The point (2, -1) is not a solution to the equation.
    
```

Explanations vary. Kiran's work is incorrect. He substituted the x -value of 2 in for the y -value of the equation and the y -value of -1 into the x -value of the equation.

5. Determine whether the following statement is true or false. Explain your thinking. The ordered pairs $(10, 28)$, $(-12, -17)$, and $(14, 45)$ all lie on the line whose equation is $y = \frac{5}{2}x + 13$.

Explanations vary. False. Substituting each point into the equation $y = \frac{5}{2}x + 13$ makes a false statement for point $(14, 45)$.

$28 = \frac{5}{2}(10) + 13$	$-17 = \frac{5}{2}(-12) + 13$	$45 = \frac{5}{2}(14) + 13$
$28 = 25 + 13$	$-17 = -30 + 13$	$45 = 35 + 13$
$28 = 28$ True	$-17 = -17$ True	$45 = 48$ False

Problems 6–7: Complete each table.

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

x	y
-10	8
-5	4

7. $x + 2y = 7$

x	y
-1	4
3	2

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Additional Practice

Practice Problem Analysis

Problem	DOK	Standard(s)
1	1	8.EE.C.8.A
2	2	8.EE.C.8.A
3	1	8.EE.C.8.A
4	2	8.EE.C.8.A
5	1	8.EE.C.8.A
6	1	8.EE.C.8.A
7	1	8.EE.C.8.A

Notes:

Additional Practice

3.13

Problems 1–5: Maria has \$48 to spend on flowers for her garden. A pack of pansies costs \$4 each and a pack of petunias costs \$6 each.

- Complete the table to show some possible combinations of packs of pansies and packs of petunias that will cost a total of \$48.

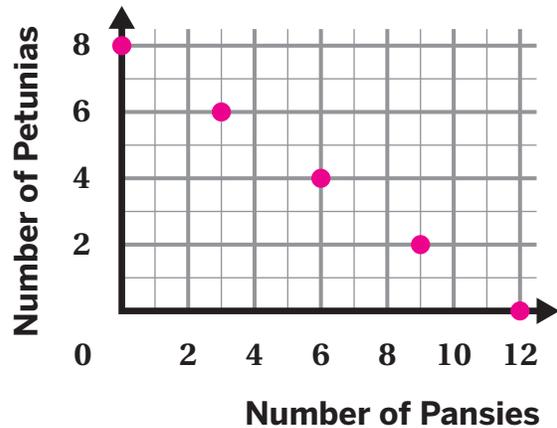
Number of Packs of Pansies	Number of Packs of Petunias
12	0
3	6
6	4

Answers may vary.

- Write an equation that represents the relationship between the number of packs of pansies, x , and the number of packs of petunias, y , that Maria can buy.

Sample answer: $4x + 6y = 48$

- Graph all possible combinations of packs of pansies and packs of petunias that will cost a total of \$48.



- What is the slope of the line? What does it tell you about this situation?

Explanations may vary. The slope is $-\frac{2}{3}$. It means for every 2 packs of petunias she buys, she can buy 3 packs of pansies.

- What are the x - and y -intercepts of the line? What do they represent in this situation?

The x -intercept is (12, 0) and it represents the number of packs of pansies Maria can buy for \$48, if she doesn't buy any packs of petunias. The y -intercept is (0, 8), and it represents the number of packs of petunias Maria can buy for \$48, if she doesn't buy any packs of pansies.

Problems 6–8: Jada made bracelets and necklaces to sell at the craft show. She sold her bracelets for \$3 each and her necklaces for \$6 each. She earned \$96 in sales at the craftshow.

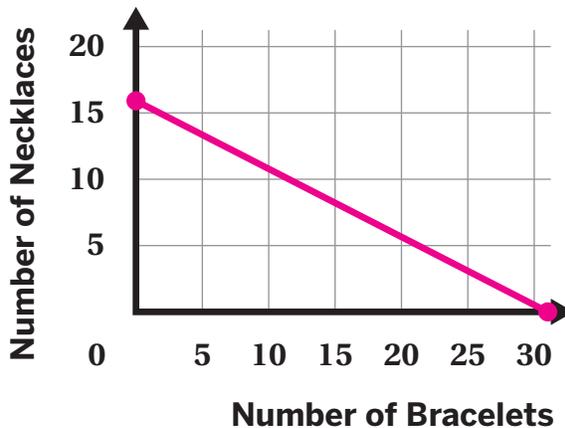
6. Give two possible combinations of the number of bracelets and necklaces sold that earn a total of \$96 in sales.

Sample answers: Jada can sell 12 bracelets and 10 necklaces to earn \$96. Or, she can sell 10 bracelets and 11 necklaces to earn \$96.

7. Write an equation that represents the relationship between the number of bracelets, x , and the number of necklaces, y , that Jada sold.

$3x + 6y = 96$

8. Graph this relationship on the coordinate plane.



9. What are the x - and y -intercepts of the line? What do they represent in this situation?

The x -intercept is (32, 0) and it represents the number of bracelets Jada can sell to earn \$96, if she doesn't sell any necklaces. The y -intercept is (0, 16), and it represents the number of necklaces Jada can sell to earn \$96, if she doesn't sell any bracelets.

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Additional Practice

3.13

Problems 1–5: Maria has \$48 to spend on flowers for her garden. A pack of pansies costs \$4 each and a pack of petunias costs \$6 each.

1. Complete the table to show some possible combinations of packs of pansies and packs of petunias that will cost a total of \$48.

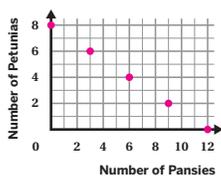
Number of Packs of Pansies	Number of Packs of Petunias
12	0
3	6
6	4

Answers may vary.

2. Write an equation that represents the relationship between the number of packs of pansies, x , and the number of packs of petunias, y , that Maria can buy.

Sample answer: $4x + 6y = 48$

3. Graph all possible combinations of packs of pansies and packs of petunias that will cost a total of \$48.



4. What is the slope of the line? What does it tell you about this situation?

Explanations may vary. The slope is $-\frac{2}{3}$. It means for every 2 packs of petunias she buys, she can buy 3 packs of pansies.

5. What are the x - and y -intercepts of the line? What do they represent in this situation?

The x -intercept is (12, 0) and it represents the number of packs of pansies Maria can buy for \$48, if she doesn't buy any packs of petunias. The y -intercept is (0, 8), and it represents the number of packs of petunias Maria can buy for \$48, if she doesn't buy any packs of pansies.

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Problems 6–8: Jada made bracelets and necklaces to sell at the craft show. She sold her bracelets for \$3 each and her necklaces for \$6 each. She earned \$96 in sales at the craftshow.

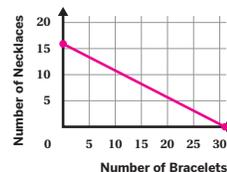
6. Give two possible combinations of the number of bracelets and necklaces sold that earn a total of \$96 in sales.

Sample answers: Jada can sell 12 bracelets and 10 necklaces to earn \$96. Or, she can sell 10 bracelets and 11 necklaces to earn \$96.

7. Write an equation that represents the relationship between the number of bracelets, x , and the number of necklaces, y , that Jada sold.

$3x + 6y = 96$

8. Graph this relationship on the coordinate plane.



9. What are the x - and y -intercepts of the line? What do they represent in this situation?

The x -intercept is (32, 0) and it represents the number of bracelets Jada can sell to earn \$96, if she doesn't sell any necklaces. The y -intercept is (0, 16), and it represents the number of necklaces Jada can sell to earn \$96, if she doesn't sell any bracelets.

Unit 3 Lesson 13

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Additional Practice

Practice Problem Analysis

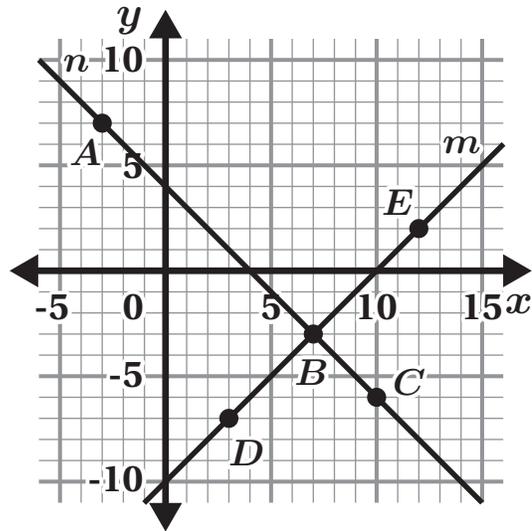
Problem	DOK	Standard(s)
1	1	8.EE.C.8.A
2	2	8.EE.C.8.A
3	1	8.EE.C.8.A
4	2	8.EE.C.8.A
5	2	8.EE.C.8.A
6	1	8.EE.C.8.A
7	2	8.EE.C.8.A
8	1	8.EE.C.8.A
9	2	8.EE.C.8.A

Notes:

Additional Practice

4.09

Problems 1–5: Here is a coordinate plane.



1. Which line represents this condition:
The coordinates of each point have a sum of 4?

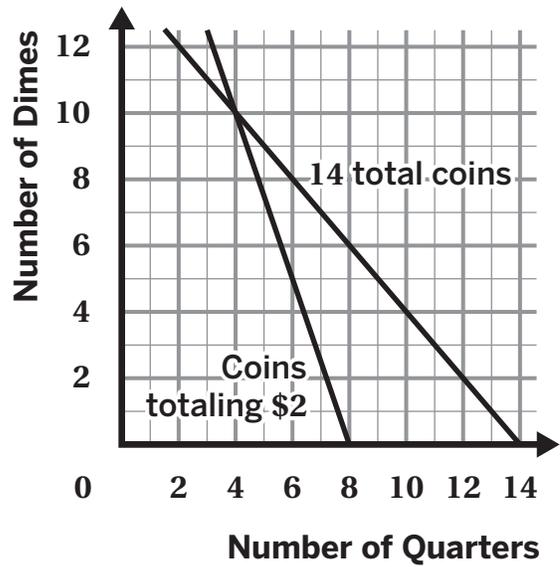
Line *n*

- Which line represents this condition:
The *y*-coordinate of each point is 8 less than the *x*-coordinate.

Line *m*

3. Select *all* the points whose coordinates have a sum of 4.
- | | |
|--|-------------------------------------|
| <input checked="" type="checkbox"/> A. Point A | <input type="checkbox"/> D. Point D |
| <input checked="" type="checkbox"/> B. Point B | <input type="checkbox"/> E. Point E |
| <input checked="" type="checkbox"/> C. Point C | |
4. Select *all* the points whose *y*-coordinate is 8 less than the *x*-coordinate.
- | | |
|--|--|
| <input type="checkbox"/> A. Point A | <input checked="" type="checkbox"/> D. Point D |
| <input checked="" type="checkbox"/> B. Point B | <input checked="" type="checkbox"/> E. Point E |
| <input type="checkbox"/> C. Point C | |
5. Select *all* the points whose coordinates have a sum of 4 and the *y*-coordinate is 8 less than the *x*-coordinate.
- | | |
|--|-------------------------------------|
| <input type="checkbox"/> A. Point A | <input type="checkbox"/> D. Point D |
| <input checked="" type="checkbox"/> B. Point B | <input type="checkbox"/> E. Point E |
| <input type="checkbox"/> C. Point C | |

Problems 6–8: On the coordinate plane shown, one line represents combinations of dimes and quarters that have a total value of \$2. The other line represents combinations of dimes and quarters when the total number of coins is 14.



6. Select *all* the combinations of coins that have a total value of \$2.

- A. 14 quarters and 0 dimes
- B. 4 quarters and 10 dimes
- C. 6 quarters and 8 dimes
- D. 8 quarters and 0 dimes
- E. 2 quarters and 12 dimes

7. Select *all* combinations of quarters and dimes that have a total of 14 coins.

- A. 10 quarters and 4 dimes
- B. 8 quarters and 0 dimes
- C. 4 quarters and 10 dimes
- D. 2 quarters and 12 dimes
- E. 4 quarters and 8 dimes

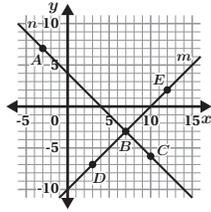
8. What combination of quarters and dimes would equal both 14 coins and total \$2?

- A. 10 quarters and 4 dimes
- B. 8 quarters and 0 dimes
- C. 2 quarters and 12 dimes
- D. 4 quarters and 10 dimes

Name: _____ Date: _____ Period: _____

Additional Practice 4.09

Problems 1–5: Here is a coordinate plane.



1. Which line represents this condition:
The coordinates of each point have a sum of 4?
Line n

Which line represents this condition:
The y -coordinate of each point is 8 less than the x -coordinate.
Line m

3. Select **all** the points whose coordinates have a sum of 4.
- A. Point A
 - B. Point B
 - C. Point C
 - D. Point D
 - E. Point E
4. Select **all** the points whose y -coordinate is 8 less than the x -coordinate.
- A. Point A
 - B. Point B
 - C. Point C
 - D. Point D
 - E. Point E
5. Select **all** the points whose coordinates have a sum of 4 **and** the y -coordinate is 8 less than the x -coordinate.
- A. Point A
 - B. Point B
 - C. Point C
 - D. Point D
 - E. Point E

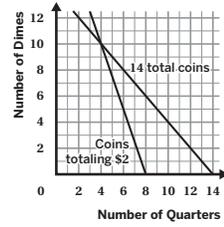
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Problems 6–8: On the coordinate plane shown, one line represents combinations of dimes and quarters that have a total value of \$2. The other line represents combinations of dimes and quarters when the total number of coins is 14.



6. Select **all** the combinations of coins that have a total value of \$2.
- A. 14 quarters and 0 dimes
 - B. 4 quarters and 10 dimes
 - C. 6 quarters and 8 dimes
 - D. 8 quarters and 0 dimes
 - E. 2 quarters and 12 dimes
7. Select **all** combinations of quarters and dimes that have a total of 14 coins.
- A. 10 quarters and 4 dimes
 - B. 8 quarters and 0 dimes
 - C. 4 quarters and 10 dimes
 - D. 2 quarters and 12 dimes
 - E. 4 quarters and 8 dimes
8. What combination of quarters and dimes would equal **both** 14 coins and total \$2?
- A. 10 quarters and 4 dimes
 - B. 8 quarters and 0 dimes
 - C. 2 quarters and 12 dimes
 - D. 4 quarters and 10 dimes

Unit 4 Lesson 9

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Additional Practice

Practice Problem Analysis

Problem	DOK	Standard(s)
1	1	MA.8.AR.4.1
2	1	MA.8.AR.4.1
3	1	MA.8.AR.4.1
4	1	MA.8.AR.4.1
5	1	MA.8.AR.4.1
6	1	MA.8.AR.4.1, MTR.7.1
7	1	MA.8.AR.4.1, MTR.7.1
8	1	MA.8.AR.4.1, MTR.7.1

Notes:

Additional Practice

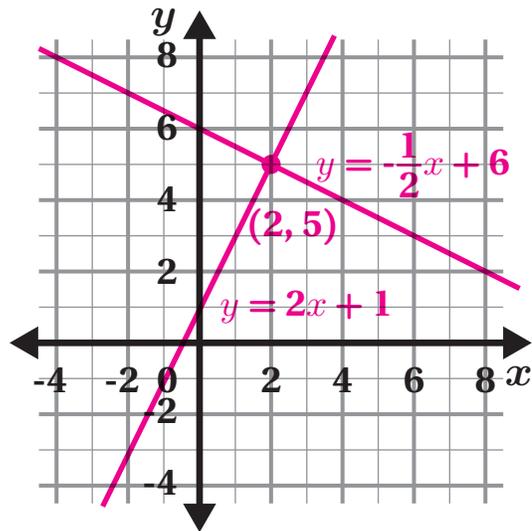
4.10

- Jack and Yusef are gaining weight for football. Jack weighs 205 pounds and is gaining 2 pounds per week. Yusef weighs 195 pounds and is gaining 3 pounds per week. Is there a week when they will weigh the same amount? Explain your thinking.

Explanations vary. Yes, if we set the expression $205 + 2w$ (for Jack) and $195 + 3w$ (for Yusef) equal to each other and solve for w , we will find the number of weeks it will take until they weigh the same amount.

- Draw a graph to determine x - and y -values that make both of the equations

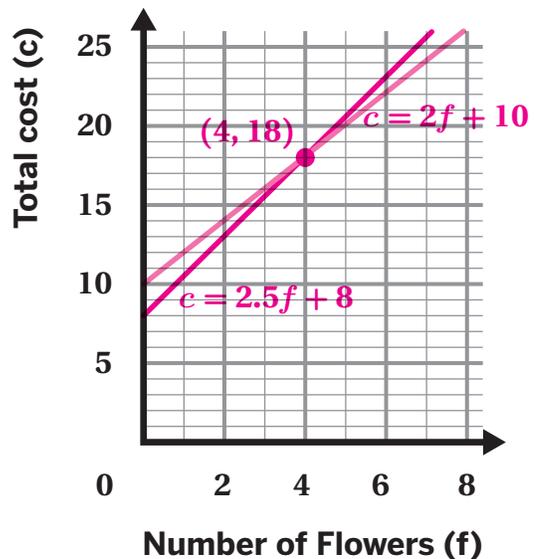
$y = 2x + 1$ and $y = -\frac{1}{2}x + 6$ true.



Problems 3–4: Trevor and Angela each bought an arrangement of flowers in a vase. The cost, c , of f flowers for Trevor’s arrangement is represented by the equation $c = 2.5f + 8$. The cost, c , of f flowers in dollars for Angela’s arrangement is represented by the equation $c = 2f + 10$.

- Graph the equations for the cost of each arrangement of flowers on the same coordinate plane.
- Identify the point of intersection. What does the intersection point mean in this context?

The point of intersection is (4, 18). It means that if both Trevor and Angela buy 4 flowers, the total cost of their arrangements will be the same at \$18 each.



Problems 5–6: Han and Elena are hosting a school bake sale.

Before the sale, Han received \$5 in donations and will earn \$2.50 per baked good sold.

Number of Baked Goods Sold (b)	Total Money Raised (t)
2	14
3	16
10	30

The table shown represents the amount of money Elena raised, where b represents the number of baked goods sold and t represents the total amount of money raised.

5. How many baked goods must be sold before they raise the same amount of money? Show or explain your thinking.

Methods vary. We could write an equation for each student and then set them equal to each other:

$$2.50x + 5 = 2x + 10$$

$$0.50x + 5 = 10$$

$$0.50x = 5$$

$$x = 10$$

After selling 10 baked goods, they will have raised the same amount of money.

6. How much will each of them have earned at that time? Show or explain your thinking.

Methods vary. Substitute 10 into each expression and simplify.

$$\text{Han: } 2.50(10) + 5 = \$30 \quad \text{Elena: } 2(10) + 10 = \$30$$

They will each have earned \$30.

7. The point where the graphs of two equations intersect has a y -coordinate of -6 . One equation is $y = 2x - 4$. Determine the other equation if its graph has a slope of -3 . Show or explain your thinking.

Methods vary. Substitute -6 into the equation $y = 2x - 4$ to determine the point of intersection.

$$-6 = 2x - 4$$

$$-2 = 2x$$

$$-1 = x \quad \text{The point of intersection is } (-1, -6).$$

Next, write the second equation in the form $y = mx + b$ and substitute the values of $x = -1$ and $y = -6$ to solve for b .

$$-6 = -3(-1) + b$$

$$-6 = 3 + b$$

$$-9 = b \quad \text{The equation of the other line is } y = -3x - 9.$$

Name: _____ Date: _____ Period: _____

Additional Practice

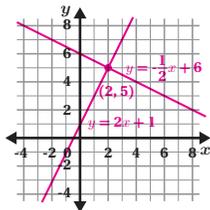
4.10

1. Jack and Yusef are gaining weight for football. Jack weighs 205 pounds and is gaining 2 pounds per week. Yusef weighs 195 pounds and is gaining 3 pounds per week. Is there a week when they will weigh the same amount? Explain your thinking.

Explanations vary. Yes, if we set the expression $205 + 2w$ (for Jack) and $195 + 3w$ (for Yusef) equal to each other and solve for w , we will find the number of weeks it will take until they weigh the same amount.

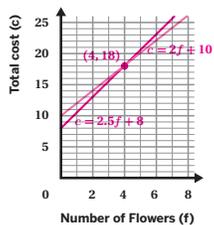
2. Draw a graph to determine x - and y -values that make both of the equations

$$y = 2x + 1 \text{ and } y = -\frac{1}{2}x + 6 \text{ true.}$$



- Problems 3–4:** Trevor and Angela each bought an arrangement of flowers in a vase. The cost, c , of f flowers for Trevor's arrangement is represented by the equation $c = 2.5f + 8$. The cost, c , of f flowers in dollars for Angela's arrangement is represented by the equation $c = 2f + 10$.

3. Graph the equations for the cost of each arrangement of flowers on the same coordinate plane.



4. Identify the point of intersection. What does the intersection point mean in this context?

The point of intersection is (4, 18). It means that if both Trevor and Angela buy 4 flowers, the total cost of their arrangements will be the same at \$18 each.

Unit 4 Lesson 10

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Name: _____ Date: _____ Period: _____

- Problems 5–6:** Han and Elena are hosting a school bake sale.

Before the sale, Han received \$5 in donations and will earn \$2.50 per baked good sold.

Number of Baked Goods Sold (b)	Total Money Raised (t)
2	14
3	16
10	30

The table shown represents the amount of money Elena raised, where b represents the number of baked goods sold and t represents the total amount of money raised.

5. How many baked goods must be sold before they raise the same amount of money? Show or explain your thinking.

Methods vary. We could write an equation for each student and then set them equal to each other.

$$2.50x + 5 = 2x + 10$$

$$0.50x + 5 = 10$$

$$0.50x = 5$$

$$x = 10$$

After selling 10 baked goods, they will have raised the same amount of money.

6. How much will each of them have earned at that time? Show or explain your thinking.

Methods vary. Substitute 10 into each expression and simplify.

$$\text{Han: } 2.50(10) + 5 = \$30 \quad \text{Elena: } 2(10) + 10 = \$30$$

They will each have earned \$30.

7. The point where the graphs of two equations intersect has a y -coordinate of -6 . One equation is $y = 2x - 4$. Determine the other equation if its graph has a slope of -3 . Show or explain your thinking.

Methods vary. Substitute -6 into the equation $y = 2x - 4$ to determine the point of intersection.

$$-6 = 2x - 4$$

$$-2 = 2x$$

$$-1 = x$$

The point of intersection is $(-1, -6)$.

Next, write the second equation in the form $y = mx + b$ and substitute the values of $x = -1$ and $y = -6$ to solve for b .

$$-6 = -3(-1) + b$$

$$-6 = 3 + b$$

$$-9 = b$$

The equation of the other line is $y = -3x - 9$.

Unit 4 Lesson 10

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Additional Practice

Practice Problem Analysis

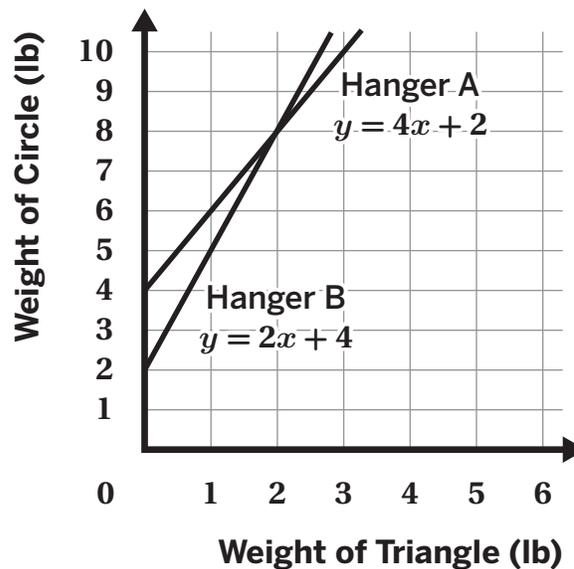
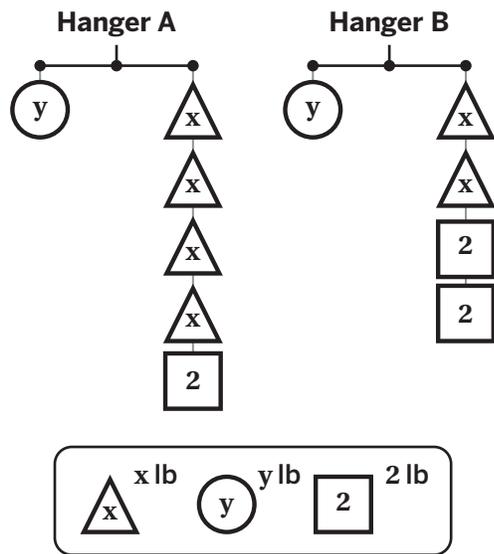
Problem	DOK	Standard(s)
1	2	8.EE.C.8.B
2	1	8.EE.C.8.A
3	1	8.F.A.3
4	2	8.EE.C.8.C
5	2	8.EE.C.8.C, 8.F.B.4
6	2	8.EE.C.8.C
7	2	8.EE.C.8.B

Notes:

Additional Practice

4.11

Problems 1–2: The hangers and the graph represent the same system of equations.



- Determine the solution to the systems of equations.

The solution to the system is the point (2, 8).

- What does the solution tell you about the weight of a triangle and the weight of a circle that will balance the hanger?

Responses vary. When the triangle weighs 2 pounds and the circle weighs 8 pounds, both hangers will be balanced.

Problems 3–4: Here is a graph.

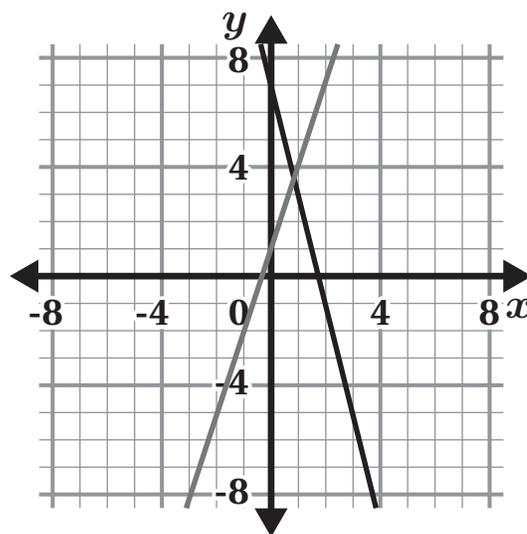
3. Write an equation that can represent each line.

$y = 3x + 1$

$y = -4x + 7$

4. Estimate the solution to the system.

Answers vary: Approximately (0.9, 3.5)



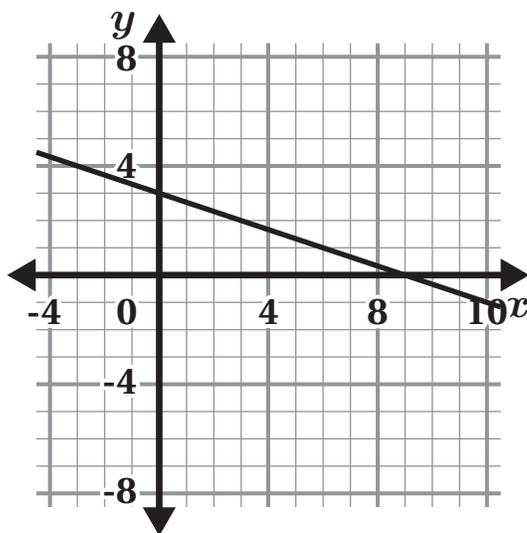
Problems 5–7: Here is a graph that represents one equation in a system of equations.

5. Write a second equation for the system so that it has *infinitely many solutions*.

Answers vary: Any equation equivalent to $y = -\frac{1}{2}x + 3$ is correct.

6. Write a second equation whose graph goes through (0, -2) so that the system has *no solution*.

$y = -\frac{1}{2}x - 2$



7. Write a second equation whose graph goes through (0, -4) so that the system has one solution (6, 0). Show or explain your thinking.

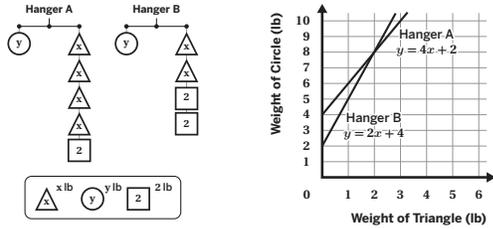
Methods vary. $y = \frac{2}{3}x - 4$. Students can graph the line or substitute the point (6, 0) into the equation $y = mx - 4$ to determine the slope.

Name: _____ Date: _____ Period: _____

Additional Practice

4.11

Problems 1–2: The hangers and the graph represent the same system of equations.



1. Determine the solution to the systems of equations.

The solution to the system is the point (2, 8).

2. What does the solution tell you about the weight of a triangle and the weight of a circle that will balance the hanger?

Responses vary. When the triangle weighs 2 pounds and the circle weighs 8 pounds, both hangers will be balanced.

Unit 4 Lesson 11

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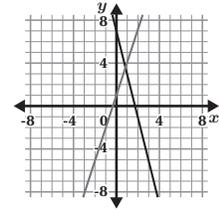
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Name: _____ Date: _____ Period: _____

Problems 3–4: Here is a graph.

3. Write an equation that can represent each line.

$y = 3x + 1$
 $y = -4x + 7$



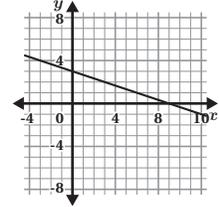
4. Estimate the solution to the system.

Answers vary: Approximately (0.9, 3.5)

Problems 5–7: Here is a graph that represents one equation in a system of equations.

5. Write a second equation for the system so that it has infinitely many solutions.

Answers vary: Any equation equivalent to $y = -\frac{1}{2}x + 3$ is correct.



6. Write a second equation whose graph goes through (0, -2) so that the system has no solution.

$y = -\frac{1}{2}x - 2$

7. Write a second equation whose graph goes through (0, -4) so that the system has one solution (6, 0). Show or explain your thinking.

Methods vary. $y = \frac{2}{3}x - 4$. Students can graph the line or substitute the point (6, 0) into the equation $y = mx - 4$ to determine the slope.

Unit 4 Lesson 11

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Additional Practice

Practice Problem Analysis

Problem	DOK	Standard(s)
1	1	8.EE.C.8.A
2	2	8.EE.C.8.A
3	1	8.F.B.4
4	1	8.EE.C.8.A
5	1	8.EE.C.8.B, 8.F.B.4
6	1	8.EE.C.8.B, 8.F.B.4
7	2	8.EE.C.8.A, 8.F.B.4

Notes:

Additional Practice

4.12

1. What is the solution to the system of equations below?

$$y = 6$$

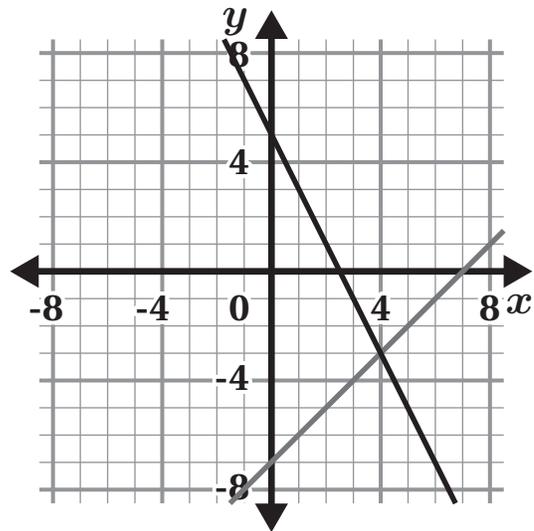
$$y = -\frac{1}{2}x + 4$$

- A. (6, -4)
- B. (-4, -6)
- C. (4, 6)
- D. (-4, 6)**

Problems 2–3: Here is a graph of the systems of equations:

$$y = x - 7$$

$$y = -2x + 5$$



2. How can you determine the solution to this system of equations by looking at the graph?

Responses vary: I look for the point of intersection of the two lines.

3. What is the solution to the system of equations?

(4, -2)

Problems 4–5: Solve each system of equations. Show your thinking.

4. $y = 2x + 5$
 $x = -3$

Methods vary:

$$y = 2(-3) + 5$$

$$y = -6 + 5$$

$$y = -1$$

The solution is (-3, -1).

5. $y = 2x - 4$
 $y = -2x + 12$

Methods vary:

$$2x - 4 = -2x + 12$$

$$4x - 4 = 12$$

$$4x = 16$$

$$x = 4$$

The solution is (4, 4).

$$y = 2(4) - 4$$

$$y = 8 - 4$$

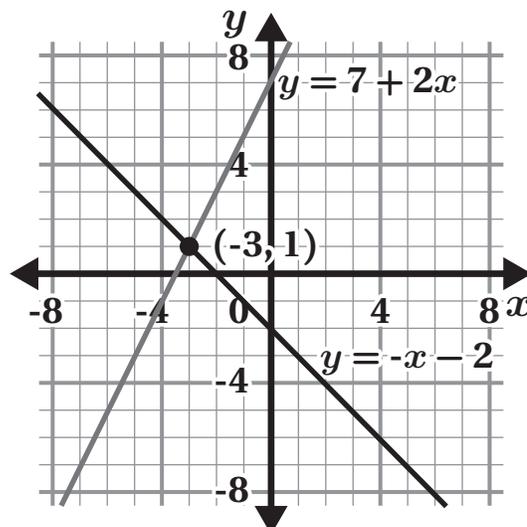
$$y = 4$$

Problems 6–8: Use the lines in the graph to decide whether each statement is true or false. Show your thinking.

6. The solution to the equation $7 + 2x = -x - 2$ is $x = 1$.

Methods vary:

False. The x -value of the intersection of the lines is -3 , not 1 .



7. The point $(-3, 1)$ is the solution to the following systems of equations:

$$y = 7 + 2x$$

$$y = -x - 2$$

Methods vary:

True. This is the point of intersection of the two lines.

8. The point $(0, -2)$ is a solution to the equation $y = -x - 2$.

Methods vary:

True. The graph of the line $y = -x - 2$ goes through the point $(0, -2)$. Therefore, it is a solution to that equation.

9. The solution to a system of equations is $(-1, -4)$. Select two equations that might make up the system. Show or explain your thinking.

A. $y = 2x + 5$

D. $y = x + 3$

B. $y = x - 3$

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

C. $y = 3x - 1$

Methods vary: I found the two equations for which $(-1, -4)$ is a solution.

Name: _____ Date: _____ Period: _____

Additional Practice

4.12

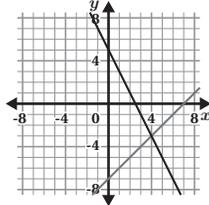
1. What is the solution to the system of equations below?

$$\begin{aligned} y &= 6 \\ y &= -\frac{1}{2}x + 4 \end{aligned}$$

- A. (6, -4)
- B. (-4, -6)
- C. (4, 6)
- D. (-4, 6)**

- Problems 2–3:** Here is a graph of the systems of equations:

$$\begin{aligned} y &= x - 7 \\ y &= -2x + 5 \end{aligned}$$



2. How can you determine the solution to this system of equations by looking at the graph?

Responses vary: I look for the point of intersection of the two lines.

3. What is the solution to the system of equations?

(4, -2)

- Problems 4–5:** Solve each system of equations. Show your thinking.

4. $y = 2x + 5$
 $x = -3$

Methods vary:

$$\begin{aligned} y &= 2(-3) + 5 \\ y &= -6 + 5 \\ y &= -1 \end{aligned}$$

The solution is (-3, -1).

5. $y = 2x - 4$
 $y = -2x + 12$

Methods vary:

$$\begin{aligned} 2x - 4 &= -2x + 12 \\ 4x - 4 &= 12 \\ 4x &= 16 \\ x &= 4 \end{aligned}$$

The solution is (4, 4).

$$\begin{aligned} y &= 2(4) - 4 \\ y &= 8 - 4 \\ y &= 4 \end{aligned}$$

Unit 4 Lesson 12

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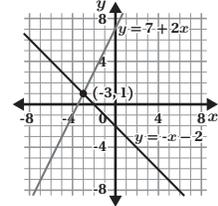
Name: _____ Date: _____ Period: _____

- Problems 6–8:** Use the lines in the graph to decide whether each statement is true or false. Show your thinking.

6. The solution to the equation $7 + 2x = -x - 2$ is $x = 1$.

Methods vary:

False. The x-value of the intersection of the lines is -3, not 1.



7. The point (-3, 1) is the solution to the following systems of equations:

$$\begin{aligned} y &= 7 + 2x \\ y &= -x - 2 \end{aligned}$$

Methods vary:

True. This is the point of intersection of the two lines.

8. The point (0, -2) is a solution to the equation $y = -x - 2$.

Methods vary:

True. The graph of the line $y = -x - 2$ goes through the point (0, -2). Therefore, it is a solution to that equation.

9. The solution to a system of equations is (-1, -4). Select two equations that might make up the system. Show or explain your thinking.

A. $y = 2x + 5$

D. $y = x + 3$

B. $y = x - 3$

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

C. $y = 3x - 1$

Methods vary: I found the two equations for which (-1, -4) is a solution.

Unit 4 Lesson 12

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Additional Practice

Practice Problem Analysis

Problem	DOK	Standard(s)
1	1	8.EE.C.8.B
2	1	8.EE.C.8.A
3	1	8.EE.C.8.A
4	1	8.EE.C.8.B
5	1	8.EE.C.8.B
6	1	8.EE.C.8.A
7	1	8.EE.C.8.A
8	1	8.EE.C.8.A
9	2	8.EE.C.8.A

Notes:

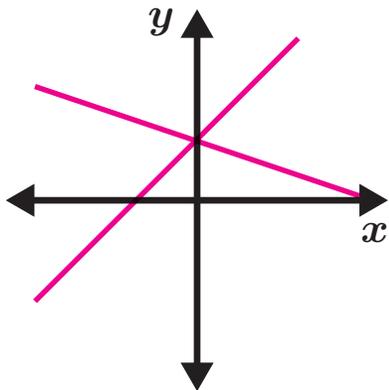
Additional Practice

4.13

Problems 1–3: Sketch two lines that match each description. Then describe the number of solutions for each system of equations.

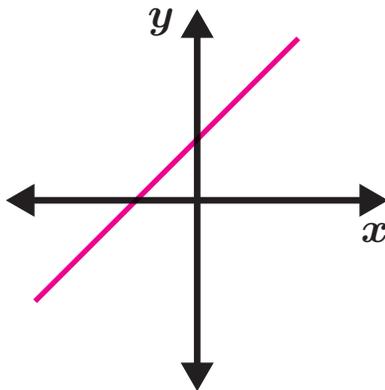
1. Two lines with different slopes but the same y -intercept.

Answers vary.



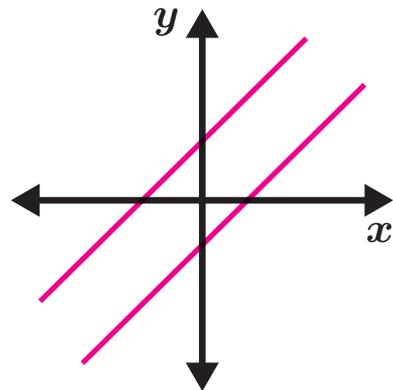
2. Two lines with the same slope and the same y -intercept.

Answers vary.



3. Two lines with the same slope and different y -intercepts.

Answers vary.



4. Which equation, together with the equation $y = -8x + 4$, creates a system with no solution? Select **all** that apply.

A. $y = 2(4x + 2)$

D. $y = -8(x - \frac{1}{2})$

B. $y = 8x - 4$

E. $y = 4(-2x - 1)$

C. $y = -2(4x + 2)$

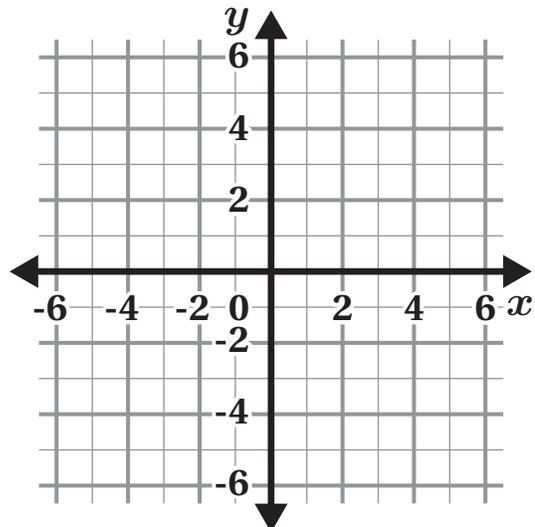
5. How many solutions does this system have? A graph is provided to help with your thinking, if needed.

$$y = \frac{2}{3}x - 4$$

$$y = \frac{1}{3}(2x - 6)$$

Show or explain your thinking.

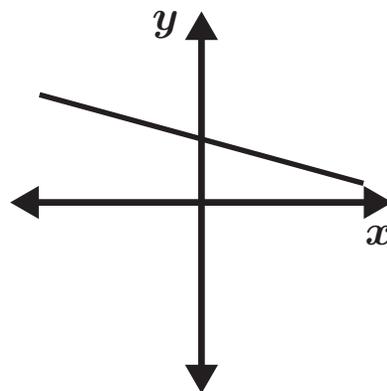
Methods vary. There will be no solutions to this system as these two graphs will have the same slope but different y -intercepts.



Problems 6–7: A graph of a system of equations is provided.

6. Select **two** of the equations below that the systems of equations shown on the graph.

- A. $y = -\frac{1}{2}x + 4$
- B. $y = -\frac{1}{2}(x + 4)$
- C. $y = -\frac{1}{2}(x + 16)$
- D. $y = -\frac{1}{2}(x - 8)$
- E. $y = -4 - \frac{1}{2}x$



7. How many solutions does this system of equations have? Explain your thinking.

Explanations vary. There are an infinite number of solutions to this system because they are the same line with the same slope and the same y -intercept.

Problems 8–9: Alex graphed this system:

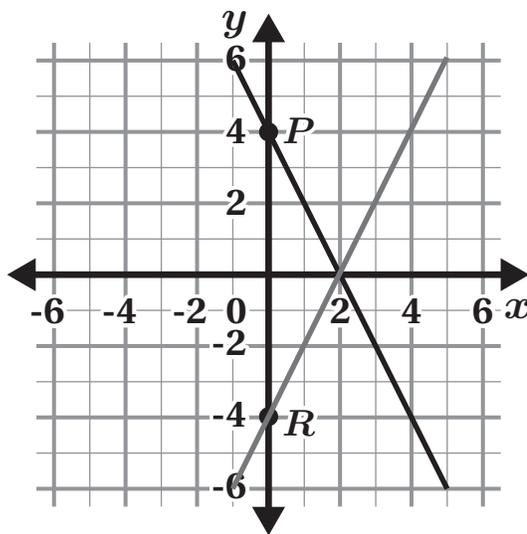
$$y = 2x - 4$$

$$y = -2x + 4$$

He marked its solutions with points P and R .

8. Which statement describes Alex's solutions?

- A. His solutions are correct.
- B. He marked the y -intercepts instead of the x -intercepts.
- C. He marked only the y -intercepts instead of the x - and y -intercepts.
- D. He marked the y -intercepts instead of the intersection point of the two lines.



9. What is the solution to the system of equations?

The solution to this system is (2, 0).

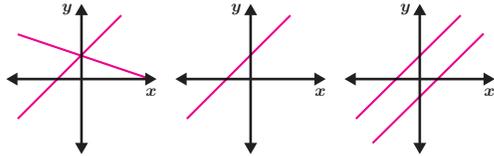
Name: _____ Date: _____ Period: _____

Additional Practice

4.13

Problems 1–3: Sketch two lines that match each description. Then describe the number of solutions for each system of equations.

- Two lines with different slopes but the same y -intercept.
Answers vary.
- Two lines with the same slope and the same y -intercept.
Answers vary.
- Two lines with the same slope and different y -intercepts.
Answers vary.



4. Which equation, together with the equation $y = -8x + 4$, creates a system with no solution? Select **all** that apply.

- A. $y = 2(4x + 2)$ D. $y = -8(x - \frac{1}{2})$
 B. $y = 8x - 4$ E. $y = 4(-2x - 1)$
 C. $y = -2(4x + 2)$

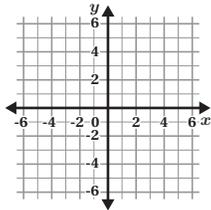
5. How many solutions does this system have? A graph is provided to help with your thinking, if needed.

$$y = \frac{2}{3}x - 4$$

$$y = \frac{1}{3}(2x - 6)$$

Show or explain your thinking.

Methods vary. There will be no solutions to this system as these two graphs will have the same slope but different y -intercepts.



Unit 4 Lesson 13

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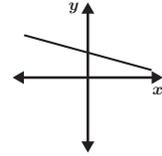
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Problems 6–7: A graph of a system of equations is provided.

6. Select **two** of the equations below that the systems of equations shown on the graph.

- A. $y = -\frac{1}{2}x + 4$
 B. $y = -\frac{1}{2}(x + 4)$
 C. $y = -\frac{1}{2}(x + 16)$
 D. $y = -\frac{1}{2}(x - 8)$
 E. $y = -4 - \frac{1}{2}x$



7. How many solutions does this system of equations have? Explain your thinking.

Explanations vary. There are an infinite number of solutions to this system because they are the same line with the same slope and the same y -intercept.

Problems 8–9: Alex graphed this system:

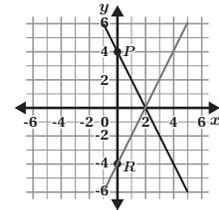
$$y = 2x - 4$$

$$y = -2x + 4$$

He marked its solutions with points P and R .

8. Which statement describes Alex's solutions?

- A. His solutions are correct.
 B. He marked the y -intercepts instead of the x -intercepts.
 C. He marked only the y -intercepts instead of the x - and y -intercepts.
 D. He marked the y -intercepts instead of the intersection point of the two lines.



9. What is the solution to the system of equations?

The solution to this system is (2, 0).

Unit 4 Lesson 13

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Additional Practice

Practice Problem Analysis

Problem	DOK	Standard(s)
1	1	8.EE.C.8.B
2	1	8.EE.C.8.B
3	1	8.EE.C.8.B
4	2	8.EE.C.8.B
5	2	8.EE.C.8.B
6	2	8.EE.C.8.B, 8.F.B.4
7	1	8.EE.C.8.B
8	2	8.EE.C.8.A
9	1	8.EE.C.8.A

Notes:

Additional Practice

4.14

Problems 1–6: Solve each system of equations. Show your thinking.

1. $y = -2x$
 $3x + y = 10$

Methods vary:

$$3x + (-2x) = 10$$

$$x = 10$$

$$y = -2(10)$$

$$y = -20$$

The solution is (10, -20).

2. $y = 2x$
 $x = 4y - 14$

Methods vary:

$$x = 4(2x) - 14$$

$$x = 8x - 14$$

$$-7x = -14$$

$$x = 2$$

$$y = 2(2)$$

$$y = 4$$

The solution is (2, 4).

3. $y = 6x + 10$
 $y = -2x - 14$

Methods vary:

$$6x + 10 = -2x - 14$$

$$8x = -24$$

$$x = -3$$

$$y = 6(-3) + 10$$

$$y = -18 + 10$$

$$y = -8$$

The solution is (-3, -8).

4. $y = -3x + 12$
 $y = 5x - 8$

Methods vary:

$$-3x + 12 = 5x - 8$$

$$-8x = -20$$

$$x = 2.5$$

$$y = 5(2.5) - 8$$

$$y = 12.5 - 8$$

$$y = 4.5$$

The solution is (2.5, 4.5).

5. $x = -3$
 $y = 4x + 8$

Methods vary:

$$y = 4(-3) + 8$$

$$y = -12 + 8$$

$$y = -4$$

The solution is (-3, -4).

6. $y = 12$
 $y = \frac{1}{2}x - 4$

Methods vary:

$$12 = \frac{1}{2}x - 4$$

$$16 = \frac{1}{2}x$$

$$32 = x$$

The solution is (32, 12).

Problems 7–9: Here is an incomplete system of equations.

$$y = \frac{4}{5}x + 6$$

$$y = ???$$

7. Create a second equation so that the system has no solution. Show or explain your thinking.

Solutions vary. All equations should be equivalent to $y = \frac{4}{5}x + n$, where $n \neq 6$.

8. Create a second equation so that the system has an infinite number of solutions. Show or explain your thinking.

$y = \frac{4}{5}x + 6$, or its equivalent.

9. Create a second equation so that the system has a solution of (10, 14).

Solutions vary. Any equation should have the solution of (10, 14). Sample answer: $y = 2x - 6$.

Name: _____ Date: _____ Period: _____

Additional Practice

4.14

Problems 1–6: Solve each system of equations. Show your thinking.

1. $y = -2x$
 $3x + y = 10$

Methods vary:

$$3x + (-2x) = 10$$

$$x = 10$$

$$y = -2(10)$$

$$y = -20$$

The solution is (10, -20).

2. $y = 2x$
 $x = 4y - 14$

Methods vary:

$$x = 4(2x) - 14$$

$$x = 8x - 14$$

$$-7x = -14$$

$$x = 2$$

$$y = 2(2)$$

$$y = 4$$

The solution is (2, 4).

3. $y = 6x + 10$
 $y = -2x - 14$

Methods vary:

$$6x + 10 = -2x - 14$$

$$8x = -24$$

$$x = -3$$

$$y = 6(-3) + 10$$

$$y = -18 + 10$$

$$y = -8$$

The solution is (-3, -8).

4. $y = -3x + 12$
 $y = 5x - 8$

Methods vary:

$$-3x + 12 = 5x - 8$$

$$-8x = -20$$

$$x = 2.5$$

$$y = 5(2.5) - 8$$

$$y = 12.5 - 8$$

$$y = 4.5$$

The solution is (2.5, 4.5).

5. $x = -3$
 $y = 4x + 8$

Methods vary:

$$y = 4(-3) + 8$$

$$y = -12 + 8$$

$$y = -4$$

The solution is (-3, -4).

6. $y = 12$
 $y = \frac{1}{2}x - 4$

Methods vary:

$$12 = \frac{1}{2}x - 4$$

$$16 = \frac{1}{2}x$$

$$32 = x$$

The solution is (32, 12).

Unit 4 Lesson 14

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Name: _____ Date: _____ Period: _____

Problems 7–9: Here is an incomplete system of equations.

$$y = \frac{4}{3}x + 6$$

$$y = ???$$

7. Create a second equation so that the system has no solution. Show or explain your thinking.

Solutions vary. All equations should be equivalent to $y = \frac{4}{3}x + n$, where $n \neq 6$.

8. Create a second equation so that the system has an infinite number of solutions. Show or explain your thinking.

Solutions vary. $y = \frac{4}{3}x + 6$, or its equivalent.

9. Create a second equation so that the system has a solution of (10, 14).

Solutions vary. Any equation should have the solution of (10, 14). Sample answer: $y = 2x - 6$.

Unit 4 Lesson 14

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Additional Practice

Practice Problem Analysis

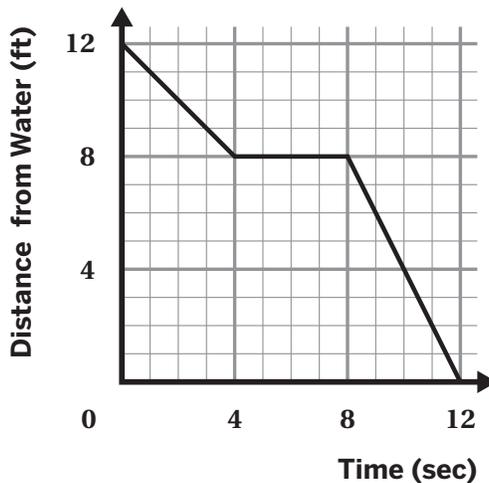
Problem	DOK	Standard(s)
1	1	8.EE.C.8.B
2	1	8.EE.C.8.B
3	1	8.EE.C.8.B
4	1	8.EE.C.8.B
5	1	8.EE.C.8.B
6	1	8.EE.C.8.B
7	2	8.EE.C.8.B
8	2	8.EE.C.8.B
9	2	8.EE.C.8.B

Notes:

Additional Practice

5.01

Problems 1–3: This graph shows a turtle’s journey towards the ocean. Determine whether each statement is true or false. If the statement is false, explain your thinking.



1. The turtle was 4 feet from the water at 4 seconds.

False. The turtle was 8 feet from the water at 4 seconds.

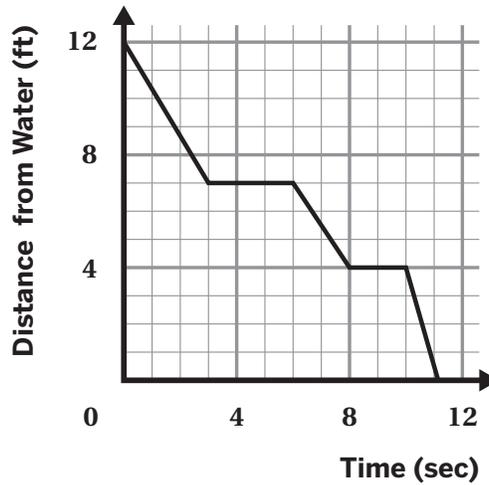
2. The turtle was 12 feet from the water at 0 seconds.

True

3. The turtle’s distance from the water did not change from 4 to 9 seconds.

False. The turtle’s distance from the water did not change from 4 to 8 seconds.

Problems 4–6: This graph represents another turtle walking across the sand towards the water.



4. What story does the graph tell about the turtle's journey?

Explanations vary. The turtle started their journey 12 feet from the water. The turtle traveled for 3 seconds until they were 7 feet from the water. The turtle rested for 3 seconds. Then, the turtle traveled until they were 4 feet from the water. The turtle rested one more time for 2 seconds. The turtle reached the water 11 seconds after it started.

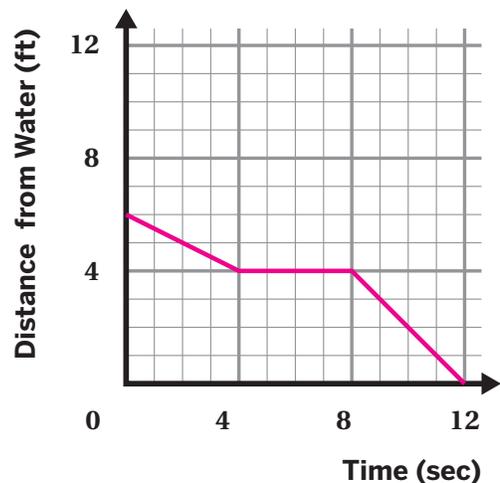
5. How far was the turtle from the water after 5 seconds?

The turtle was 7 feet from the water at 5 seconds.

6. After how many seconds is the turtle's distance 4 feet from the water?

- A. 3 seconds B. 6 seconds **C. 8 seconds** D. 11 seconds

7. A turtle started their journey towards the ocean. When the turtle started their journey, they were 6 feet from the water. The turtle traveled for 4 seconds. When the turtle was 4 feet from the water, they rested for 4 seconds. Then, the turtle kept traveling towards the water. They reached the water at 12 seconds. Sketch a graph that could represent the turtle's distance from the water.

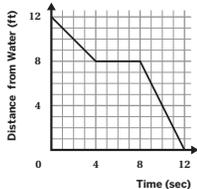


Name: _____ Date: _____ Period: _____

Additional Practice

5.01

Problems 1–3: This graph shows a turtle's journey towards the ocean. Determine whether each statement is true or false. If the statement is false, explain your thinking.



- The turtle was 4 feet from the water at 4 seconds.
False. The turtle was 8 feet from the water at 4 seconds.
- The turtle was 12 feet from the water at 0 seconds.
True
- The turtle's distance from the water did not change from 4 to 9 seconds.
False. The turtle's distance from the water did not change from 4 to 8 seconds.

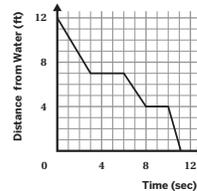
Unit 5 Lesson 1

101

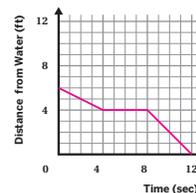
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Name: _____ Date: _____ Period: _____

Problems 4–6: This graph represents another turtle walking across the sand towards the water.



- What story does the graph tell about the turtle's journey?
Explanations vary. The turtle started their journey 12 feet from the water. The turtle traveled for 3 seconds until they were 7 feet from the water. The turtle rested for 3 seconds. Then, the turtle traveled until they were 4 feet from the water. The turtle rested one more time for 2 seconds. The turtle reached the water 11 seconds after it started.
- How far was the turtle from the water after 5 seconds?
The turtle was 7 feet from the water at 5 seconds.
- After how many seconds is the turtle's distance 4 feet from the water?
A. 3 seconds B. 6 seconds **C. 8 seconds** D. 11 seconds
- A turtle started their journey towards the ocean. When the turtle started their journey, they were 6 feet from the water. The turtle traveled for 4 seconds. When the turtle was 4 feet from the water, they rested for 4 seconds. Then, the turtle kept traveling towards the water. They reached the water at 12 seconds. Sketch a graph that could represent the turtle's distance from the water.



Unit 5 Lesson 1

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Additional Practice

Practice Problem Analysis

Problem	DOK	Standard(s)
1	1	8.F.A.1, 8.F.B.5
2	1	8.F.A.1, 8.F.B.5
3	1	8.F.A.1, 8.F.B.5
4	2	8.F.A.1, 8.F.B.5
5	1	8.F.A.1, 8.F.B.5
6	1	8.F.A.1, 8.F.B.5
7	2	8.F.A.1, 8.F.B.5

Notes:

Additional Practice

5.02

1. Each table shows a set of input values with their corresponding output values. Determine whether each table could represent a function. Explain your thinking.

a

Input	Output
4	6
5	7
6	8
4	9
7	10

Not a function; Sample response:
There are two different output values for the same input value 4.

b

Input	Output
-4	17
-2	5
0	0
2	5
3	17

Function; Sample response:
There is only one output for each given input.

2. A birthstone is a gemstone that represents the month in which you were born. Both tables show a relationship between birthday and birthstone. For each table, the input is shown on the left, and the output is shown on the right.

Table A

Birthdate	Gemstone
October 16	Opal
July 5	Ruby
March 20	Aquamarine
June 22	Pearl
October 26	Opal

Table B

Gemstone	Birthdate
Opal	October 16
Ruby	July 5
Aquamarine	March 20
Pearl	June 22
Opal	October 26

Which table(s) represent a function?

- A.** Table A **B.** Table B **C.** Neither **D.** Both

3. Kiran earns an hourly wage. Determine whether each statement is *true* or *false*. Explain your thinking.

- a** Kiran's earnings are a function of his hours worked.

True; Sample response: For each hour worked, Kiran earns one dollar amount — whatever amount he makes in one hour.

- b** Kiran's hours worked are a function of his earnings.
True; Sample response: Each amount of earnings relates to only one number of hours worked.
- c** Kiran's earnings are a function of the number of people working.
False; Sample response: The number of people working does not affect his earnings.

4. A partially completed input-output table is shown. Complete the table so that it represents a function.

Sample response:

Input	Output
-5	25
-3	9
-1	1
-2	4
5	25
3	9
10	100

5. Diego wants to know if it is possible for a function to have more than one input value, but only one output value. What would you tell Diego? Explain your thinking.

Input	1	2	3
Output	12	12	12

Sample response: Yes, it is possible. For example, the table shown is a function where each input has the same output of 12. This represents a function because each input has only one output.

6. Identify a possible rule for the table shown.

Sample response: If the input is a negative number, the output is 0. If the input is a positive number, the output is 1.

Input	Output
1	1
2	1
0	No output
-1	0
-2	0

Name: _____ Date: _____ Period: _____

Additional Practice

5.02

1. Each table shows a set of input values with their corresponding output values. Determine whether each table could represent a function. Explain your thinking.

a

Input	Output
4	6
5	7
6	8
4	9
7	10

Not a function; Sample response: There are two different output values for the same input value 4.

b

Input	Output
-4	17
-2	5
0	0
2	5
3	17

Function; Sample response: There is only one output for each given input.

2. A birthstone is a gemstone that represents the month in which you were born. Both tables show a relationship between birthday and birthstone. For each table, the input is shown on the left, and the output is shown on the right.

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Table B

Gemstone	Birthdate
Opal	October 16
Ruby	July 5
Aquamarine	March 20
Pearl	June 22
Opal	October 26

Which table(s) represent a function?

- A. Table A B. Table B C. Neither D. Both

3. Kiran earns an hourly wage. Determine whether each statement is true or false. Explain your thinking.

- a Kiran's earnings are a function of his hours worked.
True; Sample response: For each hour worked, Kiran earns one dollar amount — whatever amount he makes in one hour.

Unit 5 Lesson 2

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Name: _____ Date: _____ Period: _____

- b Kiran's hours worked are a function of his earnings.
True; Sample response: Each amount of earnings relates to only one number of hours worked.
- c Kiran's earnings are a function of the number of people working.
False; Sample response: The number of people working does not affect his earnings.

4. A partially completed input-output table is shown. Complete the table so that it represents a function.
Sample response:

Input	Output
-5	25
-3	9
-1	1
-2	4
5	25
3	9
10	100

5. Diego wants to know if it is possible for a function to have more than one input value, but only one output value. What would you tell Diego? Explain your thinking.

Input	1	2	3
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Sample response: Yes, it is possible. For example, the table shown is a function where each input has the same output of 12. This represents a function because each input has only one output.

6. Identify a possible rule for the table shown.

Sample response: If the input is a negative number, the output is 0. If the input is a positive number, the output is 1.

Input	Output
1	1
2	1
0	No output
-1	0
-2	0

Unit 5 Lesson 2

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Additional Practice

Practice Problem Analysis

Problem	DOK	Standard(s)
1	1	8.F.A.1
2	1	8.F.A.1
3	2	8.F.A.1
4	2	8.F.A.1
5	2	8.F.A.1
6	3	8.F.A.1

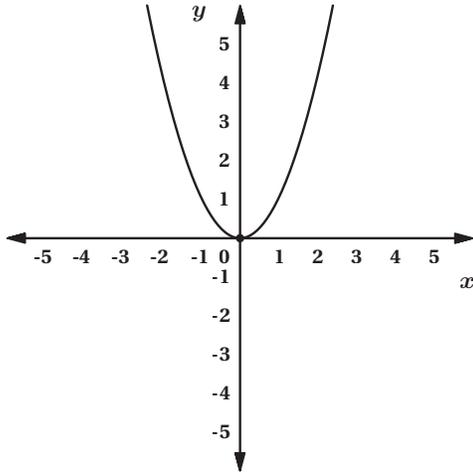
Notes:

Additional Practice

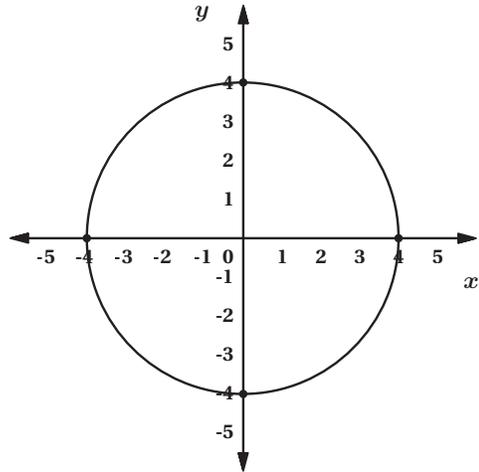
5.03

1. Which graph represents y as a function of x ?

A.

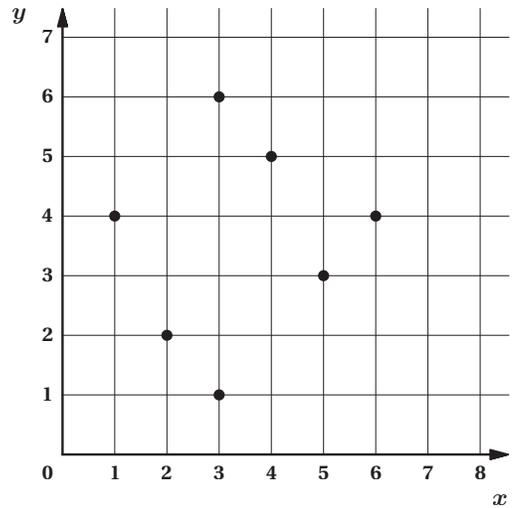


B.

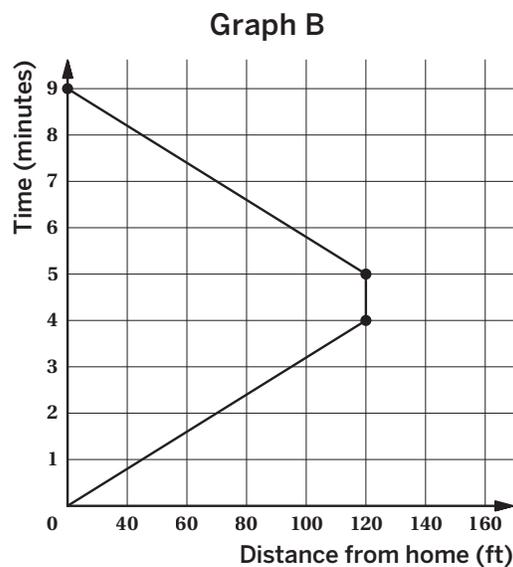
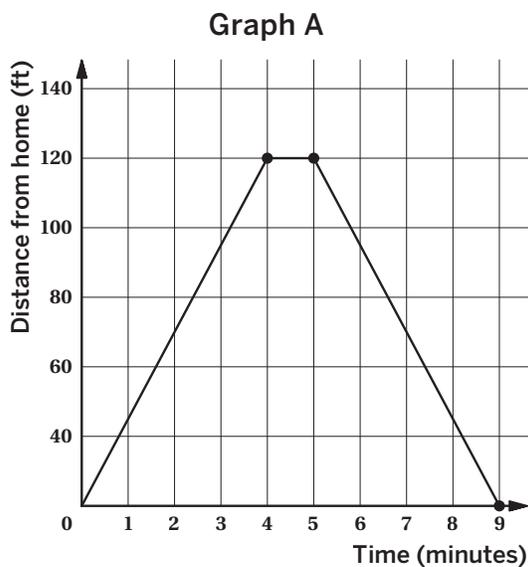


2. Refer to the graph. Which point on the graph could you remove so that y is a function of x ?

Point (3, 1) or point (3, 6)



3. Clare rode her bike to her friends house and back. Both graphs show the relationship between her time and the distance from the starting point.



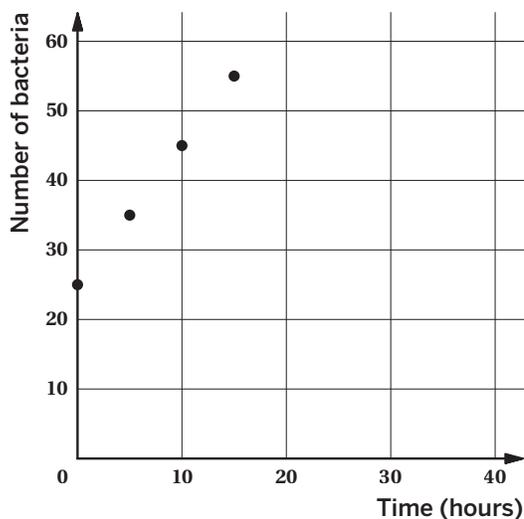
Which graph represents Clare's distance from her house as a function of time?
Explain your thinking.

- A. Graph A B. Graph B C. Both graphs D. Neither graph

Sample response: Graph A is the only graph where distance, the output, is based on time, the input.

4. A scientist graphs the growth of a strain of bacteria. The graph represents a function. Suppose there was the same number of bacteria at 20 and 22 hours. Would the graph still be a function? Explain your thinking.

Yes; Sample response: There still would be one input value paired with only one output value.



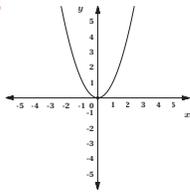
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Additional Practice

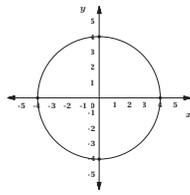
5.03

1. Which graph represents y as a function of x ?

A.

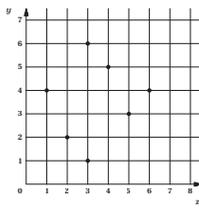


B.



2. Refer to the graph. Which point on the graph could you remove so that y is a function of x ?

Point (3, 1) or point (3, 6)



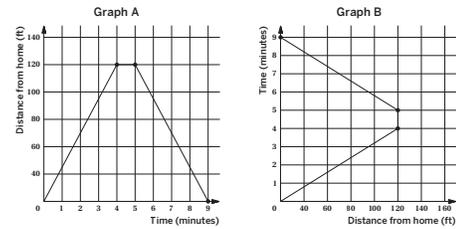
Unit 5 Lesson 3

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Name: _____ Date: _____ Period: _____

3. Clare rode her bike to her friends house and back. Both graphs show the relationship between her time and the distance from the starting point.



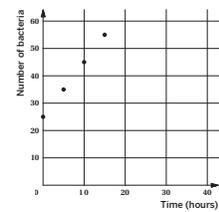
Which graph represents Clare's distance from her house as a function of time? Explain your thinking.

- A.** Graph A **B.** Graph B **C.** Both graphs **D.** Neither graph

Sample response: Graph A is the only graph where distance, the output, is based on time, the input.

4. A scientist graphs the growth of a strain of bacteria. The graph represents a function. Suppose there was the same number of bacteria at 20 and 22 hours. Would the graph still be a function? Explain your thinking.

Yes: Sample response: There still would be one input value paired with only one output value.



Unit 5 Lesson 3

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Additional Practice

Practice Problem Analysis

Problem	DOK	Standard(s)
1	1	8.F.A.1
2	2	8.F.A.1
3	2	8.F.A.1
4	2	8.F.A.1

Notes:

Additional Practice

5.04

1. Which equation expresses the output as a function of the input for the following scenario?

The amount your school charges c for t tickets to the school play that cost \$4 each.

A. $c = \frac{1}{4}t$

B. $t = \frac{1}{4}c$

C. $c = 4t$

D. $t = 4c$

2. Refer to the real-world description in Problem 1. Identify the independent variable and dependent variable.

- a amount your school charges or c

Dependent variable

- b tickets or t

Independent variable

3. For each description, write an equation that expresses the output as a function of the input. Then determine the independent and dependent variables.

- a The circumference C , of a circle with diameter, d .

Equation: $C = \pi \cdot d$ (or equivalent)

Independent variable: diameter of the circle or d

Dependent variable: circumference of the circle or C

- b The selling price p , after a markup of 15% is applied to the original price of an item r .

Equation: $p = 1.15r$ (or equivalent)

Independent variable: original price or r

Dependent variable: selling price or p

- c The area A , of a square with a side length s .

Equation: $A = s^2$ (or equivalent)

Independent variable: side length of the square or s

Dependent variable: area of the square or A

4. Han's family car averages 25 miles per gallon when driven. Han writes the equation $y = 25x$ to represent the distance, in miles, his family has traveled on a certain number of gallons of gasoline.
- a Based on the equation, which variable represents the independent variable? Which variable represents the dependent variable?
 x represents the independent variable.
 y represents the dependent variable.
- b What do the independent variable and dependent variable represent in this situation?
The independent variable x represents the input, or the number of gallons of gasoline.
The dependent variable y represents the output, or distance, in miles, Han's family drives on x gallons of gasoline.
5. Mai is buying vegetable plants for her garden. Tomato plants cost \$3 each and pepper plants cost \$1 each. Mai has \$24 to spend on these plants. Let t represent the number of tomato plants Mai buys and p represent the number of pepper plants Mai buys.
- a Write an equation relating the two variables.
 $3t + p = 24$
- b Rewrite the equation so that it expresses p as the dependent variable in terms of t as the independent variable.
 $p = 24 - 3t$
- c Rewrite the equation so that it expresses t as the dependent variable in terms of p as the independent variable.
 $t = 8 - \frac{1}{3}p$
6. To determine the number of degrees Fahrenheit of a temperature given in degrees Celsius, you multiply the degrees Celsius by $\frac{9}{5}$ and add 32. For each description, write an equation that expresses the output as a function of the input. Then determine the independent and dependent variables.
- a The temperature in degrees Celsius C , based on the temperature in degrees Fahrenheit F .
 **$C = \frac{5}{9}(F - 32)$; Independent variable: temperature in degrees Fahrenheit or F ;
Dependent variable: temperature in degrees Celsius or C**
- b The temperature in degrees Fahrenheit F , based on the temperature in degrees Celsius C .
 $F = \frac{9}{5}C + 32$; Independent variable: temperature in degrees Celsius or C ; Dependent variable: temperature in degrees Fahrenheit or F

Name: _____ Date: _____ Period: _____

Additional Practice

5.04

- Which equation expresses the output as a function of the input for the following scenario?
The amount your school charges c for t tickets to the school play that cost \$4 each.
 - $c = \frac{1}{4}t$
 - $t = \frac{1}{4}c$
 - $c = 4t$**
 - $t = 4c$
- Refer to the real-world description in Problem 1. Identify the independent variable and dependent variable.
 - amount your school charges or c
Dependent variable
 - tickets or t
Independent variable
- For each description, write an equation that expresses the output as a function of the input. Then determine the independent and dependent variables.
 - The circumference C , of a circle with diameter, d .
Equation: $C = \pi \cdot d$ (or equivalent)
Independent variable: diameter of the circle or d
Dependent variable: circumference of the circle or C
 - The selling price p , after a markup of 15% is applied to the original price of an item r .
Equation: $p = 1.15r$ (or equivalent)
Independent variable: original price or r
Dependent variable: selling price or p
 - The area A , of a square with a side length s .
Equation: $A = s^2$ (or equivalent)
Independent variable: side length of the square or s
Dependent variable: area of the square or A

Unit 5 Lesson 4

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Name: _____ Date: _____ Period: _____

- Han's family car averages 25 miles per gallon when driven. Han writes the equation $y = 25x$ to represent the distance, in miles, his family has traveled on a certain number of gallons of gasoline.
 - Based on the equation, which variable represents the independent variable? Which variable represents the dependent variable?
 **x represents the independent variable.
 y represents the dependent variable.**
 - What do the independent variable and dependent variable represent in this situation?
The independent variable x represents the input, or the number of gallons of gasoline. The dependent variable y represents the output, or distance, in miles, Han's family drives on x gallons of gasoline.
- Mai is buying vegetable plants for her garden. Tomato plants cost \$3 each and pepper plants cost \$1 each. Mai has \$24 to spend on these plants. Let t represent the number of tomato plants Mai buys and p represent the number of pepper plants Mai buys.
 - Write an equation relating the two variables.
 $3t + p = 24$
 - Rewrite the equation so that it expresses p as the dependent variable in terms of t as the independent variable.
 $p = 24 - 3t$
 - Rewrite the equation so that it expresses t as the dependent variable in terms of p as the independent variable.
 $t = 8 - \frac{1}{3}p$
- To determine the number of degrees Fahrenheit of a temperature given in degrees Celsius, you multiply the degrees Celsius by $\frac{9}{5}$ and add 32. For each description, write an equation that expresses the output as a function of the input. Then determine the independent and dependent variables.
 - The temperature in degrees Celsius C , based on the temperature in degrees Fahrenheit F .
 **$C = \frac{5}{9}(F - 32)$; Independent variable: temperature in degrees Fahrenheit or F ;
Dependent variable: temperature in degrees Celsius or C .**
 - The temperature in degrees Fahrenheit F , based on the temperature in degrees Celsius C .
 $F = \frac{9}{5}C + 32$; Independent variable: temperature in degrees Celsius or C ; Dependent variable: temperature in degrees Fahrenheit or F .

Unit 5 Lesson 4

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Additional Practice

Practice Problem Analysis

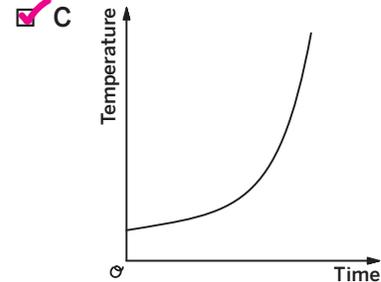
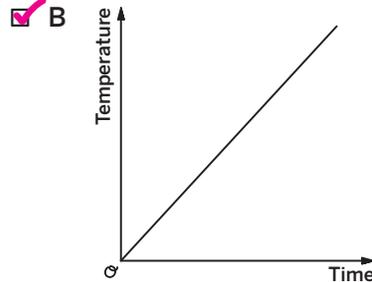
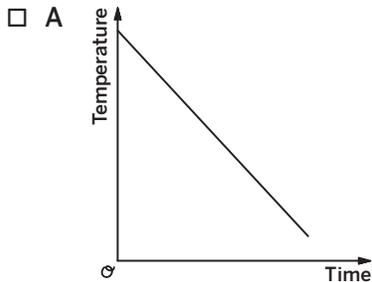
Problem	DOK	Standard(s)
1	1	8.F.A.2
2	1	8.F.A.2
3	2	8.F.A.2
4	2	8.F.A.2
5	2	8.F.A.2
6	3	8.F.A.2

Notes:

Additional Practice

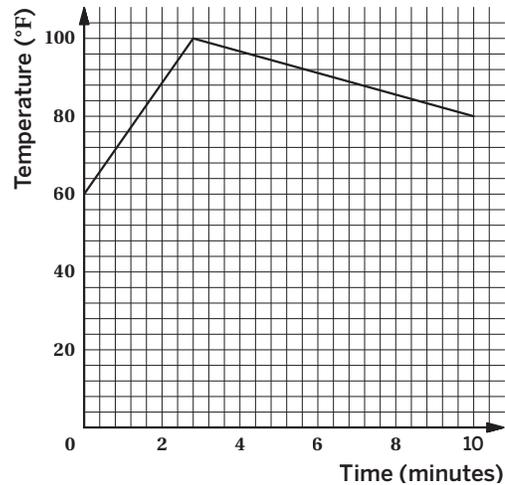
5.05

1. Which graph(s) represents an increasing function? Select *all* that apply.



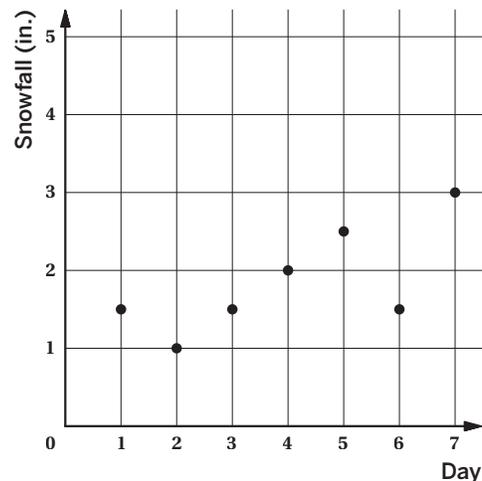
2. The graph shows the temperature of a liquid in a mug over time. Which best describes the graph of the function?

- A. The temperature of the liquid slowly increases, and then slowly decreases over time.
- B. The temperature of the liquid quickly decreases, and then slowly increases over time.
- C. The temperature of the liquid quickly increases, and then decreases even faster over time.
- D. The temperature of the liquid quickly increases, and then decreases more slowly over time.



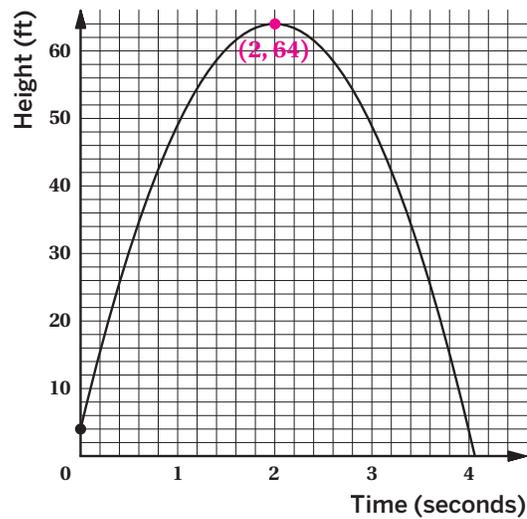
3. The graph shows the total amount of snow that fell each day over a 7-day period.

- a What was the amount of snowfall for Day 2?
1 in.
- b On which day(s) was the amount of snowfall 1.5 in.?
Days 1, 3, 6
- c Is the amount of snowfall a function of the day or is the day a function of the amount of snowfall? Explain your thinking. Then determine the independent and dependent variables.



The amount of snowfall is a function of the day. Sample response: For each day, there is one corresponding amount of snowfall. The independent variable is the day and the dependent variable is the amount of snowfall.

4. Andre’s science class is launching model rockets from a picnic table. The graph represents a model rocket that is launched upward, that then falls to the ground.



a What is the height at which the model rocket was launched?

4 ft

b Plot the point that represents the greatest height of the model rocket. How long did it take for the model rocket to reach that height?

2 sec

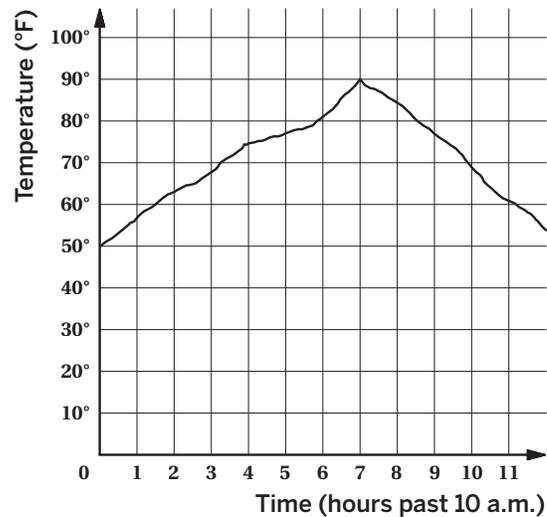
c Determine one time interval when the height of the object was increasing.

The model rocket’s height was increasing from 0 to 2 seconds.

d Determine one time interval when the height of the object was decreasing.

The model rocket’s height was decreasing from 2 to about 4 seconds.

5. The graph shows the temperature between 10 a.m. and 10 p.m. for one day in the city in which Lin lives.



a When the input is 7, what is the output? What does that tell you about the time and temperature?

90; At 5 p.m., the temperature was 90°F.

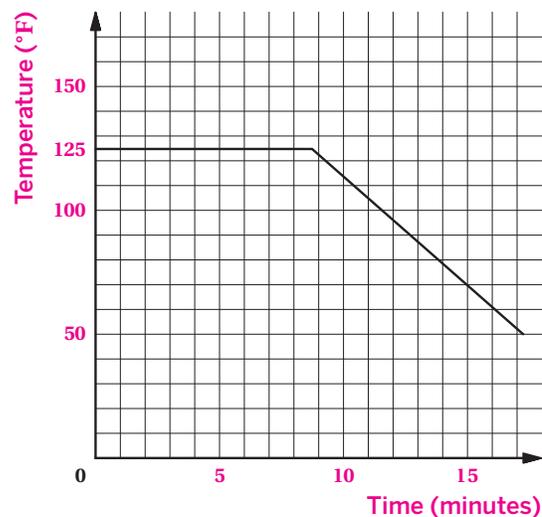
b Determine one time interval when the height of the object was increasing.

The temperature was increasing from 10 a.m. to 5 p.m.

c Determine one time interval when the height of the object was decreasing.

The temperature was decreasing from 5 p.m. to 10 p.m.

6. Describe a real-world situation that would represent the graph. Label your axis.



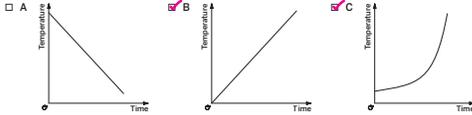
Sample response: A cup of hot tea is kept warm in a kettle at a constant temperature for a time before ice is added to cool it down.

Name: _____ Date: _____ Period: _____

Additional Practice

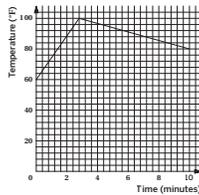
5.05

1. Which graph(s) represents an increasing function? Select *all* that apply.



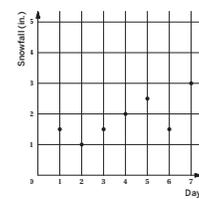
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- C. The temperature of the liquid quickly increases, and then decreases even faster over time.
- D. The temperature of the liquid quickly increases, and then decreases more slowly over time.



3. The graph shows the total amount of snow that fell each day over a 7-day period.

- a. What was the amount of snowfall for Day 2?
1 in.
- b. On which day(s) was the amount of snowfall 1.5 in.?
Days 1, 3, 6
- c. Is the amount of snowfall a function of the day or is the day a function of the amount of snowfall? Explain your thinking. Then determine the independent and dependent variables.



The amount of snowfall is a function of the day. Sample response: For each day, there is one corresponding amount of snowfall. The independent variable is the day and the dependent variable is the amount of snowfall.

Unit 5 Lesson 5

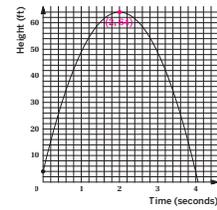
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Name: _____ Date: _____ Period: _____

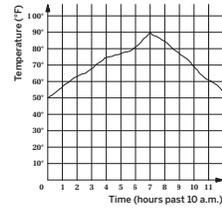
4. Andre's science class is launching model rockets from a picnic table. The graph represents a model rocket that is launched upward, then that falls to the ground.

- a. What is the height at which the model rocket was launched?
4 ft
- b. Plot the point that represents the greatest height of the model rocket. How long did it take for the model rocket to reach that height?
2 sec
- c. Determine one time interval when the height of the object was increasing.
The model rocket's height was increasing from 0 to 2 seconds.
- d. Determine one time interval when the height of the object was decreasing.
The model rocket's height was decreasing from 2 to about 4 seconds.



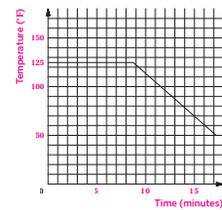
5. The graph shows the temperature between 10 a.m. and 10 p.m. for one day in the city in which Lin lives.

- a. When the input is 7, what is the output? What does that tell you about the time and temperature?
90; At 5 p.m., the temperature was 90°F.
- b. Determine one time interval when the height of the object was increasing.
The temperature was increasing from 10 a.m. to 5 p.m.
- c. Determine one time interval when the height of the object was decreasing.
The temperature was decreasing from 5 p.m. to 10 p.m.



6. Describe a real-world situation that would represent the graph. Label your axis.

- Sample response: A cup of hot tea is kept warm in a kettle at a constant temperature for a time before ice is added to cool it down.**



Unit 5 Lesson 5

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Additional Practice

Practice Problem Analysis

Problem	DOK	Standard(s)
1	1	8.F.A.5
2	1	8.F.A.5
3	2	8.F.A.5
4	2	8.F.A.5
5	2	8.F.A.5
6	3	8.F.A.5

Notes:

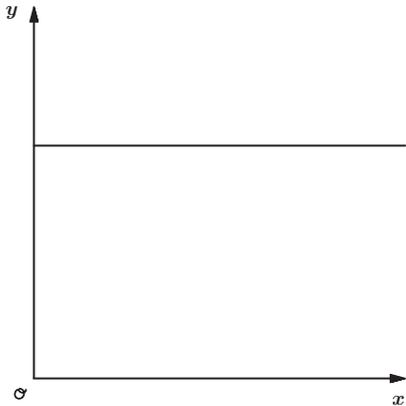
Additional Practice

5.06

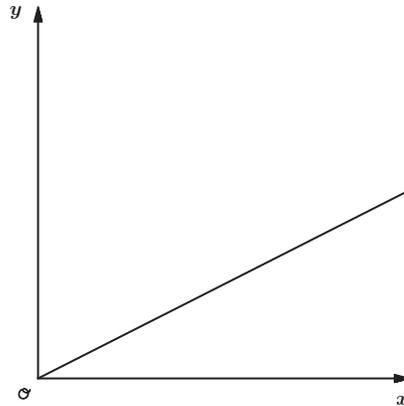
1. Which graph represents the following scenario?

Noah walks from his home to the park at a steady pace without stopping.

Graph A



Graph B



2. Refer to the scenario in Problem 1. Indicate whether the variable described is the possible *independent* or *dependent* variable.

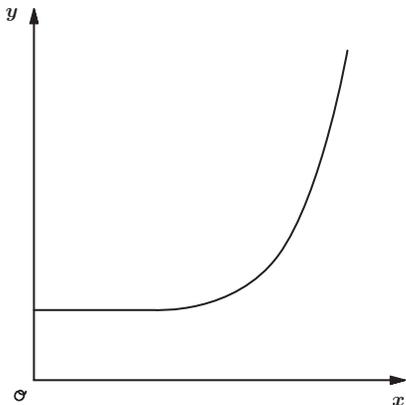
a Distance from home
Dependent variable

b Time
Independent variable

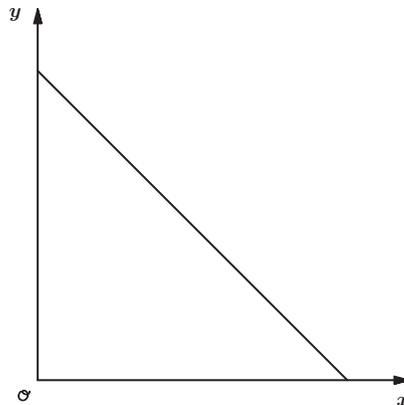
3. For each scenario, determine which graph best represents it. Then identify the possible independent and dependent variables and how you would label the axes.

Note: You may select a graph more than once.

Graph 1



Graph 2



- a Mai has some money saved and starts spending the same amount each week.

Graph 2. Independent variable and horizontal axis label: Time (weeks). Dependent variable and vertical axis label: Money saved (\$).

- b** The day started cold, but then it got warmer.

Graph 1. Independent variable and horizontal axis label: Time (hours). Dependent variable and vertical axis label: Temperature (°F).

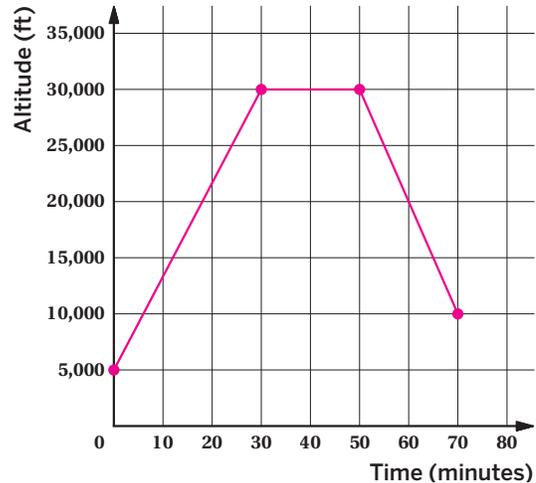
- c** The attendance at fitness class was low and consistent, and then started increasing each week.

Graph 1. Independent variable and horizontal axis label: Time (weeks). Dependent variable and vertical axis label: Attendance.

- 4.** An airplane was at an altitude of 5,000 ft. It took the airplane 30 minutes to go from an altitude of 5,000 ft to 30,000 ft. Once at that altitude, the airplane flew for 20 minutes. Then it took the plane 20 minutes to reach an altitude of 10,000 ft.

Sketch a graph that represents this situation.

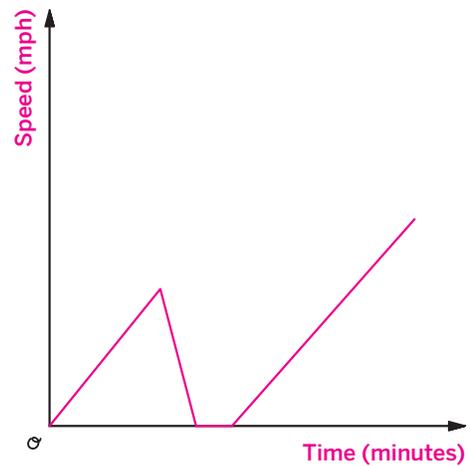
Sample response shown.



- 5.** Tyler got on his rollerblades. He was slowly increasing his speed but then fell down. He got up and continued rollerblading, gradually increasing his speed.

Sketch a graph that corresponds with Tyler's speed, in miles per hour, after several minutes. Be sure to label the axes.

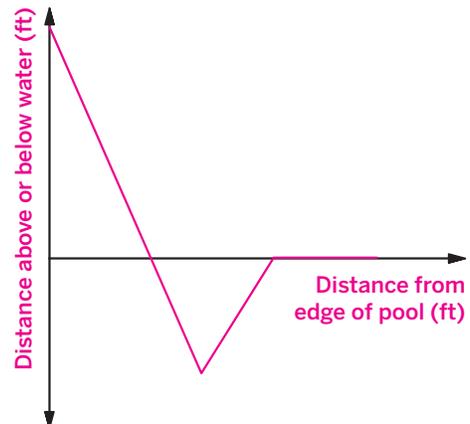
Sample response shown.



- 6.** Kiran was on a water slide. He slid down the slide and dove into the water. He was below the surface water and immediately swam to the surface of the water. He swam at the surface of the water for a few minutes.

Sketch a graph that corresponds with Kiran's elevation at the distances from the edge of the pool. Be sure to label the axes.

Sample response:



Name: _____ Date: _____ Period: _____

Additional Practice **5.06**

1. Which graph represents the following scenario?
Noah walks from his home to the park at a steady pace without stopping.

Graph A

Graph B

2. Refer to the scenario in Problem 1. Indicate whether the variable described is the possible *independent* or *dependent* variable.

a Distance from home **Dependent variable** b Time **Independent variable**

3. For each scenario, determine which graph best represents it. Then identify the possible independent and dependent variables and how you would label the axes.
Note: You may select a graph more than once.

Graph 1

Graph 2

a Mai has some money saved and starts spending the same amount each week.
Graph 2. Independent variable and horizontal axis label: Time (weeks). Dependent variable and vertical axis label: Money saved (\$).

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Name: _____ Date: _____ Period: _____

b The day started cold, but then it got warmer.
Graph 1. Independent variable and horizontal axis label: Time (hours). Dependent variable and vertical axis label: Temperature (°F).

c The attendance at fitness class was low and consistent, and then started increasing each week.
Graph 1. Independent variable and horizontal axis label: Time (weeks). Dependent variable and vertical axis label: Attendance.

4. An airplane was at an altitude of 5,000 ft. It took the airplane 30 minutes to go from an altitude of 5,000 ft to 30,000 ft. Once at that altitude, the airplane flew for 20 minutes. Then it took the plane 20 minutes to reach an altitude of 10,000 ft.
Sketch a graph that represents this situation.
Sample response shown.

5. Tyler got on his rollerblades. He was slowing increasing his speed but then fell down. He got up and continued rollerblading, gradually increasing his speed.
Sketch a graph that corresponds with Tyler's speed, in miles per hour, after several minutes. Be sure to label the axes.
Sample response shown.

6. Kiran was on a water slide. He slid down the slide and dove into the water. He was below the surface water and immediately swam to the surface of the water. He swam at the surface of the water for a few minutes.
Sketch a graph that corresponds with Kiran's elevation at the distances from the edge of the pool. Be sure to label the axes.
Sample response:

Unit 5 Lesson 6 112 Additional Practice

Practice Problem Analysis

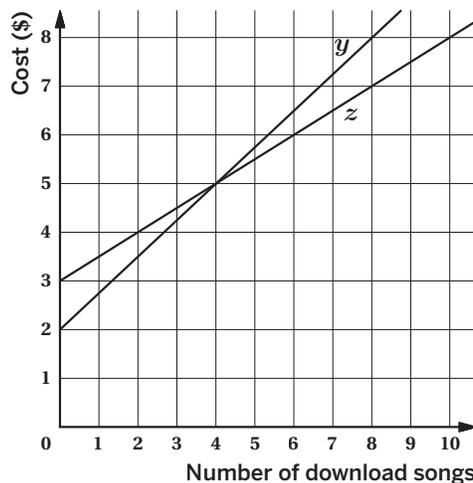
Problem	DOK	Standard(s)
1	1	8.F.A.5
2	1	8.F.A.5
3	2	8.F.A.5
4	2	8.F.A.5
5	2	8.F.A.5
6	3	8.F.A.5

Notes:

Additional Practice

5.07

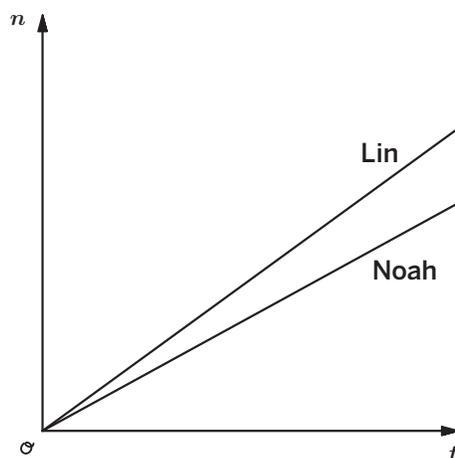
1. Andre is considering two online music subscriptions. Company A charges \$3 per month plus \$0.50 per downloaded song. Company B charges \$2 per month plus d dollars per downloaded song. Match the companies to the lines y and z shown on the graph.



Company A represents line z .

Company B represents line y .

2. Noah and Lin are having a typing contest. The graph shows the number of words typed n for each student from the start of the contest as a function of time t . Who is typing faster? Explain your thinking.

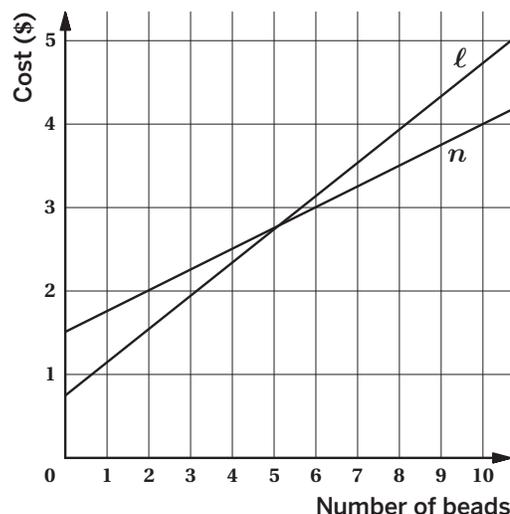


Lin is typing faster because her line is steeper (the number of words typed from the start increases at a faster rate) than the line representing Noah.

3. Mai and her sister each want to buy a new scooter and they plan to borrow money from their parents. They each plan to repay their parents the same amount of money every week, but Mai's scooter costs less than her sister's scooter. On a graph, the amount they owe their parents, in dollars, is a function of the time from when they begin paying their parents back the money they owe them.

- a As you read the graphs from left to right, would you expect the lines to increase or decrease?
The lines would decrease. As the time (the independent variable) increases, the amount of money they owe their parents (the dependent variable) decreases.
- b What would you expect to be *different* about the lines representing the amount Mai owes her parents and the amount her sister owes her parents? Explain your thinking.
I expect the y-intercepts to be different. Mai's initial amount owed will be less than her sister's because her scooter costs less. So, her y-intercept, will be less than her sisters.
- c What would you expect to be *similar* about the lines representing the amount Mai owes her parents and the amount her sister owes her parents? Explain your thinking.
I expect the slopes to be the same because they are paying the same amount of money to their parents each week.

4. Shawn and Elena each sell customized bracelets. Shawn charges \$0.75 plus \$0.40 per bead added to the bracelet. Elena charges \$1.50 plus d dollars per bead added to the bracelet.



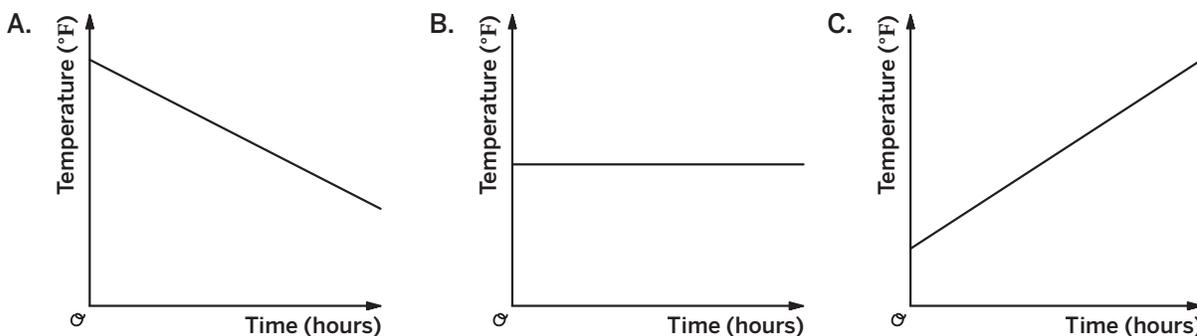
- a Match each person to the lines l and n shown on the graph.

Line l represents Shawn. Line n represents Elena.

- b For Elena, is the additional charge per bead greater than or less than \$0.40 per bead? Explain your thinking.

The charge per bead is less than \$0.40 because line n is not as steep as line l .

5. One day, a certain city's temperature steadily increased from noon to 6 p.m. Then from 6 p.m. until midnight its temperature steadily decreased.



- a Which of the graphs is most likely to represent the temperature from noon to 6 p.m.? Explain your thinking.

Graph C; The city's temperature increases at a steady rate, so the line must increase.

- b Which of the graphs is most likely to represent the temperature from 6 p.m. to midnight? Explain your thinking.

Graph A; It is the only graph with a decreasing slope, and the temperature decreases during that time span.

- c Why does the other graph not likely represent the temperature during either time span? Explain your thinking.

Graph B would not make sense because Graph B shows the temperature remaining constant, but the temperature did not remain constant.

6. Fitness Center A charges \$25 per month plus \$2 per visit. The monthly cost of Fitness Center B is represented by $y = 2x + 20$ where x is the number of visits. What can you conclude about the monthly costs of the fitness centers? Explain your thinking.

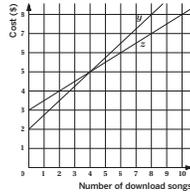
Sample response: The cost will always be greater for Fitness Center A because the cost per visit is the same.

Name: _____ Date: _____ Period: _____

Additional Practice

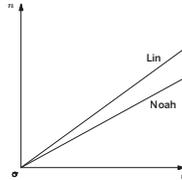
5.07

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- What would you expect to be different about the lines representing the amount Mai owes her parents and the amount her sister owes her parents? Explain your thinking. **I expect the y -intercepts to be different. Mai's initial amount owed will be less than her sister's because her scooter costs less. So, her y -intercept, will be less than her sister's.**
- What would you expect to be similar about the lines representing the amount Mai owes her parents and the amount her sister owes her parents? Explain your thinking. **I expect the slopes to be the same because they are paying the same amount of money to their parents each week.**

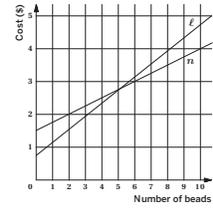
Unit 5 Lesson 7

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Name: _____ Date: _____ Period: _____

4. Shawn and Elena each sell customized bracelets. Shawn charges \$0.75 plus \$0.40 per bead added to the bracelet. Elena charges \$1.50 plus d dollars per bead added to the bracelet.



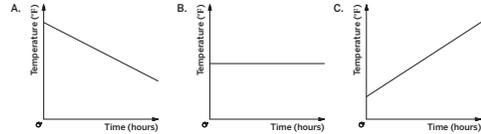
- a. Match each person to the lines l and n shown on the graph.

Line l represents Shawn. Line n represents Elena.

- b. For Elena, is the additional charge per bead greater than or less than \$0.40 per bead? Explain your thinking.

The charge per bead is less than \$0.40 because line n is not as steep as line l .

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- a. Which of the graphs is most likely to represent the temperature from noon to 6 p.m.?

Explain your thinking.

Graph C. The city's temperature increases at a steady rate, so the line must increase.

- b. Which of the graphs is most likely to represent the temperature from 6 p.m. to midnight?

Explain your thinking.

Graph A. It is the only graph with a decreasing slope, and the temperature decreases during that time span.

- c. Why does the other graph not likely represent the temperature during either time span?

Explain your thinking.

Graph B would not make sense because Graph B shows the temperature remaining constant, but the temperature did not remain constant.

6. Fitness Center A charges \$25 per month plus \$2 per visit. The monthly cost of Fitness Center B is represented by $y = 2x + 20$ where x is the number of visits. What can you conclude about the monthly costs of the fitness centers? Explain your thinking.

Sample response: The cost will always be greater for Fitness Center A because the cost per visit is the same.

Unit 5 Lesson 7

114

Additional Practice

Practice Problem Analysis

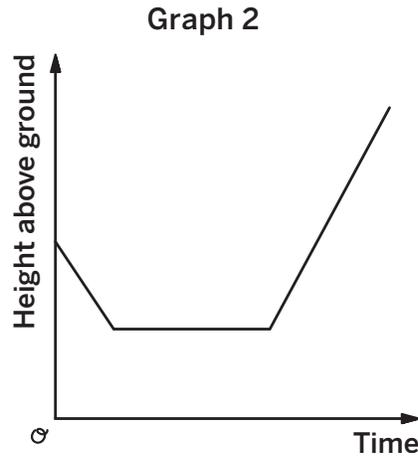
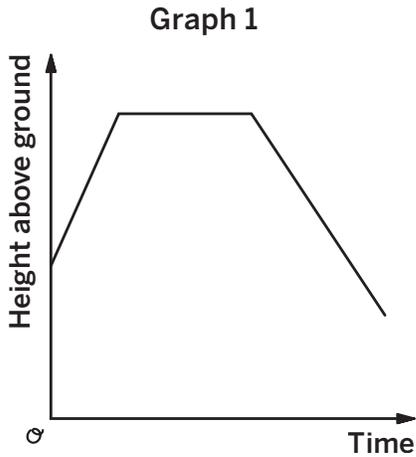
Problem	DOK	Standard(s)
1	1	8.F.A.2
2	1	8.F.A.2
3	2	8.F.A.2
4	2	8.F.A.2
5	2	8.F.A.2
6	3	8.F.A.2

Notes:

Additional Practice

5.09

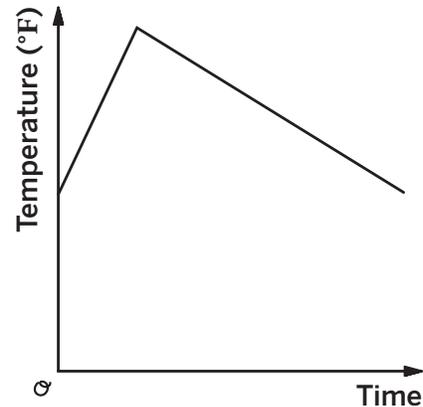
1. The graph shows the height above ground of two elevators over time. Match each graph to the situation it represents.



- a The elevator starts at the fourth floor, then stops at the second floor, and then goes up to the seventh floor.
Graph 2
- b The elevator starts at the third floor, then stops at the sixth floor, and then goes down to the second floor.
Graph 1

2. Mai had a teacup of water. The graph shows the temperature of water in a teacup. Describe a possible situation that could represent the graph.

Sample response: The water was heated quickly, possibly in a microwave. Then the water cools to room temperature.



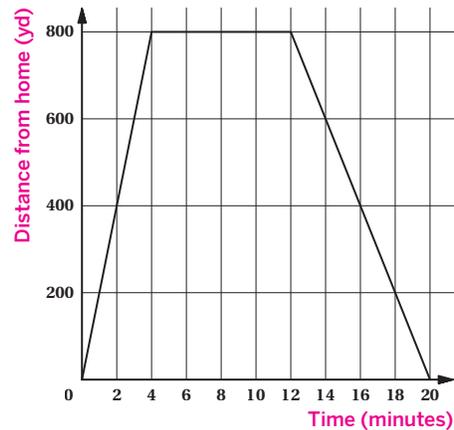
3. The following statements are descriptions of the linear segments that make up a piecewise function. Draw a graph of the piecewise function described.

- Starts at the y -intercept 1.
- Increasing at its greatest constant rate from $x = 0$ to $x = 3$.
- Has a slope of 0 from $x = 3$ to $x = 6$.
- Decreasing at a constant rate from $x = 6$ to $x = 8$.
- Has a slope of 0 from $x = 8$ to $x = 10$.



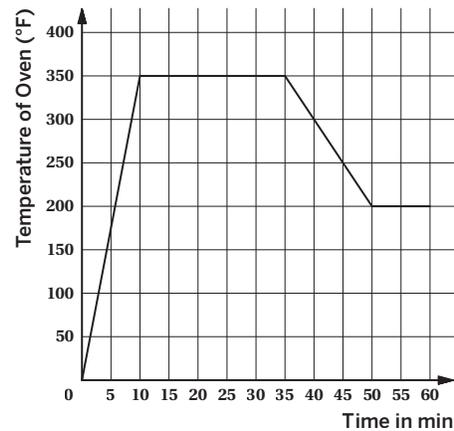
4. Clare walked her dog to the dog park and let the dog play at the park. Then she walked home.

- a The graph shows her distance walked in yards, as a function of time, in minutes. Add the axes labels to the graph to show this.
- b When did she reach the dog park?
After 4 minutes
- c How far did Clare walk to get to the dog park?
800 yd
- d How long were Clare and her dog at the dog park?
8 minutes
- e At what rate did she walk to the dog park?
200 yd per minute
- f At what rate did she walk home from the dog park?
100 yd per minute



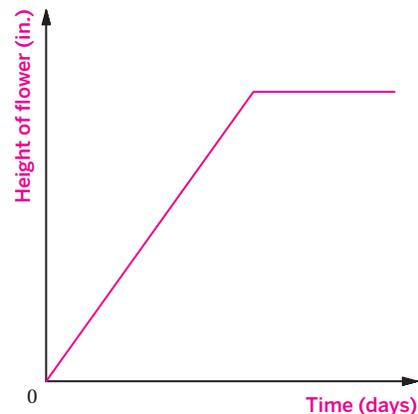
5. Andre’s dad is baking a casserole. He preheated the oven. The graph shows the temperature of the oven from when he turned the oven on.

- a When was the temperature of the oven increasing?
From 0 to 10 minutes
- b What was happening from 10 minutes to 35 minutes after the stove was turned on?
Sample response: The temperature remained constant at 350° F while the casserole was baking.
- c What rate did the temperature of the oven increase?
35° F per minute because $\frac{350}{10} = 35$.



6. Noah graphed the growth of his flower. The flower grew at a steady rate until it reached its full height and then stopped growing.

- a What does Noah’s graph look like? **Sample response:**
- b Han suggested that Noah’s flower had a constant growth rate during this time because all parts of the graph can be represented by straight lines. Is he correct? Explain your thinking.
No. Sample response: While sections of Noah’s graph represent constant rates of change, the graph as a whole does not have one constant rate of change. The rate of change changes from positive to zero, so it is not one number the entire time.

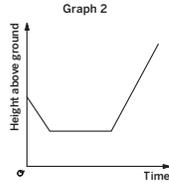
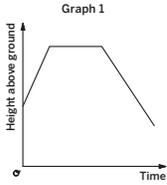


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Additional Practice

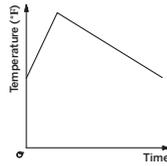
5.09

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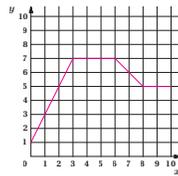
- a. The elevator starts at the fourth floor, then stops at the second floor, and then goes up to the seventh floor.
Graph 2
- b. The elevator starts at the third floor, then stops at the sixth floor, and then goes down to the second floor.
Graph 1

2. Mai had a teacup of water. The graph shows the temperature of water in a teacup. Describe a possible situation that could represent the graph.
Sample response: The water was heated quickly, possibly in a microwave. Then the water cools to room temperature.



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- Has a slope of 0 from $x = 8$ to $x = 10$.



Unit 5 Lesson 9

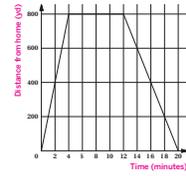
117

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Name: _____ Date: _____ Period: _____

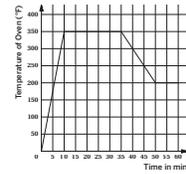
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- d. How long were Clare and her dog at the dog park?
8 minutes
- e. At what rate did she walk to the dog park?
200 yd per minute
- f. At what rate did she walk home from the dog park?
100 yd per minute



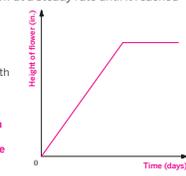
5. Andre's dad is baking a casserole. He preheated the oven. The graph shows the temperature of the oven from when he turned the oven on.

- a. When was the temperature of the oven increasing?
From 0 to 10 minutes
- b. What was happening from 10 minutes to 35 minutes after the stove was turned on?
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6. Noah graphed the growth of his flower. The flower grew at a steady rate until it reached its full height and then stopped growing.

- a. What does Noah's graph look like? **Sample response:**
- b. Han suggested that Noah's flower had a constant growth rate during this time because all parts of the graph can be represented by straight lines. Is he correct? Explain your thinking.
No. Sample response: While sections of Noah's graph represent constant rates of change, the graph as a whole does not have one constant rate of change. The rate of change changes from positive to zero, so it is not one number the entire time.



Unit 5 Lesson 9

118

Additional Practice

Practice Problem Analysis

Problem	DOK	Standard(s)
1	1	8.F.B.5
2	1	8.F.B.5
3	2	8.F.B.5
4	2	8.F.B.5
5	2	8.F.B.5
6	3	8.F.B.5

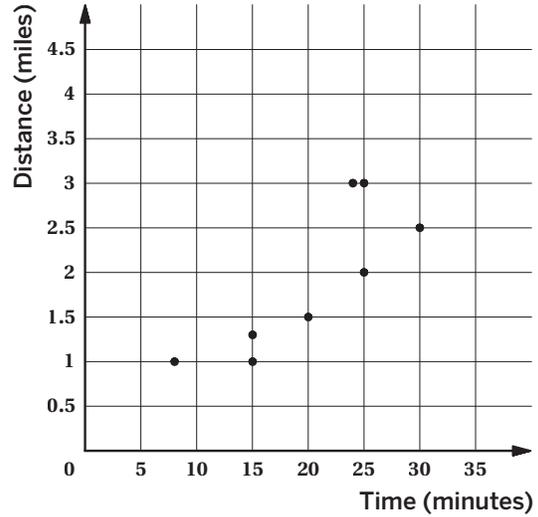
Notes:

Additional Practice

6.01

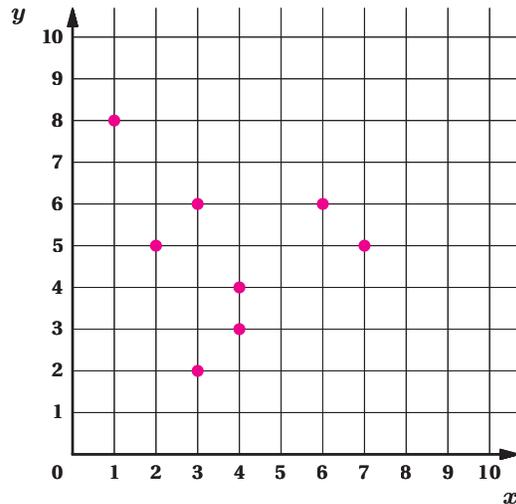
1. The graph shows the relationship between the amount of time, in minutes, and the distance, in miles, ran by eight different runners. Determine the coordinates for each point in the scatter plot.

Time (minutes) <i>x</i>	Distance (miles) <i>y</i>
30	2.5
15	1
8	1
25	3
20	1.5
15	1.4
24	3
25	2



2. Create a scatter plot from the data shown in the table.

<i>x</i>	<i>y</i>
3	2
4	4
2	5
7	5
4	3
3	6
1	8
6	6



3. Refer to the scatter plot in Problem 1. What patterns, if any, do you see in the data? Explain your thinking.

Sample response: There appears to be a relationship between the amount of time and the distance run. As the number of minutes increases, the number of miles also increases.

4. When is it helpful to use a table to represent data instead of a scatter plot? Explain your thinking.

Sample response: A table of data is helpful to determine the precise values of data.

5. The graph shows the height h in inches of a house plant m months after it has been planted.

- a Write an equation that gives the plant's height h after m months.

$h = 2m + 5$

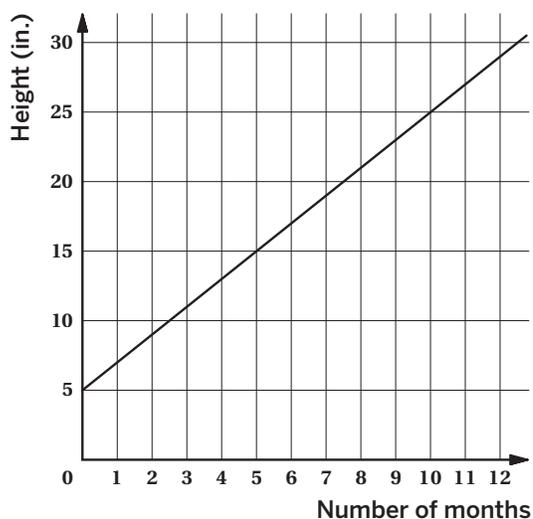
- b After how many months will the plant be 95 in. tall? Show or explain your thinking.

45 months; I substituted 95 for h in my equation and solved for m .

$95 = 2m + 5$

$90 = 2m$

$m = 45$



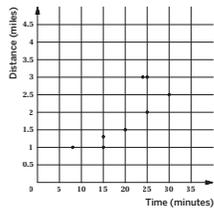
Name: _____ Date: _____ Period: _____

Additional Practice

6.01

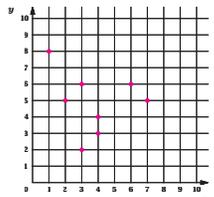
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Time (minutes) x	Distance (miles) y
30	2.5
15	1
8	1
25	3
20	1.5
15	1.4
24	3
25	2



2. Create a scatter plot from the data shown in the table.

x	y
3	2
4	4
2	5
7	5
4	3
3	6
1	8
6	6



Unit 6 Lesson 1

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Name: _____ Date: _____ Period: _____

3. Refer to the scatter plot in Problem 1. What patterns, if any, do you see in the data? Explain your thinking.

Sample response: There appears to be a relationship between the amount of time and the distance run. As the number of minutes increases, the number of miles also increases.

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Sample response: A table of data is helpful to determine the precise values of data.

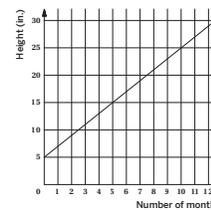
5. The graph shows the height h in inches of a house plant m months after it has been planted.

- a. Write an equation that gives the plant's height h after m months.

$h = 2m + 5$

- b. After how many months will the plant be 95 in. tall? Show or explain your thinking.

45 months; I substituted 95 for h in my equation and solved for m .
 $95 = 2m + 5$
 $90 = 2m$
 $m = 45$



Unit 6 Lesson 1

132

Additional Practice

Practice Problem Analysis

Problem	DOK	Standard(s)
1	1	8.SP.A.1
2	1	8.SP.A.1
3	2	8.SP.A.1
4	2	8.SP.A.1
5*	2	8.EE.B.6

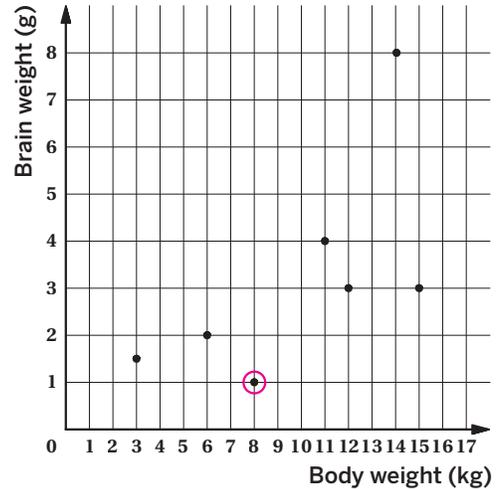
*Spiral review

Notes:

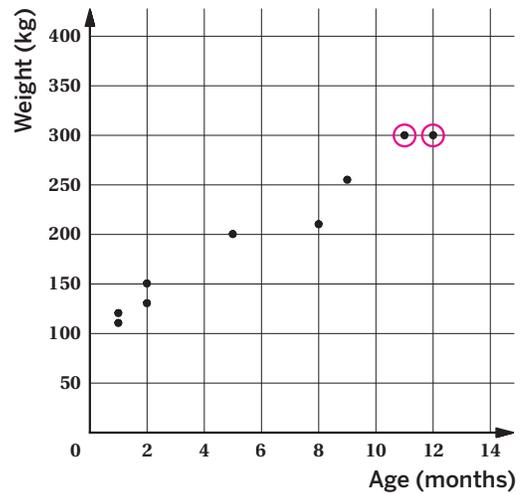
Additional Practice

6.02

1. The scatter plot shows the body weight and brain weight, in grams, of eight small animals. Circle the point that represents the animal with the lightest brain.



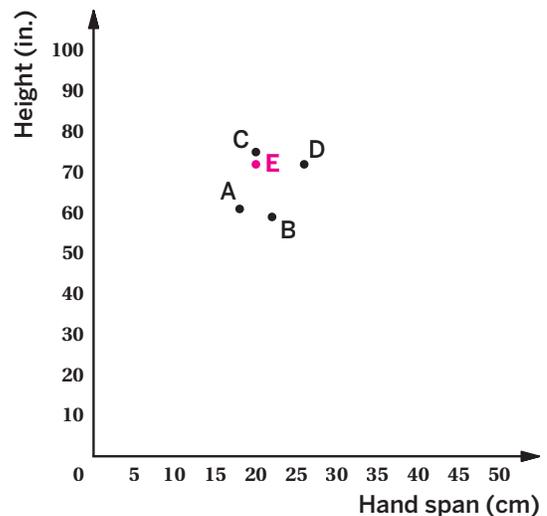
2. The scatter plot shows the age, in months, and weight, in kilograms, of nine elephants. Which elephant(s) weigh the most? Circle those points. Then list the age(s) and weight(s) of the elephant(s).



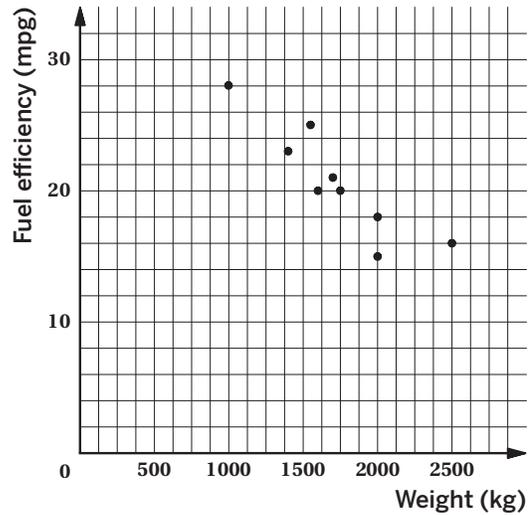
11 months, 300 kg and 12 months, 300 kg

3. The table shows the hand span, in centimeters, and the height, in inches, of five middle school students. Add a point to the graph that represents Student E.

Student	Hand span (cm)	Height (in.)
A	18	61
B	22	59
C	20	75
D	26	72
E	20	72



4. The fuel efficiency of a vehicle can be expressed as the distance traveled per unit of fuel used, e.g., miles per gallon (mpg). The scatter plot shows the weight and fuel efficiency of nine different cars.



- a How much does the heaviest car weigh?
2,500 kg
- b What is the weight and fuel efficiency of the car with the highest fuel efficiency?
1,000 kg and 28 mpg.
- c Plot a point on the graph that represents a car that has a fuel efficiency less than 20 mpg and a weight of 1,500 kg.
Any point with a value of x less than 20 and a value of y equal to 1,500.

5. The table from a local clothing store compares the average monthly temperature, in degrees Celsius, to coat sales, in dollars. Elena plans to create a graph to represent this data. What does the point (13, 840) represent?

Temperature (degrees Celsius)	Coat sales (dollars)
1	1,245
3	1,040
7	1,115
13	840
24	235

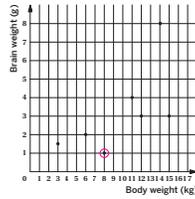
When the temperature was 13°C, the store had \$840 in coat sales.

Name: _____ Date: _____ Period: _____

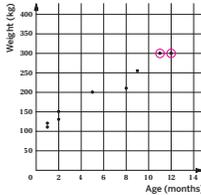
Additional Practice

6.02

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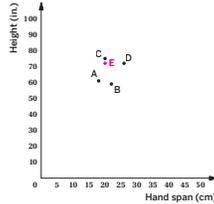
2. The scatter plot shows the age, in months, and weight, in kilograms, of nine elephants. Which elephant(s) weigh the most? Circle those points. Then list the age(s) and weight(s) of the elephant(s).



11 months, 300 kg and 12 months, 300 kg

3. The table shows the hand span, in centimeters, and the height, in inches, of five middle school students. Add a point to the graph that represents Student E.

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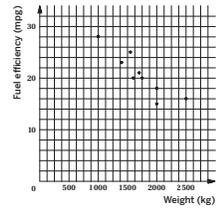
Unit 6 Lesson 2

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Name: _____ Date: _____ Period: _____

4. The fuel efficiency of a vehicle can be expressed as the distance traveled per unit of fuel used, e.g., miles per gallon (mpg). The scatter plot shows the weight and fuel efficiency of nine different cars.



- a. How much does the heaviest car weigh?
2,500 kg
- b. What is the weight and fuel efficiency of the car with the highest fuel efficiency?
1,000 kg and 28 mpg.
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Any point with a value of x less than 20 and a value of y equal to 1,500.

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When the temperature was 13°C, the store had \$840 in coat sales.

Unit 6 Lesson 2

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Additional Practice

Practice Problem Analysis

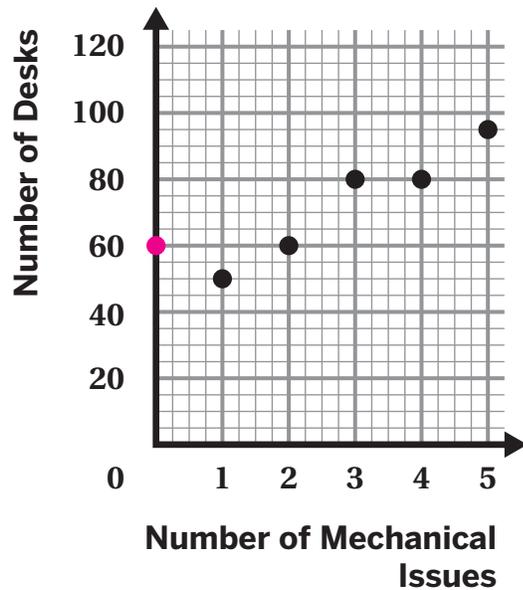
Problem	DOK	Standard(s)
1	1	8.SP.A.1
2	1	8.SP.A.1
3	2	8.SP.A.1
4	2	8.SP.A.1
5	2	8.SP.A.1

Notes:

Additional Practice

6.03

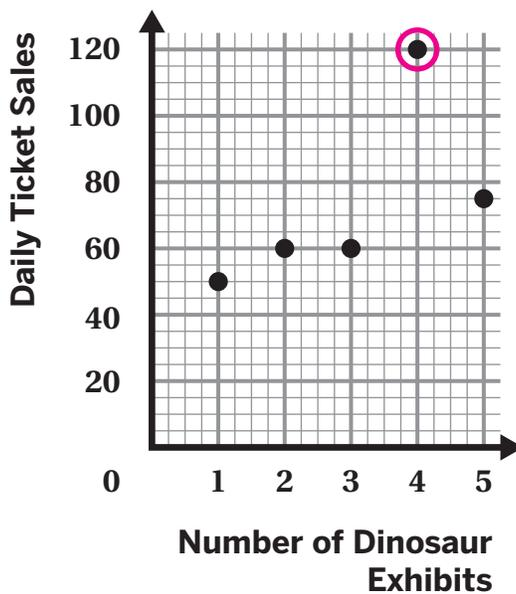
Problems 1–4: A factory produces wood desks for offices. This scatter plot shows the number of mechanical issues and the number of desks produced for five machines at a factory.



1. What is the number of desks produced at a machine with the most mechanical issues?
95 desks
2. What is the number of mechanical issues for a machine that produces the least number of desks?
1 mechanical issue
3. The number of desks produced at a machine that has 0 mechanical issues is 60 desks. Plot a point on the graph that represents this machine.
See graph.
4. What does the point (3, 80) represent?
The point (3, 80) represents a machine that produces 80 desks and has 3 mechanical issues.

Problems 5–6: A study gathered data about different natural history museums. The table and scatter plot shows the number of exhibits and the number of daily ticket sales for each museum.

Museum	Dinosaur Exhibits	Daily Ticket Sales
National Dinosaur Museum	4	120
Time Capsule Institute	2	60
The Hall of History	1	50
The Museum of National Treasures	5	75
The Hall of Historical Tales	3	60



5. Circle the point on the scatter plot that represents the data for the National Dinosaur Museum.

See graph.

6. What does the point (1, 50) represent?

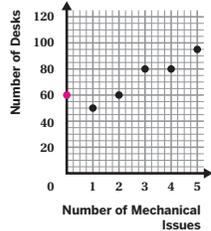
The point (1, 50) represents The Hall of History museum. This museum has 1 dinosaur exhibit and has 50 daily ticket sales.

Name: _____ Date: _____ Period: _____

Additional Practice

6.03

Problems 1–4: A factory produces wood desks for offices. This scatter plot shows the number of mechanical issues and the number of desks produced for five machines at a factory.



- What is the number of desks produced at a machine with the most mechanical issues?
95 desks
- What is the number of mechanical issues for a machine that produces the least number of desks?
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Unit 6 Lesson 3

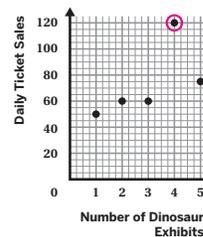
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Name: _____ Date: _____ Period: _____

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- What does the point (1, 50) represent?
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Unit 6 Lesson 3

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Additional Practice

Practice Problem Analysis

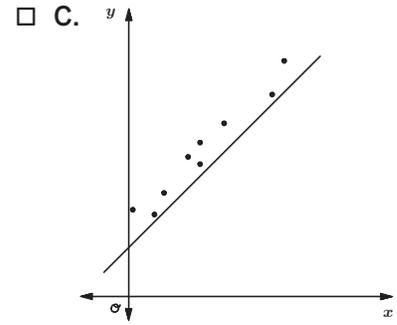
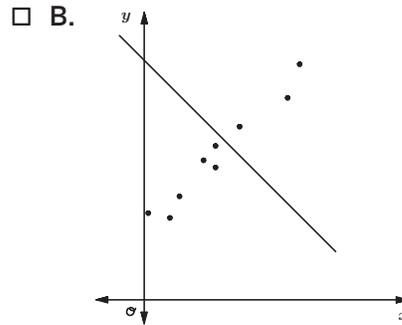
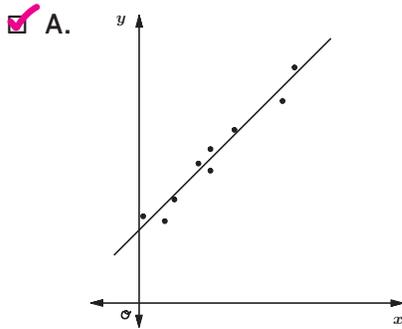
Problem	DOK	Standard(s)
1	1	8.SP.A.1
2	1	8.SP.A.1
3	2	8.SP.A.1
4	2	8.SP.A.1
5	1	8.SP.A.1
6	2	8.SP.A.1

Notes:

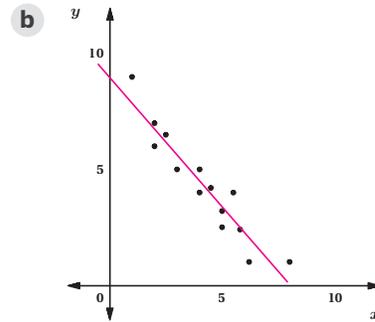
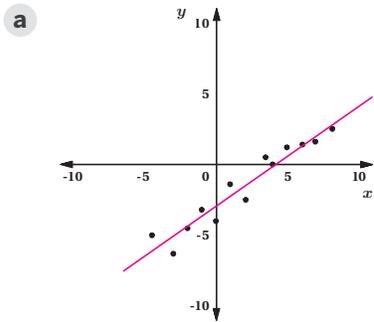
Additional Practice

6.04

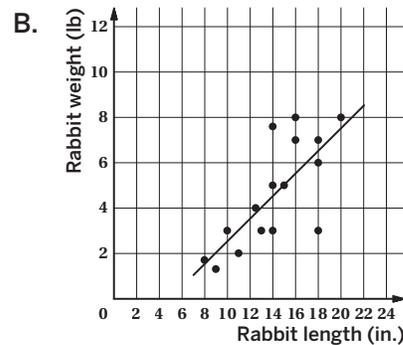
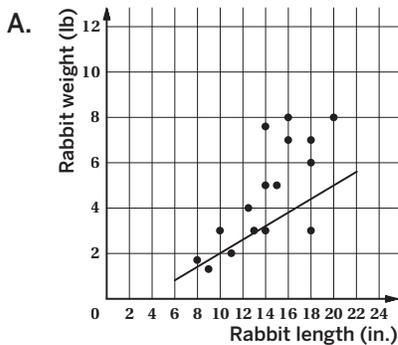
1. Select the graph whose line best fits the data.



2. For each graph, draw a line that models the data.

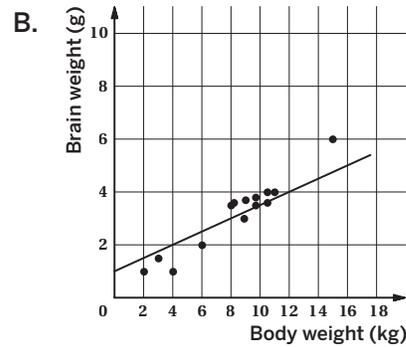
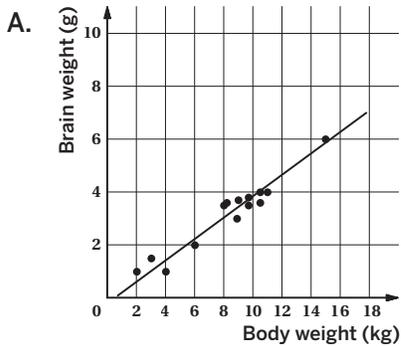


3. The two scatter plots have the same data, but different lines. Which line is a better fit? Explain your thinking.



B; Sample response: The line in Scatter plot B is a better fit because the line follows the trend of the data and better balances the points above and below the line.

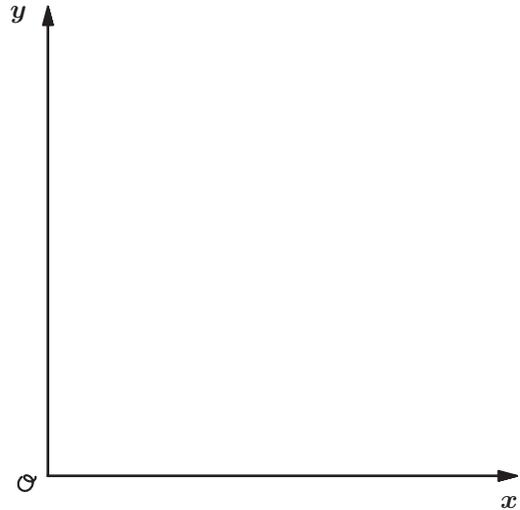
4. The two scatter plots have the same data, but different lines. Which line is a better fit? Explain your thinking.



A; Sample response: The line in Scatter plot A is a better fit because the line follows the trend of the data and better balances the points above and below the line.

5. Create a scatter plot that has a positive association without clustering. Then draw a line of fit for your scatter plot.

Answers may vary, but the scatter plot should show that, as the value of x increases, the value of y increases. The trend of the points should follow a line.

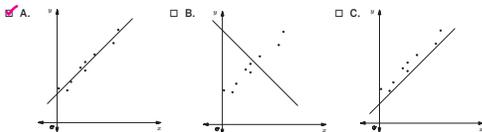


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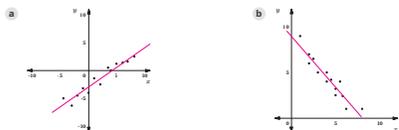
Additional Practice

6.04

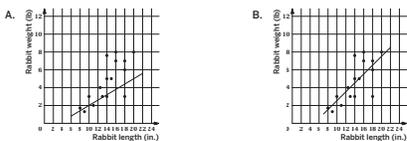
1. Select the graph whose line best fits the data.



2. For each graph, draw a line that models the data.



3. The two scatter plots have the same data, but different lines. Which line is a better fit? Explain your thinking.



B: Sample response: The line in Scatter plot B is a better fit because the line follows the trend of the data and better balances the points above and below the line.

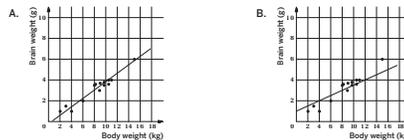
Unit 6 Lesson 4

137

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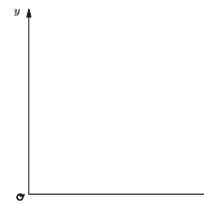
4. The two scatter plots have the same data, but different lines. Which line is a better fit? Explain your thinking.



A: Sample response: The line in Scatter plot A is a better fit because the line follows the trend of the data and better balances the points above and below the line.

5. Create a scatter plot that has a positive association without clustering. Then draw a line of fit for your scatter plot.

Answers may vary, but the scatter plot should show that, as the value of x increases, the value of y increases. The trend of the points should follow a line.



Unit 6 Lesson 4

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Additional Practice

Practice Problem Analysis

Problem	DOK	Standard(s)
1	1	8.SP.A.2
2	1	8.SP.A.2
3	2	8.SP.A.2
4	2	8.SP.A.2
5	2	8.SP.A

Notes:

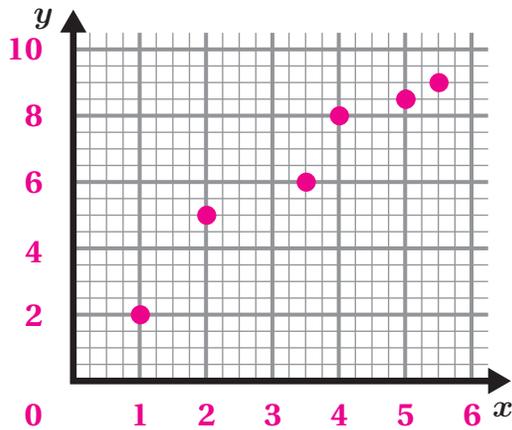
Additional Practice

6.05

Problems 1–2: Use the table.

x	y
1	2
2	5
3.5	6
4	8
5	8.5
5.5	9

1. Create a scale for the graph so it fits all the data. Then create a scatter plot of the data.



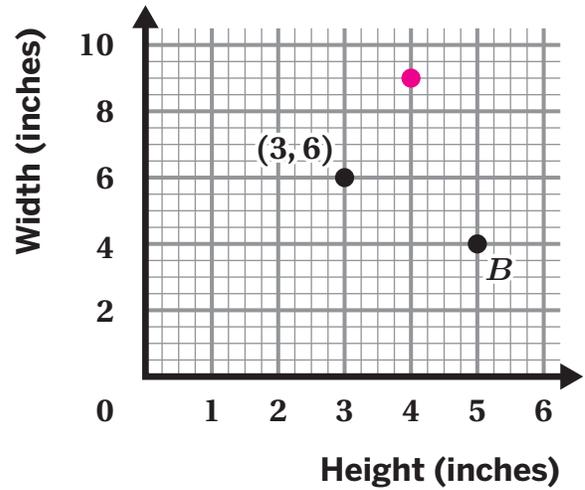
2. What pattern do you notice in the scatter plot?

Explanations vary. In general, as x increases, y increases.

Problems 3–5: The graph shows the height and width of sketchbooks available at an art store.

3. What does the point (3, 6) tell you about the sketchbook?

The sketchbook is 3 inches tall and 6 inches wide.



4. Plot a point to represent a different sketchbook that has a height of 4 inches and a width of 9 inches.

See graph.

5. What values represent point *B*?

- a. (5, 4)
- b. (4, 5)
- c. (4, 4)
- d. (4, 6)

Name: _____ Date: _____ Period: _____

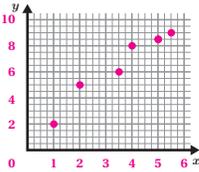
Additional Practice

6.05

Problems 1–2: Use the table.

x	y
1	2
2	5
3.5	6
4	8
5	8.5
5.5	9

1. Create a scale for the graph so it fits all the data. Then create a scatter plot of the data.



2. What pattern do you notice in the scatter plot?

Explanations vary. In general, as x increases, y increases.

Unit 6 Lesson 5

139

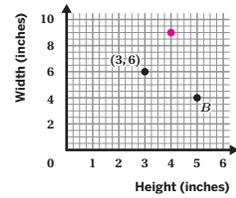
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Name: _____ Date: _____ Period: _____

Problems 3–5: The graph shows the height and width of sketchbooks available at an art store.

3. What does the point (3, 6) tell you about the sketchbook?

The sketchbook is 3 inches tall and 6 inches wide.



4. Plot a point to represent a different sketchbook that has a height of 4 inches and a width of 9 inches.

See graph.

5. What values represent point B?

- a. (5, 4)
- b. (4, 5)
- c. (4, 4)
- d. (4, 6)

Unit 6 Lesson 5

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Additional Practice

Practice Problem Analysis

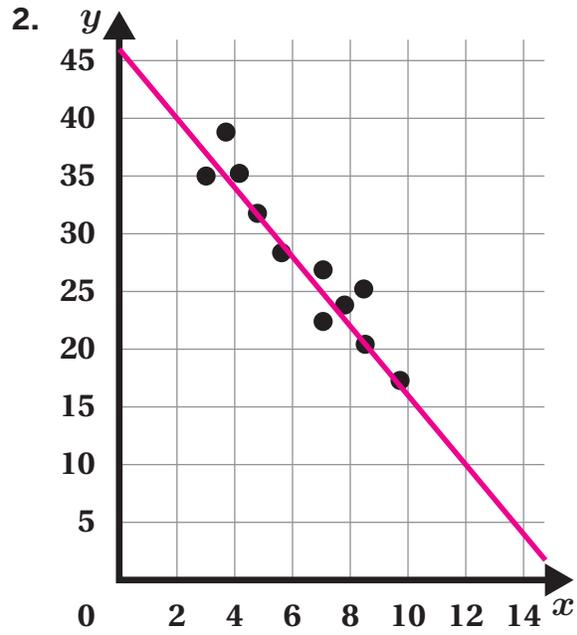
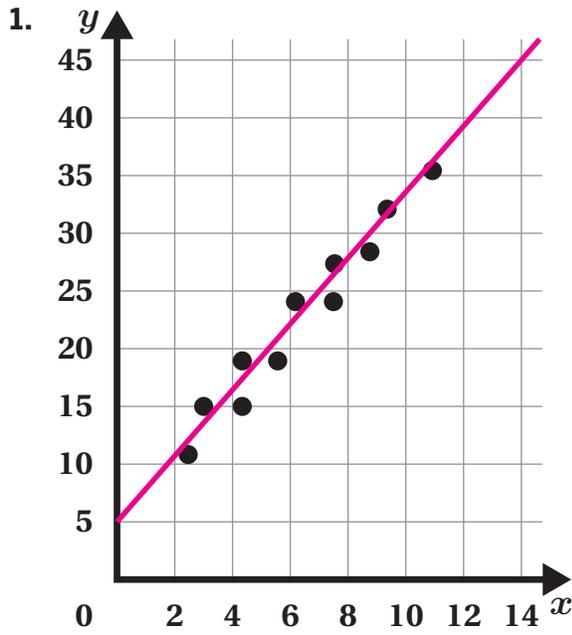
Problem	DOK	Standard(s)
1	1	8.SP.A.1
2	2	8.SP.A.1
3	2	8.SP.A.1
4	1	8.SP.A.1
5	1	8.SP.A.1

Notes:

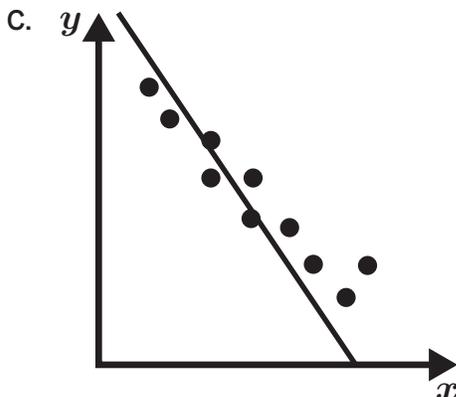
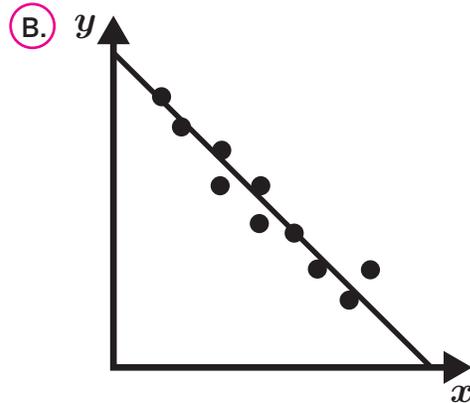
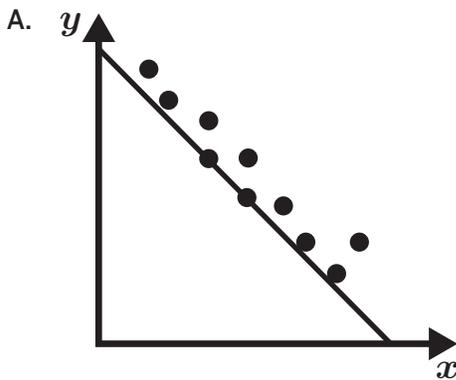
Additional Practice

6.06

Problems 1–2: Sketch a line that fits the data.

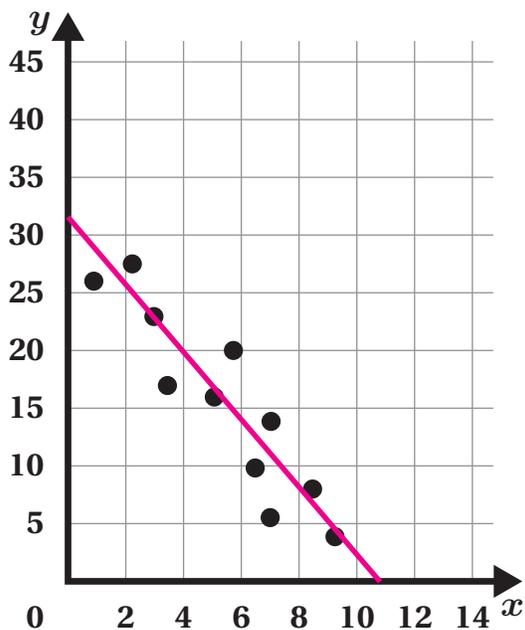


3. Which line best fits the data? Explain your thinking.



Line B best fits the data. Explanations vary. This line of fit follows the trend of the data. It's as close to the plotted points as possible and has roughly the same number of points above and below the line.

Problems 4–5: Use this scatter plot.



4. Sketch a line of fit for the data.

See graph.

5. If a new data point has an x -value of 4, what does your line of fit predict for the value of y ? Explain your thinking.

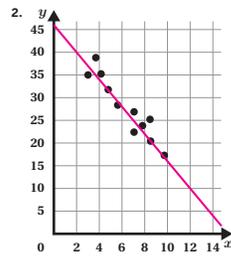
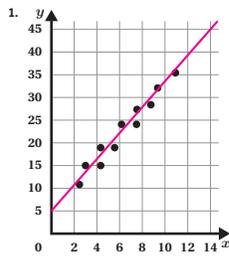
The line of fit predicts a value of 20 for y . Explanations vary. I sketched a line of fit that follows the trend of the data. Roughly the same number of points are above and below the line. Based on this line of best fit an x -value of 4 predicts a value of 20 for y .

Name: _____ Date: _____ Period: _____

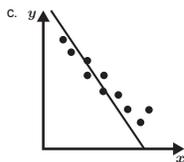
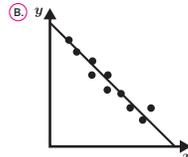
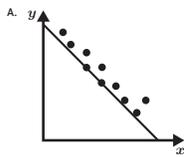
Additional Practice

6.06

Problems 1–2: Sketch a line that fits the data.



3. Which line best fits the data? Explain your thinking.



Line B best fits the data. Explanations vary. This line of fit follows the trend of the data. It's as close to the plotted points as possible and has roughly the same number of points above and below the line.

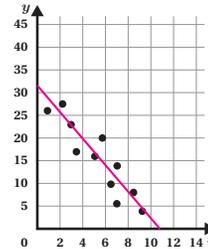
Unit 6 Lesson 6

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Name: _____ Date: _____ Period: _____

Problems 4–5: Use this scatter plot.



4. Sketch a line of fit for the data.

See graph.

5. If a new data point has an x -value of 4, what does your line of fit predict for the value of y ? Explain your thinking.

The line of fit predicts a value of 20 for y . Explanations vary. I sketched a line of fit that follows the trend of the data. Roughly the same number of points are above and below the line. Based on this line of best fit an x -value of 4 predicts a value of 20 for y .

Unit 6 Lesson 6

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Additional Practice

Practice Problem Analysis

Problem	DOK	Standard(s)
1	1	8.SP.A.1, 8.SP.A.2
2	1	8.SP.A.1, 8.SP.A.2
3	2	8.SP.A.1, 8.SP.A.2
4	1	8.SP.A.1, 8.SP.A.2
5	2	8.SP.A.1, 8.SP.A.2

Notes:

Additional Practice

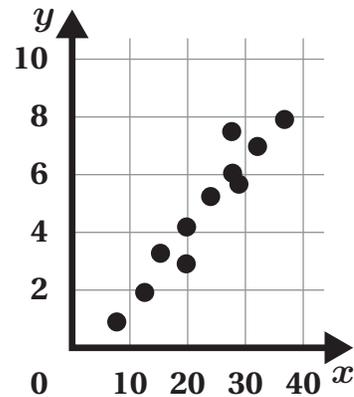
6.07

1. Which type of association does the scatter plot show?

- A. Positive association
- B. Negative association
- C. No association

Explain your thinking.

Explanations vary. The scatter plot shows a positive association because when the x values increases, the y values increases.



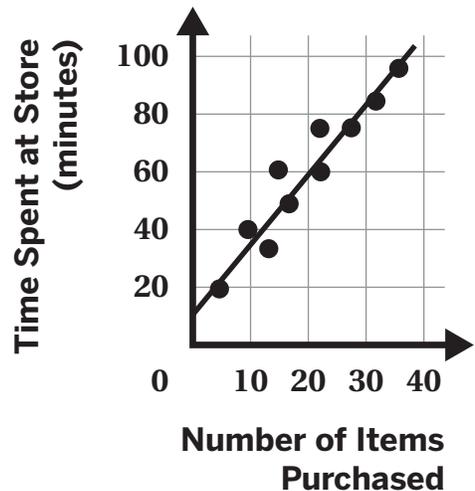
Problems 2–4: The scatter plot shows the data from 10 customers shopping at a supermarket. The equation for this linear model is $y = 4.1x + 15.6$.

2. What is the slope of the linear model?

The slope of the linear model is 4.1.

3. What does the slope represent in this situation?

For every additional item purchased, the time spent at the store increases by 4.1 minutes.



4. What type of association is there between the number of items purchased and time spent at the store? Circle your choice.

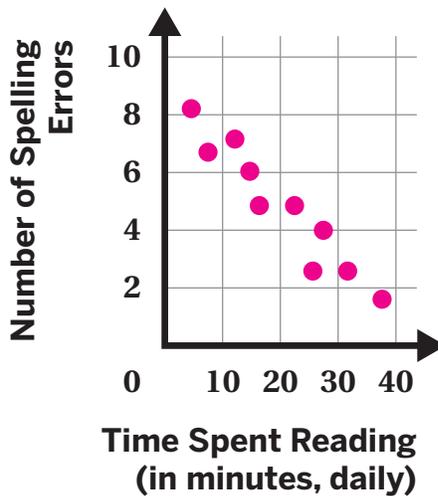
- Positive association Negative association No association

Explain your thinking.

Explanations vary. The scatter plot shows a positive association because when the number of items at the store increases, the time spent at the store increases.

Problems 5–6: Librarians looked at the relationship between the minutes spent reading a book (daily) and the number of spelling errors made when writing an email. They found the variables had a negative association.

5. What does this negative association mean about the relationship between time spent reading and the number of spelling errors when writing an email?
- A. As the time spent reading increases, the number of spelling errors decreases.
 - B. As the time spent reading increases, the number of spelling errors increases.
 - C. As the time spent reading decreases, the number of spelling errors decreases.
 - D. There is no relationship between the time spent reading and the number of spelling errors.
6. Create a scatter plot that represents this situation.



Name: _____ Date: _____ Period: _____

Additional Practice

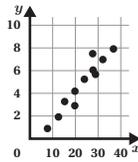
6.07

1. Which type of association does the scatter plot show?

- A. Positive association
- B. Negative association
- C. No association

Explain your thinking.

Explanations vary. The scatter plot shows a positive association because when the x values increase, the y values increase.



Problems 2–4: The scatter plot shows the data from 10 customers shopping at a supermarket. The equation for this linear model is $y = 4.1x + 15.6$.

2. What is the slope of the linear model?

The slope of the linear model is 4.1.

3. What does the slope represent in this situation?

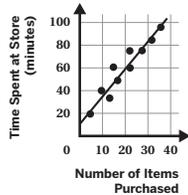
For every additional item purchased, the time spent at the store increases by 4.1 minutes.

4. What type of association is there between the number of items purchased and time spent at the store? Circle your choice.

- Positive association
- Negative association
- No association

Explain your thinking.

Explanations vary. The scatter plot shows a positive association because when the number of items at the store increases, the time spent at the store increases.



Unit 6 Lesson 7

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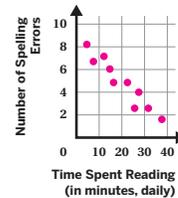
Name: _____ Date: _____ Period: _____

Problems 5–6: Librarians looked at the relationship between the minutes spent reading a book (daily) and the number of spelling errors made when writing an email. They found the variables had a negative association.

5. What does this negative association mean about the relationship between time spent reading and the number of spelling errors when writing an email?

- A. As the time spent reading increases, the number of spelling errors decreases.
- B. As the time spent reading increases, the number of spelling errors increases.
- C. As the time spent reading decreases, the number of spelling errors decreases.
- D. There is no relationship between the time spent reading and the number of spelling errors.

6. Create a scatter plot that represents this situation.



Unit 6 Lesson 7

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Additional Practice

Practice Problem Analysis

Problem	DOK	Standard(s)
1	2	8.SP.A.2
2	1	8.SP.A.2, 8.SP.A.3
3	2	8.SP.A.2, 8.SP.A.3
4	1	8.SP.A.2
5	1	8.SP.A.2, 8.SP.A.3
6	2	8.SP.A.1

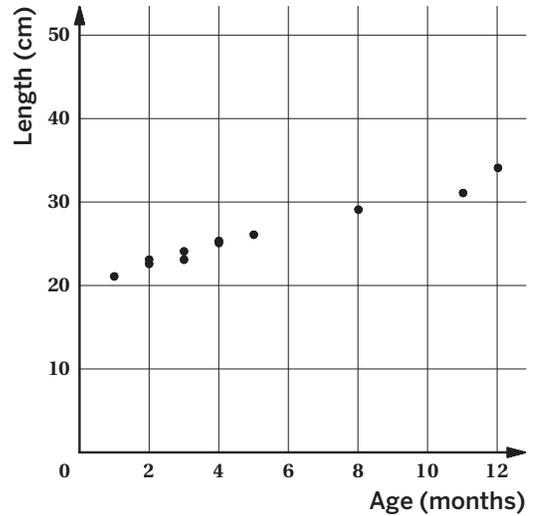
Notes:

Additional Practice

6.08

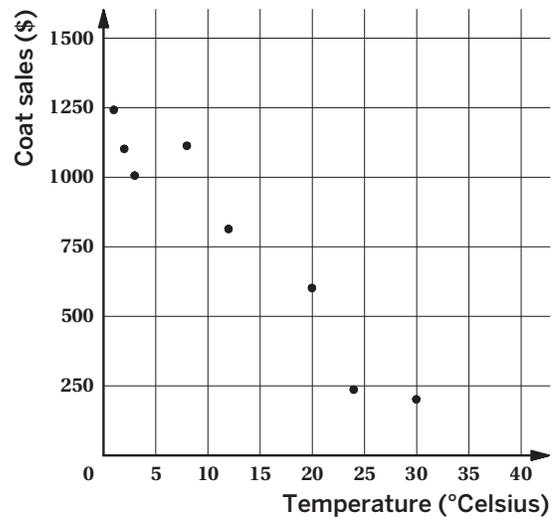
1. Select *all* the following terms that describe the association represented in the scatter plot.

- A. Linear association
- B. Nonlinear association
- C. Positive association
- D. Negative association
- E. No association



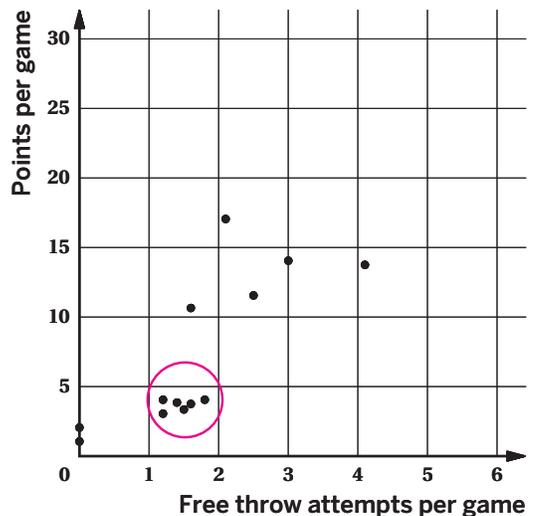
2. Select *all* the following terms that describe the association represented in the scatter plot.

- A. Linear association
- B. Nonlinear association
- C. Positive association
- D. Negative association
- E. No association



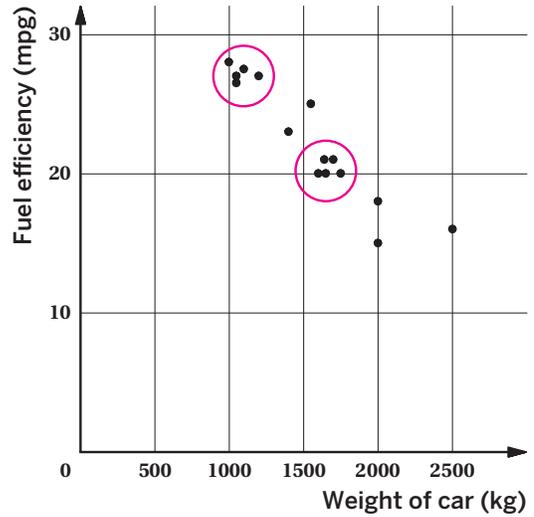
3. Circle any clusters in the data. Use the labels on the axes to explain what the clusters mean in context.

Sample response: When a player has between 1 and 2 free throw attempts per game, the player's points per game is about 4.



4. Circle any clusters in the data. Use the labels on the axes to explain what the clusters mean in context.

Sample response: When the weight of a car is around 1,100 kg, the fuel efficiency is about 28 mpg. When the weight of a car is around 1,700 kg, the fuel efficiency is about 20 mpg.



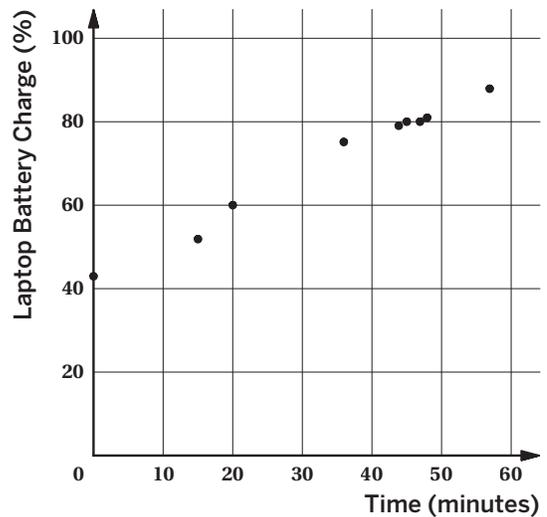
5. Consider the scatter plot shown.

- a Determine the type(s) of association and indicate whether there is any clustering.

The scatter plot shows a positive, linear association. There is clustering.

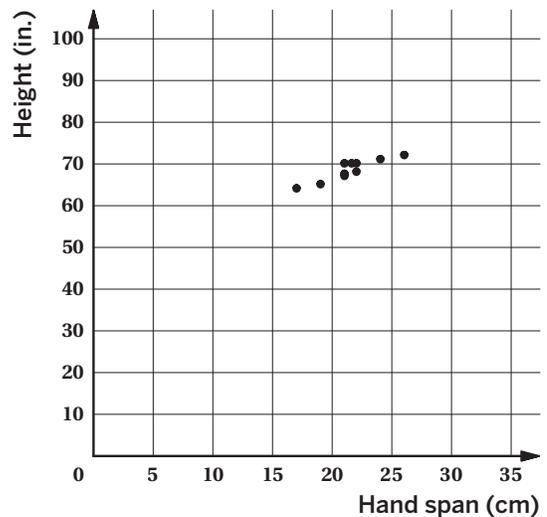
- b Describe the association and clustering, if any, in context.

Sample response: As time increases, the laptop battery charge increases. The cluster shows that around 45 minutes, the laptop battery charge is about 80%.



6. Noah creates the scatter plot shown and says that it has a positive, linear association and clustering. He explains that the association means that as a hand span increases the height of a person decreases. Do you agree with Noah? Explain your thinking.

Noah's interpretation is incorrect. Sample response: Because the scatter plot shows a positive association, as the hand span increases, the height of a person also increases.



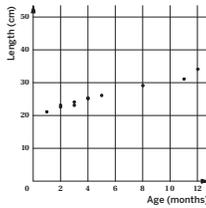
Name: _____ Date: _____ Period: _____

Additional Practice

6.08

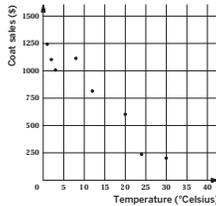
1. Select *all* the following terms that describe the association represented in the scatter plot.

- A. Linear association
- B. Nonlinear association
- C. Positive association
- D. Negative association
- E. No association



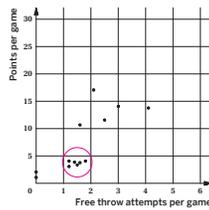
2. Select *all* the following terms that describe the association represented in the scatter plot.

- A. Linear association
- B. Nonlinear association
- C. Positive association
- D. Negative association
- E. No association



3. Circle any clusters in the data. Use the labels on the axes to explain what the clusters mean in context.

Sample response: When a player has between 1 and 2 free throw attempts per game, the player's points per game is about 4.



Unit 6 Lesson 8

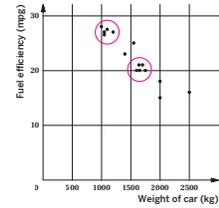
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Name: _____ Date: _____ Period: _____

4. Circle any clusters in the data. Use the labels on the axes to explain what the clusters mean in context.

Sample response: When the weight of a car is around 1,100 kg, the fuel efficiency is about 28 mpg. When the weight of a car is around 1,700 kg, the fuel efficiency is about 20 mpg.



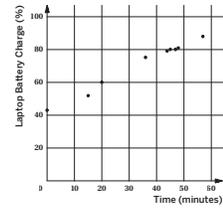
5. Consider the scatter plot shown.

- a. Determine the type(s) of association and indicate whether there is any clustering.

The scatter plot shows a positive, linear association. There is clustering.

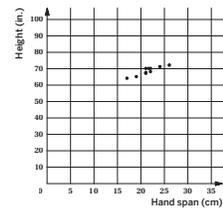
- b. Describe the association and clustering, if any, in context.

Sample response: As time increases, the laptop battery charge increases. The cluster shows that around 45 minutes, the laptop battery charge is about 80%.



6. Noah creates the scatter plot shown and says that it has a positive, linear association and clustering. He explains that the association means that as a hand span increases the height of a person decreases. Do you agree with Noah? Explain your thinking.

Noah's interpretation is incorrect. Sample response: Because the scatter plot shows a positive association, as the hand span increases, the height of a person also increases.



Unit 6 Lesson 8

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Additional Practice

Practice Problem Analysis

Problem	DOK	Standard(s)
1	1	8.SP.A.1
2	1	8.SP.A.1
3	2	8.SP.A.1
4	2	8.SP.A.1
5	2	8.SP.A.1
6	3	8.SP.A.1

Notes:

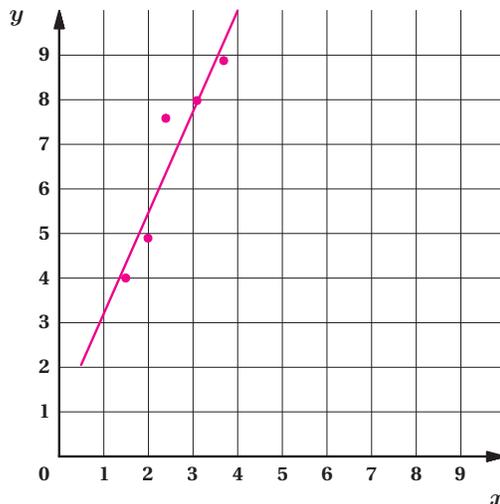
Additional Practice

6.09

1. Plot the points to create a scatter plot of the data, and then draw a line to model the data.

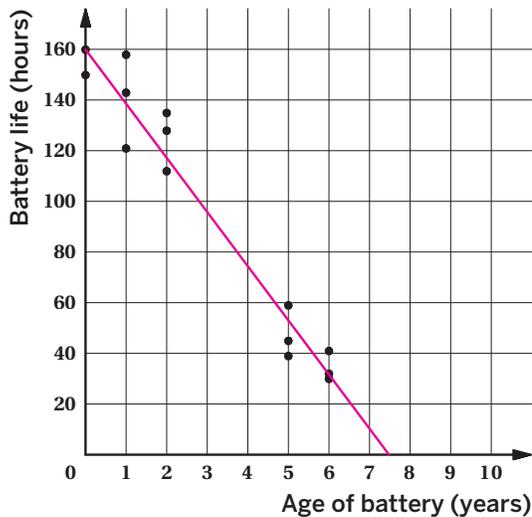
x	y
2.4	7.6
3.7	8.9
3.1	8
2	4.9
1.5	4

Sample line of fit shown



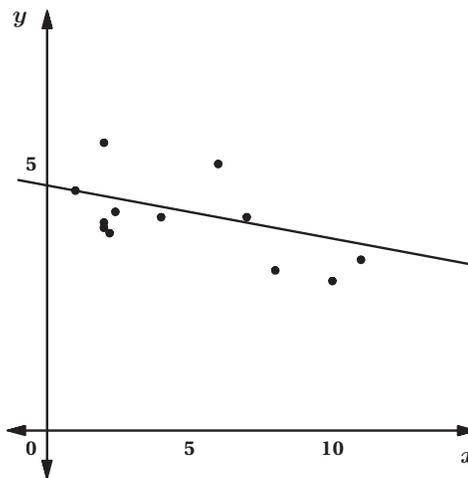
2. Kiran wants to draw a line to model the data shown on the graph. Which type of slope would best fit his line?

- A. Positive
- B. Negative**
- C. Zero



3. Which of the following equations might be the linear model that describes the data?

- A. $y = -0.1x$
- B. $y = 0.1x - 4.5$
- C. $y = -0.1x + 4.5$**
- D. $y = 4.5x + 4.5$



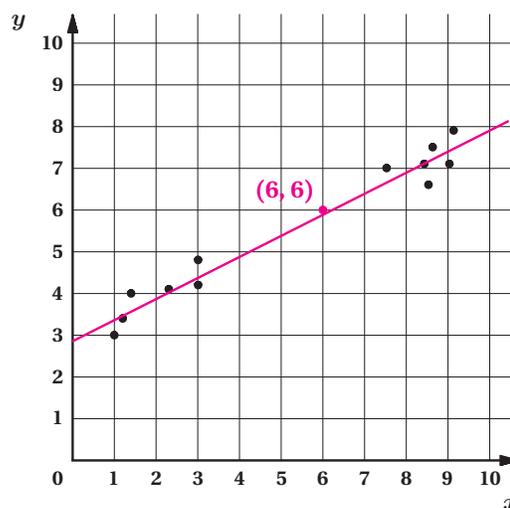
4. For the scatter plot shown, complete the following.

- a Draw a line of fit to model the data.

Sample line of fit shown

- b If a new point is added to the scatter plot where $x = 6$, what do you predict for the value of y of this point? Add this point to the scatter plot.

Sample response shown on graph. The point should be located around (6, 6).



5. The scatter plot shows the relationship between the number of people in an elevator and weight in kilograms.

- a Draw a line of fit to model the data.

- b Write an equation for your line.

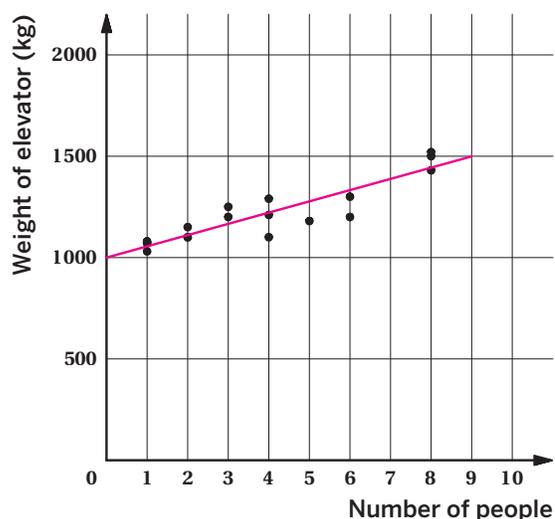
Sample response: $y = 53.5x + 1005$

- c What does your linear model's slope represent in this context?

Sample response: The weight of the elevator is predicted to increase by the 53.5 kg for every 1 person.

- d What does your linear model's y -intercept represent in this context?

Sample response: When the elevator is empty, 0 people, the elevator weight is predicted to be 1,005 kg.



6. Clare determined the equation for the line of fit of a data set. She noticed that, for a given value of x , her equation predicts a different value of y than is observed in the data. Is her equation incorrect? Explain your thinking.

Sample response: The equation is not necessarily incorrect. Observed data points will not always fall on the line of fit and, therefore, will not always be predicted by the equation of the line of fit.

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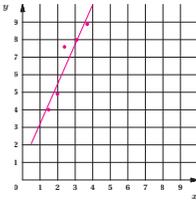
Additional Practice

6.09

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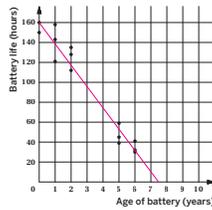
x	y
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3.7	8.9
3.1	8
2	4.9
1.5	4

Sample line of fit shown



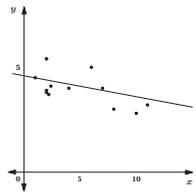
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Unit 6 Lesson 9

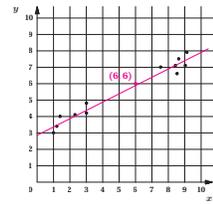
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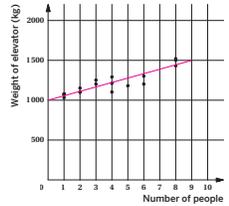
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- a. Draw a line of fit to model the data.
Sample line of fit shown
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Sample response shown on graph. The point should be located around (6, 6).



5. The scatter plot shows the relationship between the number of people in an elevator and weight in kilograms.

- a. Draw a line of fit to model the data.
Sample response: $y = 53.5x + 1005$
- c. What does your linear model's slope represent in this context?
Sample response: The weight of the elevator is predicted to increase by the 53.5 kg for every 1 person.
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6. Clare determined the equation for the line of fit of a data set. She noticed that, for a given value of x , her equation predicts a different value of y than is observed in the data. Is her equation incorrect? Explain your thinking.

Sample response: The equation is not necessarily incorrect. Observed data points will not always fall on the line of fit and, therefore, will not always be predicted by the equation of the line of fit.

Unit 6 Lesson 9

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Additional Practice

Practice Problem Analysis

Problem	DOK	Standard(s)
1	1	8.SP.A.1, 8.SP.A.2
2*	1	8.SP.A.1
3	1	8.SP.A.2, 8.SP.A.3
4	2	8.SP.A.2, 8.SP.A.3
5	2	8.SP.A.2, 8.SP.A.3
6	3	8.SP.A.2, 8.SP.A.3

*Spiral review

Notes:

Additional Practice

6.10

1. The two-way table shows the relationship between news-reading habits among different age groups. What does the number 132 represent in the table?

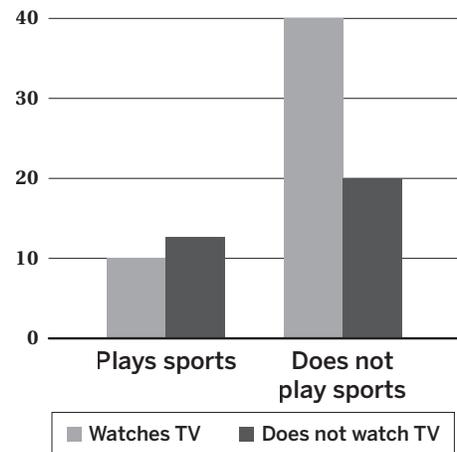
	Internet media	Print media	Total
18–25 year olds	151	28	179
26–45 year olds	132	72	204
Total	283	100	383

- A. 132 people, who are 18–25 years old and read print media.
- B. 132 people, who are 26–45 years old and read print media.
- C. 132 people, who are 18–25 years old and read internet media.

D. 132 people, who are 26–45 years old and read internet media.

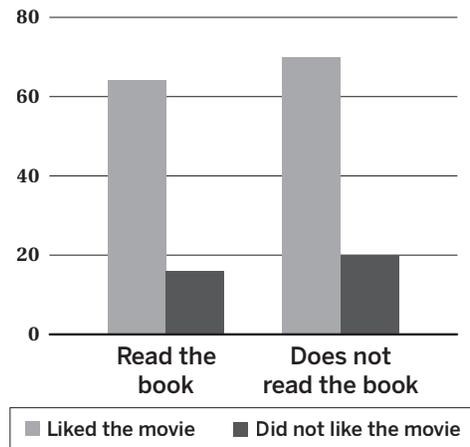
2. The double bar graph shows the relationship between watching TV and playing sports for several students in a middle school. How many students do not play sports and do not watch TV?

- A. 10
- B. 12
- C.** 20
- D. 40



3. A teacher wants to know whether reading a certain book affects liking the movie adaptation of the book for middle school students. Several students' responses were recorded and then graphed using the bar graph shown. Is there evidence to suggest an association between reading the book and liking the movie? Explain your thinking.

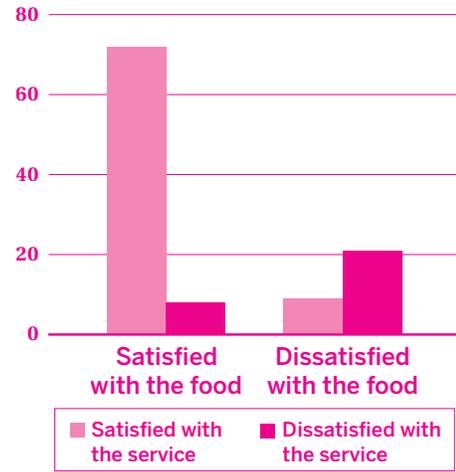
	Liked the movie	Did not like the movie	Total
Read the book	64	16	80
Did not read the book	70	20	90
Total	134	36	170



No; Sample response: There does not appear to be any evidence. While more students liked the movie than did not like the movie, each student, whether they read the book or not, had similar preferences for the movie.

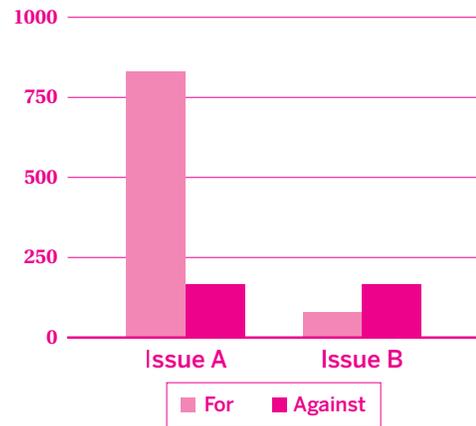
4. A restaurant manager records whether people were satisfied with their food and service. Complete the two-way table. Then create a double bar graph to represent the data.

	Satisfied with the service	Dissatisfied with the service	Total
Satisfied with the food	72	8	80
Dissatisfied with the food	9	21	30
Total	81	29	110



5. A journalist surveys several people about whether they will vote for or against two issues. Complete the two-way table. Then create a double bar graph to represent the data.

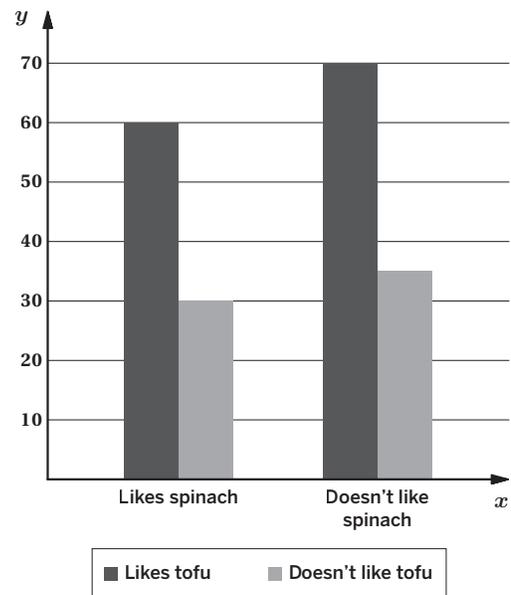
	For	Against	Total
Issue A	832	165	997
Issue B	80	160	240
Total	912	325	1,237



6. Create a real-world example that is supported by this double bar graph. Create a two-way table with data that would support your example. Be sure to describe what association, if any, is in your data, and add labels to the graph and table.

	Likes spinach	Doesn't like spinach	Total
Likes tofu	60	70	130
Doesn't like tofu	30	35	65
Total	90	105	95

Sample response shown.



Name: _____ Date: _____ Period: _____

Additional Practice

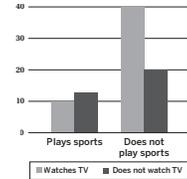
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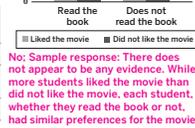
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No. Sample response: There does not appear to be any evidence. While more students liked the movie than did not like the movie, each student, whether they read the book or not, had similar preferences for the movie.

Unit 6 Lesson 10

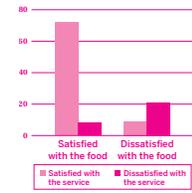
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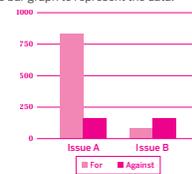
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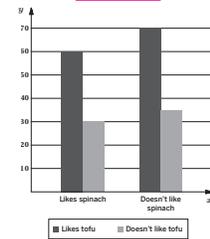
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Sample response shown.



Unit 6 Lesson 10

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Additional Practice

Practice Problem Analysis

Problem	DOK	Standard(s)
1	1	8.SP.A.4
2	1	8.SP.A.4
3	2	8.SP.A.4
4	2	8.SP.A.4
5	2	8.SP.A.4
6	3	8.SP.A.4

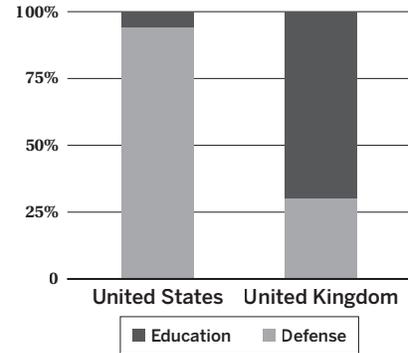
Notes:

Additional Practice

6.11

1. The two-way table and segmented bar graph displays the government budgets for 2009, in billions of U.S. dollars. Which of the following describes the data?

	Defense	Education	Total
United States	718.4	44.9	763.3
United Kingdom	49.2	113.9	163.1
Total	767.6	158.8	926.4



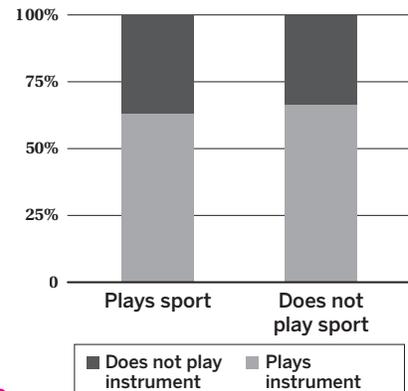
- A. There is no association; the relative frequency for each country is roughly the same.
 - B. There is a greater percentage of budget spent on education in the United States.
 - C.** There is a greater percentage of budget spent on defense in the United States.
 - D. There is a greater percentage of budget spent on defense in the United Kingdom.
2. Complete the frequency table to represent the data from the two-way table, showing relative frequencies by column. Round to the nearest percent.

	Class A	Class B
Prefers math	6	8
Prefers science	2	10
Total	8	18

	Class A	Class B
Prefers math	75%	44%
Prefers science	25%	56%
Total	100%	100%

3. Students were asked if they play a sport or play a musical instrument. The results are shown in the table and in the segmented bar graph. Is there evidence of an association between playing a sport and playing an instrument? Explain your thinking.

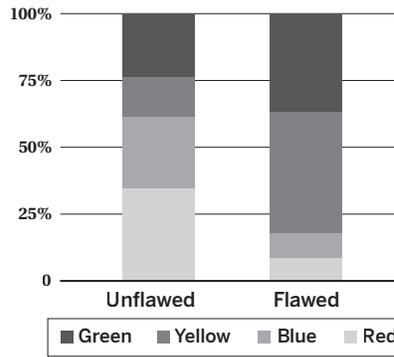
	Plays instrument	Does not play instrument	Total
Plays sport	12	7	19
Does not play sport	10	5	15
Total	22	12	34



No; Sample response: Playing an instrument appears to have no connection to playing a sport. The relative frequency for each playing or not playing a sport is roughly the same.

4. The manager of an eraser factory notices some flaws in certain erasers. Each color eraser is made through a different machine. The manager collects data on the number of flawed and unflawed erasers of each color. The results are recorded in the table and are shown in the segmented bar graph. Is there evidence that the flawed erasers are associated with certain colors? Explain your thinking.

	Unflawed	Flawed
Red	285	15
Blue	223	17
Yellow	120	80
Green	195	65



Yes; Sample response: The double bar graph shows a greater frequency of yellow and green flawed erasers.

5. A scientist is interested in whether certain plants attract more bees or butterflies. Do these data show an association between bees and butterflies and flower types? Explain your thinking.

	Daisies	Lavender
Bees	17	23
Butterflies	22	28

No; Sample response: Bees and butterflies appear to prefer each flower with similar relative frequencies. 42.5% of bees prefer daisies while 44% of butterflies prefer daisies and 57.5% of bees prefer lavender while 56% of butterflies prefer lavender flowers.

6. Several students at a middle school were asked whether they preferred drama or band classes. The results are shown in the two-way table.

Write a question that could be answered by the data in the table.

	Drama	Band	Total
7th grade	72	51	123
8th grade	85	32	117
Total	157	83	240

Sample response: Are students in 8th grade more likely to take drama than students in 7th grade?

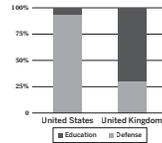
Name: _____ Date: _____ Period: _____

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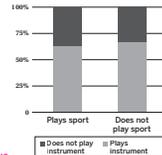
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Prefers science	2	10	12
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Unit 6 Lesson 11

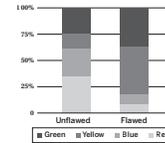
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Name: _____ Date: _____ Period: _____

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Unit 6 Lesson 11

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Additional Practice

Practice Problem Analysis

Problem	DOK	Standard(s)
1	1	8.SP.A.4
2	1	8.SP.A.4
3	2	8.SP.A.4
4	2	8.SP.A.4
5	2	8.SP.A.4
6	3	8.SP.A.4

Notes:

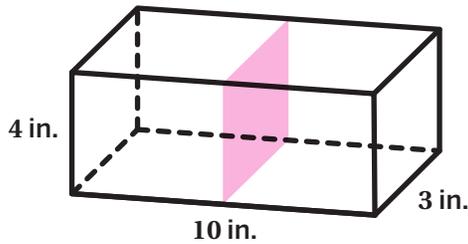
Additional Practice

7.09

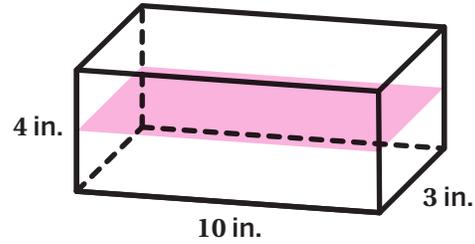
Problems 1–3: Show how to cut a rectangular prism to make each cross section.

Sample responses shown.

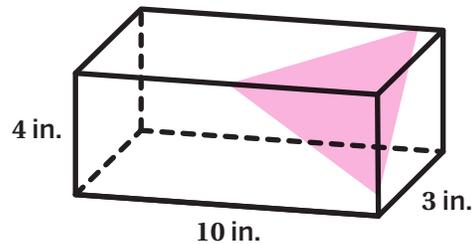
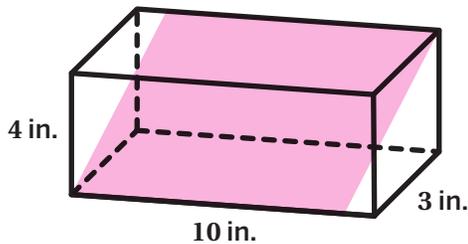
1. 3-in. by 4-in. Rectangle



2. 4-in. by 10-in. Rectangle

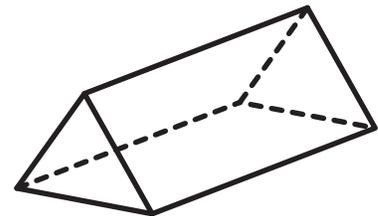


3. A different rectangle than Problem 1 or 2 4. A triangle



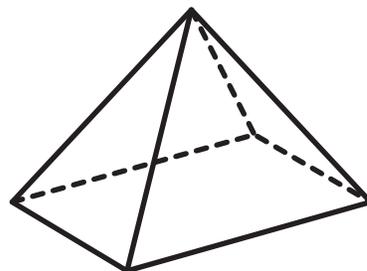
5. Select *all* of the cross sections you can make from the prism shown with a base that is an equiangular triangle.

- A. Equiangular Triangle
- B. Square
- C. Rectangle
- D. Trapezoid
- E. Isosceles Triangle



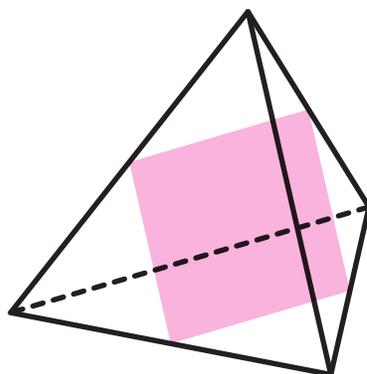
6. Which of the following descriptions could result in a triangular cross section for the three-dimensional figure shown?

- A. Slice the figure parallel to its base halfway up.
- B. Slice the figure parallel to its base near the top.
- C. Slice the figure parallel to its base near the bottom.
- D.** Slice the figure vertical to its base through the top of the pyramid.



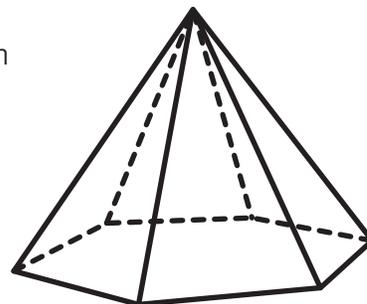
7. Ben says, “No matter which way you slice this three-dimensional figure, the cross section will be a triangle.” Harper says, “I’m not so sure.” Show and describe a slice Harper might be thinking of.

Responses vary. A rectangular cross-section made by cutting diagonally from the side of the pyramid to the base.



Problems 8–10: The pyramid shown has a hexagonal base. The side lengths of the hexagon are equal. Describe the cross section that will result if the pyramid is sliced:

- 8. Parallel to the base
A hexagon smaller than the base.
- 9. Vertical to the base through the top point of the pyramid.
A triangle



10. Describe another way you could slice the pyramid that would result in a different cross section.

Responses vary. A rectangular cross-section made by cutting diagonally from one side of the pyramid to the edge of the opposite side of the base.

Name: _____ Date: _____ Period: _____

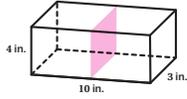
Additional Practice

7.09

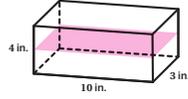
Problems 1–3: Show how to cut a rectangular prism to make each cross section.

Sample responses shown.

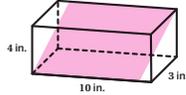
1. 3-in. by 4-in. Rectangle



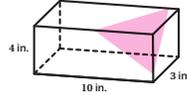
2. 4-in. by 10-in. Rectangle



3. A different rectangle than Problem 1 or 2

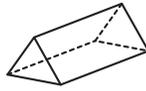


4. A triangle



5. Select *all* of the cross sections you can make from the prism shown with a base that is an equiangular triangle.

- A. Equiangular Triangle
- B. Square
- C. Rectangle
- D. Trapezoid
- E. Isosceles Triangle



Unit 7 Lesson 9

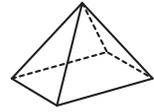
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Name: _____ Date: _____ Period: _____

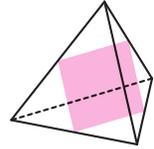
6. Which of the following descriptions could result in a triangular cross section for the three-dimensional figure shown?

- A. Slice the figure parallel to its base halfway up.
- B. Slice the figure parallel to its base near the top.
- C. Slice the figure parallel to its base near the bottom.
- D. Slice the figure vertical to its base through the top of the pyramid.



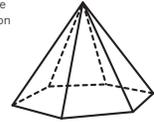
7. Ben says, "No matter which way you slice this three-dimensional figure, the cross section will be a triangle." Harper says, "I'm not so sure." Show and describe a slice Harper might be thinking of.

Responses vary. A rectangular cross-section made by cutting diagonally from the side of the pyramid to the base.



Problems 8–10: The pyramid shown has a hexagonal base. The side lengths of the hexagon are equal. Describe the cross section that will result if the pyramid is sliced:

- 8. Parallel to the base
A hexagon smaller than the base.
- 9. Vertical to the base through the top point of the pyramid.
A triangle
- 10. Describe another way you could slice the pyramid that would result in a different cross section.
Responses vary. A rectangular cross-section made by cutting diagonally from one side of the pyramid to the edge of the opposite side of the base.



Unit 7 Lesson 9

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Additional Practice

Practice Problem Analysis

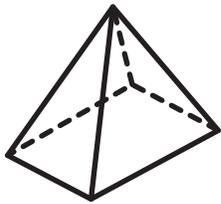
Problem	DOK	Standard(s)
1	1	7.G.3
2	1	7.G.3
3	2	7.G.3
4	2	7.G.3
5	1	7.G.3
6	1	7.G.3
7	2	7.G.3
8	1	7.G.3
9	1	7.G.3
10	2	7.G.3

Notes:

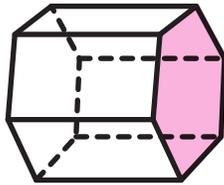
Additional Practice

7.10

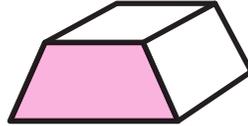
Problems 1–2: Here is a set of 3-D objects.



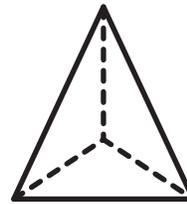
Object A



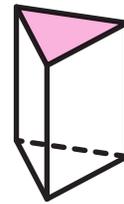
Object B



Object C



Object D



Object E

1. Circle all of the prisms.
2. For each prism, shade one of the bases.

Problems 3–5: Here are three prisms with the same base.

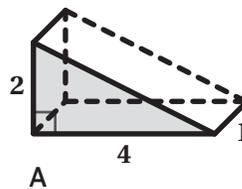
3. Determine the volume of prism A.

$$V = B \cdot h$$

$$V = \left(\frac{1}{2} \cdot 4 \cdot 2\right) \cdot 1$$

$$V = 4 \cdot 1$$

$$V = 4 \text{ units}^2$$

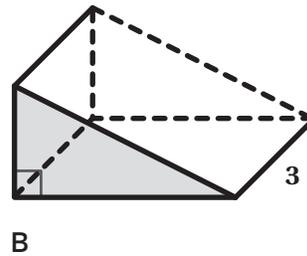


4. Determine the volume of prism B.

$$V = B \cdot h$$

$$V = 8 \cdot 3$$

$$V = 24 \text{ units}^2$$

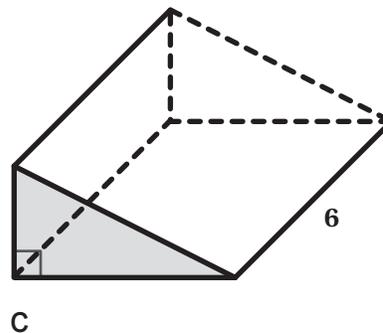


5. Determine the volume of prism C.

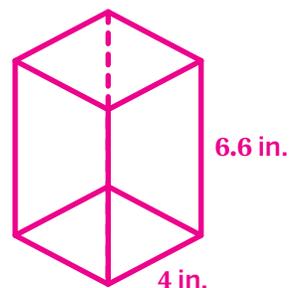
$$V = B \cdot h$$

$$V = 4 \cdot 6$$

$$V = 24 \text{ units}^2$$



Problems 6–7: The base of a rectangular prism is a square with edges of 4 inches. The height of the prism is 6.6 inches.



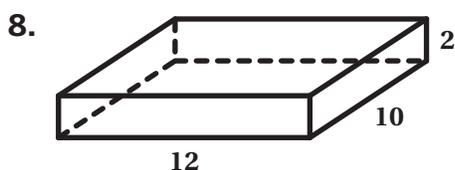
6. Draw the prism and label the measurements.

Responses vary.

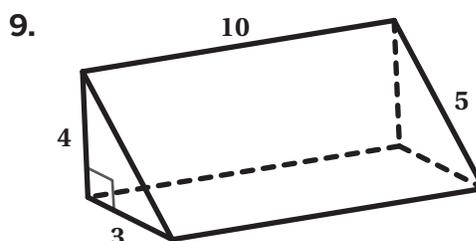
7. Calculate the volume of the prism. Show or explain your thinking.

$$V = (4 \cdot 4) \cdot 6.6 = 105.6 \text{ in}^3$$

Problems 8–9: Determine the volume of each prism. Show or explain your thinking.

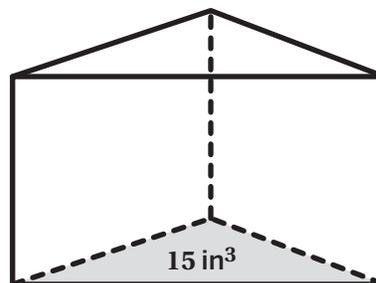


$$V = 12 \cdot 10 \cdot 2 = 240 \text{ units}^3$$



$$V = \frac{1}{2} \cdot 4 \cdot 3 \cdot 10 = 60 \text{ units}^3$$

10. The volume of this prism is between 60 in^3 and 80 in^3 . What are three possible heights of the prism? Show or explain your thinking.



Between 4 and $5\frac{1}{3}$ inches. Methods vary.

If $V = 60 \text{ in}^3$:

$$V = B \cdot h$$

$$60 = 15 \cdot h$$

$$4 \text{ inches} = h$$

If $V = 80 \text{ in}^3$:

$$V = B \cdot h$$

$$80 = 15 \cdot h$$

$$5\frac{1}{3} \text{ inches} = h$$

Name: _____ Date: _____ Period: _____

Additional Practice 7.10

Problems 1–2: Here is a set of 3-D objects.

Object A Object B Object C Object D Object E

- Circle all of the prisms.
- For each prism, shade one of the bases.

Problems 3–5: Here are three prisms with the same base.

- Determine the volume of prism A.

$$V = B \cdot h$$

$$V = \left(\frac{1}{2} \cdot 4 \cdot 2\right) \cdot 1$$

$$V = 4 \cdot 1$$

$$V = 4 \text{ units}^2$$
- Determine the volume of prism B.

$$V = B \cdot h$$

$$V = 8 \cdot 3$$

$$V = 24 \text{ units}^2$$
- Determine the volume of prism C.

$$V = B \cdot h$$

$$V = 4 \cdot 6$$

$$V = 24 \text{ units}^2$$

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Name: _____ Date: _____ Period: _____

Problems 6–7: The base of a rectangular prism is a square with edges of 4 inches. The height of the prism is 6.6 inches.

- Draw the prism and label the measurements.
- Calculate the volume of the prism. Show or explain your thinking.

$$V = (4 \cdot 4) \cdot 6.6 = 105.6 \text{ in}^3$$

Problems 8–9: Determine the volume of each prism. Show or explain your thinking.

- $$V = 12 \cdot 10 \cdot 2 = 240 \text{ units}^3$$
- $$V = \frac{1}{2} \cdot 4 \cdot 3 \cdot 10 = 60 \text{ units}^2$$

10. The volume of this prism is between 60 in^3 and 80 in^3 . What are three possible heights of the prism? Show or explain your thinking.

Between 4 and $5\frac{1}{3}$ inches. *Methods vary.*

If $V = 60 \text{ in}^3$:	If $V = 80 \text{ in}^3$:
$V = B \cdot h$	$V = B \cdot h$
$60 = 15 \cdot h$	$80 = 15 \cdot h$
4 inches = h	$5\frac{1}{3}$ inches = h

Unit 7 Lesson 10 174 Additional Practice

Practice Problem Analysis

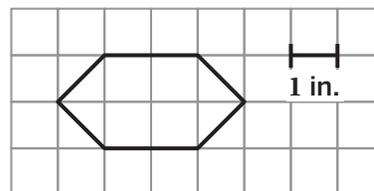
Problem	DOK	Standard(s)
1	1	7.G.B.6
2	1	7.G.B.6
3	1	7.G.B.6
4	1	7.G.B.6
5	1	7.G.B.6
6	1	7.G.B.6
7	1	7.G.B.6
8	1	7.G.B.6
9	1	7.G.B.6
10	2	7.G.B.6

Notes:

Additional Practice

7.11

Problems 1–2: The base of a prism is shown.



1. If the height of the prism is 5 inches, what is the volume of the prism? Show or explain your thinking.

30 inches³ Methods vary.

The area of the base is 6 square inches.

$$V = B \cdot h$$

$$V = 6 \cdot 5$$

$$V = 30 \text{ in}^3$$

2. If the volume of the prism is 99 in³, what is the height of the prism? Show or explain your thinking.

16.5 inches Methods vary.

$$V = B \cdot h$$

$$99 = 6 \cdot h$$

$$\frac{99}{6} = h$$

$$16.5 = h$$

Problems 3–4: Finnias calculated the volume of the prism but made an error.

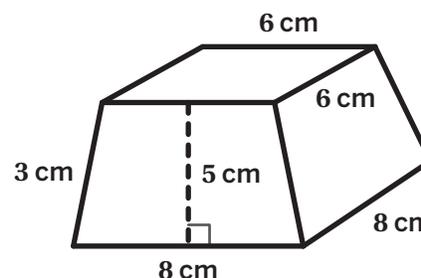
Finnias' Method

$$V = \text{Base} \cdot \text{height}$$

$$V = (8 \cdot 8) \cdot 5$$

$$V = 64 \cdot 5$$

$$V = 320 \text{ cm}^3$$



3. Identify and explain why Finnias' method is incorrect.

Finnias incorrectly identified the Base and height of the prism. The base of the prism is a trapezoid and the height of the prism is the distance between the trapezoids.

4. Calculate the volume of the prism.

$$V = \text{Base} \cdot \text{height}$$

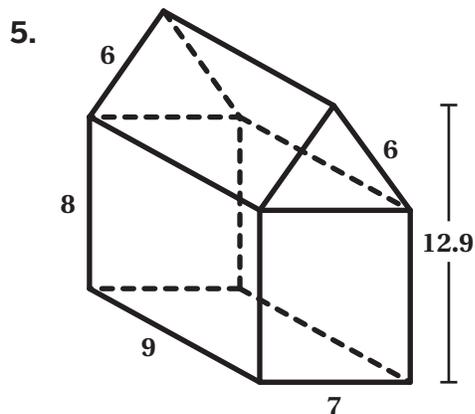
$$V = \left[\frac{1}{2} \cdot 5(8 + 6) \right] \cdot 8$$

$$V = \left(\frac{1}{2} \cdot 70 \right) \cdot 8$$

$$V = 35 \cdot 8$$

$$V = 280 \text{ cm}^3$$

Problems 5–8: Determine the area of the base of each prism and the volume of each prism. Show or explain your thinking.



Methods vary.

$$Area_{base} = 56 + \frac{1}{2} \cdot 7 \cdot (12.9 - 8)$$

$$Area_{base} = 56 + \frac{1}{2} \cdot 7 \cdot (4.9)$$

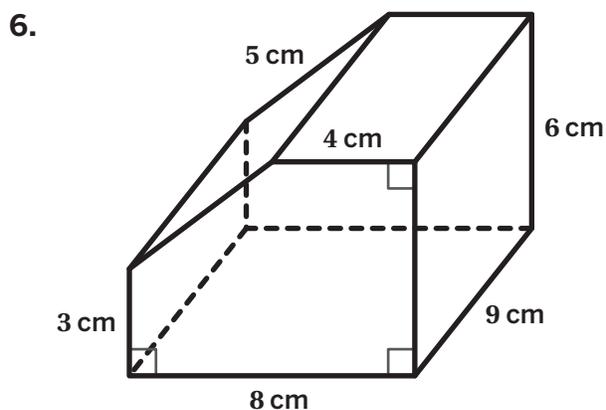
$$Area_{base} = 56 + 17.15$$

$$Area_{base} = 73.15 \text{ units}^2$$

$$V = \text{Base} \cdot \text{height}$$

$$V = 73.15 \cdot 9$$

$$V = 683.35 \text{ units}^3$$



Methods vary.

$$Area_{base} = \frac{1}{2} \cdot 8 \cdot (3 + 5)$$

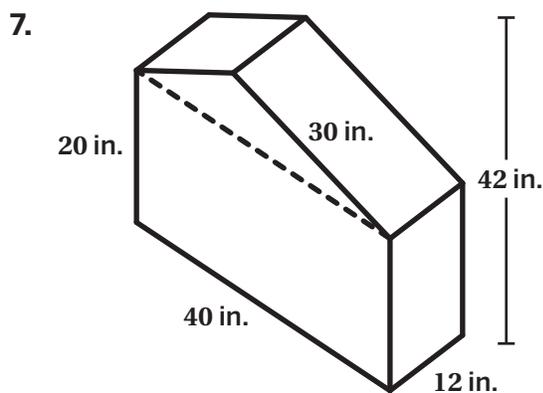
$$Area_{base} = 4 \cdot 9$$

$$Area_{base} = 36 \text{ cm}^2$$

$$V = \text{Base} \cdot \text{height}$$

$$V = 36 \cdot 9$$

$$V = 324 \text{ cm}^3$$



Methods vary.

$$Area_{base} = 800 + \frac{1}{2} \cdot 40 \cdot (42 - 20)$$

$$Area_{base} = 800 + 20 \cdot 22$$

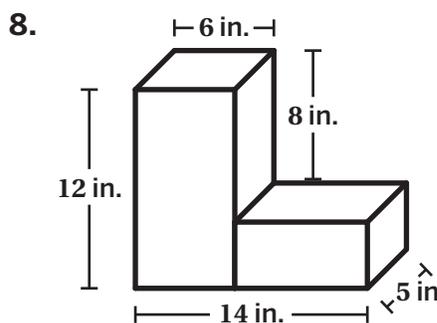
$$Area_{base} = 800 + 440$$

$$Area_{base} = 1240 \text{ in}^2$$

$$V = \text{Base} \cdot \text{height}$$

$$V = 1240 \cdot 12$$

$$V = 14,880 \text{ in}^3$$



Methods vary.

$$Area_{base} = (12 \cdot 14) - (8 \cdot 8)$$

$$Area_{base} = 168 - 64$$

$$Area_{base} = 104 \text{ in}^2$$

$$V = \text{Base} \cdot \text{height}$$

$$V = 104 \cdot 5$$

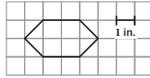
$$V = 520 \text{ in}^3$$

Name: _____ Date: _____ Period: _____

Additional Practice

7.11

Problems 1–2: The base of a prism is shown.



1. If the height of the prism is 5 inches, what is the volume of the prism? Show or explain your thinking.

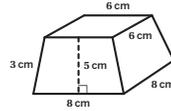
30 inches³ *Methods vary.*
 The area of the base is 6 square inches.
 $V = B \cdot h$
 $V = 6 \cdot 5$
 $V = 30 \text{ in}^3$

2. If the volume of the prism is 99 in³, what is the height of the prism? Show or explain your thinking.

16.5 inches *Methods vary.*
 $V = B \cdot h$
 $99 = 6 \cdot h$
 $99 = h$
 $6 = 16.5 = h$

Problems 3–4: Finnius calculated the volume of the prism but made an error.

Finnias' Method
 $V = \text{Base} \cdot \text{height}$
 $V = (8 \cdot 8) \cdot 5$
 $V = 64 \cdot 5$
 $V = 320 \text{ cm}^3$



3. Identify and explain why Finnius' method is incorrect.

Finnias incorrectly identified the Base and height of the prism. The base of the prism is a trapezoid and the height of the prism is the distance between the trapezoids.

4. Calculate the volume of the prism.

$V = \text{Base} \cdot \text{height}$
 $V = \left[\frac{1}{2} \cdot 5(8 + 6) \right] \cdot 8$
 $V = \left(\frac{1}{2} \cdot 70 \right) \cdot 8$
 $V = 35 \cdot 8$
 $V = 280 \text{ cm}^3$

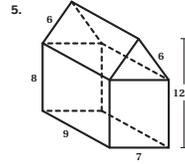
Unit 7 Lesson 11

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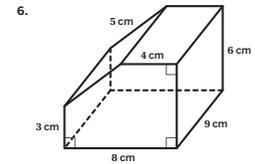
Name: _____ Date: _____ Period: _____

Problems 5–8: Determine the area of the base of each prism and the volume of each prism. Show or explain your thinking.



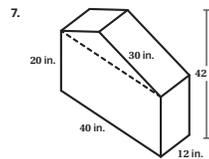
Methods vary.
 $\text{Area}_{\text{base}} = 56 + \frac{1}{2} \cdot 7 \cdot (12.9 - 8)$
 $\text{Area}_{\text{base}} = 56 + \frac{1}{2} \cdot 7 \cdot (4.9)$
 $\text{Area}_{\text{base}} = 56 + 17.15$
 $\text{Area}_{\text{base}} = 73.15 \text{ units}^2$

$V = \text{Base} \cdot \text{height}$
 $V = 73.15 \cdot 9$
 $V = 663.35 \text{ units}^3$



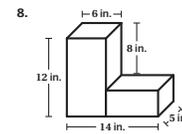
Methods vary.
 $\text{Area}_{\text{base}} = \frac{1}{2} \cdot 8 \cdot (3 + 5)$
 $\text{Area}_{\text{base}} = 4 \cdot 9$
 $\text{Area}_{\text{base}} = 36 \text{ cm}^2$

$V = \text{Base} \cdot \text{height}$
 $V = 36 \cdot 9$
 $V = 324 \text{ cm}^3$



Methods vary.
 $\text{Area}_{\text{base}} = 800 + \frac{1}{2} \cdot 40 \cdot (42 - 20)$
 $\text{Area}_{\text{base}} = 800 + 20 \cdot 22$
 $\text{Area}_{\text{base}} = 800 + 440$
 $\text{Area}_{\text{base}} = 1240 \text{ in}^2$

$V = \text{Base} \cdot \text{height}$
 $V = 1240 \cdot 12$
 $V = 14,880 \text{ in}^3$



Methods vary.
 $\text{Area}_{\text{base}} = (12 \cdot 14) - (8 \cdot 8)$
 $\text{Area}_{\text{base}} = 168 - 64$
 $\text{Area}_{\text{base}} = 104 \text{ in}^2$

$V = \text{Base} \cdot \text{height}$
 $V = 104 \cdot 5$
 $V = 520 \text{ in}^3$

Unit 7 Lesson 11

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Additional Practice

Practice Problem Analysis

Problem	DOK	Standard(s)
1	1	7.G.B.6
2	1	7.G.B.6, 7.EE.B.4
3	2	7.G.B.6
4	1	7.G.B.6
5	1	7.G.B.6
6	1	7.G.B.6
7	1	7.G.B.6
8	1	7.G.B.6

Notes:

Additional Practice

7.12

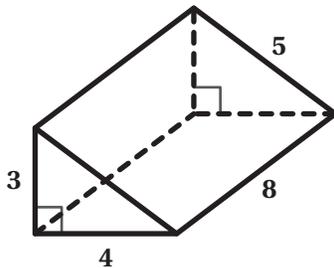
1. Select *all* the situations where knowing the surface area of an object would be useful.

- A. Deciding on the amount of cardboard needed to make a box of cereal.
- B. Determining how much wood is needed to build cubed-shaped stacking blocks.
- C. Determining the amount of paint needed to paint a playhouse.
- D. Measuring the amount of milk remaining in a jug of milk.
- E. Calculating how much brown paper is needed to cover a package.
- F. Charging a company for advertising space on a highway sign.

Problems 2–3: Determine the volume and surface area of each prism. Show your thinking.

Methods vary.

2.



Volume:

$$V = \text{Base} \cdot \text{height}$$

$$V = \frac{1}{2}(3 \cdot 4) \cdot 8$$

$$V = 48 \text{ units}^3$$

Surface Area:

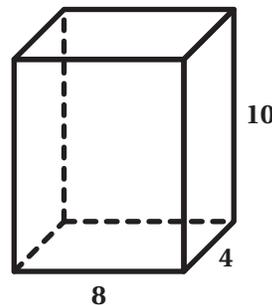
$$S.A. = 2(\text{Bases}) + F + F + F$$

$$S.A. = 2(6) + (4 \cdot 8) + (3 \cdot 8) + (5 \cdot 8)$$

$$S.A. = 12 + 32 + 24 + 40$$

$$S.A. = 108 \text{ units}^2$$

3.



Volume:

$$V = \text{Base} \cdot \text{height}$$

$$V = (4 \cdot 8) \cdot 10$$

$$V = 320 \text{ units}^3$$

Surface Area:

$$S.A. = 2(\text{Bases}) + 2(F) + 2(F)$$

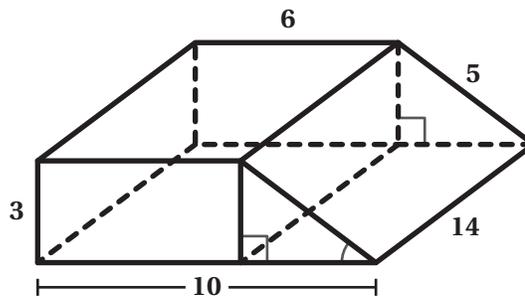
$$S.A. = 2(32) + 2(4 \cdot 10) + 2(8 \cdot 10)$$

$$S.A. = 64 + 80 + 160$$

$$S.A. = 304 \text{ units}^2$$

Problems 4–5: Here is a 3-D object.

4. Determine the surface area using two different methods. Show your thinking.



Method #1:

Methods vary.

$$S.A. = 2(\text{Bases}) + F_1 + F_2 + F_3 + F_4$$

$$S.A. = 2\left(3 \cdot 6 + \frac{1}{2} \cdot 3 \cdot 4\right) + (3 \cdot 14) + (10 \cdot 14) + (5 \cdot 14) + (6 \cdot 14)$$

$$S.A. = 2(18 + 6) + 42 + 140 + 70 + 84$$

$$S.A. = 2(24) + 168$$

$$S.A. = 384 \text{ units}^2$$

Method #2:

Methods vary.

$$S.A. = 2(\text{Bases}) + (\text{Perimeter}_{\text{base}} \cdot \text{height of prism})$$

$$S.A. = 2\left(3 \cdot 6 + \frac{1}{2} \cdot 3 \cdot 4\right) + (10 + 5 + 6 + 3) \cdot 14$$

$$S.A. = 2(24) + 24 \cdot 14$$

$$S.A. = 48 + 336$$

$$S.A. = 384 \text{ units}^2$$

5. Determine the volume. Show your thinking.

Methods vary.

$$V = \text{Base} \cdot \text{height}$$

$$V = 24 \cdot 14$$

$$V = 336 \text{ units}^3$$

Name: _____ Date: _____ Period: _____

Additional Practice

7.12

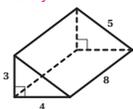
1. Select *all* the situations where knowing the surface area of an object would be useful.

- A. Deciding on the amount of cardboard needed to make a box of cereal.
- B. Determining how much wood is needed to build cubed-shaped stacking blocks.
- C. Determining the amount of paint needed to paint a playhouse.
- D. Measuring the amount of milk remaining in a jug of milk.
- E. Calculating how much brown paper is needed to cover a package.
- F. Charging a company for advertising space on a highway sign.

Problems 2–3: Determine the volume and surface area of each prism. Show your thinking.

Methods vary.

2.



Volume:

$$V = \text{Base} \cdot \text{height}$$

$$V = \frac{1}{2}(3 \cdot 4) \cdot 8$$

$$V = 48 \text{ units}^3$$

Surface Area:

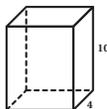
$$S.A. = 2(\text{Bases}) + F + F + F$$

$$S.A. = 2(6) + (4 \cdot 8) + (3 \cdot 8) + (5 \cdot 8)$$

$$S.A. = 12 + 32 + 24 + 40$$

$$S.A. = 108 \text{ units}^2$$

3.



Volume:

$$V = \text{Base} \cdot \text{height}$$

$$V = (4 \cdot 8) \cdot 10$$

$$V = 320 \text{ units}^3$$

Surface Area:

$$S.A. = 2(\text{Bases}) + 2(F) + 2(F)$$

$$S.A. = 2(32) + 2(4 \cdot 10) + 2(8 \cdot 10)$$

$$S.A. = 64 + 80 + 160$$

$$S.A. = 304 \text{ units}^2$$

Unit 7 Lesson 12

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Name: _____ Date: _____ Period: _____

Problems 4–5: Here is a 3-D object.

4. Determine the surface area using two different methods. Show your thinking.

Method #1:

Methods vary.

$$S.A. = 2(\text{Bases}) + F_1 + F_2 + F_3 + F_4$$

$$S.A. = 2(3 \cdot 6 + \frac{1}{2} \cdot 3 \cdot 4) + (3 \cdot 14) + (10 \cdot 14) + (5 \cdot 14) + (6 \cdot 14)$$

$$S.A. = 2(18 + 6) + 42 + 140 + 70 + 84$$

$$S.A. = 2(24) + 168$$

$$S.A. = 384 \text{ units}^2$$

Method #2:

Methods vary.

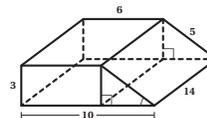
$$S.A. = 2(\text{Bases}) + (\text{Perimeter}_{\text{base}} \cdot \text{height of prism})$$

$$S.A. = 2(3 \cdot 6 + \frac{1}{2} \cdot 3 \cdot 4) + (10 + 5 + 6 + 3) \cdot 14$$

$$S.A. = 2(24) + 24 \cdot 14$$

$$S.A. = 48 + 336$$

$$S.A. = 384 \text{ units}^2$$



5. Determine the volume. Show your thinking.

Methods vary.

$$V = \text{Base} \cdot \text{height}$$

$$V = 24 \cdot 14$$

$$V = 336 \text{ units}^3$$

Unit 7 Lesson 12

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Additional Practice

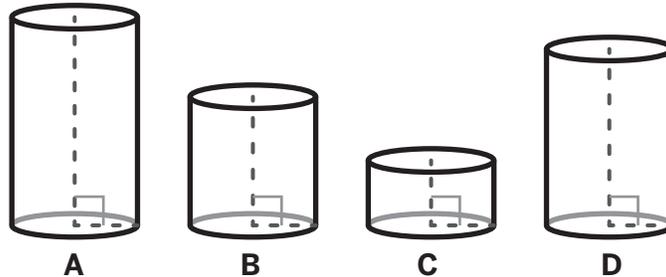
Practice Problem Analysis

Problem	DOK	Standard(s)
1	1	7.G.B.6
2	1	7.G.B.6
3	1	7.G.B.6
4	2	7.G.B.6
5	1	7.G.B.6

Notes:

Additional Practice **5.10**

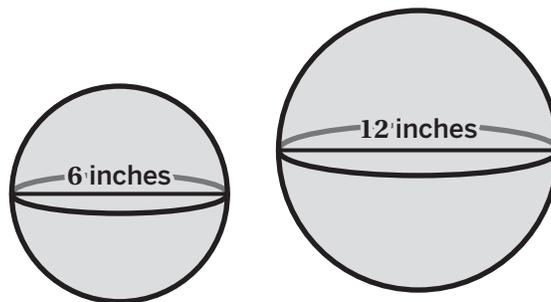
1. Cylinders A, B, and C have the same radius but different heights.



Order the cylinders from *least* volume to *greatest* volume.

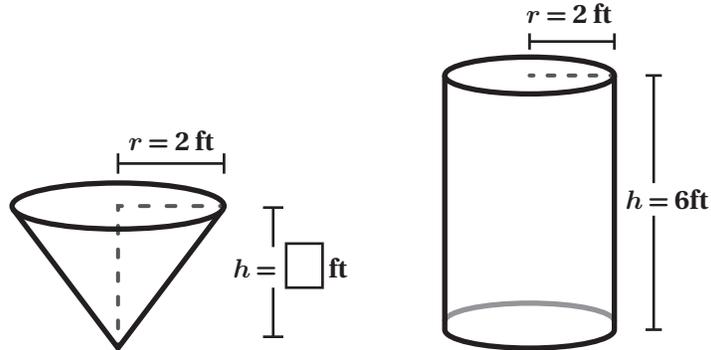
C	B	D	A
Least			Greatest

2. Kai bought a balloon for a birthday party. The diameter of the balloon measures 6 inches and has a volume of approximately 113 cubic inches. Kai would like a balloon that has double the diameter. He finds a sphere balloon that measures 12 inches in diameter. What is the approximate volume of this balloon? Explain your thinking.

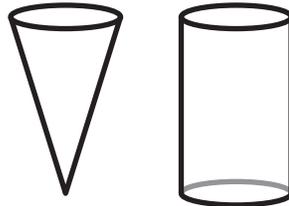


The volume of this balloon is approximately 904 cubic inches. When the diameter of a sphere is doubled, the original volume of the sphere will be multiplied by 8.

3. Here is a cylinder and a cone. What does the height of the cone need to be so that the cylinder will have a volume that is three times greater than the cone?



- A. 2 feet
 B. 3 feet
 C. 6 feet
 D. 18 feet
4. Maia bought two items at a flower shop, a bouquet of flowers and a vase. The bouquet of flowers is in the shape of a cone. The base of the bouquet has a height of 12 inches and a diameter of 6 inches. The vase is in the shape of a cylinder. The base of the vase also has a height of 12 inches and a diameter of 6 inches. How many bouquets would it take to fill the vase? Explain your thinking.



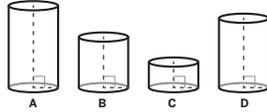
It would take 3 bouquets of flowers to fill the vase. When the base height and diameter are equal for a cylinder and cone, then the cylinder will have a volume that is three times greater than the cone.

Name: _____ Date: _____ Period: _____

Additional Practice

5.10

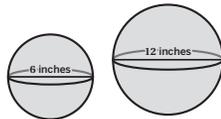
1. Cylinders A, B, and C have the same radius but different heights.



Order the cylinders from least volume to greatest volume.

C	B	D	A
Least			Greatest

2. Kai bought a balloon for a birthday party. The diameter of the balloon measures 6 inches and has a volume of approximately 113 cubic inches. Kai would like a balloon that has double the diameter. He finds a sphere balloon that measures 12 inches in diameter. What is the approximate volume of this balloon? Explain your thinking.



The volume of this balloon is approximately 904 cubic inches. When the diameter of a sphere is doubled, the original volume of the sphere will be multiplied by 8.

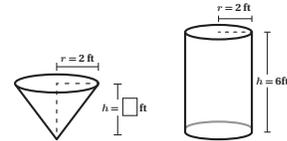
Unit 5 Lesson 10

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Name: _____ Date: _____ Period: _____

3. Here is a cylinder and a cone. What does the height of the cone need to be so that the cylinder will have a volume that is three times greater than the cone?



- A. 2 feet
B. 3 feet
C. 6 feet
D. 18 feet

4. Maia bought two items at a flower shop, a bouquet of flowers and a vase. The bouquet of flowers is in the shape of a cone. The base of the bouquet has a height of 12 inches and a diameter of 6 inches. The vase is in the shape of a cylinder. The base of the vase also has a height of 12 inches and a diameter of 6 inches. How many bouquets would it take to fill the vase? Explain your thinking.



It would take 3 bouquets of flowers to fill the vase. When the base height and diameter are equal for a cylinder and cone, then the cylinder will have a volume that is three times greater than the cone.

Unit 5 Lesson 10

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Additional Practice

Practice Problem Analysis

Problem	DOK	Standard(s)
1	1	8.G.C
2	2	8.G.C
3	2	8.G.C
4	2	8.G.C

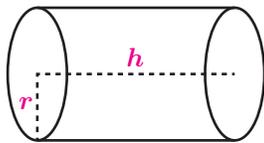
Notes:

Additional Practice

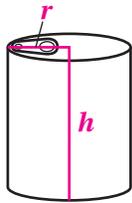
5.11

1. For Cylinders A–D, draw the radius and the height. Label each radius with r and each height with h .

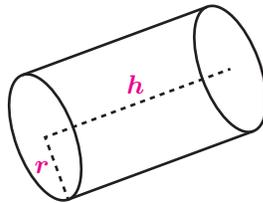
Cylinder A



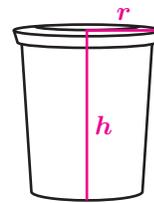
Cylinder B



Cylinder C

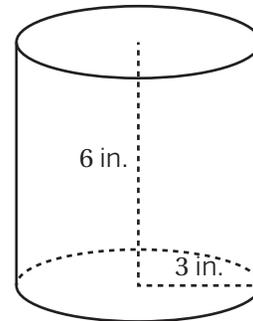


Cylinder D



2. What is the volume of the cylinder shown?

- A. $9\pi \text{ in}^3$
- B. $18\pi \text{ in}^3$
- C. $54\pi \text{ in}^3$
- D. $108\pi \text{ in}^3$



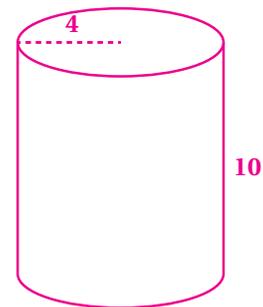
3. Respond to the following questions.

- a Draw a cylinder. Label the radius 4 units and the height 10 units.
- b Determine the area of the base. Write your response in terms of π .

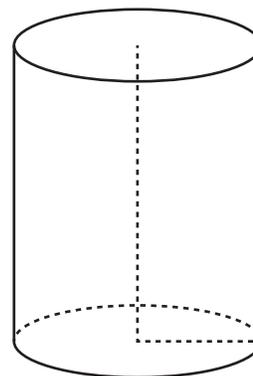
$A = \pi r^2$; $A = 4^2 \cdot \pi$, or 16π square units

- c Determine the volume of the cylinder. Write your response in terms of π .

The volume of a cylinder is determined by multiplying the area of its base by its height. $V = \pi r^2 h$; $V = 16\pi \cdot 10$, or 160π cubic units



4. The cylinder shown has a height of 12 cm and a radius of 5 cm.



- a How many cubic centimeters of fluid can fill this cylinder? Write your response in terms of π .

$V = \pi r^2 h$; if $r = 5$ and $h = 12$, then $V = \pi \cdot 5^2 \cdot 12$ or $300\pi \text{ cm}^3$.

- b Give a decimal approximation of your answer to the nearest hundredths place.

942.48 cm^3

5. A preschool teacher stores modeling clay in two types of containers. One type of container is in the shape of a rectangular prism. The base has side lengths 14 cm and 21 cm, and the height is 8 cm. The second container is in the shape of a cylinder with a diameter of 20 cm. The height of the cylinder container is 8 cm, the same height as the rectangular container.

- a Which is greater in area, the rectangular base of the rectangular container or the circular base of the cylinder container? Show your thinking.

The base of the cylinder; Sample response: The rectangular base area is $14 \cdot 21 = 294 \text{ cm}^2$, and the cylindrical base area is $\pi \cdot 10^2 = 100\pi \text{ cm}^2$, which is approximately 314 cm^2 .

- b Which is greater in volume, the rectangular container or the cylinder container? Show your thinking.

The cylinder; Sample response: Both figures have the same height, so the figure with the greater base area has the greater volume. The cylinder's base area is $100\pi \approx 314.16 \text{ cm}^2$, which is greater than the rectangular prism's base area, 294 cm^2 .

6. Cylinder A has a radius of 9 in. Cylinder B has the same height as Cylinder A and a radius of one third as long as Cylinder A. What fraction of the volume of Cylinder A is the volume of Cylinder B? Show or explain your thinking.

$\frac{1}{9}$; Sample response: For any height h , Cylinder A has a volume of $81\pi h \text{ in}^3$. Cylinder B has a volume of $9\pi h \text{ in}^3$ because $\frac{1}{9}$ of 81 is 9.

7. Andre says that if you double the height of a cylinder, it will have the same effect on the volume as doubling the radius of the cylinder. Do you agree with Andre? Show or explain your thinking.

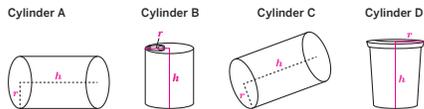
No; Sample response: A cylinder with a radius of 2 units and a height of 4 units has a volume of 16π cubic units. Doubling the height gives a volume of 32π cubic units. Doubling the radius gives a volume of 64π cubic units.

Name: _____ Date: _____ Period: _____

Additional Practice

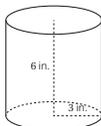
5.11

1. For Cylinders A–D, draw the radius and the height. Label each radius with r and each height with h .



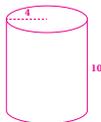
2. What is the volume of the cylinder shown?

- A. $9\pi \text{ in}^3$
- B. $18\pi \text{ in}^3$
- C. $54\pi \text{ in}^3$**
- D. $108\pi \text{ in}^3$



3. Respond to the following questions.

- a Draw a cylinder. Label the radius 4 units and the height 10 units.
- b Determine the area of the base. Write your response in terms of π .
 $A = \pi r^2$; $A = 4^2 \cdot \pi$, or 16π square units
- c Determine the volume of the cylinder. Write your response in terms of π .



The volume of a cylinder is determined by multiplying the area of its base by its height. $V = \pi r^2 h$; $V = 16\pi \cdot 10$, or 160π cubic units

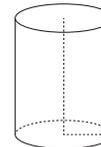
Unit 5 Lesson 11

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Name: _____ Date: _____ Period: _____

4. The cylinder shown has a height of 12 cm and a radius of 5 cm.



- a How many cubic centimeters of fluid can fill this cylinder? Write your response in terms of π .
 $V = \pi r^2 h$; if $r = 5$ and $h = 12$, then $V = \pi \cdot 5^2 \cdot 12$ or $300\pi \text{ cm}^3$.
- b Give a decimal approximation of your answer to the nearest hundredths place.
 942.48 cm^3

5. A preschool teacher stores modeling clay in two types of containers. One type of container is in the shape of a rectangular prism. The base has side lengths 14 cm and 21 cm, and the height is 8 cm. The second container is in the shape of a cylinder with a diameter of 20 cm. The height of the cylinder container is 8 cm, the same height as the rectangular container.

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- b Which is greater in volume, the rectangular container or the cylinder container? Show your thinking.

The cylinder; Sample response: Both figures have the same height, so the figure with the greater base area has the greater volume. The cylinder's base area is $100\pi \approx 314.16 \text{ cm}^2$, which is greater than the rectangular prism's base area, 294 cm^2 .

6. Cylinder A has a radius of 9 in. Cylinder B has the same height as Cylinder A and a radius of one third as long as Cylinder A. What fraction of the volume of Cylinder A is the volume of Cylinder B? Show or explain your thinking.

$\frac{1}{9}$; Sample response: For any height h , Cylinder A has a volume of $81\pi h \text{ in}^3$. Cylinder B has a volume of $9\pi h \text{ in}^3$ because $\frac{1}{9}$ of 81 is 9.

7. Andre says that if you double the height of a cylinder, it will have the same effect on the volume as doubling the radius of the cylinder. Do you agree with Andre? Show or explain your thinking.

No; Sample response: A cylinder with a radius of 2 units and a height of 4 units has a volume of 16π cubic units. Doubling the height gives a volume of 32π cubic units. Doubling the radius gives a volume of 64π cubic units.

Unit 5 Lesson 11

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Additional Practice

Practice Problem Analysis

Problem	DOK	Standard(s)
1	1	8.G.C.9
2	1	8.G.C.9
3	2	8.G.C.9
4	2	8.G.C.9
5	2	8.G.C.9
6	2	8.G.C.9
7	3	8.G.C.9

Notes:

5. If the radius of the soup can is doubled, does the volume double?

Yes

No

Maybe

6. A cylinder has a volume of 216π cubic inches and a height represented by h . Complete this table with the volumes of other cylinders that have the same radius but different heights.

Height (inches)	Volume (cubic inches)
$\frac{h}{2}$	108π
$\frac{h}{3}$	72π
$2h$	432π
$3h$	648π
$4h$	864π

7. Using the volumes from the table, what do you think the volume of a cylinder with a height of $8h$ will be? Explain your thinking.

$1,728\pi$ cubic inches. Explanations vary. Since the volume of the cylinder with a height of $4h$ is 864π , the volume will double for a cylinder with a height of $8h$.

Name: _____ Date: _____ Period: _____

Additional Practice

5.12

1. Each row of this table lists information about a specific cylinder. Complete the table.

Diameter (units)	Area of Base (square units)	Height (units)	Volume (cubic units)
6	9π	3	27π
4	4π	5	20π
2	π	2	2π
10	25π	6	150π

Problems 2–5: George buys soup at the store. The soup cans are in the shape of cylinders. All the soup cans have a height of 5 inches. Let r represent the radii of the soup cans, in inches, and V represent the volume of the soup cans, in cubic inches.

2. Write an equation that represents the relationship between the volume, V , and the radius, r , for all the soup cans with a height of 5 inches.

$$V = 5\pi r^2$$

3. Complete this table:

r (inches)	4	5	6
V (cubic inches)	80π	125π	180π

4. George notices a jumbo soup can that is now available at the store. The jumbo soup can is also in the shape of a cylinder and has a height of 5 inches, but the radius is 8 inches. What is the volume of this jumbo soup can in cubic inches?

- A. 80π B. 160π
 C. 240π D. 320π

Unit 5 Lesson 12

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Name: _____ Date: _____ Period: _____

5. If the radius of the soup can is doubled, does the volume double?

Yes

No

Maybe

6. A cylinder has a volume of 216π cubic inches and a height represented by h . Complete this table with the volumes of other cylinders that have the same radius but different heights.

Height (inches)	Volume (cubic inches)
$\frac{h}{2}$	108π
$\frac{h}{3}$	72π
$2h$	432π
$3h$	648π
$4h$	864π

7. Using the volumes from the table, what do you think the volume of a cylinder with a height of $8h$ will be? Explain your thinking.

$1,728\pi$ cubic inches. Explanations vary. Since the volume of the cylinder with a height of $4h$ is 864π , the volume will double for a cylinder with a height of $8h$.

Unit 5 Lesson 12

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Additional Practice

Practice Problem Analysis

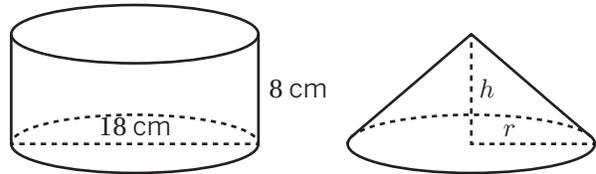
Problem	DOK	Standard(s)
1	1	8.F.B, 8.G.C.9
2	2	8.F.B, 8.G.C.9
3	1	8.F.B, 8.G.C.9
4	2	8.F.B, 8.G.C.9
5	2	8.F.B, 8.G.C.9
6	1	8.F.B, 8.G.C.9
7	2	8.F.B, 8.G.C.9

Notes:

Additional Practice

5.13

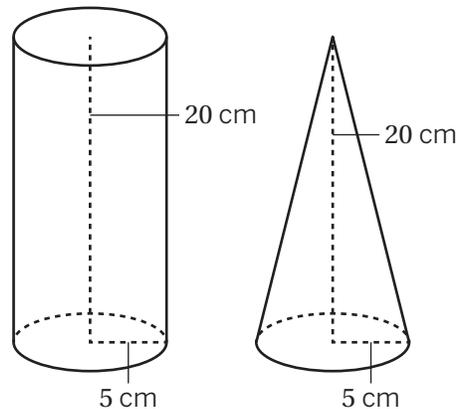
1. The cylinder and cone shown have the same height and the same base area.



a What is the radius r of the cone?
9 cm

b What is the height h of the cone?
8 cm

2. Which is a true statement about the volumes of the cylinder and cone?



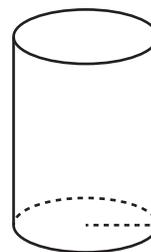
A. The volumes are equal.

B. The volume of the cone is $\frac{1}{3}$ times the volume of the cylinder.

C. The volume of the cylinder is $\frac{1}{3}$ times the volume of the cone.

D. The volume of the cone is 3 times the volume of the cylinder.

3. The volume of this cylinder is $72\pi \text{ mm}^3$. What is the volume of a cone that has the same base area and the same height?



A. $24\pi \text{ mm}^3$

B. $36\pi \text{ mm}^3$

C. $72\pi \text{ mm}^3$

D. $216\pi \text{ mm}^3$

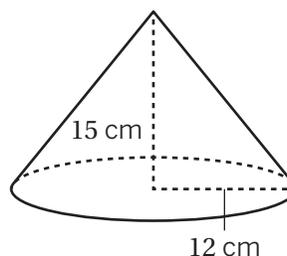
4. What is the volume of the cone shown?

A. $60\pi \text{ cm}^3$

B. $180\pi \text{ cm}^3$

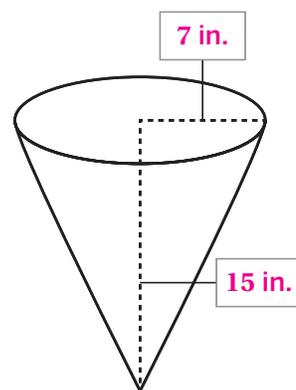
C. $720\pi \text{ cm}^3$

D. $900\pi \text{ cm}^3$



5. A cone-shaped hanging basket is used to grow flowers. The basket has a diameter of 14 in. and a height of 15 in.

- a Label the height and radius of the hanging basket.
 b If the container is filled completely with potting soil, about how many cubic inches can the container hold? Round to the nearest tenth. Show your thinking.



769.7 in³; Sample response:

$$V = \frac{1}{3}\pi r^2 h; \text{ If } r = 7 \text{ and } h = 15, \text{ then}$$

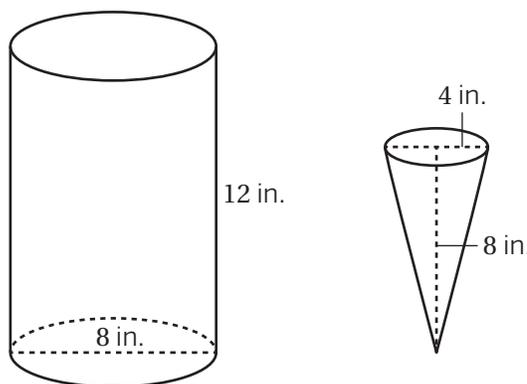
$$V = \frac{1}{3} \cdot \pi \cdot 7^2 \cdot 15$$

$$V = 245\pi \text{ or about } 769.7 \text{ in}^3$$

6. The volume of a cylinder is 96π cubic units. What is the volume of a cone that has the same base area and the same height as the cylinder? Explain your thinking.

32π cubic units; Sample response: The volume of a cone is one third times the volume of a cylinder with the same height and base area.

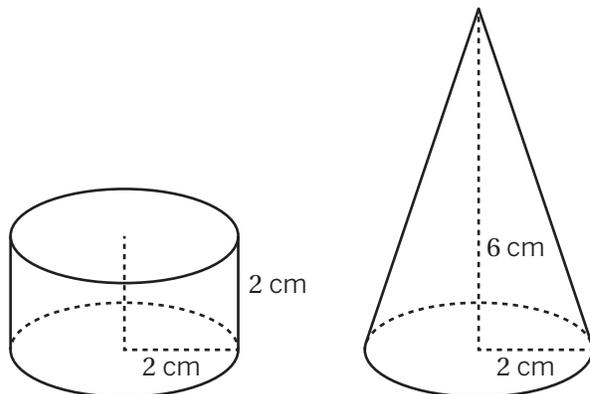
7. At a frozen yogurt shop, a cylinder-shaped container of frozen yogurt has the base diameter and height shown. The shop serves the frozen yogurt in waffle cones that have a base diameter of 4 in. and a height of 8 in. If each waffle cone is filled completely with frozen yogurt, how many cones can be filled from one container of frozen yogurt? Explain your thinking.



18 cones; Sample response: The container has a volume of $192\pi \text{ in}^3$ and each cone has a volume of $\frac{32\pi}{3} \text{ in}^3$. $192\pi \div \frac{32\pi}{3} = 18$, so 18 cones can be filled.

8. Study the cylinder and cone shown. Bard claims that the cone has a greater volume than the cylinder. Han argues that the cylinder has the greater volume. Who is correct? Explain your thinking.

Neither; Sample response: A cone with the same base area and the same height as a cylinder has a volume that is one third the volume of the cylinder. Here, the cone has the same base area as the cylinder, but its height is 3 times the height of the cylinder. So, its volume is the same as the volume of the cylinder. Both figures have a volume of $8\pi \text{ cm}^3$.



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Additional Practice 5.13

- The cylinder and cone shown have the same height and the same base area.
 - What is the radius r of the cone?
9 cm
 - What is the height h of the cone?
8 cm
- Which is a true statement about the volumes of the cylinder and cone?
 - The volumes are equal.
 - The volume of the cone is $\frac{1}{3}$ times the volume of the cylinder.**
 - The volume of the cylinder is $\frac{1}{3}$ times the volume of the cone.
 - The volume of the cone is 3 times the volume of the cylinder.
- The volume of this cylinder is $72\pi \text{ mm}^3$. What is the volume of a cone that has the same base area and the same height?
 - $24\pi \text{ mm}^3$**
 - $36\pi \text{ mm}^3$
 - $72\pi \text{ mm}^3$
 - $216\pi \text{ mm}^3$
- What is the volume of the cone shown?
 - $60\pi \text{ cm}^3$
 - $180\pi \text{ cm}^3$
 - $720\pi \text{ cm}^3$**
 - $900\pi \text{ cm}^3$

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- A cone-shaped hanging basket is used to grow flowers. The basket has a diameter of 14 in. and a height of 15 in.
 - Label the height and radius of the hanging basket.
 - If the container is filled completely with potting soil, about how many cubic inches can the container hold? Round to the nearest tenth. Show your thinking.
 **769.7 in^3 ; Sample response: $V = \frac{1}{3}\pi r^2 h$; If $r = 7$ and $h = 15$, then $V = \frac{1}{3} \cdot \pi \cdot 7^2 \cdot 15$
 $V = \frac{1}{3} \cdot \pi \cdot 7^2 \cdot 15$
 $V = 245\pi$ or about 769.7 in^3**
- The volume of a cylinder is 96π cubic units. What is the volume of a cone that has the same base area and the same height as the cylinder? Explain your thinking.
 32π cubic units; Sample response: The volume of a cone is one third times the volume of a cylinder with the same height and base area.
- At a frozen yogurt shop, a cylinder-shaped container of frozen yogurt has the base diameter and height shown. The shop serves the frozen yogurt in waffle cones that have a base diameter of 4 in. and a height of 8 in. If each waffle cone is filled completely with frozen yogurt, how many cones can be filled from one container of frozen yogurt? Explain your thinking.
18 cones; Sample response: The container has a volume of $192\pi \text{ in}^3$ and each cone has a volume of $\frac{32\pi}{3} \text{ in}^3$. $192\pi \div \frac{32\pi}{3} = 18$, so 18 cones can be filled.
- Study the cylinder and cone shown. Bard claims that the cone has a greater volume than the cylinder. Han argues that the cylinder has the greater volume. Who is correct? Explain your thinking.
Neither; Sample response: A cone with the same base area and the same height as a cylinder has a volume that is one third the volume of the cylinder. Here, the cone has the same base area as the cylinder, but its height is 3 times the height of the cylinder. So, its volume is the same as the volume of the cylinder. Both figures have a volume of $8\pi \text{ cm}^3$.

Unit 5 Lesson 13 126 Additional Practice

Practice Problem Analysis

Problem	DOK	Standard(s)
1	1	8.G.C.9
2	1	8.G.C.9
3	2	8.G.C.9
4	2	8.G.C.9
5	2	8.G.C.9
6	2	8.G.C.9
7	3	8.G.C.9
8	3	8.G.C.9

Notes:

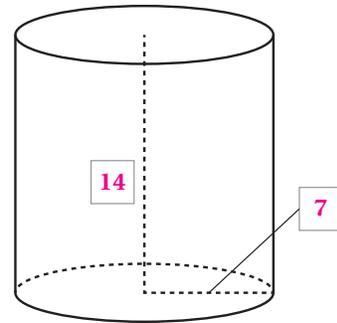
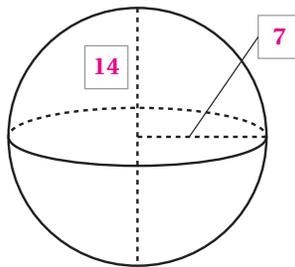
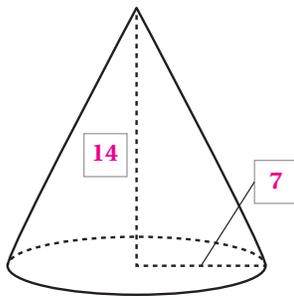
Additional Practice

5.15

1. Complete the following table for different spheres.

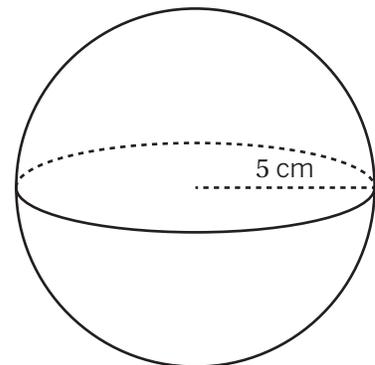
Radius	14 in.	8 cm	$\frac{500}{3}$ ft	$\frac{350}{3}$ yd	4.09 m	2.045 m
Diameter	28 in.	16 cm	$\frac{1000}{3}$ ft	$\frac{700}{3}$ yd	8.18 m	4.09 m

2. The cylinder, cone, and sphere all have the same radius and height. The radius of the cone is 7 units. Label the radius and height on each figure, in units.



3. Use the formula $V = \frac{4}{3}\pi r^3$ to determine the volume of the sphere with a radius of 5 cm.

- A. $\frac{125}{3}\pi \text{ cm}^3$
- B. $\frac{500}{3}\pi \text{ cm}^3$**
- C. $125\pi \text{ cm}^3$
- D. $500\pi \text{ cm}^3$



4. A sphere has a diameter of 12 in. What is the volume of the sphere? Write your response in terms of π .

$288\pi \text{ in}^3$

5. Which of the following are true statements about the volumes of a sphere, a cone, and a cylinder with the same dimensions? Select *all* that apply.

- A. The sphere has the greatest volume.
- B. The cone's volume is half the sphere's volume.
- C. The cone's volume is half the cylinder's volume.
- D. The sphere's volume is double the cone's volume.
- E. The cylinder's volume is $\frac{3}{2}$ the sphere's volume.
- F. The sphere's volume is $\frac{2}{3}$ the cylinder's volume.

6. Match the description of each sphere to its volume.

- a. Sphere A: radius of 7 cm **b** $\frac{32}{3}\pi \text{ cm}^3$
- b. Sphere B: radius of 2 cm **c** $\frac{256}{3}\pi \text{ cm}^3$
- c. Sphere C: diameter of 8 cm **a** $\frac{1372}{3}\pi \text{ cm}^3$
- d. Sphere D: radius of 9 cm **d** $972\pi \text{ cm}^3$

7. A cube's volume is 216 in^3 .

- a** What is the length of its edge?
6 in.
- b** If a sphere fits snugly inside this cube, what is the volume of the sphere? Show or explain your thinking.
 $36\pi \text{ in}^3$; Sample response: The diameter is 6 in., so the radius is 3 in. If $r = 3$, then $V = \frac{4}{3}\pi \cdot 3^3$ or 36π .
- c** What percent of the cube is taken up by the sphere? Round to the nearest whole percent. Show or explain your thinking.
52%; Sample response: $\frac{36\pi}{216} \approx 0.52$, so about 52% of the cube is taken up by the sphere.

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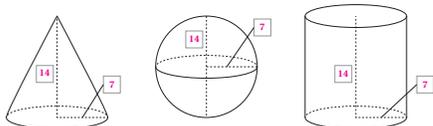
Additional Practice

5.15

1. Complete the following table for different spheres.

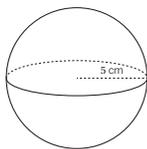
Radius	14 in.	8 cm	$\frac{500}{3}$ ft	$\frac{350}{3}$ yd	4.09 m	2.045 m
Diameter	28 in.	16 cm	$\frac{1000}{3}$ ft	$\frac{700}{3}$ yd	8.18 m	4.09 m

2. The cylinder, cone, and sphere all have the same radius and height. The radius of the cone is 7 units. Label the radius and height on each figure, in units.



3. Use the formula $V = \frac{4}{3}\pi r^3$ to determine the volume of the sphere with a radius of 5 cm.

- A. $\frac{125}{3}\pi \text{ cm}^3$
B. $\frac{500}{3}\pi \text{ cm}^3$
 C. $125\pi \text{ cm}^3$
 D. $500\pi \text{ cm}^3$



4. A sphere has a diameter of 12 in. What is the volume of the sphere? Write your response in terms of π .

$288\pi \text{ in}^3$

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5. Which of the following are true statements about the volumes of a sphere, a cone, and a cylinder with the same dimensions? Select *all* that apply.

- A. The sphere has the greatest volume.
 B. The cone's volume is half the sphere's volume.
 C. The cone's volume is half the cylinder's volume.
 D. The sphere's volume is double the cone's volume.
 E. The cylinder's volume is $\frac{2}{3}$ the sphere's volume.
 F. The sphere's volume is $\frac{2}{3}$ the cylinder's volume.

6. Match the description of each sphere to its volume.

- a. Sphere A: radius of 7 cm **b** $\frac{32}{3}\pi \text{ cm}^3$
 b. Sphere B: radius of 2 cm **c** $\frac{256}{3}\pi \text{ cm}^3$
 c. Sphere C: diameter of 8 cm **a** $\frac{1372}{3}\pi \text{ cm}^3$
 d. Sphere D: radius of 9 cm **d** $972\pi \text{ cm}^3$

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- a. What is the length of its edge?
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- c. What percent of the cube is taken up by the sphere? Round to the nearest whole percent. Show or explain your thinking.
52%; Sample response: $\frac{36\pi}{216} \approx 0.52$, so about 52% of the cube is taken up by the sphere.

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Additional Practice

Practice Problem Analysis

Problem	DOK	Standard(s)
1	1	8.G.C.9
2	1	8.G.C.9
3	2	8.G.C.9
4	2	8.G.C.9
5	2	8.G.C.9
6	2	8.G.C.9
7	3	8.G.C.9

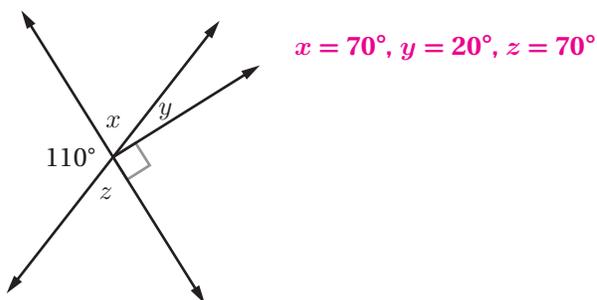
Notes:

Additional Practice

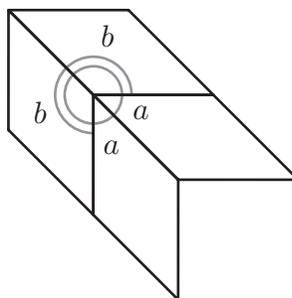
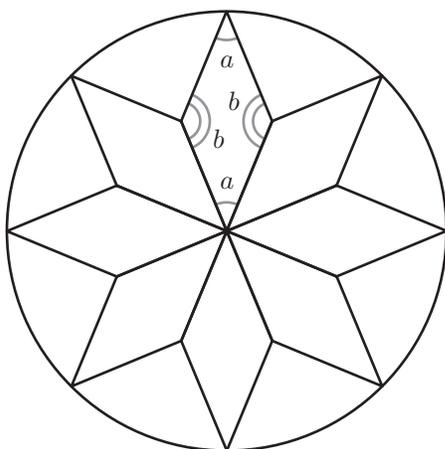
7.13

In Problems 1–4, you will apply your understanding of the skills and concepts you learned throughout this unit.

1. Refer to the diagram shown. Determine the values of x , y , and z .



2. The two patterns shown were created using identical rhombuses. Without using a protractor, determine the values of a and b . Show or explain your thinking.



From the first pattern:

$$8a = 360$$

$$a = 45^\circ$$

From the second pattern:

$$a + b = 180$$

$$45 + b = 180$$

$$b = 135^\circ$$

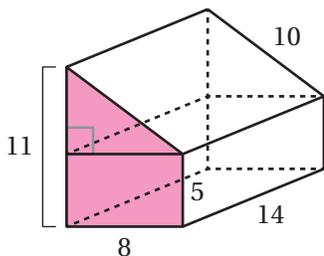
3. Can you draw a triangle with side lengths of 4 cm, 2 cm, and 8 cm? If so, draw one. If not, explain why.

No, the side lengths of 4 cm and 2 cm are too short to meet with the endpoints of the side length of 8 cm.

4. Refer to the prism shown.

- a. Shade a base of the prism.

Sample response:



- b. Determine the area of the base you shaded. Show your thinking.

64 square units

- c. Determine the volume of the prism. Show your thinking.

896 cubic units

- d. Determine the surface area of the prism. Show your thinking.

604 square units

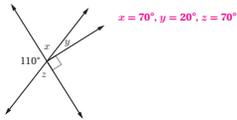
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Additional Practice

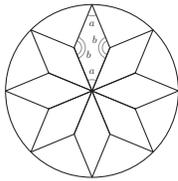
7.13

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From the first pattern:

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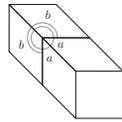
$$a = 45^\circ$$

From the second pattern:

$$a + b = 180$$

$$45 + b = 180$$

$$b = 135^\circ$$



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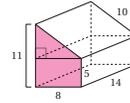
3. Can you draw a triangle with side lengths of 4 cm, 2 cm, and 8 cm? If so, draw one. If not, explain why.

No, the side lengths of 4 cm and 2 cm are too short to meet with the endpoints of the side length of 8 cm.

4. Refer to the prism shown.

- a. Shade a base of the prism.

Sample response:



- b. Determine the area of the base you shaded. Show your thinking.

64 square units

- c. Determine the volume of the prism. Show your thinking.

896 cubic units

- d. Determine the surface area of the prism. Show your thinking.

604 square units

Unit 7 Lesson 13

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Additional Practice

Practice Problem Analysis

Problem	DOK	Standard(s)
1	2	7.G.B.5
2	2	7.G.B.5
3	2	7.G.A.2
4	2	7.G.B.6

Notes:

Additional Practice

7.01

1. Match each single power with its expanded form.

Single power

Expanded form

a. 2^6

d. $3 \cdot 3 \cdot 3 \cdot 3$

b. 6^2

c. $4 \cdot 4 \cdot 4$

c. 4^3

b. $6 \cdot 6$

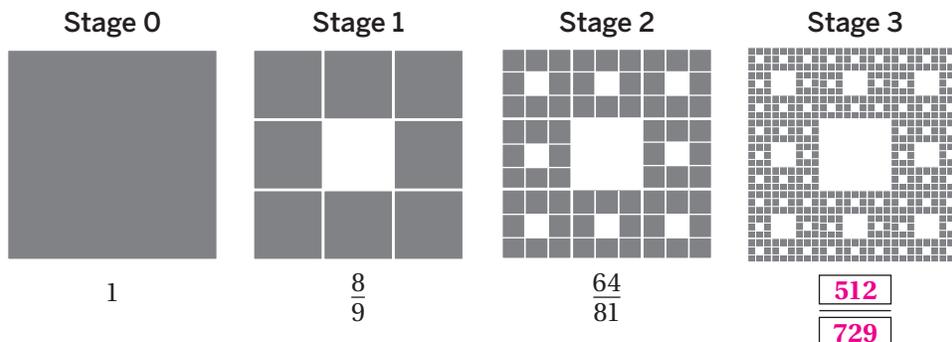
d. 3^4

a. $2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2$

2. Complete the table by writing the missing single power or expanded form.

Single power	Expanded form
10^2	$10 \cdot 10$
4^5	$4 \cdot 4 \cdot 4 \cdot 4 \cdot 4$
$\left(\frac{1}{2}\right)^6$	$\frac{1}{2} \cdot \frac{1}{2} \cdot \frac{1}{2} \cdot \frac{1}{2} \cdot \frac{1}{2} \cdot \frac{1}{2}$
$\left(\frac{7}{9}\right)^1$	$\frac{7}{9}$
$\left(1\frac{2}{3}\right)^4$	$1\frac{2}{3} \cdot 1\frac{2}{3} \cdot 1\frac{2}{3} \cdot 1\frac{2}{3}$

3. The pattern shown is called Sierpiński's carpet. Study the pattern. The shaded area of each square in Stages 0–2 is written as a fraction of the total area, in square units. Write the fraction that represents the shaded area for Stage 3.



4. Han made \$240 mowing lawns last summer. He put the money in a savings account that pays 2% interest per year. If Han does not touch the money in his account, he can determine the amount he will have the next year by multiplying his current amount by 1.02.

a How much money will Han have in his account after 1 year? Explain your thinking.

\$244.80; $240 \cdot 1.02 = 244.80$

b How much money will Han have in his account after 3 years? Explain your thinking.

about \$254.69; $240 \cdot 1.02 \cdot 1.02 \cdot 1.02 \approx 254.69$

c Write an expression for the amount of money Han would have after 20 years if he never withdraws money from the account.

$240 \cdot 1.02^{20}$

5. Bard received \$150 as a gift and put the money in a savings account that pays 2.5% interest per year. If Bard does not touch the money in the account, Bard can determine the amount that will be in the account the next year by multiplying the current amount by 1.025.

a How much money will Bard have in the account after 1 year? Explain your thinking.

\$153.75; $150 \cdot 1.025 = 153.75$

b How much money will Bard have in the account after 5 years? Explain your thinking.

about \$169.71; $150 \cdot 1.025 \cdot 1.025 \cdot 1.025 \cdot 1.025 \cdot 1.025 \approx 169.71$

c Write an expression for the amount of money Bard would have after 40 years if money was never withdrawn from the account.

$150 \cdot 1.025^{40}$

6. Use exponents to write another expression equivalent to $(6)^3$. Explain your thinking.

Sample response: $6 \cdot 6^2$; $6 \cdot 6^2 = 6 \times 6 \times 6$ and $6^3 = 6 \times 6 \times 6$

7. The first three terms of a pattern are shown.

$\frac{3}{5}, \frac{9}{25}, \frac{27}{125}, \dots$

a What is the 10th term of this pattern? Explain your thinking.

$\frac{59,049}{9,765,625}$; Sample response: The pattern can also be expressed in terms of a single power: $(\frac{3}{5})^1, (\frac{3}{5})^2, (\frac{3}{5})^3$. The 10th term can be found by evaluating $(\frac{3}{5})^{10}$.

b Write an expression for the n th term of this pattern. Explain your thinking.

$(\frac{3}{5})^n$; Sample response: Because the pattern can be expressed in terms of a single power. Any term, n , can be found by evaluating $(\frac{3}{5})^n$.

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Additional Practice 7.01

1. Match each single power with its expanded form.

Single power	Expanded form
a. 2^5	d. $3 \cdot 3 \cdot 3 \cdot 3 \cdot 3$
b. 6^2	e. $4 \cdot 4 \cdot 4$
c. 4^3	b. $6 \cdot 6$
d. 3^4	a. $2 \cdot 2 \cdot 2 \cdot 2 \cdot 2$

2. Complete the table by writing the missing single power or expanded form.

Single power	Expanded form
10^2	$10 \cdot 10$
4^3	$4 \cdot 4 \cdot 4$
$(\frac{1}{2})^3$	$\frac{1}{2} \cdot \frac{1}{2} \cdot \frac{1}{2}$
$(\frac{7}{9})^2$	$\frac{7}{9} \cdot \frac{7}{9}$
$(1\frac{2}{3})^3$	$1\frac{2}{3} \cdot 1\frac{2}{3} \cdot 1\frac{2}{3}$

3. The pattern shown is called Sierpiński's carpet. Study the pattern. The shaded area of each square in Stages 0–2 is written as a fraction of the total area, in square units. Write the fraction that represents the shaded area for Stage 3.

Stage 0	Stage 1	Stage 2	Stage 3
			
1	$\frac{8}{9}$	$\frac{64}{81}$	$\frac{512}{729}$

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4. Han made \$240 mowing lawns last summer. He put the money in a savings account that pays 2% interest per year. If Han does not touch the money in his account, he can determine the amount he will have the next year by multiplying his current amount by 1.02.

- How much money will Han have in his account after 1 year? Explain your thinking.
 $\$244.80; 240 \cdot 1.02 = 244.80$
- How much money will Han have in his account after 3 years? Explain your thinking.
 $\text{about } \$254.69; 240 \cdot 1.02 \cdot 1.02 \cdot 1.02 = 254.69$
- Write an expression for the amount of money Han would have after 20 years if he never withdraws money from the account.
 $240 \cdot 1.02^{20}$

5. Bard received \$150 as a gift and put the money in a savings account that pays 2.5% interest per year. If Bard does not touch the money in the account, Bard can determine the amount that will be in the account the next year by multiplying the current amount by 1.025.

- How much money will Bard have in the account after 1 year? Explain your thinking.
 $\$153.75; 150 \cdot 1.025 = 153.75$
- How much money will Bard have in the account after 5 years? Explain your thinking.
 $\text{about } \$169.71; 150 \cdot 1.025 \cdot 1.025 \cdot 1.025 \cdot 1.025 \cdot 1.025 \approx 169.71$
- Write an expression for the amount of money Bard would have after 40 years if money was never withdrawn from the account.
 $150 \cdot 1.025^{40}$

6. Use exponents to write another expression equivalent to $(6 \cdot 6)^2$. Explain your thinking.
Sample response: $6 \cdot 6^2; 6 \cdot 6^2 = 6 \times 6 \times 6$ and $6^3 = 6 \times 6 \times 6$

7. The first three terms of a pattern are shown.

$$3 \quad 9 \quad 27$$

$$5 \quad 25 \quad 125 \quad \dots$$

- What is the 10th term of this pattern? Explain your thinking.
 $\frac{50,000}{9,765,625}$. **Sample response:** The pattern can also be expressed in terms of a single power: $(\frac{1}{5})^3, (\frac{1}{5})^2, (\frac{1}{5})^1$. The 10th term can be found by evaluating $(\frac{1}{5})^{10}$.
- Write an expression for the n th term of this pattern. Explain your thinking.
 $(\frac{1}{5})^n$; **Sample response:** Because the pattern can be expressed in terms of a single power, Any term, n , can be found by evaluating $(\frac{1}{5})^n$.

Unit 7 Lesson 1 154 Additional Practice

Practice Problem Analysis

Problem	DOK	Standard(s)
1	1	6.EE.A.1
2	1	6.EE.A.1
3	2	6.EE.A.1
4	2	6.EE.A.1
5	2	6.EE.A.1
6	2	6.EE.A.1
7	2	6.EE.A.1

Notes:

Additional Practice

7.02

1. Write each expression as a single power. Show your thinking.

a $7^4 \cdot 7^7$
 7^{11}

b $25^8 \cdot 25^3$
 25^{11}

c $\left(\frac{2}{3}\right)^9 \cdot \left(\frac{2}{3}\right)^5$
 $\left(\frac{2}{3}\right)^{14}$

d $(5.4)^{13} \cdot (5.4)^6$
 $(5.4)^{19}$

e $(-3) \cdot (-3)^6$
 $(-3)^7$

f $6^{15} \cdot 6^7 \cdot 6^3$
 6^{25}

2. Which expressions are equivalent to 10^{16} ? Select *all* that apply.

A. $10^4 \cdot 10^4$

D. $10^{16} \cdot 10$

B. $10^2 \cdot 10^8$

E. $10^{15} \cdot 10$

C. $10^8 \cdot 10^8$

3. Two of the following expressions are equivalent. Identify the expression that is *not* equivalent. Explain your thinking.

10^6

$10 + 10 + 10 + 10 + 10 + 10$

$10^3 \cdot 10 \cdot 10 \cdot 10$

$10 + 10 + 10 + 10 + 10 + 10$; Sample response: The other expressions can be represented with the single exponent 10^6 . This expression equals 60.

4. A new large rectangular aquarium is 81 in. long, 81 in. wide, and 9 in. deep. The aquarium is filled to the top with water.

a Write each measurement of the aquarium as a single power of 9.

Length: 9^2 in.

Width: 9^2 in.

Depth: 9 in.

b Use your responses from part a to write an expression that represents the volume, in cubic inches, of the aquarium.

$9^2 \cdot 9^2 \cdot 9$

c How much water does the aquarium hold? Write your response as a single power of 9.

9^5 in³

5. Replace the empty box with a single power of 4 to make each equation true.

a $4^7 \cdot \boxed{4^9} = 4^{16}$

b $\boxed{4} \cdot 4^6 = 4^7$

c $4^{10} \cdot \boxed{4^7} \cdot 4 = 4^{18}$

6. Replace the empty box with a single power of a to make each equation true.

a $a^9 \cdot \boxed{a} = a^{10}$

b $\boxed{a^{10}} \cdot a^{10} = a^{20}$

c $a^3 \cdot \boxed{a^2} \cdot a = a^6$

7. Lin wants to write a multiplication expression that is equivalent to 2^8 . She writes the expression $2^4 \cdot 2^2$. Is her expression correct? Explain your thinking and correct Lin's expression, if necessary.

No; Sample response: Her expression could be $2^4 \cdot 2^4$. Lin needed to add the exponents, not multiply them.

8. If $a^b \cdot a^b = a^c$ is true, is $\frac{c}{2}$ greater than, less than, or equal to b ? Show or explain your thinking.

$\frac{c}{2} = b$. If $a^b \cdot a^b = a^c$, then $b + b = c$, and $2b = c$ or $\frac{c}{2} = b$.

Name: _____ Date: _____ Period: _____

Additional Practice

7.02

1. Write each expression as a single power. Show your thinking.

a $7^4 \cdot 7^7$
 7^{11}

b $25^3 \cdot 25^5$
 25^{11}

c $\left(\frac{2}{3}\right)^4 \cdot \left(\frac{2}{3}\right)^5$
 $\left(\frac{2}{3}\right)^9$

d $(5.4)^{13} \cdot (5.4)^8$
 $(5.4)^{21}$

e $(-3) \cdot (-3)^8$
 $(-3)^9$

f $6^{15} \cdot 16^2 \cdot 16^2$
 6^{19}

2. Which expressions are equivalent to 10^{10} ? Select *all* that apply.

A. $10^4 \cdot 10^4$

D. $10^6 \cdot 10$

B. $10^5 \cdot 10^5$

E. $10^{15} \cdot 10$

C. $10^8 \cdot 10^2$

3. Two of the following expressions are equivalent. Identify the expression that is *not* equivalent. Explain your thinking.

10^6

$10 + 10 + 10 + 10 + 10 + 10$

$10^6 \cdot 10 \cdot 10 \cdot 10$

$10 + 10 + 10 + 10 + 10 + 10$; **Sample response: The other expressions can be represented with the single exponent 10^7 . This expression equals 60 .**

4. A new large rectangular aquarium is 81 in. long, 81 in. wide, and 9 in. deep. The aquarium is filled to the top with water.

a Write each measurement of the aquarium as a single power of 9.

Length: 9^2 in.

Width: 9^2 in.

Depth: 9 in.

b Use your responses from part a to write an expression that represents the volume, in cubic inches, of the aquarium.

$9^5 \cdot 9^2 \cdot 9$

c How much water does the aquarium hold? Write your response as a single power of 9.

9^9 in³

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5. Replace the empty box with a single power of 4 to make each equation true.

a $4^7 \cdot \boxed{4^4} = 4^{10}$

b $\boxed{4^3} \cdot 4^8 = 4^7$

c $4^{18} \cdot \boxed{4^7} \cdot 4 = 4^{18}$

6. Replace the empty box with a single power of a to make each equation true.

a $a^4 \cdot \boxed{a^5} = a^{19}$

b $\boxed{a^{10}} \cdot a^{10} = a^{20}$

c $a^2 \cdot \boxed{a^2} \cdot a = a^6$

7. Lin wants to write a multiplication expression that is equivalent to 2^6 . She writes the expression $2^4 \cdot 2^2$. Is her expression correct? Explain your thinking and correct Lin's expression, if necessary.

No; Sample response: Her expression could be $2^4 \cdot 2^4$. Lin needed to add the exponents, not multiply them.

8. If $a^4 \cdot a^2 = a^c$ is true, is $\frac{c}{2}$ greater than, less than, or equal to b ? Show or explain your thinking.

$\frac{c}{2} = b$. If $a^4 \cdot a^2 = a^c$, then $b + b = c$, and $2b = c$ or $\frac{c}{2} = b$.

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Additional Practice

Practice Problem Analysis

Problem	DOK	Standard(s)
1	1	8.EE.A.1
2	1	8.EE.A.1
3	2	8.EE.A.1
4	2	8.EE.A.1
5	2	8.EE.A.1
6	2	8.EE.A.1
7	2	8.EE.A.1
8	2	8.EE.A.1

Notes:

Additional Practice

7.04

1. Select *all* expressions that are equivalent to 12^4 .

A. $\frac{12^7}{12^3}$

B. $2 \cdot 6^4$

C. $12^{10} - 12^6$

D. $12 \cdot 12^3$

E. $(12^2)^2$

Problems 2–9: Rewrite each expression as a single power.

2. $3^2 \cdot 4^2$ 12^2

3. $\frac{7^{12}}{7^8}$ 7^4

4. $(16^2)^3$ 16^6

5. $\frac{5^8 \cdot 5^4}{5^9}$ 5^3

6. $31^2 \cdot 31^{10}$ 31^{12}

7. $\frac{9^5}{9}$ 9^4

8. $(11^4)^5 \cdot 11$ 11^{21}

9. $\frac{8^{11}}{4^{11}}$ 2^{11}

10. Michael and Amelia were asked to rewrite the expression $\frac{4^{10}}{4^4} \cdot 4$ as a single power.

Michael says the answer is 4^7 . Amelia says the answer is 2^{14} .

Who is correct? Circle your choice.

Michael

Amelia

Neither

Both

Show or explain your thinking.

Explanations vary. Michael is correct when he simplified the expression $\frac{4^{10}}{4^4} \cdot 4$ to 4^7 by subtracting the exponents 10 and 4 to get $4^6 \cdot 4$ and then adding the exponents to get 4^7 . Amelia is also correct because $4^7 = (2^2)^7 = 2^{14}$.

Name: _____ Date: _____ Period: _____

Additional Practice

7.04

1. Select *all* expressions that are equivalent to 12^4 .

- A. $\frac{12^7}{12^3}$
- B. $2 \cdot 6^4$
- C. $12^{10} - 12^6$
- D. $12 \cdot 12^3$
- E. $(12^2)^2$

Problems 2–9: Rewrite each expression as a single power.

2. $3^5 \cdot 4^2$ 12^7

3. $\frac{7^{12}}{7^5}$ 7^7

4. $(16^2)^3$ 16^6

5. $\frac{5^6 \cdot 5^4}{5^3}$ 5^7

6. $31^2 \cdot 31^{10}$ 31^{12}

7. $\frac{9^5}{9}$ 9^4

8. $(11^4)^5 \cdot 11$ 11^{21}

9. $\frac{8^{11}}{4^{11}}$ 2^{11}

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10. Michael and Amelia were asked to rewrite the expression $\frac{4^{10}}{4^4} \cdot 4$ as a single power.

Michael says the answer is 4^7 . Amelia says the answer is 2^{14} .

Who is correct? Circle your choice.

Michael Amelia Neither **Both**

Show or explain your thinking.

Explanations vary. Michael is correct when he simplified the expression $\frac{4^{10}}{4^4} \cdot 4$ to 4^7 by subtracting the exponents 10 and 4 to get $4^6 \cdot 4$ and then adding the exponents to get 4^7 . Amelia is also correct because $4^7 = (2^2)^7 = 2^{14}$.

Unit 7 Lesson 4

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Additional Practice

Practice Problem Analysis

Problem	DOK	Standard(s)
1	1	8.EE.A.1
2	1	8.EE.A.1
3	1	8.EE.A.1
4	1	8.EE.A.1
5	1	8.EE.A.1
6	1	8.EE.A.1
7	1	8.EE.A.1
8	1	8.EE.A.1
9	1	8.EE.A.1
10	2	8.EE.A.1

Notes:

Additional Practice

7.05

1. Rewrite each expression using a single *negative* exponent.

a $\frac{1}{10} \cdot \frac{1}{10} \cdot \frac{1}{10} \cdot \frac{1}{10} \cdot \frac{1}{10}$
 10^{-5}

b $\frac{1}{6 \cdot 6 \cdot 6 \cdot 6}$
 6^{-4}

c $\frac{1}{2} \cdot \frac{1}{2} \cdot \frac{1}{2} \cdot \frac{1}{2} \cdot \frac{1}{2} \cdot \frac{1}{2}$
 2^{-6}

d $\frac{1}{y \cdot y \cdot y}$
 y^{-3}

2. Rewrite each expression using a single *positive* exponent.

a 10^{-2}
 $\frac{1}{10^2}$

b 5^{-5}
 $\frac{1}{5^5}$

c 8^{-7}
 $\frac{1}{8^7}$

d 2^{-8}
 $\frac{1}{2^8}$

3. Rewrite each expression using a single *positive* exponent.

a $10^7 \cdot 10^{-2}$
 10^5

b $9^{-3} \cdot 9^{-5}$
 $\frac{1}{9^8}$

c $\frac{10^6}{10^8}$
 $\frac{1}{10^2}$

d $\frac{4^2}{4^7}$
 $\frac{1}{4^5}$

4. Which expressions are equivalent to $\frac{1}{1,000}$? Select *all* that apply.

- A. $(-10)^4$
- B. 10^{-3}
- C. $1,000^{-1}$
- D. 100^{-2}
- E. $-1,000$

5. Which expressions are equivalent to 10^{-5} ? Select *all* that apply.

- A. $\frac{10^5}{10^{10}}$
- B. -50
- C. $10^{-2} + 10^{-3}$
- D. $10^{-5} \cdot 10$
- E. $\frac{1}{10} \cdot \frac{1}{10} \cdot \frac{1}{10} \cdot \frac{1}{10} \cdot \frac{1}{10}$

6. Replace the empty box with a single power of 10 to make each equation true.

a $\frac{10^3}{\boxed{10^7}} = \frac{1}{10^4}$

b $\frac{\boxed{10^3}}{10^4} = \frac{1}{10}$

c $10^{-4} \cdot \boxed{10^2} \cdot 10 = \frac{1}{10}$

7. Without evaluating, order the expressions 12^{-3} , 12^2 , and 12^0 from least to greatest. Explain your thinking.

12^{-3} , 12^0 , 12^2 ; Sample response: The expression 12^{-3} written with a positive exponent is $\frac{1}{12^3}$ and is less than 1, 12^0 equals 1, and 12^2 is greater than 1.

8. Mai states the missing single power of b in the expression $\frac{b^{-12}}{\boxed{}} = \frac{1}{b^{10}}$ is b^2 . Do you agree? Show or explain your thinking.

No; Sample response: The missing power is b^{-2} because $b^{-12 - (-2)} = b^{-10}$ or $\frac{1}{b^{10}}$.

Name: _____ Date: _____ Period: _____

Additional Practice

7.05

1. Rewrite each expression using a single *negative* exponent.

a $\frac{1}{10} \cdot \frac{1}{10} \cdot \frac{1}{10} \cdot \frac{1}{10} \cdot \frac{1}{10}$
 10^{-5}

b $\frac{1}{6 \cdot 6 \cdot 6 \cdot 6}$
 6^{-4}

c $\frac{1}{2} \cdot \frac{1}{2} \cdot \frac{1}{2} \cdot \frac{1}{2} \cdot \frac{1}{2}$
 2^{-5}

d $\frac{1}{y \cdot y \cdot y}$
 y^{-3}

2. Rewrite each expression using a single *positive* exponent.

a 10^{-2}
 $\frac{1}{10^2}$

b 5^{-3}
 $\frac{1}{5^3}$

c 8^{-7}
 $\frac{1}{8^7}$

d 2^{-9}
 $\frac{1}{2^9}$

3. Rewrite each expression using a single *positive* exponent.

a $10^7 \cdot 10^{-2}$
 10^5

b $9^{-3} \cdot 9^{-3}$
 $\frac{1}{9^6}$

c $\frac{10^6}{10^8}$
 $\frac{1}{10^2}$

d $\frac{4^7}{4^7}$
 $\frac{1}{4^0}$

4. Which expressions are equivalent to $\frac{1}{1,000}$? Select all that apply.

- A. $(-10)^4$
- B. 10^{-3}
- C. $1,000^{-1}$
- D. 100^{-2}
- E. $-1,000$

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5. Which expressions are equivalent to 10^{-3} ? Select *all* that apply.

- A. $\frac{10^1}{10^6}$
- B. -50
- C. $10^{-2} + 10^{-3}$
- D. $10^{-3} \cdot 10$
- E. $\frac{1}{10} \cdot \frac{1}{10} \cdot \frac{1}{10} \cdot \frac{1}{10} \cdot \frac{1}{10}$

6. Replace the empty box with a single power of 10 to make each equation true.

a $\frac{10^3}{\boxed{10}} = \frac{1}{10^7}$

b $\frac{10^7}{10^4} = \frac{1}{10}$

c $10^{-4} \cdot \boxed{10^3} \cdot 10 = \frac{1}{10}$

7. Without evaluating, order the expressions 12^{-3} , 12^2 , and 12^0 from least to greatest.

Explain your thinking.

12^{-3} , 12^0 , 12^2 ; Sample response: The expression 12^{-3} written with a positive exponent is $\frac{1}{12^3}$ and is less than 1, 12^0 equals 1, and 12^2 is greater than 1.

8. Mai states the missing single power of b in the expression $\frac{b^{-12}}{\boxed{b^2}} = \frac{1}{b^2}$ is b^2 . Do you agree? Show or explain your thinking.

No; Sample response: The missing power is b^{-2} because $b^{-12} \cdot b^{-2} = b^{-14} = \frac{1}{b^{14}}$.

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Additional Practice

Practice Problem Analysis

Problem	DOK	Standard(s)
1	1	8.EE.A.1
2	1	8.EE.A.1
3	1	8.EE.A.1
4	1	8.EE.A.1
5	2	8.EE.A.1
6	2	8.EE.A.1
7	2	8.EE.A.1
8	2	8.EE.A.1

Notes:

Additional Practice

7.07

1. Show three different ways to write each number as a multiple of a power of 10. For example, one way is writing 576,000 as $5,760 \cdot 10^2$.

a 576,000

Sample responses:

$576 \cdot 10^3$ $5.76 \cdot 10^5$ $57.6 \cdot 10^4$

b 9,510,000 Sample responses:

$9,510 \cdot 10^3$ $951 \cdot 10^4$ $95.1 \cdot 10^5$

2. Rewrite the quantity in each statement as a multiple of a power of 10.

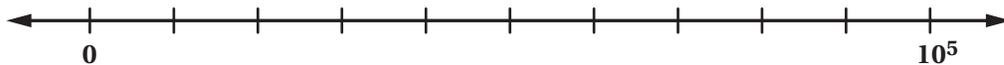
a One light-year is about 6 trillion miles. Sample responses:

$6 \cdot 10^{12}$

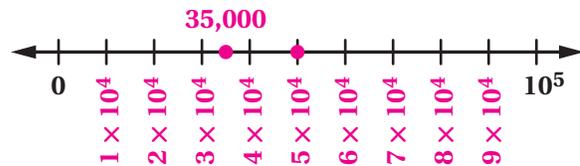
b On average, the human brain has 86 billion neurons. Sample responses:

$86 \cdot 10^9$

3. Refer to the number line.



a Label the tick marks on the number line.



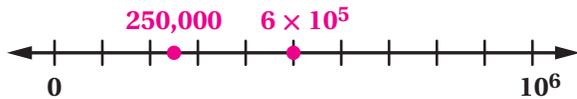
b Plot and label the values 35,000 and $5 \cdot 10^4$ on the number line.

3a–3b. Sample responses:

c Which value is less, 35,000 or $5 \cdot 10^4$? Estimate how many times less.

Sample response: 35,000 is the lesser value. 35,000 is about 1.5 times less than $5 \cdot 10^4$.

4. Refer to the number line.



a Plot and label the values 250,000 and $6 \cdot 10^5$ on the number line. **Sample responses:**

b Which is greater: 250,000 or $6 \cdot 10^5$? Estimate how many times greater.

Sample response: $6 \cdot 10^5$ is the greater value. $6 \cdot 10^5$ is about 2.4 times greater than 250,000.

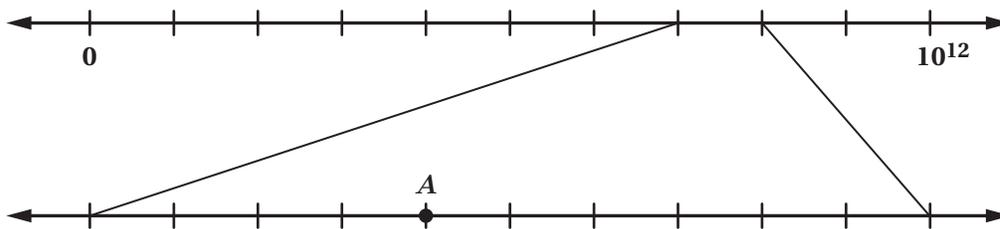
5. Which value is less: $2 \cdot 10^4$ or $2 \cdot 10^5$? Explain your thinking.

$2 \cdot 10^4$; Sample response: $2 \cdot 10^4$ is smaller because the exponent 4 is less than the exponent 5.

6. Which value is greater: 500,000 or $50 \cdot 10^4$? Explain your thinking.

They are equal; Sample response: When written as multiples of a power of 10, the exponent on the power on 10 for 500,000 is the same as the exponent on the power of 10 for $50 \cdot 10^4$.

7. What number is represented by point A? Show or explain your thinking.



$7.4 \cdot 10^{11}$; Sample response: Point A lies between $7 \cdot 10^{11}$ and $8 \cdot 10^{11}$. It is $7.4 \cdot 10^{11}$ because it is four tick marks from $7.0 \cdot 10^{11}$.

8. The distance from Pluto to the Sun is about 4 billion miles. Andre claims that this is less than $4 \cdot 10^8$ miles. Do you agree? Explain your thinking.

No; Sample response: 4 billion expressed as a multiple of a power of 10 is $4 \cdot 10^9$ which is greater than $4 \cdot 10^8$.

Name: _____ Date: _____ Period: _____

Additional Practice

7.07

1. Show three different ways to write each number as a multiple of a power of 10. For example, one way is writing 576,000 as $5,760 \cdot 10^2$.

a. 576,000

Sample responses:

$576 \cdot 10^3$ $5.76 \cdot 10^5$ $57.6 \cdot 10^4$

b. 9,510,000 Sample responses:

$9,510 \cdot 10^3$ $951 \cdot 10^4$ $95.1 \cdot 10^5$

2. Rewrite the quantity in each statement as a multiple of a power of 10.

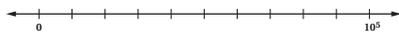
a. One light-year is about 6 trillion miles. Sample responses:

$6 \cdot 10^{12}$

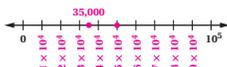
b. On average, the human brain has 86 billion neurons. Sample responses:

$86 \cdot 10^9$

3. Refer to the number line.



a. Label the tick marks on the number line.



b. Plot and label the values 35,000 and $5 \cdot 10^4$ on the number line.

3a–3b. Sample responses:

c. Which value is less, 35,000 or $5 \cdot 10^4$? Estimate how many times less.

Sample response: 35,000 is the lesser value. 35,000 is about 1.5 times less than $5 \cdot 10^4$.

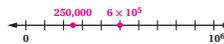
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4. Refer to the number line.



a. Plot and label the values 250,000 and $6 \cdot 10^5$ on the number line. Sample responses:

b. Which is greater, 250,000 or $6 \cdot 10^5$? Estimate how many times greater.

Sample response: $6 \cdot 10^5$ is the greater value. $6 \cdot 10^5$ is about 2.4 times greater than 250,000.

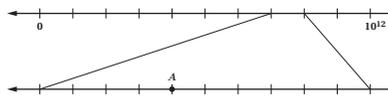
5. Which value is less: $2 \cdot 10^4$ or $2 \cdot 10^5$? Explain your thinking.

$2 \cdot 10^4$; Sample response: $2 \cdot 10^4$ is smaller because the exponent 4 is less than the exponent 5.

6. Which value is greater: 500,000 or $50 \cdot 10^4$? Explain your thinking.

They are equal. Sample response: When written as multiples of a power of 10, the exponent on the power of 10 for 500,000 is the same as the exponent on the power of 10 for $50 \cdot 10^4$.

7. What number is represented by point A? Show or explain your thinking.



$7.4 \cdot 10^{11}$; Sample response: Point A lies between $7 \cdot 10^{11}$ and $8 \cdot 10^{11}$. It is $7.4 \cdot 10^{11}$ because it is four tick marks from $7 \cdot 10^{11}$.

8. The distance from Pluto to the Sun is about 4 billion miles. Andre claims that this is less than $4 \cdot 10^9$ miles. Do you agree? Explain your thinking.

No; Sample response: 4 billion expressed as a multiple of a power of 10 is $4 \cdot 10^9$ which is greater than $4 \cdot 10^8$.

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Additional Practice

Practice Problem Analysis

Problem	DOK	Standard(s)
1	1	8.EE.A.3
2	1	8.EE.A.3
3	2	8.EE.A.3
4	2	8.EE.A.3
5	2	8.EE.A.3
6	2	8.EE.A.3
7	2	8.EE.A.3
8	2	8.EE.A.3

Notes:

Additional Practice

7.08

1. Select *all* expressions that are equivalent to $\frac{1}{100}$.

A. $-1 \cdot 10^2$

B. $1 \cdot 10^{-2}$

C. $-1 \cdot 10^2$

D. $10 \cdot 10^{-3}$

E. $-1 \cdot 10^{-3}$

2. Order the expressions from least to greatest.

$-4 \cdot 10^0$	$-5 \cdot 10^{-2}$	$4 \cdot 10^2$	$5 \cdot 10^{-2}$	$-4 \cdot 10^2$
$-4 \cdot 10^2$	$-4 \cdot 10^0$	$-5 \cdot 10^{-2}$	$5 \cdot 10^{-2}$	$4 \cdot 10^2$
Least				Greatest

Problems 3–4: Write the sum as a decimal.

3. $7 \cdot 10^{-3} + 3 \cdot 10^{-4} + 2 \cdot 10^{-5}$

0.00732

4. $5 \cdot 10^{-6} + 1 \cdot 10^{-3} + 4 \cdot 10^{-1}$

0.401005

Problems 5–6: Write each value as a number times a single power of 10.

5. $\frac{1}{100,000}$

$8 \cdot 10^{-5}$

6. 0.012

$12 \cdot 10^{-3}$ or $1.2 \cdot 10^{-2}$

7. Write $-625,000$ in three different ways, using a single power of 10.

Answers vary.

$-6.25 \cdot 10^5$

$-62.5 \cdot 10^4$

$-625 \cdot 10^3$

8. Write 0.000986 in three different ways, using a single power of 10.

Answers vary.

$9.86 \cdot 10^{-4}$

$98.6 \cdot 10^{-5}$

$986 \cdot 10^{-6}$

9. Which value is greater: 0.91 thousands or $9 \cdot 10^{-3}$. Explain your thinking.

91 thousands ; Responses vary. 0.91 thousands is equal to 0.091 and $9 \cdot 10^{-3}$ is equal to 0.009. $0.091 > 0.0090$

10. Consider the statement $5 \cdot 10^{-x} > 5 \cdot 10^{-y}$. For what values of x and y will the statement be true? Show or explain your thinking.

Answers vary. For any $x < y$, this statement will be true.

Name: _____ Date: _____ Period: _____

Additional Practice

7.08

1. Select *all* expressions that are equivalent to $\frac{1}{100}$.

- A. $-1 \cdot 10^2$
- B. $1 \cdot 10^{-2}$
- C. $-1 \cdot 10^0$
- D. $10 \cdot 10^{-3}$
- E. $-1 \cdot 10^{-3}$

2. Order the expressions from least to greatest.

$-4 \cdot 10^0$	$-5 \cdot 10^{-2}$	$4 \cdot 10^2$	$5 \cdot 10^{-2}$	$-4 \cdot 10^2$
$-4 \cdot 10^2$	$-4 \cdot 10^0$	$-5 \cdot 10^{-2}$	$5 \cdot 10^{-2}$	$4 \cdot 10^2$
Least				Greatest

Problems 3–4: Write the sum as a decimal.

3. $7 \cdot 10^{-3} + 3 \cdot 10^{-4} + 2 \cdot 10^{-5}$
0.00732

4. $5 \cdot 10^{-6} + 1 \cdot 10^{-3} + 4 \cdot 10^{-1}$
0.401005

Problems 5–6: Write each value as a number times a single power of 10.

5. $\frac{1}{100,000}$ $8 \cdot 10^{-5}$

6. 0.012 $12 \cdot 10^{-3}$ or $1.2 \cdot 10^{-2}$

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Name: _____ Date: _____ Period: _____

7. Write $-625,000$ in three different ways, using a single power of 10.

Answers vary.
 $-6.25 \cdot 10^5$ $-62.5 \cdot 10^4$ $-625 \cdot 10^3$

8. Write 0.000986 in three different ways, using a single power of 10.

Answers vary.
 $9.86 \cdot 10^{-4}$ $98.6 \cdot 10^{-6}$ $986 \cdot 10^{-8}$

9. Which value is greater: 0.91 thousands or $9 \cdot 10^{-3}$. Explain your thinking.

91 thousands ; Responses vary. 0.91 thousands is equal to 0.091 and $9 \cdot 10^{-3}$ is equal to 0.009. $0.091 > 0.0090$

10. Consider the statement $5 \cdot 10^{-x} > 5 \cdot 10^{-y}$. For what values of x and y will the statement be true? Show or explain your thinking.

Answers vary. For any $x < y$, this statement will be true.

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Additional Practice

Practice Problem Analysis

Problem	DOK	Standard(s)
1	1	8.EE.A.3
2	1	8.EE.A.3
3	1	8.EE.A.3
4	1	8.EE.A.3
5	1	8.EE.A.3
6	1	8.EE.A.3
7	2	8.EE.A.3
8	2	8.EE.A.3
9	1	8.EE.A.3
10	2	8.EE.A.3

Notes:

Additional Practice

7.09

1. Determine whether the following statements are *true* or *false*. Explain your thinking.

- a** 18.2 billion written in scientific notation is 18.2×10^9 .
False; written in scientific notation, 18.2 billion is 1.82×10^{10} .
- b** 95 million written in scientific notation is 9.5×10^7 .
True; written in scientific notation, 95 million is 9.5×10^7 .
- c** 0.00083 written in scientific notation is 83×10^{-4} .
False; written in scientific notation, 0.00083 is 8.3×10^{-4} .
- d** 0.0005 written in scientific notation is 5×10^{-4} .
True; written in scientific notation, 0.0005 is 5×10^{-4} .

2. Complete the table to show equivalent forms of each number written in scientific notation.

Number	Scientific notation
23,400	2.34×10^4
0.0035	3.5×10^{-3}
64,000,000	6.4×10^7
0.00097	9.7×10^{-4}
3,500	3.5×10^3
0.06	6×10^{-2}
0.35	3.5×10^{-1}
3.5	3.5×10^0
350,000,000,000	3.5×10^{11}
0.000000006	6×10^{-9}

3. Han and Clare were determining the correct way to write the approximate radius of Jupiter, 71-million m, in scientific notation. Han wrote the value as 71×10^6 m. Clare wrote the value as 7.1×10^7 m. Who is correct? Explain your thinking.

Clare is correct. The first factor must be greater than or equal to 1, but less than 10.

4. Bard and Elena were determining the correct way to write the approximate diameter of a red blood cell, 0.000007 m, in scientific notation. Bard wrote the value as 7×10^{-6} m. Elena wrote the value as 0.7×10^{-5} m. Who is correct? Explain your thinking.

Bard is correct. The first factor must be greater than or equal to 1, not less than 1.

5. The radius of a certain fish egg is 0.0028 m. Andre claims that the number written in scientific notation is 2.8×10^3 m. Andre is incorrect. Without evaluating, how do you know he is incorrect? Explain your thinking.

Sample response: Numbers greater than 0, but less than 1, are written using negative exponents on the power of 10.

6. Shawn analyzed a microorganism in science class. Using a microscope, Shawn measured the diameter to be 0.0000035 cm. Shawn was asked to write this value in meters and rewrote the value as 3.5×10^{-6} m. Did Shawn correctly rewrite the value in scientific notation? Explain your thinking.

No; the correct way to write the value in scientific notation is 3.5×10^{-8} . The solution shows the value still in cm.

7. The volume of a drop of a liquid is 0.05 ml. Priya was asked to write this value in liters, so she rewrote the value as 5×10^{-6} liters. Did she correctly rewrite the value in scientific notation? Explain your thinking.

No; the correct way to write the value in scientific notation is 5×10^{-5} liters.

Name: _____ Date: _____ Period: _____

Additional Practice

7.09

1. Determine whether the following statements are true or false. Explain your thinking.

- a. 18.2 billion written in scientific notation is 18.2×10^9 .
False; written in scientific notation, 18.2 billion is 1.82×10^{10} .
- b. 95 million written in scientific notation is 9.5×10^7 .
True; written in scientific notation, 95 million is 9.5×10^7 .
- c. 0.00083 written in scientific notation is 83×10^{-4} .
False; written in scientific notation, 0.00083 is 8.3×10^{-4} .
- d. 0.0005 written in scientific notation is 5×10^{-4} .
True; written in scientific notation, 0.0005 is 5×10^{-4} .

2. Complete the table to show equivalent forms of each number written in scientific notation.

Number	Scientific notation
23,400	2.34×10^4
0.0035	3.5×10^{-3}
64,000,000	6.4×10^7
0.00097	9.7×10^{-4}
3,500	3.5×10^3
0.06	6×10^{-2}
0.35	3.5×10^{-1}
3.5	3.5×10^0
350,000,000,000	3.5×10^{11}
0.000000006	6×10^{-9}

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3. Han and Clare were determining the correct way to write the approximate radius of Jupiter, 71-million m, in scientific notation. Han wrote the value as 71×10^6 m. Clare wrote the value as 7.1×10^7 m. Who is correct? Explain your thinking.
Clare is correct. The first factor must be greater than or equal to 1, but less than 10.

4. Bard and Elena were determining the correct way to write the approximate diameter of a red blood cell, 0.000007 m, in scientific notation. Bard wrote the value as 7×10^{-6} m. Elena wrote the value as 0.7×10^{-5} m. Who is correct? Explain your thinking.
Bard is correct. The first factor must be greater than or equal to 1, not less than 1.

5. The radius of a certain fish egg is 0.0028 m. Andre claims that the number written in scientific notation is 2.8×10^3 m. Andre is incorrect. Without evaluating, how do you know he is incorrect? Explain your thinking.
Sample response: Numbers greater than 0, but less than 1, are written using negative exponents on the power of 10.

6. Shawn analyzed a microorganism in science class. Using a microscope, Shawn measured the diameter to be 0.0000035 cm. Shawn was asked to write this value in meters and rewrote the value as 3.5×10^{-6} m. Did Shawn correctly rewrite the value in scientific notation? Explain your thinking.
No; the correct way to write the value in scientific notation is 3.5×10^{-4} . The solution shows the value still in cm.

7. The volume of a drop of a liquid is 0.05 ml. Priya was asked to write this value in liters, so she rewrote the value as 5×10^{-6} liters. Did she correctly rewrite the value in scientific notation? Explain your thinking.
No; the correct way to write the value in scientific notation is 5×10^{-2} liters.

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Additional Practice

Practice Problem Analysis

Problem	DOK	Standard(s)
1	1	8.EE.A.4
2	1	8.EE.A.4
3	1	8.EE.A.4
4	1	8.EE.A.4
5	1	8.EE.A.4
6	2	8.EE.A.4
7	2	8.EE.A.4

Notes:

Additional Practice

7.11

1. Evaluate each expression. Write the result in scientific notation.

Show your thinking.

a $(2.5 \times 10^3) \times (3 \times 10^7)$
 $7.5 \cdot 10^{10}$

b $\frac{9 \times 10^{-10}}{3 \times 10^{-4}}$
 $3 \cdot 10^{-6}$

c $(7 \times 10^5) \times (4 \times 10^6)$
 $2.8 \cdot 10^{12}$

d $(8.4 \times 10^2) \div (2.1 \times 10^7)$
 $4 \cdot 10^{-5}$

2. Replace the empty box with the correct value to make each equation true.

a $(\boxed{3} \times 10^8) \times (3 \times 10^2) = 9 \times 10^{10}$

b $\frac{8 \times 10^9}{\boxed{2} \times 10^2} = 4 \times 10^7$

c $(5 \times 10^{\boxed{4}}) \times (8 \times 10^3) = 4 \times 10^8$

d $(15 \times 10^5) \div (3 \times 10^{\boxed{7}}) = 5 \times 10^{-2}$

3. On planet Zerg, there are two different types of alien species, zings and zangs. One zing has a mass of 5.6×10^6 kg and one zang has a mass of 2.1×10^2 kg. About how many times less in mass is one zang than one zing? Show your thinking.

$$\frac{5.6 \times 10^6}{2.1 \times 10^2} \approx \frac{6 \times 10^6}{2 \times 10^2} \approx 3 \times 10^4$$

So, the mass of one zang is about 3×10^4 , or 30,000, times less than the mass of one zing.

4. The mass of one Brachiosaurus is estimated to have been 8.7×10^4 kg. The mass of one antarctic krill is 4.86×10^{-4} kg. About how many times more massive is one Brachiosaurus than one antarctic krill? Show your thinking.

$$\frac{8.7 \times 10^4}{4.86 \times 10^{-4}} \approx \frac{10 \times 10^4}{5 \times 10^{-4}} \approx 2 \times 10^8$$

So, a Brachiosaurus is about 2×10^8 , or 200,000,000, times more massive than one antarctic krill.

5. The radius of an atom of silver is 0.000000000125 m. The radius of the Moon is 1,740,000 m. To determine how many times greater the radius of the Moon is than the radius of an atom of silver, Elena says it will be more efficient to estimate using scientific notation. Shawn says it will be more efficient to estimate using the values given in standard form. Do you agree with Elena or Shawn? Explain your thinking.

Sample response: I agree with Elena. Elena's method will often be more efficient when working with large or small numbers.

6. The mass of one white-toothed pygmy shrew is 4.86×10^{-3} kg. One of the largest blue whales to ever have lived had a mass of about 1.7×10^5 kg. Clare and Diego were determining how many times more massive the largest blue whale is than the mass of one white-toothed pygmy shrew. Their strategies are shown.

Clare's strategy:

$$\frac{1.7 \times 10^5}{4.86 \times 10^{-3}} \approx \frac{20 \times 10^4}{5 \times 10^{-3}} \approx 4 \times 10^7$$

Diego's strategy:

$$\frac{1.7 \times 10^5}{4.86 \times 10^{-3}} \approx 0.4 \times 10^8 \approx 4 \times 10^7$$

What do you notice about each strategy used and their solutions?

They each arrived at the same solution. Clare rewrote 1.7×10^5 using powers of ten so that the first factor, 20, was divisible by a rounded 5. Diego used the fraction-decimal equivalent, $\frac{2}{5}$ or 0.4, and then subtracted the exponents, before rewriting the result in scientific notation.

7. How many Olympic-sized swimming pools would it take to hold all the water in the world's oceans? Write your response in scientific notation.

Some useful information:

- The world's oceans hold about 1.4×10^9 km³ of water.
- An Olympic-sized swimming pool holds about 2,500,000,000 cm³ of water.
- There are 10^{15} cm³ in a cubic kilometer.

$$(1.4 \times 10^9) \times 10^{15} = 1.4 \times 10^{24} \text{ cm}^3 \text{ of water in the world's oceans. } \frac{1.4 \times 10^{24}}{2,500,000,000} = \frac{14 \times 10^{23}}{2.5 \times 10^9} =$$

$5.6 \times 10^{14} \approx 6 \times 10^{14}$. So, about 6×10^{14} Olympic-sized swimming pools are needed to hold all the water in the world's oceans.

Name: _____ Date: _____ Period: _____

Additional Practice

7.11

1. Evaluate each expression. Write the result in scientific notation. Show your thinking.

a. $(2.5 \times 10^2) \times (3 \times 10^7)$
 $7.5 \cdot 10^9$

b. $\frac{9 \times 10^{-10}}{3 \times 10^{-4}}$
 $3 \cdot 10^{-6}$

c. $(7 \times 10^2) \times (4 \times 10^2)$
 $2.8 \cdot 10^5$

d. $(8.4 \times 10^2) \div (2.1 \times 10^2)$
 $4 \cdot 10^{-3}$

2. Replace the empty box with the correct value to make each equation true.

a. $(\boxed{3}) \times 10^2 \times (3 \times 10^2) = 9 \times 10^4$

b. $\frac{8 \times 10^2}{\boxed{2}} \times 10^2 = 4 \times 10^2$

c. $(5 \times 10^{\boxed{4}}) \times (8 \times 10^2) = 4 \times 10^6$

d. $(15 \times 10^2) \div (3 \times 10^{\boxed{2}}) = 5 \times 10^{-2}$

3. On planet Zerg, there are two different types of alien species, zings and zangs. One zing has a mass of 5.6×10^4 kg and one zang has a mass of 2.1×10^6 kg. About how many times less in mass is one zang than one zing? Show your thinking.

$$\frac{5.6 \times 10^4}{2.1 \times 10^6} = \frac{6 \times 10^4}{2 \times 10^6} = 3 \times 10^{-2}$$

So, the mass of one zang is about 3×10^1 , or 30,000, times less than the mass of one zing.

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Name: _____ Date: _____ Period: _____

4. The mass of one Brachiosaurus is estimated to have been 8.7×10^4 kg. The mass of one antarctic krill is 4.86×10^{-4} kg. About how many times more massive is one Brachiosaurus than one antarctic krill? Show your thinking.

$$\frac{8.7 \times 10^4}{4.86 \times 10^{-4}} \approx \frac{10 \times 10^4}{5 \times 10^{-4}} \approx 2 \times 10^8$$

So, a Brachiosaurus is about 2×10^8 , or 200,000,000, times more massive than one antarctic krill.

5. The radius of an atom of silver is 0.00000000125 m. The radius of the Moon is 1,740,000 m. To determine how many times greater the radius of the Moon is than the radius of an atom of silver, Elena says it will be more efficient to estimate using scientific notation. Shawn says it will be more efficient to estimate using the values given in standard form. Do you agree with Elena or Shawn? Explain your thinking.

Sample response: I agree with Elena. Elena's method will often be more efficient when working with large or small numbers.

6. The mass of one white-toothed pygmy shrew is 4.86×10^{-3} kg. One of the largest blue whales to ever have lived had a mass of about 1.7×10^5 kg. Clare and Diego were determining how many times more massive the largest blue whale is than the mass of one white-toothed pygmy shrew. Their strategies are shown.

Clare's strategy:

$$\frac{1.7 \times 10^5}{4.86 \times 10^{-3}} \approx \frac{20 \times 10^4}{5 \times 10^{-3}} \approx 4 \times 10^7$$

Diego's strategy:

$$\frac{1.7 \times 10^5}{4.86 \times 10^{-3}} \approx 0.4 \times 10^8 \approx 4 \times 10^7$$

What do you notice about each strategy used and their solutions?

They each arrived at the same solution. Clare rewrote 1.7×10^5 using powers of ten so that the first factor, 20, was divisible by a rounded 5. Diego used the fraction-decimal equivalent, $\frac{2}{5}$ or 0.4, and then subtracted the exponents, before rewriting the result in scientific notation.

7. How many Olympic-sized swimming pools would it take to hold all the water in the world's oceans? Write your response in scientific notation.

Some useful information:

- The world's oceans hold about 1.4×10^9 km³ of water.
- An Olympic-sized swimming pool holds about 2,500,000,000 cm³ of water.
- There are 10^9 cm³ in a cubic kilometer.

$$(1.4 \times 10^9) \times 10^9 = 1.4 \times 10^{18} \text{ cm}^3 \text{ of water in the world's oceans. } \frac{1.4 \times 10^{18}}{2,500,000,000} = \frac{14 \times 10^{17}}{2.5 \times 10^9} = 5.6 \times 10^8 = 6 \times 10^8. \text{ So, about } 6 \times 10^8 \text{ Olympic-sized swimming pools are needed to hold all the water in the world's oceans.}$$

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Additional Practice

Practice Problem Analysis

Problem	DOK	Standard(s)
1	1	8.EE.A.4
2	1	8.EE.A.4
3	2	8.EE.A.4, 8.EE.A.3
4	2	8.EE.A.4, 8.EE.A.3
5	2	8.EE.A.4, 8.EE.A.3
6	2	8.EE.A.4, 8.EE.A.3
7	2	8.EE.A.4, 8.EE.A.3

Notes:

Additional Practice

7.13

1. State whether each statement is *true* or *false*. Show or explain your thinking.

a $(6 \times 10^3) + (2 \times 10^4) = 8 \times 10^7$

False; the digits 6 and 8 do not have the same place value because the powers of 10 are not the same.

b $(8 \times 10^{-3}) + (4 \times 10^{-2}) = 4.8 \times 10^{-2}$

True; $8 \times 10^{-3} = 0.8 \times 10^{-2}$, which will result in a sum of 4.8×10^{-2} .

c $(5 \times 10^3) - (3.3 \times 10^4) = 1.7 \times 10^2$

False; 3.3×10^4 is greater than 5×10^3 , so the difference must be negative.

2. Evaluate each expression. Write the result in scientific notation. Show your thinking.

a $(1.9 \times 10^{-5}) + (8.9 \times 10^{-5})$

1.08×10^{-4}

b $(4.9 \times 10^6) - (4.1 \times 10^5)$

4.49×10^6

c $(3.8 \times 10^3) + (6.2 \times 10^3)$

1×10^4

d $(5.3 \times 10^{-4}) - (5.2 \times 10^{-4})$

1×10^{-5}

3. Select *all* the expressions that are equal to the expression 1×10^5 .

A. $(7.9 \times 10^4) + (2.1 \times 10^4)$

D. $(3 \times 10^5) + (7 \times 10^5)$

B. $(6.3 \times 10^5) - (5.3 \times 10^4)$

E. $(2.1 \times 10^5) - (1.1 \times 10^5)$

C. $(8 \times 10^4) + (2 \times 10^4)$

4. Select *all* the expressions that are equal to the expression 6×10^{-3} .

A. $(8.8 \times 10^{-3}) - (8.2 \times 10^{-3})$

D. $(4 \times 10^{-4}) + (2 \times 10^{-3})$

B. $(7.7 \times 10^{-2}) - (7.1 \times 10^{-2})$

E. $(4.7 \times 10^{-2}) - (4.1 \times 10^{-2})$

C. $(3 \times 10^{-3}) + (3 \times 10^{-3})$

5. Tardigrades, also known as water bears, are eight-legged micro-animals. One tardigrade has a length of 5×10^{-3} cm. One adult male Kodiak bear has a length of 2.44×10^2 cm. Compare the length of one Tardigrade with the length of an adult Kodiak bear. Explain your thinking.

A kodiak bear is 2.43995×10^2 cm longer; Sample response: $244 - 5 \times 10^{-3} = 243.995$ or 2.43995×10^2

6. The average mass of one Brachiosaurus is estimated to have been 8.7×10^4 kg. The mass of one human is 6.2×10^1 kg. How much greater is the average mass of one Brachiosaurus than the average mass of five humans? Explain your thinking.

**8.669×10^4 kg more; Sample response: $5 \times 6.2 \times 10^1 = 31 \times 10^1$ or 0.031×10^4
 $8.7 \times 10^4 - 0.031 \times 10^4 = 8.669 \times 10^4$. The mass of a Brachiosaurus is about 90,000 times greater than the mass of 5 adult humans.**

7. Priya wants to find $(4.3 \times 10^4) + (3.5 \times 10^5)$ and writes $(4.3 \times 10^4) + (3.5 \times 10^5) = 7.8 \times 10^5$. Explain Priya's mistake and determine the correct sum.

Priya incorrectly added digits in place-value positions that are not the same because the powers of 10 are different. The digit 4 in 4.3×10^4 is in the same place-value position as the digit 5 in 3.5×10^5 . The correct sum is 3.93×10^5 .

8. Bard wants to find $(2.8 \times 10^3) - (2.7 \times 10^3)$ in scientific notation and writes $(2.8 \times 10^3) - (2.7 \times 10^3) = 1 \times 10^3$. Is Bard correct? Show or explain your thinking.

No; Sample response: In the difference, the exponent for the power of 10 should be 2, not 3. Bard did not rewrite the power of 10 when writing the difference in scientific notation.

Name: _____ Date: _____ Period: _____

Additional Practice

7.13

1. State whether each statement is *true* or *false*. Show or explain your thinking.

- a $(6 \times 10^7) + (2 \times 10^7) = 8 \times 10^7$
False; the digits 6 and 8 do not have the same place value because the powers of 10 are not the same.
- b $(8 \times 10^{-3}) + (4 \times 10^{-2}) = 4.8 \times 10^{-2}$
True; $8 \times 10^{-3} = 0.8 \times 10^{-2}$, which will result in a sum of 4.8×10^{-2} .
- c $(5 \times 10^0) - (3.3 \times 10^0) = 1.7 \times 10^0$
False; 3.3×10^0 is greater than 5×10^0 , so the difference must be negative.

2. Evaluate each expression. Write the result in scientific notation. Show your thinking.

- a $(1.9 \times 10^{-3}) + (8.9 \times 10^{-3})$
 1.08×10^{-4}
- b $(4.9 \times 10^0) - (4.1 \times 10^0)$
 4.49×10^0
- c $(3.8 \times 10^0) + (6.2 \times 10^0)$
 1×10^1
- d $(5.3 \times 10^{-4}) - (5.2 \times 10^{-4})$
 1×10^{-5}

3. Select *all* the expressions that are equal to the expression 1×10^5 .

- A. $(7.9 \times 10^4) + (2.1 \times 10^4)$ D. $(3 \times 10^6) + (7 \times 10^5)$
- B. $(6.3 \times 10^6) - (5.3 \times 10^6)$ E. $(2.1 \times 10^5) - (1.1 \times 10^5)$
- C. $(8 \times 10^4) + (2 \times 10^4)$

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4. Select *all* the expressions that are equal to the expression 6×10^{-3} .

- A. $(8.8 \times 10^{-3}) - (8.2 \times 10^{-3})$ D. $(4 \times 10^{-4}) + (2 \times 10^{-3})$
- B. $(7.7 \times 10^{-2}) - (7.1 \times 10^{-2})$ E. $(4.7 \times 10^{-2}) - (4.1 \times 10^{-2})$
- C. $(3 \times 10^{-3}) + (3 \times 10^{-3})$

5. Tardigrades, also known as water bears, are eight-legged micro-animals. One tardigrade has a length of 5×10^{-3} cm. One adult male Kodiak bear has a length of 2.44×10^2 cm. Compare the length of one Tardigrade with the length of an adult Kodiak bear. Explain your thinking.

A Kodiak bear is 2.43995×10^5 cm longer. Sample response: $244 - 5 \times 10^{-3} = 243.995$ or 2.43995×10^2

6. The average mass of one Brachiosaurus is estimated to have been 8.7×10^4 kg. The mass of one human is 6.2×10^1 kg. How much greater is the average mass of one Brachiosaurus than the average mass of five humans? Explain your thinking.

8.669×10^4 kg more. Sample response: $5 \times 6.2 \times 10^1 = 31 \times 10^1$ or 0.031×10^4 . $8.7 \times 10^4 - 0.031 \times 10^4 = 8.669 \times 10^4$. The mass of a Brachiosaurus is about 90,000 times greater than the mass of 5 adult humans.

7. Priya wants to find $(4.3 \times 10^3) + (3.5 \times 10^3)$ and writes $(4.3 \times 10^3) + (3.5 \times 10^3) = 7.8 \times 10^6$. Explain Priya's mistake and determine the correct sum.

Priya incorrectly added digits in place-value positions that are not the same because the powers of 10 are different. The digit 4 in 4.3×10^3 is in the same place-value position as the digit 5 in 3.5×10^3 . The correct sum is 3.93×10^3 .

8. Bard wants to find $(2.8 \times 10^3) - (2.7 \times 10^3)$ in scientific notation and writes $(2.8 \times 10^3) - (2.7 \times 10^3) = 1 \times 10^6$. Is Bard correct? Show or explain your thinking.

No. Sample response: In the difference, the exponent for the power of 10 should be 2, not 3. Bard did not rewrite the power of 10 when writing the difference in scientific notation.

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Additional Practice

Practice Problem Analysis

Problem	DOK	Standard(s)
1	1	8.EE.A.4
2	1	8.EE.A.4
3	1	8.EE.A.4
4	1	8.EE.A.4
5	2	8.EE.A.4
6	2	8.EE.A.4
7	2	8.EE.A.4
8	2	8.EE.A.4

Notes:

Additional Practice

7.14

Problems 1–4: In 2023, the European countries had an approximate population of 742.3 million people. Russia, Turkey, Germany, and the United Kingdom had the greatest populations out of all the countries.

1. What was the total population of all four countries? Write your answer in scientific notation.

$3.87 \cdot 10^8$ people

County	Population (people)
Russia	$1.5 \cdot 10^8$
Turkey	$8.5 \cdot 10^7$
Germany	$8.4 \cdot 10^7$
United Kingdom	$6.8 \cdot 10^7$

2. What was the total population of other European countries not listed? Write your answer in scientific notation. Show or explain your thinking.

$3.55 \cdot 10^8$ people. *Methods vary.* First, I converted 742.3 million to scientific notation, we get $7.42 \cdot 10^8$; Subtracting $3.87 \cdot 10^8$ from $7.42 \cdot 10^8$, we get $3.55 \cdot 10^8$ people.

3. What percentage of the European population is made up of these top 4 populated countries? Show your thinking.

$\frac{3.87 \cdot 10^8}{7.42 \cdot 10^8} \approx 0.52 \cdot 10^0$ or 52% of the population.

4. One of the smaller European countries is Liechtenstein which has a population of about 40,000 people. How many times greater is the population of Germany than the population of Liechtenstein?

$\frac{8.4 \cdot 10^7}{4 \cdot 10^4} \approx 2.1 \cdot 10^3$ or 2,100 times greater

Problems 5–8: Here are some interesting facts about the weight and length of very large and very small sea creatures.

- The blue whale can weigh up to 400,000 pounds and can be up to 100 feet long.
- The great white shark can weigh up to 5000 pounds and can be up to 20 feet long.
- An orca, or killer whale, can weigh up to 12,000 pounds and can be up to 32 feet long.
- A manta ray can weigh up to 6000 pounds and can be up to 29 feet long.
- An angler fish can weigh up to 5 pounds and can be up to 3.3 feet long.
- A clownfish can weigh up to 0.1 pound and can be up to 0.3 feet long.
- A sea horse can weigh up to 0.5 pound and can be up to 1.2 feet long.
- A krill can weigh up to 0.004 pounds and can be up to 0.12 feet long

5. What is the sum of the weights of the blue whale, great white shark, and orca (killer) whale? Write your answer in standard form and in scientific notation.

417,000 or $4.17 \cdot 10^5$ pounds

6. How much longer is a manta ray than a clownfish? Write your answer in standard form and in scientific notation.

$29 - 0.3 = 29.97$ or 3×10^1 feet longer

7. A blue whale can consume an astonishing amount of krill each day. On average, a blue whale eats around 8000 pounds of krill daily during feeding seasons. Approximately how many krill does a blue whale consume in one day? Show your thinking.

$$\frac{8000}{0.004} = \frac{8 \cdot 10^3}{4 \cdot 10^{-3}} = \frac{8}{4} \cdot \frac{10^3}{10^{-3}} = 2 \cdot 10^6 \text{ or } 2,000,000 \text{ krill}$$

8. Write and solve your own question using the facts shared about sea creatures. Show your thinking.

Responses vary.

Name: _____ Date: _____ Period: _____

Additional Practice

7.14

Problems 1–4: In 2023, the European countries had an approximate population of 742.3 million people. Russia, Turkey, Germany, and the United Kingdom had the greatest populations out of all the countries.

1. What was the total population of all four countries? Write your answer in scientific notation.

$3.87 \cdot 10^8$ people

Country	Population (people)
Russia	$1.5 \cdot 10^8$
Turkey	$8.5 \cdot 10^7$
Germany	$8.4 \cdot 10^7$
United Kingdom	$6.8 \cdot 10^7$

2. What was the total population of other European countries not listed? Write your answer in scientific notation. Show or explain your thinking.

$3.55 \cdot 10^8$ people. *Methods vary.* First, I converted 742.3 million to scientific notation, we get $7.42 \cdot 10^8$. Subtracting $3.87 \cdot 10^8$ from $7.42 \cdot 10^8$, we get $3.55 \cdot 10^8$ people.

3. What percentage of the European population is made up of these top 4 populated countries? Show your thinking.

$\frac{3.87 \cdot 10^8}{7.42 \cdot 10^8} \approx 0.52 \cdot 10^0$ or 52% of the population.

4. One of the smaller European countries is Liechtenstein which has a population of about 40,000 people. How many times greater is the population of Germany than the population of Liechtenstein?

$\frac{8.4 \cdot 10^7}{4 \cdot 10^4} \approx 2.1 \cdot 10^3$ or 2,100 times greater

Unit 7 Lesson 14

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Name: _____ Date: _____ Period: _____

Problems 5–8: Here are some interesting facts about the weight and length of very large and very small sea creatures.

- The blue whale can weigh up to 400,000 pounds and can be up to 100 feet long.
- The great white shark can weigh up to 5000 pounds and can be up to 20 feet long.
- An orca, or killer whale, can weigh up to 12,000 pounds and can be up to 32 feet long.
- A manta ray can weigh up to 6000 pounds and can be up to 29 feet long.
- An angler fish can weigh up to 5 pounds and can be up to 3.3 feet long.
- A clownfish can weigh up to 0.1 pound and can be up to 0.3 feet long.
- A sea horse can weigh up to 0.5 pound and can be up to 1.2 feet long.
- A krill can weigh up to 0.004 pounds and can be up to 0.12 feet long.

5. What is the sum of the weights of the blue whale, great white shark, and orca (killer) whale? Write your answer in standard form and in scientific notation.

417,000 or $4.17 \cdot 10^5$ pounds

6. How much longer is a manta ray than a clownfish? Write your answer in standard form and in scientific notation.

$29 - 0.3 = 29.97$ or 3×10^1 feet longer

7. A blue whale can consume an astonishing amount of krill each day. On average, a blue whale eats around 8000 pounds of krill daily during feeding seasons. Approximately how many krill does a blue whale consume in one day? Show your thinking.

$\frac{8000}{0.004} = \frac{8 \cdot 10^3}{4 \cdot 10^{-3}} = \frac{8}{4} \cdot \frac{10^3}{10^{-3}} = 2 \cdot 10^6$ or 2,000,000 krill

8. Write and solve your own question using the facts shared about sea creatures. Show your thinking.

Responses vary.

Unit 7 Lesson 14

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Additional Practice

Practice Problem Analysis

Problem	DOK	Standard(s)
1	2	8.EE.A.3, 8.EE.A.4
2	2	8.EE.A.3, 8.EE.A.4
3	2	8.EE.A.3, 8.EE.A.4
4	2	8.EE.A.3, 8.EE.A.4
5	2	8.EE.A.3, 8.EE.A.4
6	2	8.EE.A.3, 8.EE.A.4
7	2	8.EE.A.3, 8.EE.A.4
8	3	8.EE.A.3, 8.EE.A.4

Notes:

Additional Practice

8.01

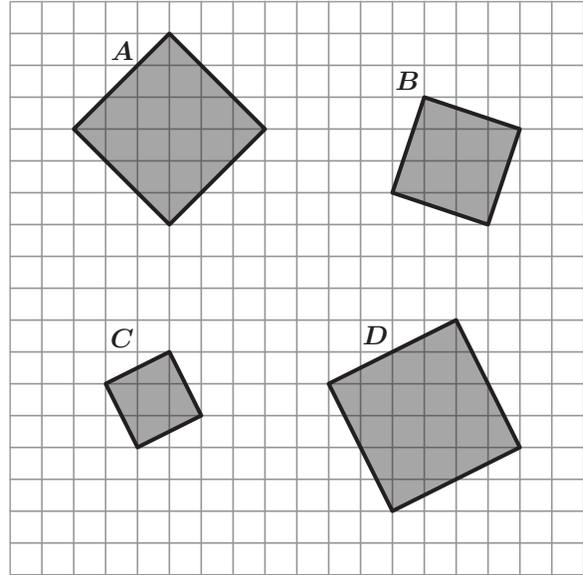
Problems 1–4: Determine the area of each tilted square. Each square grid represents 1 square unit.

- 1. Square A
18 square units

- 2. Square B
10 square units

- 3. Square C
5 square units

- 4. Square D
20 square units



Problems 5–6: Determine the area of each square given its side length.

- 5. Side length: 4 centimeters
 $4^2 = 16$ square centimeters

- 6. Side length: x units
 x^2 square units

Problems 7–9: Here are the areas of three squares. Determine the side length of each square.

7. Area: 36 square meters

6 meters

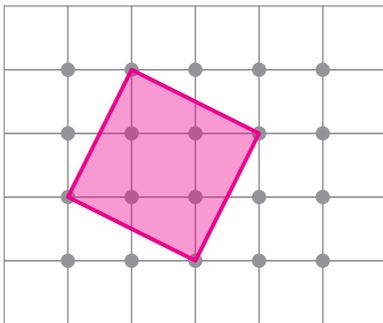
8. Area: $\frac{9}{49}$ square inches

$\frac{3}{7}$ inches

9. Area: w^2 square units

w units

10. Determine the area of the largest tilted square that can be created on the dot grid. Show your thinking.



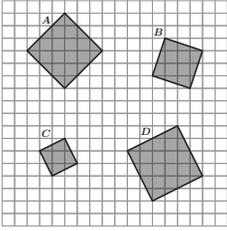
Area = $16 - 4(1) = 12$ square units

Name: _____ Date: _____ Period: _____

Additional Practice 8.01

Problems 1–4: Determine the area of each tilted square. Each square grid represents 1 square unit.

- Square A
18 square units
- Square B
10 square units
- Square C
5 square units
- Square D
20 square units



Problems 5–6: Determine the area of each square given its side length.

- Side length: 4 centimeters
 $4^2 = 16$ square centimeters
- Side length: x units
 x^2 square units

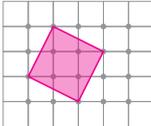
Unit 8 Lesson 1 181
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Name: _____ Date: _____ Period: _____

Problems 7–9: Here are the areas of three squares. Determine the side length of each square.

- Area: 36 square meters
6 meters
- Area: $\frac{9}{16}$ square inches
 $\frac{3}{4}$ inches
- Area: w^2 square units
 w units

10. Determine the area of the largest tilted square that can be created on the dot grid. Show your thinking.



Area = $16 - 4(1) = 12$ square units

Unit 8 Lesson 1 182 Additional Practice

Practice Problem Analysis

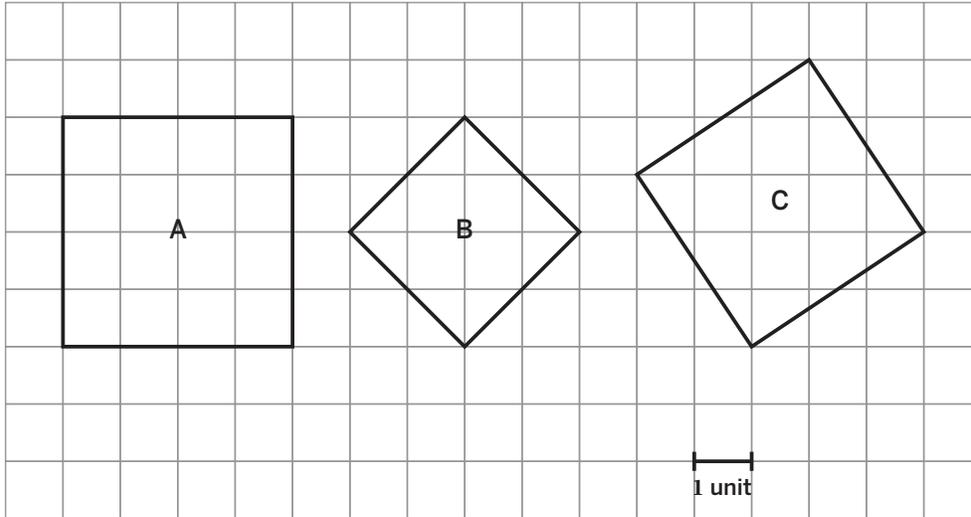
Problem	DOK	Standard(s)
1	1	6.G.A.1
2	1	6.G.A.1
3	1	6.G.A.1
4	1	6.G.A.1
5	1	6.G.A.1
6	1	6.G.A.1
7	1	8.EE.A.2
8	1	8.EE.A.2
9	1	8.EE.A.2
10	2	6.G.A.1

Notes:

Additional Practice

8.02

1. Determine the area and exact side length of each square.



Square A has an area of 16 square units and a side length of 4 units (or $\sqrt{16}$ units).

Square B has an area of 8 square units and a side length of $\sqrt{8}$ units.

Square C has an area of 13 square units and a side length of $\sqrt{13}$ units.

2. Determine the side length of a square if the area of the square is . . .

a 9 cm^2
3 cm

b $\frac{1}{4} \text{ in}^2$
 $\frac{1}{2}$ in.

c 25 m^2
5 m

d $\frac{4}{49} \text{ ft}^2$
 $\frac{2}{7}$ ft

3. Compare each pair of expressions using the symbol $<$, $>$, or $=$.

a $\sqrt{15} \square \sqrt{51}$
 $\sqrt{15} < \sqrt{51}$

b $\sqrt{100} \square 8$
 $\sqrt{100} > 8$

c $\sqrt{7} \square \sqrt{0.7}$
 $\sqrt{7} > \sqrt{0.7}$

d $\sqrt{25} \square 5$
 $\sqrt{25} = 5$

4. Write each square root under the corresponding column in the table according to its value.

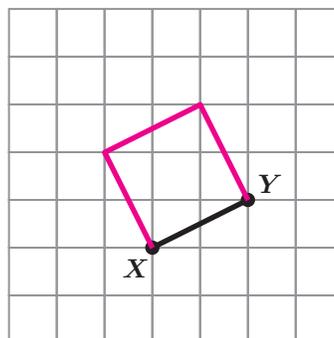
$\sqrt{37}$	$\sqrt{52}$	$\sqrt{60}$	$\sqrt{43}$	$\sqrt{58}$
Between 6 and 7		Between 7 and 8		
$\sqrt{37}, \sqrt{43}$		$\sqrt{52}, \sqrt{60}, \sqrt{58}$		

5. Order the squares by side length, from least to greatest.

Area: 81 square units	Side length: 8 units	Side length: 8.5 units	Side length: $\sqrt{61}$ units
Side length: $\sqrt{61}$ units	Side length: 8 units	Side length: 8.5 units	Area: 81 square units
Least			Greatest

6. Determine the exact length of line segment XY . Explain your thinking.

$\sqrt{5}$ units; Sample response: I drew a square using XY as the length for each side. Then, I determined the area of 5 square units. Because the side length is the square root of the area, I know that the side length of the square is $\sqrt{5}$ units.

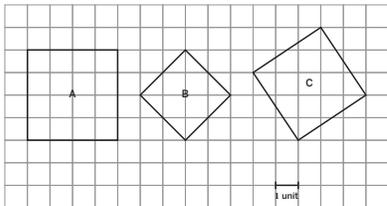


Name: _____ Date: _____ Period: _____

Additional Practice

8.02

1. Determine the area and exact side length of each square.



Square A has an area of 16 square units and a side length of 4 units (or $\sqrt{16}$ units).

Square B has an area of 8 square units and a side length of $\sqrt{8}$ units.

Square C has an area of 13 square units and a side length of $\sqrt{13}$ units.

2. Determine the side length of a square if the area of the square is ...

- a. 9 cm^2
3 cm
- b. $\frac{1}{4} \text{ in}^2$
 $\frac{1}{2}$ in.
- c. 25 m^2
5 m
- d. $\frac{4}{49} \text{ ft}^2$
 $\frac{2}{7}$ ft

3. Compare each pair of expressions using the symbol $<$, $>$, or $=$.

- a. $\sqrt{15} \square \sqrt{51}$
 $\sqrt{15} < \sqrt{51}$
- b. $\sqrt{100} \square 8$
 $\sqrt{100} > 8$
- c. $\sqrt{7} \square \sqrt{0.7}$
 $\sqrt{7} > \sqrt{0.7}$
- d. $\sqrt{25} \square 5$
 $\sqrt{25} = 5$

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Name: _____ Date: _____ Period: _____

4. Write each square root under the corresponding column in the table according to its value.

$\sqrt{37}$	$\sqrt{52}$	$\sqrt{60}$	$\sqrt{43}$	$\sqrt{58}$
Between 6 and 7		Between 7 and 8		
$\sqrt{37}, \sqrt{43}$		$\sqrt{52}, \sqrt{60}, \sqrt{58}$		

5. Order the squares by side length, from least to greatest.

Area: 81 square units	Side length: 8 units	Side length: 8.5 units	Side length: $\sqrt{61}$ units
Side length: $\sqrt{61}$ units	Side length: 8 units	Side length: 8.5 units	Area: 81 square units

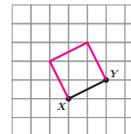
Least

Greatest

6. Determine the exact length of line segment \overline{XY} .

Explain your thinking.

$\sqrt{5}$ units. Sample response: I drew a square using \overline{XY} as the length for each side. Then, I determined the area of 5 square units. Because the side length is the square root of the area, I know that the side length of the square is $\sqrt{5}$ units.



Unit 8 Lesson 2

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Additional Practice

Practice Problem Analysis

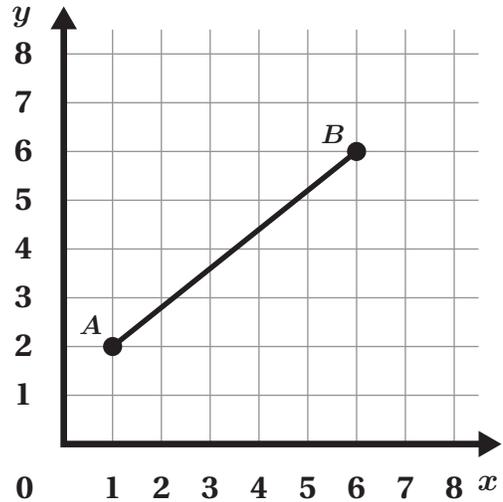
Problem	DOK	Standard(s)
1	1	8.EE.A.2
2	1	8.EE.A.2
3	2	8.NS.A.2, 8.EE.A.2
4	2	8.NS.A.2, 8.EE.A.2
5	2	8.NS.A.2, 8.EE.A.2
6	3	8.EE.A.2

Notes:

Additional Practice

8.03

Problems 1–4: Here is a line segment AB . Each grid square represents 1 square unit. Use the ruler, circle, or square if they help with your thinking.



- Determine the approximate length of AB .

Answers vary. ≈ 6.4 units

- Determine the exact length of AB .

$\sqrt{41}$ units

- Which method did you choose to help with your thinking? Answers vary.

Ruler

Circle

Square

- Why did you choose that particular method?

Answers vary.

Problems 5–6: Determine the value of each square root.

5. $\sqrt{81}$

9

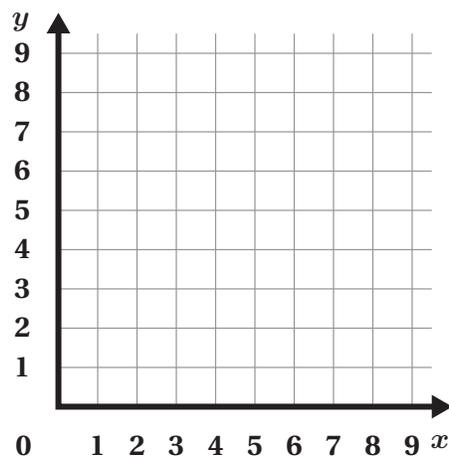
6. $\sqrt{36}$

6

Problems 7–8: Estimate each square root. Draw a square if it helps with your thinking.

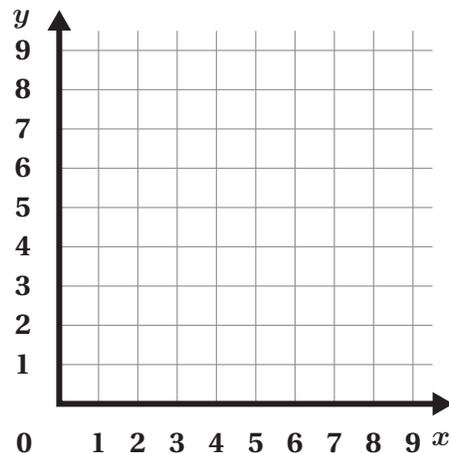
7. $\sqrt{27}$

≈ 5.2 or reasonable approximation



8. $\sqrt{50}$

≈ 7.1 or reasonable approximation



Problems 9–10: Determine which two whole numbers each square root is between.

9. $\sqrt{38}$

Between 6 and 7

10. $\sqrt{72}$

Between 8 and 9

11. Here is a list of values ordered from least to greatest. One value is unknown. Which could be the unknown value?

$\frac{9}{2}, 4.8, ?, \sqrt{26}$

A. 5.5

B. $(2.5)^2$

C. 5.1

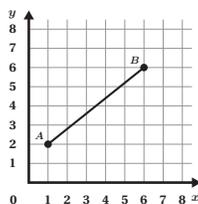
D. $\frac{5}{2}$

Name: _____ Date: _____ Period: _____

Additional Practice

8.03

Problems 1–4: Here is a line segment AB . Each grid square represents 1 square unit. Use the ruler, circle, or square if they help with your thinking.



1. Determine the approximate length of AB .
Answers vary. ≈ 6.4 units

2. Determine the exact length of AB .
 $\sqrt{41}$ units

3. Which method did you choose to help with your thinking? **Answers vary.**

Ruler Circle Square

4. Why did you choose that particular method?
Answers vary.

Problems 5–6: Determine the value of each square root.

5. $\sqrt{81}$
9

6. $\sqrt{36}$
6

Unit 8 Lesson 3

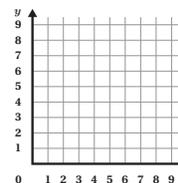
185

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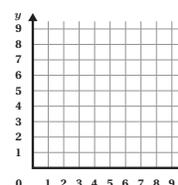
Name: _____ Date: _____ Period: _____

Problems 7–8: Estimate each square root. Draw a square if it helps with your thinking.

7. $\sqrt{27}$
 ≈ 5.2 or reasonable approximation



8. $\sqrt{50}$
 ≈ 7.1 or reasonable approximation



Problems 9–10: Determine which two whole numbers each square root is between.

9. $\sqrt{38}$
Between 6 and 7

10. $\sqrt{72}$
Between 8 and 9

11. Here is a list of values ordered from least to greatest. One value is unknown. Which could be the unknown value?

$\frac{9}{2}$, 4.8, ?, $\sqrt{26}$

A. 5.5

B. $(2.5)^2$

C. 5.1

D. $\frac{9}{2}$

Unit 8 Lesson 3

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Additional Practice

Practice Problem Analysis

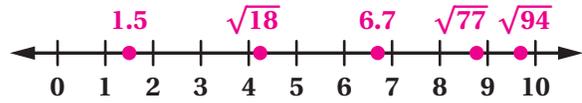
Problem	DOK	Standard(s)
1	1	8.NS.A.2
2	1	8.NS.A.2
3	2	8.NS.A.2
4	1	8.NS.A.2
5	1	8.NS.A.2
6	1	8.NS.A.2
7	1	8.NS.A.2
8	1	8.NS.A.2
9	1	8.NS.A.2
10	1	8.NS.A.2
11	1	8.NS.A.2, 8.EE.A.2

Notes:

Additional Practice

8.04

1. Plot and label the approximate value for each number on the number line.
 $\sqrt{77}$, 1.5, 6.7, $\sqrt{94}$, $\sqrt{18}$



2. Estimate each square root to the nearest tenth.

a $\sqrt{13}$

b $\sqrt{28}$

c $\sqrt{78}$

d $\sqrt{85}$

Sample response: 3.6

Sample response: 5.3

Sample response: 8.8

Sample response: 9.2

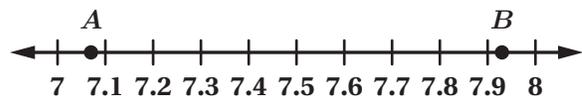
3. Refer to the number line.

- a Write a number using square root notation that could represent Point A.

Sample response: $\sqrt{50}$

- b Write a number using square root notation that could represent Point B.

Sample response: $\sqrt{63}$



4. Between which two decimals is the solution for the equation $x^2 = 7$?

A. 2.3 and 2.4

C. 2.5 and 2.6

B. 2.4 and 2.5

D. 2.6 and 2.7

5. Determine whether each statement is *true* or *false*. Circle your response.

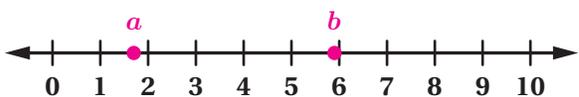
a $\sqrt{14}$ is greater than 3.5. True False

b $\sqrt{125}$ is greater than 11.5. True False

c $\sqrt{22}$ is between 4.5 and 4.6. True False

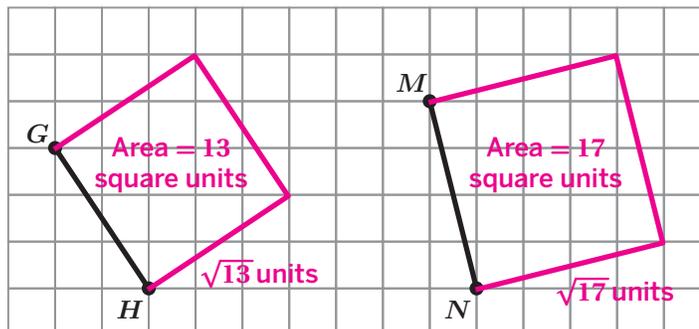
d $\sqrt{77}$ is between 8.7 and 8.8. True False

6. Consider the equations $a^2 = 3$ and $b^2 = 35$, where a is a positive solution for the first equation and b is a positive solution for the second equation. Plot and label the approximate values of a and b on the number line.



7. Which line segment, GH or MN, has an approximate length of 4.1 units? Show or explain your thinking.

Note: Each grid square has a side length of 1 square unit.



Line segment MN; Sample response: I drew squares to determine the areas and side lengths. Then, I estimated each side length to the nearest tenth, $\sqrt{13} \approx 3.6$ and $\sqrt{17} \approx 4.1$, and determined that line segment MN is approximately 4.1 units long.

Name: _____ Date: _____ Period: _____

Additional Practice

8.04

1. Plot and label the approximate value for each number on the number line.
 $\sqrt{77}$, 1.5, 6.7, $\sqrt{94}$, $\sqrt{18}$



2. Estimate each square root to the nearest tenth.

a $\sqrt{13}$ b $\sqrt{28}$ c $\sqrt{78}$ d $\sqrt{85}$

Sample response: 3.6 Sample response: 5.3 Sample response: 8.8 Sample response: 9.2

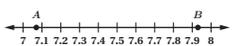
3. Refer to the number line.

- a Write a number using square root notation that could represent Point A.

Sample response: $\sqrt{50}$

- b Write a number using square root notation that could represent Point B.

Sample response: $\sqrt{63}$



4. Between which two decimals is the solution for the equation $x^2 = 7$?

A. 2.3 and 2.4 C. 2.5 and 2.6
 B. 2.4 and 2.5 **D. 2.6 and 2.7**

Unit 8 Lesson 4

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Name: _____ Date: _____ Period: _____

5. Determine whether each statement is true or false. Circle your response.

a $\sqrt{14}$ is greater than 3.5. **True** False

b $\sqrt{125}$ is greater than 11.5. True **False**

c $\sqrt{22}$ is between 4.5 and 4.6. True **False**

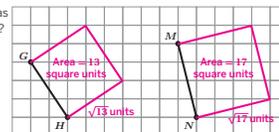
d $\sqrt{77}$ is between 8.7 and 8.8. **True** False

6. Consider the equations $a^2 = 3$ and $b^2 = 35$, where a is a positive solution for the first equation and b is a positive solution for the second equation. Plot and label the approximate values of a and b on the number line.



7. Which line segment, GH or MN, has an approximate length of 4.1 units? Show or explain your thinking.

Note: Each grid square has a side length of 1 square unit.



Line segment MN: Sample response: I drew squares to determine the areas and side lengths. Then, I estimated each side length to the nearest tenth. $\sqrt{13} \approx 3.6$ and $\sqrt{17} \approx 4.1$, and determined that line segment MN is approximately 4.1 units long.

Unit 8 Lesson 4

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Additional Practice

Practice Problem Analysis

Problem	DOK	Standard(s)
1	1	8.NS.A.2
2	1	8.NS.A.2
3	2	8.NS.A.2
4	2	8.NS.A.2
5	2	8.NS.A.2
6	2	8.NS.A.2
7	3	8.NS.A.2

Notes:

Additional Practice

8.05

1. Write an equivalent value *without* using a cube root symbol.

a $\sqrt[3]{27}$
3

b $\sqrt[3]{8}$
2

b $\sqrt[5]{125}$
5

2. Complete the table. If possible, write your response without using cube root notation.

x	x^3
1	1
$\sqrt[3]{10}$	10
4	64
$\sqrt[3]{24}$	24

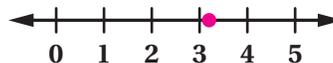
3. Order the numbers from least to greatest.

$\sqrt[3]{27}$	$\sqrt[3]{120}$	$\sqrt{48}$	$\sqrt{121}$	$\sqrt[3]{\frac{1}{64}}$
$\sqrt[3]{\frac{1}{64}}$	$\sqrt[3]{27}$	$\sqrt[3]{120}$	$\sqrt{48}$	$\sqrt{121}$
Least				Greatest

4. Cube A is smaller than Cube B. Cube B is smaller than Cube C. The edge lengths of the cubes are $\sqrt[3]{62}$ units, $\sqrt[3]{7}$ units, and 8.5 units. Determine the edge length of Cube A, Cube B, and Cube C.

Cube A: $\sqrt[3]{7}$ units
 Cube B: $\sqrt[3]{62}$ units
 Cube C: 8.5 units

5. Consider the equation $x^3 = 33$. Plot the approximate value of x on the number line.



Cube A: $\sqrt[3]{7}$ units
 Cube B: $\sqrt[3]{62}$ units
 Cube C: 8.5 units

6. Determine whether each statement is *true* or *false*. Circle your response.

a $\sqrt[3]{41}$ is less than 3. True **False**

b $\sqrt{4}$ is equal to $\sqrt[3]{8}$. **True** False

c $\sqrt[3]{29}$ is between 3 and 4. **True** False

d $\sqrt[3]{\frac{64}{125}}$ is between 1 and 2. True **False**

7. If you double the edge length of a cube, what happens to the volume?

The volume is multiplied by 2^3 , or 8.

8. If you double the volume of a cube, what happens to the edge length?

The edge length is multiplied by $\sqrt[3]{2}$.

Name: _____ Date: _____ Period: _____

Additional Practice

8.05

1. Write an equivalent value *without* using a cube root symbol.

- a $\sqrt[3]{27}$ b $\sqrt[3]{8}$ c $\sqrt[3]{125}$
3 2 5

2. Complete the table. If possible, write your response without using cube root notation.

x	x^3
1	1
$\sqrt[3]{10}$	10
4	64
$\sqrt[3]{24}$	24

3. Order the numbers from least to greatest.

$\sqrt[3]{27}$	$\sqrt[3]{120}$	$\sqrt{48}$	$\sqrt{121}$	$\sqrt[3]{\frac{1}{64}}$
$\sqrt[3]{\frac{1}{64}}$	$\sqrt[3]{27}$	$\sqrt[3]{120}$	$\sqrt{48}$	$\sqrt{121}$
Least				Greatest

Unit 8 Lesson 5

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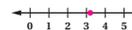
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Name: _____ Date: _____ Period: _____

4. Cube A is smaller than Cube B. Cube B is smaller than Cube C. The edge lengths of the cubes are $\sqrt[3]{62}$ units, $\sqrt{7}$ units, and 8.5 units. Determine the edge length of Cube A, Cube B, and Cube C.

Cube A: $\sqrt[3]{7}$ units
 Cube B: $\sqrt[3]{62}$ units
 Cube C: 8.5 units

5. Consider the equation $x^3 = 33$. Plot the approximate value of x on the number line.



Cube A: $\sqrt[3]{7}$ units
 Cube B: $\sqrt[3]{62}$ units
 Cube C: 8.5 units

6. Determine whether each statement is *true* or *false*. Circle your response.

- a $\sqrt[3]{41}$ is less than 3. True **False**
- b $\sqrt{4}$ is equal to $\sqrt{8}$. **True** False
- c $\sqrt[3]{29}$ is between 3 and 4. **True** False
- d $\sqrt[3]{\frac{64}{125}}$ is between 1 and 2. True **False**

7. If you double the edge length of a cube, what happens to the volume?

The volume is multiplied by 2³, or 8.

8. If you double the volume of a cube, what happens to the edge length?

The edge length is multiplied by $\sqrt[3]{2}$.

Unit 8 Lesson 5

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Additional Practice

Practice Problem Analysis

Problem	DOK	Standard(s)
1	1	8.EE.A.2
2	1	8.EE.A.2
3	2	8.EE.A.2, 8.NS.A.2
4	2	8.NS.A.2
5	2	8.NS.A.2
6	2	8.EE.A.2, 8.NS.A.2
7	3	8.NS.A.2
8	3	8.NS.A.2

Notes:

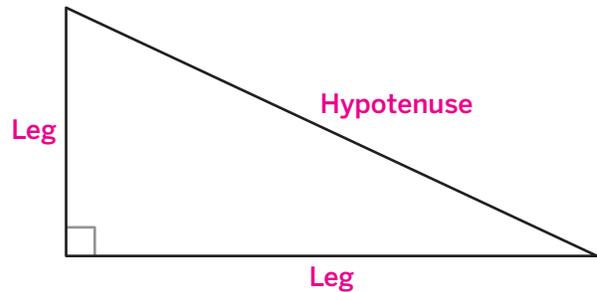
Additional Practice

8.06

- Show that the Pythagorean Theorem is true for a right triangle with legs 3 units and 4 units and a hypotenuse of 5 units.

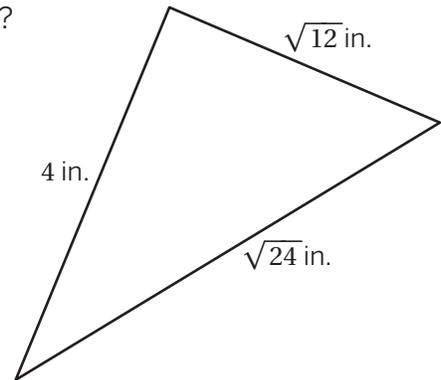
$3^2 + 4^2 = 25$ and $25 = 5^2$.

- Label the legs and hypotenuse of the right triangle.

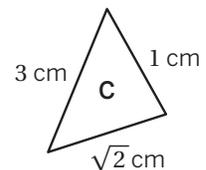
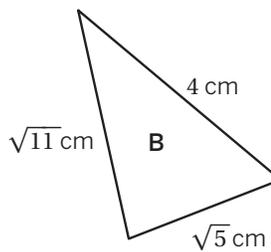
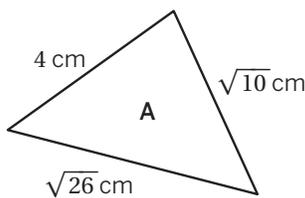


- Is the Pythagorean Theorem true for the triangle shown? Show or explain your thinking.

No; Sample response:
 $leg^2 + leg^2 = hypotenuse^2$, and if
 $leg = 4$, $leg = \sqrt{12}$, and
 $hypotenuse = \sqrt{24}$, then $4^2 + (\sqrt{12})^2$
 should equal $(\sqrt{24})^2$



- Consider the three triangles. For which triangles is the Pythagorean Theorem true? Show or explain your thinking.



Triangles A and B

5. If a right triangle has legs a and b and hypotenuse c , which of the following statements are true? Select *all* that apply.

- A. $c^2 - b^2 = a^2$
- B. $c^2 + b^2 = a^2$
- C. $c^2 = a^2 + b^2$
- D. $c^2 - a^2 = b^2$
- E. $c^2 - a^2 - b^2 = 0$

6. Han is asked to determine lengths for a triangle with legs a and b and hypotenuse c that would make the Pythagorean Theorem true for the triangle. Han claims that if $a = \sqrt{5}$, $b = \sqrt{31}$, and $c = 6$, the Pythagorean Theorem will be true for the triangle. Do you agree? Explain your thinking.

Yes, I agree with Han. Sample response:

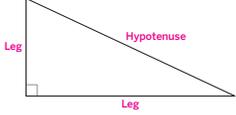
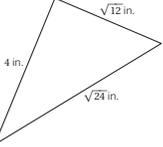
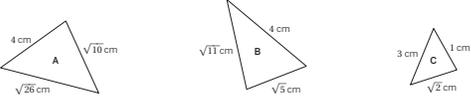
If $a^2 + b^2 = c^2$, and if $a = \sqrt{5}$, $b = \sqrt{31}$, and $c = 6$, then $(\sqrt{5})^2 + (\sqrt{31})^2$ should equal 6^2 , or 36. $(\sqrt{5})^2 + (\sqrt{31})^2 = 5 + 31$, or 36, which means those values for the side length measures will make the Pythagorean Theorem true for the triangle.

7. Can the Pythagorean Theorem ever be true for an isosceles triangle? What about an equilateral triangle? **Hint:** An isosceles triangle has two congruent sides and an equilateral triangle has three congruent sides.

Yes, for an isosceles triangle, but never for an equilateral triangle. Sample response: For example, for an isosceles triangle with legs of $\sqrt{2}$ and $\sqrt{2}$, the hypotenuse would be 2 because $(\sqrt{2})^2 + (\sqrt{2})^2 = 4$ and $4 = 2^2$. This would be an example of an isosceles triangle that works with the Pythagorean Theorem. For an equilateral triangle, if all sides are equal, then $a = b = c$. If $a = b = c$, then it can never be the case that $a^2 + b^2 = c^2$, which means there can never be a right triangle that is also an equilateral triangle.

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Additional Practice 8.06

- Show that the Pythagorean Theorem is true for a right triangle with legs 3 units and 4 units and a hypotenuse of 5 units.
 $3^2 + 4^2 = 25$ and $25 = 5^2$.
- Label the legs and hypotenuse of the right triangle.
 
- Is the Pythagorean Theorem true for the triangle shown? Show or explain your thinking.
No. Sample response:
 $leg^2 + leg^2 = hypotenuse^2$, and if $leg = 4$, $leg = \sqrt{12}$, and $hypotenuse = \sqrt{24}$, then $4^2 + (\sqrt{12})^2$ should equal $(\sqrt{24})^2$.
 
- Consider the three triangles. For which triangles is the Pythagorean Theorem true? Show or explain your thinking.
 

Triangles A and B

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Name: _____ Date: _____ Period: _____

- If a right triangle has legs a and b and hypotenuse c , which of the following statements are true? Select *all* that apply.
 - A. $c^2 - b^2 = a^2$
 - B. $c^2 + b^2 = a^2$
 - C. $c^2 = a^2 + b^2$
 - D. $c^2 - a^2 = b^2$
 - E. $c^2 - a^2 - b^2 = 0$
- Han is asked to determine lengths for a triangle with legs a and b and hypotenuse c that would make the Pythagorean Theorem true for the triangle. Han claims that if $a = \sqrt{5}$, $b = \sqrt{31}$, and $c = 6$, the Pythagorean Theorem will be true for the triangle. Do you agree? Explain your thinking.
Yes, I agree with Han. Sample response:
 If $a^2 + b^2 = c^2$, and if $a = \sqrt{5}$, $b = \sqrt{31}$, and $c = 6$, then $(\sqrt{5})^2 + (\sqrt{31})^2$ should equal 6^2 , or 36 . $(\sqrt{5})^2 + (\sqrt{31})^2 = 5 + 31$, or 36 , which means those values for the side length measures will make the Pythagorean Theorem true for the triangle.
- Can the Pythagorean Theorem ever be true for an isosceles triangle? What about an equilateral triangle? **Hint:** An isosceles triangle has two congruent sides and an equilateral triangle has three congruent sides.
Yes, for an isosceles triangle, but never for an equilateral triangle. Sample response: For example, for an isosceles triangle with legs of $\sqrt{2}$ and $\sqrt{2}$, the hypotenuse would be 2 because $(\sqrt{2})^2 + (\sqrt{2})^2 = 4$ and $4 = 2^2$. This would be an example of an isosceles triangle that works with the Pythagorean Theorem. For an equilateral triangle, if all sides are equal, then $a = b = c$. If $a = b = c$, then it can never be the case that $a^2 + b^2 = c^2$, which means there can never be a right triangle that is also an equilateral triangle.

Unit 8 Lesson 6 192 Additional Practice

Practice Problem Analysis

Problem	DOK	Standard(s)
1	1	8.G.B.6
2	1	8.G.B.6
3	2	8.G.B.6
4	2	8.G.B.6
5	2	8.G.B.6
6	2	8.G.B.6
7	3	8.G.B.6

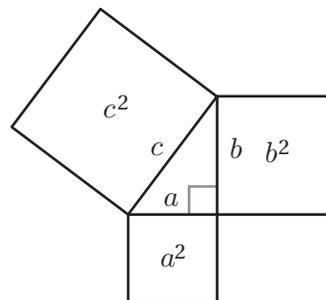
Notes:

Additional Practice

8.07

1. Consider the diagram shown. If $a = 6$ and $b = 8$, what is the value of c^2 ? Show or explain your thinking.

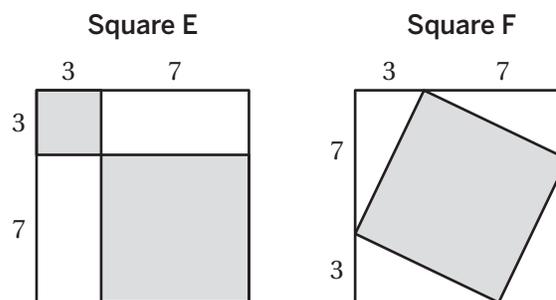
$c = 100$



2. Consider Squares E and F.

- a Determine the total area of the shaded region for each square in square units.

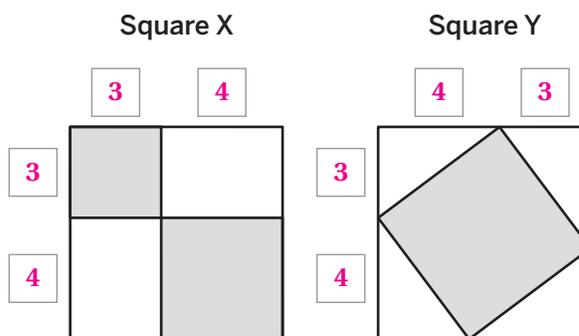
Square E: 58, Square F: 58



- b For Square F, determine the exact side length of the shaded square.

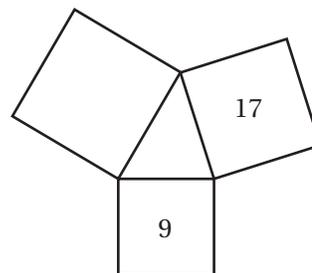
$\sqrt{58}$ units

3. Complete the diagram to show that $3^2 + 4^2 = 5^2$.



4. The diagram shows an acute triangle and three squares.

Tyler says the area of the large unmarked square is 26 square units because $9 + 17 = 26$. Do you agree with Tyler? Explain your thinking.



No, I disagree; Sample response: Tyler's equation, the Pythagorean Theorem, only works for right triangles, and this is an acute triangle.

5. The lengths of the three sides are given for several right triangles in inches. For each, write an equation that expresses the relationship between the lengths of the three sides.

a $\sqrt{5}, \sqrt{3}, \sqrt{8}$

$(\sqrt{5})^2 + (\sqrt{3})^2 = (\sqrt{8})^2$ (or equivalent)

b $1, \sqrt{37}, 6$

$1^2 + 6^2 = (\sqrt{37})^2$ (or equivalent)

c $5, \sqrt{5}, \sqrt{30}$

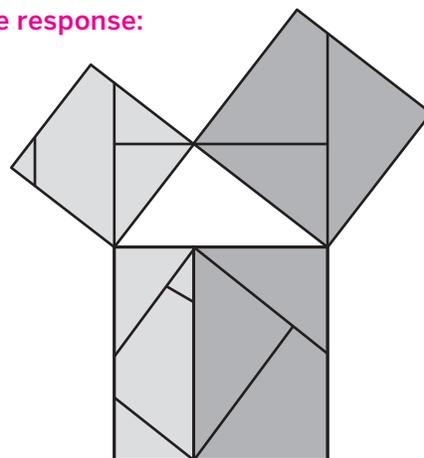
$5^2 + (\sqrt{5})^2 = (\sqrt{30})^2$ (or equivalent)

d $3, \sqrt{2}, \sqrt{7}$

$(\sqrt{2})^2 + (\sqrt{7})^2 = 3^2$ (or equivalent)

6. How does the figure show that the Pythagorean Theorem is true for the right triangle shown? **Sample response:**

Sample response: The areas of the decomposed pieces for the squares created using the legs of the triangle as the side lengths for each square equal the area of the decomposed pieces of the square created using the hypotenuse as the side length of the square.



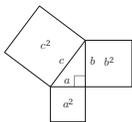
Name: _____ Date: _____ Period: _____

Additional Practice

8.07

1. Consider the diagram shown. If $a = 6$ and $b = 8$, what is the value of c^2 ? Show or explain your thinking.

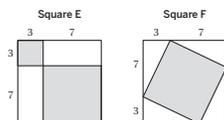
$c = 100$



2. Consider Squares E and F.

- a. Determine the total area of the shaded region for each square in square units.

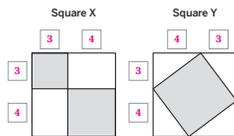
Square E: 58, Square F: 58



- b. For Square F, determine the exact side length of the shaded square.

$\sqrt{58}$ units

3. Complete the diagram to show that $3^2 + 4^2 = 5^2$.



Unit 8 Lesson 7

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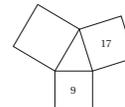
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Name: _____ Date: _____ Period: _____

4. The diagram shows an acute triangle and three squares.

Tyler says the area of the large unmarked square is 26 square units because $9 + 17 = 26$. Do you agree with Tyler? Explain your thinking.

No, I disagree. Sample response: Tyler's equation, the Pythagorean Theorem, only works for right triangles, and this is an acute triangle.



5. The lengths of the three sides are given for several right triangles in inches. For each, write an equation that expresses the relationship between the lengths of the three sides.

a. $\sqrt{5}$, $\sqrt{3}$, $\sqrt{8}$

$(\sqrt{5})^2 + (\sqrt{3})^2 = (\sqrt{8})^2$ (or equivalent)

b. 1 , $\sqrt{37}$, 6

$1^2 + 6^2 = (\sqrt{37})^2$ (or equivalent)

c. 5 , $\sqrt{5}$, $\sqrt{30}$

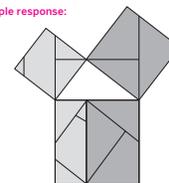
$5^2 + (\sqrt{5})^2 = (\sqrt{30})^2$ (or equivalent)

d. 3 , $\sqrt{2}$, $\sqrt{7}$

$(\sqrt{2})^2 + (\sqrt{7})^2 = 3^2$ (or equivalent)

6. How does the figure show that the Pythagorean Theorem is true for the right triangle shown?

Sample response: The areas of the decomposed pieces for the squares created using the legs of the triangle as the side lengths for each square equal the area of the decomposed pieces of the square created using the hypotenuse as the side length of the square.



Unit 8 Lesson 7

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Additional Practice

Practice Problem Analysis

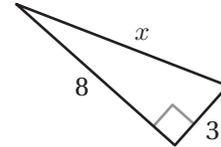
Problem	DOK	Standard(s)
1	1	8.G.B.6
2	1	8.G.B.6
3	2	8.G.B.6
4	2	8.G.B.6
5	2	8.G.B.6
6	3	8.G.B.6

Notes:

Additional Practice

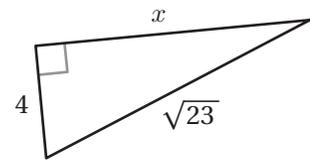
8.08

1. Clare was solving for the unknown side measure, x , for the right triangle shown. Which equation should she use to help her solve for x ?



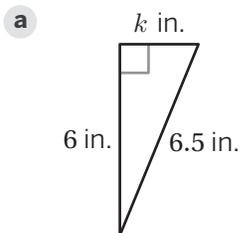
- A. $3^2 - 8^2 = x^2$
- B. $8^2 + x^2 = 3^2$
- C. $8^2 + 3^2 = x^2$**
- D. $3^2 + x^2 = 8^2$

2. Mai was solving for the unknown side measure, x , for the right triangle shown. Which equation should she use to help her solve for x ?



- A. $4 + x = \sqrt{23}$
- B. $4^2 + x^2 = (\sqrt{23})^2$**
- C. $4^2 + (\sqrt{23})^2 = x^2$
- D. $(\sqrt{23})^2 + x^2 = 4^2$

3. Determine the exact value of each variable that represents a side length in a right triangle. Show your thinking.



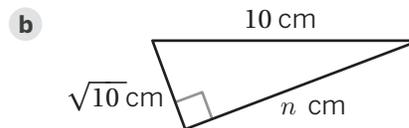
$k = 2.5$; Sample response:

$$6^2 + k^2 = 6.5^2$$

$$36 + k^2 = 42.25$$

$$k^2 = 6.25$$

$$k = 2.5$$



$n = (\sqrt{90})$ cm; Sample response:

$$(\sqrt{10})^2 + n^2 = 10^2$$

$$10 + n^2 = 100$$

$$n^2 = 90$$

$$n = \sqrt{90}$$

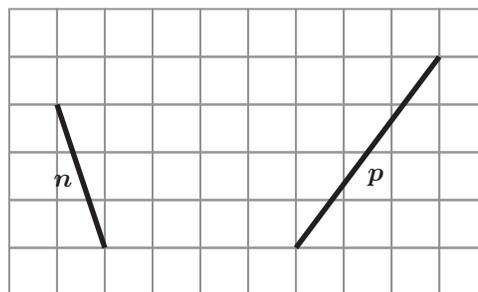
4. A right triangle has side lengths of a , b , and c units. The longest side has a length of c units. Complete each equation to show three relations among a , b , and c .

a $c^2 = a^2 + b^2$ or $c^2 = b^2 + a^2$

b $a^2 = c^2 - b^2$

c $b^2 = c^2 - a^2$

5. Consider the two line segments. One segment is n units long and the other is p units long. Determine the exact values of n and p . **Note:** Each small grid square is 1 square unit. Show or explain your thinking.



$n = (\sqrt{10})$, $p = 5$ (or equivalent);
Sample response:

$n = \sqrt{10}$ because $1^2 + 3^2 = 10$.

$p = \sqrt{25}$ or $p = 5$ because $3^2 + 4^2 = 25$.

6. One leg of a right triangle has length of $\frac{1}{4}$ m. If the length of the hypotenuse is $\frac{1}{2}$ m, what is the length of the other leg? Show or explain your thinking.

$\sqrt{\frac{3}{16}}$; **Sample response:**

$leg^2 + leg^2 = hypotenuse^2$

$leg^2 + \left(\frac{1}{4}\right)^2 = \left(\frac{1}{2}\right)^2$

$leg^2 + \frac{1}{16} = \frac{1}{4}$

$leg^2 = \frac{3}{16}$

$leg = \sqrt{\frac{3}{16}}$

7. A right triangle has side lengths of 2 cm and 5 cm.

Clare said that the other side must be $\sqrt{21}$ cm.

Diego said that the other side must be $\sqrt{29}$ cm.

Who is correct? Use drawings or equations to support your thinking.

Both could be correct; Sample response: If 2 cm is the measure of a leg, 5 cm is the measure of the hypotenuse, and the unknown side is the other leg, then $leg^2 + 2^2 = 5^2$ and $leg = \sqrt{21}$. If 2 cm and 5 cm are each measures of the legs, and the unknown side is the hypotenuse, then $2^2 + 5^2 = hypotenuse^2$ and $hypotenuse = \sqrt{29}$. Because the problem did not specify which measures were the legs or the hypotenuse, both answers could be correct.

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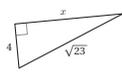
Additional Practice 8.08

- Clare was solving for the unknown side measure, x , for the right triangle shown. Which equation should she use to help her solve for x ?



 - $3^2 - 8^2 = x^2$
 - $8^2 + x^2 = 3^2$
 - $8^2 + 3^2 = x^2$**
 - $3^2 + x^2 = 8^2$

- Mai was solving for the unknown side measure, x , for the right triangle shown. Which equation should she use to help her solve for x ?



 - $4 + x = \sqrt{23}$
 - $4^2 + x^2 = (\sqrt{23})^2$**
 - $4^2 + (\sqrt{23})^2 = x^2$
 - $(\sqrt{23})^2 + x^2 = 4^2$

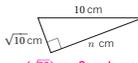
- Determine the exact value of each variable that represents a side length in a right triangle. Show your thinking.

a



$k = 2.5$; Sample response:
 $6^2 + k^2 = 6.5^2$
 $36 + k^2 = 42.25$
 $k^2 = 6.25$
 $k = 2.5$

b



$n = \sqrt{90}$ cm; Sample response:
 $(\sqrt{10})^2 + n^2 = 10^2$
 $10 + n^2 = 100$
 $n^2 = 90$
 $n = \sqrt{90}$

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Name: _____ Date: _____ Period: _____

- A right triangle has side lengths of a , b , and c units. The longest side has a length of c units. Complete each equation to show three relations among a , b , and c .
 - $c^2 = a^2 + b^2$ or $c^2 = b^2 + a^2$
 - $a^2 = c^2 - b^2$
 - $b^2 = c^2 - a^2$

- Consider the two line segments. One segment is n units long and the other is p units long. Determine the exact values of n and p . **Note:** Each small grid square is 1 square unit. Show or explain your thinking.



$n = \sqrt{10}$, $p = 5$ (or equivalent);
 Sample response:
 $n = \sqrt{10}$ because $1^2 + 3^2 = 10$.
 $p = \sqrt{25}$ or $p = 5$ because $3^2 + 4^2 = 25$.

- One leg of a right triangle has length of $\frac{3}{4}$ m. If the length of the hypotenuse is $\frac{5}{2}$ m, what is the length of the other leg? Show or explain your thinking.

$\sqrt{\frac{3}{16}}$; Sample response:
 $leg^2 + leg^2 = hypotenuse^2$
 $leg^2 + (\frac{3}{4})^2 = (\frac{5}{2})^2$
 $leg^2 + \frac{9}{16} = \frac{25}{4}$

$leg^2 = \frac{3}{16}$
 $leg = \sqrt{\frac{3}{16}}$

- A right triangle has side lengths of 2 cm and 5 cm. Clare said that the other side must be $\sqrt{21}$ cm. Diego said that the other side must be $\sqrt{29}$ cm. Who is correct? Use drawings or equations to support your thinking.

Both could be correct; Sample response: If 2 cm is the measure of a leg, 5 cm is the measure of the hypotenuse, and the unknown side is the other leg, then $leg^2 + 2^2 = 5^2$ and $leg = \sqrt{21}$. If 2 cm and 5 cm are each measures of the legs, and the unknown side is the hypotenuse, then $2^2 + 5^2 = hypotenuse^2$ and $hypotenuse = \sqrt{29}$. Because the problem did not specify which measures were the legs or the hypotenuse, both answers could be correct.

Unit 8 Lesson 8 196 Additional Practice

Practice Problem Analysis

Problem	DOK	Standard(s)
1	1	8.G.B.7
2	1	8.G.B.7
3	2	8.G.B.7
4	2	8.G.B.7
5	2	8.G.B.7
6	2	8.G.B.7
7	3	8.G.B.7

Notes:

Additional Practice

8.09

1. A triangle has side lengths $\sqrt{11}$, 2, and $\sqrt{15}$ such that $(\sqrt{11})^2 + 2^2 = (\sqrt{15})^2$. Is it a right triangle?

Yes

2. A right triangle has side lengths 5, $\sqrt{7}$ and $\sqrt{32}$. A second triangle has side lengths 5, $\sqrt{7}$, and the longest side is greater than $\sqrt{32}$. What type of triangle is the second triangle, *acute* or *obtuse*?

Obtuse

3. For each right triangle, select the side that is the hypotenuse.

a Triangle A

A. 6 in.

B. 10 in.

C. 8 in.

b Triangle B

A. 3 cm

B. 7 cm

C. $\sqrt{40}$ cm

c Triangle C

A. 11 ft

B. 4 ft

C. $\sqrt{137}$ ft

d Triangle D

A. $\sqrt{14}$ m

B. $\sqrt{11}$ m

C. 5 m

4. A triangle has side lengths 4, 7 and $\sqrt{61}$. Is this triangle acute, right, or obtuse? Show or explain your thinking.

Acute; Sample response: $4^2 + 7^2 = 65$ which means the hypotenuse of a right triangle would be $\sqrt{65}$, but the longest side of this triangle is less than the length of the hypotenuse, $\sqrt{61} < \sqrt{65}$, which means the triangle is acute.

5. Consider the set of triangles and their side lengths.

Triangle A: 6, 8, 10

Triangle B: 6, 8, 9

Triangle C: 5, 12, 13

Triangle D: 5, 12, 14

Triangle E: 1, $\sqrt{10}$, $\sqrt{11}$

a Which are acute triangles?

Triangle B

b Which are obtuse triangles?

Triangle D

c Which are right triangles?

Triangles A, C, and E

6. In each set of numbers, a and b represent the length of a leg of a right triangle, and c represents the length of its hypotenuse. Determine the missing length, given the other two lengths. Show or explain your thinking.

a $a = 12, b = 5$

$c = 13$; Sample response:

$$5^2 + 12^2 = c^2$$

$$169 = c^2$$

$$c = 13$$

b $b = 21, c = 29$

$a = 20$; Sample response:

$$a^2 + 21^2 = 29^2$$

$$a^2 + 441 = 841$$

$$a^2 = 400$$

$$a = 20$$

7. A triangle with legs of 5 and 12 and a hypotenuse of 13 is a right triangle because $5^2 + 12^2 = 169$ and $13^2 = 169$. Is a triangle with legs of 50, 120, and a hypotenuse of 130 also a right triangle? Show or explain your thinking *without* using the Pythagorean Theorem. Then, use the Pythagorean Theorem to check your thinking.

Yes; Sample response: I know that a triangle with sides 50, 120, and 130 is a similar triangle to a triangle with sides 5, 12, and 13 because the smaller triangle can be mapped to the larger triangle by a dilation with a scale factor of 10. This means the angles of the two triangles are congruent. So, if the smaller triangle is a right triangle, the larger triangle is a right triangle as well.

Check:

$$50^2 + 120^2 = 16900 \text{ and } 16900 = 130^2.$$

Name: _____ Date: _____ Period: _____

Additional Practice

8.09

- A triangle has side lengths $\sqrt{11}$, 2, and $\sqrt{15}$ such that $(\sqrt{11})^2 + 2^2 = (\sqrt{15})^2$. Is it a right triangle?
Yes
- A right triangle has side lengths 5, $\sqrt{7}$ and $\sqrt{32}$. A second triangle has side lengths 5, $\sqrt{7}$, and the longest side is greater than $\sqrt{32}$. What type of triangle is the second triangle, acute or obtuse?
Obtuse
- For each right triangle, select the side that is the hypotenuse.

a Triangle A	b Triangle B
A. 6 in.	A. 3 cm
B. 10 in.	B. 7 cm
C. 8 in.	C. $\sqrt{40}$ cm

c Triangle C	d Triangle D
A. 11 ft	A. $\sqrt{14}$ m
B. 4 ft	B. $\sqrt{11}$ m
C. $\sqrt{137}$ ft	C. 5 m
- A triangle has side lengths 4, 7 and $\sqrt{61}$. Is this triangle acute, right, or obtuse? Show or explain your thinking.
Acute: Sample response: $4^2 + 7^2 = 65$ which means the hypotenuse of a right triangle would be $\sqrt{65}$, but the longest side of this triangle is less than the length of the hypotenuse, $\sqrt{61} < \sqrt{65}$, which means the triangle is acute.

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Name: _____ Date: _____ Period: _____

- Consider the set of triangles and their side lengths.

Triangle A: 6, 8, 10

Triangle B: 6, 8, 9

Triangle C: 5, 12, 13

Triangle D: 5, 12, 14

Triangle E: 1, $\sqrt{10}$, $\sqrt{11}$

- Which are acute triangles?

Triangle B

- Which are obtuse triangles?

Triangle D

- Which are right triangles?

Triangles A, C, and E

- In each set of numbers, a and b represent the length of a leg of a right triangle, and c represents the length of its hypotenuse. Determine the missing length, given the other two lengths. Show or explain your thinking.

a $a = 12, b = 5$

$c = 13$; **Sample response:**

$5^2 + 12^2 = c^2$

$169 = c^2$

$c = 13$

b $b = 21, c = 29$

$a = 20$; **Sample response:**

$a^2 + 21^2 = 29^2$

$a^2 + 441 = 841$

$a^2 = 400$

$a = 20$

- A triangle with legs of 5 and 12 and a hypotenuse of 13 is a right triangle because $5^2 + 12^2 = 169$ and $13^2 = 169$. Is a triangle with legs of 50, 120, and a hypotenuse of 130 also a right triangle? Show or explain your thinking *without* using the Pythagorean Theorem. Then, use the Pythagorean Theorem to check your thinking.

Yes: Sample response: I know that a triangle with sides 50, 120, and 130 is a similar triangle to a triangle with sides 5, 12, and 13 because the smaller triangle can be mapped to the larger triangle by a dilation with a scale factor of 10. This means the angles of the two triangles are congruent. So, if the smaller triangle is a right triangle, the larger triangle is a right triangle as well.

Check:

$50^2 + 120^2 = 16900$ and $16900 = 130^2$.

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Additional Practice

Practice Problem Analysis

Problem	DOK	Standard(s)
1	1	8.G.B.6, 8.G.B
2	1	8.G.B.6, 8.G.B
3	2	8.G.B.6, 8.G.B
4	2	8.G.B.6, 8.G.B
5	2	8.G.B.6, 8.G.B
6	2	8.G.B.6, 8.G.B
7	3	8.G.B.6, 8.G.A.3

Notes:

Additional Practice

8.10

1. Television screens are classified by the length of their diagonal. If a television screen is 22.5 in. tall and 40 in. wide, what is the length of its diagonal? Estimate your answer to the nearest inch. Show your thinking.

46 in.; Sample response:

$$22.5^2 + 40^2 = x^2$$

$$506.25 + 1600 = x^2$$

$$2106.25 = x^2$$

$$\sqrt{2106.25} = x$$

$$45.9 = x$$

$$46 \approx x$$

2. Lin leaves her house for a jog. She jogs 4 miles directly north, and then 3 miles directly west. If Lin wants to return home, what is the shortest distance she can travel directly back to her house? Show your thinking.

5 miles; Sample response:

$$4^2 + 3^2 = x^2$$

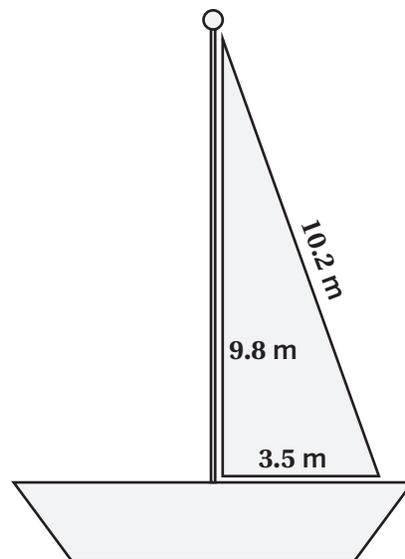
$$16 + 9 = x^2$$

$$25 = x^2$$

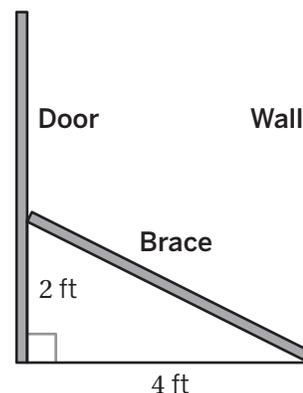
$$5 = x$$

3. Sails come in many shapes and sizes. Is the sail shown a right triangle? Show or explain your thinking.

No; Sample response: 10.2 is the longest side. $3.5^2 + 9.8^2 = 108.29$, and 10.2^2 is equal to 104.04. It is not a right triangle.



4. A carpenter cuts a length of wood that will brace a door against a wall. The wall is 4 ft away from the door, and she wants the brace to rest on the door, 2 ft above the floor. About how long should she cut the brace? Estimate your answer to the nearest tenth of a foot. Show or explain your thinking.



About 4.5 ft; Sample response:

$$2^2 + 4^2 = x^2$$

$$4 + 16 = x^2$$

$$20 = x^2$$

$$\sqrt{20} = x$$

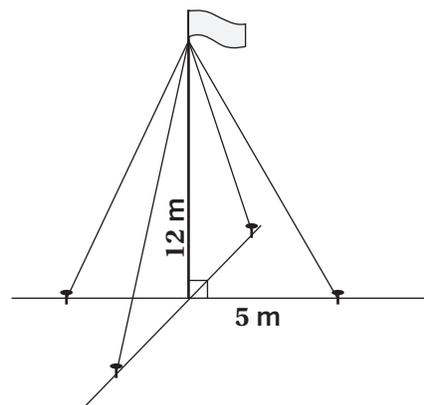
$$4.5 \approx x$$

5. Jada is building a marble run track. She wants to create a straight path from the top of one section to the top of a second section. The height of the first section is 8 in., and the height of the second section is 4 in. If the distance between the bottom of the two sections is 10 in., how long should the connected path be? Estimate your answer to the nearest tenth. Show or explain your thinking.

About 10.8 in.; Sample response: A right triangle with the legs 4 in. and 10 in. is created at the top of the track. I used the Pythagorean Theorem $4^2 + 10^2 = x^2$ to determine the path to be about 10.8 in. long.

6. Four cables are used to mount a 12 m post. Each cable is mounted at the top of the post to the ground, where it is 5 m from the bottom of the post. What is the total amount of cable needed to mount the post? Show or explain your thinking.

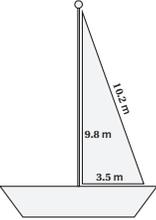
52 m; Sample response: First, I determined the length of one cable, where it represents the hypotenuse of a right triangle with legs 5 m and 12 m. Then, I used the Pythagorean Theorem, $5^2 + 12^2 = x^2$, to determine one cable length of 13 m. Finally, to determine the length for the four cables, I multiplied the length of one cable by four, $4 \cdot 13 = 52$.



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Additional Practice 8.10

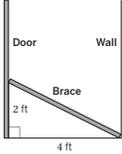
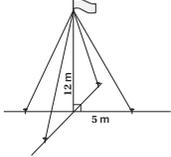
- Television screens are classified by the length of their diagonal. If a television screen is 22.5 in. tall and 40 in. wide, what is the length of its diagonal? Estimate your answer to the nearest inch. Show your thinking.
46 in.; Sample response:
 $22.5^2 + 40^2 = x^2$
 $506.25 + 1600 = x^2$
 $2106.25 = x^2$
 $\sqrt{2106.25} = x$
 $45.9 = x$
 $46 \approx x$
- Lin leaves her house for a jog. She jogs 4 miles directly north, and then 3 miles directly west. If Lin wants to return home, what is the shortest distance she can travel directly back to her house? Show your thinking.
5 miles; Sample response:
 $4^2 + 3^2 = x^2$
 $16 + 9 = x^2$
 $25 = x^2$
 $5 = x$
- Sails come in many shapes and sizes. Is the sail shown a right triangle? Show or explain your thinking.
No; Sample response: 10.2 is the longest side. $3.5^2 + 9.8^2 = 108.29$, and 10.2^2 is equal to 104.04. It is not a right triangle.



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Name: _____ Date: _____ Period: _____

- A carpenter cuts a length of wood that will brace a door against a wall. The wall is 4 ft away from the door, and she wants the brace to rest on the door, 2 ft above the floor. About how long should she cut the brace? Estimate your answer to the nearest tenth of a foot. Show or explain your thinking.
About 4.5 ft; Sample response:
 $2^2 + 4^2 = x^2$
 $4 + 16 = x^2$
 $20 = x^2$
 $\sqrt{20} = x$
 $4.5 \approx x$
- Jada is building a marble run track. She wants to create a straight path from the top of one section to the top of a second section. The height of the first section is 8 in., and the height of the second section is 4 in. If the distance between the bottom of the two sections is 10 in., how long should the connected path be? Estimate your answer to the nearest tenth. Show or explain your thinking.
About 10.8 in.; Sample response: A right triangle with the legs 4 in. and 10 in. is created at the top of the track. I used the Pythagorean Theorem $4^2 + 10^2 = x^2$ to determine the path to be about 10.8 in. long.
- Four cables are used to mount a 12 m post. Each cable is mounted at the top of the post to the ground, where it is 5 m from the bottom of the post. What is the total amount of cable needed to mount the post? Show or explain your thinking.
52 m; Sample response: First, I determined the length of one cable, where it represents the hypotenuse of a right triangle with legs 5 m and 12 m. Then, I used the Pythagorean Theorem, $5^2 + 12^2 = x^2$, to determine one cable length of 13 m. Finally, to determine the length for the four cables, I multiplied the length of one cable by four, $4 \cdot 13 = 52$.

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Practice Problem Analysis

Problem	DOK	Standard(s)
1	1	8.G.B.7
2	1	8.G.B.7
3	2	8.G.B.7
4	2	8.G.B.7
5	2	8.G.B.7
6	3	8.G.B.7

Notes:

Additional Practice

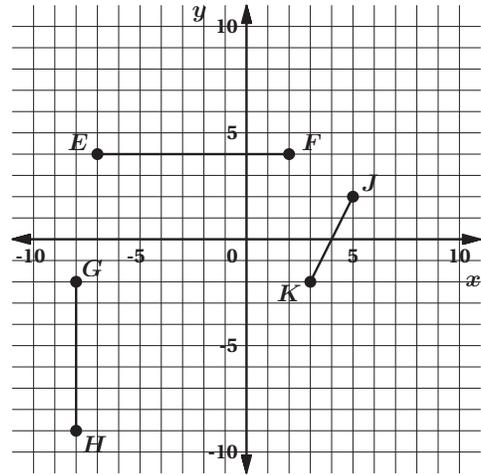
8.11

1. Determine the exact length of each line segment. Show or explain your thinking.

a Line segment EF
9 units

b Line segment GH
7 units

c Line segment JK
 $\sqrt{20}$ units



2. Determine the exact length of segment XZ . Show or explain your thinking.

$\sqrt{34}$ units; Sample response:

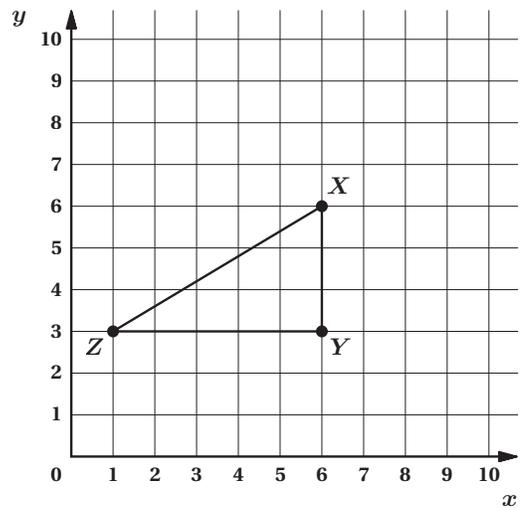
leg² + leg² = hypotenuse²

$$3^2 + 5^2 = x^2$$

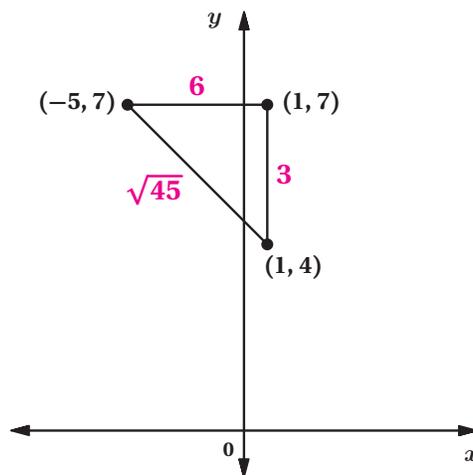
$$9 + 25 = x^2$$

$$34 = x^2$$

$$\sqrt{34} = x$$

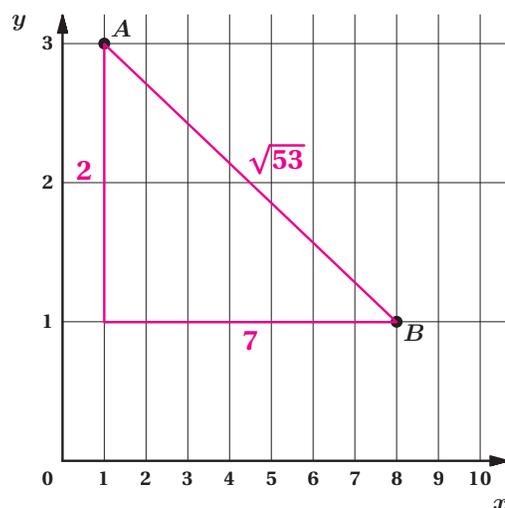


3. A right triangle is drawn on the coordinate plane, and the coordinates of its vertices are labeled. Label each side of the triangle with its exact length.



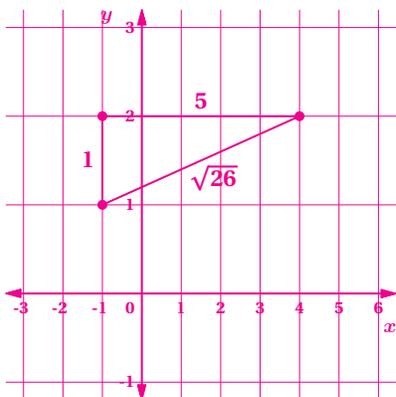
4. Determine the exact distance from Point A to Point B. Show or explain your thinking.

$\sqrt{53}$ units; Sample response:



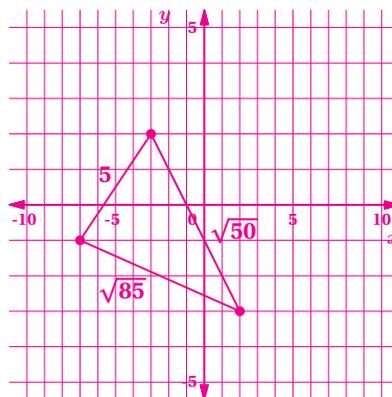
5. Estimate the perimeter of a triangle whose vertices are $(-1, 2)$, $(4, 2)$ and $(-1, 1)$ to the nearest tenth. To help with your thinking, plot the points on graph paper.

About 11.1 units



6. Estimate the perimeter of a triangle whose vertices are $(-3, 2)$, $(2, -3)$ and $(-7, -1)$ to the nearest tenth. To help with your thinking, plot the points on graph paper.

About 21.3 units



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Additional Practice

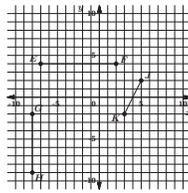
8.11

1. Determine the exact length of each line segment. Show or explain your thinking.

a. Line segment EF
9 units

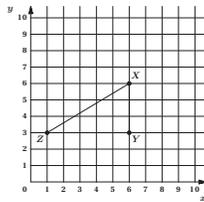
b. Line segment GH
7 units

c. Line segment JK
 $\sqrt{20}$ units



2. Determine the exact length of segment XZ . Show or explain your thinking.

$\sqrt{34}$ units; Sample response:
 $leg^2 + leg^2 = hypotenuse^2$
 $3^2 + 5^2 = z^2$
 $9 + 25 = z^2$
 $34 = z^2$
 $\sqrt{34} = z$



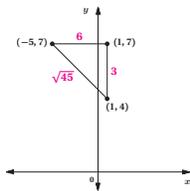
Unit 8 Lesson 11

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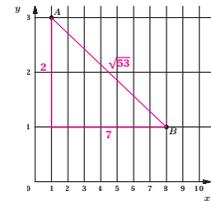
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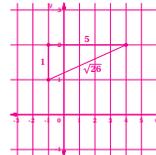
3. A right triangle is drawn on the coordinate plane, and the coordinates of its vertices are labeled. Label each side of the triangle with its exact length.



4. Determine the exact distance from Point A to Point B . Show or explain your thinking.
 $\sqrt{53}$ units; Sample response:

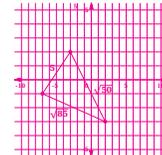


5. Estimate the perimeter of a triangle whose vertices are $(-1, 2)$, $(4, 2)$ and $(-1, 1)$ to the nearest tenth. To help with your thinking, plot the points on graph paper.
About 11.1 units



Unit 8 Lesson 11

6. Estimate the perimeter of a triangle whose vertices are $(-3, 2)$, $(2, -3)$ and $(-7, -1)$ to the nearest tenth. To help with your thinking, plot the points on graph paper.
About 21.3 units



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Additional Practice

Practice Problem Analysis

Problem	DOK	Standard(s)
1	1	8.G.B.8
2	1	8.G.B.8
3	2	8.G.B.8
4	2	8.G.B.8
5	3	8.G.B.8
6	3	8.G.B.8

Notes:

Additional Practice

8.12

1. Rewrite each fraction as a decimal.

a $\frac{3}{5}$ **0.6**

b $-\frac{23}{100}$ **-0.23**

c $\frac{7}{45}$ **0.1 $\bar{5}$**

2. Determine whether the decimal representation of each fraction *terminates* or *repeats*. Circle your response.

a $\frac{1}{20}$ Terminates Repeats

b $\frac{1}{11}$ Terminates Repeats

c $\frac{1}{15}$ Terminates Repeats

3. Select *all* of the decimals that have the digit 4 in the thousandths place.

A. $0.\bar{4}$

B. $0.4\bar{1}$

C. $0.4\bar{1}$

D. $4.\overline{04}$

E. 0.44

Name: _____ Date: _____ Period: _____

Additional Practice 8.12

1. Rewrite each fraction as a decimal.

a. $\frac{3}{5}$ **0.6**

b. $-\frac{23}{100}$ **-0.23**

c. $\frac{7}{45}$ **0.15**

2. Determine whether the decimal representation of each fraction *terminates* or *repeats*. Circle your response.

a. $\frac{1}{20}$ Terminates Repeats

b. $\frac{1}{11}$ Terminates Repeats

c. $\frac{1}{15}$ Terminates Repeats

3. Select *all* of the decimals that have the digit 4 in the thousandths place.

A. $0.\overline{4}$

B. $0.4\overline{1}$

C. $0.4\overline{1}$

D. $4.0\overline{4}$

E. 0.44

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4. What is the value of $0.\overline{3} + 0.5$?

A. $\frac{8}{10}$ C. $\frac{8}{9}$

B. $\frac{6}{13}$ **D. $\frac{5}{6}$**

5. Determine whether each inequality is *true* or *false*. Circle your response.

a. $\frac{1}{12} = 0.08$ True **False**

b. $-0.4\overline{6} = -\frac{7}{15}$ True **False**

c. $\frac{2}{33} = 0.\overline{6}$ True **False**

d. $5.\overline{3} = 5\frac{1}{3}$ **True** False

6. Let $x = \frac{25}{11} = 2.272727\dots$ and $y = \frac{58}{33} = 1.757575\dots$. For each problem, determine whether the fraction or decimal representation of each number is more helpful to respond to the problem, and then determine your response.

a. Is x or y is closer to 2? Explain your thinking.
y; Sample response: I used the decimal representation and saw that y is less than 0.25 units away, while x is more than 0.25 units away.

b. What is the value of x^2 ? Show or explain your thinking.
 $x^2 = \frac{625}{121}$; Sample response: I used the fraction representation to calculate $(\frac{25}{11})^2$

Unit 8 Lesson 12 204 Additional Practice

Practice Problem Analysis

Problem	DOK	Standard(s)
1	1	8.NS.A.1
2	1	8.NS.A.1
3	2	8.NS.A.1
4	2	8.NS.A.1
5	3	8.NS.A.1
6	3	8.NS.A.1

Notes:

Additional Practice

8.13

1. Write each number as a fraction. Show your thinking.

a $0.4 = \frac{4}{10}$

b $0.\bar{4} = \frac{4}{9}$

2. Select the fraction that is equivalent to $0.\overline{23}$.

A. $\frac{2}{3}$

D. $\frac{2}{9}$

B. $\frac{23}{99}$

E. $\frac{3}{2}$

C. $\frac{23}{100}$

3. Complete the table.

Fraction	Decimal expansion
$\frac{14}{5}$	2.8
$\frac{2}{9}$	$0.\bar{2}$
$-\frac{51}{99}$	$-0.\overline{51}$
$-2\frac{67}{100}$	-2.67
$\frac{82}{90}$ (or equivalent)	$0.9\bar{1}$

4. Write each rational number as an equivalent fraction.

a $\sqrt{\frac{100}{121}} = \frac{10}{11}$ (or equivalent)

b $\sqrt{1.44} = 1\frac{1}{5}$ (or equivalent)

c $\sqrt[3]{0.064} = \frac{2}{5}$ (or equivalent)

5. Match each decimal with its fraction.

Decimal	Fraction
a. 0.07	<u> a </u> $\frac{7}{100}$
b. $0.0\bar{7}$	<u> c </u> $\frac{5}{9}$
c. $0.\bar{5}$	<u> b </u> $\frac{7}{90}$
d. $0.\overline{05}$	<u> d </u> $\frac{5}{99}$

6. Complete the statement by writing the word *always*, *sometimes*, or *never*, so that the statement is true.

- a A repeating decimal is Always a rational number.
- b If the digits in the decimal expansion do not repeat and do not terminate, the number is Never rational.
- c A non terminating decimal can Sometimes be written as a fraction.

7. Consider the fractions $\frac{3}{7}$ and $\frac{4}{7}$.

- a Write each fraction as a decimal. Then determine the sum, written as decimal.
 $0.\overline{428571} + 0.\overline{571428} = 0.\overline{999999}$
- b Determine the sum of $\frac{3}{7}$ and $\frac{4}{7}$, written as a fraction.
 $\frac{3}{7} + \frac{4}{7} = \frac{7}{7} = 1$
- c Compare the the decimal representation and fractional representation for the sum of $\frac{3}{7}$ and $\frac{4}{7}$. What do you notice?
Sample response: I notice that the decimal and fraction representation do not produce the same sum.

Name: _____ Date: _____ Period: _____

Additional Practice

8.13

1. Write each number as a fraction. Show your thinking.

a. $0.4 = \frac{4}{10}$

b. $0.\bar{4} = \frac{4}{9}$

2. Select the fraction that is equivalent to $0.\bar{23}$.

A. $\frac{2}{3}$

B. $\frac{23}{99}$

C. $\frac{23}{100}$

D. $\frac{2}{99}$

E. $\frac{2}{9}$

3. Complete the table.

Fraction	Decimal expansion
$\frac{14}{5}$	2.8
$\frac{2}{9}$	0. $\bar{2}$
$-\frac{51}{99}$	-0. $\bar{51}$
$-\frac{67}{100}$	-2.67
$\frac{82}{99}$ (or equivalent)	0. $\bar{82}$

4. Write each rational number as an equivalent fraction.

a. $\sqrt{\frac{100}{121}} = \frac{10}{11}$ (or equivalent)

b. $\sqrt{1.44} = 1\frac{1}{5}$ (or equivalent)

c. $\sqrt[3]{0.064} = \frac{2}{5}$ (or equivalent)

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Name: _____ Date: _____ Period: _____

5. Match each decimal with its fraction.

Decimal: 0.07 Fraction: $\frac{7}{100}$ (a)

b. $0.0\bar{7}$ c. $\frac{5}{9}$

c. 0.5 b. $\frac{7}{90}$

d. $0.\overline{05}$ d. $\frac{5}{99}$

6. Complete the statement by writing the word *always*, *sometimes*, or *never*, so that the statement is true.

- a. A repeating decimal is **Always** a rational number.
- b. If the digits in the decimal expansion do not repeat and do not terminate, the number is **Never** rational.
- c. A non terminating decimal can **Sometimes** be written as a fraction.

7. Consider the fractions $\frac{3}{7}$ and $\frac{4}{7}$.

- a. Write each fraction as a decimal. Then determine the sum, written as decimal.
 $0.42857\bar{1} + 0.57142\bar{8} = 0.99999\bar{9}$
- b. Determine the sum of $\frac{3}{7}$ and $\frac{4}{7}$, written as a fraction.
 $\frac{3}{7} + \frac{4}{7} = \frac{7}{7} = 1$
- c. Compare the the decimal representation and fractional representation for the sum of $\frac{3}{7}$ and $\frac{4}{7}$. What do you notice?
Sample response: I notice that the decimal and fraction representation do not produce the same sum.

Unit 8 Lesson 13

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Additional Practice

Practice Problem Analysis

Problem	DOK	Standard(s)
1	1	8.NS.A.1
2	1	8.NS.A.1
3	2	8.NS.A.1
4	2	8.NS.A.1
5	2	8.NS.A.1
6	2	8.NS.A.1
7	3	8.NS.A.1

Notes:

Additional Practice

8.14

1. Write three examples of *rational numbers*, including at least one number written as a square root or cube root.

Sample response: $\frac{1}{2}$, $\sqrt{25}$, 3.5

2. Write three examples of *irrational numbers*, including at least one number written as a square root or cube root.

Sample response: $\sqrt[3]{13}$, π , $\sqrt{2}$

3. Write each number as a ratio of integers. If it is impossible, write “irrational number.”

a 0.12 $\frac{12}{100}$ (or equivalent)

b $\sqrt[3]{27}$ $\frac{3}{1}$ (or equivalent)

c $\sqrt{73}$ Irrational number

d $-\sqrt{49}$ $-\frac{7}{1}$ (or equivalent)

e $\sqrt[3]{11}$ Irrational number

4. Han says that the solution to $x^2 = 50$ is a rational number. Is Han correct or incorrect? Explain your thinking.

Han is incorrect; Sample response: The solution to the equation $x^2 = 50$ is $x = \sqrt{50}$, and 50 is not a perfect square, so the solution is an irrational number.

5. Write each number under its corresponding column in the table.

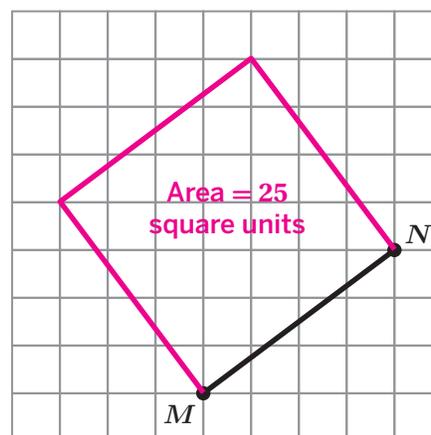
$\sqrt{9}$	$\sqrt[3]{29}$	0.123	$-\frac{2}{13}$	$\sqrt{8}$	$\sqrt[3]{125}$
Rational number			Irrational number		
$\sqrt{9}, 0.123, -\frac{2}{13}, \sqrt[3]{125}$			$\sqrt[3]{29}, \sqrt{8}$		

6. Complete the statement by writing the word *always*, *sometimes*, or *never*, so that the statement is true.

- a Perfect squares are **Never** irrational numbers.
- b The square root of a number is **Sometimes** an irrational number.
- c Irrational numbers can **Never** be written as fractions.
- d The cube root of a perfect cube is **Always** a rational number.

7. Does the exact length of the line segment MN represent a rational number or irrational number? Explain your thinking.

Rational number; Sample response:
 I drew a square using the line segment as the side length of the square. I determined the area of the square, 25 square units, which means that the side length is $\sqrt{25}$ units. Because $\sqrt{25}$ could be written as the fraction $\frac{5}{1}$, it is a rational number.



Name: _____ Date: _____ Period: _____

Additional Practice

8.14

1. Write three examples of *rational numbers*, including at least one number written as a square root or cube root.

Sample response: $\frac{1}{2}$, $\sqrt{25}$, 3.5

2. Write three examples of *irrational numbers*, including at least one number written as a square root or cube root.

Sample response: $\sqrt{13}$, π , $\sqrt{2}$

3. Write each number as a ratio of integers. If it is impossible, write "irrational number."

a. 0.12 $\frac{12}{100}$ (or equivalent)

b. $\sqrt[3]{27}$ $\frac{3}{1}$ (or equivalent)

c. $\sqrt{73}$ Irrational number

d. $-\sqrt{49}$ $-\frac{7}{1}$ (or equivalent)

e. $\sqrt{11}$ Irrational number

4. Han says that the solution to $x^2 = 50$ is a rational number. Is Han correct or incorrect? Explain your thinking.

Han is incorrect; Sample response: The solution to the equation $x^2 = 50$ is $x = \sqrt{50}$, and 50 is not a perfect square, so the solution is an irrational number.

Unit 8 Lesson 14

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Name: _____ Date: _____ Period: _____

5. Write each number under its corresponding column in the table.

$\sqrt{9}$	$\sqrt[3]{29}$	0.123	$-\frac{2}{13}$	$\sqrt{8}$	$\sqrt[3]{125}$
Rational number			Irrational number		
$\sqrt{9}$, 0.123, $-\frac{2}{13}$, $\sqrt[3]{125}$			$\sqrt[3]{29}$, $\sqrt{8}$		

6. Complete the statement by writing the word *always*, *sometimes*, or *never*, so that the statement is true.

a. Perfect squares are Never irrational numbers.

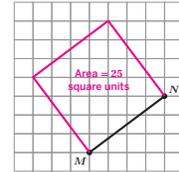
b. The square root of a number is Sometimes an irrational number.

c. Irrational numbers can Never be written as fractions.

d. The cube root of a perfect cube is Always a rational number.

7. Does the exact length of the line segment MN represent a rational number or irrational number? Explain your thinking.

Rational number; Sample response: I drew a square using the line segment as the side length of the square. I determined the area of the square, 25 square units, which means that the side length is $\sqrt{25}$ units. Because $\sqrt{25}$ could be written as the fraction $\frac{5}{1}$, it is a rational number.



Unit 8 Lesson 14

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Additional Practice

Practice Problem Analysis

Problem	DOK	Standard(s)
1	1	8.NS.A.1, 8.EE.A.2
2	1	8.NS.A.1, 8.EE.A.2
3	2	8.NS.A.1, 8.EE.A.2
4	2	8.NS.A.1
5	2	8.NS.A.1, 8.EE.A.2
6	3	8.NS.A.1, 8.EE.A.2
7	3	8.NS.A.1, 8.EE.A.2

Notes: