

Student Journal Answers

Chapter 1

Review & Refresh

- | | |
|-------------------------|----------------------|
| 1. composite | 2. prime |
| 3. prime | 4. composite |
| 5. prime | 6. composite |
| 7. composite | 8. prime |
| 9. prime | 10. composite |
| 11. yes | 12. no |
| 13. $2\frac{4}{5}$ | 14. $5\frac{5}{7}$ |
| 15. $10\frac{7}{9}$ | 16. $8\frac{10}{11}$ |
| 17. $2\frac{1}{2}$ | 18. $1\frac{1}{2}$ |
| 19. $\frac{3}{5}$ | 20. $3\frac{1}{2}$ |
| 21. $4\frac{1}{2}$ cups | |

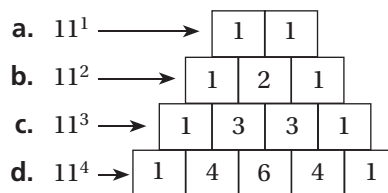
1.1 Exploration

Exploration 1

Repeated Factors	Using an Exponent	Value
a. 10×10	10^2	100
b. 4×4	4^2	16
c. 6×6	6^2	36
d. $10 \times 10 \times 10$	10^3	1000
e. $100 \times 100 \times 100$	100^3	1,000,000
f. $3 \times 3 \times 3 \times 3$	3^4	81
g. $4 \times 4 \times 4 \times 4 \times 4$	4^5	1024
h. $2 \times 2 \times 2 \times 2 \times 2 \times 2$	2^6	64

- i. 3 is the number being multiplied, 5 is how many times 3 is used as a factor.

Exploration 2



Sample answer: Each digit is a 1 or the sum of the two numbers above it.

1.1 Practice

- The 5 was written as a factor rather than an exponent. The exponent 5 indicates that the base 7 is used as a factor 5 times.
 $7^5 = 7 \cdot 7 \cdot 7 \cdot 7 \cdot 7 = 16,807$
- 81^4
- 500^3
- p^6
- 8
- 1,000,000
- 243
- $3^3 = 27$ ft
- 4 yd²
- 64 and 81
- 289 and 324
- 169, 196, and 225
- Sample answer:* 2^9 , 8^3 , and 23^2
- a. 36 ft²
b. Divide a row of 4 tiles among the other 2 rows of 4 tiles, creating 6 rows of 6 tiles.
c. 13 tiles; yes
d. move 1 tile; remove 11 tiles

1.2 Exploration

Exploration 1

- | | |
|---------------|---------------|
| a. 10; 7; no | b. 45; 9; no |
| c. 62; 48; no | d. 38; 48; no |

Exploration 2

- Sample answer:* so expressions always have the same value
- Multiply first, then add or subtract.
- Find the value of the power, then add or subtract.
- no; $18 \div 3 \cdot 3 = 6 \cdot 3 = 18$ and $18 \div 3^2 = 18 \div 9 = 2$
- Evaluate powers first.

1.2 Practice

- 80
 - 80
yes; Division and multiplication are evaluated from left to right.
- 2
 - 10
no; In part (a), 4 is added to 2 in the denominator, and in (b), 4 is added after dividing.
- 6
 - 6
yes; The denominator in (a) is treated as a group, so it is evaluated before the division.
- 32 people 5. 12
- 2
- \$4.50; Divide the total cost of all the items by the number of students. $\frac{4 \times 5 + 2 \times 2 + 8 \times 1.5}{8} = 4.5$
- 60 servings
- Sample answer:* $2^2 + 7 \times 4 \div 2 - 8$
- $17 - 2 \times 3 - 8 = 3$
 - $33 \div 3 - 2 \times 5 = 1$
 - $6^2 + 6 \div 2 \times 3 = 45$
 - $8^2 \div 4 \div 2 \div 2 = 4$

1.3 Exploration

Exploration 1

- yes; $108 = 3 \cdot 3 \cdot 3 \cdot 2 \cdot 2$
- $80 = 2 \cdot 2 \cdot 2 \cdot 2 \cdot 5$; $162 = 2 \cdot 3 \cdot 3 \cdot 3 \cdot 3$;
 $300 = 2 \cdot 2 \cdot 3 \cdot 5 \cdot 5$
- Answers will vary. Look for students to pick the products with five prime factors. *Sample answer:* The factors are prime.

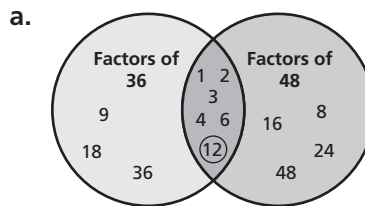
1.3 Practice

- The pair, $30 = 1 \cdot 30$, is missing.
- 9 3. 144
- 3025 5. 2310
- 3 or 4 athletes per group
- mini cookies table; The mini cupcake table can only be arranged in six 5×5 squares. The mini cookie table can be arranged in forty-five 2×2 squares, twenty 3×3 squares, or five 6×6 squares.

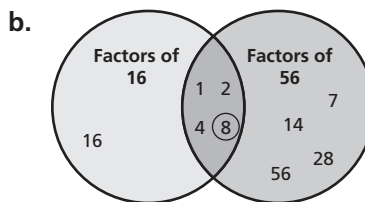
- $5 \text{ ft} \times 30 \text{ ft}$, $6 \text{ ft} \times 25 \text{ ft}$, $10 \text{ ft} \times 15 \text{ ft}$
 - $5 \text{ ft} \times 30 \text{ ft}$; 70 ft c. $5 \text{ ft} \times 30 \text{ ft}$
- 6; Possible dimensions (in feet) are $1 \times 1 \times 54$, $1 \times 2 \times 27$, $1 \times 3 \times 18$, $1 \times 6 \times 9$, $2 \times 3 \times 9$, and $3 \times 3 \times 6$.

1.4 Exploration

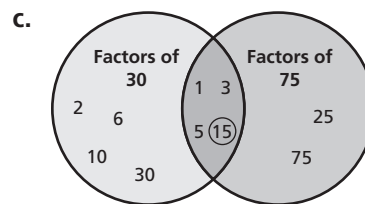
Exploration 1



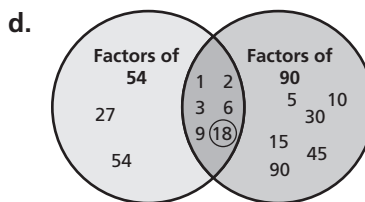
1, 2, 3, 4, 6, 12



1, 2, 4, 8



1, 3, 5, 15

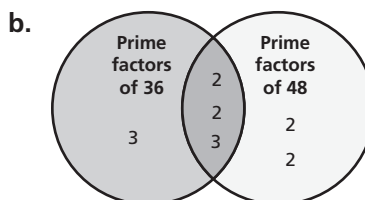


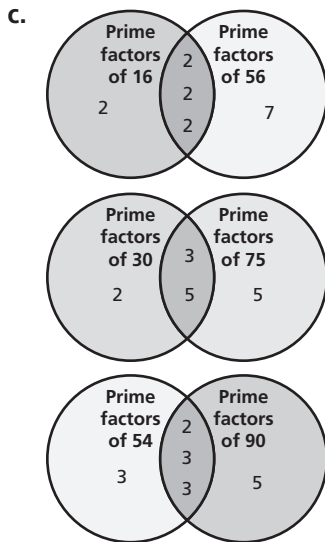
1, 2, 3, 6, 9, 18

- It is the greatest of the common factors; The greatest common factors are circled in diagrams for parts (a) through (d).

Exploration 2

- 18 and 27 , 180 and 55 ; $2 \cdot 3 \cdot 3 = 18$, $3 \cdot 3 \cdot 3 = 27$,
 $2 \cdot 2 \cdot 3 \cdot 3 \cdot 5 = 180$, $5 \cdot 11 = 55$





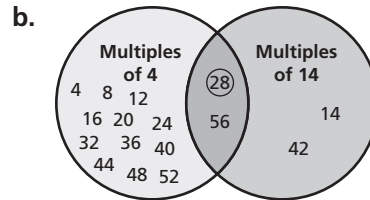
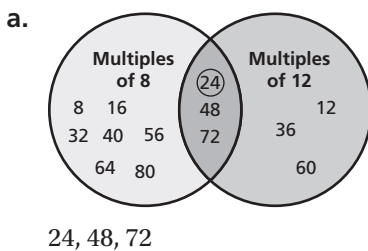
d. The product of the numbers in the overlap is equal to the greatest common factor of the numbers.

1.4 Practice

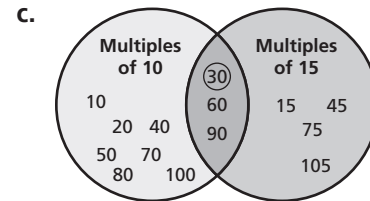
- The student found the LCM. The GCF is the product of the shared prime factors. The only shared prime factor is 2.
- 9 arrangements
- a. 27
b. *Sample answer:* 9 and 18
- always; 2 is a factor of every even number, so it will be a factor of the GCF.
- always; Odd numbers have only odd factors, so the GCF will have only odd factors.
- never; 2 is not a factor of any odd number, so it will not be a factor of the GCF.
- always; The least of the numbers is a factor of the larger number, so it is the GCF.
- a. $308 = 2^2 \cdot 7 \cdot 11$
 $616 = 2^3 \cdot 7 \cdot 11$
 $660 = 2^2 \cdot 3 \cdot 5 \cdot 11$
b. GCF of 308 and 616: 308; GCF of 308 and 660: 44; GCF of 616 and 660: 44
c. 308 and 616 d. 44

1.5 Exploration

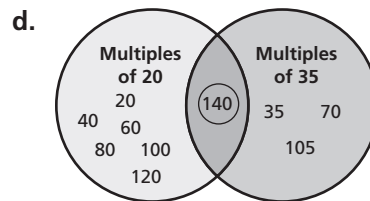
Exploration 1



28, 56



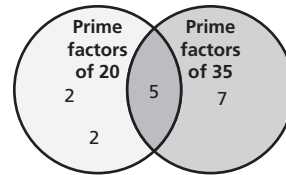
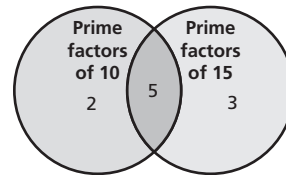
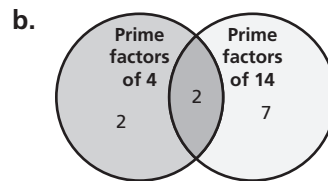
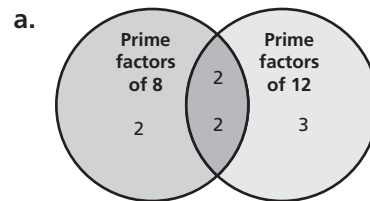
30, 60, 90



140

e. It is the least of the common multiples; It is circled in each diagram for parts (a)-(d).

Exploration 2



c. The least common multiple is the product of the numbers.

d. 120 and 180; 60; 360

1.5 Practice

- a. You ran 5 miles. Your friend ran 4 miles.
b. You ran 10 miles. Your friend ran 8 miles.
- 15 packs of plates, 10 packs of utensils,
6 packs of cups
- never 4. always
- a. 50th customer b. 22 tickets
- 120 minutes

Chapter 2

Review & Refresh

- Sample answer: 1800
- Sample answer: 1800
- Sample answer: 4 4. Sample answer: 20
- Sample answer: 5 6. Sample answer: 800
- Sample answer: 1500
- Sample answer: 13
- Sample answer: 11 batches
- 5265 11. 5049
- 37 13. 158
- 95 rows

2.1 Exploration

Exploration 1

$\frac{2}{6}$ or $\frac{1}{3}$ bottle; *Sample answer:* Shade 2 of the 3 columns of the area model. Then shade 1 of the 2 rows. Write the fraction of the model that is shaded twice.

Exploration 2

- $\frac{3}{5}$; *Sample answer:* Draw an area model with 5 rows and 4 columns. Shade 4 of the rows and 3 of the columns.
- Multiply the numerators and the denominators of $\frac{3}{4}$ and $\frac{4}{5}$, and simplify the result.

2.1 Practice

- The denominators should have been multiplied.
$$\frac{5}{6} \times \frac{5}{6} = \frac{5 \times 5}{6 \times 6} = \frac{25}{36}$$
- 4 CDs
- a. $3\frac{6}{7}$ in.²; *Sample answer:* Divide the shaded area into three rectangles and add their areas.
$$\left(3 \times \frac{5}{8}\right) + \left(4 \times \frac{3}{7}\right) + \left(\frac{5}{8} \times \frac{3}{7}\right)$$

b. $4\frac{5}{8} \times 3\frac{3}{7}$ c. $15\frac{6}{7}$ in.²

d. 12 in.²; the area of the poster

4. *Sample answer:* $\frac{5}{6}$

5. a. $\frac{11}{120}$

b. 99 people; 110 people own a laptop computer, and 11 of those people also own a desktop computer.

2.2 Exploration

Exploration 1

- a. 6 b. 4 c. 2 d. $4\frac{1}{2}$ e. $2\frac{1}{2}$

Exploration 2

$\frac{3}{2}, \frac{4}{3}, \frac{5}{2}, \frac{3}{2}$; 3; To divide by a fraction, swap the numerator and denominator, then multiply.

2.2 Practice

- Only the divisor should be inverted.

$$\frac{3}{5} \div \frac{9}{10} = \frac{3}{5} \cdot \frac{10}{9} = \frac{2}{3}$$

2. $\frac{5}{24}$

3. 6

4. $\frac{1}{5}$

5. $\frac{1}{3}$

- >; When you divide a number by a fraction less than 1, the quotient is larger than the number.
- >; When you divide a number by a fraction less than 1, the quotient is larger than the number.
- >; When you divide a fraction by a fraction less than 1, the quotient is larger than the number.
- When the fraction is equal to 1, the numerator and denominator are the same.
- 16 times larger
- a. $\frac{2}{3} \div \frac{1}{6}$ b. $\frac{2}{3} \cdot 6$ c. 4 pounds
- a. 900 pictures b. 225 pictures
c. 750 pictures

2.3 Exploration

Exploration 1

- Sample answer:* You make $\frac{3}{4}$ of a bracelet in 1 hour. How many bracelets do you make in $4\frac{1}{2}$ hours? 6

- b. *Sample answer:* You ran $\frac{3}{8}$ of a mile yesterday. You ran $2\frac{1}{4}$ miles today. How many times farther did you run today than yesterday? 6
- c. *Sample answer:* You have 6 cups of biscuit mix. One batch calls for $1\frac{1}{2}$ cups of mix. How many batches can you make? 4
- d. *Sample answer:* A bicycle travels 1 yard when the foot pedal makes $\frac{7}{6}$ rotations. How many yards does the bicycle travel when the foot pedal makes $3\frac{1}{3}$ rotations? $2\frac{6}{7}$ yd
- e. *Sample answer:* One batch of punch calls for $1\frac{1}{5}$ pints of cider. How many batches can you make with 5 pints of cider? $4\frac{1}{6}$
- f. *Sample answer:* A dump truck holding $3\frac{1}{2}$ tons of sand dumps $2\frac{1}{2}$ tons of sand. What portion of the sand is dumped? $\frac{5}{7}$
- g. *Sample answer:* You buy $4\frac{1}{2}$ gallons of paint. It takes $1\frac{1}{2}$ gallons to paint a room. What portion of the paint do you use to paint the room? $\frac{1}{3}$

2.3 Practice

- The divisor 15 should be inverted, not the dividend $\frac{25}{3}$.

$$8\frac{1}{3} \div 15 = \frac{25}{3} \div 15 = \frac{25}{3} \times \frac{1}{15} = \frac{25}{45} = \frac{5}{9}$$
- 3
- $8\frac{1}{2}$ feet; *Sample answer:* $8\frac{1}{2}$ feet is the only ribbon length that divides evenly into 187 yards, or 561 feet.
- 26 wires; yes; $2\frac{1}{2}$ inches
- a. $101\frac{1}{4}$ pounds
 b. 6 bags; Divide 27,000 by 5000 and round the quotient, $5\frac{2}{5}$, up to 6 because you need a whole number of bags.
- no; You only have enough oatmeal to make $56 \div 2\frac{3}{4} = 20\frac{4}{11}$ batches of cookies.

- 5 batches; Divide $14\frac{1}{2}$ by $2\frac{3}{4}$ to find the number of batches when you are limited by granola. You get $5\frac{3}{11}$. Divide 10 by $1\frac{1}{3}$ to find the number of batches when you are limited by peanuts. You get $7\frac{1}{2}$. Granola is the limiting ingredient. You can only make 5 whole batches.
- $1\frac{129}{655}$

2.4 Exploration

Exploration 1

- 3.1, 0.5; *Sample answer:* $A = 1.3$ and $B = 1.8$
- 2.24, 0.02; *Sample answer:* $A = 1.11$ and $B = 1.13$
- 7.6, 0.8; *Sample answer:* $A = 3.4$ and $B = 4.2$
- 5.1, 0.8; *Sample answer:* $A = 2.15$ and $B = 2.95$

Exploration 2

Write the numbers in the rows of the chart.

- 18.995
- 15.479
- 30.102
- 13.801
- 310.1465
- 1004.90032

2.4 Practice

- 4.17 cm
- a. 1.769 pounds b. 2.667 pounds
- a. 0.281 in. b. 16.088 in.
 c. 15.907 in. d. 31.995 in.
 e. Frame A: 9.2 in., Frame B: 9.3 in.; Frame B
- a. \$2.22 b. \$5.28 c. \$0.77

2.5 Exploration

Exploration 1

- 0.8×0.5 ; 0.4; *Sample answer:* 40 squares are shaded twice, and $\frac{40}{100} = 0.4$.
 - 0.4×0.9 ; 0.36; *Sample answer:* 36 squares are shaded twice, and $\frac{36}{100} = 0.36$.
 - 0.5×1.5 ; 0.75; *Sample answer:* 75 squares are shaded twice, and $\frac{75}{100} = 0.75$.
 - 0.7×1.7 ; 1.19; *Sample answer:* 119 squares are shaded twice, and $\frac{119}{100} = 1.19$.
- Multiply as with whole numbers; The number of decimal places in each answer is equal to the sum of the number of decimal places in the factors.
 - 0.2475; *Sample answer:* Multiply as with whole numbers, the product has four decimal places.

2.5 Practice

- 26.1355 pounds
- a.** quarter, nickel
b. quarter: 41.5 cents (\$0.415), dime: 9 cents (\$0.09), nickel: 72 cents (\$0.72), penny: 0.5 cents (\$0.005)
- week 4
- $7.8 \cdot (6.9 + 3.5)$; $7.8 \cdot (6.9 + 3.5) = 81.12$ and $7.8 + (6.9 \cdot 3.5) = 31.95$.
- 4 decimal places; 6 decimal places; 8 decimal places; Each factor of 1.25 adds 2 decimal places.
- \$7.18
- multiply by 3; 56.7, 170.1, 510.3
- multiply by 5; 81.25, 406.25, 2031.25
- multiply by 0.02; 0.00000032, 0.000000064, 0.00000000128
- multiply by 0.3; 0.0486, 0.01458, 0.004374
- a.** \$231.48 **b.** \$51.72

2.6 Exploration

Exploration 1

- Sample answer:* The amount of trash increased each year; The amount of recyclables increased each year; The amount of trash is several times greater than the amount of recyclables; There was 3 times as much trash in 2017 as in 2014; The cleanup started in 2014.
- Sample answer:* There was $4970 \div 2130 = 2\frac{1}{3}$ times as much trash and $732 \div 183 = 4$ times as much recyclables collected in 2016 as in 2014.
- 5007.5 lb
- Sample answer:* There will be about 19,000 pounds of trash collected during City Cleanup Day 2020.

2.6 Practice

- \$25
- a.** 16 round tables **b.** 12 rectangular tables
c. rectangular
- a.** 35 rows **b.** 33 students
- a.** 46 ft
b. $46 \div 6$; 8 baseboard pieces
c. $15 \div 6$; 2 baseboard pieces; 3 ft
d. $8 \div 6$; 1 baseboard piece; 2 ft

- yes; *Sample answer:* Each length needs $2\frac{1}{2}$ baseboard pieces, and each width needs $1\frac{1}{3}$ baseboard pieces. So, you need $7\frac{2}{3}$ baseboard pieces, which is less than 8 pieces.

2.7 Exploration

Exploration 1

- i.** $0.4 \div 0.8 = 0.5$, $0.4 \div 0.5 = 0.8$; Rewrote $0.8 \times 0.5 = 0.4$.
ii. $0.75 \div 0.5 = 1.5$, $0.75 \div 1.5 = 0.5$; Rewrote $0.5 \times 1.5 = 0.75$.
iii. $1.19 \div 0.7 = 1.7$, $1.19 \div 1.7 = 0.7$; Rewrote $0.7 \times 1.7 = 1.19$.
- 7; 7; 7; 7; The quotients are the same; *Sample answer:* Multiply both numbers by the same power of 10, then divide whole numbers.

2.7 Practice

- 18-ounce box; it has the lowest price per ounce, \$0.22.
- 5.5 ft **3.** $9 \times \underline{\quad} = 2.7$
- a.** 16 weeks
b. 4 weeks; *Sample answer:* You need to save for a total of 20 weeks.
- $<$; *Sample answer:* The dividend on the right is greater but the divisors are the same.
- $>$; *Sample answer:* The dividends are the same, but the divisor on the right is greater.
- a.** about 9.27 times greater
b. about 11.63 mph
c. about 6 minutes

Chapter 3

Review & Refresh

- The x -value plus three equals the y -value.
- The x -value times three equals the y -value.
- The x -value minus 10 equals the y -value.
- The x -value divided by two equals the y -value.

5.

x	y
0.65	0
0.70	0.05
0.75	0.10
1.00	0.35

The x -value minus 0.65 equals the y -value.

6. $\frac{5}{27}$

7. $\frac{2}{5}$

8. $\frac{1}{72}$

9. $\frac{20}{27}$

10. $\frac{14}{11}$

11. $\frac{3}{4}$

12. $7\frac{1}{12}$ cups

3.1 Exploration

Exploration 1

- Sample answers:* 8 boys and 16 girls; 6 boys and 12 girls; 10 boys and 20 girls
- Answers will vary. Listen for students to describe the ratio of girls to boys in their class and compare to the 2 : 1 ratio for the science class; no; no; The actual numbers of girls and boys in the science class is not given.
- Answers will vary. For example, students could describe the ratio of students to teachers, textbooks to students, students to tables/desks, etc.

Exploration 2

- yes
- Add 3 parts of iced tea for every 1 part of lemonade added.

3.1 Practice

- 6 to 5; There are 6 circles for every 5 triangles.
- 10 : 4; There are 10 triangles for every 4 circles.
- 21
- 30
- 20 fl oz
- 18 sixth graders; Find two numbers that have ratio equivalent to 2 : 3 and a sum of 45.
 $\frac{18}{27} = \frac{2}{3}$, $18 + 27 = 45$
- 6 years old, 12 years old, 15 years old
- 84 beads
- a. 20 : 3 b. 23 : 20
c. 160 sandwiches

10. 26 students; Find a ratio of girls to boys that is equivalent to 5 : 7 and becomes equivalent to 6 : 7 when the number of girls increases by 2. $\frac{10}{14} = \frac{5}{7}$,
 $\frac{10+2}{14} = \frac{12}{14} = \frac{6}{7}$. 12 girls + 14 boys = 26 students.

3.2 Exploration

Exploration 1

- The expert trail is 4 times as long as the beginner trail.
- Sample answers:* beginner trail: 1000 feet; Each part of the tape diagram represents a length of 1000 feet, and the length of the expert trail is 4000 feet; $4 \times 1000 = 4000$
- Divide the length by the number of parts, then multiply by the number of parts for each trail; *Sample answers:* difference: 3600 ft; length of 1 part: $3600 \div 3 = 1200$ ft, length of beginner trail: $1200 \times 1 = 1200$ ft, length of expert trail: $1200 \times 4 = 4800$ ft

3.2 Practice

- 15 hours 2. 8 hours
- 3 blackberries, 12 raspberries
- 15 blackberries, 9 raspberries
- 12 blackberries, 42 raspberries
- 26 blackberries, 22 raspberries
- 18 trucks, 30 cars
- a. 6 small bags b. 98 baby carrots

3.3 Exploration

Exploration 1

- | | | | | | |
|----------|-----|-----|-----|-----|-----|
| Cups | 2 | 4 | 6 | 8 | 10 |
| Calories | 180 | 360 | 540 | 720 | 900 |
- Sample answers:* As cups of milk increase by 2, calories increase by 180; The number of calories is 90 times the number of cups of milk.
- Sample answers:* Multiply or divide each quantity in one ratio by the same number; Add the numbers in the given ratio to the respective quantities in one ratio.

Exploration 2

- yes

- Sample answer:* 3 is halfway between 2 and 4, so find the value halfway between 180 and 360; 3.5 is halfway between 3 and 4, so find the value halfway between 270 and 360.

3.3 Practice

1. 16 red velvet cupcakes

Sample answer:

Chocolate	Red Velvet
42	28
3	2
24	16

2. 30 songs

Sample answer:

Purchase	Free
40	24
5	3
30	18

3. 8 was subtracted in each column, rather than multiplying or dividing each by the same number.

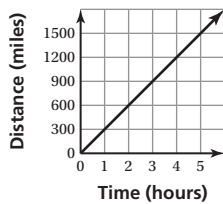
A	B
64	32
56	28
48	24

4. $A = 10, B = 22$ 5. $A = 56, B = 20$
 6. $A = 72, B = 16$ 7. $A = 100, B = 35$
 8. 35 trials

3.4 Exploration

Exploration 1

- a. Sample answer:



- b. Sample answer: How far does the airplane travel in 4 hours? (Answer: 1200 miles)

Exploration 2

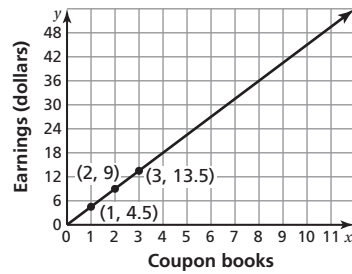
Sample answer:

Milk (fluid ounces)	0	5	10	15
Cereal (ounces)	0	2	4	6

The blue and red arrows correspond to equivalent ratios of milk to cereal. The green arrows show how to generate an equivalent ratio.

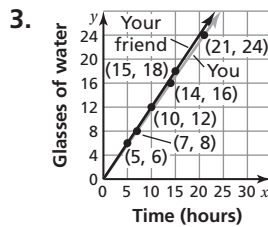
3.4 Practice

1. a.



- b. \$40.50

2. Your friend; Your friend's graph is steeper. So, your friend has a greater ratio of red paint to yellow paint than you.

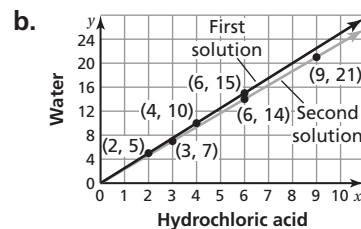


your friend; Your friend's graph is steeper than yours.

4. a.

First Solution		Second Solution	
Hydrochloric acid	Water	Hydrochloric acid	Water
2	5	3	7
4	10	6	14
6	15	9	21

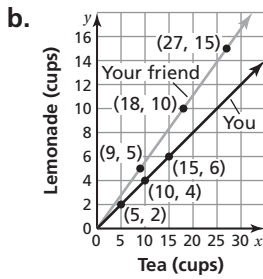
second solution



second solution

- c. Sample answer: The graph method is easier because it is visual.

5. a. 14 cups



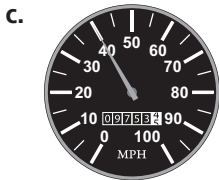
The graph for your friend is steeper, so your friend's mixture has a higher ratio of lemonade to tea than yours.

- c. your friend's tea; It has more lemonade in it.

3.5 Exploration

Exploration 1

- a. *Sample answer:* The car traveled 80 miles in 2 hours.
 b. 130 mi; *Sample answer:* Use a ratio table.



Multiply the speed by 3.25.

Exploration 2

- a. Answers will vary. Look for the ratio of each number of hand claps to 12 seconds.
 b. *Sample answer:* Use multiplication to generate equivalent ratios for times of 120 seconds, 150 seconds, and 180 seconds.

3.5 Practice

1.

Feet	12	$\frac{12}{5}$	$\frac{108}{5}$
Seconds	5	1	9

2.

Dollars	20	1	23
Hour	3	$\frac{3}{20}$	$\frac{69}{20}$

3. a. $\frac{21}{4}$ or 5.25 quarts b. 12 days
 4. equivalent 5. not equivalent
 6. first glacier; about 1.3 days
 7. Grade 6; Grade 7 needs 22 more books to have the same rate.

8. a. about 107.8 miles per hour
 b. about 0.0093 hour per mile
 c. nearly two miles per minute; 107.8 miles per hour is about 1.8 miles per minute.

3.6 Exploration

Exploration 1

- a. $3\frac{3}{4}$ L/gal b. $\frac{1}{4}$ gal/L
 c. $20\frac{5}{8}$ L, 3 gal; *Sample answers:* Multiply $\frac{3}{4}$ by 5.5, and multiply 12 by $\frac{1}{4}$; Graph the ratio relationship.

Exploration 2

Sample answer: Divide by 60 to find the rate in inches per second, then find the length on the centimeter ruler corresponding to the number of inches.

3.6 Practice

1. 4.68 kg 2. > 3. <
 4. < 5. > 6. 159.18
 7. 9.6 8. 525 9. 18,696
 10. a. about 1,033.33 mi/h
 b. about 27,777.78 m/min
 c. less than
 11. 51.3 L; You need $0.75(18) = 13.5$ gallons, or 54 quarts of gas. This is equivalent to about 51.3 liters.
 12. a. $\frac{24}{25} = 0.96$ sec/m b. $\frac{41}{36}$ yd/sec
 c. you; Your pace is about 2.3295 miles per hour.
 13. a. *Sample answer:* about 117 L
 b. *Sample answer:* 50 quarts

Chapter 4

Review & Refresh

1. 0.2, 0.4, 0.54, 0.61 2. 0.02, 0.11, 0.3, 0.45
 3. 1.02, 1.24, 1.33, 1.7 4. 1.01, 1.06, 1.2, 1.42
 5. 0.87, 0.9, 0.98, 1.23 6. 0.06, 0.5, 1.23, 1.4
 7. 0.003, 0.03, 0.031, 0.033
 8. 0.002, 0.02, 0.022, 0.2
 9. group that brought fruit to lunch
 10. < 11. > 12. <
 13. = 14. > 15. <

16. *Sample answer:* $\frac{1}{2}$, 0.36, and 0.4
17. *Sample answer:* $\frac{5}{9}$, $\frac{7}{9}$, and 0.5
18. *Sample answer:* $2\frac{4}{5}$, 3, and 2.6
19. *Sample answer:* $\frac{3}{10}$, 0.4, and $\frac{1}{2}$
20. *Sample answer:* $\frac{2}{5}$, 0.3, and 0
21. *Sample answer:* $5\frac{9}{10}$, 6, and 10
22. $\frac{18}{25} > 0.7$

4.1 Exploration

Exploration 1

- a. 60%; $\frac{60}{100}$; 60 : 100 b. 8%; $\frac{8}{100}$; 8 : 100
- c. 51%; $\frac{51}{100}$; 51 : 100 d. 25%; $\frac{25}{100}$; 25 : 100

Percents, fractions, and ratios all represent part of a whole.

4.1 Practice

1. $\frac{407}{500}$ 2. $2\frac{1}{10}$ 3. $\frac{1}{125}$
4. $\frac{1}{8000}$ 5. 325% 6. 250%
7. 180% 8. 514%
9. a. $\frac{11}{20}$ students b. 45%
- c. 4 students; Currently there are 22 students seated in window seats and 18 students seated in aisle seats. If 4 students come on the bus and sit in aisle seats, then there are 22 students in each type of seat (which is 50% of 44 students).
10. $1\frac{1}{20}$; The perspective in the figure makes the Florida flag look taller, but the U.S. flag is taller than the Florida flag.
11. the reticulated python; The anaconda is 118% as long as the Burmese python, but only 115% as long as the reticulated python, so the reticulated python must be longer than the Burmese python.



The area of the smaller square is $\frac{1}{4}$, or 25%, the area of the original square.

13. 12 years

4.2 Exploration

Exploration 1

- a. 100%; 1 b. 33%; 0.33
- c. 37%; 0.37 d. 64%; 0.64
- e. 50%; 0.5 f. 60%; 0.6
- g. 130%; 1.3

A percent is written as a decimal by removing the percent symbol and dividing by 100.

4.2 Practice

1. $\frac{53}{125}$, 0.424 2. $\frac{92}{125}$, 0.736
3. $\frac{5}{16}$, 0.3125 4. $\frac{893}{2000}$, 0.4465
5. a. $\frac{16}{25}$ b. 32%
6. a. 0.48, $\frac{12}{25}$; 0.28, $\frac{7}{25}$; 0.14, $\frac{7}{50}$
- b. 10%
7. a. 33% b. 27%, 0.27
- c. Art: 0.33; Math: 0.29 $\bar{3}$; Reading: 0.14 $\bar{3}$; English: 0.23 $\bar{3}$

8. a-d.

Distance	Within 1 mi	1-2 mi	2-3 mi	over 3 mi
Percent	50%	28%	10%	12%

4.3 Exploration

Exploration 1

- a. 0.9%, 0.25, 40%, 0.5 b. 0%, $\frac{1}{20}$, 30%, $\frac{3}{4}$
- c. 0.125, $\frac{3}{10}$, 75%, 100% d. $\frac{1}{100}$, 12.5%, 25%, 1.02
- e. 4%, $\frac{1}{8}$, 0.3, 0.75 f. $\frac{9}{10}$, $\frac{51}{50}$, 105%, 1.5

Sample answer: Labeled the number line with fractions, decimals, and percents.

4.3 Practice

1. 0.3, $\frac{8}{25}$, 33%, $\frac{1}{3}$, 33.6%
2. 210%, $\frac{43}{20}$, 2.2, 2. $\bar{2}$
3. B 4. C
5. A 6. D

7. *Sample answer:* Write 31% and 32% as the decimals 0.31 and 0.32. Graph 0.31 and 0.32 on a number line. Then identify a decimal between them, such as 0.315.
8. yes; 5% of a meter = $0.05(100 \text{ cm}) = 5 \text{ cm}$; Because 6 centimeters is greater than 5 centimeters, 6 centimeters is greater than 5% of a meter.
9. no; 6% of 1 lb = $0.06(16 \text{ oz}) = 0.96 \text{ oz}$; Because 0.96 ounce is less than 1 ounce, 6% of a pound is less than an ounce.
10. 0.0004 of a day, 1% of an hour, $\frac{2}{3}$ of a minute
11. a. 0.45%, 0.0082, $\frac{1}{36}$, $\frac{1}{16}$
- b. The population of Florida has grown faster than the population of the U.S.; *Sample answer:* People tend to move to Florida because it is a nice place to live.
- c. *Sample answer:* no; Someday Florida will become too crowded to keep growing.

12. no;

$$0.000002\% = 0.00000002 = \frac{2}{100,000,000}$$

$$= \frac{20}{1,000,000,000}$$

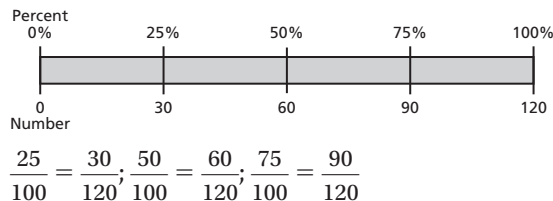
$$= 20 \text{ parts per billion}$$

Because this is greater than 10 parts per billion, it is not an allowable amount.

4.4 Exploration

Exploration 1

- a. above: 25%, $66\frac{2}{3}\%$; below: 20, 45;
Sample answer: different percents of 60
- b. *Sample answer:*



Exploration 2

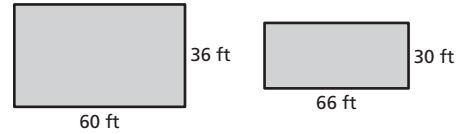
- a. *Sample answer:* Multiply or divide by 0.75.
- b. *Sample answer:* Write 80 under 100%, divide the model into four parts.

4.4 Practice

1. 120 2. 103.5
3. 1053.7 4. 149.5
5. < 6. =

7. = 8. >
9. 54 h 10. 4224 ft
11. 11.2 fl oz
12. a. C b. B c. B
13. \$15; 45% is equal to 3 times 15%, so the discount is 3 times \$5, or \$15.

14. *Sample answer:*



15. 68%

Chapter 5

Review & Refresh

1. $2 \times (126 + 2566)$ is 2 times as large as $126 + 2566$.
2. $4 \times (6425 + 25)$ is 4 times as large as $6425 + 25$.
3. $(65 - 23) + 3$ is 3 more than $65 - 23$.
4. $(65,000 - 5169) + 58$ is 58 more than $65,000 - 5169$.
5. $(890 \div 2) \div 2$ is half as large as $890 \div 2$.
6. $(65 \times 6) \div 3$ is one-third as large as 65×6 .
7. *Sample answer:* You and two friends each buy an amusement park ticket for \$20 and game tickets for \$6. What is the total amount spent?

8. 0 9. 9
10. 12 11. 21
12. 20 13. 20
14. 26 15. 8
16. \$105

5.1 Exploration

Exploration 1

- a. number of hours worked; *Sample answer:* 4; $\$24 \div 4 = \6
- b. price of each baking mold; *Sample answer:* \$4; $5 \times \$4 = \20
- c. total race distance; *Sample answer:* 5000 ft; $5000 \text{ ft} - 2000 \text{ ft} = 3000 \text{ ft}$
- d. number of months; *Sample answer:* 5; $25 \text{ cm} + 1.6 \times 5 = 33 \text{ cm}$

5.1 Practice

1. 35 2. 6
3. 1

4. row 1: 40, 67, 103
row 2: 29, 68, 148
row 3: 65, 152, 324
5. a. \$204 b. \$187
6. neither; You both earned \$140.
7. 14 one-point foul shots
8. a. *Sample answer:* $m = 3$ and $n = 10$
b. $m = 9$ and $n = 7$
c. *Sample answer:* One four-legged animal or 2 two-legged animals were added to the exhibit.

5.2 Exploration

Exploration 1

- a.
- | Sandwich | Price (dollars) | Change Received (dollars) |
|------------|-----------------|---------------------------|
| Reuben | 6.45 | $20 - 6.45$ |
| BLT | 5.25 | $20 - 5.25$ |
| Egg salad | 4.65 | $20 - 4.65$ |
| Roast beef | 6.75 | $20 - 6.75$ |
- b. *Sample answer:* $20 - p$
- c. 20: customer has \$20; 4.65s: total cost; 4.65: price per sandwich; s: number of sandwiches; no; Egg salad and grilled cheese both cost \$4.65, and the number of sandwiches is unknown.

5.2 Practice

1. $2n + 6$ 2. $3m - 7$
3. $f + 3$ or $3 + f$ 4. $w^3 - 25$
5. $2 + 2k$
6. a. 15.79% b. $d + 0.1579d$
7. $\frac{24}{x} + 15$; 18 8. $\frac{y + 30}{5}$; 10
9. $2(x + 9)$; 34
10. A; The next number is three more than the previous number.
11. a. $24x - 5$
b. no; The new expression would be $24x - 5x = 19x$.
c. 14 is the number of bags, 5 is the number of cookies in each bag, 2 is the number of cookies that are not needed to fill the bags, 3 is the number of batches, and 24 is the number of cookies in each batch or recipe.
12. $3x$

5.3 Exploration

Exploration 1

- a. *Sample answer:*

x	1	2	3	4
$4 + x + 4$	9	10	11	12

x	1	2	3	4
$16x$	16	32	48	64

x	1	2	3	4
$4 \cdot (x \cdot 4)$	16	32	48	64

x	1	2	3	4
$x + 4 + 4$	9	10	11	12

x	1	2	3	4
$x + 8$	9	10	11	12

x	1	2	3	4
$(4 \cdot x) \cdot 4$	16	32	48	64

yes; $4 + x + 4 = x + 4 + 4 = x + 8$;
 $16x = 4 \cdot (x \cdot 4) = (4 \cdot x) \cdot 4$

- b. Commutative Property of Addition: Changing the order of addends does not change the sum; Commutative Property of Multiplication: Changing the order of factors does not change the product; Associative Property of Addition: Changing the grouping of addends does not change the sum; Associative Property of Multiplication: Changing the grouping of factors does not change the product; yes; *Sample answer:* You can substitute numbers for the variables.

5.3 Practice

1. $11 + h$ 2. $k \cdot 12$
3. $(21 + 9) + 8$ 4. $(12 \cdot 5) \cdot 4$
5. $18 \cdot w$ 6. $26 + c$
7. The change in grouping shows the Associative Property of Multiplication.
8. a. $21 + n + (n - 5)$
b. $21 + n + (n - 5) = 21 + (n + n) - 5$ Assoc. Prop. of Addition
 $= 21 - 5 + (n + n)$ Comm. Prop. of Addition
 $= 16 + (n + n)$ Subtract
 $21 - 5$
- c. 54 miles

9. a. 120; The league fee only occurs once, so it would not have a variable.
 b. $14x$; There are 14 players on the team, so 14 T-shirts will be needed.
 c. y represents the cost of a new softball.

5.4 Exploration

Exploration 1

- a. $3x + 12$; $48 + 8y$; $9n$; n ; Rewrite the area of the large rectangle as the sum of the areas of the smaller rectangles; There is a total of 9 parts and a difference of 1 part.
 b. Answers will vary. Students should evaluate each expression for several values to show they are equivalent.
 c. To multiply a sum by a number, multiply each term in the sum by the number. *Sample answer:* yes; It is true for the expression in part (a).

5.4 Practice

1. D 2. A 3. C 4. B
 5. 6 must be multiplied by both x and 7. $6x + 42$
 6. $4(y + 3) = 4y + 12$ 7. $4y + 44 - 10 = 4y + 34$
 8. $3.2d + 5.44$ 9. $\frac{2}{3}x - \frac{5}{9} + 4x = 4\frac{2}{3}x - \frac{5}{9}$
 10. $\frac{3}{7}\left(5 + \frac{1}{2}\right) = 2\frac{5}{14}$; $\frac{3}{7} \times \frac{11}{2} = 2\frac{5}{14}$; *Sample answer:*
 The improper fraction method was easier because it did not involve adding with unlike denominators.
 11. $\frac{5}{12}\left(4 + \frac{3}{10}\right) = 1\frac{19}{24}$; $\frac{5}{12} \times \frac{43}{10} = 1\frac{19}{24}$; *Sample answer:*
 The improper fraction method was easier because it did not involve adding with unlike denominators.
 12. $\frac{3}{8}\left(3 + \frac{1}{6}\right) = 1\frac{3}{16}$; $\frac{3}{8} \times \frac{19}{6} = 1\frac{3}{16}$; *Sample answer:*
 The Distributive Property method was easier because the numbers were smaller.
 13. $x = 11$ 14. $x = 3$
 15. $8 \cdot x + 10 + 2x + 4 \cdot (x + 8) - 6$
 16. $2.5(2)(x + 3)$; $5x + 15$

5.5 Exploration

Exploration 1

- a. *Sample answer:* $4(2 + 6)$; $8(10 + 7)$; $3(x + 6)$; Use a common factor as the height and find the lengths.
 b. *Sample answer:* Use the Distributive Property.

- c. Use the Distributive Property to rewrite the expression as the common factor times the sum of the two remaining factors.

5.5 Practice

1. C 2. $6(3x + 1)$
 3. $9(3x - 2y)$ 4. $14(3x + 2y)$
 5. $2(10x + 50)$, $4(5x + 25)$, $5(4x + 20)$, $10(2x + 10)$, $20(x + 5)$
 6. $(x + 3)$
 7. a. 2, 3, 4, 6, 12 b. 6, 4, 3, 2, 1
 8. The additional cost is \$5.
 9. no; $48x - 16 = 16(3x) - 16(1) = 16(3x - 1)$
 10. a. the number of dollars received by the company after selling m mugs
 b. the number of dollars received by you after selling m mugs
 c. $m(x + k)$ d. k dollars

Chapter 6

Review & Refresh

1. 30 2. 10
 3. 17 4. 6
 5. 6 6. 44
 7. 16 8. 72
 9. 85 10. $2k + 3$
 11. $\frac{q}{2} + 8$ 12. $p - 6$
 13. $9x$ 14. $\frac{5}{n}$
 15. $1 + 3y$ 16. $2c$
 17. $\frac{p}{2} + 6$

6.1 Exploration

Exploration 1

- a. *Sample answer:* The total is \$20.25 for 3 roast beef sandwiches at \$6.75 each; the amount used for payment or the change received
 b. Customer A: $6.45a = 19.35$;
 3 sandwiches; $6.45 \times 3 = 19.35$
 Customer B: $4.95b = 9.90$;
 2 sandwiches; $4.95 \times 2 = 9.90$
 Customer C: $5.25c = 21.00$;
 4 sandwiches; $5.25 \times 4 = 21.00$
 Customer D: $4.65d = 23.25$;
 5 sandwiches; $4.65 \times 5 = 23.25$

6.1 Practice

- $7\frac{2}{3} = 2\frac{1}{8}x$
- $12.4 + k = 19$
- $9x = 36$
- $108 = \frac{1}{2}(12)x$
- $10w = 520(0.25)$
- $2(25) + 12(10) + 23 + p = 200$ or
 $2(0.25) + 12(0.10) + 0.23 + 0.01p = 2.00$
- $24 = \frac{1}{2}h + \frac{1}{2}\left(\frac{1}{2}h\right)$
- $6(27) + 8m = 626$
- a. Because 3 to 10 fibers are used for each thread, it isn't possible to write an equation to find the exact total length of the fibers.

b. *Sample answer:* Using 6 fibers, an equation is $300 = t \div 6$

6.2 Exploration

Exploration 1

- $12 = x + 4; x = 8$
- Step 2 reforms 12 as 8 plus 4, Step 3 subtracts 4 from each of the two equal quantities.

Exploration 2

- The two sides of an equation are expressions that are equal, or have the same value.
- Add the same amount of weight to the other side; Subtract the same amount of weight from the other side; When you add or subtract the same amount to each side of an equation, the sides will be equal.
- $x = 5$; Subtract 2 from each side of the equation.

6.2 Practice

- $h - 27 = 3.5; h = 30.5$
- $b + 4.7 = 10.9; b = 6.2$
- $x + 13 + 5 = 30; x = 12; 12$ in.
- $x + 10 + 15 + 10 = 43; x = 8; 8$ m
- $x + 5 + 5 = 16; x = 6; 6$ ft
- a. $m - 1.56 = 2.19, m = 3.75, \$3.75;$
 $c - 3.20 = 1.39, c = 4.59, \$4.59;$
 $e + 2.36 = 3.75, e = 1.39, \1.39

b. $d - 2.19 - 3.75 - 4.59 - 1.39 = 0.08, d = 12, \12
- $c - 10 - 5.80 = 33.19; c = 48.99; \48.99
- $71 + w - 78.75 = 7.25; w = 15; \15
- $x = 7$; Both sides of the equation are identical except the addends of 7 and x .

10. a. $9 - x = 5$
 $9 = 5 + x$
 $4 = x$
thus, $x = 4$

b. $9 - x = 5$
 $-x = -4$
 $0 = -4 + x$
thus, $x = 4$

c. (a); *Sample answer:* It took fewer steps.

6.3 Exploration

Exploration 1

- $20 = 4x; x = 5$
- Step 2 divides both 20 and $4x$ into four equal parts, Step 3 uses one part to show the value of x .

Exploration 2

- \$4
- Triple the weight on the other side; Divide the weight on the other side in half; Do the same thing to each side.
- $x = 3$; Divide each side of the equation by 5.

6.3 Practice

- $v = 108$
- $x = 6.5$
- $c = 61.56$
- $x = 7$ units

5. $x = 14$ units

6. $\frac{1}{5}x = 4$
 $\frac{1}{5}x = \frac{4}{1}$
 $\frac{1}{5}x \cdot \frac{5}{1} = \frac{4}{1} \cdot \frac{5}{1}$
 $x = 20$

- Use the perimeter formula, $P = 4s$, to write an equation, then solve for s . The side length is 25 yards.
- Sample answer:* The price of gas is \$3.299 per gallon; $\frac{p}{15} = 3.299; p = 49.485$; it costs \$49.49 to fill the empty tank.
- 20%
- \$2.70; *Sample answer:* Write and solve an equation to find the weight w of each biscuit: $25w = 0.75; w = 0.03$ lb. Multiply to find the weight of 40 biscuits; $40(0.03) = 1.2$ lbs. Then multiply to find the price of 1.2 pounds of biscuits: $1.2(2.25) = \$2.70$.

6.4 Exploration

Exploration 1

- Sample answer:* The distance is 300 times the time; distance
- $y = 300x$; *Sample answer:* Find the distance for a given time; In 6 hours, the airplane flies $y = 300(6) = 1800$ miles.
- $y = 1500 - 300x$; *Sample answer:* Find the coordinates of two ordered pairs, then draw a line through the points.

6.4 Practice

- $P = 16 + 2b$; P = perimeter, b = length of base; dependent variable: P , independent variable: b
- $A = 2\ell$; A = area; ℓ = length; dependent variable: A , independent variable: ℓ
- Both x and y were given the value of 2, but y gets the value of 6.
 $y = 5x - 4$; (2, 6)
 $6 = 5(2) - 4$
 $6 = 6$
(2, 6) is a solution.
- Sample answer:* the amount of money you earn
- Sample answer:* the number of stores where you shop
- $c = 14 + 2v$
 - The number of additional video rentals v is the independent variable. The monthly cost c is the dependent variable.
- Sample answer:* $y = 2x - 7$

Chapter 7

Review & Refresh

- trapezoid
- rectangle
- square
- equilateral triangle
- square
- 504 units³
- 160 units³
- 224 units³
- 60 units³
- 66 units³
- 126 units³

7.1 Exploration

Exploration 1

- They are the same.
- 18 cm²
- no; *Sample answer:* The area is not changed by how it is calculated.
- $A = bh$

7.1 Practice

- 672 ft²
- 34 in.²
- 102 mm²
- 124 cm²
- 7.2 cm
 - 60%
 - yes; Your parallelogram has a base of 17 centimeters, a height of 12 centimeters, and an area of 204 cm². Your friend's parallelogram has the same height of 12 centimeters, and an area that is 60% of the area of your parallelogram. The area is 122.4 cm². So, the base is 10.2 cm. 60% of 17 centimeters is 10.2 centimeters.

7.2 Exploration

Exploration 1

- Divide the area of the parallelogram by 2.
- 20 cm²; $\frac{1}{2}bh$
- Answers will vary.
- no; The area is not changed by how it is calculated.
- $A = \frac{1}{2}bh$; 15 m²

7.2 Practice

- 48 in.²
- 252 cm²
- 517 ft²
- 182,812.5 mm²
- 1 acre
- two times greater
 - three times greater
 - one-half as great
 - n times greater
 - yes; The area of Triangle A is 72 m². The height of Triangle B is 45 meters, so the area is 360 m², which is 5 times the area of Triangle A.

7.3 Exploration

Exploration 1

- Divide the area of the parallelogram by 2.
- 26 cm²; *Sample answer:* Find one-half the area of the parallelogram with a base of 10 units and a height of 4 units.
- Answers will vary.
- $A = \frac{1}{2}h(b_1 + b_2)$; 20 m²

7.3 Practice

- 4 ft
- Sample answers:*
 $b_1 = 2$ mm, $b_2 = 6$ mm;
 $b_1 = 3$ mm, $b_2 = 5$ mm
 - no; $b_1 + b_2 = 8$, so b_2 cannot be larger than 8 millimeters.

3. 24 m^2

4. 34 units^2

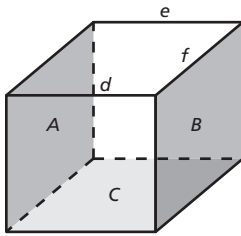
5. 42 units^2

6. 46 ft^2

7.4 Exploration

Exploration 1

- face: a flat surface of a prism; edge: a line segment where two faces intersect; vertex: a point where edges intersect
- Sample answer:* Planes are parallel if they never intersect; lines are parallel if they lie on the same plane and do not intersect; a line is parallel to a plane if they never intersect; lines or planes are perpendicular if they meet at a right angle;



Faces *A* and *B* are parallel.
 Face *C* is perpendicular to faces *A* and *B*.
 Edges *d* and *e* are parallel.
 Edge *f* is perpendicular to edges *d* and *e*.
 Edges *d* and *e* are parallel to face *C*.
 Edges *d* and *e* are perpendicular to faces *A* and *B*.

Exploration 2

a. 4

b. 4

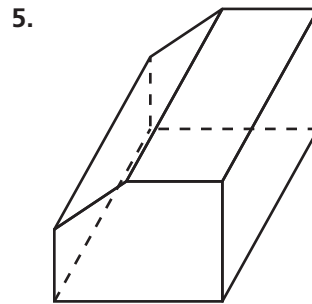
c. 5

d. 6

7.4 Practice

-
-
-

4.



6. a. 6 cubes b. 4 cubes

c. Side view for (a):

Side view for (b):

7. Faces: $n + 2$; n lateral faces and 2 bases
 Edges: $3n$; n edges on each base, and n edges between the lateral faces
 Vertices: $2n$; n vertices on each base

7.5 Exploration

Exploration 1

- a. rectangular prism b. 228 units^2

Exploration 2

- a. 78 units^2 ; $2(3 \times 3) + 4(3 \times 5) = 78$
- b. 84 units^2 ;
 $3 \times 6 + 4 \times 6 + 5 \times 6 + 2\left(\frac{1}{2}\right)(3 \times 4) = 84$

7.5 Practice

- 386 m^2 2. 150 cm^2
- a. 179 in.^2 b. 180 in.^2
- c. 220.75 in.^2
- d. your friend; Your cake pan differs by only 1 square inch. Your friend's cake pan has a larger surface area, which would normally decrease the cooking time, and a greater depth, which would normally increase the cooking time. It would be best to watch the cake and adjust the time as needed.

4. a. *Sample answer:* The base of the box went from being long and rectangular to being square. It has a new look. Yes, the appearance change did change the surface area. The old packaging had a surface area of 52 square inches. The new packaging has a surface area of 48 square inches.
- b. *Sample answer:* more; the new surface area is an 8% reduction in size, which is less than the 10% increase in the cost of packaging. However, it is less than it would have been without the packaging change.

7.6 Exploration

Exploration 1

- a. square pyramid b. 132 units²

Exploration 2

a. $33 \text{ units}^2; 3 \cdot 3 + 4 \cdot \left(\frac{1}{2}\right) \cdot 3 \cdot 4 = 33$

b. $75 \text{ units}^2; 5 \cdot 5 + 4 \cdot \left(\frac{1}{2}\right) \cdot 5 \cdot 5 = 75$

7.6 Practice

1. 8.96 yd² 2. 572.4 cm²
3. 9 cm
4. a. 9 cm²
- b. The side length of the base is 1 centimeter and the height of one of the triangular faces is 2 centimeters.
- c. 4 : 9; less; $\frac{4}{9} < \frac{2}{3}$

7.7 Exploration

Exploration 1

- a. The volume of each prism is $\frac{1}{24}$ unit³; There are 24 identical prisms in the unit cube.
- b. $\frac{18}{24}$, or $\frac{3}{4}$ unit³; The prism can be made of 18 of the prisms from part (a).
- c. *Sample answer:* Divide a unit cube into 2, 2, and 4 parts, use 3 of them to form the given prism.
- d. yes; *Sample answer:* In part (b), $B = \frac{3}{2} \cdot \frac{3}{4} = \frac{9}{8}$, so $V = Bh = \frac{9}{8} \cdot \frac{2}{3} = \frac{3}{4}$, and $V = \ell wh = \frac{3}{2} \cdot \frac{3}{4} \cdot \frac{2}{3} = \frac{3}{4}$.

7.7 Practice

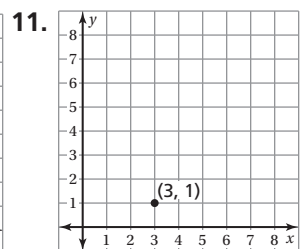
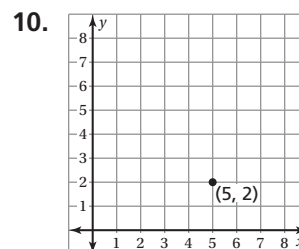
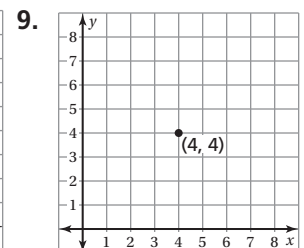
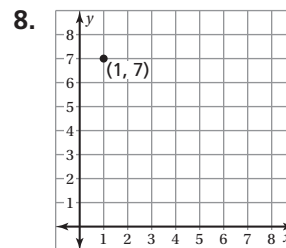
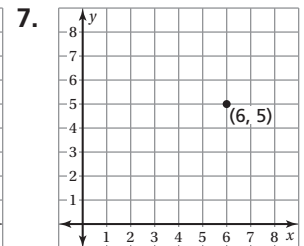
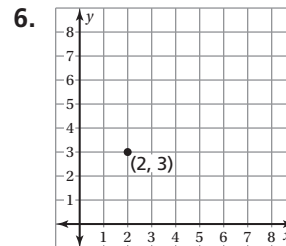
1. $3\frac{3}{4}$ ft³ 2. 34.5 cm high
3. 2.5 mm 4. $4\frac{4}{5}$ ft
5. $\frac{3}{4}$ mi 6. 75 mm

7. a. 8 ft³ b. 13,824 in.³
8. a. 0.268 in.³ b. 8.308 in.³
9. The volume is multiplied by 8.

Chapter 8

Review & Refresh

1. 50 ft² 2. 9 cm²
3. 16 in.² 4. 14 yd²
5. 80 ft²



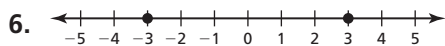
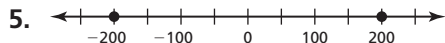
8.1 Exploration

Exploration 1

- a. **i:** Death Valley, California; **ii:** Seattle, Washington; **iii:** Honolulu, Hawaii; **iv:** Anchorage, Alaska
- b. *Sample answer:* All temperatures are greater than or equal to 0°F.
- c. *Sample answer:* It is colder than 0°F; -2°F; elevation, banking
- d. *Sample answer:* on a horizontal number line

8.1 Practice

1. 24 2. -2
- 3.
- 4.

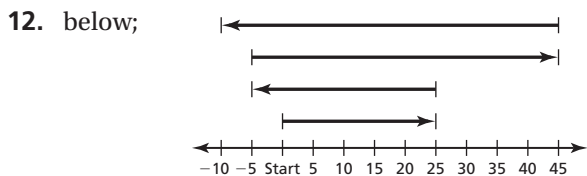


7. -75 8. -40

9. 20 10. -55

11. a. -8 b. 15

c. -12 d. 0

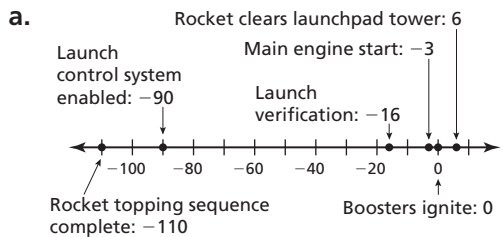


13. a. sometimes; If n is a positive integer, say, $n = 6$, then $-n = -6$, so your friend is correct. If n is a negative integer, say, $n = -5$, then $-n = 5$, so your friend is not correct.

b. no; Zero is neither positive nor negative, so it does not have an opposite.

8.2 Exploration

Exploration 1



b. rocket topping sequence complete, launch control system enabled, launch verification, main engine start, boosters ignite, rocket clears launchpad tower

c. Answers will vary.

8.2 Practice

1. -50, -20, 20, 40, 50 2. -30, -20, -15, 10, 25

3. your friend; $-4 < -3$

4. Because zero is in the middle, three of the integers are positive and three are negative.

5. a. 50, 225, 275, 300, 350

b. -250, -100, -50, 75, 125

c. 275 d. -50

e. West; It was least of both rankings.

6. -6 7. 4

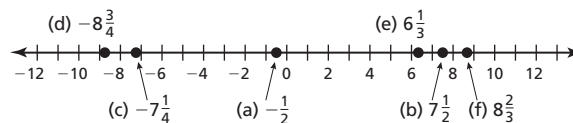
8. never; The opposite of a negative number is always a positive number, which is never less than zero.

9. sometimes; A positive integer is to the right of its opposite on the number line. A negative integer is to the left of its opposite on the number line.

8.3 Exploration

Exploration 1

Sample answer: Let 0 represent noon.



8.3 Practice

1. Sample answer: $-\frac{3}{4}$

2. Sample answer: $-3\frac{1}{5}$

3. $-1\frac{2}{3} < -1\frac{1}{2}$ 4. $-2.05 > -2.50$

5. $-1\frac{1}{4}, -1\frac{1}{8}, -\frac{3}{4}, -\frac{5}{8}, -\frac{3}{8}$

6. -0.37, -0.3, 0, 0.25, 0.7

7. first

8. a. 0 seconds b. 4 seconds

c. Between 2 and 3 seconds, the speed is 0 when the ball is changing direction.

d. Between 2 and 3 seconds; The speed changed from positive to negative.

9. Tuesday

10. All integer values make the statement true.

8.4 Exploration

Exploration 1

a. 0; Sample answer: Find the distance of each object from sea level.

b. Sample answer: seaplane and whale; Both are the same distance from sea level.

c. Kaiko: up 2000 meters; Sample answer: Alvin: down 500 meters; Jason, Jr.: down 1100 meters

8.4 Practice

1. $\frac{1}{4}$ 2. 10.2

3. $2\frac{1}{7}$ 4. 15, -15

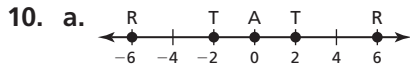
5. $|9| = |-9|$ 6. $|\frac{-1}{6}| < |\frac{1}{2}|$

7. a. Boat A: 33 ft
Boat B: 25 ft

b. Boat B c. -28 ft

8. -12, -9, 0, |-7|, 12, |-13|

9. $-17, -15, |-16|, |-18|, |20|, 22$



b. $O = -4$



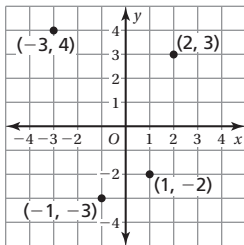
11. *Sample answer:* $x = -10$
 $y = 3$

12. always; The opposite of a negative number is its positive, which is its absolute value.
13. never; The absolute value of a negative number is a positive value, so the opposite is negative.
14. always; The absolute value of a positive number is a positive number, so the opposite is always negative.
15. never; The absolute value of a number is either itself or its positive opposite, which is greater than the number.

8.5 Exploration

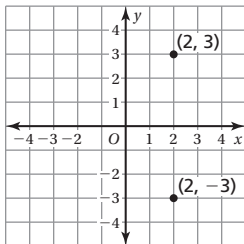
Exploration 1

a. *Sample answer:*



Extend the x - and y -axes to include negative values.

- b. 4; The signs of the coordinates are the same within each region.
c. *Sample answer:*



The x -coordinate remains the same, the y -coordinate changes sign.

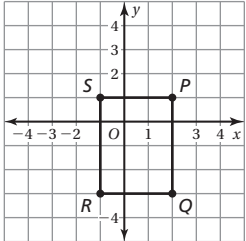
8.5 Practice

1. $A(4, 7)$ 2. $B(-6, 0)$
3. $C(7, -5)$ 4. $D(3, 1)$
5. $E(0, 5)$ 6. $F(-4, -6)$

7. $G(-5, 3)$

8. $H(5, -4)$

9. never; Quadrant IV is on the negative side of the y -axis, so the points in Quadrant IV cannot have positive values.
10. never; Quadrants III and IV and have negative y -coordinates.
11. sometimes; For example, $(-3, 2)$ has a positive y -coordinate and $(-6, 10)$ has a negative x -coordinate and they both lie in Quadrant II. But, $(3, 2)$ has a positive y -coordinate and $(-6, -10)$ has a negative x -coordinate and they do not both lie in Quadrant II.

12. a.  b. 14 c. 12

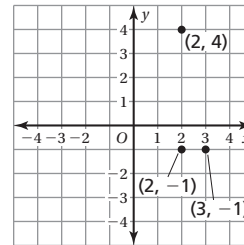
13. a. $(a - 4, b - 5)$ b. $(a, b - 3)$
c. $(a - 2, b - 2)$

d. *Sample answer:* movie theater: $(1, 7)$; your house: $(-3, 2)$; your friend's house: $(-3, 5)$; ice cream parlor: $(-1, 5)$

8.6 Exploration

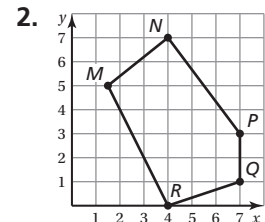
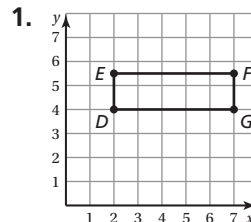
Exploration 1

a. *Sample answer:*



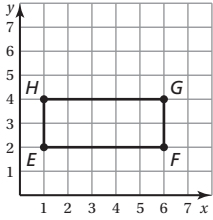
- b. *Sample answer:* It is a right triangle.
c. yes; yes; *Sample answer:* side lengths, perimeter, and area of the rectangle, area of the trapezoid

8.6 Practice

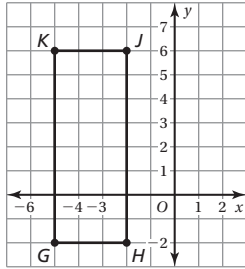


3. 40 units; 91 units² 4. 30 units; 36 units²

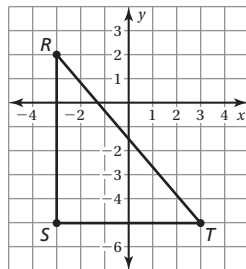
5. Vertices E and F should be connected, and vertices G and H should be connected.



6. *Sample answer:*



7. *Sample answer:*



8. Both routes are the same distance, 34 units.

9. a. 4 units b. 10 units
c. $(2a + 2b)$ units

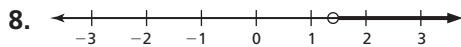
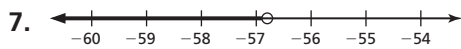
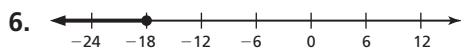
8.7 Exploration

Exploration 1

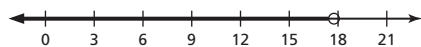
- a. any number greater than 3; 3 or any number greater than 3; 3 or any number less than 3; any number less than 3
b. *Sample answer:* Shade the values to the left or right of 3.

8.7 Practice

1. $3.5b \geq 21$ 2. $h - \frac{1}{4} \leq 0$
3. $w + 2.56 \geq 10.24$
4. *Sample answer:* $x < 2$; A number x is less than 2.
5. *Sample answer:* $k \geq -1$; A number k is at least -1 .



9. a. Let h be the height of a vehicle that can travel on the highway; $h < 17.75$;



- b. Let c be the height of what can be carried on the flat bed as the truck travels on the highway;
 $4.25 + c < 17.75$ or $c < 13.5$

10. a. Scrambler: $h \geq 48$; Busy Boats: $h \leq 48$

- b. 48 in.

11. a. $n = 3, 4, 5, 6, 7,$ and 8
b. $n = -3$ c. no solution
d. no solution e. $n = -11$

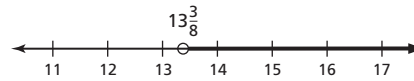
8.8 Exploration

Exploration 1

- a. *Sample answer:* Replace the equal sign with a greater than sign.
b. $x > 8$; *Sample answer:* Subtract 4 from 12 and from $x + 4$.
c. $4x < 20$; *Sample answer:* $x < 5$

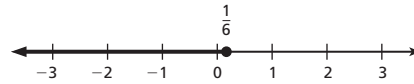
8.8 Practice

1. $z > 13\frac{3}{8}$;



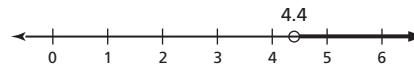
Sample answer: 14, 15

2. $u \leq \frac{1}{6}$;



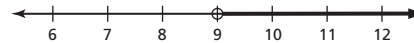
Sample answer: $-1, 0$

3. $h > 4.4$;



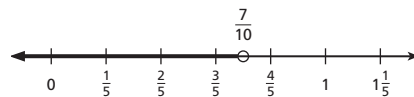
Sample answer: 5, 6

4. $p > 9$;



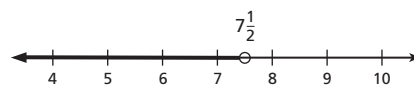
Sample answer: 10, 11

5. $k < \frac{7}{10}$;



Sample answer: $-1, 0$

6. $n < 7\frac{1}{2}$;



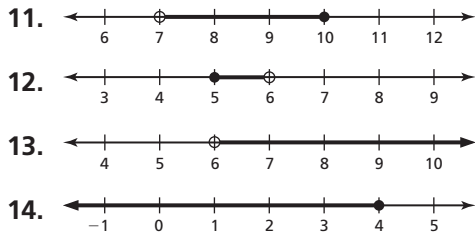
Sample answer: 6, 7

7. $m - 9.1 < 4.6$; $m < 13.7$

8. $10q \geq 2.01$; $q \geq 0.201$

9. $5\frac{1}{4} > y + 2\frac{1}{10}$; $y < 3\frac{3}{20}$

10. $\frac{d}{8} \leq 3.43$; $d \leq 27.44$



15. 1.1

16. $3x \geq 1200$; $x \geq \$400$

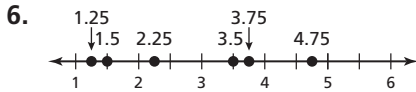
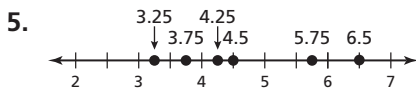
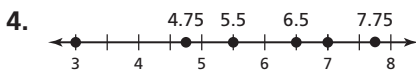
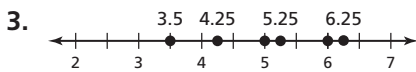
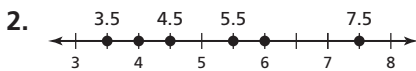
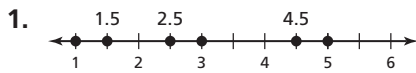
17. a. $80m \geq 380$; $m \geq 4.75$ minutes

b. $80n \geq 15 \cdot 380$; $80n \geq 5700$; $n \geq 71.25$ minutes

c. $4800h \geq 15,000$; $h \geq 3.125$ hours

Chapter 9

Review & Refresh



7. \$122

8. pants

9. pants

9.1 Exploration

Exploration 1

a. *Sample answer:* 66 b. Answers will vary.

c. *Sample answer:* Find the average; The average represents the center of the data set.

Exploration 2

a. 1 and 4; 2 and 3

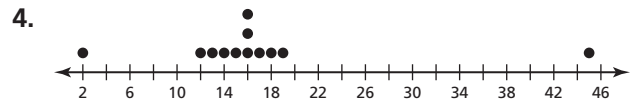
b. *Sample answer:* 2 and 3; The answers will vary.

9.1 Practice

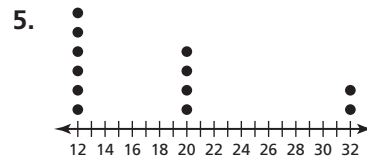
1. statistical; The answers will vary.

2. statistical; The answers will vary.

3. not statistical; There is only one answer.



Most of the data are in a cluster from 12 to 19. The peak is 16. There is a gap between 2 and 12 and between 19 and 45.



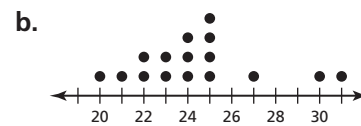
There is no cluster. The peak is 12. There is a gap between 12 and 20 and between 20 and 32.

6. a. 11

b. *Sample answer:* The boats can be measured; feet

c. What is the length of your racing boat? Most racing boats are between 16 and 20 feet long.

7. a. yes; The number of customers each day will vary.



Most of the data are in a cluster from 20 to 25. There is a peak at 25 and gaps between 25 and 27 and between 27 and 30.

c. *Sample answer:* about 24 customers

9.2 Exploration

Exploration 1

a. 4; yes; *Sample answer:* There are the same number of tokens on either side of the balance point of 4.

b. 6; no; *Sample answer:* There are many more tokens to the left of 6.

Exploration 2

a. 4; *Sample answer:* Everyone has the same number of tokens.

b. Divide the total number of tokens by 6 people.

c. *Sample answer:* How many tokens do people bring to the batting cages?

9.2 Practice

1. 120; no; The mean is greater than five of the seven data items.

2. 0.3; yes; Three data items are less than the mean, and four data items are greater than the mean.

3. 62.425; yes; All the data items are close together.

5. 40%
6. *Sample answer:* There is one high pumpkin weight. Most of the weights are between 12 and 38 pounds.
7. 59; increases the mean
8. The stem of 4 has no leaves, so there are no data values in the 40s.

9. a.

Stem	Leaf
1	2 8 9
2	1 1 2 3 4 5
3	1 1
4	2

Key: 3 | 1 = 31 kittens

- b. December; *Sample answer:* More kittens may have been adopted during the holidays.
- c. the stem of 2; 50%
- d. mean: 24.1; mode: 21 and 31

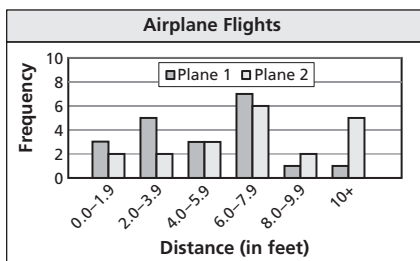
10.2 Exploration

Exploration 1

- a. Answers will vary.
- b. Answers will vary.
- c. *Sample answer:*

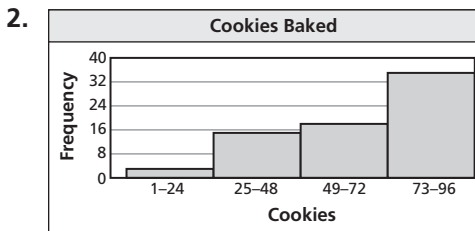
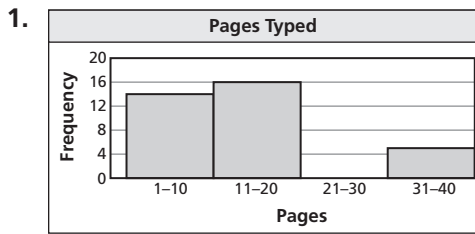
Distance Traveled	Plane 1 Frequency	Plane 2 Frequency
0.0–1.9	3	2
2.0–3.9	5	2
4.0–5.9	3	3
6.0–7.9	7	6
8.0–9.9	1	2
10 +	1	5

- d. *Sample answer:*

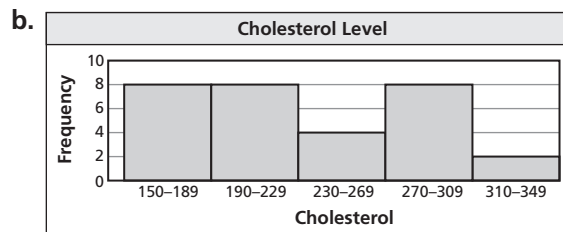
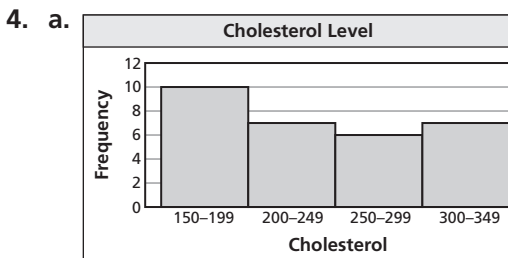


Plane 2; Most of Plane 2 flights were longer than most Plane 1 flights.

10.2 Practice



3. a. 0–9 b. 67 surfers
- c. 10–19
- d. no; There are no data values in the 0–9 interval.
- e. *Sample answer:* good; Every surfer caught at least 10 waves. Most of the surfers caught between 20 and 39 waves.



- c. histogram in part (a)
- d. histogram in part (a); In part (a), there is an interval that ends at 299 which is close to 300.
- e. neither; Neither histogram has an interval that ends close to 220.

10.3 Exploration

Exploration 1

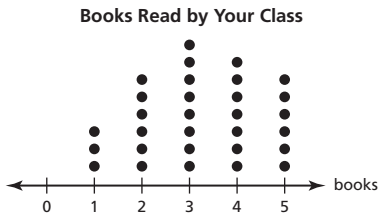
- a. *Sample answer:* All of the values along the last digit number line have the same number of dots making the distribution look flat. The sets of dots form what looks like a rectangle. The first digit dot plot looks like it peaks at 6. There are the same number of values on each side of the peak. The dots at 4 and 5 match the dots at 8 and 7.

- b. *Sample answer:* Most of the data are between 0 and 2 with a peak at 0. There are no gaps and the data extends to 7; It has a peak so it is not flat like the last digit plot from part (a). The peak is not in the middle of the data so it does not look like the first digit plot from part (a).

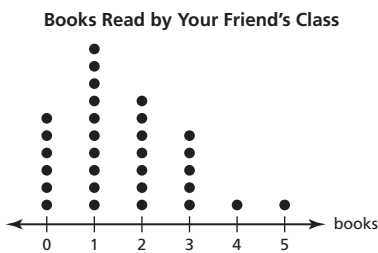
10.3 Practice

1. symmetric 2. skewed left

3. a.



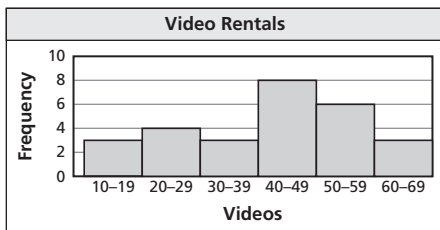
skewed left



skewed right

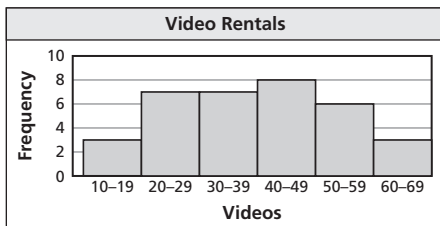
- b. your class; There are more data values on the right.
 c. your class; Both classes have 30 students and your class read more books.
 d. your friend's class; The mode is 1 book.

4. a.



skewed left

b.



c. symmetric

10.4 Exploration

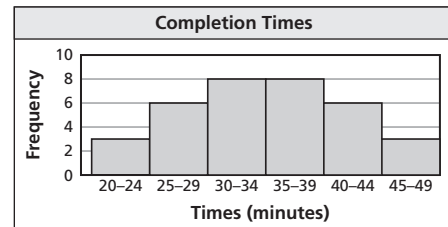
Exploration 1

- a. The mean, median, and mode of the first digits are all the same but the mean of the ages is greater than the median and mode of the ages. The range and MAD of the first digits are less than those of the ages but the IQR is greater. The data from the first digits are symmetric while the data for ages are skewed right.
- b. *Sample answer:* first digits: mean; The mean is a more reliable measure because it uses all of the data values in its calculation; ages: median; The mode of the data set is 1, and most of the data are clustered around 1. The mean is affected by the outliers.
- c. first digits: MAD; *Sample answer:* The mean is used in the calculation of MAD; ages: IQR; *Sample answer:* The median is used in the calculation of IQR.

10.4 Practice

1. mean and mean absolute deviation; mean: 4; MAD: 1.2
 2. median and interquartile range; median: 1.5; IQR: 1.5

3. a.



b. mean and mean absolute deviation

c. no; *Sample answer:* The exact data values are unknown.

4. *Sample answer:*



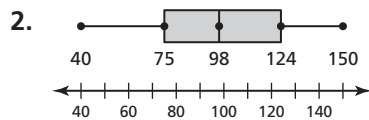
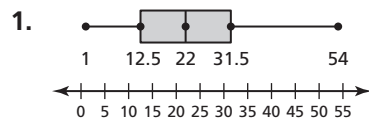
5. the median to describe the center and the IQR to describe the variation; *Sample answer:* Monthly home sales prices usually have outliers, which affect the mean.

10.5 Exploration

Exploration 1

- Sample answer:* The rectangle from 8 to 17 represents the “box”; The line segments from 2 to 8 and 17 to 19 represent the “whiskers” because they look like whiskers coming off the box.
- 2: least value; 8: first quartile; 14: median; 17: third quartile; 19: greatest value
- Sample answer:* The box-and-whisker plot uses quartiles to divide the data set into four parts; It shows how the data varies in each of those four parts.
- Answers will vary.

10.5 Practice



- 25%
 - above 230; the right whisker is longer
 - range: 205; The numbers of cars in airport parking lots varies by at most 205 cars.
 - median and IQR
- skewed left; The left whisker is longer than the right whisker.
- symmetric; The whiskers are about the same length, and the median is in the middle of the box.
- Company A; *Sample answer:* The median is approximately in the middle of the minimum and maximum values.
 - Company B; *Sample answer:* The median is close to the maximum stock price, so the price was \$9 or \$10 for 15 or more days.