

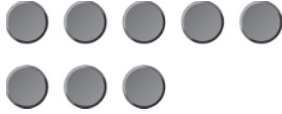
**LESSON**  
**1-1**

**Adding Integers with the Same Sign**

*Practice and Problem Solving: A/B*

Find each sum. White counters are positive. Black counters are negative.

1.  $-5 + (-3)$

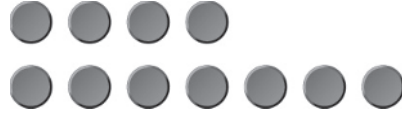


a. How many counters are there? \_\_\_\_\_

b. Do the counters represent positive or negative integers? \_\_\_\_\_

c.  $-5 + (-3) =$  \_\_\_\_\_

2.  $-4 + (-7)$



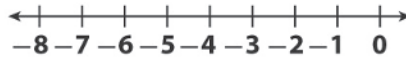
a. How many counters are there? \_\_\_\_\_

b. Do the counters represent positive or negative integers? \_\_\_\_\_

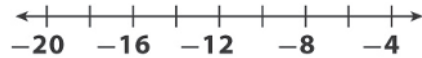
c.  $-4 + (-7) =$  \_\_\_\_\_

Model each addition problem on the number line to find each sum.

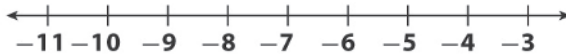
3.  $-4 + (-2) =$  \_\_\_\_\_



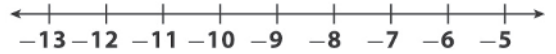
4.  $-5 + (-5) =$  \_\_\_\_\_



5.  $-3 + (-6) =$  \_\_\_\_\_



6.  $-7 + (-5) =$  \_\_\_\_\_



Find each sum.

7.  $-7 + (-1) =$  \_\_\_\_\_

8.  $-5 + (-4) =$  \_\_\_\_\_

9.  $-36 + (-17) =$  \_\_\_\_\_

10.  $-51 + (-42) =$  \_\_\_\_\_

11.  $98 + 126 =$  \_\_\_\_\_

12.  $-20 + (-75) =$  \_\_\_\_\_

13.  $-350 + (-250) =$  \_\_\_\_\_

14.  $-110 + (-1200) =$  \_\_\_\_\_

Solve.

15. A construction crew is digging a hole. On the first day, they dug a hole 3 feet deep. On the second day, they dug 2 more feet. On the third day, they dug 4 more feet. Write a sum of negative numbers to represent this situation. Find the total number of feet the construction crew dug. Write your answer as a negative integer.

**LESSON**  
**1-1**

# Adding Integers with the Same Sign

## Practice and Problem Solving: C

### Solve.

1. A grocery sells green apples and red apples. On Monday, the store put 500 of each kind of apple on display. That day, the store sold 42 red apples and 57 green apples. On Tuesday, the store sold 87 red apples and 75 green apples. On Wednesday, the store sold 29 red apples and 38 green apples.

a. Write an addition expression using negative integers to show the number of red apples the store sold.

\_\_\_\_\_

b. Write an addition expression using negative integers to show the number of green apples the store sold.

\_\_\_\_\_

c. Did the store have more red apples or green apples left over? Explain.

\_\_\_\_\_

\_\_\_\_\_

2. A hotel has 18 floors. The hotel owner believes the number 13 is unlucky. The first 12 floors are numbered from 1 to 12. Floor 13 is numbered 14, and the remaining floors are numbered from 15 to 19. The hotel manager starts on the top floor of the apartment building. He rides the elevator two floors down. The doors open and a hotel guest gets in. They ride the elevator three floors down. The hotel guest gets off the elevator. The hotel manager rides the elevator the remaining floors down to the first floor.

a. Write an addition expression using negative integers to show the number of floors the hotel manager rode down in the elevator.

\_\_\_\_\_

b. On what floor did the hotel guest get off the elevator? Explain.

\_\_\_\_\_

\_\_\_\_\_

**LESSON**  
**1-1**

**Adding Integers with the Same Sign**

*Practice and Problem Solving: D*

Find each sum. White counters are positive. Black counters are negative. The first one is done for you.

1.  $5 + 2 =$

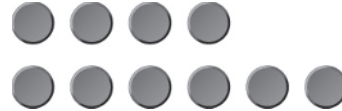


a. How many counters are there? 7

b. Do the counters represent positive or negative numbers? positive

c.  $5 + 2 =$          $+7$        

2.  $-4 + (-6) =$



a. How many counters are there? \_\_\_\_\_

b. Do the counters represent positive or negative numbers? \_\_\_\_\_

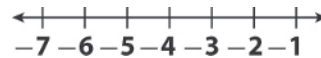
c.  $-4 + (-6) =$  \_\_\_\_\_

Model each addition problem on the number line to find each sum. The first one is done for you.

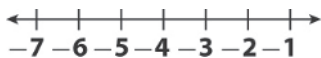
3.  $-3 + (-2) =$  -5



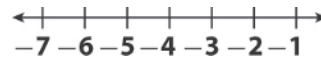
4.  $-5 + (-1) =$  \_\_\_\_\_



5.  $-4 + (-3) =$  \_\_\_\_\_



6.  $-1 + (-6) =$  \_\_\_\_\_



Find each sum. The first one is done for you.

7.  $-3 + (-1) =$  -4

8.  $-6 + (-2) =$  \_\_\_\_\_

9.  $-12 + (-7) =$  \_\_\_\_\_

10.  $-20 + (-15) =$  \_\_\_\_\_

Solve.

11. The table shows how much money Hannah withdrew in 3 days.

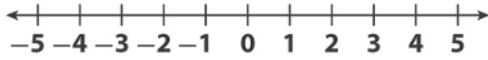
Day	Day 1	Day 2	Day 3
Dollars	-5	-1	-2

Find the total amount Hannah withdrew. \_\_\_\_\_

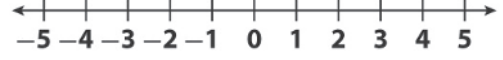
**LESSON**  
**1-2****Adding Integers with Different Signs****Practice and Problem Solving: A/B**

Show the addition on the number line. Find the sum.

1.  $2 + (-3)$  \_\_\_\_\_



2.  $-3 + 4$  \_\_\_\_\_



Find each sum.

3.  $-4 + 9$

\_\_\_\_\_

4.  $7 + (-8)$

\_\_\_\_\_

5.  $-2 + 1$

\_\_\_\_\_

6.  $6 + (-9)$

\_\_\_\_\_

7.  $5 + (-7)$

\_\_\_\_\_

8.  $9 + (-5)$

\_\_\_\_\_

9.  $(-1) + 9$

\_\_\_\_\_

10.  $9 + (-7)$

\_\_\_\_\_

11.  $50 + (-7)$

\_\_\_\_\_

12.  $27 + (-6)$

\_\_\_\_\_

13.  $1 + (-30)$

\_\_\_\_\_

14.  $15 + (-25)$

\_\_\_\_\_

Solve.

15. The temperature outside dropped  $13^{\circ}\text{F}$  in 7 hours. The final temperature was  $-2^{\circ}\text{F}$ . What was the starting temperature?

\_\_\_\_\_

16. A football team gains 8 yards in one play, then loses 5 yards in the next. What is the team's total yardage for the two plays?

\_\_\_\_\_

17. Matt is playing a game. He gains 7 points, loses 10 points, gains 2 points, and then loses 8 points. What is his final score?

\_\_\_\_\_

18. A stock gained 2 points on Monday, lost 5 points on Tuesday, lost 1 point on Wednesday, gained 4 points on Thursday, and lost 6 points on Friday.

a. Was the net change for the week positive or negative? \_\_\_\_\_

b. How much was the gain or loss? \_\_\_\_\_

**LESSON**  
**1-2****Adding Integers with Different Signs****Practice and Problem Solving: C**

Tell whether each sum will be positive or negative. Then find each sum.

1.  $-3 + (-7)$

\_\_\_\_\_

2.  $14 + (-9)$

\_\_\_\_\_

3.  $-12 + 5$

\_\_\_\_\_

4.  $-3 + 8$

\_\_\_\_\_

5.  $11 + (-5)$

\_\_\_\_\_

6.  $7 + 8$

\_\_\_\_\_

7.  $-8 + 7$

\_\_\_\_\_

8.  $-2 + 3$

\_\_\_\_\_

9. If two integers have the same sign, what is the sign of their sum?

\_\_\_\_\_

10. When adding two integers with different signs, how do you find the sign?

\_\_\_\_\_

Evaluate  $a + b$  for the given values.

11.  $a = 9, b = -24$

\_\_\_\_\_

12.  $a = -17, b = -7$

\_\_\_\_\_

13.  $a = 32, b = -19$

\_\_\_\_\_

14.  $a = -15, b = -15$

\_\_\_\_\_

15.  $a = -20, b = 20$

\_\_\_\_\_

16.  $a = -30, b = 12$

\_\_\_\_\_

Solve.

17. The high temperature for the day dropped  $7^{\circ}\text{F}$  between Monday and Tuesday, rose  $9^{\circ}\text{F}$  on Wednesday, dropped  $2^{\circ}\text{F}$  on Thursday, and dropped  $5^{\circ}\text{F}$  on Friday. What was the total change in the daily high temperature from Monday to Friday?

\_\_\_\_\_

18. Karen deposited \$25 in the bank on Monday, \$50 on Wednesday and \$15 on Friday. On Saturday, she took out \$40. Karen's original balance was \$100. What is her balance now?

\_\_\_\_\_

19. Lance and Rita were tied in a game. Then Lance got these scores: 19,  $-7$ , 3,  $-11$ , 5. Rita got these scores: 25,  $-9$ , 5,  $-9$ , 8. Who had the higher score? How much higher was that higher score?

\_\_\_\_\_

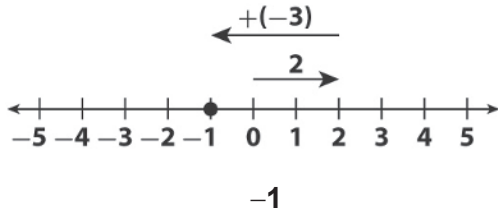
**LESSON**  
**1-2**

**Adding Integers with Different Signs**

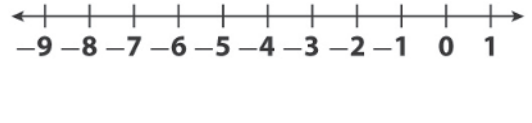
*Practice and Problem Solving: D*

Show the addition on the number line. Then write the sum. The first one is done for you.

1.  $2 + (-3)$



2.  $-3 + (-4)$



Find each sum. The first one is done for you.

3.  $4 + (-9)$

\_\_\_\_\_

-5

4.  $7 + (-8)$

\_\_\_\_\_

5.  $-2 + 1$

\_\_\_\_\_

6.  $5 + 7$

\_\_\_\_\_

7.  $9 + (-5)$

\_\_\_\_\_

8.  $-1 + 9$

\_\_\_\_\_

9.  $2 + (-7)$

\_\_\_\_\_

10.  $-6 + (-4)$

\_\_\_\_\_

11.  $-15 + 9$

\_\_\_\_\_

Solve. The first one is done for you.

12. The temperature dropped  $12^{\circ}\text{F}$  in 8 hours. If the final temperature was  $-7^{\circ}\text{F}$ , what was the starting temperature?

\_\_\_\_\_

$5^{\circ}\text{F}$

13. At 3 P.M., the temperature was  $9^{\circ}\text{F}$ . By 11 P.M., it had dropped  $31^{\circ}\text{F}$ . What was the temperature at 11 P.M.?

\_\_\_\_\_

14. A submarine submerged at a depth of  $-40$  feet dives 57 feet more. What is the new depth of the submarine?

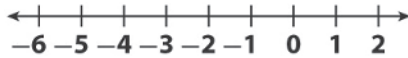
\_\_\_\_\_

15. An airplane cruising at 20,000 feet drops 2,500 feet in altitude. What is the airplane's new altitude?

\_\_\_\_\_

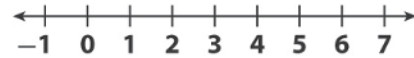
**LESSON**  
**1-3****Subtracting Integers****Practice and Problem Solving: A/B****Show the subtraction on the number line. Find the difference.**

1.  $-2 - 3$



\_\_\_\_\_

2.  $5 - (-1)$



\_\_\_\_\_

**Find the difference.**

3.  $-6 - 4$

\_\_\_\_\_

4.  $-7 - (-12)$

\_\_\_\_\_

5.  $12 - 16$

\_\_\_\_\_

6.  $5 - (-19)$

\_\_\_\_\_

7.  $-18 - (-18)$

\_\_\_\_\_

8.  $23 - (-23)$

\_\_\_\_\_

9.  $-10 - (-9)$

\_\_\_\_\_

10.  $29 - (-13)$

\_\_\_\_\_

11.  $9 - 15$

\_\_\_\_\_

12.  $-12 - 14$

\_\_\_\_\_

13.  $22 - (-8)$

\_\_\_\_\_

14.  $-16 - (-11)$

\_\_\_\_\_

**Solve.**

15. Monday's high temperature was  $6^{\circ}\text{C}$ . The low temperature was  $-3^{\circ}\text{C}$ .  
What was the difference between the high and low temperatures?

\_\_\_\_\_

16. The temperature in Minneapolis changed from  $-7^{\circ}\text{F}$  at 6 A.M. to  $7^{\circ}\text{F}$  at noon. How much did the temperature increase?

\_\_\_\_\_

17. Friday's high temperature was  $-1^{\circ}\text{C}$ . The low temperature was  $-5^{\circ}\text{F}$ .  
What was the difference between the high and low temperatures?

\_\_\_\_\_

18. The temperature changed from  $5^{\circ}\text{C}$  at 6 P.M. to  $-2^{\circ}\text{C}$  at midnight. How much did the temperature decrease?

\_\_\_\_\_

19. The daytime high temperature on the moon can reach  $130^{\circ}\text{C}$ . The nighttime low temperature can get as low as  $-110^{\circ}\text{C}$ . What is the difference between the high and low temperature?

\_\_\_\_\_

**LESSON**  
**1-3****Subtracting Integers****Practice and Problem Solving: C**

For each set of values find  $x - y$ . Answer the questions that follow.

1.  $x = 14, y = -2$

\_\_\_\_\_

2.  $x = -11, y = 11$

\_\_\_\_\_

3.  $x = -8, y = -15$

\_\_\_\_\_

4.  $x = -9, y = -9$

\_\_\_\_\_

5.  $x = 9, y = -20$

\_\_\_\_\_

6.  $x = 0, y = -9$

\_\_\_\_\_

7.  $x = 9, y = 11$

\_\_\_\_\_

8.  $x = -1, y = -1$

\_\_\_\_\_

9.  $x = -5, y = 5$

\_\_\_\_\_

10. If  $x$  and  $y$  are both positive, when is  $x - y$  negative? \_\_\_\_\_11. If  $x$  and  $y$  are both negative, when is  $x - y$  positive? \_\_\_\_\_**Solve.**

12. The temperature changed from  $7^{\circ}\text{F}$  at 6 P.M. to  $-5^{\circ}\text{F}$  at midnight. What was the difference between the high and low temperatures? What was the average change in temperature per hour?

\_\_\_\_\_

13. The lowest point in the Pacific Ocean is about  $-11,000$  meters. The lowest point in the Atlantic Ocean is about  $-8,600$  meters. Which ocean has the lower point? How much lower?

\_\_\_\_\_

14. At 11,560 feet above sea level, Climax, Colorado is the highest town in the United States. The lowest town is Calipatria, California at 185 feet below sea level. Express both of these distances as integers and tell which is closer to sea level. How much closer to sea level is the town that is closer?

\_\_\_\_\_

**Use the table for 15–16.****Temperatures at a Ski Resort**

Day	High	Low
Saturday	$8^{\circ}\text{F}$	$-3^{\circ}\text{F}$
Sunday	$6^{\circ}\text{F}$	$-2^{\circ}\text{F}$

15. On which day was the difference in temperature greater? \_\_\_\_\_

16. How much greater was the difference one day than the other? \_\_\_\_\_



**LESSON**  
**1-3**

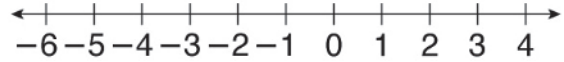
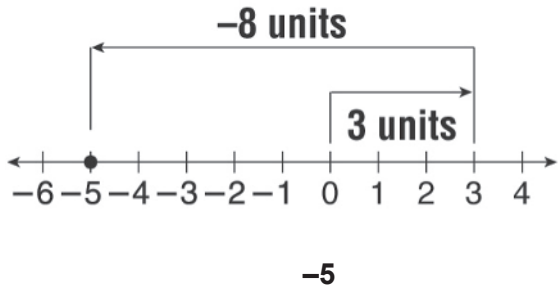
# Subtracting Integers

## Practice and Problem Solving: D

Show the subtraction on the number line. Then write the difference.  
The first one is done for you.

1.  $3 - 8$

2.  $-5 - (-1)$



Find each difference. The first one is done for you.

3.  $-3 - 4$

4.  $-7 - (-2)$

5.  $12 - 6$

-7

6.  $-8 - 8$

7.  $-5 - (-5)$

8.  $-1 - (-2)$

9.  $8 - 1$

10.  $7 - (-9)$

11.  $-3 - 8$

Solve. The first one is done for you.

12. The daytime temperature on the planet Mercury can reach  $430^{\circ}\text{C}$ . The nighttime temperature can drop to  $-180^{\circ}\text{C}$ . What is the difference between these temperatures?

$610^{\circ}\text{C}$

13. An ice cream company made a profit of \$24,000 in 2011. The same company had a loss of \$11,000 in 2012. What is the difference between the company's financial results for 2011 and 2012?

14. The high temperature on Saturday day was  $6^{\circ}\text{F}$ . The low temperature was  $-3^{\circ}\text{F}$ . What was the difference between the high and low temperatures for the day?

**LESSON**  
**1-4**

# Applying Addition and Subtraction of Integers

## *Practice and Problem Solving: A/B*

**Write an expression to represent the situation. Then solve by finding the value of the expression.**

1. Owen is fishing from a dock. He starts with the bait 2 feet below the surface of the water. He reels out the bait 19 feet, then reels it back in 7 feet. What is the final position of the bait relative to the surface of the water?

\_\_\_\_\_

2. Rita earned 45 points on a test. She lost 8 points, earned 53 points, then lost 6 more points. What is Rita's final score on the test?

\_\_\_\_\_

**Find the value of each expression.**

3.  $-7 + 12 + 15$

\_\_\_\_\_

4.  $-5 - 9 - 13$

\_\_\_\_\_

5.  $40 - 33 + 11$

\_\_\_\_\_

6.  $57 + 63 - 10$

\_\_\_\_\_

7.  $-21 - 17 + 25 + 65$

\_\_\_\_\_

8.  $12 + 19 + 5 - 2$

\_\_\_\_\_

**Compare the expressions. Write  $<$ ,  $>$  or  $=$ .**

9.  $-15 + 3 - 7$    $-9 - 1 + 16$

10.  $31 - 4 + 6$    $-17 + 22 - 5$

**Solve.**

11. Anna and Maya are competing in a dance tournament where dance moves are worth a certain number of points. If a dance move is done correctly, the dancer earns points. If a dance move is done incorrectly, the dancer loses points. Anna currently has 225 points.

- a. Before her dance routine ends, Anna earns 75 points and loses 30 points. Write and solve an expression to find Anna's final score.

\_\_\_\_\_

- b. Maya's final score is 298. Which dancer has the greater final score?

\_\_\_\_\_

**LESSON**  
**1-4**

# Applying Addition and Subtraction of Integers

## Practice and Problem Solving: C

**Write an expression to represent the situation. Then solve by finding the value of the expression.**

- Jana is doing an experiment. She is on a dock that is 10 feet above the surface of the water. Jana drops the weighted end of a fishing line 35 feet below the surface of the water. She reels out the line 29 feet, and then reels it back in 7 feet. What is the final distance between Jana and the end of the fishing line?

\_\_\_\_\_

- Kirsten and Gigi are riding in hot air balloons. They start 500 feet above the ground. Kirsten's balloon rises 225 feet, falls 105 feet, and then rises 445 feet. Every time Kirsten's balloon travels up or down, Gigi's balloon travels 15 feet farther in the same direction. Then both balloons stop moving so a photographer on the ground can take a picture.

- Find Kirsten's final position relative to the ground.

\_\_\_\_\_

- Is Kirsten or Gigi closer to the ground when the photographer takes the picture?

\_\_\_\_\_

- In a ring-toss game, players get points for the number of rings they can toss and land on a colored stake. They earn 20 points for landing on a red stake and 30 points for landing on a blue stake. They lose 10 points each time they miss. The table shows the number of rings tossed by David and Jon during the game.

- Write and evaluate an expression that represents David's total score.

Player	Red	Blue	Miss
David	2	3	3
Jon	3	2	2

\_\_\_\_\_

- Who scored more points during the game?

\_\_\_\_\_

**LESSON**  
**1-4**

# Applying Addition and Subtraction of Integers

## *Practice and Problem Solving: D*

**Write an expression to represent the situation. Then solve by finding the value of the expression. The first one is done for you.**

1. Jeremy is fishing from a dock. He starts with the bait 2 feet below the surface of the water. He lowers the bait 9 feet, then raises it 3 feet. What is the final position of the bait relative to the surface of the water?

**$-2 - 9 + 3 = -8$ ; 8 feet below the surface of the water**

---

2. Rita earned 20 points on a quiz. She lost 5 points for poor penmanship, then earned 10 points of extra credit. What is Rita's final score on the quiz?
- 

**Find the value of each expression. The first one is done for you.**

3.  $-7 + 1 + 5$

**$-1$**

---

4.  $-5 - 9 - 10$

---

5.  $40 - 30 + 10$

---

6.  $2 + 8 - 19$

---

7.  $-12 + 14 + 6$

---

8.  $50 + 60 - 10$

---

**Compare the expressions. Write  $<$ ,  $>$ , or  $=$ .**

9.  $-20 + 5 - 10$  ○  $-10 - 11 + 30$

10.  $-10 + 40 - 5$  ○  $25 - 15 + 3$

**Solve.**

11. Angela is competing in a dance competition. If a dance move is done correctly, the dancer earns points. If a dance move is done incorrectly, the dancer loses points. Angela currently has 200 points. Angela then loses 30 points and earns 70 points. Write and evaluate an expression to find Angela's final score.
-

**LESSON**  
**2-1****Multiplying Integers****Practice and Problem Solving: A/B****Find each product.**

1.  $4(-20)$   
\_\_\_\_\_

2.  $-6(12)$   
\_\_\_\_\_

3.  $(-8)(-5)$   
\_\_\_\_\_

4.  $(13)(-3)$   
\_\_\_\_\_

5.  $(-10)(0)$   
\_\_\_\_\_

6.  $(-5)(16)$   
\_\_\_\_\_

7.  $(-9)(-21)$   
\_\_\_\_\_

8.  $11(-1)$   
\_\_\_\_\_

9.  $18(-4)$   
\_\_\_\_\_

10.  $10(8)$   
\_\_\_\_\_

11.  $9(-6)$   
\_\_\_\_\_

12.  $-7(-7)$   
\_\_\_\_\_

**Write a mathematical expression to represent each situation. Then find the value of the expression to solve the problem.**

13. You play a game where you score
- $-6$
- points on the first turn and on each of the next 3 turns. What is your score after those 4 turns?
- 
- \_\_\_\_\_

14. The outdoor temperature declines 3 degrees each hour for 5 hours. What is the change in temperature at the end of those 5 hours?
- 
- \_\_\_\_\_

15. You have \$200 in a savings account. Each week for 8 weeks, you take out \$18 for spending money. How much money is in your account at the end of 8 weeks?
- 
- \_\_\_\_\_

16. The outdoor temperature was 8 degrees at midnight. The temperature declined 5 degrees during each of the next 3 hours. What was the temperature at 3 A.M.?
- 
- \_\_\_\_\_

17. The price of a stock was \$325 a share. The price of the stock went down \$25 each week for 6 weeks. What was the price of that stock at the end of 6 weeks?
- 
- \_\_\_\_\_

**LESSON**  
**2-1****Multiplying Integers****Practice and Problem Solving: C****Find each product.**

1.  $(-14)(7)$   
\_\_\_\_\_

2.  $(-24)(-5)$   
\_\_\_\_\_

3.  $12(-12)$   
\_\_\_\_\_

4.  $15(-9)(-1)$   
\_\_\_\_\_

5.  $2(-3)(4)$   
\_\_\_\_\_

6.  $-3(-6)(-2)$   
\_\_\_\_\_

7.  $40(-78)(0)$   
\_\_\_\_\_

8.  $-6(-60)(-4)$   
\_\_\_\_\_

9.  $-24(7)(-7)$   
\_\_\_\_\_

**Write a mathematical expression to represent each situation. Then find the value of the expression to solve the problem.**

10. A football team loses 4 yards on each of three plays. Then they complete a pass for 9 yards. What is the change in yardage after those four plays?
- \_\_\_\_\_

11. You have \$220 in your savings account. You take \$35 from your account each week for four weeks. How much is left in your account at the end of the four weeks?
- \_\_\_\_\_

12. A submarine is at  $-125$  feet in the ocean. The submarine makes three dives of 50 feet each. At what level is the submarine after the three dives?
- \_\_\_\_\_

**Find each product. Use a pattern to complete the sentences.**

13.  $-1(-1)$  \_\_\_\_\_

14.  $-1(-1)(-1)$  \_\_\_\_\_

15.  $-1(-1)(-1)(-1)$  \_\_\_\_\_

16.  $-1(-1)(-1)(-1)(-1)$  \_\_\_\_\_

17.  $-1(-1)(-1)(-1)(-1)(-1)$  \_\_\_\_\_

18. When multiplying integers, if there is an odd number of negative factors, then the product is \_\_\_\_\_.

If there is an even number of negative factors, then the product is

\_\_\_\_\_.

**LESSON**  
**2-1****Multiplying Integers****Practice and Problem Solving: D**

Find each product. The first one is done for you.

1.  $3(-2)$

\_\_\_\_\_

**-6**

\_\_\_\_\_

2.  $5(0)$

\_\_\_\_\_

3.  $(-1)(-8)$

\_\_\_\_\_

4.  $(-4)(7)$

\_\_\_\_\_

5.  $(-3)(-4)$

\_\_\_\_\_

6.  $(6)(-6)$

\_\_\_\_\_

7.  $10(-5)$

\_\_\_\_\_

8.  $-2(9)$

\_\_\_\_\_

9.  $7(-10)$

\_\_\_\_\_

10.  $-1(-1)$

\_\_\_\_\_

11.  $2(-6)$

\_\_\_\_\_

12.  $-2(-2)$

\_\_\_\_\_

Write a mathematical expression to represent each situation. Then find the value of the expression to solve the problem. The first one is done for you.

13. You play a game where you score  $-3$  points on the first 5 turns. What is your score after those 5 turns?

**$5(-3) = -15$ ;  $-15$  points**

\_\_\_\_\_

14. The outdoor temperature gets 1 degree colder each hour for 3 hours. What is the change in temperature at the end of those 3 hours?

\_\_\_\_\_

15. A football team loses 4 yards on each of 2 plays. What is the change in yardage after those 2 plays?

\_\_\_\_\_

16. You take \$9 out of your savings account each week for 7 weeks. At the end of 7 weeks, what is the change in the amount in your savings account?

\_\_\_\_\_

17. The price of a stock went down \$5 each week for 5 weeks. What was the change in the price of that stock at the end of 5 weeks?

\_\_\_\_\_

**LESSON**  
**2-2****Dividing Integers****Practice and Problem Solving: A/B****Find each quotient.**

1.  $7 \overline{) -84}$

\_\_\_\_\_

2.  $-38 \div -2$

\_\_\_\_\_

3.  $-27 \overline{) 81}$

\_\_\_\_\_

4.  $-28 \div 7$

\_\_\_\_\_

5.  $-121 \div -11$

\_\_\_\_\_

6.  $-35 \div 4$

\_\_\_\_\_

**Simplify.**

7.  $(-6 - 4) \div 2$

\_\_\_\_\_

8.  $5(-8) \div 4$

\_\_\_\_\_

9.  $-6(-2) \div 4(-3)$

\_\_\_\_\_

**Write a mathematical expression for each phrase.**

10. thirty-two divided by the opposite of 4

\_\_\_\_\_

11. the quotient of the opposite of 30 and 6, plus the opposite of 8

\_\_\_\_\_

12. the quotient of 12 and the opposite of 3 plus the product of the opposite of 14 and 4

\_\_\_\_\_

**Solve. Show your work.**

13. A high school athletic department bought 40 soccer uniforms at a cost of \$3,000. After soccer season, they returned some of the uniforms but only received \$40 per uniform. What was the difference between what they paid for the uniforms and what they got for returns?

\_\_\_\_\_

14. A commuter has \$245 in his commuter savings account. This account charges  $-\$15$  each week he buys a ticket. In one time period, the account changed by  $-\$240$ .

a. For how many weeks did the commuter buy tickets?

\_\_\_\_\_

b. How much must he add to his account if he wants to buy 20 weeks of tickets?

\_\_\_\_\_



**LESSON**  
**2-2**

## Dividing Integers

### Practice and Problem Solving: C

**Simplify.**

1.  $-\frac{-8}{-2} + (-12)$

2.  $\frac{6}{-3} - \frac{15-7}{-2}$

3.  $3 - 2(4 - 7) \div 9$

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

The integers from  $-3$  to  $+3$  can be used in the blanks below. Which of these integers produces a positive, even integer for the expression?

Show your work for those that do.

4.  $-\frac{8}{2} + 4(\text{_____}) - 2$

5.  $\frac{(\text{_____})}{4} + \frac{3}{2}$

\_\_\_\_\_

\_\_\_\_\_

6.  $\text{_____} \div \frac{2}{-3}$

7.  $\left(\frac{-1}{\text{_____}}\right) \div -\frac{1}{2}$

\_\_\_\_\_

\_\_\_\_\_

**Solve. Show your work.**

8. In a sports competition, Alyssa received  $-16$  points. She got these points evenly in 4 events. How many points was she penalized for each event?

\_\_\_\_\_

9. The surface temperature of a deep, spring-fed lake is  $70^\circ\text{F}$ . The lake temperature drops  $2^\circ\text{F}$  for each yard below the lake surface until a depth of 6 yards is reached. From 6 yards to 15 yards deep, the temperature is constant. From 15 yards down to the spring source, the temperature *increases*  $3^\circ\text{F}$  per *foot* until the spring source is reached at 20 yards below the surface.

- a. What is the temperature at 10 yards below the surface?

\_\_\_\_\_

- b. What is the temperature at 50 feet below the surface?

\_\_\_\_\_

\_\_\_\_\_

- c. Write an expression for finding the lake temperature at the spring source.

\_\_\_\_\_

**LESSON**  
**2-2**

# Dividing Integers

## Practice and Problem Solving: D

Find the quotient. The first one is done for you.

1.  $-3 \overline{) -15}$

5

2.  $27 \div -3$

\_\_\_\_\_

3.  $\frac{28}{-7}$

\_\_\_\_\_

Compare the quotients. Write  $>$ ,  $<$ , or  $=$ .

4.  $-4 \overline{) -16}$   $\bigcirc$   $-16 \overline{) -4}$

5.  $11 \div 77$   $\bigcirc$   $77 \div 11$

6.  $\frac{48}{-6}$   $\bigcirc$   $\frac{-48}{6}$

Write a mathematical expression for the written expression. Then solve. The first one is done for you.

7. the opposite of 45 divided by 5

$-45 \div 5 = -9$

\_\_\_\_\_

8. fifty-five over negative eleven

\_\_\_\_\_

9. negative 38 divided by positive 19

\_\_\_\_\_

10. negative four divided by negative two

\_\_\_\_\_

Solve. Show your work. The first one is done for you.

11. Four investors lost 24 percent of their combined investment in a company. On average, how much did each investor lose?

$-24 \div 4 = -6$ ; On average, each investor lost 6%.

\_\_\_\_\_

\_\_\_\_\_

12. The temperature in the potter's kiln dropped 760 degrees in 4 hours. On average, how much did the temperature drop per hour?

\_\_\_\_\_

\_\_\_\_\_

13. The value of a car decreased by \$5,100 over 3 years. On average, how much did its value decrease each year?

\_\_\_\_\_

\_\_\_\_\_

**LESSON**  
**2-3****Applying Integer Operations****Practice and Problem Solving: A/B****Find the value of each expression.**

1.  $(-3)(-2) + 8$   
\_\_\_\_\_

2.  $(-18) \div 3 + (5)(-2)$   
\_\_\_\_\_

3.  $7(-3) - 6$   
\_\_\_\_\_

4.  $24 \div (-6)(-2) + 7$   
\_\_\_\_\_

5.  $4(-8) + 3$   
\_\_\_\_\_

6.  $(-9)(0) + (8)(-5)$   
\_\_\_\_\_

**Compare. Write  $<$ ,  $=$ , or  $>$ .**

7.  $(-5)(8) + 3$    $(-6)(7) + 1$

8.  $(-8)(-4) + 16 \div (-4)$    $(-9)(-3) + 15 \div (-3)$

**Write an expression to represent each situation. Then find the value of the expression to solve the problem.**

9. Dave owns 15 shares of ABC Mining stock. On Monday, the value of each share rose \$2, but on Tuesday the value fell \$5. What is the change in the value of Dave's shares?
- \_\_\_\_\_

10. To travel the Erie Canal, a boat must go through locks that raise or lower the boat. Traveling east, a boat would have to be lowered 12 feet at Amsterdam, 11 feet at Tribes Hill, and 8 feet at Randall. By how much does the elevation of the boat change between Amsterdam and Randall?
- \_\_\_\_\_

11. The Gazelle football team made 5 plays in a row where they gained 3 yards on each play. Then they had 2 plays in a row where they lost 12 yards on each play. What is the total change in their position from where they started?
- \_\_\_\_\_

12. On Saturday, Mrs. Armour bought 7 pairs of socks for \$3 each, and a sweater for her dog for \$12. Then she found a \$5 bill on the sidewalk. Over the course of Saturday, what was the change in the amount of money Mrs. Armour had?
- \_\_\_\_\_

**LESSON**  
**2-3****Applying Integer Operations****Practice and Problem Solving: C**

Complete the table to answer 1–4.

	You Own	Company	Monday	Tuesday	Wednesday	Net Gain or Loss
1.	5 shares	ABC	−\$2	+\$5	−\$1	
2.	2 shares	DEF	+\$8	−\$7	−\$10	
3.	8 shares	GHI	−\$2	+\$9	+\$6	
4.	7 shares	JKL	+\$5	−\$12	+\$3	

5. What expression shows your net gain or loss on GHI Company?  
\_\_\_\_\_

6. How much value did you gain or lose overall? \_\_\_\_\_

**Write an expression to represent each situation. Then, find the value of the expression to solve the problem.**7. A submarine cruised below the surface of the water. During a training exercise, it made 4 dives, each time descending 45 feet more. Then it rose 112 feet. What is the change in the submarine's position?  
\_\_\_\_\_8. A teacher wanted to prevent students from guessing answers on a multiple-choice test. The teacher graded 5 points for a correct answer, 0 points for no answer, and −2 points for a wrong answer. Giselle answered 17 questions correctly, left 3 blank, and had 5 wrong answers. She also got 8 out of 10 possible points for extra credit. What was her final score?  
\_\_\_\_\_9. Hugh wrote six checks from his account in the following amounts: \$20, \$20, \$12, \$20, \$12, and \$42. He also made a deposit of \$57 and was charged a \$15 service fee by the bank. What is the change in Hugh's account balance?  
\_\_\_\_\_

10. a. Without finding the product, what is the sign of this product? Explain how you know.

$$(-4)(-1)(-2)(-6)(-3)(-5)(-2)(-2)$$

b. Find the product. \_\_\_\_\_

**LESSON**  
**2-3****Applying Integer Operations****Practice and Problem Solving: D**

Find the value of each expression. Show your work. The first one is done for you.

1.  $15 + (-6)(2)$

$$= 15 + (-12) \quad \text{Multiply}$$

$$= 3 \quad \text{Add.}$$

2.  $(-5)(-3) + 18$

3.  $42 \div (-6) + 23$

4.  $52 + 45 \div (-9)$

Write an expression to represent each situation. Then find the value of the expression to solve the problem. The first one is done for you.

5. Mr. Carlisle paid his utility bills last weekend. He paid \$50 to the phone company, \$112 to the power company, and \$46 to the water company. After he paid those bills, what was the change in the total amount of money that Mr. Carlisle had?

$$(-50) + (-112) + (-46) = -208; \text{ He had } \$208 \text{ less.}$$

6. Over 5 straight plays, a football team gained 8 yards, lost 4 yards, gained 7 yards, gained 3 yards, and lost 11 yards. What is the team's position now compared to their starting position?

7. At the grocery store, Mrs. Knight bought 4 pounds of apples for \$2 per pound and 2 heads of lettuce for \$1 each. She had a coupon for \$3 off the price of the apples. After her purchases, what was the change in the amount of money that Mrs. Knight had?

8. The depth of the water in a water tank changes every time someone in the Harrison family takes a bath or does laundry. A bath lowers the water level by 4 inches. Washing a load of laundry lowers the level by 2 inches. On Monday the Harrisons took 3 baths and washed 4 loads of laundry. By how much did the water level in the water tank change?

**LESSON**  
**3-1**

**Rational Numbers and Decimals**

*Practice and Problem Solving: A/B*

**Write each rational number as a terminating decimal.**

1.  $\frac{19}{20}$

2.  $-\frac{1}{8}$

3.  $\frac{17}{5}$

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**Write each rational number as a repeating decimal.**

4.  $-\frac{7}{9}$

5.  $\frac{11}{15}$

6.  $\frac{8}{3}$

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**Write each mixed number as an improper fraction and as a decimal.  
Then tell whether the decimal is terminating or repeating.**

7.  $3\frac{2}{9}$  \_\_\_\_\_

8.  $15\frac{1}{20}$  \_\_\_\_\_

9.  $-5\frac{3}{10}$  \_\_\_\_\_

10. In part a and in part b, use each of the digits 2, 3, and 4 exactly once.

a. Write a mixed number that has a terminating decimal, and write the decimal.

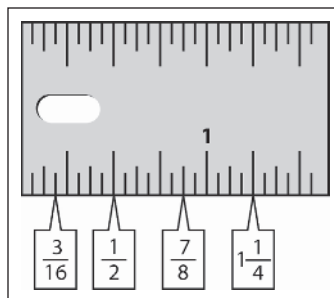
\_\_\_\_\_

b. Write a mixed number that has a repeating decimal, and write the decimal.

\_\_\_\_\_

11. The ruler is marked at every  $\frac{1}{16}$  inch. Do the labeled measurements

convert to repeating or terminating decimals? \_\_\_\_\_



**LESSON**  
**3-1**

# Rational Numbers and Decimals

## Practice and Problem Solving: C

Use the table to answer problems 1 to 4.

The table lists the commuting times for 5 people. Write each ratio in

the form  $\frac{a}{b}$ , and then as a decimal. Tell whether each decimal is a

terminating or a repeating decimal.

1. Beau's time to the sum of Charra's and DeLee's times

\_\_\_\_\_

2. The product of DeLee's time and Beau's time to Adelle's time

\_\_\_\_\_

3. Write two or three rational numbers with Emmet's time in each denominator. Is the rational number always a terminating decimal? Justify your answer.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

4. Use Adelle's time as the denominator of rational numbers. Find a numerator that results in a terminating decimal and find a numerator that results in a repeating decimal. Explain how to find numerators for each type of rational number.

\_\_\_\_\_  
\_\_\_\_\_

5. Is  $\frac{1.5}{7.5}$  a rational number? If not, explain why. If so, explain why and write it as a decimal.

\_\_\_\_\_  
\_\_\_\_\_

Person	Commuting Time (min.)
Adelle	15
Beau	25
Charra	10
DeLee	8
Emmet	20

**LESSON**  
**3-1**

# Rational Numbers and Decimals

## Practice and Problem Solving: D

Write each rational number as a repeating decimal or a terminating decimal. Then tell whether the decimal is terminating or repeating. The first two are done for you.

1.  $\frac{13}{20}$  **0.65, terminating** \_\_\_\_\_

$$\begin{array}{r} 0.65 \\ 20 \overline{)13.00} \\ \underline{120} \\ 100 \\ \underline{100} \\ 0 \end{array}$$

2.  $4\frac{2}{3}$  \_\_\_\_\_  **$4.\overline{6}$ , repeating**

$$4\frac{2}{3} = \frac{12}{3} + \frac{2}{3} = \frac{14}{3}$$

$$\begin{array}{r} 4.666 \\ 3 \overline{)14.000} \\ \underline{12} \\ 20 \\ \underline{18} \\ 20 \\ \underline{18} \\ 20 \end{array}$$

3.  $\frac{5}{9}$  \_\_\_\_\_

4.  $3\frac{5}{6}$  \_\_\_\_\_

5.  $8\frac{3}{4}$  \_\_\_\_\_

6.  $10\frac{5}{8}$  \_\_\_\_\_

The decimal for  $\frac{5}{16}$  is 0.3125. Use that value to write each decimal.

7.  $1\frac{5}{16}$

8.  $7\frac{5}{16}$

9.  $26\frac{5}{16}$

\_\_\_\_\_

The decimal for  $\frac{4}{15}$  is 0.266... or  $0.2\overline{6}$ . Use that value to write each decimal.

10.  $1\frac{4}{15}$

11.  $17\frac{4}{15}$

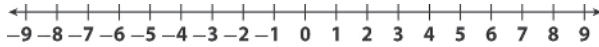
12.  $23\frac{4}{15}$

\_\_\_\_\_



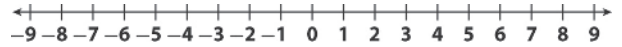
**LESSON**  
**3-2****Adding Rational Numbers****Practice and Problem Solving: A/B****Use a number line to find each sum.**

1.  $-3 + 4$



\_\_\_\_\_

2.  $1 + -8$



\_\_\_\_\_

**Find each sum without using a number line.**

3.  $4 + 5$

\_\_\_\_\_

4.  $-3 + \frac{1}{2}$

\_\_\_\_\_

5.  $-\frac{2}{9} + \frac{3}{9}$

\_\_\_\_\_

6.  $-3.5 + -4.9$

\_\_\_\_\_

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

\_\_\_\_\_

8.  $-0.6 + -2.5$

\_\_\_\_\_

9.  $-\frac{3}{4} + \frac{1}{5}$

\_\_\_\_\_

10.  $3 + -7.5 + 1.2$

\_\_\_\_\_

11.  $-1.32 + 5.02 + -1.24$

\_\_\_\_\_

12.  $-3 + -1.35 + 2.5$

\_\_\_\_\_

13.  $-6.5 + -0.15 + -0.2$

\_\_\_\_\_

14.  $-\frac{3}{2} - \frac{7}{4} + \frac{1}{8}$

\_\_\_\_\_

**Solve.**

15. Alex borrowed \$12.50 from his friend Danilo. He paid him back \$8.75. How much does he still owe?

\_\_\_\_\_

16. A football team gains 18 yards in one play and then loses 12 yards in the next. What is the team's total yardage?

\_\_\_\_\_

17. Dee Dee bought an apple for \$0.85, a sandwich for \$4.50, and a bottle of water for \$1.50. How much did Dee Dee spend?

\_\_\_\_\_

18. Andre went hiking near his house. The first trail he hiked on took him 4.5 miles away from his house. The second trail he hiked took him 2.4 miles closer to his house. The third trail took him 1.7 miles further away from his house. After Andre hiked the three trails, how far from his house was he?

\_\_\_\_\_

**LESSON**  
**3-2****Adding Rational Numbers****Practice and Problem Solving: C****Find each sum.**

1.  $3\frac{1}{4} + \left(-1\frac{1}{2}\right) + 2\frac{1}{4}$

\_\_\_\_\_

2.  $3\frac{3}{5} + \left(-1\frac{4}{9}\right) + \frac{1}{5}$

\_\_\_\_\_

3.  $-\frac{1}{9} + 8\frac{3}{5} - \frac{1}{15}$

\_\_\_\_\_

4.  $-3.5 + (-4.9) + 0.8$

\_\_\_\_\_

5.  $-\frac{1}{12} + \left(-3\frac{3}{8}\right) + \frac{4}{3}$

\_\_\_\_\_

6.  $-0.25 + (-1.65) + 0.77$

\_\_\_\_\_

7.  $-\frac{3}{4} + \frac{1}{5} + \frac{2}{9}$

\_\_\_\_\_

8.  $0.3 + -5.5 + 5.2$

\_\_\_\_\_

9.  $-1.091 + 12.12 + (-1.1)$

\_\_\_\_\_

10.  $-3.24 + (-1.55) + 2.512$

\_\_\_\_\_

11.  $-1.27 + (-0.35) + (-0.13)$

\_\_\_\_\_

12.  $-1\frac{1}{2} + \left(-2\frac{12}{23}\right) + 5\frac{7}{46}$

\_\_\_\_\_

**Solve.**

13. Marley bought an action figure for \$10.99, a board game for \$24.95 and a book for \$5.99. She paid with a \$50 bill. How much change did Marley receive?

\_\_\_\_\_

14. Tim bought a pen for \$2.25, a pencil for \$0.59, a notebook for \$6.49, and a highlighter for \$1.49. He used a coupon that gave him \$5.25 off his entire purchase. How much did he spend in total?

\_\_\_\_\_

15. During the first hour of a snowstorm,  $1\frac{1}{2}$  inches of snow fell. In the next hour,  $4\frac{3}{8}$  inches fell. In the third hour, the snow stopped and  $\frac{7}{8}$  inches of snow melted. How much snow was on the ground at the end of the third hour?

\_\_\_\_\_

**LESSON**  
**3-2**

**Adding Rational Numbers**

*Practice and Problem Solving: D*

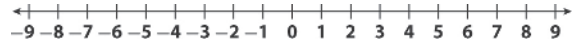
Use a number line to find each sum. The first one is done for you.

1.  $2 + 3$

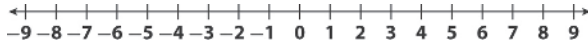


5

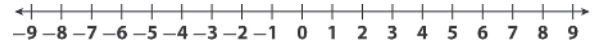
2.  $-2 + 1$



3.  $-5 + (-3)$



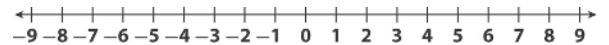
4.  $-2 + 5$



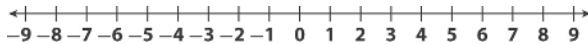
5.  $1 + 7$



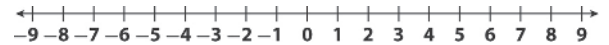
6.  $-8 + 2$



7.  $1 + (-0.5)$



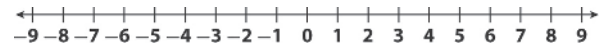
8.  $-2.5 + 0.5$



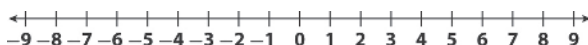
9.  $0.5 + 1.5$



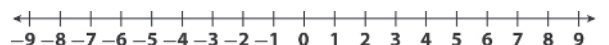
10.  $-1 + \frac{1}{2}$



11.  $\frac{1}{2} + 1\frac{1}{2}$



12.  $-\frac{1}{2} + \frac{1}{2}$



Find each sum without using a number line. The first one is done for you.

13.  $5 + (-1)$

4

14.  $\frac{2}{3} + \frac{5}{3}$

15.  $-\frac{1}{8} + \frac{7}{8}$

16.  $-1.5 + (-1.9)$

17.  $-2 + (-1.2)$

18.  $-4.0 + 3.5$

19.  $-1\frac{3}{4} + \frac{1}{4}$

20.  $-7 + 4$

21.  $-0.1 + (-0.8)$

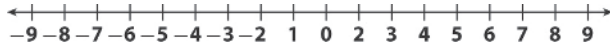
**LESSON**  
**3-3**

# Subtracting Rational Numbers

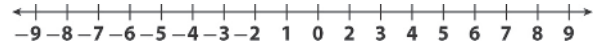
## Practice and Problem Solving: A/B

Use a number line to find each difference.

1.  $-5 - 4$



2.  $1 - (-8)$



Find each difference without using a number line.

3.  $4 - (-5)$

\_\_\_\_\_

4.  $-5 - \frac{1}{2}$

\_\_\_\_\_

5.  $\frac{1}{7} - \frac{3}{7}$

\_\_\_\_\_

6.  $-3.7 - (-4.9)$

\_\_\_\_\_

7.  $-2\frac{1}{4} - (-3)$

\_\_\_\_\_

8.  $-1.6 - 2.1$

\_\_\_\_\_

9.  $-4\frac{3}{4} - \frac{3}{4}$

\_\_\_\_\_

10.  $2 - (-7.5) - 1.2$

\_\_\_\_\_

11.  $-0.02 - 9.02 - 0.04$

\_\_\_\_\_

12.  $4 - (-0.25) - 0.5$

\_\_\_\_\_

13.  $-5.1 - (-0.1) - 1.2$

\_\_\_\_\_

14.  $-\frac{3}{5} - \frac{7}{5} - \left(-\frac{2}{5}\right)$

\_\_\_\_\_

**Solve.**

15. The temperature on Monday was  $-1.5^\circ\text{C}$ . The temperature on Tuesday was  $2.6^\circ$  less than the temperature on Monday. What was the temperature on Tuesday?

\_\_\_\_\_

16. A diver dove to a location  $6\frac{3}{5}$  meters below sea level. He then dove to a second location  $8\frac{1}{5}$  below sea level. How many meters are there between the two locations?

\_\_\_\_\_

**LESSON**  
**3-3****Subtracting Rational Numbers****Practice and Problem Solving: C****Find each difference.**

1.  $-3\frac{1}{3} - 5\frac{2}{3} - \left(-2\frac{1}{3}\right)$   
\_\_\_\_\_

2.  $3\frac{3}{7} - 1\frac{2}{3} - \frac{5}{7}$   
\_\_\_\_\_

3.  $-\frac{1}{10} - 4\frac{3}{5} - 5\frac{3}{10}$   
\_\_\_\_\_

4.  $-1.5 - 4.9 - 0.8$   
\_\_\_\_\_

5.  $-\frac{1}{12} - 3\frac{3}{8} - \left(-\frac{4}{3}\right)$   
\_\_\_\_\_

6.  $-9.54 - 1.651 - 0.988$   
\_\_\_\_\_

7.  $-\frac{5}{6} - \frac{17}{18} - \left(-\frac{2}{9}\right)$   
\_\_\_\_\_

8.  $-0.03 - (-5.51) - 5.12$   
\_\_\_\_\_

9.  $-1.099 - 12.001 - 0.09$   
\_\_\_\_\_

10.  $-1.02 - 1.99 - 1.34$   
\_\_\_\_\_

11.  $-1.65 - (-0.45) - (-0.15)$   
\_\_\_\_\_

12.  $-3\frac{1}{2} - \left(-5\frac{5}{9}\right) - 9\frac{1}{18}$   
\_\_\_\_\_

**Solve.**

13. If
- $x$
- equals
- $8 - (-2.25)$
- and
- $y$
- equals
- $6 - 4.2 - (-4.9)$
- , what is the value of
- $x - y$
- ?
- 
- \_\_\_\_\_

14. Alex's score for a game is given by the expression
- $9 - 8.2 - (-1.9)$
- . Beth's score for the same game is
- $-8 - (-5.4) - 1.8$
- . Whose score was higher? By how much?
- 
- \_\_\_\_\_

15. The temperature on Monday was
- $14^\circ\text{C}$
- . On Tuesday the temperature decreased by
- $5^\circ$
- . On Wednesday the temperature decreased another
- $10^\circ$
- . On Thursday the temperature decreased by
- $-8^\circ$
- . What was the temperature at the end of the day on Thursday?
- 
- \_\_\_\_\_

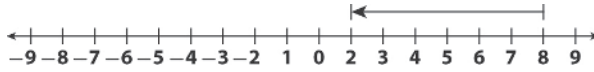
**LESSON**  
**3-3**

# Subtracting Rational Numbers

## Practice and Problem Solving: D

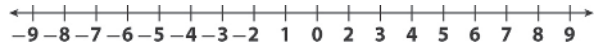
Use a number line to find each difference. The first one is done for you.

1.  $8 - 6$



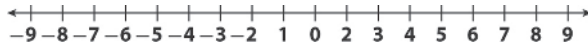
2

2.  $5 - (-1)$



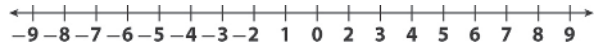
\_\_\_\_\_

3.  $-5 - (-2)$



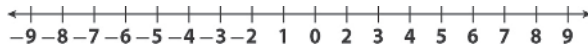
-3

4.  $-2 - 5$

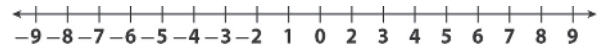


\_\_\_\_\_

5.  $1 - 4$

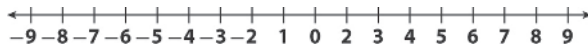


6.  $4 - (-4)$

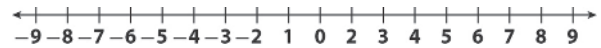


\_\_\_\_\_

7.  $1 - (-0.5)$

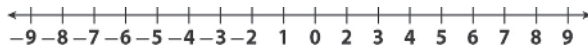


8.  $-2 - 1$

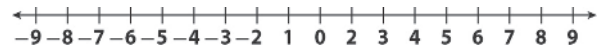


\_\_\_\_\_

9.  $1.5 - 3$

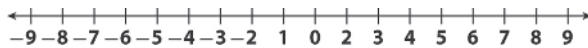


10.  $2 - \frac{1}{2}$

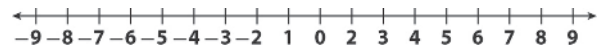


\_\_\_\_\_

11.  $\frac{1}{2} - 1\frac{1}{2}$



12.  $-\frac{1}{2} - 1$



\_\_\_\_\_

Find each difference without using a number line. The first one is done for you.

13.  $6 - (-1)$

7

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

\_\_\_\_\_

15.  $-\frac{1}{8} - \frac{3}{8}$

\_\_\_\_\_

16.  $-1.5 - (-2.9)$

\_\_\_\_\_

17.  $-2 - 0.2$

\_\_\_\_\_

18.  $-4.0 - 3.8$

\_\_\_\_\_

19.  $-1\frac{3}{4} - \frac{1}{4}$

\_\_\_\_\_

20.  $-2 - 4.5$

\_\_\_\_\_

21.  $-0.2 - 0.8$

\_\_\_\_\_

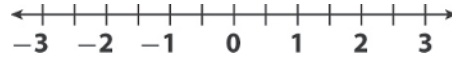
**LESSON**  
**3-4**

# Multiplying Rational Numbers

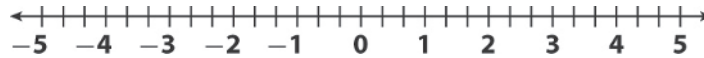
## Practice and Problem Solving: A/B

Use the number line to find each product.

1.  $4\left(-\frac{1}{2}\right)$  \_\_\_\_\_



2.  $-5\left(-\frac{2}{3}\right)$  \_\_\_\_\_



Find the product.

3.  $-2(3.1)$

\_\_\_\_\_

4.  $4(-5.4)$

\_\_\_\_\_

5.  $-3.3(6)$

\_\_\_\_\_

6.  $-3(-5.6)$

\_\_\_\_\_

7.  $4.5(8)$

\_\_\_\_\_

8.  $2(-1.05)$

\_\_\_\_\_

9.  $-2.05(4)$

\_\_\_\_\_

10.  $-3.5(-9)$

\_\_\_\_\_

Find the product. Show your work.

11.  $\left(\frac{2}{3}\right) \times (-6) \times 5 =$  \_\_\_\_\_

12.  $\left(-\frac{3}{5}\right) \left(-\frac{10}{3}\right) \left(-\frac{2}{9}\right) =$  \_\_\_\_\_

13.  $-7 \times \left(-\frac{3}{5}\right) \times \left(\frac{15}{7}\right) =$  \_\_\_\_\_

14.  $2(4)\left(\frac{1}{16}\right) =$  \_\_\_\_\_

Solve. Show your work.

15. A landscaper installs 12 sections of trellis. Each section of trellis is  $\frac{3}{4}$  yard long. How many yards of trellis are installed altogether?

\_\_\_\_\_

16. A biologist uses a box-shaped fish trap that measures  $\frac{1}{4}$ -meter by  $\frac{2}{3}$ -meter by  $\frac{3}{5}$ -meter. What is the volume of the trap in cubic meters?

\_\_\_\_\_

17. The temperature at noon is  $75^\circ\text{F}$ . The temperature drops 3 degrees every half hour. What is the temperature at 4 P.M.?

\_\_\_\_\_

**LESSON**  
**3-4****Multiplying Rational Numbers****Practice and Problem Solving: C**

Compare the products by writing  $<$  or  $>$ . Without doing the calculations, explain how you know your answers are correct.

1.  $\frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} = \left(\frac{1}{2}\right)^3$   1

\_\_\_\_\_

2.  $\left(-\frac{1}{2}\right) \times \left(-\frac{1}{2}\right) \times \left(-\frac{1}{2}\right) = \left(-\frac{1}{2}\right)^3$   0

\_\_\_\_\_

3.  $\frac{1}{2} \times \frac{1}{2} \times \frac{1}{2}$    $\left(-\frac{1}{2}\right) \times \left(-\frac{1}{2}\right) \times \left(-\frac{1}{2}\right)$

\_\_\_\_\_

4.  $0.5(-1.1)$   0

\_\_\_\_\_

Tell whether each statement is *True* or *False*. Without doing the calculations, explain how you know your answers are correct.

5.  $\left(-\frac{1}{2}\right)^6 < 0$  \_\_\_\_\_

\_\_\_\_\_

6.  $(1.5)^7 > 1$  \_\_\_\_\_

\_\_\_\_\_

7.  $(0.9)^4 > 1$  \_\_\_\_\_

\_\_\_\_\_

**Solve.** (The formula for the volume of a sphere is  $V = \frac{4}{3}\pi r^3$ .)

8. The radius of a spherical balloon is  $\frac{1}{2}$  foot. The radius of a second one is  $\frac{3}{4}$  foot. How do the volumes of the balloons compare?

\_\_\_\_\_

9. The radius of a sphere is reduced by one third. How does its volume change?

\_\_\_\_\_



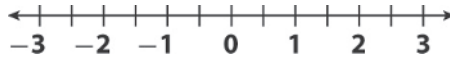
**LESSON**  
**3-4**

# Multiplying Rational Numbers

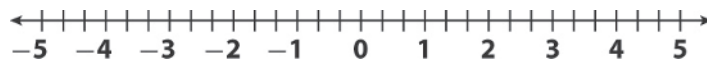
## Practice and Problem Solving: D

Fill in the blanks to complete the computation. Refer to the number line if you need help. The first one in each group is done for you.

$$1. 6\left(-\frac{1}{2}\right) = \frac{\left(-\frac{1}{2}\right)}{\quad} + \frac{\left(-\frac{1}{2}\right)}{\quad} + \frac{\left(-\frac{1}{2}\right)}{\quad} + \frac{\left(-\frac{1}{2}\right)}{\quad} + \frac{\left(-\frac{1}{2}\right)}{\quad} + \frac{\left(-\frac{1}{2}\right)}{\quad} = \underline{-\frac{6}{2} \text{ or } -3}$$



$$2. -3\left(-\frac{2}{3}\right) = - \underline{\quad} - \underline{\quad} - \underline{\quad} = \underline{\quad}$$



Write each addition expression as a multiplication expression. Then, solve. The first one is done for you.

$$3. \frac{5}{8} + \frac{5}{8} + \frac{5}{8} + \frac{5}{8} = \underline{4} \times \frac{\underline{5}}{\underline{8}} = \underline{\frac{20}{8} \text{ or } 2\frac{1}{2}}$$

$$4. (-2.5) + (-2.5) = \underline{\quad} = \underline{\quad}$$

$$5. \left(-\frac{2}{9}\right) + \left(-\frac{2}{9}\right) + \left(-\frac{2}{9}\right) = \underline{\quad} = \underline{\quad}$$

Fill in the missing steps. Then, find the answer. The first one is started for you.

$$6. \left(-\frac{1}{4}\right) \times \frac{3}{5} \times \left(-\frac{2}{5}\right) = \underline{-\frac{1}{4}} \times \frac{\left(\frac{\underline{3} \times \underline{(-2)}}{\underline{5} \times \underline{5}}\right)}{\quad} = \underline{-\frac{1}{4}} \times \underline{\quad} = \underline{\quad}$$

$$7. 4(2.5)0.8 = \underline{\quad} \times \underline{\quad} \times 0.8 = \underline{\quad} \times 0.8 = \underline{\quad}$$

Solve. The first one is done for you.

8. A seal dives when it see a whale. The seal dives for 5 seconds at an average rate of 3.5 meters per second.

- a. Write an addition expression to represent how far the seal dives in 5 seconds. Find the sum.

$$\underline{(-3.5) + (-3.5) + (-3.5) + (-3.5) + (-3.5)} = \underline{\quad}$$

- b. Write a multiplication expression to represent how far the seal dives in 5 seconds. Find the product.

\_\_\_\_\_

**LESSON**  
**3-5****Dividing Rational Numbers****Practice and Problem Solving: A/B****Find each quotient.**

1.  $\frac{1}{2} \div (-3)$   
\_\_\_\_\_

2.  $-6 \div \left(-\frac{3}{4}\right)$   
\_\_\_\_\_

3.  $\frac{5}{6} \div 10$   
\_\_\_\_\_

4.  $\frac{5.25}{15}$   
\_\_\_\_\_

5.  $24 \div (-3.2)$   
\_\_\_\_\_

6.  $-0.125 \div (-0.5)$   
\_\_\_\_\_

7.  $-\frac{1}{7} \div -\frac{3}{14}$   
\_\_\_\_\_

8.  $\frac{\left(\frac{3}{2}\right)}{\left(-\frac{9}{8}\right)} =$   
\_\_\_\_\_

9.  $-1\frac{1}{2} \div 3\frac{1}{3}$   
\_\_\_\_\_

10.  $2\frac{1}{4} \div \frac{3}{8}$   
\_\_\_\_\_

11.  $\frac{4.2}{-2.4}$   
\_\_\_\_\_

12.  $-\frac{5}{8} \div \left(-\frac{5}{16}\right)$   
\_\_\_\_\_

**Fill in the blank with a number to make a true statement.**

13.  $0.25 \div \underline{\hspace{2cm}} = -0.25$

14.  $-\frac{1}{2} \div \underline{\hspace{2cm}} = -\frac{7}{3}$

15.  $\frac{1}{7} \div \underline{\hspace{2cm}} = 14$

**Write a division problem for each situation. Then, solve it.**

16. How many quarter-pound
- $\left(\frac{1}{4}\right)$
- packets of plant food can a garden shop make out of 8 pounds of the plant food?
- 
- \_\_\_\_\_

17. The assembly of a machine takes
- $\frac{3}{4}$
- hour. There are twelve steps in the assembly process. What is the average time for each step?
- 
- \_\_\_\_\_

18. A 35-meter length of cable is cut into pieces that measure 1.25 meters each. Into how many pieces is the cable cut?
- 
- \_\_\_\_\_

- 19.
- $4\frac{1}{8}$
- tons of gravel is spread evenly across
- $2\frac{1}{6}$
- acres. How many tons of gravel are on each acre?
- 
- \_\_\_\_\_

**LESSON**  
**3-5**

# Dividing Rational Numbers

## Practice and Problem Solving: C

Write each quotient two other ways by moving the negative sign.

1.  $\frac{-1}{5} =$  \_\_\_\_\_      2.  $-\frac{7}{30} =$  \_\_\_\_\_      3.  $\frac{1}{-2} =$  \_\_\_\_\_  
 = \_\_\_\_\_      = \_\_\_\_\_      = \_\_\_\_\_

Use  $>$ ,  $<$ , or  $=$  to compare the quotients. Show the quotients.

4.  $(4 \times \frac{1}{3}) \div \frac{2}{5} \bigcirc 4 \times (\frac{1}{3} \div \frac{2}{5})$       5.  $(4.5 \div 0.5) \div 3 \bigcirc 4.5 \div (0.5 \div 3)$

6.  $(6 \div -\frac{1}{5}) \times -\frac{4}{3} \bigcirc 6 \div (-\frac{1}{5} \times -\frac{4}{3})$       7.  $5.5(-3 \times 7.5) \bigcirc 7.5(-3 \times 5.5)$

Use decimals to rewrite each quotient. Then, solve.

8.  $\frac{(\frac{2}{5})}{(-\frac{5}{8})}$       9.  $\frac{(-5\frac{2}{5})}{(-\frac{5}{16})}$       10.  $\frac{(\frac{1}{4})}{(\frac{3}{5})}$

\_\_\_\_\_

Write each quotient as a decimal and as a fraction. Show your work.

11.  $\frac{(1 + \frac{1}{2} + \frac{1}{4})}{(1 - \frac{1}{2} - \frac{1}{4})}$  \_\_\_\_\_

12.  $\frac{(1 + \frac{1}{3} + \frac{1}{6})}{(1 - \frac{1}{3} - \frac{1}{6})}$  \_\_\_\_\_

13.  $\frac{(1 + \frac{1}{4} + \frac{1}{8})}{(1 - \frac{1}{4} - \frac{1}{8})}$  \_\_\_\_\_

14. If the 4s in question 13 are replaced with 5s, and the 8s are replaced with 10s, how will the quotient compare to the other three quotients? Explain.

\_\_\_\_\_

\_\_\_\_\_

**LESSON**  
**3-5**
**Dividing Rational Numbers**
*Practice and Problem Solving: D*

Write the missing number. Then, solve. The first one is done for you.

$$1. -6 \div \frac{3}{4} = -6 \times \frac{4}{\underline{3}}$$

$$\underline{-8}$$

$$2. \frac{4}{5} \div 8 = \frac{4}{5} \times \underline{\hspace{2cm}}$$

$$3. \frac{-7}{8} \div \frac{7}{-4} = \frac{-7}{8} \times \underline{\hspace{2cm}}$$

$$4. \frac{\left(\frac{5}{-3}\right)}{\left(\frac{7}{8}\right)} = \left(\frac{5}{-3}\right) \times \underline{\hspace{2cm}}$$

$$5. \frac{-2}{\left(\frac{4}{9}\right)} = -2 \times \underline{\hspace{2cm}}$$

$$6. \frac{\left(-4\frac{3}{4}\right)}{4} = -\frac{19}{4} \times \underline{\hspace{2cm}}$$

Solve. The first one is done for you.

$$7. \frac{-1}{8} \div -5 = \frac{-1}{8} \times -\frac{1}{5} = \underline{\hspace{2cm}}$$

$$\underline{\frac{1}{40}}$$

$$8. \frac{\left(2\frac{1}{4}\right)}{\left(-\frac{6}{7}\right)} = \frac{9}{4} \times -\frac{7}{6} = \underline{\hspace{2cm}}$$

$$9. 3 \div \frac{6}{7} = \frac{3}{1} \times \frac{7}{6} = \underline{\hspace{2cm}}$$

Find the missing numbers. Add zeros as needed. Then, solve.  
The first one is done for you.

$$10. 0.4 \div 2.5 \rightarrow 2.5 \overline{) \hspace{1cm}}?$$

$$\underline{0.40; 0.16}$$

$$11. \frac{-4.75}{0.3} \rightarrow ? \overline{) -4.75}$$

$$12. 8 \div 2.5 \rightarrow 2.5 \overline{) \hspace{1cm}}?$$

Solve.

13. The town's highway department marks a new road with reflective markers. The road is  $6\frac{3}{4}$  miles in length. The markers are spaced every eighth  $\left(\frac{1}{8}\right)$  of a mile.

a. Write a division problem to find how many markers are installed.

\_\_\_\_\_

b. Solve the problem.

\_\_\_\_\_

c. Explain the answer.

\_\_\_\_\_

**LESSON**  
**3-6****Applying Rational Number Operations****Practice and Problem Solving: A/B**

**Estimate each answer. Explain your reasoning.**

1. Sections of prefabricated fencing are each  $4\frac{1}{3}$  feet long. How long are  $6\frac{1}{2}$  sections placed end to end?

---

2. One half liter of lemonade concentrate is added to 3 liters of water. How many  $\frac{1}{3}$ -liter servings of lemonade are made?

---

3. Two  $2\frac{1}{2}$ -inch plastic strips and two  $5\frac{1}{3}$ -inch plastic strips are used to form a rectangle. What is the perimeter of the rectangle?

---

4. The average mass of the eggs laid by chickens on Ms. Watson's farm is 3.5 grams. About how many grams does a dozen eggs weigh?

---

5. An 8.5-centimeter green bean pod contains peas that average 0.45-centimeter in diameter. How many peas are in the pod?

---

**Solve by converting to the easiest form of the rational numbers to use in the problem. Show your work**

6. Arwen uses a dropper that produces drops that have a volume of  $\frac{1}{8}$ -milliliter to fill a 30-milliliter test tube. How many drops does it take to fill the test tube?

---

---

7. Three strips of 2-yard-wide outdoor carpet are used to cover a sidewalk. One is 3.5 yards long, the second is 25 percent longer than the first, and the third is  $6\frac{1}{4}$  yards long. How long are the three carpets placed end to end?

---

---

**LESSON**  
**3-6****Applying Rational Number Operations*****Practice and Problem Solving: C***

Use the information given in the table below to complete Exercises 1–4.

**Planets' Orbital Velocity**

Planet	Orbital Velocity (mi/s)
Mercury	29.74
Venus	21.76
Earth	18.5
Mars	14.99
Jupiter	8.12
Saturn	6.02
Uranus	4.23

**Solve. Show your work. Express the answer in fraction form.**

1. How many miles does Mercury travel in an hour? Simplify the fractions in your answer.

---

2. How much greater is the orbital velocity of Mercury than Jupiter? Simplify the fractions in your answer.

---

3. During the time it takes Saturn to travel 32,508 miles, how much time in seconds has elapsed on Earth? Simplify the fractions in your answer.

---

4. How many miles does Venus travel in a minute? Simplify the fractions in your answer.

---

**LESSON**  
**3-6**

**Applying Rational Number Operations**

*Practice and Problem Solving: D*

**Solve. Show your work. The first one has been done for you.**

1. A middle school conducts a recycling drive, during which  $\frac{1}{5}$  of the materials collected were bottles and  $\frac{1}{4}$  was paper. Cardboard boxes made up  $\frac{1}{10}$  of the material. How much of the total do these three categories of items represent?

**The LCM of the three denominators, 4, 5, and 10, is 20.**

**Multiply each fraction to get a common denominator of 20.**

$$\frac{1}{5} \cdot \frac{4}{4} = \frac{4}{20} \qquad \frac{1}{4} \cdot \frac{5}{5} = \frac{5}{20} \qquad \frac{1}{10} \cdot \frac{2}{2} = \frac{2}{20}$$

**Add the fractions:**  $\frac{4}{20} + \frac{5}{20} + \frac{2}{20} = \frac{11}{20}$

**Bottles, paper, and cardboard boxes were  $\frac{11}{20}$  of the total amount of recycled material collected by the middle school.**

---

2. A family budgets  $\frac{1}{2}$  of its income for housing and  $\frac{1}{3}$  for food. What fraction of their budget do these expenses cover?

---



---

3. Decorations for the seventh-grade dance take  $\frac{1}{6}$  of the student council's budget. Entertainment takes  $\frac{3}{8}$  of the budget. What fraction of the budget do these expenses cover? What fraction is left for other activities? (*Hint:* To answer the second question, subtract the answer to the first question from 1, which represents the whole budget.)

---



---



---

## LESSON

## 4-1

**Unit Rates****Practice and Problem Solving: A/B****Solve.**

1. To make 2 batches of nut bars, Jayda needs to use 4 eggs. How many eggs are used in each batch of nut bars?  
\_\_\_\_\_
2. On her way to visit her parents, Jennifer drives 265 miles in 5 hours. What is her average rate of speed in miles per hour?  
\_\_\_\_\_
3. Last week Alexander was paid \$56 for 7 hours of work. How much money does Alexander's job pay per hour?  
\_\_\_\_\_
4. Ned has scored 84 points in the first 6 games of the basketball season. How many points per game has Ned scored?  
\_\_\_\_\_
5. At the local grocery store, a 16-ounce bottle of apple juice costs \$3.20. What is the cost of the apple juice per ounce?  
\_\_\_\_\_
6. An above-ground swimming pool is leaking. After  $\frac{1}{2}$  hour the pool has leaked  $\frac{7}{8}$  of a gallon of water. How many gallons of water per hour is the swimming pool leaking?  
\_\_\_\_\_
7. After  $\frac{3}{4}$  of a minute a sloth has moved just  $\frac{3}{8}$  of a foot. What is the sloth's speed in feet per minute?  
\_\_\_\_\_
8. Food A contains 150 calories in  $\frac{3}{4}$  of a serving. Food B contains 250 calories in  $\frac{2}{3}$  of a serving. Find each unit rate. Which food has fewer calories per serving?  
\_\_\_\_\_



**LESSON**  
**4-1****Unit Rates*****Practice and Problem Solving: C*****Solve.**

1. Sasha can mow  $\frac{3}{8}$  of an acre of grass in 45 minutes. How many acres of grass does Sasha mow per hour?

---

2. Ammar hikes  $2\frac{3}{4}$  miles of nature trail in 1 hour and 15 minutes. How many miles of trail does Ammar hike per hour?

---

3. Melinda paints  $\frac{7}{8}$  of a wall in  $1\frac{1}{6}$  hours. What part of a wall does Melinda paint in 1 minute?

---

4. There is  $\frac{1}{4}$  ounce of yeast in every  $2\frac{1}{4}$  teaspoons of yeast. A recipe for bread calls for 2 teaspoons of yeast. How many ounces of yeast are needed for this recipe?

---

5. Every  $5\frac{1}{2}$  cups of flour weighs  $1\frac{9}{16}$  pounds. Use a unit rate to show how you could determine if there are more than or less than 35 cups of flour in a 10-pound bag of flour.

---

---

6. One tank is filling at a rate of  $\frac{5}{8}$  gallon per  $\frac{7}{10}$  hour. A second tank is filling at rate of  $\frac{5}{9}$  gallon per  $\frac{2}{3}$  hour. Which tank is filling faster? Explain how you know.

---

---

---

## LESSON

## 4-1

## Unit Rates

*Practice and Problem Solving: D*

**Solve. The first one is done for you.**

1. To make 2 loaves of banana bread, Leandra needs 6 eggs.  
How many eggs are needed to make 1 loaf of banana bread?

$$\frac{6 \text{ eggs}}{2 \text{ loaves}} = \frac{3 \text{ eggs}}{1 \text{ loaf}}$$

Leandra needs 3 eggs to make 1 loaf of banana bread.

2. On his way to visit his sister at college, Gregg drives 135 miles in 3 hours. What is his average rate of speed in miles per hour?

$$\frac{135 \text{ miles}}{3 \text{ hours}} = \frac{\text{miles}}{1 \text{ hour}}$$

Gregg's average rate of speed is \_\_\_\_\_ miles per hour.

3. Jan designs a new logo for Kim's website. Kim pays Jan \$45 for 5 hours of work. How much money does Kim pay Jan per hour?

\_\_\_\_\_

4. At a discount grocery store, Jessica paid \$0.72 for an 8-ounce bottle of spring water. What is the cost of the spring water per ounce?

\_\_\_\_\_

5. A bucket is leaking. After 3 hours the bucket has leaked  $\frac{3}{4}$  of an ounce. How many ounces per hour is the bucket leaking?

$$\frac{\frac{3}{4} \text{ oz}}{3 \text{ h}} = \frac{3}{4} \div \frac{3}{1} = \frac{3}{4} \times \frac{1}{3} = \frac{\text{oz}}{1 \text{ h}}$$

\_\_\_\_\_

6. After 15 minutes a train has moved  $\frac{9}{2}$  miles toward its destination.  
How many miles per minute is the train moving?

\_\_\_\_\_

7. A snack that Reginald just bought has 150 calories in  $\frac{3}{4}$  of a serving.  
How many calories per serving is this?

$$\frac{150 \text{ cal}}{\frac{3}{4} \text{ serving}} = \frac{150}{1} \div \frac{3}{4} = \frac{150}{1} \times \frac{4}{3} = \frac{\text{cal}}{1 \text{ serving}}$$

**LESSON**  
**4-2**

# Constant Rates of Change

## Practice and Problem Solving: A/B

Use the table to determine whether the relationship is proportional. If so, write an equation for the relationship. Tell what each variable you used represents.

1. 

<b>Number of tickets</b>	2	3	4	5
<b>Total Cost (\$)</b>	54	81	108	135

- a. Proportional? \_\_\_\_\_
- b. Equation: \_\_\_\_\_
- c. Number of tickets: \_\_\_\_\_
- d. Total Cost: \_\_\_\_\_

2. 

<b>Weight (lb)</b>	4	5	46
<b>Total Cost (\$)</b>	17.40	21.75	200.10

- a. Proportional? \_\_\_\_\_
- b. Equation: \_\_\_\_\_
- c. Weight: \_\_\_\_\_
- d. Total cost: \_\_\_\_\_

3. 

<b>Time (h)</b>	2	3	4	5	6
<b>Pages Read</b>	50	75	90	110	120

\_\_\_\_\_

\_\_\_\_\_

4. 

<b>Time (h)</b>	2	3	4
<b>Distance (mi)</b>	80	120	160

\_\_\_\_\_

\_\_\_\_\_

The tables show proportional relationships. Find the constant of proportionality,  $k$ . Write an equation to represent the relationship between the two quantities. Tell what each variable represents.

5. 

<b>Pens</b>	3	6	9	12
<b>Boxes</b>	1	2	3	4

\_\_\_\_\_

\_\_\_\_\_

6. 

<b>Pack</b>	1	2	4	5
<b>Muffins</b>	6	12	24	30

\_\_\_\_\_

\_\_\_\_\_

7. a. Create a table to show how the number of days is related to the number of hours. Show at least 5 days.
- b. Is the relationship proportional? \_\_\_\_\_
  - c. Write an equation for the relationship. \_\_\_\_\_

**LESSON**  
**4-2**

**Constant Rates of Change**

*Practice and Problem Solving: C*

Answer the following questions.

1. Three tickets to attend an Off-Broadway show cost \$81, 4 tickets cost \$108, and 5 tickets cost \$135.
  - a. Show that the relationship between number and the cost is a proportional relationship by making a table of tickets for 1 to 5 tickets.

<b>Number of Tickets</b>					
<b>Total Cost (\$)</b>					

- b. The constant of proportionality  $k$  is \_\_\_\_\_.
  - c. Write an equation for the relationship: \_\_\_\_\_
2. On the seventh-grade trip to Washington, D.C., for every 8 students, there were 3 chaperones. Twelve chaperones were needed. How many students went on the trip?

**Determine whether the relationship is a proportional relationship. If so, write an equation for the relationship, and tell what each of your variables represents. If the relationship is not proportional, explain.**

3. Ty takes 1 hour to read 35 pages, 2 hours to read 70 pages, and 3 hours to read 105 pages.

4. There are 12 grams of protein in 2 ounces of almonds.

5.

<b>Weight (lb)</b>	4	5	6	7
<b>Cost (\$)</b>	18	22.5	27	31.5

6.

<b>Time (h)</b>	1	2	3	4
<b>Distance (mi)</b>	35	80	120	145

**LESSON**  
**2-2**

# Constant Rates of Change

## Practice and Problem Solving: D

Use the table to determine whether the relationship is proportional. If so, write an equation to show the relationship between the two quantities. Tell what each of the variables you used represents. The first one has been done for you.

1.

<b>Teams</b>	1	2	3	4
<b>Number of Players</b>	6	12	18	24

- a. Proportional? yes
- b. Equation:  $y = 6x$
- c. Number of teams:  $x$
- d. Number of players:  $y$

2.

<b>Time (h)</b>	1	2	3	4
<b>Cars Washed</b>	3	6	9	12

- a. Proportional? \_\_\_\_\_
- b. Equation: \_\_\_\_\_
- c. Number of hours: \_\_\_\_\_
- d. Cars washed: \_\_\_\_\_

3.

<b>Weight (lb)</b>	3	4	5
<b>Cost (\$)</b>	2.25	3.00	3.75

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

4.

<b>Time (min)</b>	2	3	4
<b>Songs Played</b>	10	14	20

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

The following tables show proportional relationships. Find the constant of proportionality,  $k$ . Then write an equation to show the relationship between the two quantities. Tell what each of the variables you used represents. The first one has been done for you.

5.

<b>Apples</b>	5	10	15	20
<b>Bags</b>	1	2	3	4

$k = \frac{1}{5}$

$y = \frac{1}{5}x;$

$x = \text{apples}; y = \text{bags}$

6.

<b>Cartons</b>	1	2	4	5
<b>Eggs</b>	12	24	48	60

$k =$  \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**LESSON**  
**4-3**

# Proportional Relationships and Graphs

## Practice and Problem Solving: A/B

Complete each table. Explain why the relationship is a proportional relationship.

1. A cashier earns \$8 per hour.

<b>Time (h)</b>	2	4		
<b>Pay (\$)</b>	16		40	72

\_\_\_\_\_

\_\_\_\_\_

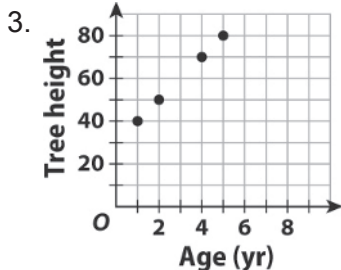
2. Tomatoes cost \$.70 per pound.

<b>Weight (lb)</b>	2		6	8
<b>Price (\$)</b>	1.40	2.10		

\_\_\_\_\_

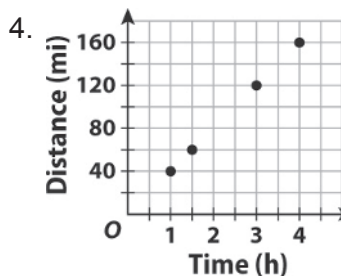
\_\_\_\_\_

Tell whether the relationship is a proportional relationship. Explain your answer.



\_\_\_\_\_

\_\_\_\_\_



\_\_\_\_\_

\_\_\_\_\_

The graph shows the relationship between the distance traveled by a car and the amount of fuel used by the car.

5. Explain the meaning of (2, 40).

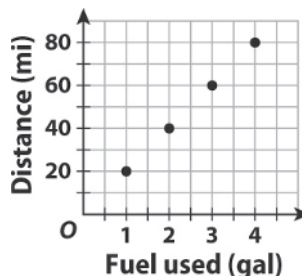
\_\_\_\_\_

\_\_\_\_\_

6. Write an equation for this relationship.

\_\_\_\_\_

\_\_\_\_\_



7. Suppose a compact car uses 1 gallon of fuel for every 27 miles traveled. How would the graph for the compact car compare to the graph for the car shown?

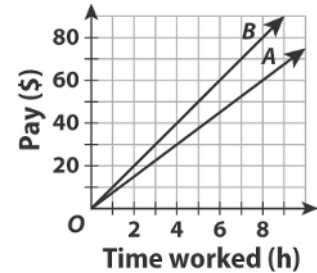
\_\_\_\_\_

**LESSON**  
**4-3**

# Proportional Relationships and Graphs

## Practice and Problem Solving: C

The graph shows the relationship between hours worked and money earned (in dollars) for two employees, A and B.



- Suppose both employees work the same amount of time. Determine which employee earns more money. Explain.

\_\_\_\_\_

\_\_\_\_\_

- Using the pay rates shown, determine the amount of money each employee earns for 15 hours of work.

\_\_\_\_\_

\_\_\_\_\_

- The pay rate for employee C is less than the pay rate for employee B and greater than the pay rate for employee A. Write an equation for the possible pay  $y$  in dollars that employee C earns working  $x$  hours.

\_\_\_\_\_

- Two companies offer digital cable television as described below.

Company A: \$39.99 per month with no installation fee

Company B: \$34.99 per month with a \$50 installation fee

For each company, tell whether the relationship between months of service and total cost is a proportional relationship. Explain why or why not.

\_\_\_\_\_

\_\_\_\_\_

The table shows the relationship between the length and width of 5 different U.S. flags.

<b>Width (ft), <math>x</math></b>	1.5	4.5	8	10.5	12.5
<b>Length (ft), <math>y</math></b>	3	9	16	21	25

- Is the relationship is a proportional relationship? If so, write an equation of the form  $y = kx$  for the relationship.

\_\_\_\_\_

- Explain how to determine whether a relationship shown in a table is a proportional relationship.

\_\_\_\_\_

\_\_\_\_\_

**LESSON**  
**4-3**

# Proportional Relationships and Graphs

## Practice and Problem Solving: D

Tell whether the relationship is a proportional relationship. Explain your answer. The first one is done for you.

1. Each shirt costs \$10.

<b>Shirts</b>	1	2	3	4
<b>Cost (\$)</b>	10	20	30	40

proportional; The cost is always

10 times the number of shirts.

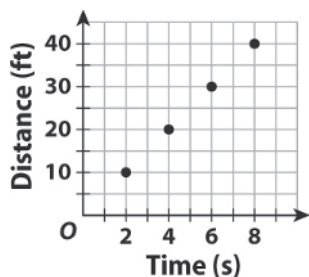
2. There are 50 crayons in each box.

<b>Boxes of crayons</b>	1	2	3
<b>Crayons</b>	50	100	150

\_\_\_\_\_

\_\_\_\_\_

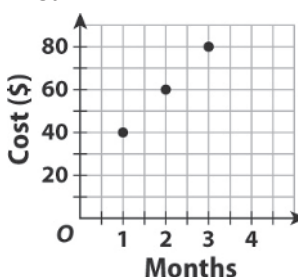
3. A person walks 5 feet per second.



\_\_\_\_\_

\_\_\_\_\_

4. A gym costs \$20 per month plus a fee.



\_\_\_\_\_

\_\_\_\_\_

Write an equation for the proportional relationship with the given constant of proportionality  $k$ . The first one is done for you.

5.  $k = 6$

$y = 6x$

6.  $k = 4$

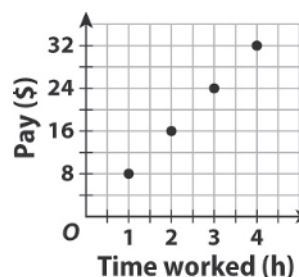
\_\_\_\_\_

7.  $k = \frac{1}{3}$

\_\_\_\_\_

8. The graph shows the relationship between the money earned and the number of hours worked. Determine the constant of proportionality for this relationship. Show your work.

\_\_\_\_\_





**LESSON**  
**5-1****Percent Increase and Decrease*****Practice and Problem Solving: A/B*****Find each percent increase. Round to the nearest percent.**

1. From 24 teachers to 30 teachers \_\_\_\_\_
2. From \$18 to \$45 \_\_\_\_\_
3. From 75 pencils to 225 pencils \_\_\_\_\_
4. From \$65 to \$144 \_\_\_\_\_
5. From 42 acres to 72 acres \_\_\_\_\_
6. From 95 trees to 145 trees \_\_\_\_\_

**Find each percent decrease. Round to the nearest percent.**

7. From 20 miles to 11 miles \_\_\_\_\_
8. From \$16 to \$4 \_\_\_\_\_
9. From 126 ounces to 48 ounces \_\_\_\_\_
10. From 84 seconds to 8 seconds \_\_\_\_\_
11. From 90 apples to 75 apples \_\_\_\_\_
12. From 248 workers to 200 workers \_\_\_\_\_

**Given the original amount and the percent of change, find the new amount.**

13. \$25; 300% increase \_\_\_\_\_
14. 160 bananas; 20% decrease \_\_\_\_\_
15. 56 books; 75% decrease \_\_\_\_\_
16. 52 companies; 25% increase \_\_\_\_\_
17. 12,000 miles; 5% increase \_\_\_\_\_
18. 710 points; 10% decrease \_\_\_\_\_

**Solve.**

19. Last year, there were 380 students at Woodland Middle School. This year, the student population will increase by 5%. What will be the school's increased student population?
- \_\_\_\_\_

20. A backpack that normally sells for \$39 is on sale for 33% off. Find the amount of the discount and the sale price.
- \_\_\_\_\_

21. In August, the Simons' water bill was \$48. In September, it was 15% lower. What was the Simons' water bill in September?
- \_\_\_\_\_

22. A gallery owner purchased a very old painting for \$3,000. The painting sells at a 325% increase in price. What is the retail price of the painting?
- \_\_\_\_\_

**LESSON**  
**5-1****Percent Increase and Decrease*****Practice and Problem Solving: C*****Solve.**

- Enrollment in the school orchestra was 340 last year. This year, it dropped 15%.
  - What is the enrollment this year? \_\_\_\_\_
  - If enrollment increases 15% next year, what will the enrollment be?  
  
Round to the nearest whole number. \_\_\_\_\_

- Rodrigo and Samantha work part-time selling magazine subscriptions. Their boss said that he wanted them to increase sales by 15% each week. As an incentive, whoever increases their sales by the higher percentage each week would get a bonus. The table below shows subscription sales for four weeks in a row.

**Number of Subscriptions Sold**

Worker	Week 1	Week 2	Week 3	Week 4
Rodrigo	17	25	18	27
Samantha	15	18	21	23

- Find Rodrigo's percent increase or decrease in sales each week.  
\_\_\_\_\_
  - Find Samantha's percent increase or decrease in sales each week.  
\_\_\_\_\_
  - Who received a bonus in weeks 2, 3, and 4?  
\_\_\_\_\_
  - After four weeks, did Rodrigo or Samantha meet their boss's goal? Explain.  
\_\_\_\_\_
- The Kelvin scale is an absolute temperature scale that can be used to calculate percent change in temperatures. The formula to convert Celsius to Kelvin is  $K = C + 273.15$ . What is the percent change if the temperature rises from  $21^{\circ}\text{C}$  to  $29^{\circ}\text{C}$ ? Round to the nearest tenth.  
\_\_\_\_\_

**LESSON**  
**5-1****Percent Increase and Decrease*****Practice and Problem Solving: D***

**Find each percent increase. Round to the nearest percent. The first one is done for you.**

1. From \$15 to \$21 40%
2. From 12 teachers to 48 teachers \_\_\_\_\_
3. From 80 pencils to 152 pencils \_\_\_\_\_
4. From 40 cans to 70 cans \_\_\_\_\_

**Find each percent decrease. Round to the nearest percent. The first one is done for you.**

5. From 80 miles to 15 miles 81%
6. From 100 ounces to 25 ounces \_\_\_\_\_
7. From \$60 to \$40 \_\_\_\_\_
8. From 39 seconds to 13 seconds \_\_\_\_\_

**Find the new amount given the original amount and the percent of change. The first one is done for you.**

9. \$25; 10% increase \$27.50
10. 160 bananas; 20% decrease \_\_\_\_\_
11. 200 books; 75% decrease \_\_\_\_\_
12. 52 companies; 25% increase \_\_\_\_\_

**Solve.**

13. Last year, there were 400 students at Woodland Middle School. This year, the student population will increase by 5%. What will be the school's student population this year?  
\_\_\_\_\_

14. A backpack that normally sells for \$39 is on sale for 30% off. Find the amount of the sale price.  
\_\_\_\_\_

**LESSON**  
**5-2****Rewriting Percent Expressions****Practice and Problem Solving: A/B**

Use the situation below to complete Exercises 1–6 in the table below.

Discounts R Us buys items at wholesale, then marks them up to set a retail sale price. Some of the items the store sells are shown in the table below.

Item	Wholesale Price	% Markup	\$ Markup	Retail Sale Price
1. Notebook	\$1.50	20%		
2. Scissors	\$3.25	40%		
3. Calculator	\$9.60	25%		
4. Sunglasses	\$12.50	78%		
5. Bicycle	\$78.00	55%		
6. Picture frame	\$2.99	150%		

Find the retail sale price of each item below. Round to two decimal places when necessary.

7. Original price: \$65.00; Markdown: 12%

\_\_\_\_\_

8. Original price: \$29.99; Markdown:  $33\frac{1}{3}\%$

\_\_\_\_\_

9. Original price: \$119.00; Markdown: 70%

\_\_\_\_\_

10. Original price: \$325.50; Markdown: 15%

\_\_\_\_\_

Use the information to complete 11–14.

A jewelry supply shop buys silver chains from a manufacturer for  $c$  dollars each, and then sells the chains at a 57% markup.

11. Write the markup as a decimal. \_\_\_\_\_

12. Write an expression for the retail price of a silver chain.

\_\_\_\_\_

13. What is the retail price of a silver chain purchased for \$45.00?

\_\_\_\_\_

14. How much was added to the original price of the chain? \_\_\_\_\_

## LESSON

## 5-2

**Rewriting Percent Expressions*****Practice and Problem Solving: C***

---

**Answer the questions about each situation.**

A clothing store offers various promotions to attract customers but wants to maintain the same amount of profit. To do this, the store marks up prices above retail and then advertises a deal that results in a markdown equivalent to the retail price. The retail price of a necktie is \$59.99. The store offers a “buy 2, get one free” deal on neckties.

1. What is the new retail price during this promotion? \_\_\_\_\_
2. What is the markup? \_\_\_\_\_
3. What is the markup percent on a tie during the promotion? \_\_\_\_\_

A sporting goods store sells jerseys with the name of the local football team. The store owner buys 80 jerseys at a wholesale price of \$55 each and applies his standard retail markup of 65%. When the local team made it to the playoffs, the store owner marked up the retail price by 25%. After the local team lost the championship, the store owner marked down that price by 33%.

4. What was the standard retail price of each jersey? \_\_\_\_\_
5. What was the price when the team was in the playoffs? \_\_\_\_\_
6. What was the price after the team lost the championship? \_\_\_\_\_

Two jewelry stores buy silver chains from a manufacturer for  $c$  dollars each, and then sell the chains at a 57% markup. Store A has a sale and marks down all chains by 20% off retail. In addition, customers can use a coupon worth 15% off the price of any item, including sale items. Store B offers a coupon worth 35% off any one item.

7. At Store A, Aurelie used a 15%-off coupon to buy a chain already marked down by 20%. Write an expression for the price of this chain.  
  
\_\_\_\_\_

8. At Store B, Tucker used a 35%-off coupon to buy a chain. Write an expression for the price of this chain.  
  
\_\_\_\_\_

9. Which store offers a better price on chains?  
  
\_\_\_\_\_

**LESSON**  
**5-2**

**Rewriting Percent Expressions**

***Practice and Problem Solving: D***

Answer each question. The first one is done for you.

1. Abdul buys dress pants from a clothing company for  $p$  dollars. He then sells each pair of pants in his men's clothing shop at a 40% markup.
  - a. Write the markup as a decimal. 0.40p
  - b. Write an expression for the retail price of a pair of dress pants.

\_\_\_\_\_

- c. What is the retail price of the pants that Abdul purchased for \$56.00?

\_\_\_\_\_

- d. How much did Abdul add to the original price of the pants?

\_\_\_\_\_

Complete the table. The first row is done for you.

Item	Price	% Markup	\$ Markup	Retail Price
2. Tie	\$30	20%	\$6.00	\$36.00
3. Cufflinks	\$10	35%		
4. Belt	\$40	25%		

Find the sale price of each item. Round to two decimal places when necessary. The first one is done for you.

5. Original price: \$65; Markdown: 10%
6. Original price: \$30.50; Markdown: 30%

58.50

\_\_\_\_\_

7. Original price: \$105; Markdown: 75%
8. Original price: \$325; Markdown: 15%

\_\_\_\_\_

\_\_\_\_\_

9. A jewelry supply shop buys silver chains from a manufacturer for  $c$  dollars each, and then sells the chains at a 40% markup. Write an expression for the retail price of a silver chain.

\_\_\_\_\_

**LESSON**  
**5-3**

**Applications of Percent**

*Practice and Problem Solving: A/B*

1. Complete the table.

Sale Amount	5% Sales Tax	Total Amount Paid
\$67.50		
\$98.75		
\$399.79		
\$1250.00		
\$12,500.00		

2. Complete the table.

Principal	Rate	Time	Interest Earned	New Balance
\$300	3%	4 years		
\$450		3 years	\$67.50	
\$500	4.5%		\$112.50	
	8%	2 years	\$108.00	

**Solve.**

3. Joanna wants to buy a car. Her parents loan her \$5,000 for 5 years at 5% simple interest. How much will Joanna pay in interest?

\_\_\_\_\_

4. This month Salesperson A made 11% of \$67,530. Salesperson B made 8% of \$85,740. Who made more commission this month? How much did that salesperson make?

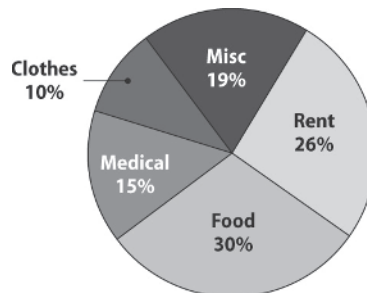
\_\_\_\_\_

5. Jon earned \$38,000 last year. He paid \$6,840 for entertainment. What percent of his earnings did Jon pay in entertainment expenses?

\_\_\_\_\_

6. Nora makes \$3,000 a month. The circle graph shows how she spends her money. How much money does Nora spend on each category?

- a. rent \_\_\_\_\_
- b. food \_\_\_\_\_
- c. medical \_\_\_\_\_
- d. clothes \_\_\_\_\_
- e. miscellaneous \_\_\_\_\_



**LESSON**  
**5-3****Applications of Percent****Practice and Problem Solving: C**

1. Complete the table.

Sale Amount	Tax	Amount of Tax	Total Cost
\$49.95		\$4.00	\$53.95
	5%	\$6.43	
\$499.99	7.5%		
		\$103.96	\$2,702.96
\$12,499.00	7%		

2. Complete the table

Principal	Rate	Time	Interest Earned	New Balance
\$2,400		6 months		\$2,442.00
	4.9%	2 years	\$4.41	
\$9,460.12		5 years		\$12,061.65
\$3,923.87	2.2%		\$64.74	

**Solve.**

3. Jorge earns a 9% commission on all of his sales. He had sales of \$89,400 for the month. Harris works for a different company, and also sold \$89,400 for the month but made \$447 more than Jorge. What is Harris' commission rate?

\_\_\_\_\_

4. Danielle wants to buy a video game. At the local Big Box store, it costs \$49.95. Danielle has a coupon for 10% off at the store, and she will pay a 6.5% sales tax. At an online store, the game is \$44.95, with \$4.00 shipping charge and no sales tax. Which purchase would be cheaper?

\_\_\_\_\_

5. A clothing store ran advertisements for a special sale. The store's ads read "Buy one at regular price, get a second one for half price." Explain how the terms of the clothing store's sale are different from offering a 50% discount. Use \$100 as the regular price for the item to write your explanation.

\_\_\_\_\_



**LESSON**  
**5-3****Applications of Percent****Practice and Problem Solving: D**

Complete the table to find the amount of sales tax to the nearest whole cent. The first one has been done for you.

1.

Sale Amount	5% Sales Tax
\$50	$0.05 \times \$50 = 2.5 = \$2.50$
\$120	
\$480	
\$2,240	
\$12,500	

Complete the table. The first one has been done for you.

2.

Principal	Rate	Time	Interest Earned
\$400	5%	2 years	\$40
\$950	10%	5 years	
\$50	4%	1 year	
\$1,000	8%	2 years	

Write the correct answer. The first one has been done for you.

3. Karl just had a birthday. Karl's age is now 50% of his uncle's age. Karl's uncle is 32 years old. How old is Karl?

**$0.5 \times 32 = 16$ , Karl is 16 years old.**

---

4. The cost of Jacquie's gym membership is \$20 per month. Jacquie gets a 10% discount of the monthly cost in any month in which she refers a friend who also becomes a member. How much does Jacquie save in a month when one of her friends joins the gym?
- 

5. Yesterday Tyler ate lunch at his local diner. The bill for his meal came to \$8.40, not including sales tax. Tyler wants to leave a 15% tip for his waiter. How much should his tip be?
-

## LESSON

## 6-1

**Algebraic Expressions*****Practice and Problem Solving: A/B***

---

**Write an algebraic expression for each phrase.**

1. Four more than the price,  $p$

\_\_\_\_\_

2. Five less than three times the length,  $L$

\_\_\_\_\_

**Write a word phrase for each algebraic expression.**

3.  $25 - 0.6x$

\_\_\_\_\_

4.  $\frac{2}{3}y + 4$

\_\_\_\_\_

**Use the Distributive Property to simplify each expression.**

5.  $(100 + 4z)20$

\_\_\_\_\_

6.  $0.75(3.5a - 6b)$

\_\_\_\_\_

**Factor each expression.**

7.  $45c + 10d$

\_\_\_\_\_

8.  $27 - 9x + 15y$

\_\_\_\_\_

**Solve. Show each step.**

9. A construction worker bought several bottles of juice for \$3 at the convenience store. She paid for them with a \$20 bill. If  $j$  represents the number of bottles of juice, write an expression for the change she should receive.

\_\_\_\_\_

10. A giant bamboo plant grew an average of 18 centimeters per year. The botanist started measuring the plant when it was 5 centimeters tall. If  $y$  represents the number of years the botanist has measured the plant, what expression represents its height?

\_\_\_\_\_

**LESSON**  
**6-1**

# Algebraic Expressions

## Practice and Problem Solving: C

An electrician has \$120 to spend on interior light fixtures. The wholesale price for a 13-watt low-energy lamp is \$4. The price for a high-energy lamp is \$5.

1. Write the algebraic expression for how much the electrician spends for  $a$  units of the low-energy lamp and  $b$  units of the high-energy lamp.

---

2. Write an *equation* that relates your answer to Exercise 1 to the amount of money the electrician has to spend.

---

3. Complete the table for the electrician's purchase. Assume that all of the \$120 is spent.

Number of low-energy lamps	Total Cost of low-energy lamps	Number of high-energy lamps	Total Cost of high-energy lamps	Total
5	a. \$ _____	b. _____	c. \$ _____	\$120
d. _____	e. \$ _____	16	f. \$ _____	\$120
15	g. \$ _____	h. _____	i. \$ _____	\$120
j. _____	k. \$ _____	l. _____	m. \$ _____	\$120

4. How does the *total* price for the high-energy lamps relate to the total price of the low-energy lamps? How does the *total* price for the low-energy lamps relate to the total price of the high-energy lamps?

---

5. The electrician wants to spend all of the \$120 and buy some of both types of lamps. If he wants to buy as many high-energy lamps as possible, how many of each type of lamp should he buy?

---

**LESSON**  
**6-1**

# Algebraic Expressions

## Practice and Problem Solving: D

Write an algebraic expression for each phrase by filling in the blanks.

The first is done for you.

1. Fifty less two tenths of  $m$ .

Write the expression for "Fifty less."

50 –

Two tenths = 0.2

0.2 "of  $m$ " is written as

0.2  $\times$   $m$ , or

0.2 $m$

Put the steps together.

"Fifty less" 50 –

"two tenths of  $m$ " 0.2 $m$  or

50 – 0.2 $m$

2. Ten less three tenths of  $n$ .

Write the expression for "Ten less."

\_\_\_\_\_

Three tenths = 0. \_\_\_\_\_

Three tenths of  $n$  is written as

0. \_\_\_\_\_  $m$ , or

0. \_\_\_\_\_  $n$ .

Put the steps together:

"Ten less than three tenths of  $n$ "

\_\_\_\_\_

Use the Distributive Property. Simplify the answer. The first one is done for you.

3.  $\frac{1}{4}(6x + 14y) =$

$\frac{1}{4} \cdot \underline{6x} + \frac{1}{4} \cdot \underline{14y} =$

$\frac{6}{4}x + \frac{14}{4}y = \frac{3}{2}x + \frac{7}{2}y$

4.  $\frac{1}{6}(15a + 20b) =$

\_\_\_\_\_  $\cdot$  \_\_\_\_\_ + \_\_\_\_\_  $\cdot$  \_\_\_\_\_ =

\_\_\_\_\_ + \_\_\_\_\_ = \_\_\_\_\_ + \_\_\_\_\_

Factor. The first one is done for you.

5.  $5x + 10y + 30z =$

5  $\cdot$   $x$  + 5  $\cdot$   $2y$  + 2  $\cdot$  3  $\cdot$  5 $z =$

5  $\cdot$  ( $x + 2y + 6z$ )

6.  $7a + 21b + 42c =$

\_\_\_\_\_  $\cdot$   $a$  + \_\_\_\_\_  $\cdot$   $3b$  + \_\_\_\_\_  $\cdot$  \_\_\_\_\_  $\cdot$  \_\_\_\_\_  $c =$

\_\_\_\_\_  $\cdot$  ( $a + 3b +$  \_\_\_\_\_  $c$ )

7.  $4x + 12$

\_\_\_\_\_

8.  $6s + 18t + 3w$

\_\_\_\_\_

## LESSON

## 6-2

**One-Step Equations with Rational Coefficients****Practice and Problem Solving: A/B****Solve by adding or subtracting.**

1.  $0.3n - 6 = -2$

2.  $y + 0.4 = 2$

3.  $7 = 0.5a - 5$

4.  $0 = \frac{1}{3}v + 1$

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

$n = \underline{\hspace{2cm}}$

$y = \underline{\hspace{2cm}}$

$a = \underline{\hspace{2cm}}$

$v = \underline{\hspace{2cm}}$

**Solve by multiplying or dividing.**

5.  $15.5z = -77.5$

6.  $\frac{t}{-11} = 11$

7.  $0.5m = 0.75$

8.  $\frac{r}{4} = 250$

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

$z = \underline{\hspace{2cm}}$

$t = \underline{\hspace{2cm}}$

$m = \underline{\hspace{2cm}}$

$r = \underline{\hspace{2cm}}$

**Write each sentence as an equation.**

9. Eight less than  $\frac{1}{3}$  a number  $n$  is  $-13$ .

10. A number  $f$  multiplied by  $-12.3$  is  $-73.8$ .

\_\_\_\_\_

\_\_\_\_\_

**Write an equation. Then, solve.**

11. During unusually cold weather, the temperature in Miami Beach was  $10^{\circ}\text{C}$ . This was 12 degrees more than in Tallahassee. What is the temperature in Tallahassee?

\_\_\_\_\_

12. A swimmer swam 48 kilometers in  $d$  days. What is the value of  $d$  if the swimmer swam an average of 3.2 kilometers daily?

\_\_\_\_\_

13. Fifteen tickets cost \$193.75. What is the average cost of each ticket?

\_\_\_\_\_

14. A student walks  $\frac{1}{4}$  mile from her home to the store on her way to a friend's house. If the store is  $\frac{1}{3}$  of the way to her friend's house, how far is her friend's house from her home?

\_\_\_\_\_

**LESSON**  
**6-2****One-Step Equations with Rational Coefficients****Practice and Problem Solving: C****Solve using addition, subtraction, multiplication, or division.**

1.  $0.6x = 3.2$

\_\_\_\_\_

2.  $m + 2.3 = 9.4$

\_\_\_\_\_

3.  $\frac{y}{0.23} = 12$

\_\_\_\_\_

4.  $z - 2.3 = 0.46$

\_\_\_\_\_

5.  $s + \frac{3}{7} = 6$

\_\_\_\_\_

6.  $\frac{5}{6}r = 4\frac{3}{5}$

\_\_\_\_\_

7.  $f - \frac{3}{4} = 1\frac{1}{2}$

\_\_\_\_\_

8.  $\frac{3m}{\frac{2}{3}} = 7$

\_\_\_\_\_

**Answer the questions.**

9. a. A painter works 37.5 hours one week. If she worked 5 days, how many hours did she work on average per day?

\_\_\_\_\_

- b. At \$15.75 per hour, how much did she make per day?

\_\_\_\_\_

10. A recipe calls for
- $3\frac{2}{3}$
- cups of flour. Earl used
- $7\frac{1}{3}$
- cups. How did he increase the recipe?

\_\_\_\_\_

11. You could use either of two operations to solve Exercise 10. Explain.

\_\_\_\_\_

\_\_\_\_\_

12. A bottle of fruit juice holds 1.89L. If Shakira bought almost 6L of fruit juice, how many bottles did she buy?

\_\_\_\_\_

13. Eric had 15.3 feet of fishing line. He cut off a piece and had 38.4 inches left. How long was the piece he cut?

\_\_\_\_\_

**LESSON**  
**6-2**

# One-Step Equations with Rational Coefficients

## Practice and Problem Solving: D

**Solve by adding or subtracting. The first one is done for you.**

1.  $x - 8 = 11$

$$x - 8 + \underline{8} = 11 + \underline{8}$$

$$x = \underline{19}$$

2.  $y - 3 = -2$

$$y - 3 + \underline{\quad} = -2 + \underline{\quad}$$

$$y = \underline{\quad}$$

3.  $w + 5 = 8$

$$w + 5 - \underline{\quad} = 8 - \underline{\quad}$$

$$w = \underline{\quad}$$

4.  $z + 7 = -14$

$$z + 7 - \underline{\quad} = -14 - \underline{\quad}$$

$$z = \underline{\quad}$$

**Solve by multiplying or dividing. The first one is done for you.**

5.  $\frac{a}{3} = 5$

$$\underline{3} \times \frac{a}{3} = \underline{3} \times 5$$

$$a = \underline{15}$$

6.  $4.5b = 27$

$$\frac{4.5b}{\underline{\quad}} = \frac{27}{\underline{\quad}}$$

$$b = \underline{\quad}$$

7.  $\frac{c}{5} = 6$

$$\underline{\quad} \times \frac{c}{5} = \underline{\quad} \times 6$$

$$c = \underline{\quad}$$

8.  $7.35d = 29.4$

$$\frac{7.35d}{\underline{\quad}} = \frac{29.4}{\underline{\quad}}$$

$$d = \underline{\quad}$$

**Solve by completing the steps. The first is done for you.**

9. Two angles of a triangle have a sum of  $110^\circ$ .  
The sum of all three angles in the triangle is  $180^\circ$ . What is the measure of the third angle?

Add the angle measures:  $\underline{110^\circ} + x$

What is the sum?  $\underline{180^\circ}$

Write the equation:  $\underline{110} + x = \underline{180}$

Solve the equation:  $x = \underline{70^\circ}$

10. A driver uses 2.7 gallons of gasoline to drive her car 72.9 miles.  
What was her car's mileage?

Define mileage:  $\underline{\quad}$  per  $\underline{\quad}$

Substitute and solve:  $\underline{\quad} \div$

$$\underline{\quad} = \underline{\quad}$$

The mileage is  $\underline{\quad}$  miles per gallon.

## LESSON

## 6-3

**Writing Two-Step Equations*****Practice and Problem Solving: A/B***

---

**Model each two-step operation by drawing algebra tiles.**

1.  $3m + 5 = 8$

\_\_\_\_\_

2.  $-2x - 3 = 5$ .

\_\_\_\_\_

**Write an equation to represent each problem.**

3. The sum of fifteen and six times a number  $t$  is eighty-one. What is the number?
- \_\_\_\_\_

4. An electrician charges \$40 to come to your house. She also charges \$55 for each hour that she works. The electrician charges you a total of \$190. How many hours does the electrician work at your house? Use  $h$  for the number of hours.
- \_\_\_\_\_

5. A taxi charges \$1.75 plus a fee of \$0.75 for each mile traveled. The total cost of a ride, without a tip, is \$4.75. How many miles is the trip? Use  $m$  for the number of miles traveled.
- \_\_\_\_\_



**LESSON**  
**6-3****Writing Two-Step Equations*****Practice and Problem Solving: C***

---

**Write a two-step equation for each word problem.**

1. The sum of a number  $p$  and seven is divided by twelve. The result is three. What is the number?

\_\_\_\_\_

2. Sixteen is divided by the sum of a number  $q$  and 1. The result is four. What is the number?

\_\_\_\_\_

3. A number  $s$  is subtracted from seven. When the result is divided by three, the quotient is two. What is the number?

\_\_\_\_\_

**Write a two-step equation to represent each problem.**

4. Twelve and three tenths more than five and thirteen thousandths of a number  $d$  is equal to fifteen and three hundred two thousandths. What is the value of  $d$ ?

\_\_\_\_\_

5. When the sum of an unknown number  $z$  and twenty-two is divided by the same unknown number, the quotient is twelve. What is the unknown number?

\_\_\_\_\_

6. A home repair crew charges seventy-five dollars per day plus two hundred fifty-five dollars for each hour the crew works. One day the crew works  $c$  hours and charges a total amount of one thousand, six hundred five dollars. How many hours does the crew work?

\_\_\_\_\_

**LESSON**  
**6-3****Writing Two-Step Equations****Practice and Problem Solving: D**

Model each two-step equation by drawing algebra tiles.  
The first one is done for you.

1.  $2p + 3 = 7$



2.  $3t + 10 = 16$

3.  $-q - 3 = 7$

Write an equation for each word problem. The first one is done for you.

4. The sum of three times a number
- $d$
- and 5 is 17. What is the number?

**$3d + 5 = 17$**

5. As a membership fee, a health club charges a one-time amount of \$40 and charges \$25 for each month. The total fee after
- $m$
- months is \$240. What is the value of
- $m$
- ?

6. A runner warms up for ten minutes and then takes seven minutes to run each mile. The total time after
- $r$
- miles is 45 minutes. How many miles are run?

## LESSON

## 6-4

**Solving Two-Step Equations***Practice and Problem Solving: A/B*

Solve each equation. Cross out each number in the box that matches a solution.

-18	-8	-6	-4	-3	-2	2	3	4	6	8	18
-----	----	----	----	----	----	---	---	---	---	---	----

1.  $5x + 8 = 23$

\_\_\_\_\_

2.  $-2p - 4 = 2$

\_\_\_\_\_

3.  $6a - 11 = 13$

\_\_\_\_\_

4.  $4n + 12 = 4$

\_\_\_\_\_

5.  $9g + 2 = 20$

\_\_\_\_\_

6.  $\frac{k}{6} + 8 = 5$

\_\_\_\_\_

7.  $\frac{s}{3} - 4 = 2$

\_\_\_\_\_

8.  $\frac{c}{2} + 5 = 1$

\_\_\_\_\_

9.  $9 + \frac{a}{6} = 8$

\_\_\_\_\_

Solve. Check each answer.

10.  $3v - 12 = 15$

\_\_\_\_\_

11.  $8 + 5x = -2$

\_\_\_\_\_

12.  $\frac{d}{4} - 9 = -3$

\_\_\_\_\_

Write an equation to represent the problem. Then solve the equation.

13. Two years of local Internet service costs \$685, including the installation fee of \$85. What is the monthly fee?

\_\_\_\_\_

14. The sum of two consecutive numbers is 73. What are the numbers?

\_\_\_\_\_

**LESSON**  
**6-4****Solving Two-Step Equations****Practice and Problem Solving: C**

Rewrite each equation so it is in the form  $ax + b = c$  or

$\frac{x + d}{e} = f$ , where  $x$  is a variable. Then solve the equation.

1.  $3x - 17 = x + 3$

\_\_\_\_\_

\_\_\_\_\_

2.  $6 + \frac{5x - 1}{3} = 10$

\_\_\_\_\_

\_\_\_\_\_

3.  $7 + \frac{3 - 4x}{5} = 0$

\_\_\_\_\_

\_\_\_\_\_

4.  $8 + 5x - 2 = -14$

\_\_\_\_\_

\_\_\_\_\_

5.  $x + 7 = 5x - 9$

\_\_\_\_\_

\_\_\_\_\_

6.  $\frac{x + 11}{3} - 5 = 1$

\_\_\_\_\_

\_\_\_\_\_

In each equation, one of the letters represents a variable and the other letters represent constants. Solve for the indicated variable and describe what operations you performed to solve for the variable.

7. Solve  $rs + t = u$  for the variable  $s$ .

\_\_\_\_\_

\_\_\_\_\_

8. Solve  $r(s + t) = u$  for the variable  $t$ .

\_\_\_\_\_

\_\_\_\_\_

9. Solve  $\frac{n + m}{p} = q$  for the variable  $n$ .

\_\_\_\_\_

\_\_\_\_\_

10. Solve  $\frac{m + n}{p} = q$  for the variable  $p$ .

\_\_\_\_\_

\_\_\_\_\_

**LESSON**  
**6-4****Solving Two-Step Equations*****Practice and Problem Solving: D***

Tell how to solve each two-step equation. Then solve it. The first one is done for you.

1.  $5x + 3 = 33$

**Subtract 3 from both sides;  $5x = 30$ . Then divide both sides by 5;  $x = 6$ .**

---

2.  $8y - 1 = 31$

---

3.  $\frac{1}{2}z + 5 = 11$

---

4.  $15 - 4t = 3$

---

5.  $\frac{1}{3}(q + 3) = 5$

---

**Solve. Check each answer.**

6.  $2m + 7 = 9$

---

7.  $3p - 5 = 19$

---

**Write an equation to represent the problem. Then solve the problem.**

**The first one is done for you.**

8. When 3 is subtracted from two times a number, the result is 17.

What is the number?

**$2n - 3 = 17; n = 10$**

9. The sum of half a number and 5 is 9. What is the number?

---

10. The sum of 15 and two times a number is 29. What is the number?

---

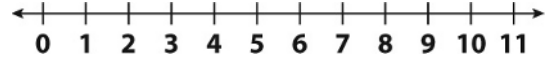
**LESSON**  
**7-1**

**Writing and Solving One-Step Inequalities**

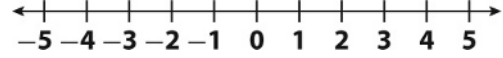
*Practice and Problem Solving: A/B*

Solve each inequality. Graph and check the solution.

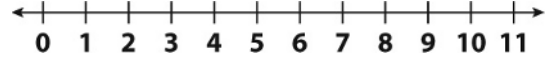
1.  $\frac{e}{2} < 3$  \_\_\_\_\_



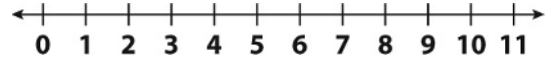
2.  $n - 1 > 3$  \_\_\_\_\_



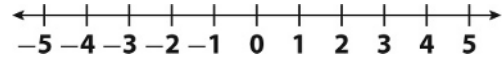
3.  $5 < 3 + w$  \_\_\_\_\_



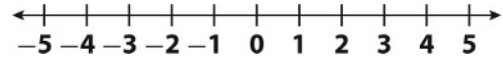
4.  $8 \leq 2m$  \_\_\_\_\_



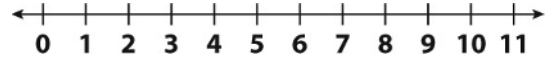
5.  $r - 4 < 1$  \_\_\_\_\_



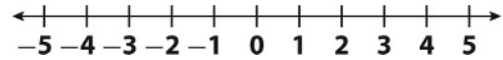
6.  $2 \leq -1t$  \_\_\_\_\_



7.  $2 \geq s - 2$  \_\_\_\_\_



8.  $2 \geq 5 + p$  \_\_\_\_\_



Solve each inequality.

9.  $\frac{1}{5} \leq \frac{x}{15}$  \_\_\_\_\_

10.  $9 > -r$  \_\_\_\_\_

11.  $-2 + b < 3$  \_\_\_\_\_

12.  $70 - a \geq 25$  \_\_\_\_\_

Write an inequality for each problem. Then solve.

13. Arthur earned \$136 in three weeks. He goes back to school in one more week. He needs at least \$189 to buy the new coat that he wants for school. How much must Arthur earn in the next week?

\_\_\_\_\_

14. Marna is playing a game where you score  $-5$  points each time you guess the correct answer. The goal is to get the lowest score. To win the game, Marna must have a score less than  $-80$  points. How many correct answers does Marna need to win the game?

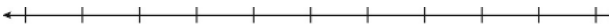
\_\_\_\_\_

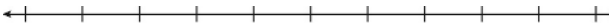
**LESSON**  
**7-1**

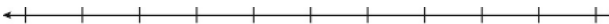
# Writing and Solving One-Step Inequalities


## Practice and Problem Solving: C

Solve each inequality. Graph and check the solution.

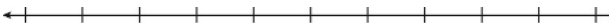
1.  $-3.2a \leq 8$  \_\_\_\_\_ 

2.  $2 > n + 0.8$  \_\_\_\_\_ 

3.  $b - 4.2 \geq -5$  \_\_\_\_\_ 

4.  $\frac{e}{2} < -0.5$  \_\_\_\_\_ 

5.  $5.1 - r \geq 5$  \_\_\_\_\_ 

6.  $-1.44 \leq -1.8y$  \_\_\_\_\_ 

**Write an inequality for each problem. Solve the inequality. Then solve the problem.**

7. Ashley took \$20 out of her savings account each week on Friday. How many weeks ago did she have at least \$250 in her account?

\_\_\_\_\_

8. A cube has a volume of greater than  $125 \text{ cm}^3$ . What are the possible lengths of the side of that cube?

\_\_\_\_\_

9. A treasure chest sinks at a rate no less than 20 feet per second. The floor of the ocean is at most at  $-4,200$  feet. Will the treasure chest reach the ocean floor in less than 3 minutes? Explain.

\_\_\_\_\_

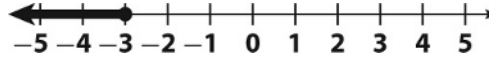
**LESSON**  
**7-1**

**Writing and Solving One-Step Inequalities**

*Practice and Problem Solving: D*

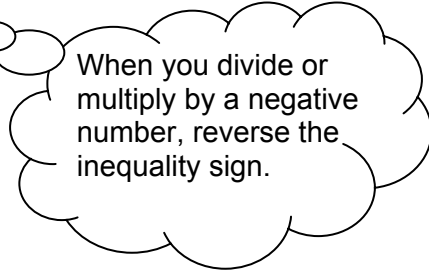
Solve each inequality. Graph and check the solution. The first one is done for you.

1.  $-2a \geq 6$        $a \leq -3$  \_\_\_\_\_

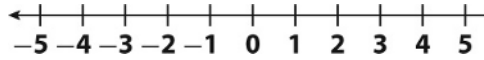


Check: Think:  
-5 is one solution because  $-5 \leq -3$ .  
Substitute -5 for  $a$ .  
 $(-2)(-5) ? 6$   
 $10 \geq 6 \checkmark$

$\frac{a}{-2} \leq \frac{6}{-2}$   
 $a \leq -3$

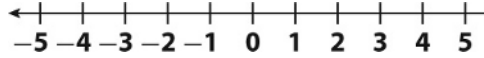


2.  $1 > n + 4$  \_\_\_\_\_



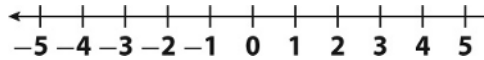
Check:

3.  $b - 2 \geq -2$  \_\_\_\_\_



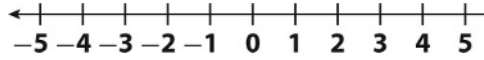
Check:

4.  $\frac{e}{2} < -1$  \_\_\_\_\_



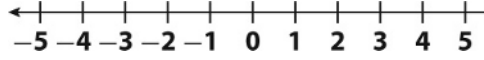
Check:

5.  $t + 2 \geq 3$  \_\_\_\_\_



Check:

6.  $\frac{c}{-2} < -2$  \_\_\_\_\_



Check:



**LESSON**  
**7-2****Writing Two-Step Inequalities****Practice and Problem Solving: A/B**

**Write an inequality for each description.**

1. Ten times a number increased by four is no more than twenty-five.

\_\_\_\_\_

2. Thirty subtracted from four times a number is greater than the opposite of ten.

\_\_\_\_\_

3. One fourth of the opposite of the difference of five and a number is less than twenty.

\_\_\_\_\_

**Write a description of each inequality.**

4.  $-5a + 3 > 1$

\_\_\_\_\_

5.  $27 - 2b \leq -6$

\_\_\_\_\_

6.  $\frac{1}{2}(c + 1) \geq 5$

\_\_\_\_\_

**Use the following situation to complete Exercise 7.**

7. The school photography club charges \$10 for each photo in its annual pet photo contest. The club wants to save \$75 of its earnings for a pizza party. The club members also want to have at least \$50 left over after the pizza party to pay for other club expenses.

Write an expression for:

- a. how much money the club earns by taking  $p$  pet photos

\_\_\_\_\_

- b. the difference between the amount the club earns and the amount for the pizza party

\_\_\_\_\_

- c. Now write a two-step inequality for finding the smallest number of photographs that need to be made to pay for the club's pizza party and have at least \$50 left over to pay club expenses.

\_\_\_\_\_

**LESSON**  
**7-2**

# Writing Two-Step Inequalities

## Practice and Problem Solving: C

**Write an inequality for each situation. Then, combine the inequalities into a *compound inequality*.**

1. A barge can safely haul no more than 400 tons across the river. The barge has an empty weight of 24 tons. The average weight of the railroad cars is 4 tons each. How many railroad cars can the barge haul?

\_\_\_\_\_

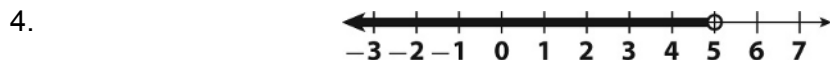
2. In order for the barge operator to meet his expenses, he has to haul at least 120 tons of freight. How many railroad cars must the barge operator haul on each trip to break even?

\_\_\_\_\_

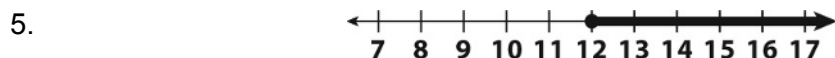
3. Write a compound inequality that gives the range of the number of railroad cars that the barge can haul which will allow the barge operator to break even.

\_\_\_\_\_

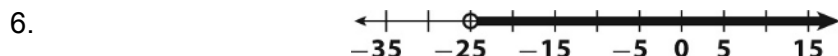
**Write a two-step inequality for the graph on each number line. Include addition, subtraction, multiplication or division.**



\_\_\_\_\_



\_\_\_\_\_



\_\_\_\_\_

7. Explain why the compound inequality,  $-5 < 3x < 10$ , is not considered a two-step inequality in the sense in which it used in this lesson.

\_\_\_\_\_

**LESSON**  
**7-2****Writing Two-Step Inequalities****Practice and Problem Solving: D**

**Write an inequality for each phrase. The first one is done for you.**

1. Four times a number is at least 2.

$$4x \geq 2$$

2. One third of the opposite of a number is less than 12.

3. A number increased by 5 is less than 7.

4. Ten less than a number is more than 30.

5. Two more than 5 times a number is greater than or equal to 3.

6. Six less than two times a number is no more than 17.

**Write an inequality for each situation. Show your work. The first one is done for you.**

7. An employee of a car wash earns \$12 for each car she washes. She always saves \$50 of her weekly earnings. This week, she wants to have at least \$100 in spending money. What is the fewest number of cars she must wash?

**Twelve times the number of cars she washes minus \$50 for her savings must be**

**greater than or equal to \$100. Twelve times the number of cars,  $n$ , is  $12n$ . Subtract**

**\$50 for her savings:  $12n - 50$ . This has to be at least \$100, so  $12n - 50 \geq 100$ .**

8. A video-game enthusiast saved \$750 to spend on a video game player and games. The player costs \$400. The games cost \$49 each. At most, how many games can the enthusiast buy along with the player?

9. A health-food producer has 250 samples of a new snack to distribute in the mall. The producer has to keep at least 50 samples for display in the health-food store for the product launch. How long will the samples last if consumers are taking the samples at a rate of 25 every hour?

**LESSON**  
**7-3**

## Solving Two-Step Inequalities

### Practice and Problem Solving: A/B

Fill in the blanks to show the steps in solving the inequality.

1.  $3x - 5 < 19$

$3x - 5 + \underline{\hspace{2cm}} < 19 + \underline{\hspace{2cm}}$

$3x < \underline{\hspace{2cm}}$

$3x \div \underline{\hspace{2cm}} < \underline{\hspace{2cm}} \div \underline{\hspace{2cm}}$

$x < \underline{\hspace{2cm}}$

2.  $-2x + 12 < -4$

$-2x + 12 - \underline{\hspace{2cm}} < -4 - \underline{\hspace{2cm}}$

$-2x < \underline{\hspace{2cm}}$

$-2x \div \underline{\hspace{2cm}} > \underline{\hspace{2cm}} \div \underline{\hspace{2cm}}$

$x > \underline{\hspace{2cm}}$

3. Why do the inequality signs stay the same in the last two steps of Exercise 1?

\_\_\_\_\_

4. Why is the inequality sign reversed in the last two steps of Exercise 2?

\_\_\_\_\_

Solve the inequalities. Show your work.

5.  $-7d + 8 > 29$

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

6.  $12 - 3b < 9$

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

7.  $\frac{z}{7} - 6 \geq -5$

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

8. Fifty students are trying to raise at least \$12,500 for a class trip. They have already raised \$1,250. How much should each student raise, on average, in order to meet the goal? Write and solve the two-step inequality for this problem.

\_\_\_\_\_  
\_\_\_\_\_

9. At the end of the day, vegetables at Farm Market sell for \$2.00 a pound, and a basket costs \$3.50. If Charlene wants to buy a basket and spend no more than \$10.00 total, how many pounds of vegetables can she buy? Write and solve the inequality.

\_\_\_\_\_

## LESSON

## 7-3

**Solving Two-Step Inequalities****Practice and Problem Solving: C**

Provide the missing steps needed to arrive at the two-step inequality.

Work backwards

1.  $a < -3$

2.  $b \geq 1$

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

$-5a + 2 > 17$

$3b + 4 \geq 7$

Use the description below for Exercises 3–5.

In Euclidean geometry, the sum of the lengths of 2 sides of a triangle is greater than the length of the third side. The lengths of 3 sides of a triangle are  $3x$ , 7, and 12.

3. Write three inequalities that apply for this triangle.

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

4. Find the value of  $x$  for each of the three inequalities.

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

5. What range of values of  $x$  satisfies all three inequalities?  
 Explain your answer.

\_\_\_\_\_

Write a description of each inequality listed below. Then, solve it.

6.  $-3 \geq \frac{1}{3}(6 - x)$

\_\_\_\_\_  
 \_\_\_\_\_

7.  $4(2x + 1) < -\frac{1}{2}$

\_\_\_\_\_  
 \_\_\_\_\_

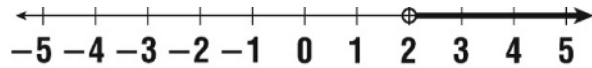
**LESSON**  
**7-3**

## Solving Two-Step Inequalities

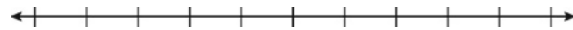
### Practice and Problem Solving: D

Solve. Then, graph each solution set. The first one is done for you.

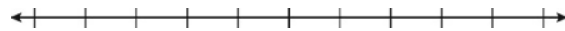
1.  $7y - 8 > 6$   $y > 2$



2.  $4d + 15 \leq -1$  \_\_\_\_\_



3.  $\frac{r}{-6} + 5 < 7$  \_\_\_\_\_



Give three solutions for each inequality. The first one is done for you.

4.  $5 + 2x > 9$

5.  $\frac{1}{5}(y + 10) \leq -25$

6.  $-3(1 - z) < 9$

3, 4, 5 \_\_\_\_\_

Solve the inequality for each problem. The first one is done for you.

7. An employee of a car wash earns \$12 for each car she washes. She always saves \$50 of her weekly earnings. This week, she wants to have at least \$100 in spending money. What is the fewest number of cars she must wash?

$$12n - 60 \geq 100$$

**Add 60 to both sides of the inequality:  $12n - 60 + 60 \geq 100 + 60$ ;  $12n \geq 160$ ; divide by**

**$12$ :  $n \geq 13\frac{1}{3}$ ; more than 13 cars have to be washed, so 14 cars have to be washed.**

8. A video-game enthusiast saved \$750 to spend on a video game player and games. The player costs \$400. The games cost \$49 each. At most, how many games can the enthusiast buy along with the player?

$$750 \geq 400 + 49x$$

---



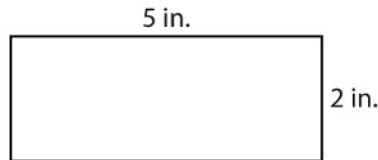
---

**LESSON**  
**8-1**

# Similar Shapes and Scale Drawings

## Practice and Problem Solving: A/B

1. The plan of a terrace is shown at right. The scale is 2 inches : 6 feet. What are the length and width of the terrace? Find the terrace's area.

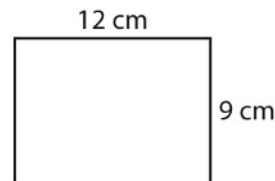


Length: \_\_\_\_\_

Width: \_\_\_\_\_

Area: \_\_\_\_\_

2. The floor plan of a ballroom is shown at right. The scale is 3 centimeters : 4 meters. What are the length and width of the ballroom? Find the ballroom's area.



Length: \_\_\_\_\_

Width: \_\_\_\_\_

Area: \_\_\_\_\_

3. A garage floor measures 150 feet by 120 feet. A scale drawing of the floor on grid paper uses a scale of 1 unit : 15 feet. What are the dimensions of the drawing?

\_\_\_\_\_

4. The scale model of a skyscraper being built is 4.2 feet tall.
- When it is finished, the skyscraper will be 525 meters tall. What scale was used to make the model?

\_\_\_\_\_

- The model is made out of a stack of plywood sheets. Each sheet is 0.6 inch thick. How many sheets of plywood tall is the model?

\_\_\_\_\_

5. You have been asked to build a scale model of a restaurant out of bottle caps. The restaurant is 20 feet tall. Your scale is 2.4 cm : 1 foot.

- A bottle cap is 1.2 cm tall. About how many bottle caps tall will your model be?

\_\_\_\_\_

- You are out of bottle caps, and decide to use popsicle sticks instead. You measure them, and they are 15.2 cm tall. How many popsicle sticks tall will your model be?

\_\_\_\_\_

**LESSON**  
**8-1**

**Similar Shapes and Scale Drawings**

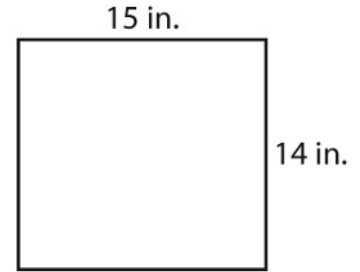
*Practice and Problem Solving: C*

1. A scale drawing of a patio is shown at right. The scale is 4 inches : 6.8 feet. What are the length and width of the patio? Find the patio's area.

Length: \_\_\_\_\_

Width: \_\_\_\_\_

Area: \_\_\_\_\_



2. The scale for a scale drawing is 8 millimeters : 1 centimeter. Which is larger, the actual object or the scale drawing? Explain.

\_\_\_\_\_

\_\_\_\_\_

3. Carol has a small copy of a painting. The dimensions of her copy are shown at right. The scale of the copy is 0.5 inches : 12 centimeter.

- a. Find the dimensions of the original painting.

\_\_\_\_\_

- b. Find the area of the original painting.

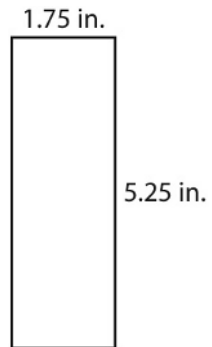
\_\_\_\_\_

- c. One centimeter is equal to approximately 0.033 foot. Find the dimensions of the original painting in feet. Round to the nearest thousandth.

\_\_\_\_\_

- d. Find the area of the original painting in square feet. Round to the nearest thousandth.

\_\_\_\_\_



4. On a scale drawing, a bookshelf is 8 inches tall. The scale factor is  $\frac{1}{8}$ .

What is the height of the bookshelf?

\_\_\_\_\_

5. On a scale drawing, a school is 1.6 feet tall. The scale factor is  $\frac{1}{22}$ .

Find the height of the school.

\_\_\_\_\_



**LESSON**  
**8-1**

# Similar Shapes and Scale Drawings

## Practice and Problem Solving: D

1. A room in a house is shown on a blueprint. The blueprint has a scale of 5 inches : 8 feet. A wall in the same blueprint is 30 inches. Complete the table. The first column is done for you.

<b>Blueprint Length (in.)</b>	5	10		20		
<b>Actual Length (ft)</b>	8	16	24		40	48

- a. How long is the actual wall? \_\_\_\_\_
- b. A door in the room has a width of 4 feet. What is the width of the door in the blueprint?

\_\_\_\_\_

2. The scale of a room in a blueprint is 2 inches : 1 foot. A window in the same blueprint is 12 inches. Complete the table.

<b>Blueprint Length (in.)</b>	2	4		8		12
<b>Actual Length (ft)</b>	1		3		5	

- a. How long is the actual window? \_\_\_\_\_
- b. A mantel in the room has an actual width of 8 feet. What is the width of the mantel in the blueprint?

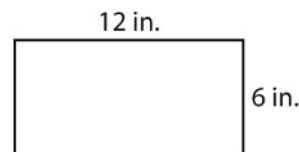
\_\_\_\_\_

3. The scale in the drawing is 2 inches : 4 feet. What are the length and width of the actual room? Find the area of the actual room.

Length: \_\_\_\_\_

Width: \_\_\_\_\_

Area: \_\_\_\_\_



4. A studio apartment has a floor that measures 80 feet by 64 feet. A scale drawing of the floor on grid paper uses a scale of 1 unit : 8 feet. What are the dimensions of the scale drawing?

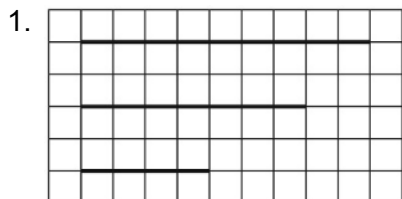
\_\_\_\_\_

**LESSON**  
**8-2**

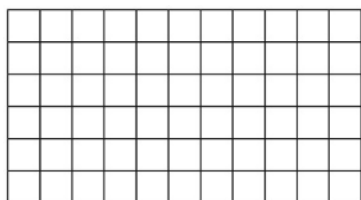
# Geometric Drawings

## Practice and Problem Solving: A/B

Use each set of line segments to sketch a triangle. If a triangle cannot be drawn, explain why.

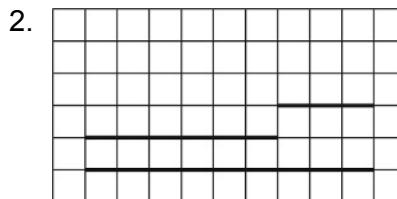


Sketch:

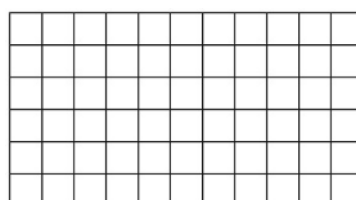


\_\_\_\_\_

\_\_\_\_\_



Sketch:



\_\_\_\_\_

\_\_\_\_\_

Can each set of line segments form a triangle? Why or why not?

3.  $\overline{AB} = \frac{1}{2}$  mile

$\overline{BC} = \frac{1}{3}$  mile

$\overline{AC} = \frac{1}{4}$  mile

4.  $\overline{DE} = 0.205$  kilometer

$\overline{EF} = 0.01$  kilometer

$\overline{DF} = 0.02$  kilometer

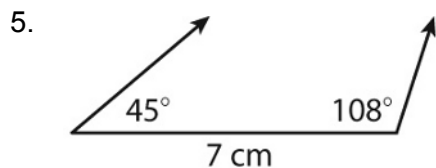
\_\_\_\_\_

\_\_\_\_\_

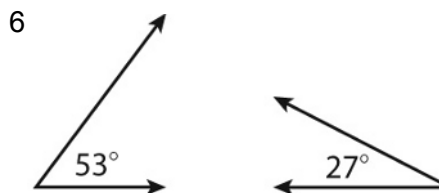
\_\_\_\_\_

\_\_\_\_\_

How many triangles are formed by the angles and sides—one, none, or many?



\_\_\_\_\_



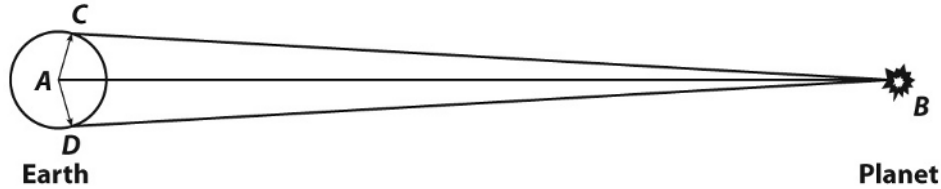
\_\_\_\_\_

**LESSON**  
**8-2**

**Geometric Drawings**

*Practice and Problem Solving: C*

Astronomers often use triangles to compute the distance between Earth and other planets in the solar system. The diagram below shows how triangles are used in this process.



1. Triangles  $ABC$  and  $ABD$  are right triangles. Where are the right angles?  
 \_\_\_\_\_  
 \_\_\_\_\_
2. What is the distance  $AC$  in this diagram called? (*Hint: What part of the circle is it? How does it compare to  $AD$ ?*)  
 \_\_\_\_\_
3. Without using exact numbers, compare the distance  $AC$  with the distance  $BC$ ?  
 \_\_\_\_\_
4. Without using exact numbers, compare the distances  $AB$  and  $BC$ .  
 \_\_\_\_\_
5. Since  $ABC$  is a right triangle, how does the distance  $AB$  compare to  $BC$ ? Is it equal, greater than, or less than? Why?  
 \_\_\_\_\_
6. If you did **not** know that  $ABC$  is a right triangle, what kind of triangle would Exercise 4 suggest that  $ABC$  is? Why?  
 \_\_\_\_\_
7. The astronomer would like to know the distance  $AB$  from Earth's center to the planet. The astronomer knows the distance  $AC$  and that  $ABC$  is a right triangle. What other angles or sides could the astronomer measure to help find the distance  $AB$ ?  
 \_\_\_\_\_  
 \_\_\_\_\_

**LESSON**  
**8-2**

**Geometric Drawings**

*Practice and Problem Solving: D*

Answer the questions. The first one is started for you.



How long are the two line segments?

**3 units and 4 units**

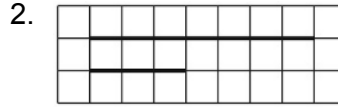
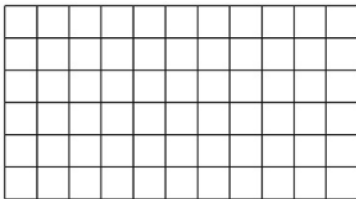
To form a triangle, how long must a third line segment be?

**less than 7 units but greater**

**than 1 unit**

Choose a third side length, and then draw the triangle on the grid.

Third side length: \_\_\_\_\_

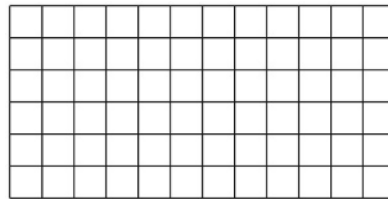


How long are the two line segments?

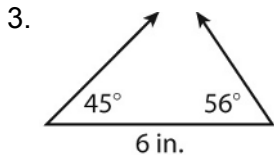
To form a triangle, how long must a third line segment be?

Choose a third side length, and then draw the triangle on the grid.

Third side length: \_\_\_\_\_



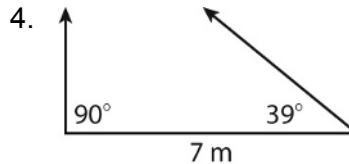
Answer the questions. The first one is started for you.



What is the sum of the two angle measures?

**101°**

If these angles formed a triangle, what would be the measure of the third angle?



What is the sum of the two angle measures?

If these angles formed a triangle, what would be the measure of the third angle?

**LESSON**  
**8-3**

# Cross Sections

## Practice and Problem Solving: A/B

What is the common set of points for these figures called—an *intersection* or a *cross section*? Place a check mark by the correct name. Describe the geometric figure formed by the common points. Assume that the two figures have more than one point in common.

1. A circle and the lateral surface of a cone.

Cross section \_\_\_\_\_ Intersection \_\_\_\_\_

Figure formed: \_\_\_\_\_

2. The edge of a square and the base of a pyramid.

Cross section \_\_\_\_\_ Intersection \_\_\_\_\_

Figure formed: \_\_\_\_\_

3. A plane that is perpendicular to the base of a cube and slices through the cube.

Cross section \_\_\_\_\_ Intersection \_\_\_\_\_

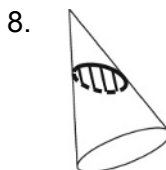
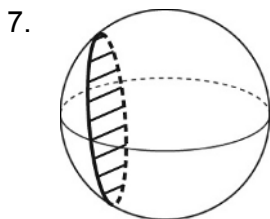
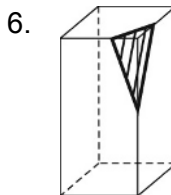
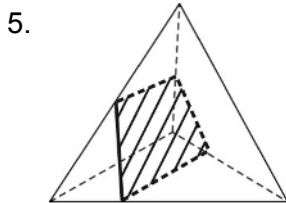
Figure formed: \_\_\_\_\_

4. A circle with an area bigger than the base of a pyramid and slicing parallel to the base through the pyramid between its apex and its base.

Cross section \_\_\_\_\_ Intersection \_\_\_\_\_

Figure formed: \_\_\_\_\_

Name or describe the geometric figure that is shaded. Each shaded region results from a plane passing through the solid.



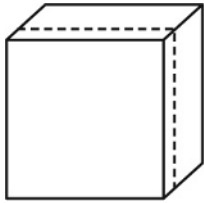
**LESSON**  
**8-3**

**Cross Sections**

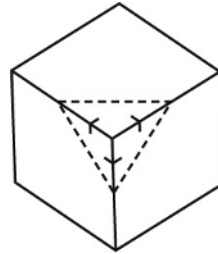
*Practice and Problem Solving: C*

Two identical cubes are intersected by a plane, resulting in two different cross sections as shown. Answer the questions about the two cross sections.

Cross section X



Cross section Y



1. The plane that created cross section X sliced through the cube parallel to one of its sides. What type of figure is this? Explain.

---



---

2. The plane that created cross section Y sliced through the corner of the cube in such a way that it intersected the midpoints of the sides of the cube. What type of triangle is formed by this cross section? Explain.

---



---

A plane intersects a cylinder. In Diagram A, the plane is perpendicular to the long axis of the cylinder. In Diagram B, the plane is tilted relative to the cylinder axis. In Diagram C, the plane is tilted even more. In Diagram D, the plane passes through the cylinder along its axis. Answer the questions.

Diagram A

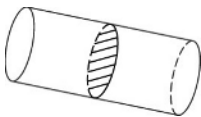


Diagram B

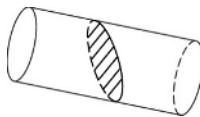


Diagram C

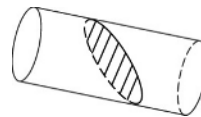
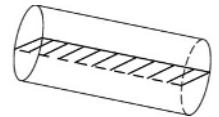


Diagram D



3. What shape are the cross sections in Diagrams A, B, C and D?

---



---

4. Compare the areas of the four cross sections.

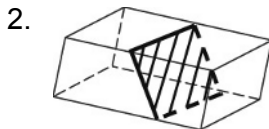
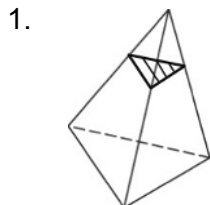
---

**LESSON**  
**8-3**

# Cross Sections

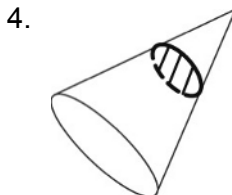
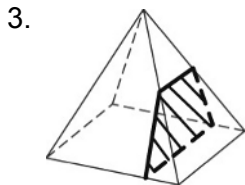
## Practice and Problem Solving: D

Describe the shape that is formed by the cross section. The first one is done for you.

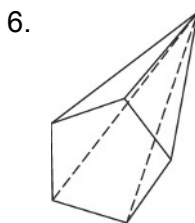
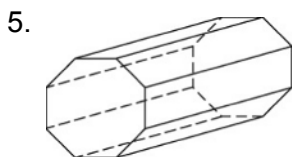


a triangle that is similar to the base

---



Draw cross sections for these figures that are parallel to their bases.

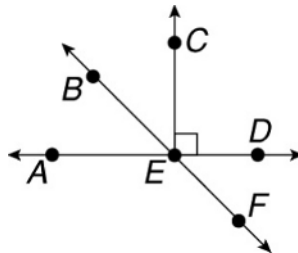


**LESSON**  
**8-4**

# Angle Relationships

## Practice and Problem Solving: A/B

For Exercises 1–3, use the figure.



1. Name a pair of vertical angles.

\_\_\_\_\_

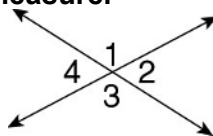
2. Name a pair of complementary angles.

\_\_\_\_\_

3. Name a pair of supplementary angles.

\_\_\_\_\_

Use the diagram to find each angle measure.



4. If  $m\angle 1 = 120^\circ$ , find  $m\angle 3$ .

\_\_\_\_\_

5. If  $m\angle 2 = 13^\circ$ , find  $m\angle 4$ .

\_\_\_\_\_

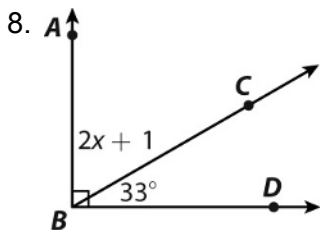
6. If  $m\angle 3 = 110^\circ$ , find  $m\angle 2$ .

\_\_\_\_\_

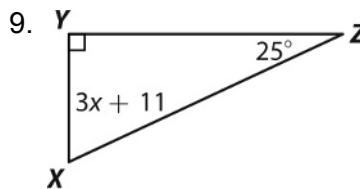
7. If  $m\angle 4 = 65^\circ$ , find  $m\angle 1$ .

\_\_\_\_\_

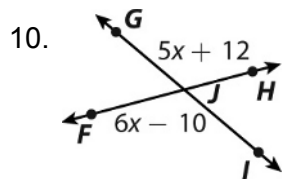
Find the value of  $x$  in each figure.



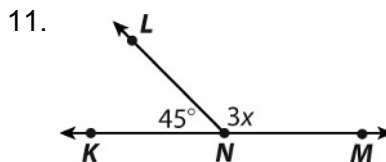
\_\_\_\_\_



\_\_\_\_\_



\_\_\_\_\_



\_\_\_\_\_

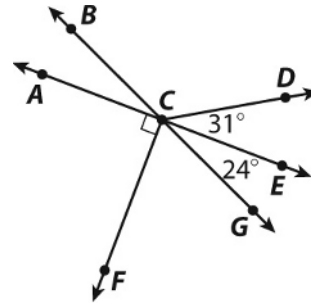


**LESSON**  
**8-4**

**Angle Relationships**

*Practice and Problem Solving: C*

For Exercises 1–4, use the figure.



1. Find  $m\angle FCG$ .

\_\_\_\_\_

2. Find  $m\angle BCD$ .

\_\_\_\_\_

3. Find  $m\angle FCB$ .

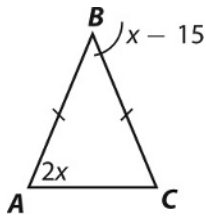
\_\_\_\_\_

4. Find  $m\angle ACG$ .

\_\_\_\_\_

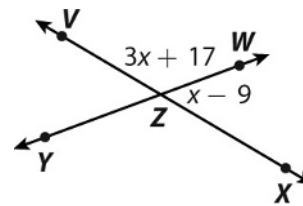
Find the value of  $x$  in each figure.

5.



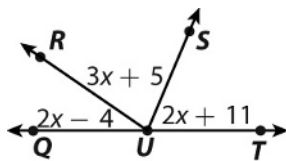
\_\_\_\_\_

6.



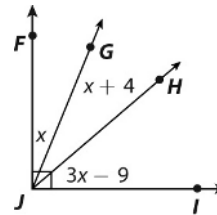
\_\_\_\_\_

7.



\_\_\_\_\_

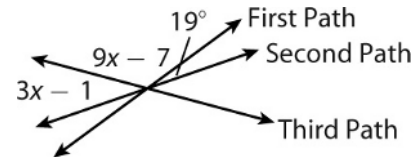
8.



\_\_\_\_\_

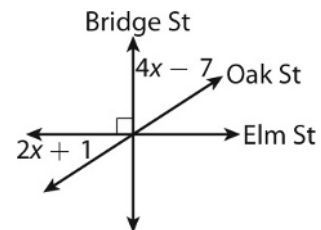
9. The walking paths at a park meet each other as shown. What is the measure of the angle between the Second Path and Third Path?

\_\_\_\_\_



10. Three streets meet each other as shown. What is the measure of the angle between Oak Street and Elm Street?

\_\_\_\_\_

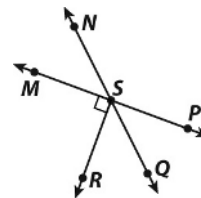


**LESSON**  
**8-4**

# Angle Relationships

## Practice and Problem Solving: D

For Exercises 1–3, use the figure. The first one is done for you.



1. Name a pair of vertical angles.

$\angle PSQ$  and  $\angle MSN$

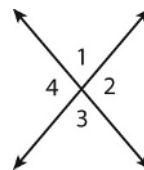
2. Name a pair of complementary angles.

\_\_\_\_\_

3. Name a pair of supplementary angles.

\_\_\_\_\_

Use the diagram to find each angle measure.  
The first one is done for you.



4. If  $m\angle 3 = 60^\circ$ , find  $m\angle 1$ .

$\angle 1$  and  $\angle 3$  are vertical angles,  
so  $m\angle 1 = 60^\circ$

5. If  $m\angle 4 = 100^\circ$ , find  $m\angle 2$ .

\_\_\_\_\_

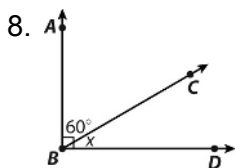
6. If  $m\angle 1 = 50^\circ$ , find  $m\angle 2$ .

\_\_\_\_\_

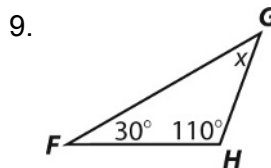
7. If  $m\angle 2 = 125^\circ$ , find  $m\angle 3$ .

\_\_\_\_\_

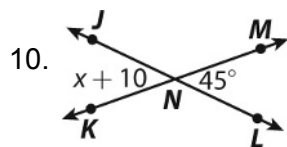
Find the value of  $x$  in each figure. The first one is done for you.



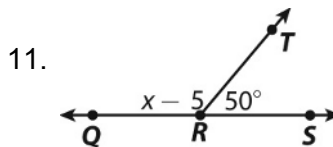
$m\angle ABC + m\angle CBD = 90$ , so  $x = 30$



\_\_\_\_\_



\_\_\_\_\_



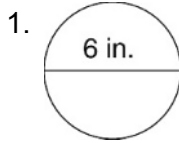
\_\_\_\_\_

**LESSON**  
**9-1**

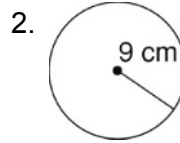
**Circumference**

*Practice and Problem Solving: A/B*

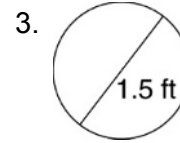
Find the circumference of each circle. Use 3.14 or  $\frac{22}{7}$  for  $\pi$ . Round to the nearest hundredth, if necessary.



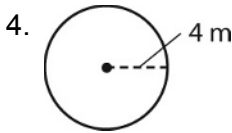
\_\_\_\_\_



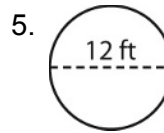
\_\_\_\_\_



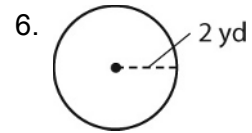
\_\_\_\_\_



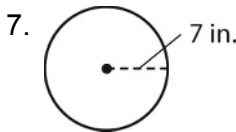
\_\_\_\_\_



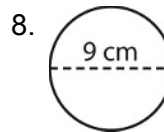
\_\_\_\_\_



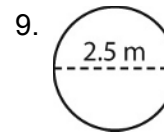
\_\_\_\_\_



\_\_\_\_\_



\_\_\_\_\_



\_\_\_\_\_

**Solve.**

10. A circular swimming pool is 21 feet in diameter. What is the circumference of the swimming pool? Use  $\frac{22}{7}$  for  $\pi$ .

\_\_\_\_\_

11. A jar lid has a diameter of 42 millimeters. What is the circumference of the lid? Use  $\frac{22}{7}$  for  $\pi$ .

\_\_\_\_\_

12. A frying pan has a radius of 14 centimeters. What is the circumference of the frying pan? Use  $\frac{22}{7}$  for  $\pi$ .

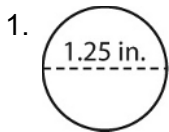
\_\_\_\_\_

**LESSON**  
**9-1**

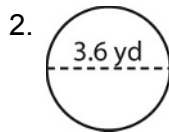
# Circumference

## Practice and Problem Solving: C

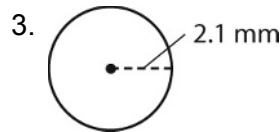
Find the circumference of each circle. Use 3.14 or  $\frac{22}{7}$  for  $\pi$ . Round to the nearest hundredth, if necessary.



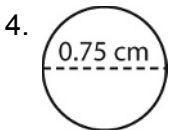
\_\_\_\_\_



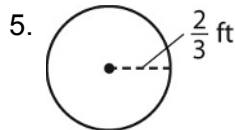
\_\_\_\_\_



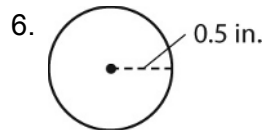
\_\_\_\_\_



\_\_\_\_\_



\_\_\_\_\_



\_\_\_\_\_

**Solve each problem.**

7. The circumference of a clock is 22 inches. What is the radius of the clock?

\_\_\_\_\_

8. The circumference of a circular hot tub at a hotel is 56.5 yards. What is the diameter of the hot tub?

\_\_\_\_\_

9. In NCAA basketball rules, the basketball can have a maximum circumference of 30 inches. What is the maximum diameter of an NCAA basketball to the nearest hundredth?

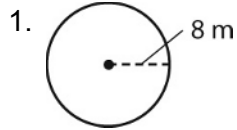
\_\_\_\_\_

10. Melanie wants to put ribbon around the circumference of a circular section of the city park. Ribbon comes in rolls of 40 feet. The radius of the section of the park is 100 feet. How many rolls of ribbon should Melanie buy?

\_\_\_\_\_

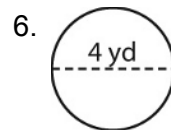
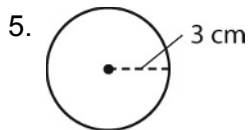
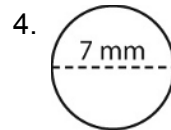
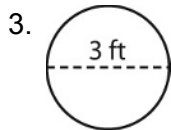
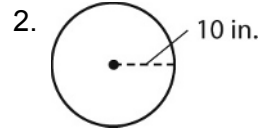
**LESSON**  
**9-1****Circumference****Practice and Problem Solving: D**

Find the circumference of each circle. Use 3.14 or  $\frac{22}{7}$  for  $\pi$ . Round to the nearest tenth, if necessary. The first one is done for you.



$$C = 2\pi r \approx 2(3.14)(8) \approx 50.24; 50.2 \text{ m}$$

---



**Solve each problem.**

7. A circular patio has a diameter of 35 yards. What is the circumference of the patio? Use  $\frac{22}{7}$  for  $\pi$ .
- 

8. A paper plate has a diameter of 9 inches. What is the circumference of the plate? Use  $\frac{22}{7}$  for  $\pi$ .
- 

9. A circular light fixture has a radius of 20 centimeters. What is the circumference of the light fixture? Use  $\frac{22}{7}$  for  $\pi$ .
-

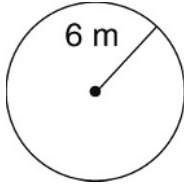
**LESSON**  
**9-2**

**Area of Circles**

*Practice and Problem Solving: A/B*

Find the area of each circle to the nearest tenth. Use 3.14 for  $\pi$ .

1.



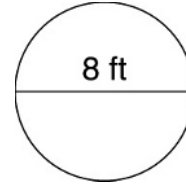
A  $113 \text{ m}^2$

B  $37.7 \text{ m}^2$

C  $354.9 \text{ m}^2$

D  $452.16 \text{ m}^2$

2.



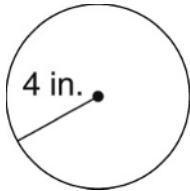
A  $201 \text{ ft}^2$

B  $50.2 \text{ ft}^2$

C  $25.1 \text{ ft}^2$

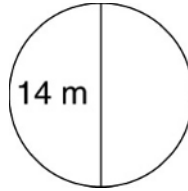
D  $157.8 \text{ ft}^2$

3.



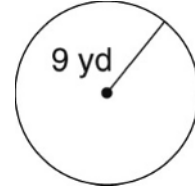
\_\_\_\_\_

4.



\_\_\_\_\_

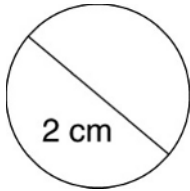
5.



\_\_\_\_\_

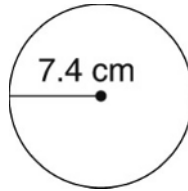
Find the area of each circle in terms of  $\pi$ .

6.



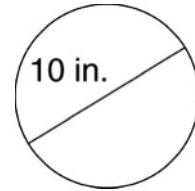
\_\_\_\_\_

7.



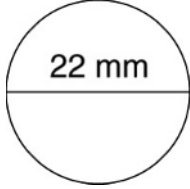
\_\_\_\_\_

8.



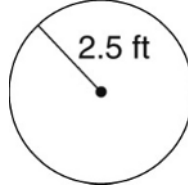
\_\_\_\_\_

9.



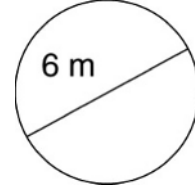
\_\_\_\_\_

10.



\_\_\_\_\_

11.



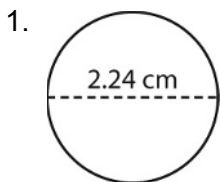
\_\_\_\_\_

**LESSON**  
**9-2**

# Area of Circles

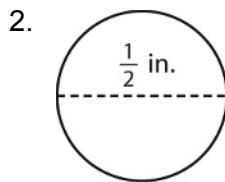
## Practice and Problem Solving: C

Find the area of each circle in terms of  $\pi$ . Then find the area to the nearest tenth using 3.14 for  $\pi$ .



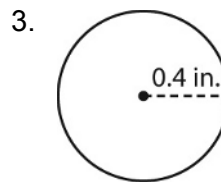
\_\_\_\_\_

\_\_\_\_\_



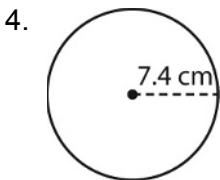
\_\_\_\_\_

\_\_\_\_\_



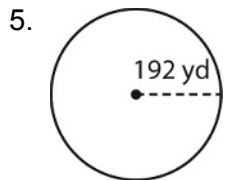
\_\_\_\_\_

\_\_\_\_\_



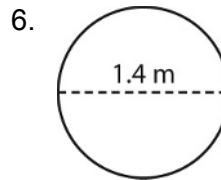
\_\_\_\_\_

\_\_\_\_\_



\_\_\_\_\_

\_\_\_\_\_



\_\_\_\_\_

\_\_\_\_\_

Use the formula  $C^2 = 4\pi A$  to find the area  $A$  of each circle in terms of  $\pi$ .

7.  $C = 2\pi$

\_\_\_\_\_

8.  $C = 5\pi$

\_\_\_\_\_

9.  $C = 8\pi$

\_\_\_\_\_

**Solve.**

10. A vanilla cake has a diameter of 8 inches. A chocolate cake has a diameter of 10 inches. What is the difference in area between the top surfaces of the two cakes? Use 3.14 for  $\pi$ .

\_\_\_\_\_

11. What is the difference in area between a circle with a diameter of 3 meters and a square with a side length of 3 meters? Use 3.14 for  $\pi$ .

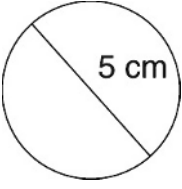
\_\_\_\_\_

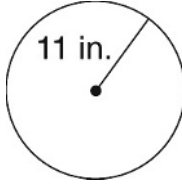
**LESSON**  
**9-2**

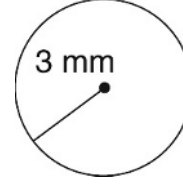
**Area of Circles**

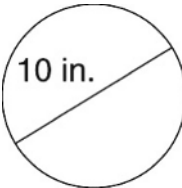
**Practice and Problem Solving: D**

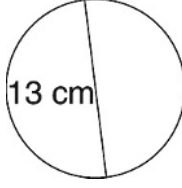
Find the area of each circle to the nearest tenth. Use 3.14 for  $\pi$ . The first problem is done for you.

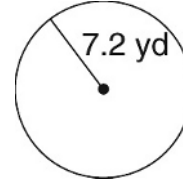
1.    
 19.6 cm<sup>2</sup>

2.    
 \_\_\_\_\_

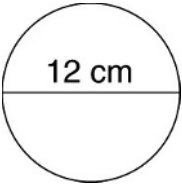
3.    
 \_\_\_\_\_


4.    
 \_\_\_\_\_

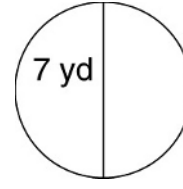
5.    
 \_\_\_\_\_

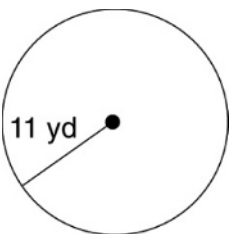
6.    
 \_\_\_\_\_

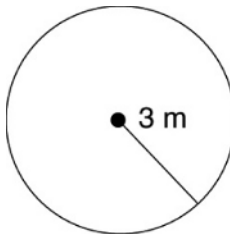
Find the area of each circle in terms of  $\pi$ . The first problem is done for you.

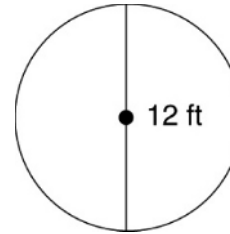
7.    
  $36\pi$  cm<sup>2</sup>

8.    
 \_\_\_\_\_

9.    
 \_\_\_\_\_

10.    
 \_\_\_\_\_

11.    
 \_\_\_\_\_

12.    
 \_\_\_\_\_

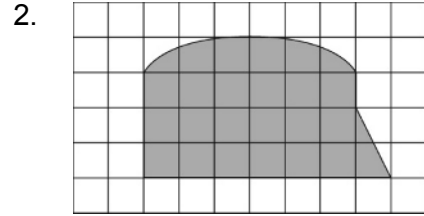
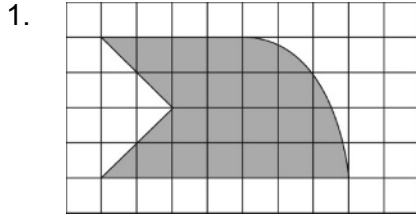


**LESSON**  
**9-3**

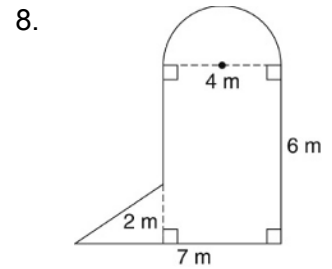
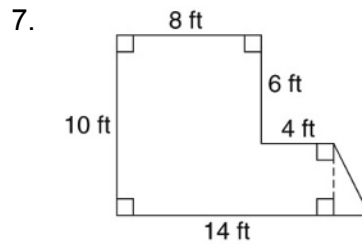
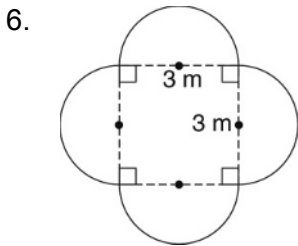
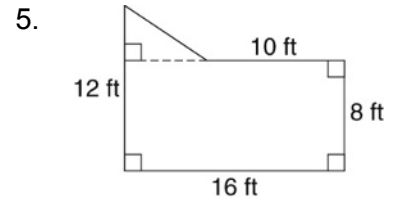
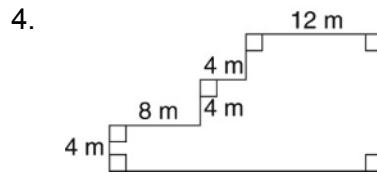
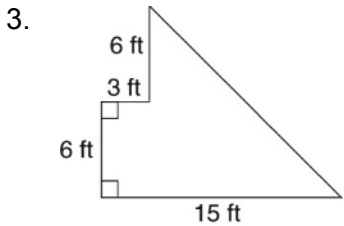
**Area of Composite Figures**

*Practice and Problem Solving: A/B*

Estimate the area of each figure. Each square represents 1 square foot.

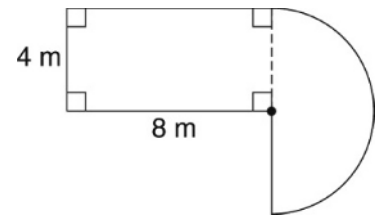


Find the area of each figure. Use 3.14 for  $\pi$ .



9. Marci is going to use tile to cover her terrace. How much tile does she need?

\_\_\_\_\_

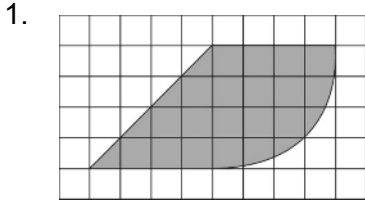


**LESSON**  
**9-3**

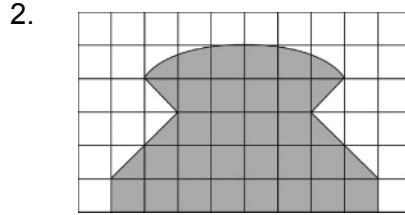
# Area of Composite Figures

## Practice and Problem Solving: C

Estimate the area of each figure. Each square represents 1 square foot.

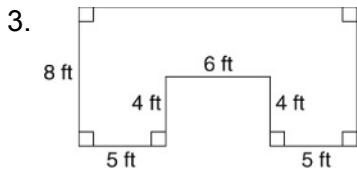


\_\_\_\_\_

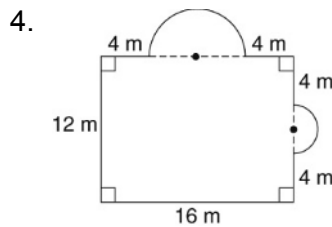


\_\_\_\_\_

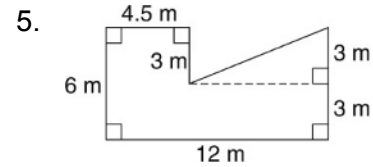
Find the area of each figure. Use 3.14 for  $\pi$ .



\_\_\_\_\_



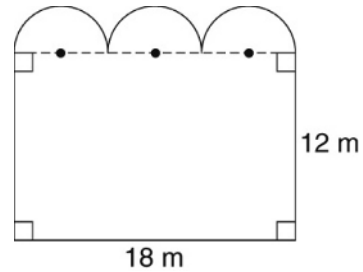
\_\_\_\_\_



\_\_\_\_\_

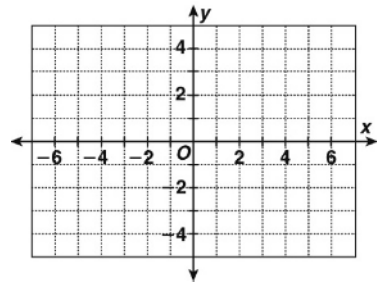
6. The figure shows the dimensions of a room in which receptions are held. The room is being carpeted. The three semi-circular parts of the room are congruent. How much carpet is needed?

\_\_\_\_\_



7. A polygon has vertices at  $F(-5, 2)$ ,  $G(-3, 2)$ ,  $H(-3, 4)$ ,  $J(1, 4)$ ,  $K(1, 1)$ ,  $L(4, 1)$ ,  $M(4, -2)$ ,  $N(6, -2)$ ,  $P(6, -3)$ , and  $Q(-5, -3)$ . Graph the figure on the coordinate plane. Then find the area and perimeter of the figure.

\_\_\_\_\_

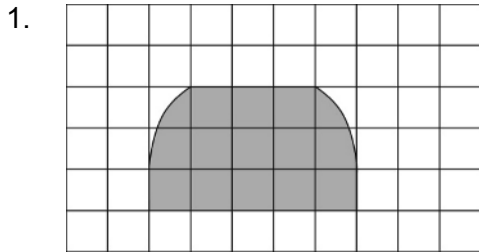


**LESSON**  
**9-3**

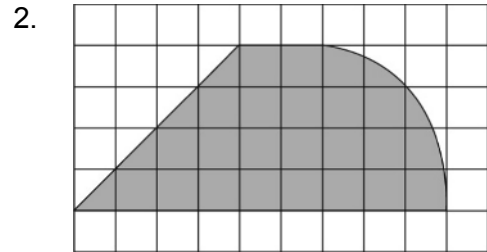
**Area of Composite Figures**

*Practice and Problem Solving: D*

Estimate the area of each figure. Each square represents 1 square foot. Choose the letter for the best answer. The first one is done for you.

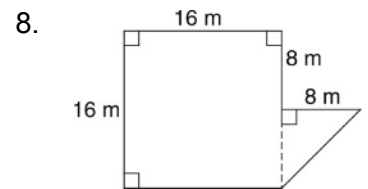
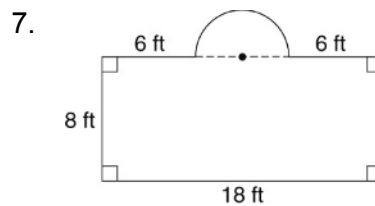
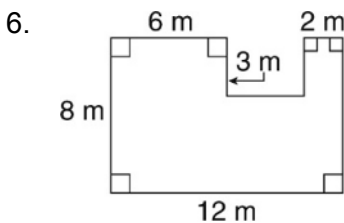
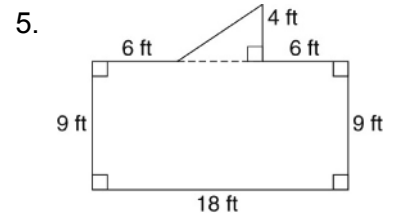
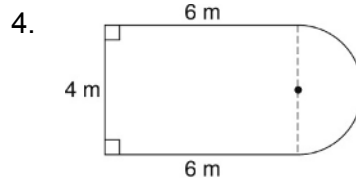
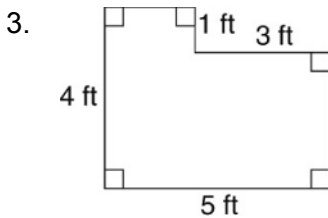


- A 10 ft<sup>2</sup>                      © 14 ft<sup>2</sup>  
B 11 ft<sup>2</sup>                      D 15 ft<sup>2</sup>



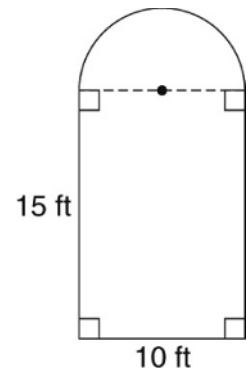
- A 24 ft<sup>2</sup>                      C 32 ft<sup>2</sup>  
B 27 ft<sup>2</sup>                      D 36 ft<sup>2</sup>

Find the area of each figure. Use 3.14 for  $\pi$ . The first one is done for you.



9. The figure shows the dimensions of a room. How much carpet is needed to cover its floor?

\_\_\_\_\_



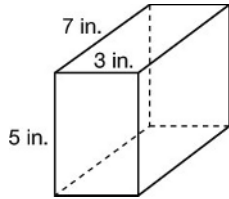
**LESSON**  
**9-4**

**Solving Surface Area Problems**

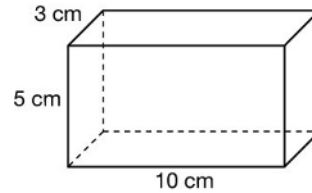
*Practice and Problem Solving: A/B*

Find the surface area of each solid figure.

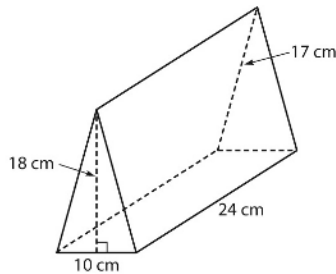
1. \_\_\_\_\_



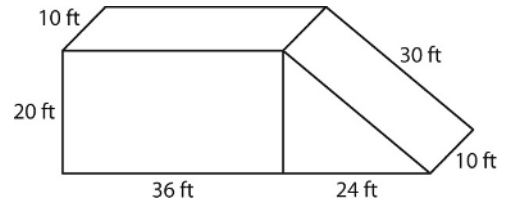
2. \_\_\_\_\_



3. \_\_\_\_\_

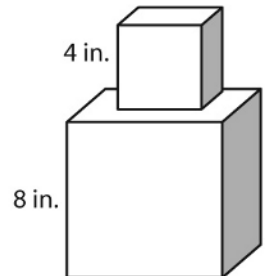


4. \_\_\_\_\_



Use the situation below to complete Exercises 5–6.

Cydney built a display stand out of two cubes. The larger cube is 8 inches on each side. The smaller cube is 4 inches on each side. She painted the display stand after she put the two cubes together. She did NOT paint the bottom of the display stand. What was the total area she painted?



5. Explain your plan for solving the problem.

\_\_\_\_\_

\_\_\_\_\_

6. Solve the problem.

\_\_\_\_\_

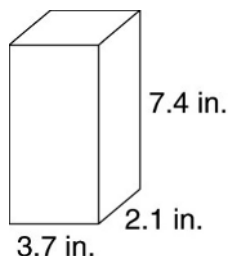
**LESSON**  
**9-4**

# Solving Surface Area Problems

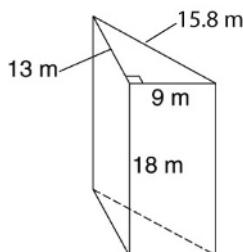
## Practice and Problem Solving: C

Find the surface area of each solid figure. Round each answer to the nearest tenth.

1. \_\_\_\_\_

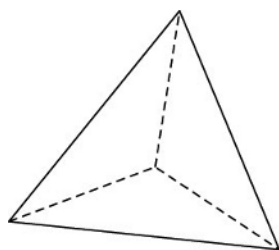


2. \_\_\_\_\_

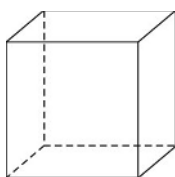


Three students constructed three-dimensional figures of cardboard.

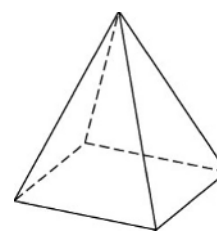
A.



B.



C.



3. Read each description in Exercises 4–6. Guess which figure has the greatest surface area and which has the least surface area.

\_\_\_\_\_

4. Josh made his figure from 6 congruent squares. The edge of each square was 8 inches. Which figure did Josh construct? What is the surface area of his figure?

\_\_\_\_\_

5. Kayla used 4 isosceles and one square for her figure. Each edge of the square was 10 inches. The two congruent sides of the triangles are 13 inches long. The height of the triangles is 12 inches. Which figure did Kayla construct? What is the surface area of her figure?

\_\_\_\_\_

6. Angelica used four congruent equilateral triangles. Each side of the triangles was 14 inches. The height of each triangle was 12.1 inches. Which figure did she construct? What is the surface area of her figure?

\_\_\_\_\_

7. Check your guess from Exercise 3. Were you correct? \_\_\_\_\_

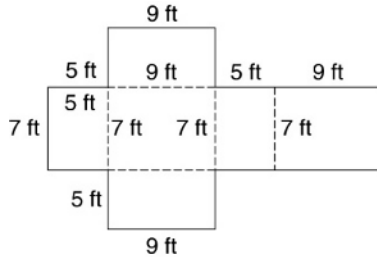
**LESSON**  
**9-4**

# Solving Surface Area Problems

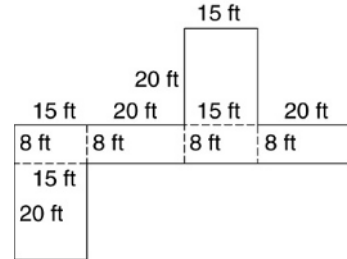
## Practice and Problem Solving: D

Find the surface area of each solid figure. The first one is done for you.

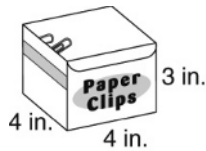
1. 286 ft<sup>2</sup>



2. \_\_\_\_\_



3. \_\_\_\_\_



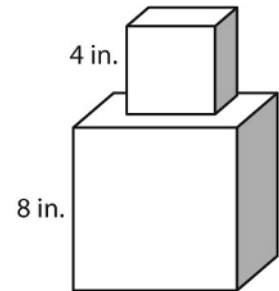
4. \_\_\_\_\_



Use the situation below to answer 5–7.

Cydney built a display stand out of two cubes. The larger cube is 8 inches on each side. The smaller cube is 4 inches on each side. She painted the entire outside of each cube before she put the cubes together.

5. What was the surface area she painted for the smaller cube? \_\_\_\_\_
6. What was the surface area she painted for the larger cube? \_\_\_\_\_
7. What was the total area that she painted on both cubes? \_\_\_\_\_

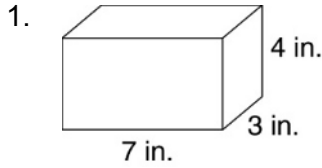


**LESSON**  
**9-5**

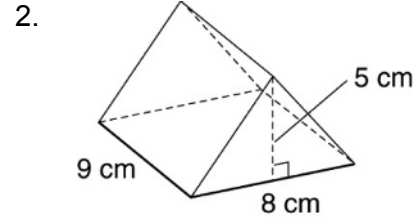
**Solving Volume Problems**

*Practice and Problem Solving: A/B*

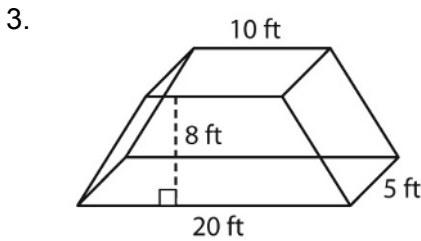
Find the volume of each figure.



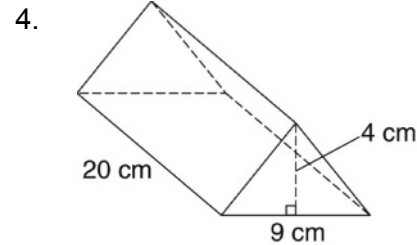
\_\_\_\_\_



\_\_\_\_\_



\_\_\_\_\_



\_\_\_\_\_

**Theo made the display at right out of cheese.**

5. How many cubic centimeters of cheese are in the completed display?

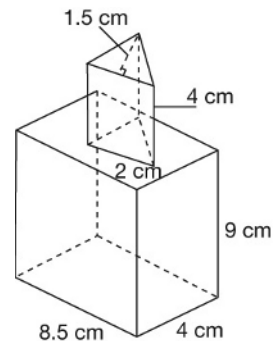
\_\_\_\_\_

6. Each kilogram of the cheese Theo used takes up a volume of about 20 cubic centimeters. What is the approximate mass of Theo's display?

\_\_\_\_\_

7. Theo's friend made a display with dimensions that were all half as big as those Theo used. What is the approximate mass of Theo's friends display?

\_\_\_\_\_

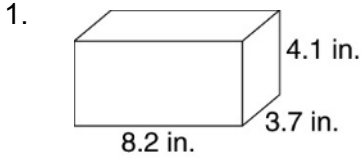


**LESSON**  
**9-5**

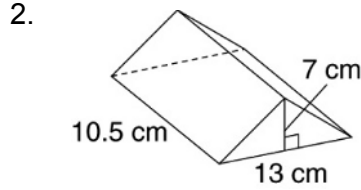
# Solving Volume Problems

## Practice and Problem Solving: C

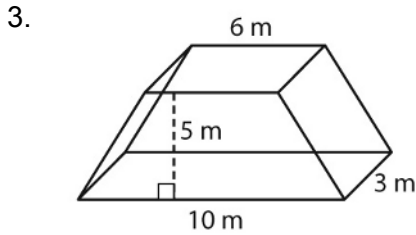
Find the volume of each figure.



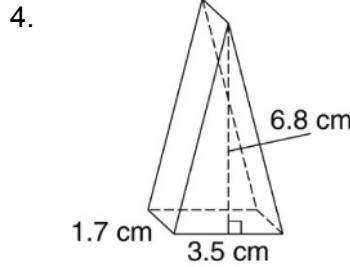
\_\_\_\_\_



\_\_\_\_\_

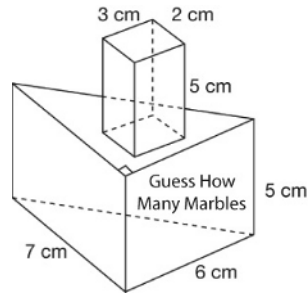


\_\_\_\_\_



\_\_\_\_\_

For the school carnival, Pietro built a clear plastic container to be used in a game called **Guess How Many Marbles**. The container is to be filled with marbles that are 12 millimeters in diameter.



5. Find the volume of the entire container.

\_\_\_\_\_

6. Marsha says that one marble has a volume of  $904.3 \text{ cm}^2$ , so the container can't hold any marbles. What error did Marsha make?

\_\_\_\_\_  
\_\_\_\_\_

7. Can you find how many marbles fit in the container by dividing the volume of the container by the volume of 1 marble? Explain your reasoning.

\_\_\_\_\_  
\_\_\_\_\_



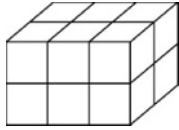
**LESSON**  
**9-5**

# Solving Volume Problems

## Practice and Problem Solving: D

Tell how many cubes are in each figure. The first one is done for you.

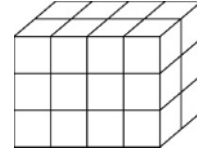
1.



Think: There are  $3 \times 2$  cubes in each layer. There are 2 layers. So, there are  $3 \times 2 \times 2$  cubes.

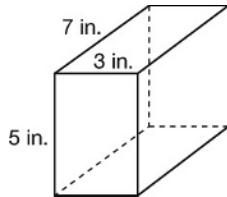
**12 cubes**

2.



Find the volume of each figure. The first one is done for you.

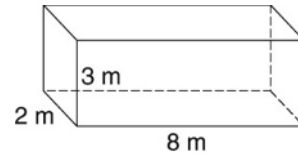
3.



Think:  $V = lwh$   
 $V = 7 \times 3 \times 5 = 105$

**105 in<sup>3</sup>**

4.

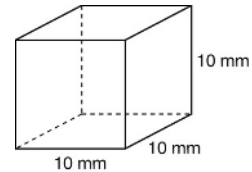


For a school project, students have to build a pyramid of cubes.

5. Each cube will be like the one shown at the right. What are the dimensions of the cube?

length: \_\_\_\_\_ mm      height: \_\_\_\_\_ mm

width: \_\_\_\_\_ mm



6. What is the volume of the cube at the right?

\_\_\_\_\_

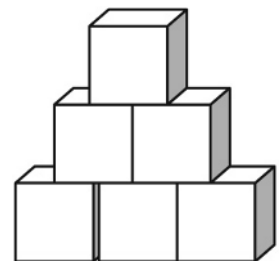
The completed pyramid will look like the figure shown at the right.

7. How many cubes are in the pyramid?

\_\_\_\_\_

8. What is the volume of the entire pyramid?

\_\_\_\_\_



**LESSON**  
**10-1**

# Populations and Samples

## Practice and Problem Solving: A

Name the *population* and the *sample* in each exercise. Explain your answer.

1. The number of roadrunners born in 2014 within a 50-mile radius of Lubbock.
2. The cars traveling at 75 kilometers per hour between Beaumont and Lufkin.

\_\_\_\_\_

\_\_\_\_\_

Name the sampling method that will best represent the whole population in each situation. Explain your answer.

3. Student satisfaction with the middle school cafeteria.  
Method A: Survey 40 students in two seventh-grade math classes. 72 percent are satisfied with the food in the cafeteria.  
Method B: Survey 65 students from a list of all students in the school. 85 percent are satisfied with the food in the cafeteria.

Method \_\_\_\_\_ best represents the whole population of the school.

\_\_\_\_\_

4. Predicted winner in an election for town mayor.  
Method C: Telephone 100 randomly-chosen voters who live in the town. 54 percent plan to vote for the incumbent mayor.  
Method D: Telephone 70 people who have lived in the town for more than 25 years. 45 percent plan to vote for the incumbent mayor.  
Method \_\_\_\_\_ best represents the whole population of the town's voters.

\_\_\_\_\_

Which of these may be biased samples? Explain your answer.

5. A town official surveys 50 people in a library to decide if town residents want the library services and facilities expanded.
6. A cable television company randomly calls 200 customers and asks them if they are satisfied with their service.

\_\_\_\_\_

**LESSON**  
**10-1****Populations and Samples*****Practice and Problem Solving: C***

**Answer the questions about each problem. Explain your answers.**

1. A manufacturing plant would like to locate in a town. The plant will have openings for 125 new, full-time jobs. However, the plant will have an impact on the town's water system and other infrastructure systems. Describe each proposed sampling of the town's residents as random, non-random, biased, or some combination of the three. Justify your description.

Sample A: Randomly sample residents in each of the town's 15 voting precincts.

---

Sample B: Randomly sample all registered voters within the town's boundaries without regard to precinct.

---

Sample C: Randomly sample all residents in the voting precinct in which the plant will be located and where it will have the greatest impact on the town's infrastructure systems, like electricity, sewer, and water systems.

---

2. Why is a telephone survey of 250 of a city's residents based on their home addresses not necessarily a random sample?
- 

3. The owner of a scooter-rental business in the city center would like to know more about his customers' rental needs before buying more scooters. He decides to sample employees in the office buildings near his business. He also plans to sample residents of nearby apartment buildings in which some of his renters live. Answer the questions about his sampling plans.

- a. Are the scooter-rental owner's sampling plans random? Explain.

---

- b. In the sample questionnaires, the scooter-rental owner lists two different rental pricing arrangements, one of which favors weekend scooter rental with lower daily and mileage rates. Describe any bias in the questionnaires.

---

**LESSON**  
**10-1**

# Populations and Samples

## Practice and Problem Solving: D

Identify the population and the sample in each exercise. The first one is done for you.

1. The number of home runs hit during one week in July of the 2014–2015 baseball season.

Population:

Home runs hit in 2014–2015.

Sample:

Home runs hit one week in July.

2. The amount of sap that is collected from six sugar maples from a 12-acre forest of sugar maples that are being tapped.

Population:

\_\_\_\_\_

Sample:

\_\_\_\_\_

Identify the best method of getting a random sample in Exercises 3 and 4. Explain your answer. The first one is done for you.

3. The school board wants to study how middle school teachers use computers and the Internet in their classes.

Sample A: all middle-school math-science teachers

Sample B: teachers whose last name begins with “N”

Sample C: every eighth teacher on a list of the school’s teachers

Sample C is the best method of getting a random sample.

4. A lawn service wants to find out how satisfied its customers are with its lawn services and pricing.

Sample X: the ten customers who spent the most money with the lawn service over the past year.

Sample Y: ten customers who only used the lawn service one time over the past year

Sample Z: ten customers who used the lawn service at any time during the past year

Answer the question.

5. Why does the following question show bias in a survey of a town’s citizens about a new professional sports stadium?

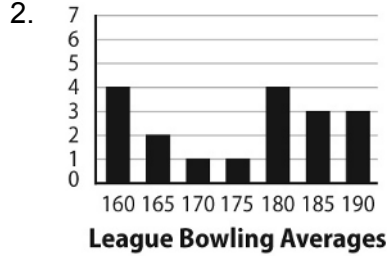
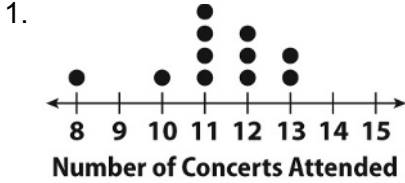
“What are your feelings about a new stadium that will bring in a professional sports teams and the possibility of greater business investment by hotels, restaurants, and other businesses in our town?”

**LESSON**  
**10-2**

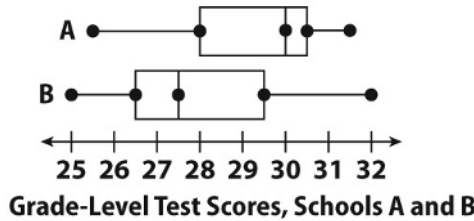
# Making Inferences from a Random Sample

## Practice and Problem Solving: A/B

What can be inferred from each data plot about the “average” value in comparison to the other data?



The box plots show the distribution of grade-level test scores of 20 students in School A and 20 students in School B. Use the box plots to do Exercises 3–6.



3. What do these plots imply about the “average” test score for the two schools. \_\_\_\_\_
4. Comment on the “spread” of the data points. Which data is more consistent? \_\_\_\_\_

5. What is the significance of the two interquartile ranges that are the same for the two schools? \_\_\_\_\_

**Solve.**

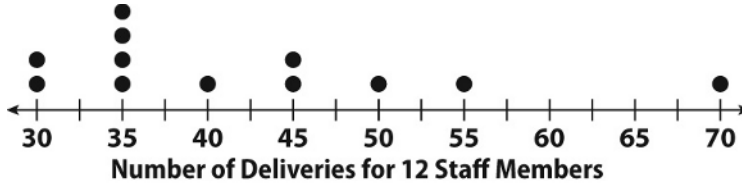
6. A seventh-grade student chooses a random sample of 50 out of 400 students. He finds that 7 students have traveled outside the United States. The student claims that over 50 of the 400 students have traveled outside the United States. Is this correct? Explain.  
\_\_\_\_\_
7. A metal-fabricating company produces 150,000 souvenir tokens each year. In a random sample of 400 tokens, 3 have stamping errors. Predict the total number of coins that will have stamping errors in a year.  
\_\_\_\_\_

**LESSON**  
**10-2**

# Making Inferences from a Random Sample

## Practice and Problem Solving: C

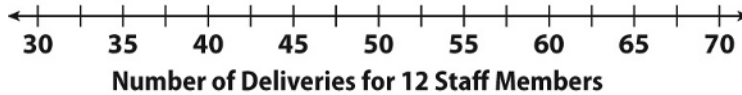
A package-delivery business wants to improve its hourly delivery rate. The business collects the data shown from 12 of its delivery staff members on a Wednesday afternoon.



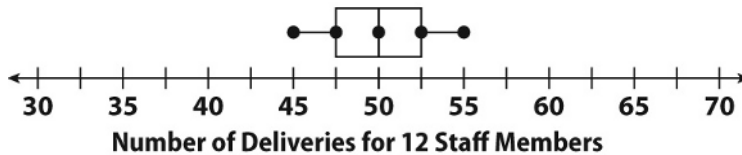
1. Describe the distribution of delivery data in the sample.

---

2. Draw a box plot of the data on the number line below.



The delivery company would like to improve its hourly delivery so that it looks like the box plot shown.



3. List delivery data for this box plot for 12 delivery staff members.

---

4. Compare the box plots for the sample data and for what the company wants to achieve using terms like median, range, and skew.

---

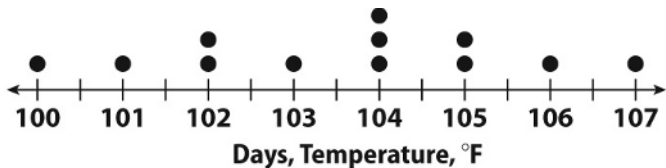
**LESSON**  
**10-2**

# Making Inferences from a Random Sample

## Practice and Problem Solving: D

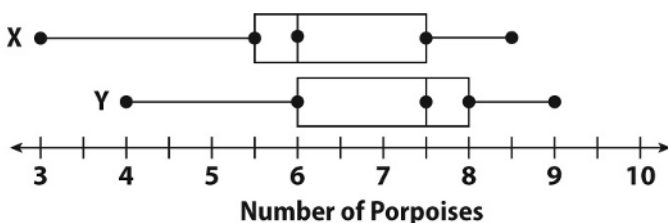
Answer the questions about the dot plots. The first one is done for you.

1.



- What is the median temperature? 104 °F
- What temperature(s) occur on more than half of the observations?  
102 (2 times), 103 (once), 104 (3 times), and 105 (twice)

2.



- Which team of observers, X or Y, saw more porpoises per observation *on average* based on this sample?  
\_\_\_\_\_
- Both teams made 20 observations of porpoises. How many times did Team Y observe 6, 7, or 8 porpoises? Explain your answer.  
\_\_\_\_\_
- What percent of the time would Team X see between 3 and 6 porpoises?  
\_\_\_\_\_
- If the number of observations was increased to 100, what percent of the time would Team Y see 8 or 9 porpoises on each observation?  
\_\_\_\_\_

**LESSON**  
**10-3**

# Generating Random Samples

## *Practice and Problem Solving: A/B*

**Use the description below to complete Exercises 1–3.**

In a set of 1,000 integers from 1 to 1,000, an integer chosen at random on a single trial should be an integer from 1 to 25 about 25 out of every 1,000 trials, or one out of every 40 integers selected.

<b>Trial 1</b>	406
<b>Trial 2</b>	734
<b>Trial 3</b>	44
<b>Trial 4</b>	340
<b>Trial 5</b>	996

1. A sample of 5 integers selected is shown. Does this sample represent the general rule for picking an integer from 1 to 25 in the population of integers from 1 to 1,000? Explain.

\_\_\_\_\_

2. How many integers between 1 and 25 would you expect to appear in a sample of 80 trials? Explain.

\_\_\_\_\_

3. The following integers from 1 to 25 appeared when a sample of 50 integers was taken from the list of the integers from 1 to 1,000.  
12, 21, and 16

Is this sample of 50 trials more or less than what was expected for the population as a whole? Explain.

\_\_\_\_\_

**Use the description below to complete Exercises 4–5.**

A manufacturer of flea collars for animals that weigh less than 5 kilograms injects the collars with 15 milligrams of a biocide that only acts on fleas. The manufacturer will release a collar that has no less than 14 milligrams and no more than 16 milligrams of insecticide. The following list shows the result of sampling 36 collars from an actual production run of 720 collars.

17, 14, 14, 16, 14, 15, 15, 15, 16, 14, 16, 14, 15, 15, 15, 16, 13, 13,  
13, 13, 13, 14, 14, 13, 17, 14, 15, 13, 14, 15, 16, 17, 14, 17, 14, 15

4. How many flea collars out of a production run of 720 collars would be acceptable to ship according to this sample? Explain your reasoning.

\_\_\_\_\_

5. How many flea collars out of a production run of 720 flea collars would have too much biocide and could not be shipped? Explain your reasoning.

\_\_\_\_\_



**LESSON**  
**10-3**

# Generating Random Samples

## Practice and Problem Solving: C

Use the situation below to complete Exercises 1–3.

A national conservation organization plans to award grants to fish hatcheries that produce populations of 1,000 or more individuals of endangered species during a seasonal breeding period. The number of fish born at each of the hatcheries that enter the grant competition is 12,000 fish. Three hatcheries sampled broods of 240 new-born fish and reported these results of the number of endangered species born.

Hatchery A	
Sample 1	3
Sample 2	19
Sample 3	2

Hatchery B	
Sample 1	10
Sample 2	12
Sample 3	9

Hatchery C	
Sample 1	4
Sample 2	3
Sample 3	1

- How many individual endangered fish would need to be in each sample to qualify for the grant prize? Explain your reasoning.  
\_\_\_\_\_
- Why do these samples imply that *none* of the three hatcheries have enough endangered species individuals to qualify for the grant?  
\_\_\_\_\_
- What would be a reasonable guess for the number of endangered individuals in the whole population of each hatchery? Show the calculations that support your answers.  
\_\_\_\_\_

**Solve.**

- The six-by-six grid shows 36 consecutive nightly samples of the sky and the number of galaxies that can be seen on each night with a small refracting telescope.

What range of numbers would you give for the average number of galaxies visible on any one of the 36 nights? Justify your answer.  
\_\_\_\_\_

30	17	20	24	23	30
16	27	13	3	30	25
3	25	16	28	9	11
2	6	29	27	1	27
6	21	7	8	13	19
2	21	7	5	30	13

**LESSON**  
**10-3**

# Generating Random Samples

## Practice and Problem Solving: D

Answer the questions below. Part of the first one is done for you.

1. A rancher's herd of 250 cattle grazes over a 40-acre pasture. He would like to find out how many cattle are grazing on each acre of the pasture at any given time, so he has some images of the pasture taken by the state department of agriculture's aerial photography division. Here are the number of cattle found in three one-acre sections.

Sample 1	4
Sample 2	1
Sample 3	9

- a. What can the rancher conclude from these samples about how many cattle graze on each acre of the 40-acre pasture?

**Sample answer: There could be as few as one or as many as 9 cattle**

**grazing on an acre, or an average of about 5 cattle grazing per acre.**

- b. If the cattle were equally "spread out" across all of the 40 acres, how many cattle would you expect to find on each acre?

\_\_\_\_\_

\_\_\_\_\_

- c. Why could the sample collected above differ from the number you would expect on each acre of pasture land?

\_\_\_\_\_

\_\_\_\_\_

2. The manager of a warehouse would like to know how many errors are made when a product's serial number is read by a bar-code reader. Six samples are collected of the number of scanning errors:

36, 14, 21, 39, 11, and 2 errors, per 1,000 scans each

- a. What number of errors is made by all scans, based on these six samples? Explain.

\_\_\_\_\_

Just to be sure, the manager has six more samples taken:

33, 45, 34, 17, 1, and 29 errors, per 1,000 scans each

- b. How should the estimate of the number of errors of all scans change, based on all 12 samples?

\_\_\_\_\_

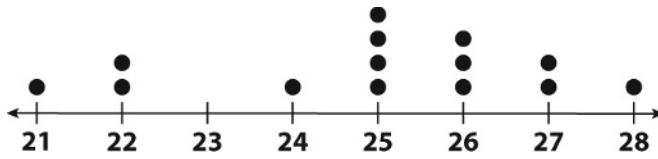
**LESSON**  
**11-1**

# Comparing Data Displayed in Dot Plots

## Practice and Problem Solving: A/B

Find the values for each dot plot.

1.



Range:

Median:

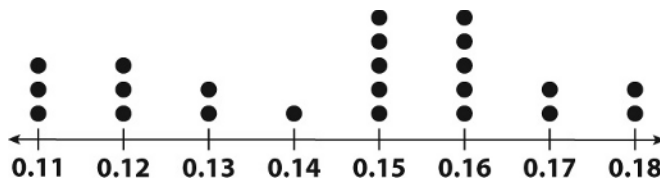
Mode:

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

2.



Range:

Median:

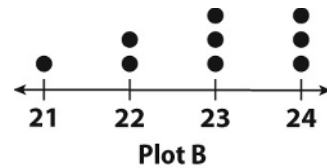
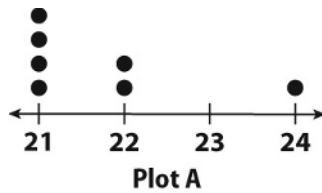
Mode:

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Compare the dot plots by answering the questions.



3. How do the ranges compare?

4. Compare the number of elements.

\_\_\_\_\_

\_\_\_\_\_

5. How do the modes compare?

6. How do the medians compare?

\_\_\_\_\_

\_\_\_\_\_

7. Describe the distribution of the dots in each plot.

\_\_\_\_\_

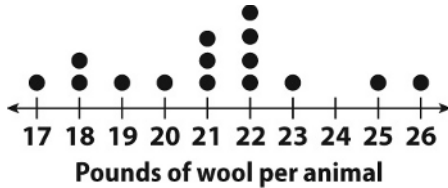
**LESSON**  
**11-1**

# Comparing Data Displayed in Dot Plots

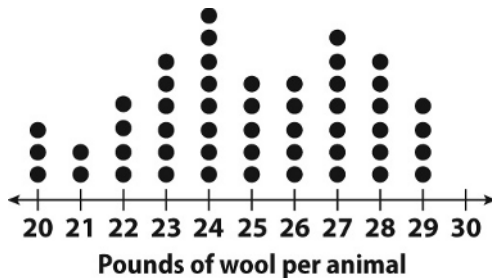
## Practice and Problem Solving: C

Use the description and dot plots below to complete Exercises 1–4.

A rancher needs to shear an average of 25 pounds of wool per animal in order to meet the production quota of a woolen mill. He decides to sample part of his herd to get a first estimate of the average amount to the nearest whole pound. The dot plot shows the results of sampling for 15 animals.



- Describe this dot set using median, mode, and range.  
\_\_\_\_\_
- How should the rancher interpret this sample in terms of the average amount of wool needed?  
\_\_\_\_\_
- Next, the rancher decides to look at a larger sample of animals. The dot plot shows the shearing results for 50 animals.



How do the central measures of this dot plot of 50 animals differ from the data you found in Exercise 1?

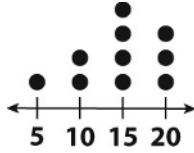
- What would you recommend to the rancher in terms of reporting the results of the sampling to the woolen mill?  
\_\_\_\_\_  
\_\_\_\_\_

**LESSON**  
**11-1**

**Comparing Data Displayed in Dot Plots**

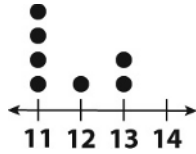
*Practice and Problem Solving: D*

Answer the questions for each dot plot. The first one is done for you.

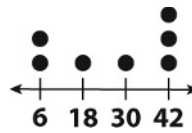


1. What is the range of the data? 15
2. Since there is an even number of dots, the *median* is halfway between the values of the two middle data points. What is the median?  
\_\_\_\_\_
3. The *mode* is the value of the data point that appears the most often. What is the mode?  
\_\_\_\_\_

Answer the questions about the two dot plots.



Plot X



Plot Y

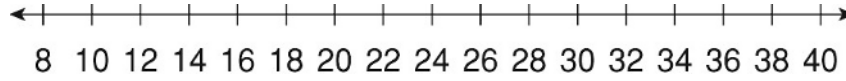
4. Which data set has the larger range? Explain.  
\_\_\_\_\_
5. Which data set has the mode with the most equivalent elements, or dots? Explain.  
\_\_\_\_\_
6. What is the median of Plot X?  
\_\_\_\_\_
7. What is the median of Plot Y?  
\_\_\_\_\_

**LESSON**  
**11-2**

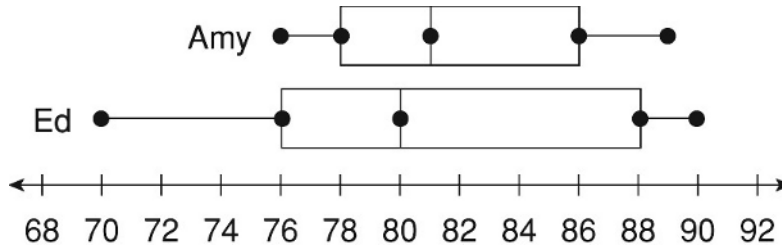
**Comparing Data Displayed in Box Plots**

*Practice and Problem Solving: A/B*

- Use the data to make a box-and-whisker plot.  
24, 32, 35, 18, 20, 36, 12



The box-and-whisker plot shows the test scores of two students. Use the box-and-whisker plot for Exercises 2–4.

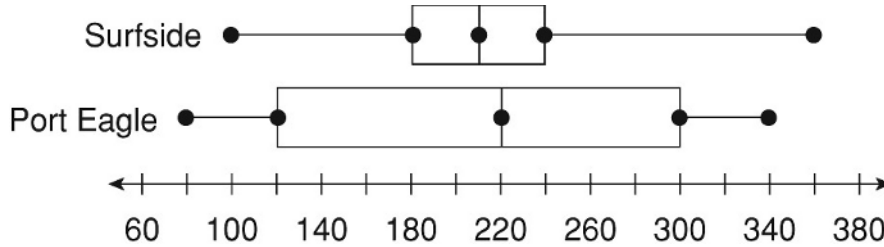


- Which student has the greater median test score? \_\_\_\_\_
- Which student has the greater interquartile range of test scores? \_\_\_\_\_
- Which student has the greater range of test scores? \_\_\_\_\_
- Which student appears to have more predictable test scores? Explain your answer.

\_\_\_\_\_

\_\_\_\_\_

The box-and-whisker plot shows prices of hotel rooms in two beach towns. Use the box-and-whisker plot for Exercises 6–8.



- Which town has the greater median room price? \_\_\_\_\_
- Which town has the greater interquartile range of room prices? \_\_\_\_\_
- Which town appears to have more predictable room prices? Explain your answer.

\_\_\_\_\_

\_\_\_\_\_

**LESSON**  
**11-2**

# Comparing Data Displayed in Box Plots

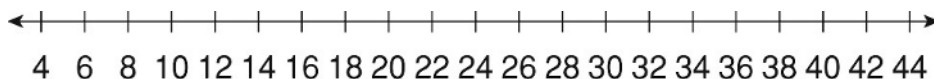
## Practice and Problem Solving: C

Use the situation and data given below to complete Exercises 1–4.

The owner of a blueberry farm recorded the following number of gallons of berries picked over 11 days:

38, 42, 26, 32, 40, 28, 36, 27, 29, 6, and 30 gallons

- Construct two box plots in the space provided, one with the outlier data point and one without the outlier.



- How does the outlier affect the interquartile range of the data? Explain using the data.

\_\_\_\_\_

- Which is affected more by the outlier: the range or the interquartile range? Explain.

\_\_\_\_\_

- Which box plot gives the more realistic picture of the blueberry farm's average production over the 11-day period? Explain your reasoning.

\_\_\_\_\_

Answer the questions about the box plots at the right.

- Comment on the “skewness” of the data in each box plot.

\_\_\_\_\_  
\_\_\_\_\_



- Compare the ranges and the interquartile ranges of the two plots.

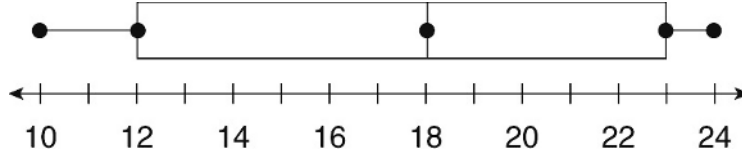
\_\_\_\_\_  
\_\_\_\_\_

**LESSON**  
**11-2**

**Comparing Data Displayed in Box Plots**

*Practice and Problem Solving: D*

Answer the questions about the box plot. The first one has been done for you.



1. What are the least and greatest data points in the data set of the box plot?

**The least data point value is 10; the greatest data point value is 24.**

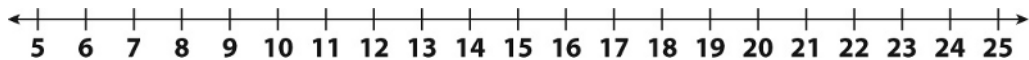
2. What is the median of the data set? \_\_\_\_\_
3. What are the first and third quartiles of the data set?  
1<sup>st</sup> quartile: \_\_\_\_\_ 3<sup>rd</sup> quartile: \_\_\_\_\_
4. What percent of the data is located between the first and third quartiles?

Use the description and data given below to complete Exercises 5–10. The first question after the drawing is done for you.

The points scored by a basketball player for eight games are:

6, 10, 12, 14, 16, 18, 20, and 23.

5. Draw a box plot of the data in the space provided.



6. What is the range of the data? **17 points**
7. What is the median of the data? \_\_\_\_\_
8. What are the first and third quartiles?  
1<sup>st</sup> quartile: \_\_\_\_\_ 3<sup>rd</sup> quartile: \_\_\_\_\_
9. What is the interquartile range? \_\_\_\_\_
10. Comment on the distribution of the data and whether it is skewed or not.



**LESSON**  
**11-3**

# Using Statistical Measures to Compare Populations

## Practice and Problem Solving: A/B

The table shows the ages of random samples of 10 students at two different secondary schools.

Mountain View
11, 14, 13, 13, 19, 18, 15, 16, 16, 14

Ocean View
13, 14, 15, 14, 18, 17, 12, 18, 11, 14

1. What is the mean and the mean absolute deviation of the ages of the sample of students at Mountain View?

Mean: \_\_\_\_\_ MAD: \_\_\_\_\_

2. What is the mean and the mean absolute deviation of the ages of the sample of students at Ocean View?

Mean: \_\_\_\_\_ MAD: \_\_\_\_\_

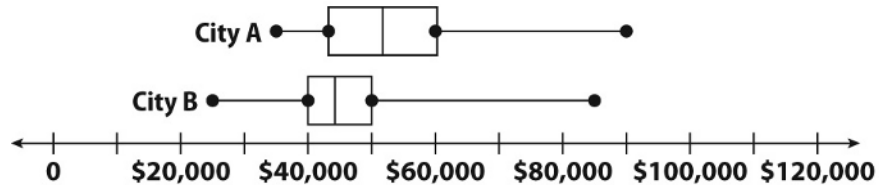
3. What is the difference of the means?

\_\_\_\_\_

4. What is the difference of the means as a multiple of the mean absolute deviations?

\_\_\_\_\_

The box plots show the distributions of mean incomes of 10 samples of 10 adults from each of two cities, A and B.



5. What can you say about any comparison of the incomes of the two populations? Explain.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**LESSON**  
**11-3**

# Using Statistical Measures to Compare Populations

## Practice and Problem Solving: C

The table shows the scores students in a class earned on their last exam, and the final grades students earned in the class.

Scores on Last Exam
48, 82, 97, 29, 75, 89, 68

Grades Earned in Class
56, 88, 93, 35, 90, 78, 74

1. What is the mean and the mean absolute deviation for the scores on the last exam?

Mean: \_\_\_\_\_ MAD: \_\_\_\_\_

2. What is the mean and the absolute deviation for the grades earned in class?

Mean: \_\_\_\_\_ MAD: \_\_\_\_\_

3. What is the difference of the means?

\_\_\_\_\_

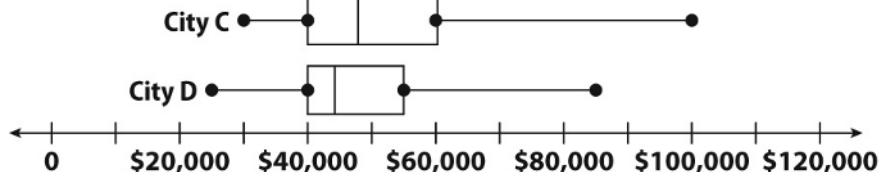
4. What is the difference of the mean absolute deviations?

\_\_\_\_\_

5. What is the difference of the means as a multiple of the difference of the mean absolute deviations?

\_\_\_\_\_

The box plots show the distributions of mean incomes of 10 samples of 10 adults from each of two cities, C and D.



6. What can you say about any comparison of the incomes of the two populations? Explain.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**LESSON**  
**11-3**

**Using Statistical Measures to Compare Populations**

*Practice and Problem Solving: D*

The tables show the weights of 10 Labradors and 10 standard poodles at a dog show.

Labradors
58, 62, 56, 74, 78, 63, 68, 72, 59, 60

Standard Poodles
67, 60, 51, 53, 57, 75, 60, 65, 50, 67

1. What is the mean and the mean absolute deviation of the weights of the Labradors?

Mean: \_\_\_\_\_ MAD: \_\_\_\_\_

2. What is the mean and the mean absolute deviation of the weights of the standard poodles?

Mean: \_\_\_\_\_ MAD: \_\_\_\_\_

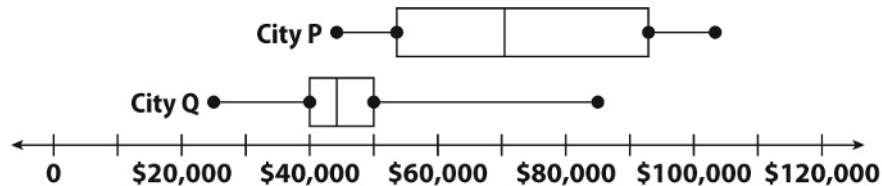
3. What is the difference of the means?

\_\_\_\_\_

4. What is the difference of the means as a multiple of the mean absolute deviations?

\_\_\_\_\_

The box plots show the distributions of mean incomes of 10 samples of 10 adults from each of two cities, A and B.



5. What can you say about any comparison of the incomes of the two populations? Explain.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**LESSON**  
**12-1**

# Probability

## Practice and Problem Solving: A/B

Determine the probability of each event. Write *impossible*, *unlikely*, *as likely as not*, *likely*, or *certain*. Then, tell whether the probability is 0, close to 0,  $\frac{1}{2}$ , close to 1, or 1.

1. randomly picking a blue card from a bag containing all blue cards

\_\_\_\_\_

2. rolling an odd number on a number cube containing numbers 1 through 6

\_\_\_\_\_

3. picking a red marble from 4 white marbles and 7 green marbles

\_\_\_\_\_

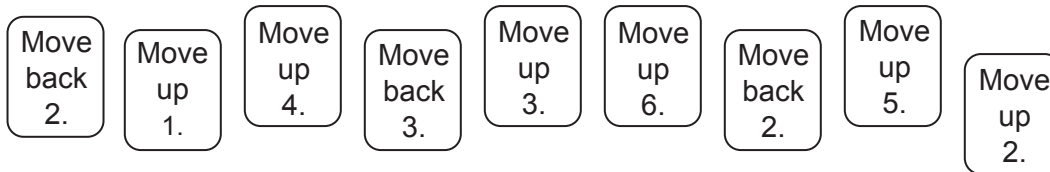
**Find each probability. Write your answer in simplest form.**

4. A bag holds 6 tiles: 2 lettered and 4 numbered. Without looking, you choose a tile. What is the probability of drawing a number? \_\_\_\_\_

5. The names Phil, Angelica, Yolanda, Mimi, and Ed are on slips of paper in a hat. A name is drawn without looking. What is the probability of **not** drawing Ed? \_\_\_\_\_

6. A standard deck of cards contains 13 of each suit: red hearts, red diamonds, black clubs, and black spades. What is the probability of drawing a red card without looking? \_\_\_\_\_

**A board game includes the 9 cards below.**



7. Mia says the probability of moving back is the same as the probability of moving up. Is she correct? What is the probability of moving back? Explain.

\_\_\_\_\_

8. Gavin needs to move up more than 4 spaces to win the game. Is he likely to win on his next turn? What is the probability that he will **not** win on his next turn? Explain.

\_\_\_\_\_

**LESSON**  
**12-1****Probability****Practice and Problem Solving: C**

Find each probability. Write your answer in simplest form.

1. picking a blue shirt from a drawer with 8 blue shirts and 2 white shirts

\_\_\_\_\_

2. drawing a vowel from letter tiles that spell out MATHEMATICS

\_\_\_\_\_

3. A spinner is divided into 8 equal sections: 4 red, 2 white, 1 green, and 1 blue. What is the probability that the spinner lands on blue or white?

\_\_\_\_\_

**There are 6 cans of soup in a kitchen cabinet: 2 chicken noodle, 3 tomato, and 1 vegetable.**

4. You select a can without looking. What is the probability that you will **not** choose chicken noodle soup?

\_\_\_\_\_

5. Suppose you use a can of chicken noodle soup from the original 6 cans. Then your father adds 2 cans of vegetable soup and 1 can of tomato soup to those left in the kitchen cabinet. What is the probability that you will choose tomato soup now?

\_\_\_\_\_

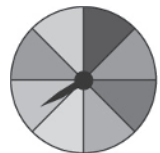
6. Later, your mother adds 7 more cans of soup to the cabinet, some chicken noodle and some vegetable. Now the probability of not choosing chicken noodle soup is  $\frac{4}{5}$ . How many cans of chicken noodle soup did your mother add to those already in the cabinet? Explain.

\_\_\_\_\_

\_\_\_\_\_

**Use the picture at the right.**

7. Write one number in each section of the spinner at right. Then write a probability problem about the spinner. The answer to your problem should be between  $\frac{1}{2}$  and 1.



\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**LESSON**  
**12-1**

**Probability**

*Practice and Problem Solving: D*

Match each event to its likelihood. The first one is done for you.

- |  |       |                     |
|--|-------|---------------------|
| 1. rolling a number less than 6 on a number cube labeled 1 through 6                   | A     | A. likely           |
| 2. flipping a coin and getting heads   | _____ | B. unlikely         |
| 3. spinning a number less than 3 on a spinner with 8 equal sections marked 1 through 8 | _____ | C. as likely as not |
| 4. drawing a red or blue marble from a bag of red marbles and blue marbles             | _____ | D. impossible       |
| 5. rolling a number greater than 6 on a number cube labeled 1 through 6                | _____ | E. certain          |

Solve. Write your answer in simplest form. The first one is done for you.

6. A bag contains 4 red marbles, 3 green marbles, and 2 yellow marbles. The probability of randomly picking a yellow marble is  $\frac{2}{9}$ .  
What is the probability of not picking a yellow marble?  $\frac{7}{9}$
- 
7. A number cube is labeled 1 through 6. The probability of randomly rolling a 5 is  $\frac{1}{6}$ . What is the probability of not rolling a 5? \_\_\_\_\_

Tell whether the event is *impossible*, *unlikely*, *as likely as not*, *likely*, or *certain*. Explain your choice. The first one is done for you.

8. Tyrone rides his bicycle to school if he gets up by 7:15 A.M. Tyrone gets up by 7:15 about half the time. Estimate the probability that Tyrone will ride his bicycle to school.
- as likely as not; Since he gets up by 7:15 about half the time, he will ride his bicycle about half the time. The probability is about  $\frac{1}{2}$ , or as likely as not.
- 
9. There are 10 shirts in a drawer. Eight of the shirts have short sleeves. Two shirts have long sleeves. Estimate the probability that you get a short-sleeved shirt if you select one out without looking.
- \_\_\_\_\_
-

**LESSON**  
**12-2****Experimental Probability of Simple Events****Practice and Problem Solving: A/B****Solve.**

1. Jolene is playing basketball. She scored 11 baskets in 15 free throws. What is the experimental probability that she will score a basket on her next free throw?
- \_\_\_\_\_

2. Sarah has gone to work for 60 days. On 39 of those days, she arrived at work before 8:30 A.M. On the rest of the days she arrived after 8:30 A.M. What is the experimental probability she will arrive after 8:30 A.M. on the next day she goes to work?
- \_\_\_\_\_

3. For the past four weeks, Micah has been recording the daily high temperature. During that time, the high temperature has been greater than 45°F on 20 out of 28 days. What is the experimental probability that the high temperature will be below 45°F on the twenty-ninth day?
- \_\_\_\_\_

4. After the movie premier, 99 out of 130 people surveyed said they liked the movie.
- a. What is the experimental probability that the next person surveyed will say he or she liked the movie?
- \_\_\_\_\_

- b. What is the experimental probability that the next person surveyed will say he or she did not like the movie?
- \_\_\_\_\_

**Find each experimental probability. Write your answer as a fraction, as a decimal, and as a percent.**

5. For the past 40 days, Naomi has been recording the number of customers at her restaurant between 10:00 A.M. and 11:00 A.M. During that hour, there have been fewer than 20 customers on 25 out of the 40 days.
- a. What is the experimental probability there will be fewer than 20 customers on the forty-first day?
- \_\_\_\_\_

- b. What is the experimental probability there will be 20 or more customers on the forty-first day?
- \_\_\_\_\_

**LESSON**  
**12-2**

## Experimental Probability of Simple Events

### *Practice and Problem Solving: C*

1. A factory makes bicycles. Out of 300 bicycles, 2 were found to have defective brakes.
  - a. What is the experimental probability that the next bike manufactured will have defective brakes?  
\_\_\_\_\_
  - b. Predict how many bikes out of 2,100 will have defective brakes.  
\_\_\_\_\_
  
2. A factory makes light bulbs. Out of 400 light bulbs, 18 were found to have defective filaments.
  - a. What is the experimental probability that the next light bulb manufactured will have a defective filament?  
\_\_\_\_\_
  - b. Predict how many bulbs out of 6,000 will have defective filaments.  
\_\_\_\_\_
  
3. A factory makes ceramic bowls. Out of 200 bowls, 8 were chipped.
  - a. What is the experimental probability that the next bowl made will **not** be chipped?  
\_\_\_\_\_
  - b. Predict how many bowls out of 10,000 will be chipped  
\_\_\_\_\_
  
4. A manufacturer of sparkplugs has a goal of producing less than 2% defective ones. Of the last 8,000 sparkplugs, 13 were defective.
  - a. What is the experimental probability that the next sparkplug will be defective?  
\_\_\_\_\_
  - b. Did the manufacturer reach its goal? Explain.  
\_\_\_\_\_
  
5. A manufacturer of electric switches has a goal of producing less than 1.5% defective one. Of the last 300 switches, 23 were defective.
  - a. What is the experimental probability that the next switch made will be defective?  
\_\_\_\_\_
  - b. Did the manufacturer reach its goal? Explain.  
\_\_\_\_\_



**LESSON**  
**12-2**

## Experimental Probability of Simple Events

### Practice and Problem Solving: D

Find each experimental probability. The first one is done for you.

1. Kathy played a game of darts. She threw 15 darts and hit the target 9 times. What is the experimental probability that Kathy will hit the target the next time she throws a dart?

a. What is the number of favorable outcomes? 9

b. What is the total number of trials? 15

c. What is the experimental probability that Kathy will hit the target the next time she throws a dart?

$$\frac{9}{15} = \frac{3}{5}$$

2. Between 10 A.M. and 11 A.M., 48 people came into Brad's store. 40 of them made a purchase. What is the experimental probability that the next person to come into the store will make a purchase?

a. What is the number of favorable outcomes? \_\_\_\_\_

b. What is the total number of trials? \_\_\_\_\_

c. What is the experimental probability the next person to come into the store will make a purchase?

3. Sharona kept track of the colors of cars that passed her house one afternoon. She collected her data in the table below.

Car Color	Number	Car Color	Number
red	12	white	42
blue	9	silver	36
black	32	yellow	1

What is the experimental probability that the next car will be silver?

a. What is the number of favorable outcomes? \_\_\_\_\_

b. What is the total number of trials? \_\_\_\_\_

c. What is the experimental probability that the next car to pass Sharona's house will be silver?

d. What is the experimental probability that the next car to pass Sharona's house will **not** be silver?

**LESSON**  
**12-3****Experimental Probability of Compound Events****Practice and Problem Solving: A/B****Solve.**

1. A coin was tossed and a spinner with three equal sections numbered 1 to 3 was spun. The results are shown in the table.

	Heads	Tails
1	53	65
2	49	71
3	54	62

What is the experimental probability that the next toss and spin will result in 3 and Tails?

---

2. A receptionist recorded the number of people who took an elevator up from his floor and the number who took an elevator down. He also noted the number of men and women. The table shows the results.

	Elevator Up	Elevator Down
Men	36	43
Women	39	42

What is the experimental probability that the next person will be a woman taking the elevator up?

---

3. Sandwich shop customers can choose the bread and meat they want. The table shows the sandwiches that were sold on a given day.

	White Bread	Wheat Bread
Ham	22	24
Turkey	21	22
Tuna	25	23

What is the experimental probability that the next sandwich sold will be tuna on wheat bread?

---

4. A store sells a coat in three sizes: small, medium, and large. The coat comes in red, navy, and tan. Sales numbers are shown in the table.

	Small	Medium	Large
Red	18	21	19
Navy	24	22	20
Tan	19	25	22

What is the experimental probability that the next coat sold is **not** a large navy?

---

**LESSON**  
**12-3**
**Experimental Probability of Compound Events**
**Practice and Problem Solving: C**
**Solve.**

1. Two brands of paint—Durable and Forever—are each sold by the gallon in three different grades: good, better, and best quality. The sales manager at a hardware store tracks all the paint sales. She started making a table, but did not finish it.

	Good	Better	Best
Durable	48	45	35
Forever		39	33

The experimental probability that the next gallon of paint sold will be better-quality Durable paint is  $\frac{9}{50}$ .

- a. How many gallons of good-quality Forever were sold?

\_\_\_\_\_

- b. What is the experimental probability that the next gallon of paint sold will **not** be the best quality paint?

\_\_\_\_\_

2. A horseback riding club is sending one individual, one pair, and one team of vaulters to the championships. These performers will be judged against others in each class. They will be awarded 1 to 5 points for artistry, and 1 to 6 points for precision. Explain how to use a simulation to find the experimental probability that each of the club's entries will score 11 points.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

3. Give your own example of a compound event that could be tested through a simulation.

\_\_\_\_\_

\_\_\_\_\_

4. Give your own example of a compound event that could **not** be tested through a simulation.

\_\_\_\_\_

\_\_\_\_\_

**LESSON**  
**12-3**

# Experimental Probability of Compound Events

## Practice and Problem Solving: D

Solve each problem. The first one is done for you.

1. Peter tossed a dime and a quarter at the same time. He did this 100 times. The results are shown in the table.

		Quarter	
		Heads	Tails
Dime	Heads	18	30
	Tails	32	20

What is the experimental probability that the next time he tosses the coins he will get a tails on the dime and a heads on the quarter?

- a. What is the number of favorable events? 32
- b. What is the total number of trials?  $18 + 30 + 32 + 20 = 100$
- c. What is the experimental probability that the next time Peter tosses both coins he will get a tails on the dime and a heads on the quarter?

$$\frac{32}{100} = \frac{8}{25}$$

2. Aimee tossed a coin and spun a spinner that is divided into 3 equal sections. She did this 50 times. The results are shown in the table.

		Spinner		
		1	2	3
Coin	Heads	4	7	8
	Tails	12	8	11

What is the experimental probability that the next time Aimee tosses the coin and spins the spinner she will get a Tails and a 2?

\_\_\_\_\_

3. The Reliable Car dealership sells cars and trucks. The cars and trucks come in red, white, and silver. Damon made this table to show the cars and trucks that are on the lot today.

	Red	White	Silver
Car	45	41	46
Truck	21	24	23

What is the experimental probability that the next vehicle that comes on the lot will be a red car?

\_\_\_\_\_

**LESSON**  
**12-4****Making Predictions with Experimental Probability****Practice and Problem Solving: A/B**

**Make a prediction based on experimental probability.**

1. A bowler knocks down at least 6 pins 70 percent of the time. Out of 200 rolls, how many times can you predict the bowler will knock down at least 6 pins?

---

2. A tennis player hits a serve that cannot be returned 45 percent of the time. Out of 300 serves, how many can you predict will not be returned?

---

3. West Palm Beach, Florida, gets rain about 16 percent of the time. On how many days out of 400 can residents of West Palm Beach predict they will get rain?

---

4. Rob notices that 55 percent of the people leaving the supermarket choose plastic bags instead of paper bags. Out of 600 people, how many can Rob predict will carry plastic bags?

---

5. A baseball player reaches base 35 percent of the time. How many times can he expect to reach base in 850 at-bats?

---

6. Fredericka can make 65 percent of her shots from the free-throw line. If she shoots 75 times, how many shots can she expect to make?

---

7. In a current-events class, a professor predicted that at least 78 percent of students prefer getting their news from a digital source rather than from a print source. He polled 3 classes. The results are shown in the table below.

	Class 1	Class 2	Class 3
Digital	20	14	30
Print	5	10	7

In which class(es) did his prediction hold true? Explain.

---

**LESSON**  
**12-4**

# Making Predictions with Experimental Probability

## Practice and Problem Solving: C

**Solve each problem.**

1. The Arno family is planning a 14-day April vacation. The location they've chosen has an average of 10 rainy days every April. The Arnos would like at least 7 days without rain. Should they keep their current plan? Explain.

---



---

2. Advertisements for the train claim it is on-time 90 percent of the time. The bus has a record of being on-time 56 out of 64 days. Which form of transportation provides more reliable service? Explain.

---



---

3. During February and March, Jack is spending 7 days in the Yukon observing endangered species. Historically, the region has snowfall that blocks roads 20 days during these months. Can Jack expect to be able to get around at least 5 of the days? Explain.

---



---

4. ABC Airlines has had delays on 18 of 126 recent flights. DEF Airlines has had delays 13 percent of the time.
  - a. Which airline would you expect to provide more reliable service? Why?

---

- b. Over the last 7 days at one airport, DEF Airlines maintained the record shown in this table.

	Mon	Tue	Wed	Thu	Fri	Sat	Sun
On Time	5	7	9	10	9	11	6
Delayed	2	6	3	1	1	2	2

On which days, if any, did DEF do better than its average? Explain.

---



---

**LESSON**  
**12-4****Making Predictions with Experimental Probability****Practice and Problem Solving: D**

Solve each problem. The first one is done for you.

1. In 1951, Odessa, Texas had high temperatures of at least 95°F for 11 percent of the year. During that year, how many days could residents predict would have highs of at least 95°F? Show your work.

Use the proportion to solve. Round to the nearest whole number.

$$\frac{11}{100} = \frac{x}{365} \quad x = \underline{40}$$

The residents of Odessa could predict highs of at least 95°F on

40 days of the year.

2. A survey shows that 67 percent of peanut-butter lovers prefer chunky-style. Out of 850 people surveyed, how many can be predicted to say they prefer chunky-style peanut butter?

Use the proportion to solve. Round to the nearest whole number.

$$\frac{67}{100} = \frac{x}{850} \quad x = \underline{\hspace{2cm}}$$

           people can be expected to say they prefer chunky-style peanut butter.

3. A football player forces at least 1 turnover in 27.5 percent of the games he plays. If the player plays in 57 games, in how many games can he predict he will force a turnover? Show your work.

Use the proportion to solve. Round to the nearest whole number.

$$\frac{27.5}{100} = \frac{x}{57} \quad x = \underline{\hspace{2cm}}$$

He can expect to force a turnover in            games.

4. Sandy says she splits her time on her homework as follows: 45 percent on math, 20 percent on science, 18 percent on social studies, and 17 percent on language arts.
- a. If Sandy spends 100 hours on homework over a month, predict how much time she spend on each subject.
- Math: \_\_\_\_\_ Science: \_\_\_\_\_
- Social Studies: \_\_\_\_\_ Language Arts: \_\_\_\_\_
- b. If Sandy only spends 75 hours on homework over a month, predict how much time she spends on each subject to the nearest tenth of an hour.

Math: \_\_\_\_\_ Science: \_\_\_\_\_

Social Studies: \_\_\_\_\_ Language Arts: \_\_\_\_\_

**LESSON**  
**13-1****Theoretical Probability of Simple Events*****Practice and Problem Solving: A/B*****Find the probability for each event.**

- tossing a number cube numbered from 1 to 6 and getting an even number that is greater than or equal to 2  
\_\_\_\_\_
- tossing a number cube numbered from 1 to 6 and getting an odd number that is less than or equal to 3  
\_\_\_\_\_
- randomly selecting a seventh grader from a school that has 250 sixth graders, 225 seventh graders, and 275 eighth graders  
\_\_\_\_\_
- without looking, **not** picking a red hat from a box that holds 20 red hats, 30 blue hats, 15 green hats, and 25 white hats  
\_\_\_\_\_

**Match each event to its likelihood.**

- rolling a number greater than 6 on a number cube labeled 1 through 6 \_\_\_\_\_ A. likely
- flipping a coin and getting heads \_\_\_\_\_ B. unlikely
- drawing a red or blue marble from a bag of red marbles and blue marbles \_\_\_\_\_ C. as likely as not
- spinning a number less than 3 on a spinner with 8 equal sections labeled 1 through 8 \_\_\_\_\_ D. impossible
- rolling a number less than 6 on a number cube labeled 1 through 6 \_\_\_\_\_ E. certain

**Use the information to find probabilities in 10–13.**

At a school health fair, individual pieces of fruit are placed in paper bags and distributed to students randomly. There are 20 apples, 15 apricots, 25 bananas, 25 pears, and 30 peaches.

- the probability of getting an apple \_\_\_\_\_
- the probability of **not** getting a pear \_\_\_\_\_
- the probability of **not** getting an apple \_\_\_\_\_
- the probability of getting an orange \_\_\_\_\_



**LESSON**  
**13-1****Theoretical Probability of Simple Events****Practice and Problem Solving: C****Use the information below to answer 1–3.**

Three students are playing a video game. Each player is randomly assigned a character from a collection of characters that includes 5 blue, 6 green, and 3 red characters. After each character is picked, it is not replaced in the collection.

1. What is the probability that the first player does **not** get a blue character?

\_\_\_\_\_

2. The first player gets a blue character. What is the probability that the second player also gets a blue character?

\_\_\_\_\_

3. Both the first and second players get blue characters. What is the probability that the third player does **not** get a blue character?

\_\_\_\_\_

**Fill in the blank.**

4.  $P = 0.4$

Total outcomes: 50

Number of events: \_\_\_\_\_

5. Number of events: 75

$P = 0.3$

Total outcomes: \_\_\_\_\_

**Use the information below to answer 6–9.**

On its first day, a neighborhood pet show includes 5 rabbits, 7 cats, 8 dogs, and 4 hamsters. Each pet has its own petting station. Children who wish to pet the animals are randomly assigned to a station.

6. How many cats would need to be added on the second day to make the probability of picking a cat from the group at least one half?

\_\_\_\_\_

7. Assume that the cats in question 6 were added on the second day. What is the probability of picking a dog from the new group?

\_\_\_\_\_

8. On the third day, no more animals were added. What is the probability of picking a rabbit or a hamster on the third day of the show?

\_\_\_\_\_

9. What is the probability of **not** picking a goldfish on the third day of the show? Explain.

\_\_\_\_\_

**LESSON**  
**13-1**

**Theoretical Probability of Simple Events**

*Practice and Problem Solving: D*

**Solve each problem. The first one is done for you.**

1. The kitchen-tile installer has 20 green, 14 beige, and 16 white tiles in a box. What is the probability of picking a beige tile from the box without looking?

$$\frac{14}{20 + 14 + 16} = \frac{14}{50} = \frac{7}{25}$$

2. There are 25 spools each of blue, green, red, white, and yellow thread in the sewing basket. Without looking, what is the probability of picking a spool of blue thread from the basket?

**Find the probability. The first one is done for you.**

3. A gardener has a bag of flower seeds. Half of the seeds are roses, one fourth are gardenias, and one fourth are irises.

$P(\text{gardenias})$

$$\frac{1}{4}$$

$P(\text{not gardenias})$

$$1 - \frac{1}{4} = \frac{3}{4}$$

4. The traffic-control monitor on the freeway shows 200 vehicles per minute passing the camera in 5 minutes. Of those vehicles, on average, 125 have one passenger, 60 have four or fewer passengers, and 15 have more than four passengers.

$P(\text{vehicle with more than four people})$

$P(\text{vehicle with four or fewer people})$

**Use the information below to complete the table. The first row is done for you.**

Tina has 3 quarters, 1 dime, and 6 nickels in her pocket. Find the probability of randomly drawing each of the following coins.

	Probability		
	Fraction	Decimal	Percent
5. quarter	$\frac{3}{10}$	0.3	30%
6. dime			
7. nickel			

**LESSON**  
**13-2****Theoretical Probability of Compound Events****Practice and Problem Solving: A/B**

Use the table of probabilities to answer questions 1–3.

	Burrito	Taco	Wrap
Cheese	$P = \frac{1}{9}$	$P = \frac{1}{9}$	$P = \frac{1}{9}$
Salsa	$P = \frac{1}{9}$	$P = \frac{1}{9}$	$P = \frac{1}{9}$
Veggie	$P = \frac{1}{9}$	$P = \frac{1}{9}$	$P = \frac{1}{9}$

- List the members of the sample space that include a taco.  
Use parentheses.  
  
\_\_\_\_\_
- List the members of the sample space that include cheese.  
Use parentheses.  
  
\_\_\_\_\_
- What is the probability of choosing a burrito with cheese and a taco or a wrap with salsa? Explain.  
  
\_\_\_\_\_  
  
\_\_\_\_\_

Use the information below to answer questions 4–6.

A basket of 40 pairs of pliers at a discount hardware store includes 5 pairs of 6-inch pliers. A second basket contains 20 hammers, including 3 large hammers.

- What is the probability of drawing a 6-inch pair of pliers from the first basket without looking? \_\_\_\_\_
- What is the probability of **not** drawing a large hammer from the second basket without looking? \_\_\_\_\_
- What is the probability of drawing a pair of 6-inch pliers and **not** drawing a large hammer? \_\_\_\_\_
- What is the probability of drawing a pair of 6-inch pliers from the second basket? Explain. \_\_\_\_\_

**LESSON**  
**13-2**

# Theoretical Probability of Compound Events

## Practice and Problem Solving: C

The table below lists 3 brands of outdoor lights and 2 colors of lighting. It also identifies some of the probabilities of picking one brand and one color at random. Use the table to answer 1–5. (Hint: The probability in each cell is the product of two probabilities, one for the brand and one for the color.)

	Brand X	Brand Y	Brand Z
blue	0.18		0.3
white	0.12	0.08	

1. What is the probability of picking blue lighting or white lighting?

\_\_\_\_\_

2. How can you find the probability of picking blue lighting or the probability of picking white lighting made by Brand X?

\_\_\_\_\_  
\_\_\_\_\_

3. What is the probability of picking Brand X, Y, or Z?

\_\_\_\_\_

4. What is the probability of picking blue lighting made by Brand Y?

\_\_\_\_\_

5. What is the probability of picking white lighting made by Brand Z?

\_\_\_\_\_

**Solve.**

6. Based on earlier expeditions to a dig site, a geologist expects to find igneous, metamorphic, and sedimentary rocks in the percentages by weight of 25%, 60%, and 15%, respectively. The rock sizes to be found and their percentages of appearance are pebbles (60%), small rocks (20%), medium rocks (15%), and boulders (5%).

a. What is the most likely combination of rock type and weight the geologist will find? Use compound probability to prove your answer.

\_\_\_\_\_

b. Compute the probabilities for finding the four weights of igneous rock.

\_\_\_\_\_

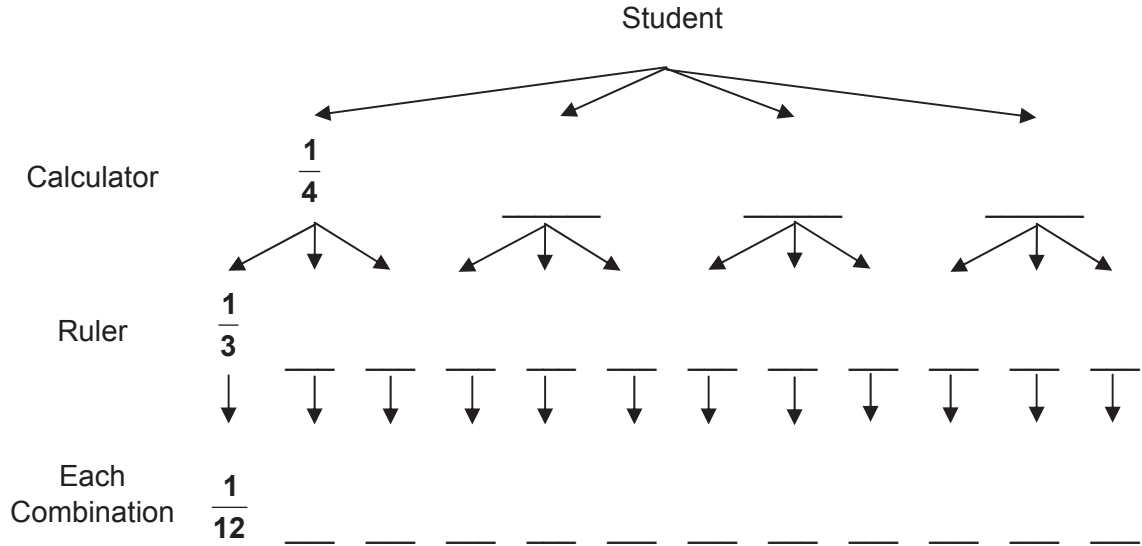
**LESSON**  
**13-2**

# Theoretical Probability of Compound Events

## Practice and Problem Solving: D

**Solve.**

- Each student receives one of 4 calculator models and one of 3 types of ruler. Fill in the tree diagram to show the probabilities of receiving each type of calculator and ruler. The first one in each row is done for you.



**Use the tree diagram to complete Exercises 2–4.**

- What is the probability of receiving each calculator? \_\_\_\_\_
- What is the probability of receiving each ruler? \_\_\_\_\_
- What is the probability of receiving a certain combination of calculator and ruler? Show how this probability is calculated.

**Solve. The first one is done for you.**

- Two students are playing a game with a quarter and a spinner that is divided into equal sixths, with the sections numbered 1 to 6. Each player tosses the coin and spins the spinner.
  - How many outcomes are possible for the coin toss? List them.  
**two: (heads, tails)**
  - How many outcomes are possible for the spin? List them.
  - How many outcomes are possible for the toss and spin? List them.

**LESSON**  
**13-3****Making Predictions with Theoretical Probability*****Practice and Problem Solving: A/B***

**In each odd-numbered question, find the theoretical probability. Then use that probability to make a prediction in the even-numbered question that follows it.**

- |   |  |
|---|--|
| <p>1. Martin flips a fair coin. What is the probability that the coin will land on heads?</p> <p>_____</p>  | <p>2. Martin flips the coin 64 times. How many times can Martin expect the coin to land on heads?</p> <p>_____</p>                                       |
| <p>3. A spinner is divided into five equal sections labeled 1 to 5. What is the probability that the spinner will land on 3?</p> <p>_____</p>               | <p>4. If the spinner is spun 60 times, how many times can you expect the spinner to land on 3?</p> <p>_____</p>  |
| <p>5. Harriet rolls a number cube. What is the probability that the number cube will land on 3 or 4?</p> <p>_____</p>                                       | <p>6. If Harriet rolls the number cube 39 times, how many times can she expect to roll a 3 or 4?</p> <p>_____</p>  |
| <p>7. A bag contains 6 red and 10 black marbles. If you pick a marble from the bag, what is the probability that the marble will be black?</p> <p>_____</p> | <p>8. If you pick a marble, record its color, and return it to the bag 200 times, how many times can you expect to pick a black marble?</p> <p>_____</p> |

**Make a prediction based on the theoretical probability.**

- |  |   |
|--|---|
| <p>9. Gill rolls a number cube 78 times. How many times can he expect to roll an odd number greater than 1?</p> <p>_____</p>   | <p>10. Jenna flips two pennies 105 times. How many times can she expect both coins to come up heads?</p> <p>_____</p>   |
| <p>11. A shoebox holds a number of disks of the same size. There are 5 red, 6 white, and 7 blue disks. You pick out a disk, record its color, and return it to the box. If you repeat this process 250 times, how many times can you expect to pick either a red or white disk?</p> <p>_____</p> | <p>12. Ron draws 16 cards from a deck of 52 cards. The deck is made up of cards of four different colors—red, blue, yellow, and green. How many of the cards drawn can Ron expect to be green?</p> <p>_____</p> |

**LESSON**  
**13-3****Making Predictions with Theoretical Probability*****Practice and Problem Solving: C***

1. Kamila has two number cubes each labeled 1 to 6. She is going to conduct an experiment by tossing both cubes a total of 150 times. She will find the sum of the two numbers in each roll.
  - a. How many possible outcomes are there? \_\_\_\_\_
  - b. What is the probability of tossing a sum of 6? \_\_\_\_\_
  - c. How many times should Kamila toss a sum of 7? \_\_\_\_\_
  - d. How many times should Kamila toss a sum of 10 or greater?  
\_\_\_\_\_
  
2. Eric has two number cubes each labeled 1 to 6. Eric is going to conduct an experiment by tossing the cubes a total of 180 times. He will find the product of the two numbers in each roll.
  - a. How many possible outcomes are there? \_\_\_\_\_
  - b. How many times should Eric toss a product of 12? \_\_\_\_\_
  - c. How many times should Eric toss a product greater than 20?  
\_\_\_\_\_
  - d. How many times should Eric toss a product less than 10?  
\_\_\_\_\_
  
3. Natalie has two number pyramids each labeled 1 to 4. Natalie is going to conduct an experiment by tossing both pyramids a total of 96 times. She will find the difference of each pair of numbers rolled by subtracting the lesser number from the greater number.
  - a. How many possible outcomes are there? \_\_\_\_\_
  - b. How many times should Natalie toss a difference of 1? \_\_\_\_\_
  - c. How many times should Natalie toss a difference of 0? \_\_\_\_\_

**LESSON**  
**13-3**

# Making Predictions with Theoretical Probability

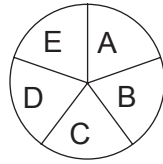
## Practice and Problem Solving D

Find the probability of each event. The first one is done for you.

1. Arjan flips a quarter. What is the probability of the quarter landing tails up?

$$\frac{1}{2}$$

3. What is the probability of spinning this spinner and having it land on B?



2. Stephanie rolls a number cube that has sides numbered from 1 to 6. What is the probability of the cube landing on either 2 or 5?

4. Jonathan has a bag that has 2 red marbles and 3 blue marbles inside of it. If you were to pick one marble from the bag without looking, what is the probability of picking a red marble?

Make a prediction based on a theoretical probability. Show your work.

The first one is done for you.

5. The probability of flipping a coin and having it land on heads is  $\frac{1}{2}$ . If a coin is tossed 4 times, how many times can you expect it to land on heads?

$$\frac{1}{2} \times 4 = \frac{1}{2} \times \frac{4}{1} = \frac{4}{2} = 2$$

7. The probability of a number cube landing on 4 is  $\frac{1}{6}$ . If a number cube is tossed 12 times, how many times can it be expected to land on 4?

6. A spinner is divided into 4 equal sections. The probability of landing on A is  $\frac{1}{4}$ . Norma spins the spinner 16 times. How many times can she expect the spinner to land on A?

8. The probability of picking a blue pen from a cup of pens is  $\frac{1}{3}$ . Tim picks one pen from the cup without looking, records the color, and puts the pen back. He does this 15 times. How many times can he expect him to pick a blue pen?



**LESSON**  
**13-4**

# Using Technology to Conduct a Simulation

## Practice and Problem Solving: A/B

Answer the questions below.

1. A marine biologist has historical records to show that the chance of finding shrimp in a catch of ocean animals is 20 percent. The simulation below models the experimental probability of finding shrimp in at least one of the next 5 catches. The numbers 1 and 2 represent catches with shrimp. The numbers 3–10 represent catches without shrimp.

- a. What does the marine biologist do?

---



---

- b. Here is the table the marine biologist created. Fill in the missing data.

Trial	Numbers Generated	Shrimp Caught	Trial	Numbers Generated	Shrimp Caught
1	7, 3, 2, 7, 10		6	8, 4, 7, 6, 5	
2	2, 4, 5, 3, 10		7	6, 10, 1, 7, 6	
3	9, 9, 7, 6, 6		8	7, 9, 8, 3, 8	
4	7, 9, 6, 6, 4		9	1, 4, 4, 8, 9	
5	10, 6, 4, 6, 4		10	7, 8, 9, 5, 3	

2. According to the simulation above, what is the experimental probability that shrimp will be caught in at least one of the next 5 catches?

---

3. At a television game show, prizes are placed under 10 percent of the seats in the studio audience. What is the experimental probability that you have to reserve exactly 4 seats before you win a prize?

- a. Describe a model to use for this simulation.

---



---



---

- b. Give an example of a trial that would result in winning a prize for exactly 4 seats.

---

**LESSON**  
**13-4****Using Technology to Conduct a Simulation*****Practice and Problem Solving: C***

Answer the questions below.

1. During the regular season, a soccer team has a 30 percent chance of scoring more than 4 goals in a match. Use a calculator and the table to find the experimental probability that the team will score exactly 4 goals in a match.

Trial	Numbers Generated	Result
1		
2		
3		
4		
5		

2. What is the experimental probability based on these 5 trials?

---

3. What do you think will happen to the *total* experimental probability if 5 more trials are run?

---

4. Complete the table below for 5 more trials.

Trial	Numbers Generated	Result
6		
7		
8		
9		
10		

5. What is the experimental probability based on all 10 trials?

---

**LESSON**  
**13-4****Using Technology to Conduct a Simulation****Practice and Problem Solving: D**

Use the information below to complete Exercises 1–3. The first parts of 1 and 2 are done for you.

A pizza parlor puts coupons in 25 percent of its pizza boxes. Answer the questions to find the experimental probability that a customer would need to buy exactly 4 pizzas before finding a coupon.

1. Choose a model.
  - a. What is the probability of finding a coupon?

$$25\% = \frac{25}{100} = \frac{1}{4}$$


---

- b. If you use the whole numbers 1–4 to represent getting or not getting a winning number, what would the winning number(s) be?
- 

- c. What would the non-winning number(s) be?
- 

2. Use your calculator to generate some random numbers for 10 trials. Remember, you are looking for exactly 4 pizzas, at least 1 of which has a coupon. Two trials are done for you. Fill in the rest of the table with your randomly generated numbers.

Trial	Numbers Generated	Pizzas Bought	Trial	Numbers Generated	Pizzas Bought
1	3, 1, 1, 3	4	6		
2	3, 2, 4, 2	4	7		
3			8		
4			9		
5			10		

Why is Trial 1 a winner but Trial 2 is not? (Hint: Is there any limit on how many of the 4 boxes in a trial can have a coupon?)

---

3. Find the experimental probability of needing to buy exactly 4 pizzas before finding a coupon in the 10 trials.

The experimental probability = \_\_\_\_ trials ÷ 10 trials = \_\_\_\_.

# UNIT 1: The Number System

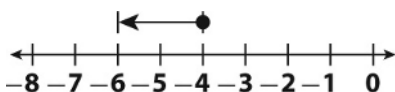
## MODULE 1 Adding and Subtracting Integers

### LESSON 1-1

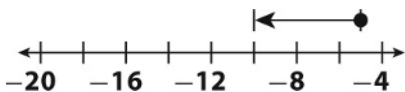
#### Practice and Problem Solving: A/B

- a. 8  
b. negative  
c. -8
- a. 11  
b. negative  
c. -11

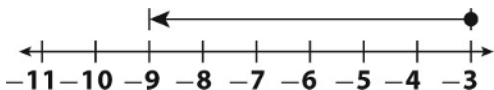
3. -6



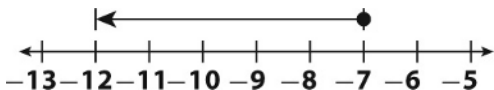
4. -10



5. -9



6. -12



7. -8

8. -9

9. -53

10. -93

11. 224

12. -95

13. -600

14. -1310

15.  $-3 + (-2) + (-4) = -9$ ; -9 feet

#### Practice and Problem Solving: C

- a.  $-42 + (-87) + (-29) = -158$   
b.  $-57 + (-75) + (-38) = -170$   
c. The store had more red apples left over.  
The store started with the same number

of red apples and green apples. It sold more green apples than red apples, so it had more red apples left.

2. a.  $-2 + (-3) + (-13) = -18$

b. The hotel guest got off on the 14<sup>th</sup> floor. The manager started on the 19<sup>th</sup> floor and rode 2 floors down to the 17<sup>th</sup> floor when the hotel guest got on. They rode the elevator down 3 floors.  $17 - 3 = 14$ , so the hotel guest got off on the 14<sup>th</sup> floor.

#### Practice and Problem Solving: D

- a. 7  
b. positive  
c. +7

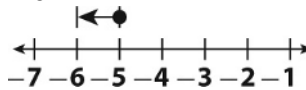
2. a. 10

- b. negative  
c. -10

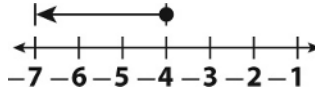
3. -5



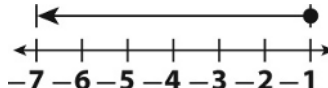
4. -6



5. -7



6. -7



7. -4

8. -8

9. -19

10. -35

11. -\$8

#### Reteach

- a. positive  
b.  $3 + 6 = 9$   
c. 98

2. a. negative
  - b.  $7 + 1 = 8$
  - c.  $-8$
3. a. negative
  - b.  $5 + 2 = 7$
  - c.  $-7$
4. a. positive
  - b.  $6 + 4 = 10$
  - c. 10
5.  $-13$
6.  $-16$
7. 37
8.  $-41$
9.  $-24$
10. 52

### Reading Strategies

1. Each counter represents  $-1$ .
2. Each counter represents a dollar that Sarah withdrew. The counters make it is easier to see how many dollars Sarah withdrew each day.
3. You can simply count the counters to find the sum.
4.  $-3 + (-5) + (-4) + (-1) = -13$

### Success for English Learners

1. positive counters
2. because you are adding a negative number
3. Answers will vary. Sample answer: Erica bought stamps three times this week. She bought 5 stamps on Monday, 3 stamps on Wednesday, and 4 stamps on Friday. How many stamps did Erica buy this week? ( $5 + 3 + 4 + 12$ )

### LESSON 1-2

#### Practice and Problem Solving: A/B

1.  $-1$
2. 1
3. 5
4.  $-1$
5.  $-1$
6.  $-3$

7.  $-2$
8. 4
9. 8
10. 2
11. 43
12. 21
13.  $-29$
14.  $-10$
15.  $11^{\circ}\text{F}$
16. 3 yards
17.  $-9$  points
18. a. negative
  - b. loss of 6, or  $-6$

#### Practice and Problem Solving: C

1. negative;  $-10$
2. positive; 5
3. negative;  $-7$
4. positive; 5
5. positive; 6
6. positive; 15
7. negative;  $-1$
8. positive; 1
9. the same sign as the integers
10. It is the sign of the integer whose absolute value is greater.
11.  $-15$
12.  $-24$
13. 13
14.  $-30$
15. 0
16.  $-18$
17.  $-5^{\circ}\text{F}$
18. \$150
19. Rita; 11 points

#### Practice and Problem Solving: D

1.  $-1$
2.  $-7$
3.  $-5$
4.  $-1$
5.  $-1$

6. 12
7. 4
8. 8
9. -5
10. -10
11. -6
12. 5°F
13. -22°F
14. -97 ft
15. 17,500 ft

### Reteach

1. subtract; the numbers have different signs
2. negative
3. 4
4. -5
5. -1
6. -4
7. 2
8. -5
9. 9
10. -10
11. -16
12. Sample answer: I look at 3 and 9 and see that  $9 > 3$ . Since the sign on 9 is negative, the answer is negative.

### Reading Strategies

1. on zero
2. right; 6
3. left; 4
4. 2
5. on zero
6. left; 5
7. left; 3
8. -8

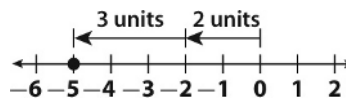
### Success for English Learners

1. negative number
2. No, the sum can be positive or negative.
3. negative
4. positive

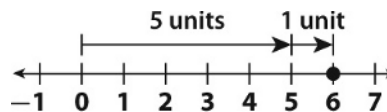
## LESSON 1-3

### Practice and Problem Solving: A/B

1. -5



2. 6



3. -10
4. 5
5. -4
6. 24
7. 0
8. 46
9. -1
10. 42
11. -6
12. -26
13. 30
14. -5
15. 9°C
16. 14°F
17. 4°C
18. 7°C
19. 240°C

### Practice and Problem Solving: C

1. 16
2. -22
3. 7
4. 0
5. 29
6. 9
7. -2
8. 0
9. -10
10. when  $x < y$
11. when  $x > y$
12. 12°F, -2°F
13. Pacific; 2,400 m

14. 11,560;  $-185$ ;  $-185$  is closer to sea level; 11,375 ft
15. Saturday
16.  $3^\circ$

### Practice and Problem Solving: D

1.  $-5$
2.  $-4$
3.  $-7$
4.  $-5$
5. 6
6.  $-16$
7. 0
8. 1
9. 7
10. 16
11.  $-11$
12.  $610^\circ\text{C}$
13. \$35,000
14.  $9^\circ\text{F}$

### Reteach

1. a. 5  
b.  $-1$   
c. 20
2. a. negative  
b. 2  
c.  $-2$
3. 40
4.  $-3$
5.  $-26$
6. 0
7. 31
8.  $-5$

### Reading Strategies

1. left
2. 7
3. right
4. 3
5.  $-4$
6. right; 2
7. left; 6
8.  $-4$

### Success for English Learners

1. positive
2. negative

### LESSON 1-4

### Practice and Problem Solving: A/B

1.  $-2 - 19 + 7 = -14$ ; 14 feet below the surface of the water
2.  $45 - 8 + 53 - 6 = 84$ ; 84 points
3. 20
4.  $-27$
5. 18
6. 110
7. 52
8. 34
9.  $<$
10.  $>$
11. a.  $225 + 75 - 30 = 270$ ; 270 points  
b. Maya

### Practice and Problem Solving: C

1.  $-35 - 29 + 7 - 10 = -67$ ; Jana is 67 ft from the end of the fishing line.
2. a.  $500 + 225 - 105 + 445 = 1065$ ; 1065 ft above the ground  
b. Kirsten is closer to the ground; Gigi's balloon position is  $500 + 240 + 120 + 460 = 1080$  ft, which is greater than 1065 ft.
3. a.  $20 + 20 + 30 + 30 - 10 - 10 - 10 = 100$ ; 100 points  
b. David and Jon tied. Jon scored  $20 + 20 + 20 + 30 + 30 - 10 - 10 = 100$ , or 100 points, which is the same number of points that David scored.

### Practice and Problem Solving: D

1.  $-2 - 9 + 3 = -8$ ; 8 ft below the surface of the water
2.  $20 - 5 + 10 = 25$ ; 25 points
3.  $-1$
4.  $-24$
5. 20
6.  $-9$

7. 8  
 8. 100  
 9. <  
 10. >  
 11.  $200 - 30 + 70 = 240$ ; 240 points

### Reteach

- a.  $10 + 5 - 19$   
 b.  $15 - 19 = -4$   
 c.  $-4$
- a.  $14 - 15 - 3$   
 b.  $14 - 18 = -4$   
 c.  $-4$
- a.  $10 - 80 - 6$   
 b.  $10 - 86 = -76$   
 c.  $-76$
- a.  $7 + 13 - 21$   
 b.  $20 - 21 = -1$   
 c.  $-1$
- a.  $13 + 2 - 5 - 6$   
 b.  $15 - 11 = 4$   
 c. 4

- $18 + 6 - 4 - 30$
- $24 - 34 = -10$
- $-10$

### Reading Strategies

- +700; above
- when the balloon rises; rise
- when the balloon drops; drop
- $700 - 200 + 500 - 100 = 900$
- 900 ft above the ground
- Angelo is higher than where he started because 900 is greater than 700.

### Success for English Learners

- When money is withdrawn, it is taken out of the bank account. So, you subtract.
- When money is deposited, it is put into the bank account. So, you add.
- Answers may vary. Sample answer: Jose has \$25. He spends \$5, and then earns and saves \$15. How much money does Jose have at the end? ( $25 - 5 + 15 = 35$ )

## MODULE 1 Challenge

1. Calculate the difficulty using the method shown in the example.

Trail	Mile 1	Mile 2	Mile 3	Mile 4	Mile 5	Total
Breakneck	$100 - (-2) = 102$	$-2 - 100 = -102$	$150 - (-2) = 152$	$-8 - 150 = -158$	$250 - (-8) = 258$	252
Lake Shore	$0 - (-10) = 10$	$6 - 0 = 6$	$55 - 6 = 49$	$-1 - 55 = -56$	$60 - (-1) = 61$	70
Mountain View	$-2 - 40 = -42$	$120 - (-2) = 122$	$35 - 120 = -85$	$200 - 35 = 165$	$180 - 200 = -20$	140

The most difficult trail is Breakneck.

2. The greatest possible value is obtained by filling the boxes as follows.

$$-3 \boxed{+} 5 \boxed{-} -4 \boxed{-} -10 \boxed{+} 18 = 34$$



## MODULE 2 Multiplying and Dividing Integers

### LESSON 2-1

#### Practice and Problem Solving: A/B

1. -80
2. -72
3. 40
4. -39
5. 0
6. -80
7. 189
8. -11
9. -72
10. 80
11. -54
12. 49
13.  $4(-6) = -24$ ; -24 points
14.  $5(-3) = -15$ ;  $-15^\circ$
15.  $8(-18) = -144$ ;  $200 + (-144) = 56$ ; \$56
16.  $3(-5) = -15$ ;  $8 + (-15) = -7$ ;  $-7^\circ$
17.  $6(-25) = -150$ ;  $325 + (-150) = 175$ ; \$175

#### Practice and Problem Solving: C

1. -98
2. 120
3. -144
4. 135
5. -24
6. -36
7. 0
8. -1,440
9. 1,176
10.  $3(-4) = -12$ ;  $-12 + 9 = -3$ ; -3 yd
11.  $4(-35) = -140$ ;  $-140 + 220 = 80$ ; \$80
12.  $3(-50) = -150$ ;  $-125 + (-150) = -275$ ; -275 ft
13. 1
14. -1
15. 1
16. -1

17. 1
18. negative; positive

#### Practice and Problem Solving: D

1. -6
2. 0
3. 8
4. -28
5. 12
6. -36
7. -50
8. -18
9. -70
10. 1
11. -12
12. 4
13.  $5(-3) = -15$ ; -15 points
14.  $3(-1) = -3$ ;  $-3^\circ$
15.  $2(-4) = -8$ ; -8 yd
16.  $7(-9) = -63$ ; -\$63
17.  $5(-5) = -25$ ; -\$25

#### Reteach

1. -2
2. 18
3. -5
4. 54
5. 44
6.  $4(-8) = -32$ ; -32 points
7.  $5(-500) = -2,500$ ; -2,500 ft

#### Reading Strategies

1. gaining 10 points
2. losing 17 points
3. left
4. 4
5. left
6. 4
7. left
8. 4
9. The score decreased by 12.
10. -12 points
11. -16 points

## Success for English Learners

1.  $-20$
2.  $3$
3.  $(-20) \times (3)$
4.  $-\$60$
5. Sample answer: You know the product will be either  $400$  or  $-400$ . It will be  $400$  because both factors are negative, so the product is positive.
6. Yes. The product of both will be negative because there is one positive factor and one negative factor. Since  $4 \times 8 = 32$ , each product will be  $-32$ .

## LESSON 2-2

### Practice and Problem Solving: A/B

1.  $-12$
2.  $19$
3.  $-3$
4.  $-4$
5.  $11$
6.  $-8.75$
7.  $-5$
8.  $-10$
9.  $-1$
10.  $32 \div (-4)$
11.  $\frac{-30}{6} + (-8)$
12.  $12 \div (-3) + (-14)4$
13.  $\$3,000 \div 40 = \$75$ ;  $\$75 - \$40 = \$35$
14. a.  $-240 \div (-15) = 16$ ; 16 weeks  
b.  $20 \times -\$15 = \$300$ ;  $\$300 - \$240 = \$60$

### Practice and Problem Solving: C

1.  $-16$
2.  $2$
3.  $3\frac{2}{3}$
4.  $+2$  produces  $+2$ ;  $+3$  produces  $+6$ .
5.  $+2$  produces  $+2$ .
6. None of the integers from  $-3$  to  $3$  produces a positive, even integer.

7.  $+1$  produces  $+2$ .
8.  $-16 \div 4 = -4$ ;  $-4$  points for each event
9. a.  $58^\circ\text{F}$ ;  $70^\circ\text{F} - (6 \text{ yd})(2^\circ\text{F}/\text{yd}) = 70^\circ\text{F} - 12^\circ\text{F} = 58^\circ\text{F}$ ; from  $6 \text{ yd}$  to  $15 \text{ yd}$  deep, the temperature is constant, so at  $10 \text{ yd}$  deep, the temperature is  $58^\circ\text{F}$ .  
b.  $73^\circ\text{F}$ ;  $50 \text{ ft} = 16\frac{2}{3} \text{ yd}$  below the surface; at  $15 \text{ yd}$  below the surface, the temperature is  $58^\circ\text{F}$ . But, from  $15 \text{ yd}$  to  $20 \text{ yd}$  the temperature increases  $3^\circ\text{F}$  per ft.  $16\frac{2}{3} \text{ yd}$  is  $16\frac{2}{3} - 15$  or  $1\frac{2}{3} \text{ yd}$ , which is  $5 \text{ ft}$ , so the temperature there is  $58^\circ\text{F} + (5 \text{ ft})(3^\circ\text{F}/\text{ft})$  or  $58^\circ\text{F} + 15^\circ\text{F} = 73^\circ\text{F}$ .  
c.  $70^\circ\text{F} - (6 \text{ yd})(2^\circ\text{F}/\text{yd}) + (5)(3 \text{ ft})(3^\circ\text{F}) = 103^\circ\text{F}$  at the spring source

### Practice and Problem Solving: D

1.  $5$
2.  $-9$
3.  $-4$
4.  $>$
5.  $<$
6.  $=$
7.  $-45 \div 5 = -9$
8.  $\frac{55}{-11} = -5$
9.  $-38 \div 19 = -2$
10.  $-4 \div -2 = 2$
11.  $-24 \div 4 = -6$ ; On average, each investor lost  $6\%$ .
12.  $-760 \div 4 = -190$ ; On average, the temperature dropped  $190^\circ/\text{h}$ .
13.  $-5,100 \div 3 = -1,700$ ; On average, the car's value decreased  $\$1,700/\text{yr}$ .

### Reteach

1. right; negative; negative
2. left; negative; positive
3. left; positive; negative

4.

Divisor	Dividend	Quotient
+	+	+
-	+	-
+	-	-
-	-	+

### Reading Strategies

- 3,600 km; 225 km/h; 16 hours
- 35 degrees; 7 hours; 5 degrees per hour
- 1,600 liters; 2-liters/bottle; 800 bottles
- Answers will vary. Sample answers: "102 divided by negative 6." "Negative 6 goes into 102 how many times?"
- Answers will vary. Sample answers: "The opposite of 17 divided into negative 221." "Negative 221 divided by negative 17."

### Success for English Learners

- $\frac{-210}{70} = -3$
- $300 \overline{) -4200} = -14$
- $-50 \div 10 = -5$
- $27 \overline{) 54} = 2$
- +, 1
- , -32
- , -4
- +, 5

### LESSON 2-3

#### Practice and Problem Solving: A/B

- 14
- 16
- 27
- 15
- 29
- 40
- >
- >
- $15(2 - 5) = -45$ ; \$45 less

10.  $(-12) + (-11) + (-8) = -31$ ; falls by 31 ft

11.  $5(3) + 2(-12) = -9$ ; 9-yd loss

12.  $7(-3) + (-12) + 5 = -28$ ; \$28 less

#### Practice and Problem Solving: C

- +10
- 18
- +104
- 28
- $8(-2 + 9 + 6)$
- gained \$68
- $4(-45) + 112 = -68$ ; 68 ft lower
- $17(5) + 5(-2) + 8 = 83$ ; She got an 83.
- $3(-20) + 2(-12) + (-42) + 57 - 15 = -84$ ; \$84 less
- a. Positive, because there is an even number of negative factors.  
b. 2,880

#### Practice and Problem Solving: D

- $15 + (-12)$ ; 3
- $15 + 18$ ; 33
- $-7 + 23$ ; 16
- $52 + (-5)$ ; 47
- $(-50) + (-112) + (-46) = -208$ ; He has \$208 less.
- $8 + (-4) + 7 + 3 + (-11) = 3$ ; They had a 3-yd gain.
- $4(-2) + 2(-1) + 3 = -7$ ; She had \$7 less.
- $3(-4) + 4(-2) = -20$ ; The water was 20 in. lower.

#### Reteach

- multiplication
- addition
- division
- addition
- multiplication
- division
- multiplication
- subtraction
- 1
- 31

11. -31
12. 33
13. -62
14. -48

### Reading Strategies

1. paid; gave;  $4(-3) + 7 = -12 + 7 = -5$ ;  
\$5 less
2. below;  $-48 \div 4 = -12$ ; 12 feet below the surface
3. lost; gained;  $3(-5) + 32 = -15 + 32 = 17$ ;  
gained 17 yards

### Success for English Learners

1. 39
2. -5
3. 6
4. a. Sample answer: Tom bought 3 DVDs for \$20 each. He had a coupon for \$5 off one DVD. After his purchase, what is the change in the amount of money Tom has?  
b.  $-3(20) + 5 = -60 + 5 = -55$ ; Tom has \$55 less now.

## MODULE 2 Challenge

1. Sample answer:  
 $81 \div (-9) + (-4) - 17 + (4)(3) + 1$   
 $-9 + (-4) - 17 + 12 + 1$   
 $-13 - 17 + 12 + 1$   
 $-30 + 12 + 1$   
 $-18 + 1$   
 $-17$
2. Sample answer: Play with 2–4 players. Shuffle the integer cards and deal them out. Place the operations card face-up on the table. One player starts making an expression by placing one card on the table. The next player can choose an operation card and an integer card from his/her hand and extend the expression. Each player does the same until the cards are gone or one player wins. To win, a player makes the expression equal to 0.

3. Sample answer:

First find multiplication and division signs and do these operations first.

1. Multiply  $(-4)(7) = -28$ . The product is negative because one of the factors is negative.

$$(-8) + (-3) + (-28) \div 14 + 9(-2)$$

2. Divide  $(-28) \div 14 = -2$ . The quotient is negative because the dividend is negative and the divisor is positive.

$$(-8) + (-3) + (-2) + 9(-2)$$

3. Multiply  $(9)(-2) = -18$ . Same reason as step 1.

$$(-8) + (-3) + (-2) + (-18)$$

Now go back and add and subtract from left to right.

4.  $(-8) + (-3) = (-11)$  because you are adding two negative numbers.

$$(-11) + (-2) + (-18)$$

5.  $(-11) + (-2) = (-13)$ , for the same reason.  $(-13) + (-18)$

$$6. (-13) + (-18) = (-31)$$

## MODULE 3 Rational Numbers

### LESSON 3-1

#### Practice and Problem Solving: A/B

1. 0.95
2. -0.125
3. 3.4
4.  $-0.777\dots$  or  $0.\overline{7}$
5.  $0.7333\dots$  or  $0.7\overline{3}$
6.  $2.666\dots$  or  $2.\overline{6}$
7.  $\frac{29}{9}$ ;  $3.222\dots$ ; repeating or  $3.\overline{2}$
8.  $\frac{301}{20}$ ; 15.05; terminating
9.  $-\frac{53}{10}$ ; -5.3; terminating

10. a. Answers may vary. Sample answer:

$$2\frac{3}{4}, 2.75; 3\frac{2}{4}, 3.5$$

b. Answers may vary. Sample answer:

$$4\frac{2}{3}, 4.666\dots \text{ or } 4.\bar{6}$$

11. They all convert to terminating decimals.

### Practice and Problem Solving: C

1.  $\frac{25}{18}$ ; 1.3888... or  $1.3\bar{8}$ ; repeating

2.  $\frac{200}{15}$ ; 13.333... or  $13.\bar{3}$ ; repeating

3. Possible answer:  $\frac{5}{20}, \frac{18}{20}, \frac{3}{20}$ ; the decimals are 0.25, 0.9, 0.15. They terminate because a rational number with 20 in the denominator is equivalent to a rational number with 100 in the denominator, which always terminates.

4. Possible answer:  $\frac{30}{15} = 2.0$ ;  $\frac{5}{15} = 0.333\dots$

or  $0.\bar{3}$ ; To find a repeating decimal, select a multiple of 5 that is less than 15. To find a terminating decimal, select a numerator that is a multiple of 15.

5. Possible answer:  $\frac{1.5}{7.5} = \frac{15}{75}$ , which

is written as a ratio of two integers;

$$\frac{15}{75} = 0.2$$

### Practice and Problem Solving: D

1. 0.65; terminating

2. 4.666... or  $4.\bar{6}$ ; repeating

3. 0.555... or  $0.\bar{5}$ ; repeating

4. 3.833... or  $3.8\bar{3}$ ; repeating

5. 8.75; terminating

6. 10.625; terminating

7. 1.3125

8. 7.3125

9. 26.3125

10. 1.266... or  $1.2\bar{6}$

11. 17.266... or  $17.2\bar{6}$

12. 23.266... or  $23.2\bar{6}$

### Reteach

1.  $\frac{3}{4} = 0.75$  so  $7\frac{3}{4} = 7.75$

2.  $\frac{5}{6} = 0.833\dots$  or  $0.8\bar{3}$  so  $11\frac{5}{6} = 11.833\dots$   
or  $11.8\bar{3}$

3.  $\frac{3}{10} = 0.3$  so  $12\frac{3}{10} = 12.3$

4.  $\frac{5}{18} = 0.277\dots$  or  $0.2\bar{7}$  so  $8\frac{5}{18} = 8.277\dots$   
or  $8.2\bar{7}$

5. Sample answer:

Method 1: Start with the fraction part.

$$\frac{2}{9} = 0.222\dots \text{ or } 0.\bar{2} \text{ so } 9\frac{2}{9} = 9.222\dots \text{ or } 9.\bar{2}$$

Method 2:  $9\frac{2}{9} = \frac{83}{9}$ . Using long division,

$$\frac{83}{9} = 9.222\dots \text{ or } 9.\bar{2}; \text{ the results agree.}$$

6. Sample answer:

Method 1: Start with the fraction part.

$$\frac{5}{8} = 0.625 \text{ so } 21\frac{5}{8} = 21.625.$$

Method 2:  $21\frac{5}{8} = \frac{173}{8}$ . Using long

division,  $\frac{173}{8} = 21.625$ ; the results agree.

### Reading Strategies

1. Both  $-3$  and  $5$  are integers.

2.  $2$  is an integer but  $1.17$  is not an integer (but that does not mean that  $\frac{2}{1.17}$  is not a rational number).

3.  $1$  is an integer but  $\frac{1}{3}$  is not an integer

(but that does not mean that  $\frac{1}{\frac{1}{3}}$  is not a rational number).

4.  $\sqrt{2}$  is not an integer and  $\sqrt{4}$  is not an integer (but  $\sqrt{4}$  can be written as the integer  $2$ ).

5.  $\frac{\sqrt{3}}{\sqrt{6}}$  cannot be written as a ratio of two integers.
6.  $\frac{\sqrt{2}}{\sqrt{2}} = 1$ , so it can be written as the ratio of two integers such as  $\frac{1}{1}$  or  $\frac{-3}{-3}$ .
7.  $\frac{\sqrt{4}}{\sqrt{25}} = \frac{2}{5}$ , so it can be written as the ratio of two integers.
8.  $\frac{\sqrt{1}}{2} = \frac{1}{2}$ , so it can be written as the ratio of two integers.

### Success for English Learners

1. D
2. B
3. Answers may vary. Sample answer: 4.616161...;  $\overline{4.61}$

### LESSON 3-2

#### Practice and Problem Solving: A/B

1. 1
2. -7
3. 9
4.  $-2\frac{1}{2}$
5.  $\frac{1}{9}$
6. -8.4
7.  $-5\frac{1}{2}$
8. -3.1
9.  $-\frac{11}{20}$
10. -3.3
11. 2.46
12. -1.85
13. -6.85
14.  $-3\frac{1}{8}$
15. \$3.75

16. gain of 6
17. \$6.85
18. 3.8 mi from his house

#### Practice and Problem Solving: C

1. 4
2.  $2\frac{16}{45}$
3.  $8\frac{19}{45}$
4. -7.6
5.  $-2\frac{1}{8}$
6. -1.13
7.  $-\frac{59}{180}$
8. 0
9. 9.929
10. -2.278
11. -1.75
12.  $1\frac{3}{23}$
13. \$8.07
14. \$5.57
15. 5 in.

#### Practice and Problem Solving: D

1. 5
2. -1
3. -8
4. 3
5. 8
6. -6
7. 0.5
8. -2.0
9. 2
10.  $-\frac{1}{2}$
11. 2
12. 0
13. 4

14.  $2\frac{1}{3}$
15.  $\frac{3}{4}$
16.  $-3.4$
17.  $-3.2$
18.  $-0.5$
19.  $-1\frac{1}{2}$
20.  $-3$
21.  $-0.9$

### Reteach

1. 2
2.  $-5$
3.  $-7$
4. 0.6
5. 4.7
6.  $-6$
7.  $\frac{3}{5}$
8.  $-1\frac{2}{3}$
9.  $-\frac{1}{2}$

### Reading Strategies

1. 0
2. to the right; 6
3. to the left; 4
4. 0
5. to the left; 5.5
6. to the left; 3

### Success for English Learners

1. Answers will vary. Sample answer: so the digits of the same place value get added together
2. the total number of pieces of pizza

## LESSON 3-3

### Practice and Problem Solving: A/B

1.  $-9$
2. 9
3. 9
4.  $-5\frac{1}{2}$
5.  $-\frac{2}{7}$
6. 1.2
7.  $\frac{3}{4}$
8.  $-3.7$
9.  $-5\frac{1}{2}$
10. 8.3
11.  $-9.08$
12. 3.75
13.  $-6.2$
14.  $-1\frac{3}{5}$
15.  $-4.1^{\circ}\text{C}$
16.  $1\frac{3}{5}$  m

### Practice and Problem Solving: C

1.  $-6\frac{2}{3}$
2.  $1\frac{1}{21}$
3.  $-10$
4.  $-7.2$
5.  $-2\frac{1}{8}$
6.  $-12.179$
7.  $-1\frac{5}{9}$

- 8. 0.36
- 9. -13.19
- 10. -4.35
- 11. -1.05
- 12. -7
- 13. 3.55
- 14. Alex by 7.1 points
- 15. 7°C

**Practice and Problem Solving: D**

- 1. 2
- 2. 6
- 3. -3
- 4. -7
- 5. -3
- 6. 8
- 7. 1.5
- 8. -3
- 9. -1.5
- 10.  $1\frac{1}{2}$
- 11. -1
- 12.  $-1\frac{1}{2}$
- 13. 7
- 14.  $-\frac{4}{3}$  or  $-1\frac{1}{3}$
- 15.  $-\frac{1}{2}$
- 16. 1.4
- 17. -2.2
- 18. -7.8
- 19. -2
- 20. -6.5
- 21. -1

**Reteach**

- 1. a. 5  
b. -1  
c. 20
- 2. a. negative  
b. 2  
c. -2

- 3. 40
- 4. -3
- 5. -26
- 6. 4.2
- 7. 2
- 8. -3.25
- 9. 1
- 10. -2
- 11.  $-\frac{5}{4}$

**Reading Strategies**

- 1. Sample answer: One number is placed in each square.
- 2. as a placeholder to show that there is no number in that place
- 3.

4	0	•	3	
-	6	•	5	4

- 4. yes; in the hundredths place of the first number
- 5. 33.76

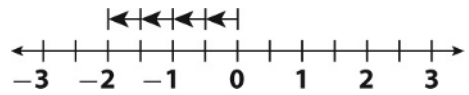
**Success for English Learners**

- 1. -9
- 2. You are not adding or subtracting -4, you are subtracting 3 from -4.
- 3. No, in  $3 - 5$  you are subtracting 5 (or adding -5) to 3. In  $5 - 3$  you are subtracting 3 from 5.
- 4. Find a common denominator
- 5.  $\frac{2}{15}$

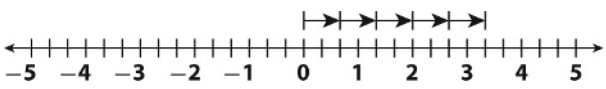
**LESSON 3-4**

**Practice and Problem Solving: A/B**

- 1. -2



- 2.  $3\frac{1}{3}$





3. -6.2
4. -21.6
5. -19.8
6. 16.8
7. 36
8. -2.1
9. -8.2
10. 31.5
11. -20
12.  $-\frac{4}{9}$
13. 9
14.  $\frac{1}{2}$
15.  $12\left(\frac{3}{4}\right) = 9$ ; 9 yards
16.  $\left(\frac{1}{4}\right)\left(\frac{2}{3}\right)\left(\frac{3}{5}\right) = \frac{1}{10}$ ;  $\frac{1}{10} \text{ m}^3$
17.  $(-3 \text{ }^\circ\text{F/half hour}) \times (2 \text{ half hours/hour}) \times 4 \text{ hours} = -24 \text{ }^\circ\text{F}$ ;  $75 \text{ }^\circ\text{F} - 24 \text{ }^\circ\text{F} = 51 \text{ }^\circ\text{F}$

### Practice and Problem Solving: C

1. <; The product of 3 positive numbers, each of which is less than 1, is less than 1.
2. <; The product of 3 negative numbers is a negative number.
3. >; The product of 3 positive numbers is greater than the product of the opposite of each of the positive numbers.
4. <; the product of a positive and a negative number is less than 0.
5. False; A negative number raised to an even power is a positive number.
6. True; A number that is greater than 1 raised to a positive power is greater than 1.
7. False; A positive number that is less than one raised to a power is less than 1.

8.  $V_1 = \frac{4}{3}\pi\left(\frac{1}{2}\right)^3 = \frac{4\pi}{24} = \frac{\pi}{6} \text{ ft}^3$ ;  
 $V_2 = \frac{4}{3}\pi\left(\frac{3}{4}\right)^3 = \frac{108\pi}{192} = \frac{9\pi}{16} \text{ ft}^3$ ;  $V_2 > V_1$ ,  
 since  $\frac{9\pi}{16} = 0.5625\pi$  and  $\frac{\pi}{6} = 0.1\bar{6}\pi$ .
9.  $V = \frac{4}{3}\pi r^3$ . If  $r$  becomes  $\frac{2r}{3}$ , then  
 $V_2 = \frac{4}{3}\pi\left(\frac{2r}{3}\right)^3 = \frac{8}{27}\left(\frac{4}{3}\pi r^3\right)$ . Therefore, if the radius is reduced to one third of its original value, the volume is  $\frac{8}{27}$  or 0.296 of the original volume.

### Practice and Problem Solving: D

1.  $\left(-\frac{1}{2}\right)$ ;  $\left(-\frac{1}{2}\right)$ ;  $\left(-\frac{1}{2}\right)$ ;  $\left(-\frac{1}{2}\right)$ ;  $\left(-\frac{1}{2}\right)$ ;  
 $\left(-\frac{1}{2}\right)$ ;  $-\frac{6}{2}$  or  $-3$
2.  $\left(-\frac{2}{3}\right)$ ;  $\left(-\frac{2}{3}\right)$ ;  $\left(-\frac{2}{3}\right)$ ;  $\frac{6}{3}$  or 2
3. Answers may vary. Sample answer:  
 $4\left(-\frac{5}{8}\right)$ ;  $\frac{20}{8}$  or  $\frac{5}{2}$  or  $-2\frac{1}{2}$
4. Answers may vary. Sample answer:  
 $2(-2.5)$ ;  $-5$
5. Answers may vary. Sample answer:  
 $3\left(-\frac{2}{9}\right)$ ;  $-\frac{2}{3}$
6.  $-\frac{1}{4} \times \left(\frac{-6}{25}\right) = \frac{6}{100} = \frac{3}{50}$  or 0.06
7.  $4 \times 2.5 \times 0.8 = 10 \times 0.8 = 8$
8. a.  $(-3.5) + (-3.5) + (-3.5) + (-3.5) + (-3.5) = -17.5 \text{ m}$ ;  $-17.5 \text{ m}$   
 b.  $5 \times (-3.5) = -17.5$ ;  $-17.5 \text{ m}$

### Reteach

1. 6; right;  $\frac{6}{4}$ ;  $1\frac{1}{2}$
2. 8 times; 26.4; 26.4
3. 5 times; 23; 23

## Reading Strategies

- 4
- 5.25
- $-2\frac{2}{5}$

## Success for English Learners

- 8.8
- 3
- 9.9
- 9.9
- 12
- $\frac{12}{7}$  or  $1\frac{5}{7}$
- 4

## LESSON 3-5

### Practice and Problem Solving: A/B

- $-\frac{1}{6}$
- 8
- $\frac{1}{12}$
- 0.35
- 7.5
- 0.25
- $\frac{2}{3}$
- $-\frac{4}{3}$
- $-\frac{9}{20}$
- 6
- 1.75
- 2
- 1
- $\frac{3}{14}$
- $\frac{1}{98}$
- $8 \div \frac{1}{4}$ ; 32 packets

- $\frac{3}{4} \div 12$ ;  $\frac{1}{16}$  h
- $\frac{35}{1.25}$ ; 28 pieces
- $4\frac{1}{8} \div 2\frac{1}{6} = \frac{99}{52}$  or  $1\frac{47}{52}$  t per acre

### Practice and Problem Solving: C

- $\frac{1}{-5}$  and  $-\frac{1}{5}$
- $\frac{-7}{30}$  and  $\frac{7}{-30}$
- $\frac{-1}{2}$  and  $-\frac{1}{2}$
- =;  $\frac{10}{3}$ ;  $\frac{10}{3}$
- <;  $(4.5 \div 0.5) \div 3 = 3$ ;  $4.5 \div (0.5 \div 3) = 27$
- >;  $\left(6 \div -\frac{1}{5}\right) \times -\frac{4}{3} = 40$ ;  
 $6 \div \left(-\frac{1}{5} \times -\frac{4}{3}\right) = 22.5$
- =; -123.75; -123.75
- $\frac{0.4}{-0.625} = -0.64$
- $\frac{-5.4}{-0.3125} = 17.28$
- $\frac{0.25}{0.6} = 0.4\overline{16}$
- $\frac{\left(\frac{3}{4}\right)}{\frac{1}{4}} = 7$ ;  $\frac{1.75}{0.25} = 7$
- $\frac{\left(\frac{1}{2}\right)}{\frac{1}{2}} = 3$ ;  $\frac{1.5}{0.5} = 3$
- $\frac{\left(\frac{3}{8}\right)}{\frac{5}{8}} = 2\frac{1}{5}$ ;  $\frac{1.375}{0.625} = 2.2$
- The quotient will be less than 7, 3, and 2.2 but greater than 1. It decreases as the denominators of the fractions increase.

## Practice and Problem Solving: D

- $\frac{4}{3}; -8$
- $\frac{1}{8}; \frac{1}{10}$
- $\frac{-4}{7}; \frac{1}{2}$
- $\frac{8}{7}; \frac{-40}{21} = -1\frac{19}{20}$
- $\frac{9}{4}; \frac{-9}{2}$
- $\frac{1}{4}; -1\frac{3}{16}$
- $\frac{1}{40}$
- $\frac{-21}{8} = -2\frac{5}{8}$
- $\frac{7}{2} = 3\frac{1}{2}$
- 0.40; 0.16
- 0.30; -15.83
- 8.0; 3.2
- a.  $6\frac{3}{4} \div \frac{1}{8}$   
b. 54 markers  
c. The town spaced the markers every eighth of a mile. They used 54 markers. Since  $6\frac{3}{4}$  is evenly divisible by  $\frac{1}{8}$ , they used a whole number of markers.

### Reteach

- +
- 
- 
- +
- $-\frac{1}{7} \div -\frac{5}{9} = -\frac{1}{7} \times -\frac{9}{5}; -\frac{1}{7} \times -\frac{9}{5} = \frac{-9}{-35}; \frac{-9}{-35} = \frac{9}{35}$

A negative divided by a negative is positive.

- $\frac{7}{8} \div \frac{8}{9} = \frac{7}{8} \times \frac{9}{8}; \frac{7}{8} \times \frac{9}{8} = \frac{63}{64};$   
 $\frac{63}{64}$  is positive since a positive divided by a positive is positive.

### Reading Strategies

- +
- 
- +
- 
- 
- +
- 
- +
- +
- 
- +
- 
- 
- 
- +

### Success for English Learners

- $2\frac{7}{88}$
- 2

### LESSON 3-6

#### Practice and Problem Solving: A/B

- Answers may vary. Sample answer: One estimate would be 4 times 6 or 24 feet long. The actual answer is greater than 24 feet.
- Answers may vary. Sample answer: 3 liters divided by a third of a liter makes about 9 servings. The actual answer is more than 9 servings.
- Answers may vary. Sample answer: The perimeter is greater than 15 inches.
- Answers may vary. Sample answer: 3-gram eggs would be 36 grams, but 4 gram eggs would be 48 grams, so 3.5-gram eggs should be about 42 grams.

5. Answers may vary. Sample answer:  
8 divided by one half is 16, so the number of peas is greater than 16.
6. These numbers can be used as they are since there would be 8 drops in a milliliter, or 240 drops in 30 milliliters.
7. The second strip is 0.25 longer than 3.5, or  $3.5 + 0.875$ , or 4.375 yards. The length of the third strip can be written as 6.25, so the total length is  $3.5 + 4.375 + 6.25$ , or 14.125 yards. 0.125 yards is one eighth of a yard, so the answer might be written as  $14\frac{1}{8}$  yd.

### Practice and Problem Solving: C

1.  $29\frac{37}{50}$  m/s  $\times$  3,600 s/h = 107,064 mi
2.  $29\frac{37}{50} - 8\frac{3}{25} = 29\frac{37}{50} - 8\frac{6}{50} = 21\frac{31}{50}$  mi/s
3.  $32,508$  mi  $\div$   $6\frac{2}{100}$  mi/s = 5,400 s
4.  $21\frac{19}{25}$  mi/s  $\times$  60 s/min =  $1,305\frac{3}{5}$  mi/min

### Practice and Problem Solving: D

1. Bottles, paper, and cardboard boxes were  $\frac{11}{20}$  of the total amount of recycled material collected by the middle school.
2.  $\frac{1}{2} = \frac{3}{6}$ ,  $\frac{1}{3} = \frac{2}{6}$ ;  $\frac{3}{6} + \frac{2}{6} = \frac{5}{6}$ ;  $\frac{5}{6}$  of the family budget

$$3. \frac{1}{6} = \frac{4}{24}, \frac{3}{8} = \frac{9}{24}; \frac{4}{24} + \frac{9}{24} = \frac{13}{24};$$

$$1 = \frac{24}{24}; \frac{24}{24} - \frac{13}{24} = \frac{11}{24} \text{ of the budget}$$

### Reteach

1.  $11\frac{2}{5}$  oz
2. 8 h
3.  $15\frac{2}{5}$  t
4.  $1\frac{1}{16}$  lb

### Reading Strategies

1.  $2\frac{1}{2}$  feet
2. one half ft
3. 5 servings
4. 5
5. 5 ft
6. 5
7. Answers may vary, but students should observe that the answers are the same, and divisor is the reciprocal of the factor 2.

### Success for English Learners

1. the number of pieces of pizza
2. Find the common denominator.
3. Add the numerators, and write the sum over the common denominator.

## MODULE 3 Challenge

1. Calculate the daily temperature change as shown.

Daily Temperature Change ( $^{\circ}$ C)

City	Monday to Tuesday	Tuesday to Wednesday	Wednesday to Thursday	Thursday to Friday
City A	$2\frac{1}{4} - \left(-\frac{1}{8}\right) = 2\frac{3}{8}$	$-3\frac{1}{2} - 2\frac{1}{4} = -5\frac{3}{4}$	$5\frac{4}{5} - \left(-3\frac{1}{2}\right) = 9\frac{3}{10}$	$-12\frac{1}{2} - 5\frac{4}{5} = -18\frac{3}{10}$
City B	$-1\frac{3}{5} - 4\frac{1}{5} = -5\frac{4}{5}$	$-8\frac{1}{10} - 1\frac{3}{5} = -6\frac{1}{2}$	$11\frac{1}{5} - \left(-8\frac{1}{10}\right) = 19\frac{3}{10}$	$3\frac{3}{10} - 11\frac{1}{5} = -7\frac{9}{10}$
City C	$2\frac{5}{6} - 11\frac{1}{3} = -8\frac{1}{2}$	$-3\frac{2}{3} - 2\frac{5}{6} = -6\frac{1}{2}$	$-9\frac{1}{6} - \left(-3\frac{2}{3}\right) = -5\frac{1}{2}$	$2\frac{1}{3} - \left(-9\frac{1}{6}\right) = 11\frac{1}{2}$

## UNIT 2: Rates and Proportional Relationships

### MODULE 4 Rates and Proportionality

#### LESSON 4-1

##### Practice and Problem Solving: A/B

- 2 eggs per batch
- 53 mph
- \$8/h
- 14 points per game
- \$0.20/oz
- $1\frac{3}{4}$  gal/h
- $\frac{1}{2}$  ft/min
- Food A: 200 cal/serving; Food B: 375 cal/serving; Food A has fewer calories per serving.

##### Practice and Problem Solving: C

- $\frac{1}{2}$  ac/h
- $2\frac{1}{5}$  mph
- $\frac{1}{80}$  of a wall
- $\frac{2}{9}$  oz
- $\frac{5\frac{1}{2} \text{ c}}{1\frac{9}{16} \text{ lb}} = \frac{88}{25} = \frac{3.52 \text{ c}}{1 \text{ lb}} = \frac{35.2 \text{ c}}{10 \text{ lb}}$ ;  $35.2 > 35$ , so there are more than 35 cups of flour in 10 lb of flour.
- Tank #1 is filling at a rate of 0.892857... gallons per hour while tank #2 is filling at a rate of  $0.8\bar{3}$  gallons per hour. Since  $0.892857... > 0.8\bar{3}$ , tank #1 is filling faster.

##### Practice and Problem Solving: D

- 3; 3
- 45; 45
- \$9/h
- \$0.09/oz
- $\frac{\frac{3}{4} \text{ oz}}{3 \text{ h}} = \frac{3}{4} \div \frac{3}{1} = \frac{3}{4} \times \frac{1}{3} = \frac{1}{4} \frac{\text{oz}}{1 \text{ h}}; \frac{1}{4} \text{ oz/h}$
- $\frac{3}{10}$  mi/min
- $\frac{150 \text{ cal}}{\frac{3}{4} \text{ serving}} = \frac{150}{1} \div \frac{3}{4} = \frac{150}{1} \times \frac{4}{3} = \frac{200 \text{ cal}}{1 \text{ serving}};$   
200 cal/serving

##### Reteach

- $\frac{70 \text{ students}}{2 \text{ teachers}}$
- $\frac{3 \text{ books}}{2 \text{ mo}}$
- $\frac{\$52}{4 \text{ h}}$
- $\frac{28 \text{ patients}}{2 \text{ nurses}} = \frac{28 \div 2}{2 \div 2} = \frac{14 \text{ patients}}{1 \text{ nurse}}$
- $\frac{5 \text{ qt}}{2 \text{ lb}} = \frac{5 \div 2}{2 \div 2} = \frac{2.5 \text{ qt}}{1 \text{ lb}}$
- $\frac{3 \text{ oz}}{\frac{3}{4} \text{ c}} = 3 \div \frac{3}{4} = \frac{3}{1} \times \frac{4}{3} = \frac{4 \text{ oz}}{1 \text{ c}}$
- $\frac{3\frac{2}{3} \text{ ft}}{\frac{11}{60} \text{ h}} = 3\frac{2}{3} \div \frac{11}{60} = \frac{11}{3} \times \frac{60}{11} = \frac{20 \text{ ft}}{1 \text{ h}}$

##### Reading Strategies

- No; It does not compare values that have different units.
- Yes; It compares a number of yards to a number of seconds.

3. It compares miles to gallons.

4. Yes

5. No;  $\frac{25 \text{ mi}}{1 \text{ gal}}$

6. No;  $\frac{800 \text{ ft}^2}{1 \text{ h}}$

7. No;  $\frac{2}{45} \text{ lb}$  or  $\frac{8}{3} \text{ lb}$   
 $\frac{1 \text{ min}}{1 \text{ min}}$  or  $\frac{1 \text{ h}}{1 \text{ h}}$

### Success for English Learners

1. 3 miles per hour or  $\frac{3 \text{ mi}}{1 \text{ h}}$

2.  $3\frac{3}{4}$  miles per hour or  $\frac{3\frac{3}{4} \text{ mi}}{1 \text{ h}}$

3. Briana has the faster speed per hour.

### LESSON 4-2

#### Practice and Problem Solving: A/B

1. a. yes

b. Sample answer:  $c = 27t$

c.  $t$

d.  $c$

2. a. yes

b. Sample answer:  $c = 4.35w$

c.  $w$

d.  $c$

3. not proportional

4. yes; Sample answers:  $d = 40t$ ;  
 $d = \text{distance}$ ;  $t = \text{time}$

5.  $k = \frac{1}{3}$ ; Sample answers:  $b = \frac{1}{3}p$ ;  
 $b = \text{boxes}$ ;  $p = \text{pens}$

6.  $k = 6$ ; Sample answers:  $m = 6p$ ;  
 $m = \text{muffins}$ ;  $p = \text{packs}$

7. a.

Days	1	2	3	4	5
Hours	24	48	72	96	120

b. yes

c. Sample answer:  $h = 24d$  where  $d$  is the number of days and  $h$  is the number of hours

#### Practice and Problem Solving: C

1. a.

Number of tickets	1	2	3	4	5
Total Cost (\$)	27	54	81	108	135

b. 27

c. Sample answer:  $c = 27t$

2. 32

3. yes; Sample answers:  $p = 35h$ ;  $h$  is number of hours;  $p$  is pages read

4. yes; Sample answers:  $y = 6x$ ;  $x$  is number of ounces;  $y$  is grams of protein

5. yes; Sample answers:  $c = 4.5w$ ;  $w$  is weight;  $c$  is total cost

6. no; You cannot write an equation for the pairs in the table as they are not proportional.

#### Practice and Problem Solving: D

1. a. yes

b.  $y = 6x$

c.  $x$

d.  $y$

2. a. yes

b.  $c = 3h$

c.  $h$

d.  $c$

3. yes; Sample answer:  $c = 0.75w$ ;  
 $w = \text{weight (oz)}$ ;  $c = \text{total cost}$

4. not proportional

5.  $k = \frac{1}{5}$ ; Sample answer:  $b = \frac{1}{5}a$ ;  
 $a = \text{apples}$ ;  $b = \text{bags}$

6.  $k = 12$ ; Sample answer:  $e = 12c$ ;  
 $c = \text{cartons}$ ;  $e = \text{eggs}$

#### Reteach

1. yes

2.  $\frac{3}{1} = 3$ ;  $\frac{6}{2} = 3$ ;  $\frac{9}{3} = 3$ ;  $\frac{12}{4} = 3$

3. Sample answer:  $y = 3x$

4. 3

5.  $y = 35x$

6.  $y = 7x$

### Reading Strategies

1.  $\frac{3}{1} = 3$ ;  $\frac{6}{2} = 3$ ;  $\frac{9}{3} = 3$ ;  $\frac{12}{4} = 3$

2. 3


3. yes

4.  $\frac{35}{1}$

5.  $\frac{4.35}{1}$

### Success for English Learners

1.

	6	3	9	12	15
	2	1	3	4	5

2. 3

### LESSON 4-3

#### Practice and Problem Solving: A/B

1.

<b>Time (h)</b>	2	4	5	9
<b>Pay (\$)</b>	16	32	40	72

Earnings are always 8 times the number of hours.

2.

<b>Weight (lb)</b>	2	3	6	8
<b>Price (\$)</b>	1.40	2.10	4.20	5.60

Cost is always 0.7 times the number of pounds.

- Not proportional; The line will not pass through the origin.
- Proportional; The line will pass through the origin.
- The car uses 2 gal of fuel to travel 40 mi.
- $y = 20x$ , where  $x$  is the gallons of fuel used,  $y$  is the distance traveled (in miles), and  $k$  is the constant of proportionality
- The graph for the compact car would be steeper.

#### Practice and Problem Solving: C

- Employee B; Answers may vary. Sample answer: Employee A earns \$7.50 per hour, and employee B earns \$10 per hour, so employee B earns more money.
- Employee A:  $15 \times \$7.50 = \$112.50$ ; employee B:  $15 \times \$10.00 = \$150.00$
- Sample answer:  $y = 8x$
- Company A: proportional because a graph comparing months of service and total cost will form a line passing through the origin; Company B: not proportional because the line formed will not pass through the origin
- Yes;  $y = 2x$
- Sample answer: Graph the points and analyze the graph. The graph of a proportional relationship is a line that passes through the origin.

#### Practice and Problem Solving: D

- proportional; The cost is always 10 times the number of shirts.
- proportional; The number of crayons is always 50 times the number of boxes.
- proportional; The line will pass through the origin.
- not proportional; The line will not pass through the origin.
- $y = 6x$
- $y = 4x$
- $y = \frac{1}{3}x$
- Use the point (1, 8) to find the constant of proportionality, 8 or  $\frac{8}{1}$ , or

#### Reteach

- hours worked; pay (in dollars); Sample answer: (2, 14),  $\frac{14}{2} = 7$ ;  $y = 7x$
- number of students; cost of admission (in dollars); Sample answer: (12, 24),  $\frac{24}{12} = 2$ ;  $y = 2x$

## Reading Strategies

1. number of glasses filled and ounces of juice needed
2. The ounces of juice needed is 8 times the number of glasses filled.
3. the number of glasses filled
4. the ounces of juice needed
5. 16 ounces of juice are needed to fill 2 glasses.
6. (3, 24)

## Success for English Learners

1. Constant of proportionality =  $\frac{\text{change in } y\text{-values}}{\text{change in } x\text{-values}}$ ; The constant of proportionality is the ratio of the change in  $y$ -values to the change in  $x$ -values.
2. No; only lines that pass through (0, 0) represent are proportional relationships.

## MODULE 4 Challenge

Sample answers are given. You may also wish to have students make sketches to show their graphing explorations.

1. direct: straight line through (0, 0), makes  $45^\circ$  angle  
quadratic: curved line, starts at (0, 0), increases quickly as  $x$  increases  
indirect:  $y$  starts really large, decreases to (1, 1), continues getting smaller and smaller
2. direct: quadrants I and III  
quadratic: quadrants I and II  
indirect: quadrants I and III
3. direct: slope of the line increases, it gets steeper  
quadratic: the parabola gets skinnier  
indirect: the curves pull away from the origin
4. direct: quadrants II and IV  
quadratic: quadrants III and IV  
indirect: quadrants II and IV

## MODULE 5 Proportions and Percent

### LESSON 5-1

#### Practice and Problem Solving: A/B

1. 25%
2. 150%
3. 200%
4. 122%
5. 71%
6. 53%
7. 45%
8. 75%
9. 62%
10. 90%
11. 17%
12. 19%
13. \$100
14. 128 bananas
15. 14 books
16. 65 companies
17. 12,600 miles
18. 639 points
19. 399
20. \$12.87; \$26.13
21. \$40.80
22. \$12,750

#### Practice and Problem Solving: C

1. a. 289  
b. 332
2. a. 47% increase, 28% decrease, 50% increase  
b. 20% increase, 17% increase, 10% increase  
c. Rodrigo received a bonus in weeks 2 and 4. Samantha received a bonus in week 3.



- d. No, Rodrigo sold a total of 87 magazines but he needed to sell 99 magazines to meet the goal of increasing sales by 15% each week. Samantha sold a total of 77 magazines but needed to sell 86 magazines to meet the goal.

3. 2.7%

### Practice and Problem Solving: D

- 40%
- 300%
- 90%
- 75%
- 81%
- 75%
- 33%
- 67%
- \$27.50
- 128 bananas
- 50 books
- 39 companies
- 420 students
- \$27.30

### Reteach

- 14; 8;  $\frac{14}{8}$ ; 175%
- 9; 90;  $\frac{9}{90}$ ; 10%
- 75; 125;  $\frac{75}{125}$ ; 60%
- 340; 400;  $\frac{340}{400}$ ; 85%
- 25%
- 95%
- 80%
- 40%
- 200%
- 5%

### Reading Strategies

- \$50
- decrease

- in the denominator (or bottom part) of the fraction
- 25
- 20
- $\frac{20}{25} = 0.8 \times 100 = 80\%$ ; percent increase

### Success for English Learners

- A percent increase is when the amount increases or goes up. A percent decrease is when the amount decreases or goes down.
- Sample answer: The height of a child from one year to the next.
- Retail is the price for the customer. Wholesale is the amount that the store bought the item for.
- wholesale price
- Answers will vary. Sample answer: Mr. Jiro buys a pack of T-shirts for \$4.95. He plans to sell them at an 80 percent increase. What is the selling price of each pack of T-shirts? ( $\$4.95 \cdot 80 = \$3.96$ ; selling price:  $\$4.95 + \$3.96 = \$8.91$ .)

### LESSON 5-2

#### Practice and Problem Solving: A/B

- \$0.30; \$1.80
- \$1.30; \$4.55
- \$2.40; \$12.00
- \$9.75; \$22.25
- \$42.90; \$120.90
- \$4.49; \$7.48
- \$57.20
- \$19.99
- \$35.70
- \$276.68
- 0.57c or 0.57
- $1 + 0.57c$  or  $1.57c$
- \$70.65
- \$25.65

#### Practice and Problem Solving: C

- \$89.99
- \$30

3. 50%
4. \$90.75
5. \$113.44
6. \$76.00
7.  $1.07c$
8.  $1.02c$
9. Store B

### Practice and Problem Solving: D

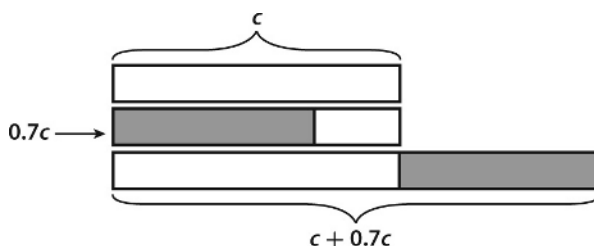
1. a.  $0.40p$   
b.  $p + 0.4p$   
c. \$78.40  
d. \$22.40
2. \$6; \$36
3. \$3.50; \$13.50
4. \$10; \$50
5. \$58.50
6. \$21.35
7. \$26.25
8. \$276.25
9.  $c + 0.4c$

### Reteach

1.  $\$45.00 + \$9.00 = \$54.00$
2.  $\$7.50 + \$3.75 = \$11.25$
3.  $\$1.25 + \$1.00 = \$2.25$
4.  $\$21.70 + \$62.00 = \$83.70$
5.  $\$150.00 - \$60.00 = \$90.00$
6.  $\$18.99 - \$4.75 = \$14.24$
7.  $\$95.00 - \$9.50 = \$85.50$
8.  $\$75.00 - \$11.25 = \$63.75$
9. a. \$3.15  
b. \$2.52

### Reading Strategies

1–4.



$$\begin{aligned} \text{Retail price} &= \text{Original cost} + \text{markup} \\ &= c + 0.7c \\ &= 1.7c = 1.7(\$80) = \$136 \end{aligned}$$

1. the bar for the cost of a camera,  $c$
2. the bar that shows the markup, 70% of  $c$ , or  $0.7c$
3. the original cost plus the markup,  $c + 0.7c$ .
4. \$136

### Success for English Learners

1. A markup is when the price increases or goes up. A markdown is when the price decreases or goes down.
2. The retail price is the original cost of an item plus a markup. The sales price is the original price of an item minus a markdown.
3. Answers will vary. Sample answer: A store buys shirts for \$15. The store's markup is 50%. What is the retail price? (\$22.50)

### LESSON 5-3

#### Practice and Problem Solving: A/B

1.

Sale Amount	5% Sales Tax	Total Amount Paid
\$67.50	\$3.38	\$70.88
\$98.75	\$4.94	\$103.69
\$399.79	\$19.99	\$419.78
\$1250.00	\$62.50	\$1,312.50
\$12,500.00	\$625.00	\$13,125.00

2.

Principal	Rate	Time	Interest Earned	New Balance
\$300	3%	4 years	\$36.00	\$336.00
\$450	5%	3 years	\$67.50	\$517.50
\$500	4.5%	5 years	\$112.50	\$612.50
\$675	8%	2 years	\$108.00	\$783.00

3. \$1,250
4. salesperson A; \$7,428.30
5. 18%

6. a. \$780
- b. \$900
- c. \$450
- d. \$300
- e. \$570

### Practice and Problem Solving: C

1.

Sale Amount	Tax	Amount of Tax	Total Cost
\$49.95	8%	\$4.00	\$53.95
<b>\$128.60</b>	5%	\$6.43	<b>\$135.03</b>
\$499.99	7.5%	<b>\$37.50</b>	<b>\$537.49</b>
<b>\$2,599</b>	4%	\$103.96	\$2,702.96
\$12,499	7%	<b>\$874.93</b>	<b>\$13,373.93</b>

2.

Principal	Rate	Time	Interest Earned	New Balance
\$2,400	3.5%	6 months	<b>\$42.00</b>	\$2,442.00
<b>\$45.00</b>	4.9%	2 years	\$4.41	<b>\$49.41</b>
\$9,460.12	5.5%	5 years	<b>\$2,601.51</b>	\$12,061.65
\$3,923.87	2.2%	<b>9 months</b>	\$64.74	\$3,988.61

3. Jorge earned \$8,046. Harris earned \$8,493. Harris' commission rate is 9.5%.
4. The total at Big Box store comes to \$47.88. The total online comes to \$48.95. It is cheaper at the Big Box store.
5. The first item is full price: \$100. The second item is half off: \$50. The total comes to \$150. A 50% discount on \$200 would be \$100.

### Practice and Problem Solving: D

1.

Sale Amount	5% Sales Tax
\$50	$0.05 \times \$50 = 2.5 = \$2.50$
\$120	<b><math>0.05 \times 120 = \\$6</math></b>
\$480	<b><math>0.05 \times 480 = \\$24</math></b>
\$2,240	<b><math>0.05 \times 2,240 = \\$112</math></b>
\$12,500	<b><math>0.05 \times 12,500 = \\$625</math></b>

2.

Principal	Rate	Time	Interest Earned
\$400	5%	2 years	\$40
\$950	10%	5 years	<b>\$475</b>
\$50	4%	1 year	<b>\$2</b>
\$1,000	8%	2 years	<b>\$160</b>

3.  $0.5 \times 32 = 16$ ; Karl is 16 years old.
4.  $0.10 \times 20 = 2.0$ ; Jacque saves \$2 for referring a friend.
5.  $0.15 \times 8.40 = 1.26$ ; Tyler's tip should be \$1.26.

### Reteach

1. \$14.95
2. 6.5%
3. amount =  $\$14.95 \times 6.5\% = \$0.97$
4.  $\$14.95 + \$0.97 = \$15.92$

### Reading Strategies

1. \$756
2. \$68.06
3. \$1,160.34
4. a. \$800  
b. 4%  
c. 5 years
5. principal, rate, and time

### Success for English Learners

1. \$1,116

## MODULE 5 Challenge

Possible solution steps are shown.

- $$1. \frac{30 \times 5,280 \times 12 \text{ m}}{39.37 \times 60 \times 60 \text{ s}} = 13.41 \text{ m/s}$$
- $$2. 2.3 \text{ km} \times \frac{1,000 \text{ m}}{1 \text{ km}} \times \frac{100 \text{ cm}}{1 \text{ m}} \times \frac{1 \text{ in.}}{2.54 \text{ cm}} = 90,551.2 \text{ in.}$$
- $$3. \frac{67.3 \text{ ft}}{1 \text{ s}} \times \frac{12 \text{ in.}}{1 \text{ ft}} \times \frac{2.54 \text{ cm}}{1 \text{ in.}} \times \frac{1 \text{ m}}{100 \text{ cm}} \times \frac{1 \text{ km}}{1,000 \text{ m}} \times \frac{60 \text{ s}}{1 \text{ min}} \times \frac{60 \text{ min}}{1 \text{ h}} = 73.85 \text{ km/h}$$
- $$4. \frac{750 \text{ ft}^3}{1 \text{ min}} \times \frac{1 \text{ gal}}{0.134 \text{ ft}^3} \times \frac{60 \text{ min}}{1 \text{ h}} = 335,820.9 \text{ gal/h}$$
- $$5. 130 \text{ ft} \times 274 \text{ ft} = 35,620 \text{ ft}^2; 35,620 \text{ ft}^2 \times \frac{(12)^2 \text{ in.}^2}{1 \text{ ft}^2} \times \frac{(2.54)^2 \text{ cm}^2}{1 \text{ in.}^2} \times \frac{1 \text{ m}^2}{(100)^2 \text{ cm}^2} = 3,309.2 \text{ m}^2$$
- $$6. 9.6 \times 4.2 \times 15.6 = 628.992 \text{ m}^3; 628.992 \text{ m}^3 \times \frac{(39.37)^3 \text{ in.}^3}{1 \text{ m}^3} \times \frac{1 \text{ ft}^3}{(12)^3 \text{ in.}^3} \times \frac{1 \text{ yd}^3}{(3)^3 \text{ ft}^3} = 822.69 \text{ yd}^3$$

## UNIT 3: Expressions, Equations, and Inequalities

### MODULE 6 Expressions and Equations

#### LESSON 6-1

##### Practice and Problem Solving: A/B

- $p + 4$
- $3L - 5$
- Answers will vary. Sample answer: \$25 less six-tenths of  $x$
- Answers will vary. Sample answer: four more than two thirds of  $y$ .
- $2,000 + 80z$
- $2.625a - 4.5b$
- $5(9c + 2d)$
- $3(9 - 3x + 5y)$
- $20 - 3j$
- $5 + 18y$

##### Practice and Problem Solving: C

- $4a + 5b$
- $4a + 5b = 120$
- a. 20  
b. 20  
c. \$100  
d. 10  
e. \$40  
f. \$80  
g. \$60  
h. 12  
i. \$60  
j. 20  
k. \$80  
l. 8  
m. \$40
- The total price of the high-energy lamp is a whole-number multiple of 4. The total price of the low-energy lamp is a whole-number multiple of 5.
- 20 high-energy lamps at \$5 = \$100; \$120 - \$100 = 20; \$20 ÷ 4 = 5; 5 low-energy lamps can be bought

##### Practice and Problem Solving: D

- $50 - ; 2; 2; 2; 2; 50 - ; 0.2m; 50 - 0.20m$
- $10 - ; 3; 3; 3; 10 - 0.3n$
- $\frac{1}{4}; 6x; \frac{1}{4}; 14y; \frac{6}{4}x; \frac{14}{4}y; \frac{3}{2}x; \frac{7}{2}y$
- $\frac{1}{6}; 15a; \frac{1}{6}; 20b; \frac{15}{6}a; \frac{20}{6}b; \frac{5}{2}a; \frac{10}{3}b$
- $5; 5; 2; 3; 5; 5; 6$
- $7; 7; 2; 3; 7; 7; 6$
- $4(x + 3)$
- $3(2s + 6t + w)$

##### Reteach

- Answers will vary. Sample answer: one hundred less five times the number of cars.
- Answers will vary. Sample answer: twenty-five hundredths of the apartments and six tenths of the condos.
- Answers will vary. Sample answer: one thirteenth of the difference between three times the number of hammers and eight times the number of pliers.

$$4. \frac{1}{10} \left( \frac{1}{2}s + \frac{1}{3}e \right)$$

- $0.3f + 25$
- $(3e - 4) + (6 + 2w)$

##### Reading Strategies

- $0.35(50m + 75a)$
- $0.35(50m + 75a) = 17.5m + 26.25a$
- The original expression shows how much was contributed to the charity and to pay for the others costs of the event. The simplified expression might be easier to use to directly calculate the amount going to the charity.
- $20d + 12c$ , where  $d$  is the drill price and  $c$  is the charger price
- $4(5d + 3c)$ ; Answers will vary.  
Sample answer: The factor  $5d + 3c$  shows that for every 5 drills purchased, 3 chargers were purchased.

6. The un-factored expression,  $20d + 12c$ , gives the total amount paid for both drills and chargers. The factored form of  $20d + 12c$  which is  $4(5d + 3c)$  gives a quick way to see how many chargers (3) are sold when a certain number of drills (5) are sold.

### Success for English Learners

- $10 + 3n$
- Three times the prize of a pizza and two drinks shows factoring, since it can be represented as the product of two factors—3 and  $p + 2d$ . Sample answers:  $3p + 6d$ ;  $3(p + 2d)$
- $3(p + 2d) = 3p + 6d$

### LESSON 6-2

#### Practice and Problem Solving: A/B

- $n = 13\frac{1}{3}$
- $y = 1.6$
- $a = 24$
- $v = -3$
- $\frac{15.5z}{15.5} = \frac{-77.5}{15.5}$ ;  $z = -5$
- $-11\left(\frac{t}{-11}\right) = -11(11)$ ;  $t = -121$
- $\frac{0.5m}{0.5} = \frac{0.75}{0.5}$ ;  $m = 1.5$
- $4\left(\frac{r}{4}\right) = 4(250)$ ;  $r = 1,000$
- $\frac{1}{3}n - 8 = -13$
- $-12.3f = -73.8$
- $10 = T + 12$ ;  $T = -1^\circ\text{C}$
- $3.2d = 48$ ;  $d = 15$  days
- $15t = 193.75$ ;  $t = \$12.92$  (to the nearest cent)
- $\frac{1}{3}d = \frac{1}{4}$ ;  $d = \frac{3}{4}$  mi

#### Practice and Problem Solving: C

- $x = 5\frac{1}{3}$
- $m = 7.1$

- $y = 2.76$
- $z = 2.76$
- $s = 5\frac{4}{7}$
- $r = 5\frac{13}{25}$
- $f = 2\frac{1}{4}$
- $m = 1\frac{5}{9}$
- $5h = 37.5$ ,  $h = 7.5$ ; She worked 7.5 h on average per day.
  - \$118.125; She made \$118.13 per day.
- $3\frac{2}{3} \cdot x = 7\frac{1}{3}$ ;  $x = 2$ ; He doubled the recipe.
- $3\frac{2}{3} + 3\frac{2}{3} = 6\frac{4}{3} = 7\frac{1}{3}$ , addition;  
 $3\frac{2}{3} \cdot 2 = 6\frac{4}{3} = 7\frac{1}{3}$ ; multiplication
- $1.89x \approx 6$ ;  $x \approx 3$ ; She bought 3 bottles.
- $38.4 \text{ in} = 3.2 \text{ ft}$ ;  $15.3 - x = 3.2$ ,  $x = 12.1$ ; The piece he cut was 12.1 feet long.

#### Practice and Problem Solving: D

- 8; 8; 19
- 3; 3; 1
- 5; 5; 3
- 7; 7; -21
- $3 \times \frac{a}{3} = 3 \times 5$ ; 15
- 4.5; 4.5; 6
- 5; 5; 30
- 7.35; 7.35; 4
- $110^\circ$ ;  $x$ ;  $180^\circ$ ;  $110 + x = 180$ ;  $x = 70^\circ$
- miles; gallon; 72.9, 2.7, 27; 27

#### Reteach

- $m = 6\frac{7}{8}$
- $t = -0.6$
- $j = 13.1$
- $y = 12$
- $w = -20$

## Reading Strategies

- $8 \times \frac{p}{8} = -2 \times 8; -16$
- $1.5 - 1.5 + q = -0.6 - 1.5; -2.1$
- $\frac{-9.5a}{-9.5} = \frac{-38}{-9.5}; 4$
- $14v = 269.50; \frac{14v}{14} = \frac{269.50}{14}; v = \$19.25$
- $\frac{3}{4}g = 18; 3g = 4 \text{ times } 18; g = 24 \text{ games}$

## Success for English Learners

- The "7.2" has to be written as "7.20" so it will have the same number of decimal places as "3.84."
- $\frac{a}{-3}$  can be written as  $-\frac{1}{3}a$ , so  $-\frac{1}{3}$  is a rational number coefficient.
- $\frac{1}{4}x$  could be written as  $\frac{x}{4}$  or as  $0.25x$ .

## LESSON 6-3

### Practice and Problem Solving: A/B

1.

2.

- $6t + 15 = 81$
- $40 + 55h = 190$
- $1.75 + 0.75m = 4.75$

### Practice and Problem Solving: C

- $\frac{p+7}{12} = 3$
- $\frac{16}{q+1} = 4$
- $\frac{7-s}{3} = 2$
- $12.3 + 5.013d = 15.302$

- $\frac{z+22}{z} = 12$
- $75 + 255c = 1,605$

### Practice and Problem Solving: D

1.

2.

3.

- $3d + 5 = 17$
- $40 + 25m = 240$
- $10 + 7r = 45$

### Reteach

- $21 + 5f = 61$
- $7j + 17 = 87$
- $18 + 0.05n = 50.50$
- $40 + 30s = 220$

### Reading Strategies

- Equation:  $50 - 5n = 15$   
Number of steps and description:  
Two steps: Multiply a number  $n$  by 5, and subtract the result from 50.
- Equation:  $m + 8 = 27$   
Number of steps and description:  
One step: Add 8 to a number  $m$ .
- Equation:  $4b + 3 = 23$   
Number of steps and description:  
Two steps: Multiply a number  $b$  by 4, then add 3.
- Equation:  $15f = 90$   
Number of steps and description:  
One step: Multiply a number  $f$  by 15.

### Success for English Learners

- Sample answer: Eighteen less three times a number equals three.
- $5x - 7 = -11$

## LESSON 6-4

### Practice and Problem Solving: A/B

- $x = 3$
- $p = -3$
- $a = 4$
- $n = -2$
- $g = 2$
- $k = -18$
- $s = 18$
- $c = -8$
- $a = -6$
- $v = 9$
- $x = -2$
- $d = 24$
- $24s + 85 = 685$ ;  $s = \$25$
- $x + x + 1 = 73$ ; 36 and 37

### Practice and Problem Solving: C

- $2x - 17 = 3$ ;  $x = 10$
- $\frac{5x - 1}{3} = 4$ ;  $x = 2.6$
- $\frac{3 - 4x}{5} = -7$ ,  $x = 9.5$
- $8 + 5x = -12$  or  $5x + 6 = -14$ ;  $x = -4$
- $-4x + 7 = -9$  or  $7 = 4x - 9$ ;  $x = 4$
- $\frac{x + 11}{3} = 6$ ;  $x = 7$
- $s = \frac{u - t}{r}$ ; Subtract  $t$  from both sides, then divide both sides by  $r$ .
- $t = \frac{u}{r} - s$ ; Divide both sides by  $r$ , then subtract  $s$  from both sides.
- $n = pq - m$ ; Multiply both sides by  $p$ , then subtract  $m$  from both sides.
- $p = \frac{m + n}{q}$ ; Multiply both sides by  $p$ , then divide both sides by  $q$ .

### Practice and Problem Solving: D

- Subtract 3 from both sides;  $5x = 30$ . Then divide both sides by 5;  $x = 6$ .
- Add 1 to both sides;  $8y = 32$ . Then divide both sides by 8;  $y = 4$ .

- Subtract 5 from both sides;  $\frac{1}{2}z = 6$ . Then multiply both sides by 2;  $z = 12$ .
- Subtract 15 from both sides;  $-4t = -12$ . Then divide both sides by  $-4$ ;  $t = 3$ .
- Multiply both sides by 3;  $q + 3 = 15$ . Then subtract 3 from both sides;  $q = 12$ .
- $m = 1$
- $p = 8$
- $2n - 3 = 17$ ;  $n = 10$
- $\frac{1}{2}x + 5 = 9$ ;  $x = 8$
- $15 + 2y = 29$ ;  $y = 7$

### Reteach

- Subtract 11 from both sides. Then divide both sides by 4.  $x = 2$
- Subtract 10 from both sides. Then divide both sides by  $-3$ .  $y = 8$
- Multiply both sides by 3. Then add 11 to each side.  $r = -10$
- Subtract 5 from each side. Then divide both sides by  $-2$ .  $p = -3$
- Subtract 1 from each side. Then multiply both sides by  $\frac{3}{2}$ .  
 $\left(\text{or divide both sides by } \frac{2}{3}\right) z = 18$
- Multiply both sides by 9. Then add 17 to each side.  $w = 35$

### Reading Strategies

- Multiply by  $-2$ , then subtract 3.  
Add 3 to each side, then divide each side by  $-2$ .  
 $x = 11$
- Add 1, then divide the result by 3.  
Multiply both sides by 3, then subtract 1 from each side.  
 $x = -16$
- Multiply by  $-4$ , then add 5.  
Subtract 5 from each side, then divide each side by  $-4$ .  
 $x = -3$



4. Subtract 7, then multiply the result by  $\frac{1}{3}$ .

Multiply both sides by 3

(or divide both sides by  $\frac{1}{3}$ ), then add 7

to both sides.

$$x = 10$$

### Success for English Learners

1. a. Multiply a variable by 13, then add 2 to the result.
- b. Subtract 2 from both sides, then divide both sides by 13;  $x = 3$
2. a. Subtract 3 from a variable, then divide the result by 5.
- b. Multiply both sides by 5, then add 3 to both sides;  $x = -2$

### MODULE 6 Challenge

1. Translate each brother's requirement into an inequality, then solve.

Adam:  $2x + 250 < 2,000 \rightarrow x < 875$

Benny:  $100 + 3x > 2,250 \rightarrow x > 700$

Christopher:  $700 < 0.25x + 500 \rightarrow 800 < x$   
and  $0.25x + 500 < 775 \rightarrow x < 900$

Desmond:  $0.35x + 1,000 > 1,275 \rightarrow x > 785.7$

Eddie:  $3x - 1,000 > 1,650 \rightarrow x > 850$

The fence must be between 850 and 875 feet long;  $850 < x < 875$ .

2. The builder only needs requirements from Adam and Eddie.

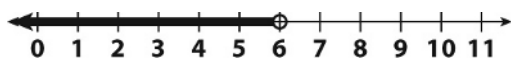
The other brother's requirements do not restrict the length of the fence any further.

### MODULE 7 Inequalities

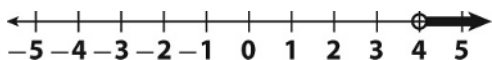
#### LESSON 7-1

#### Practice and Problem Solving: A/B

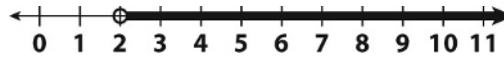
1.  $e < 6$



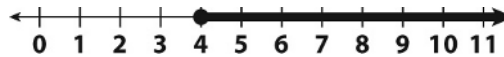
2.  $n > 4$



3.  $2 < w$



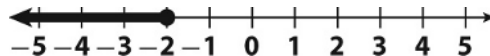
4.  $4 \leq m$



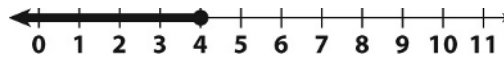
5.  $r < 5$



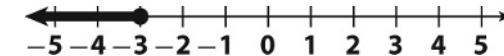
6.  $-2 \geq t$



7.  $4 \geq s$



8.  $-3 \geq p$



9.  $x \geq 3$

10.  $r > -9$

11.  $b < 5$

12.  $a \leq 45$

13.  $136 + x \geq 189$ ;  $x \geq 53$ ; Arthur must earn at least \$53.

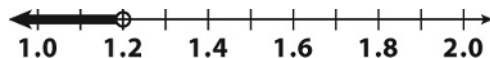
14.  $-5x < -80$ ;  $5x > 80$ ,  $x > 16$ ; Marna needs more than 16 correct answers.

#### Practice and Problem Solving: C

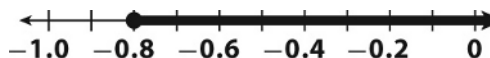
1.  $a \geq -2.5$



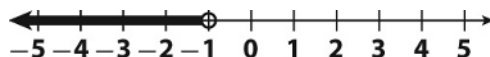
2.  $1.2 > n$



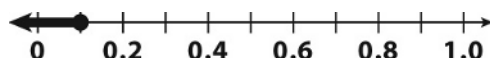
3.  $b \geq -0.8$



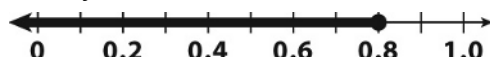
4.  $e < -1$



5.  $r \leq 0.1$



6.  $0.8 \geq y$



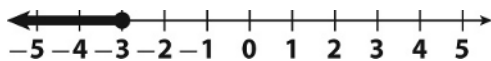
7.  $-20a \leq -250$ ;  $a \geq 12.5$ ; 13 or more weeks ago

8.  $s^3 > 125$ ;  $s > 5$ ; greater than 5 cm

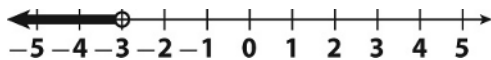
9.  $-20t \leq -4,200$ ;  $t \geq 210$ ; No, 3 minutes is 180 seconds. The time needs to be at least 210 seconds.

### Practice and Problem Solving: D

1.  $a \leq -3$ ;



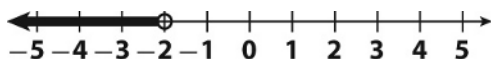
2.  $-3 > n$



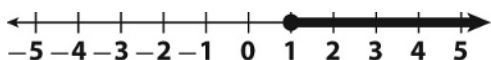
3.  $b \geq 0$



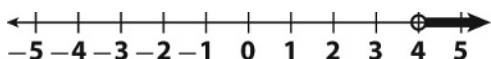
4.  $e < -2$



5.  $t \geq 1$



6.  $c > 4$



### Reteach

- $n \geq -9$
- $n > 6$
- $n \leq -63$
- $n \geq 4$
- $n < 7$
- $n > -2$
- $n < -3$
- $n < 12$

### Reading Strategies

- add 5; no
- multiply by  $-6$ ; yes
- divide by 3; no

### Success for English Learners

- $\geq$
- $>$
- $\leq$
- $\geq$
- $<$
- $>$
- When you multiply or divide by a negative number, the inequality sign reverses.

## LESSON 7-2

### Practice and Problem Solving: A/B

- $10n + 4 \leq 25$
- $4n - 30 > -10$
- $-\frac{1}{4}(5 - n) < 20$
- Answers will vary. Sample answer: "The opposite of 5 times a number increased by 3 is greater than 1."
- Answers will vary. Sample answer: "Twenty-seven less two times a number is less than or equal to the opposite of 6."
- Answers will vary. Sample answer: "Half of the sum of 1 and a number is 5 or greater."
- $10p$ ;
  - $10p - 75$ ;
  - $10p - 75 \geq 50$

### Practice and Problem Solving: C

- $24 + 4n \leq 400$ , or  $n \leq 94$
- $120 \leq 24 + 4n$ , or  $n \geq 24$
- $24 \leq n \leq 94$
- Answers will vary. Sample answer:  $2x + 7 < 17$
- Answers will vary. Sample answer:  $\frac{1}{2}(x + 2) \geq 7$
- Answers will vary. Sample answer:  $2x - 5 > -55$
- Each of the parts of the compound inequality,  $-5 < 3x$  and  $3x < 10$ , is a one-step inequality. The only operation needed to simplify the compound inequality is to divide each term by 3.

### Practice and Problem Solving: D

- $4x \geq 2$
- $-\frac{1}{3}x < 12$
- $x + 5 < 7$
- $n - 10 > 30$
- $5n + 2 \geq 3$
- $2n - 6 \leq 17$

7. Twelve times the number of cars she washes minus \$50 for her savings must be greater than or equal to \$100. Twelve times the number of cars,  $n$ , is  $12n$ . Subtract \$50 for her savings:  $12n - 50$ . This has to be at least \$100, so  $12n - 50 \geq 100$ .
8. 49 times the number of games plus \$400 for the video player must be less than or equal to the saved \$750, so  $49n + 400 \leq 750$  or  $750 \geq 400 + 49x$ .
9. The number of samples saved for display, 50, plus the distribution at the rate of 25 per hour must be less than or equal to 250, so  $50 + 25t \leq 250$ .

### Reteach

- $3n; 5 -; 3n - 5; 3n - 5 > -8$
- $5n; + 13; 5n + 13; 5n + 13 \leq 30$

### Reading Strategies

- $\frac{1}{2}(a + 6) \geq 20$
- $12 + 3b \leq -11$
- $2c - 8 < 5$

### Success for English Learners

- Sample answer: Five minus two times a number is greater than the opposite of four.
- $3n - 7 \leq -10$

## LESSON 7-3

### Practice and Problem Solving: A/B

- 5, 5; 24, 3, 24, 3; 8
- 12, 12; -16; -2, -16, -2; 8
- Because of dividing by a positive number.
- Because of dividing by a negative number.
- $$\begin{aligned} -7d + 8 &> 29 \\ -7d + 8 - 8 &> 29 - 8 \\ -7d &> 21 \\ d &< -3 \end{aligned}$$
- $$\begin{aligned} 12 - 3b &< 9 \\ 12 - 12 - 3b &< 9 - 12 \\ -3b &< -3 \\ b &> 1 \end{aligned}$$

$$\begin{aligned} 7. \quad \frac{z}{7} - 6 &\geq -5 \\ \frac{z}{7} - 6 + 6 &\geq -5 + 6 \\ \frac{z}{7} &\geq 1 \\ z &\geq 7 \end{aligned}$$

$$8. 50x + 1,250 \geq 12,500 \text{ or } x \geq \$225$$

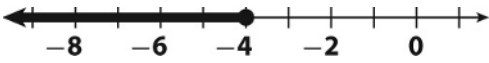
$$\begin{aligned} 9. 2n + 3.50 &\leq 10 \\ 2n &\leq 6.50 \\ n &\leq 3.25 \end{aligned}$$

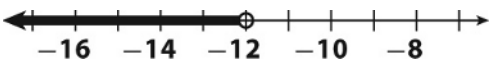
She can buy no more than 3.25 lb.

### Practice and Problem Solving: C

- $-5a > 15; -5a + 2 > 15 + 2$
- $3b \leq 3; 3b + 4 \geq 3 + 4; 3b \geq 7$
- $3x + 7 > 12; 3x + 12 > 7; 7 + 12 > 3x$
- $x > \frac{5}{3}; x > -\frac{5}{3}; x < \frac{19}{3}$
- All three solutions overlap at  $\frac{5}{3} < x < \frac{19}{3}$ , which gives the common solution for all three inequalities.
- Answers will vary. Sample answer: "The opposite of three is no less than a third of the difference of 6 and a number."  $x \geq 15$
- Answers will vary. Sample answer: "Four times the sum of one and twice a number is less than the opposite of one half."  $x < -\frac{9}{16}$ .

### Practice and Problem Solving: D

- $y > 2$
- $d \leq -4$ 


A number line with arrows at both ends. Tick marks are labeled at -8, -6, -4, -2, and 0. A solid black dot is placed at -4, and a thick black line segment extends to the left from this dot, ending in an arrowhead.
- $r > -12$ 


A number line with arrows at both ends. Tick marks are labeled at -16, -14, -12, -10, and -8. An open circle is placed at -12, and a thick black line segment extends to the right from this circle, ending in an arrowhead.
- Answers will vary. Accept any answer greater than 2.
- Answers will vary. Accept any answer less than or equal to -135.

- Answers will vary. Sample answer:  
1, 2, 3
- 14 cars
- 7 games

### Reteach

- $h \geq 5.5$ , or 6 whole hours; 5 hours would not be enough to reach the 75-kilometer goal.
- $b \leq 9.29$  bird boxes, so 9 bird boxes would be the greatest number that could be sold and still leave \$10 worth of boxes in inventory.

### Reading Strategies

- $12n \leq (750 - 50) 10$   
 $12n \leq 7000$   
 $n \leq 583.3$   
 $n \leq 583.3$ , so 583 people can be given meals in 10 hours
- $24h > 2,500 - 1,400$   
 $24h > 1,100$   
 $h > 45.8$   
 $h > 45.8$ , so it will take 46 whole hours to recycle more than what is left of 2,500 liters of used oil.

### Success for English Learners

- No,  $x$  is less than 125, not less than or equal to 125.
- There was no multiplication or division by a negative number.
- Answers will vary. Accept any answer less than 40.
- Answers will vary. Accept any answer less than or equal to  $-4$ .

## MODULE 7 Challenge

- $2(20 + x) \leq 100$ ;  $x \leq 30$
- $20x > 400$ ;  $x > 20$
- $0.5(20x) \leq 350$ ;  $x \leq 35$
- $0.15(20x) \geq 45$ ;  $x \geq 15$
- Accept any scale drawing that shows a garden with a width of 20 feet (10 units) and a length greater than 20 feet (10 units) and less than or equal to 30 feet (15 units).

# UNIT 4: Geometry

## MODULE 8 Modeling Geometric Figures

### LESSON 8-1

#### Practice and Problem Solving: A/B

- 15 ft; 6 ft;  $90 \text{ ft}^2$
- 16 m; 12 m;  $192 \text{ m}^2$
- The scale drawing is 10 units by 8 units.
- a. 1 ft = 125 m  
b. 84 sheets of plywood tall
- a. 40 bottle caps tall  
b. approximately 3 popsicle sticks tall

#### Practice and Problem Solving: C

- 25.5 ft; 23.8 ft;  $606.9 \text{ ft}^2$
- Because the scale is 8 mm: 1 cm, and because 1 cm is longer than 8 mm, the actual object will be larger.
- a. 42 cm by 126 cm  
b.  $5,292 \text{ cm}^2$   
c. approximately 1.386 ft by 4.158 ft  
d. approximately  $5.763 \text{ ft}^2$
- 64 in.
- 35.2 ft

#### Practice and Problem Solving: D

1.

<b>Blueprint length (in.)</b>	5	10	15	20	25	30
<b>Actual Length (ft)</b>	8	16	24	32	40	48

- 48 ft
- 2.5 in.

2.

<b>Blueprint length (in.)</b>	2	4	6	8	10	12
<b>Actual Length (ft)</b>	1	2	3	4	5	6

- 6 ft
- 16 in.

- 24 ft; 12 ft;  $288 \text{ ft}^2$
- 10 units by 8 units

#### Reteach

- 3 in.; 24 in.;  $\frac{1}{8}$
- 4 cm; 20 cm;  $\frac{1}{5}$
- 84 in.
- 75 mi

#### Reading Strategies

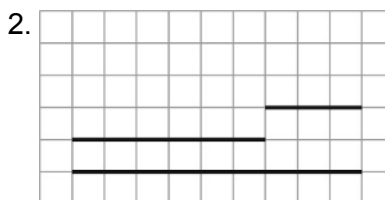
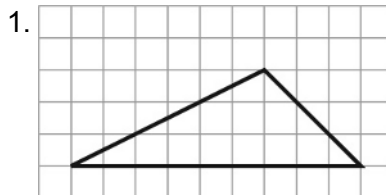
- 3 cm
- Sample answer:  $\frac{1}{10} = \frac{3}{x}$
- 5 cm
- Sample answer:  $\frac{1}{10} = \frac{5}{x}$

#### Success for English Learners

- Sample answer: The car would not be in proportion.
- Sample answer: If the photo does not have the same proportions as the painting, the face will be stretched tall or stretched wide.

### LESSON 8-2

#### Practice and Problem Solving: A/B



No triangle can be formed because the sum of the measures of the two shorter sides has the same measure as the longest side.

3. Yes, because the sum of the measures of the two shorter sides is greater than the measure of the longest side,

$$\text{e.g., } \frac{1}{3} + \frac{1}{4} > \frac{1}{2}.$$

4. No, because the sum of the measures of the two shorter sides is less than the measure of the longest side, e.g.,  $0.02 + 0.01 < 0.205$ .
5. One, since the sum of the angles is less than  $180^\circ$  and a side is included.
6. Many, since the sum of the measures of the angles is less than  $180^\circ$  but no side is included.

### Practice and Problem Solving: C

1. They are angles  $ACB$  and  $ADB$ , formed by Earth's radii and the tangent lines running to the planet.
2. Both are Earth's radii.
3.  $AC$  is much less than  $BC$ .
4.  $AB$  and  $BC$  are approximately equal.
5.  $AB > BC$
6. Isosceles triangle, since  $AB$  and  $BC$  are approximately equal.
7. The astronomer knows that  $ACB$  is a right angle and the angle  $CAB$  could be measured. This is enough information to compute  $AB$  using similar triangles or trigonometry.

### Practice and Problem Solving: D

1. 3 and 4 units; less than 7 units, but greater than 1 unit; Diagrams will vary.
2. 3 and 7 units; less than 10 units, but greater than 4 units; Diagrams will vary.
3.  $101^\circ$ ;  $79^\circ$
4.  $129^\circ$ ;  $51^\circ$

### Reteach

1. Yes; if  $x$  is the length of each side, then  $x + x > x$  or  $2x > x$ , so the condition for a triangle to be formed is met.
2. No. The sum of the measures of the three angles is greater than  $180^\circ$ .

### Reading Strategies

1. Diagrams may vary, but students should realize that the two 4-foot boards add up

to 8 feet, which is less than the 10-foot board, so no triangle can be formed with the boards.

2. Diagrams and calculations may vary, but students should first find the hypotenuse of the right triangle formed by the 5 and 6-inch sides, which is  $\sqrt{61}$  inches. Then, they should find the length of the hypotenuse formed by the 25-inch side and  $\sqrt{61}$  inches, which is  $\sqrt{686}$  inches, or about 26 inches. A 30-inch bat would not fit in the box.

### Success for English Learners

1. The compass could be used to make two arcs of radii equal in length to the shorter segments from each end of the longer segment. The point of intersection of the arcs would be where the shorter sides of the triangle intersect.
2. Yes, the sum of the measures of the angles given is  $90^\circ$ , so the third angle has to be 90 degrees for the sum of the three angle measures to be  $180^\circ$ .

## LESSON 8-3

### Practice and Problem Solving: A/B

1. cross section; The circle is a plane figure intersecting a three-dimensional curved surface. The figure formed is a curved line on the surface of the cone.
2. intersection; The edge of a square is a straight line and the base of the pyramid is a plane figure. A straight line is formed.
3. cross section; A square is formed.
4. cross section; The circle is a plane figure. A polygon results that is similar to the polygon that forms the base.
5. trapezoid
6. triangle
7. circle
8. ellipse or oval

### Practice and Problem Solving: C

1. It is a square. The length of each of its sides is the same as the length of the side of the square.
2. An equilateral triangle; Since each of the segments from the vertex of the cube to the midpoint of the side is equal and the

angles at the vertex are  $90^\circ$ , the third sides of each triangle are equal and form the cross section.

3. A: circle; B and C: ellipses or ovals; D: a plane of length,  $h$ , the cylinder's height, and width,  $d$ , the cylinder's diameter
4. Area A < Area B < Area C < Area D

### Practice and Problem Solving: D

1. a triangle that is similar to the base
2. a rectangle or a square
3. a trapezoid
4. a circle
5. Drawings will vary, but the cross section should be a regular octagon that is congruent to the bases of the prism.
6. Drawings will vary, but the cross section should be a regular pentagon that is similar to the base of the pyramid.

### Reteach

1. Drawings will vary. Sample answers: a triangular cross section formed by a plane that is perpendicular to the base of the pyramid and including its apex point; a rectangular cross section formed by a plane that is parallel to the base of the pyramid
2. Drawings will vary, Sample answers: a triangular cross section formed by a plane that is parallel to the prism's bases and congruent to them; a rectangular cross section formed by a plane that is perpendicular to the bases and having a length that is equal to the height of the prism

### Reading Strategies

1. Diagrams will vary but should show a rectangular cross section that is parallel to the base and similar to it.
2. rectangle
3. Diagrams will vary but should show a pentagonal cross section that is congruent to the bases.
4. parallel to the bases
5. congruent to bases

6. Diagrams will vary but should show a circular cross section of radius less than the radius of the sphere.
7. circle
8. similar to a circle that is the circumference of the sphere but smaller than that circle
9. Diagrams will vary but should show a plane passing through the cone's vertex, its lateral surface in two lines, and bisecting its base.
10. isosceles triangle
11. The two sides of the triangle that are equal length are the same length as the slant height of the cone. The third, shorter side is equal to the diameter of the cone's base.

### Success for English Learners

1. It is a trapezoid; the edge of the cross section in the base is longer than and parallel to the edge of the cross section in the face of the pyramid.
2. Both cross sections are parallel to the bases. Each cross section is similar to the figure's base.

### LESSON 8-4

#### Practice and Problem Solving: A/B

1.  $\angle AEB$  and  $\angle DEF$
2.  $\angle AEB$  and  $\angle BEC$
3. Sample answer:  $\angle AEF$  and  $\angle DEF$
4.  $120^\circ$
5.  $13^\circ$
6.  $70^\circ$
7.  $115^\circ$
8. 28
9. 18
10. 22
11. 15

#### Practice and Problem Solving: C

1.  $66^\circ$
2.  $125^\circ$
3.  $114^\circ$
4.  $156^\circ$
5. 39

6. 43
7. 24
8. 19
9. 41.25°
10. 33°

### Practice and Problem Solving: D

1.  $\angle MSN$  and  $\angle PSQ$
2.  $\angle PSQ$  and  $\angle QSR$
3. Sample answer:  $\angle MSN$  and  $\angle NSP$
4. 60°
5. 100°
6. 130°
7. 55°
8. 30
9. 40
10. 35
11. 135

### Reteach

1. vertical angles;
2. 90°; complementary angles
3. 180°; supplementary angles
4. 80
5. 20
6. 6
7. 25

### Reading Strategies

1. 30°
2. 60°
3. 150°
4. 90°

### Success for English Learners

1. 90°; 180°
2. 180°

### Module 8 Challenge

1. A rectangular solid;  $V_A = 4x(6x)x = 24x^3$
2. A trapezoid;  $A_B = \frac{1}{2}h(b_1 + b_2) =$   
 $\frac{1}{2}4x(4x + 8x) = 24x^2$

$$3. V_{B \text{ part } 1} = A_B(x) = (24x^2)x = 24x^3$$

$$4. V_{B \text{ part } 2} = \frac{1}{2}A_B(3x) = \frac{1}{2}(24x^2)(3x) = 36x^3$$

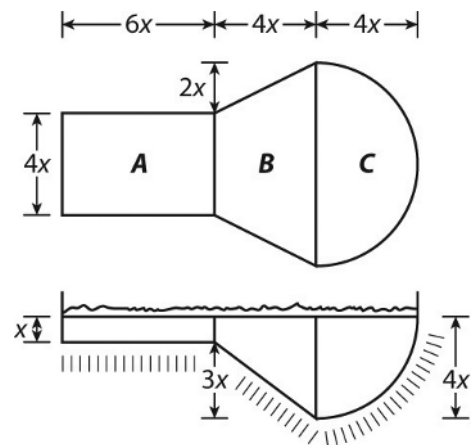
$$5. V_{B \text{ total}} = 24x^3 + 36x^3 = 60x^3$$

6. A sphere; one fourth of a sphere;

$$V_C = \frac{1}{4} \left( \frac{4}{3} \pi (4x)^3 \right) = \frac{64}{3} \pi x^3$$

$$7. V_{\text{total}} = V_A + V_{B \text{ total}} + V_C = 24x^3 + 60x^3 + \frac{64}{3} \pi x^3 = 4x^3 \left( 21 + \frac{16}{3} \pi \right) \text{ or approx. } 151x^3.$$

8. Divide 33,000 by 151 to get about 218. Take the cube root; x is about 6 feet.



## MODULE 9 Circumference, Area, and Volume

### LESSON 9-1

#### Practice and Problem Solving: A/B

1. 12 ft
2. 8 ft
3. 6 ft
4. 4 ft
5. Yes;  $\frac{12}{8} = \frac{6}{4}$
6. a.  $\frac{7}{21} = \frac{3}{x}$   
 b. 9 cm
7. 100.48 in.
8. 141.3 yd
9. about 2.9 in.



### Practice and Problem Solving: C

1. about 2 in.
2. 31.4 cm
3. greater than
4. 439.6 ft
5. a. 116.18 cm  
b. 80.07 cm
6. a. 1.88 in.  
b. 2.51 in.

### Practice and Problem Solving: D

1. 4 m
2. 16 m
3. 2 m
4. 8 m
5. Yes;  $\frac{4}{16} = \frac{2}{8}$
6. a.  $\frac{8}{25} = \frac{2}{x}$   
b. 6.25 cm
7. a. 8 cm  
b. 24 cm  
c.  $\frac{4}{25} = \frac{12}{x}$   
d. 75 cm

### Reteach

1. 18 cm
2. 21 ft

### Reading Strategies

1. 2
2. 3.14
3. 24 ft
4. 47.1 in.

### Success for English Learners

1. All circles are similar. Corresponding measures in similar shapes are proportional. The ratio of circumference to diameter of one circle is proportional to the ratio of circumference to diameter of any circle.  $\frac{C}{d} = \pi$ .

2. Set up a proportion:

$$\frac{21}{7} = \frac{15}{\text{diameter of small circle}}$$

Since 21 divided by 7 is 3, divide 15 by 3 to find the diameter of the smaller circle. The diameter of the smaller circle is 5 cm.

### LESSON 9-2

#### Practice and Problem Solving: A/B

1. 18.84 in.
2. 56.52 cm
3. 4.71 ft
4. 25.12 m
5. 37.68 ft
6. 12.56 yd
7. 43.96 in.
8. 26.26 cm
9. 7.85 m
10. 66 ft
11. 132 mm
12. 88 cm

#### Practice and Problem Solving: C

1. 3.93 in.
2. 11.30 yd
3. 13.19 mm
4. 2.36 cm
5. 4.19 ft
6. 3.14 in.
7. 3.5 in.
8. 18 yd
9. 9.55 in.
10. 16

#### Practice and Problem Solving: D

1. 50.2 m
2. 62.8 in.
3. 9.4 ft
4. 22.0 mm
5. 18.8 cm
6. 12.6 yd
7. 110 yd
8. 28.3 in.
9. 125.7 cm

## Reteach

1. 9; 28.26; 28.3
2. 13; 26; 81.64; 81.6
3. 40.8 cm
4. 31.4 ft
5. 9.4 in.

## Reading Strategies

1.  $C = 2\pi r$
2.  $C = \pi d$
3. It is twice as long.
4. Sample answer: 3.14 or  $\frac{22}{7}$
5. The circumference of a circle is the distance around a circle. It is given in units. The perimeter of a polygon is the distance around a polygon. It is given in units.

## Success for English Learners

1. the length of the diameter.
2. 18 cm
3. Take half of the diameter, 17 ft, and substitute that value into the formula for  $r$ .
4.  $d = 10$  so  $r = 5$

$$C = 2\pi r$$

$$= 2 \cdot 3.14 \cdot 5$$

$$= 31.4$$

$$C = \pi d$$

$$= 3.14 \cdot 10$$

$$= 31.4$$

## LESSON 9-3

### Practice and Problem Solving: A/B

1. A
2. B
3.  $50.2 \text{ in.}^2$
4.  $153.9 \text{ m}^2$
5.  $254.3 \text{ yd}^2$
6.  $\pi \text{ cm}^2$
7.  $54.76\pi \text{ cm}^2$
8.  $25\pi \text{ in.}^2$
9.  $121\pi \text{ mm}^2$
10.  $6.25\pi \text{ ft}^2$
11.  $9\pi \text{ m}^2$

### Practice and Problem Solving: C

1.  $1.2544\pi \text{ cm}^2$ ;  $3.9 \text{ cm}^2$
2.  $0.0625\pi \text{ in.}^2$ ;  $0.2 \text{ in}^2$
3.  $0.16\pi \text{ in.}^2$ ;  $0.5 \text{ in}^2$
4.  $54.76\pi \text{ cm}^2$ ;  $171.9 \text{ cm}^2$
5.  $36,864\pi \text{ yd}^2$ ;  $115,753 \text{ yd}^2$
6.  $0.49\pi \text{ m}^2$ ;  $1.5 \text{ m}^2$
7.  $A = \pi$
8.  $A = 6.25\pi$
9.  $A = 16\pi$
10. The 10-inch chocolate cake's area is  $28.26 \text{ in}^2$  larger.
11. The square's area is  $1.935 \text{ m}^2$  larger than the circle's area.

### Practice and Problem Solving: D

1.  $19.6 \text{ cm}^2$
2.  $379.9 \text{ in.}^2$
3.  $28.3 \text{ mm}^2$
4.  $78.5 \text{ in}^2$
5.  $132.7 \text{ cm}^2$
6.  $162.8 \text{ yd}^2$
7.  $36\pi \text{ cm}^2$
8.  $90.25\pi \text{ in}^2$
9.  $12.25\pi \text{ yd}^2$
10.  $121\pi \text{ yd}^2$
11.  $9\pi \text{ m}^2$
12.  $36\pi \text{ ft}^2$

## Reteach

1.  $64\pi \text{ in}^2$
2.  $3600\pi \text{ m}^2$
3.  $56.7 \text{ in.}^2$
4.  $314 \text{ yd}^2$
5.  $452.2 \text{ m}^2$
6.  $66.4 \text{ cm}^2$

## Reading Strategies

1.  $49\pi \text{ cm}^2$ ;  $153.86 \text{ cm}^2$
2.  $6.25\pi \text{ yd}^2$ ;  $19.625 \text{ yd}^2$

## Success for English Learners

- $10.24\pi \text{ mm}^2$ ;  $32.2 \text{ mm}^2$
- $90.25\pi \text{ yd}^2$ ;  $283.4 \text{ yd}^2$

## LESSON 9-3

### Practice and Problem Solving: A/B

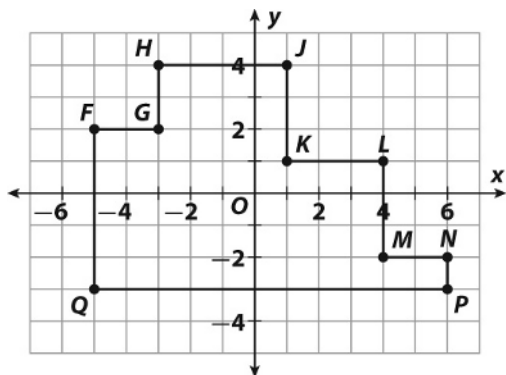
Answers may vary for Exercises 1 and 2.

- $21 \text{ ft}^2$
- $24 \text{ ft}^2$
- $90 \text{ ft}^2$
- $208 \text{ m}^2$
- $140 \text{ ft}^2$
- $23.13 \text{ m}^2$
- $100 \text{ ft}^2$
- $33.28 \text{ m}^2$
- $57.12 \text{ m}^2$

### Practice and Problem Solving: C

Answers may vary for Exercises 1 and 2.

- $22 \text{ ft}^2$
- $30 \text{ ft}^2$
- $104 \text{ ft}^2$
- $223.4 \text{ m}^2$
- $60.75 \text{ m}^2$
- $258.39 \text{ m}^2$
- $A = 52 \text{ units}^2$ ;  $P = 36 \text{ units}$



### Practice and Problem Solving: D

- C
- B
- $17 \text{ ft}^2$
- $30.28 \text{ m}^2$
- $174 \text{ ft}^2$
- $84 \text{ m}^2$

- $158.13 \text{ ft}^2$
- $288 \text{ m}^2$
- $189.25 \text{ ft}^2$

## Reteach

- $9, 1\frac{1}{2}, \frac{1}{2}, 1, 9, 1\frac{1}{2}, \frac{1}{2}, 1, 12$
- $32, 6, 32, 6, 38$

## Reading Strategies

- $63 \text{ m}^2$
- $76 \text{ m}^2$
- $30.28 \text{ m}^2$

## Success for English Learners

- Separate the figures into simpler figures whose areas you can find.

## LESSON 9-4

### Practice and Problem Solving: A/B

- $142 \text{ in}^2$
- $190 \text{ cm}^2$
- $1,236 \text{ cm}^2$
- $3,020 \text{ ft}^2$
- Possible answer: I would find the total surface area of each cube and then subtract the area of the sides that are not painted, including the square underneath the small cube.
- $384 \text{ in}^2$

### Practice and Problem Solving: C

- $101.4 \text{ in}^2$
- $797.4 \text{ m}^2$
- Check student's guesses.
- B;  $384 \text{ in}^2$
- C;  $340 \text{ in}^2$
- A;  $338.8 \text{ in}^2$
- Discuss student guesses and whether they were correct or not.

### Practice and Problem Solving: D

1.  $286 \text{ ft}^2$
2.  $1,160 \text{ ft}^2$
3.  $80 \text{ in}^2$
4.  $124 \text{ in}^2$
5.  $96 \text{ in}^2$
6.  $384 \text{ in}^2$
7.  $480 \text{ in}^2$

### Reteach

1.  $5 \bullet 8 = 40 \text{ in}^2$ ;  $2 \bullet 40 = 80 \text{ in}^2$
2.  $5 \bullet 3 = 15 \text{ in}^2$ ;  $2 \bullet 15 = 30 \text{ in}^2$
3.  $3 \bullet 8 = 24 \text{ in}^2$ ;  $2 \bullet 24 = 48 \text{ in}^2$
4.  $80 + 30 + 48 = 158 \text{ in}^2$
5.  $158 \text{ in}^2$
6.  $340 \text{ in}^2$
7.  $592 \text{ cm}^2$

### Reading Strategies

1. 756 square feet
2. 600 square inches

### Success for English Learners

1.  $32 \text{ cm}^2$
2.  $32 \text{ cm}^2$
3.  $8 \text{ cm}^2$
4.  $8 \text{ cm}^2$
5.  $16 \text{ cm}^2$
6.  $16 \text{ cm}^2$
7.  $112 \text{ cm}^2$
8. Sample answer: There are 3 pairs of surfaces with the same areas: the top and bottom, the left side and right side, the front and back.

## LESSON 9-5

### Practice and Problem Solving: A/B

1.  $84 \text{ in}^3$
2.  $180 \text{ cm}^3$
3.  $600 \text{ ft}^3$
4.  $360 \text{ cm}^3$

5.  $312 \text{ cm}^3$
6.  $15.6 \text{ kg}$
7.  $1.95 \text{ kg}$

### Practice and Problem Solving: C

1.  $124.4 \text{ in}^3$
2.  $477.8 \text{ cm}^3$
3.  $120 \text{ m}^3$
4.  $20.2 \text{ cm}^3$
5.  $135 \text{ cm}^3$
6. Marsha got the units confused. The volume of one marble is  $7,234.5 \text{ mm}^3$ . Marsha needs to convert that volume to  $\text{cm}^3$ , which is about  $7.2 \text{ cm}^3$ .
7. No, the marbles will not completely fill the container. There will be spaces between them. The number of marbles would be fewer than the quotient.

### Practice and Problem Solving: D

1. 12 cubes
2. 24 cubes
3.  $105 \text{ in}^3$
4.  $48 \text{ m}^3$
5. length: 10 mm; width: 10 mm; height: 10 mm
6.  $1,000 \text{ mm}^3$
7. 6 cubes
8.  $6,000 \text{ mm}^3$

### Reteach

1.  $80 \text{ m}^3$
2.  $120 \text{ in}^3$
3.  $72 \text{ cm}^3$

### Reading Strategies

1.  $60 \text{ m}^3$
2.  $720 \text{ in}^3$
3.  $108 \text{ cm}^3$

### Success for English Learners

1.  $216 \text{ in}^3$
2.  $108 \text{ cm}^3$

## UNIT 5: Statistics

---

### MODULE 10 Random Samples and Populations

#### LESSON 10-1

##### Practice and Problem Solving: A/B

1. Answers may vary, but students should realize that the number of road runners born within a 50-mile radius of Lubbock, Texas is a subset of the number of road runners born everywhere or in Texas.
2. Answers may vary, but students should realize that the cars traveling at 75 kilometers per hour between Beaumont and Lufkin, Texas is a subset of the cars traveling between Beaumont and Lufkin at all speeds.
3. Answers may vary, but Method B is probably more representative of the opinions of any student chosen at random from the entire school population.
4. Answers may vary, but Method C may be more representative of all voters than a sample that consists of 25-year town residents who may or may not be voters.
5. Biased; library patrons have a vested interest in seeing that the library is expanded.
6. Not biased, if the cable company samples customers, regardless of their history and experience with the company.

##### Practice and Problem Solving: C

1. Sample A is random *within* each precinct but not across the city as a whole. If the precincts have different populations, the sampling from one precinct might outweigh that of another, less-populous precinct. There is no way to tell about the bias of the sampling since the content of questionnaire is not included.

Sample B is random across the city. There is no way to tell about the bias of the sampling since the content of questionnaire is not included.

Sample C is not random and is biased in concentrating on the precinct in which the factory would be located and where it

would have the greatest impact on infrastructure. It is not clear if this precinct would benefit from the new jobs, either.

2. Some streets may have more residents than others. Some residents may not have private telephones; they may use cell phones or public phones.
3. a. They are not random across all persons in the city center who might rent a scooter, but they could be random across the two clusters that the owner wants to sample, office workers and apartment residents.  
b. The questionnaire with the lower weekend rates is biased against the weekday office workers and in favor of possible weekend rentals by apartment residents.

##### Practice and Problem Solving: D

1. Home runs hit in 2014–2015; Home runs hit one week in July
2. All of the sugar maples in the 12-acre forest; the six sugar maples
3. Sample C is the best method of getting a random sample.
4. Sample Z is the best method of getting a random sample.
5. The question shows bias because it only mentions the benefits of having a professional sports stadium and teams.

##### Reteach

1. The sample is biased. The passengers on one on-time flight are likely to feel differently about their flight than passengers on some other flights.
2. The sample is not biased. It is a random sample.
3. The sample is not biased. It is a random sample.
4. The sample is biased. The people who go to movies are more likely to spend money on movies than on other entertainment.

## Reading Strategies

1. Population is everyone and a sample is part of the population.
2. An unbiased sample represents the population and a biased sample does not.
3. biased sample
4. unbiased sample
5. biased sample

## Success for English Learners

1. The population is all athletes on the track team.
2. Athletes who specialize in certain events could be sampled, e.g. athletes who are in field events, track events, or in both events. In any case, the samples would be small and biased in favor of the training needs of the events in which the athletes participate.
3. Answers will vary, e.g. the restaurant could sample families who come into its restaurant and ask if they go to cafeterias out of town but in south Texas, and if so how large their families are.

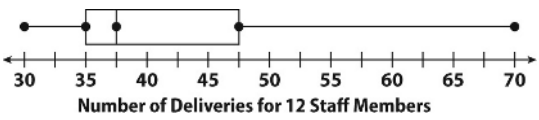
## LESSON 10-2

### Practice and Problem Solving: A/B

1. Answers will vary, but student responses should mention the median and mode, both of which are 11 concerts attended. Since all but one of the data points indicate that from 10 to 13 concerts were attended, the data point corresponding to 8 concerts should be considered an outlier and not used in computing average concert attendance.
2. Answers will vary, but students should observe that this data is bi-modal at average scores of 160 and 180. The distribution of data points is skewed to the lower and upper ends of the distribution, too. In this example, an arithmetic mean would not reflect the reality of the data spread.
3. Answers may vary, but students should observe that the median score for School A is significantly greater than the median score for School B, in terms of the spread of the score data.

4. Students should observe that by virtue of the range of the data and the interquartile range above and below the median the data from School B is more widely distributed than the data from School A.
5. Answers will vary, but students first notice that lower IQR for School A is the same size as the upper IQR for Schools B, which suggests a greater distribution of “below average” scores in School A and a greater distribution of “above average” scores in School B. Even so, the lower IQR for School A still corresponds to slightly higher scores than the upper IQR of School B.
6. Yes;  $\frac{7}{50} = \frac{56}{400}$ , and  $56 > 50$ .
7.  $\frac{400}{3} = \frac{150,000}{x}$ ;  $400x = 450,000$ ;  
 $x = 1,125$ ; there will be 1,125 tokens with misprints.

### Practice and Problem Solving: C

1. Answers will vary, but students should observe that the data is skewed to the left with median of 37.5 (or 38 in whole deliveries) and a mode of 35 deliveries. There is an outlier at 70, too.
2. 

Number of Deliveries for 12 Staff Members
3. Answers will vary, but students should notice that the data wanted by the company is symmetric about a median of 50, with a low value of not less than 45 and a high value of no more than 55. Twelve sample data points could be the whole numbers 45, 46, 47, 48, 49, 50, 50, 51, 52, 53, 54, 55.
4. Answers will vary, but students should use the terms in ways similar to these: The business wants a distribution that is not **skewed**, has a smaller **range** than the sample, and a higher average, **median** number of deliveries made.

### Practice and Problem Solving: D

1. a.  $104^{\circ}\text{F}$ ;  
b. 102 (2 times), 103 (once),  
104 (3 times), and 105 (twice)

2. a. Team Y;
- b. 10 times, since 6, 7, and 8 observations are 50 percent of the observations between the lower and upper quartiles;
- c. 50 percent of the time;
- d. 25 percent of the time.

### Reteach

1. 750 chips would be defective.
2. about 1,563

### Reading Strategies

1. Answers will vary, e.g. the data is skewed to the right.
2. 10 blooms per plant is an outlier.
3. Sample answer: With the outlier, the median is shown as 17 blooms per plant. If the outlier is removed, the median will shift to the right.  
The amount of the shift is unknown since no information is provided about the values of the data points in each quartile of the data.
4. Answers will vary. Sample answer: the greatest concentration of data is the 25 percent of the data points between the lower quartile and the median. Since there is less variation in this data, it provides the statistic of the sample that can be used with the most confidence to make an inference about the entire of population of plants.

### Success for English Learners

1. There could be times when there would be more or fewer than nine cardinals at the birdbath. The nine cardinals may visit the birdbath several times each day, too, especially early and late in a day.
2. Answers will vary, but students should realize that there are limits to drawing conclusions from a limited sample like this one to a larger population. An observer could watch the feeder over a longer period of time, e.g. several days or hours. Observers could also record the number of sightings of birds that visit the bird bath infrequently, e.g. thrashers, to see if their numbers change.

## LESSON 10-3

### Practice and Problem Solving: A/B

1. The sample is representative of the expected number of integers from 1 to 25 in a sample of 5 integers, which would be none or zero
2. A sample of 80 integers would be expected to have two integers from 1 to 25.
3. Three numbers from 1 to 25 is higher than expected since a sample of 40 numbers would be expected to have one number from 1 to 25, and a sample of 80 numbers would be expected to have two numbers from 1 to 25.
4. The 25 highlighted collars in this sample would be OK to ship, so 25 times 20 or 500 collars from a production run of 720 could be shipped.  
**17, 14, 14, 16, 14, 15, 15, 15, 16, 14, 16, 14, 15, 15, 15, 16, 13, 13, 13, 13, 13, 14, 14, 13, 17, 14, 15, 13, 14, 15, 16, 17, 14, 17, 14, 15**
5. The 4 highlighted collars in this sample contain more than the allowable biocide, so 4 times 20 or 80 of the collars from a production run of 720 would not be shipped.  
**17, 14, 14, 16, 14, 15, 15, 15, 16, 14, 16, 14, 15, 15, 15, 16, 13, 13, 13, 13, 13, 14, 14, 13, 17, 14, 15, 13, 14, 15, 16, 17, 14, 17, 14, 15**

### Practice and Problem Solving: C

1. A sample of 240 individuals would have to have 20 endangered species to meet the grant requirement of 1,000 endangered species in a population of 12,000 fish.
2. None of the samples have 20 endangered individuals, even though one of Hatchery A's samples had 19.
3. Answers will vary. Student solutions might include averaging the number of endangered in each sample, using the largest number of endangered as an indicator of the population etc.
4. Answers will vary, but students should notice that the extreme values of the number of galaxies are 1 and 30. Students might use decades of 10 for a

range, e.g. 11 to 20, 21 to 30 etc. in which case students might observe that there are 12 samples between 1 and 10, 9 samples between 11 and 20, and 15 samples between 21 and 30, inclusive.

### Practice and Problem Solving: D

- Answers will vary. Sample answer: There could be as few as one or as many as 9 cattle grazing on an acre, or an average of about 5 cattle grazing per acre.
  - If 250 cattle are divided by 40 acres, an average of about 6 cows should be grazing on each acre.
  - Answers will vary. Sample answer: some of the pasture might not have enough food for the cattle, or there might be parts of the pasture that provide food, such as bare ground, creeks, or other such features.
- Answers will vary. Sample answer: As many as 40 as few as one or two, an average of “about” 20 etc. but no more than 40.
  - Answers will vary. Sample answer: The average of the twelve samples is 23.5, which is higher than the average of six samples. The estimate should increase. This estimate will have a little more “certainty” than the estimate based on six samples.

### Reteach

- Answers will vary, but students should observe that in both outcomes, there are more 6's than most of the other numbers.
- Answers will vary, but students may infer that the random sample outcomes will become more like the predicted results as the number of random samples increases.

### Reading Strategies

- Answers will vary. Sample answer: These results are close to what the farmer wants, even if they are a percent less.
- Answers will vary. Sample answer: The numbers 1, 3, and 5 are representative of the number of females in all 18 litters. One female occurs four times, 3 females occurs three times, and 5 females occurs two times.

### Success for English Learners

- 7 teams
- 2 teams
- 9 goals; 8 times
- 3, 8, and 10 goals; 2 times each

### MODULE 10 Challenge

- Population: all of the school's teachers; Sample: every third teacher from an alphabetical list. Within this population, the sample is a random sample only if every teacher on the list has an equal chance of being selected, which would be a function of the number of teachers in the school and its correlation to the 26 letters of the alphabet.
- Population: all schools in the system; Sample: 5 randomly-selected schools in the system. The schools are selected randomly.
- Population: all math-science classes in the school; or the ten math-science classes. Sample: The sample is described as 3 math and 3 science teachers. There is no stated randomness in any of these choices. For example, how did the director select the principal, how did the principal select the math-science classes, and why only math-science classes, and not classes of other subject areas?
- Population: broken into two parts: teachers with 12 or more years of experience and teachers with less than 12 years of experience; Sample: 10 teachers in each of the population categories. Splitting the teacher population decreases the randomness of the sampling process. Also, it is not stated why “12 years” is used to break the population into two parts.
- Population: all schools in the system; Sample: 4 randomly-selected schools. The sample is described as random.
- Population: all schools in the system; Sample: different numbers of schools in each of three categories. It is not stated why the system's schools are separated into these categories, even though it is sensible. It is not stated why 10, 5, and 5 schools in each category were selected, or if they were randomly selected.



# MODULE 11 Analyzing and Comparing Data

## LESSON 11-1

### Practice and Problem Solving: A/B

- 7; 25; 25
- 0.07; 0.15; 0.15 and 0.16 (bi-modal distribution)
- Both are 3.
- Plot A has 7 dots; plot B has 9 dots.
- Plot A's mode is 21; plot B's mode is 23 and 24 (bi-modal).
- Plot A's median is 21; plot B's median is 23.
- Plot A is skewed to the left so its central measures are shifted toward the lower values. Plot B is skewed to the right so its central measures are shifted toward the higher values.

### Practice and Problem Solving: C

- The median is 21 pounds, the mode is 22 pounds, and the range is 9 pounds.
- By both central measures median and mode, each shearing does not produce the 25 pounds he needs.
- The median is 25 pounds, but the mode is 24 pounds. The range is 9 pounds.
- The distribution is "almost" bi-modal with 24 and 27 pounds. Because of this and the fact that the median is 25 pounds, the rancher should feel confident that he is very close to the 25 pound target. If he needs more data, he could sample a larger population to see how its measures compare to the 50-animal sample.

### Practice and Problem Solving: D

- 15
- 15
- 15
- Plot Y; Plot X range is  $13 - 11 = 2$ . Plot Y range is  $42 - 6 = 36$
- Plot X; 4 values of 11
- 11
- 30

## Reteach

- The data are not symmetric about the center. The distribution is skewed slightly to the right. The mode is 6, the median is 6, and the range is 10.

## Reading Strategies

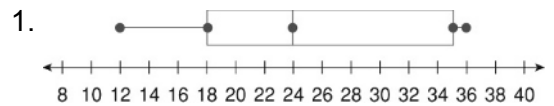
- Mean: 6.9; median: 7; mode: 7
- Mean: 7.3; median: 7; mode: 7

## Success for English Learners

- If there are 12 dots, the median is the average of the 6<sup>th</sup> and 7<sup>th</sup> dots' values.
- There would be two modes, "1" and "3."

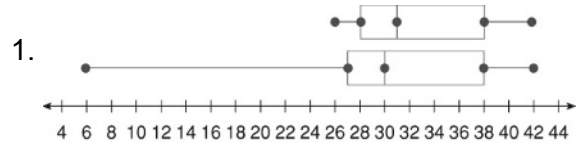
## LESSON 11-2

### Practice and Problem Solving: A/B



- Amy
- Ed
- Ed
- Amy; The range and interquartile range are smaller for Amy than for Ed, so Amy's test scores are more predictable.
- Port Eagle
- Port Eagle
- Surfside; The interquartile range is smaller for Surfside than for Port Eagle, so Surfside's room prices are more predictable.

### Practice and Problem Solving: C



- It increases the interquartile range by 1.
- The range is more affected since the difference is 16.
- If the farmer is concerned about "average" production, either box plot will do, since the medians are similar.
- Answers may vary, but students should observe that the IQR for the top box plot is symmetric about the median, implying no skewing. The 3<sup>rd</sup> quartile of the bottom

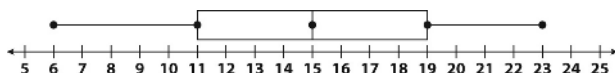
box plot is larger than its 1<sup>st</sup> quartile, which implies some skew to the right.

- The range of the top plot is 1 unit greater than the range of the bottom plot. The IQR of the bottom plot is greater than the IQR of the top plot.

### Practice and Problem Solving: D

- The smallest data point value is 12; the largest data point value is 24.

- 18
- 12; 23
- 50%
- 5.



- 17
- 15
- 11; 19
- 8

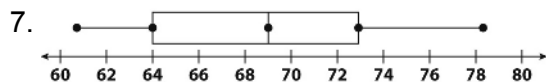
- The data is almost symmetrical, except for the extreme points, 6 and 23, which skew it slightly to the right.

### Reteach

- 20, 24, 25, 27, 31, 35, 38
- 20, 38, and 27
- 24, 35



- 61, 63, 65, 68, 69, 70, 72, 74, 78
- 61, 78, 69, 64, and 73



### Reading Strategies

- Class B; 8
- Class B
- Class A
- 25%

### Success for English Learners

- Answers may vary, but students should understand that the quartiles divide the data set into four fourths: 25% below the lower quartile, 50% below the median,

25% above the upper quartile, and any other combination that reflects the definition of quartiles.

- The only measure of “average” on this page is the median, so the team with the median of 54 fish had the greater average measure.

### LESSON 11-3

#### Practice and Problem Solving: A/B

- mean: 14.9; MAD: 1.9
- mean: 14.6; MAD: 1.92
- 0.3
- The means of the two data sets differ by about 6.3 times the variability of the two data sets.
- Sample answer: The median of the mean incomes for the samples from City A is higher than for City B. According to these samples it appears that adults in City A earn a higher average income than adults in City B. Also, there is a greater range of mean incomes in City A and a greater interquartile range.

#### Practice and Problem Solving: C

- mean: 69.7; MAD: 18.3
- mean: 73.4; MAD: 16
- 3.7
- 2.3
- The means of the two data sets differ by about 1.6 times the variability of the two data sets.
- Sample answer: The median of the mean incomes for the samples from City C is higher than for City D. However, they are close and there is a lot of overlap, so it is difficult to make a convincing comparison.

#### Practice and Problem Solving: D

- mean: 65; MAD: 6.4
- mean: 60.5; MAD: 6.4
- 4.5
- The difference of the MADs is zero, and 4.5 is not a multiple of zero.
- Sample answer: Adults in City P clearly have higher incomes than adults in City Q.

## **Reteach**

1. The difference of the means is 4.8. This is 0.3 times the range of the first group, and 1.2 times the range of the second group.
2. Based on the means, the people in the town Raul surveyed seem to receive fewer phone calls.

## **Reading Strategies**

1. Survey more samples of students.

## **Success for English Learners**

1. No, this is not enough information. You need the difference of two means.
2. Sample answer: Track the customers for more hours for a longer period of time and then analyze the data.

## **MODULE 11 Challenge**

1. Sample answer: 8, 10, 11, 11, 12, 14
2. 10, 12, 12, 16, 17, 18, 20
3. 8, 9, 9, 10, 14, 14, 15, 17
4. 14
5. 8
6. 33

## UNIT 6: Probability

---

### MODULE 12 Experimental Probability

#### LESSON 12-1

##### Practice and Problem Solving: A/B

1. certain; 1
2. as likely as not;  $\frac{1}{2}$
3. impossible; 0
4.  $\frac{2}{3}$
5.  $\frac{4}{5}$
6.  $\frac{1}{2}$
7. No, 6 of the 9 cards involve forward moves. The probability of moving backward is  $\frac{1}{3}$ .
8. No; Only two cards will let him win. The probability that he will not win on his next turn is  $\frac{7}{9}$ .

##### Practice and Problem Solving: C

1.  $\frac{4}{5}$
2.  $\frac{4}{11}$
3.  $\frac{3}{8}$
4.  $\frac{2}{3}$
5.  $\frac{1}{2}$
6. There were 8 cans in the cabinet, including 1 chicken noodle. Mother added 2 cans of chicken noodle soup and 5 cans of vegetable soup. So, there are 15 cans of soup, 3 of which are chicken noodle.
7. Answers will vary. Sample answer: The spinner is marked with numbers 1, 2, 3, 3, 4, 5, 5, 5. What is the probability that the spinner will not land on 5?  $\left(\frac{5}{8}\right)$ .

##### Practice and Problem Solving: D

1. A
2. C
3. B
4. E
5. D
6.  $\frac{7}{9}$
7.  $\frac{5}{6}$
8. as likely as not; Since he gets up by 7:15 about half the time, he will ride his bicycle about half the time. The probability is about  $\frac{1}{2}$ , or as likely as not.
9. likely; The probability of choosing a short-sleeved shirt is  $\frac{4}{5}$ , or likely.

##### Reteach

1. unlikely;  $\frac{1}{24}$
2. as likely as not;  $\frac{1}{2}$
3. impossible; 0

##### Reading Strategies

1. unlikely
2. impossible
3. certain

4.

Possible Outcomes	Desired Outcomes		
	6	Factor of 4	Greater than 0
0	no	no	no
1	no	yes	yes
2	no	yes	yes
3	no	no	yes
4	no	yes	yes
5	no	no	yes
Results	0 out of 6	3 out of 6	5 out of 6
Probability	impossible	as likely as not	likely

### Success for English Learners

- as likely as not; Sample answer: because there are 3 even numbers and 3 numbers that are not even
- impossible; There are no purple marbles in the bag.

### LESSON 12-2

#### Practice and Problem Solving: A/B

- $\frac{11}{15}$
- $\frac{7}{20}$
- $\frac{2}{7}$
- $\frac{99}{130}$
  - $\frac{31}{130}$
- $\frac{5}{8}$ , 0.625, 62.5%
  - $\frac{3}{8}$ , 0.375, 37.5%

#### Practice and Problem Solving: C

- $\frac{1}{150}$
  - 14

- $\frac{9}{200}$
  - 270
- $\frac{24}{25}$
  - 400
- $\frac{13}{8000}$
  - Yes. The percent of defective spark plugs is 0.1625%, which is less than 2%.
- $\frac{23}{300}$
  - No. The percent of defective switches is 7.67%, which is greater than 1.5%.

#### Practice and Problem Solving: D

- 9
  - 15
  - $\frac{9}{15} = \frac{3}{5}$
- 40
  - 48
  - $\frac{40}{48} = \frac{5}{6}$
- 36
  - 132
  - $\frac{36}{132} = \frac{3}{11}$
  - $\frac{96}{132} = \frac{8}{11}$

#### Reteach

- 12
  - 15
  - $\frac{12}{15} = \frac{4}{5}$
- 9
  - 14
  - $\frac{9}{14}$
- $P(\text{catch}) = \frac{4}{5}$ ;  $P(\text{no catch}) = 1 - \frac{4}{5} = \frac{1}{5}$

## Reading Strategies

- 3; Sample: There are more 3's than any other number, so the probability that you will land on 3 is would be greater than the probability for the other numbers.
- 1; Sample: There is only one 1, so the probability that you will on 1 is lower than the probability you will land on the other numbers.
- Sample: No, I predicted the cube would land on 1 the least number of times.
- Sample: No, I predicted the cube would land on 3 most often.

## Success for English Learners

- a. 28  
b. 40  
c.  $\frac{28}{40} = \frac{7}{10}$
- $\frac{18}{52} = \frac{9}{26}$ ;  $1 - \frac{9}{26} = \frac{17}{26}$
- Sample answer: Elena tossed a coin 30 times. It landed on heads 18 times. What is the experimental probability the coin will land on heads on the next toss?  $\left(\frac{18}{30} = \frac{3}{5}\right)$

## LESSON 12-3

### Practice and Problem Solving: A/B

- $\frac{62}{354} = \frac{31}{177}$
- $\frac{39}{160}$
- $\frac{23}{137}$
- $\frac{170}{190} = \frac{17}{19}$

### Practice and Problem Solving: C

- a. 50;  
b.  $\frac{182}{250} = \frac{91}{125}$
- Sample answer: You could use a spinner with 3 equal sections for the individual, pair, and team. You could use notecards

for the artistry points, and a number cube for the precision points.

- Sample answer: Tossing two number cubes to advance around a board game.
- Sample answer: Boys and girls being assigned to either a science class or a reading class when the number of boys and girls is not equal.

### Practice and Problem Solving: D

- a. 32  
b. 100  
c.  $\frac{32}{100} = \frac{8}{25}$
- $\frac{8}{50} = \frac{4}{25}$
- $\frac{45}{200} = \frac{9}{40}$

### Reteach

- 200
- $\frac{19}{200}$
- $\frac{85}{200} = \frac{17}{40}$
- $\frac{136}{200} = \frac{17}{25}$

### Reading Strategies

Section	Heads	Tails
1	3	4
2	2	3
3	5	3

- $\frac{3}{20}$
- $\frac{1}{10}$
- $\frac{9}{10}$
- $\frac{1}{2}$

### Success for English Learners

- a. 5  
b.  $\frac{5}{50} = \frac{1}{10}$

2. a.  $4 + 3 + 6 + 4 + 4 + 5 = 26$

b.  $\frac{26}{50} = \frac{13}{25}$

c.  $1 - \frac{13}{25} = \frac{12}{25}$

### LESSON 12-4

#### Practice and Problem Solving: A/B

- 140 times
- 135 serves
- 64 days
- 330 people
- 298 times
- 49 shots
- in Classes 1 and 3, because the percents preferring digital were 80% and 81%

#### Practice and Problem Solving: C

- Yes, they should keep their plans. The location is likely to provide over 9 days without rain.
- The train is more reliable. The bus is on-time 87.5% of the time, while the train is on-time 90% of the time.
- No. It is likely to snow heavily more than two of the days.
- a. DEF provides more reliable service. They are late only 13% of the time, while ABC is late more than 14% of the time.  
b. DEF did better than its average on Thursday and Friday, with delays of 9% and 10%.

#### Practice and Problem Solving: D


- 40; 40
- 570; 570
- 15.675; 16
- a. Math: 45 h; Science: 20 h; Social Studies: 18 h; Language Arts: 17 h  
b. Math: 33.8 h; Science: 15 h; Social Studies: 13.5 h; Language Arts: 12.8 h

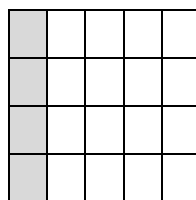
#### Reteach

1.  $\frac{25}{100} = \frac{x}{120}$ ; 30; 30

2. 495; 495

### Reading Strategies

1. 4; 



- 9
- Yes. The subway has been on time about 90% of the time. The elevated train is on time about 96% of the time.

### Success for English Learners

- No;  $\frac{32}{91} = \frac{x}{14}$ ;  $x = 4.9$ , or about 5 days;  
 $14 - 5 = 9$  days
- Yes;  $\frac{10}{62} = \frac{x}{14}$ ;  $x = 2.3$ , or about 2 days;  
 $14 - 2 = 12$  days

### MODULE 12 Challenge

- The expected daily number of defective toys produced in each factory is calculated by multiplying the probability of producing a defective toy by the total production in each factory.  
Factory A:  $\frac{2}{49} \times 3,000 \approx 122$   
Factory B:  $\frac{17}{99} \times 3,300 \approx 567$   
Factory C:  $\frac{13}{70} \times 2,900 \approx 539$   
Factory D:  $\frac{11}{83} \times 3,200 \approx 424$   
Factory A produces the least defective toys.
- Shlomo can select Factory A or Factory D.  
Factory A produces  $3,000 - 122 = 2,878$  toys that can be sold.  
Factory D produces  $3,200 - 424 = 2,776$  toys that can be sold.
- Factory A produces  $3,000 - 122 = 2,878$  toys that can be sold.  
Factory C produces  $2,900 - 539 = 2,361$  toys that can be sold.  
The two factories produce  $2,878 + 2,361 = 5,239$  toys that can be sold in one day.  
The total revenue produced by the factory

is  $5,239 \times \$29.99 = \$157,117.61$ .  
 Each day Factory A spends  $3,000 \times \$2.39 = \$7,170$  to produce toys.  
 Each day Factory C spends  $2,900 \times \$1.89 = \$5,481$  to produce toys.  
 The total expenses in Factory A and Factory C are  $\$7,170 + \$5,481 = \$12,651$ .  
 The profit earned in one day is  $\$157,117.61 - \$12,651 = \$144,466.61$ .

## MODULE 13 Theoretical Probability and Simulations

### LESSON 13-1

#### Practice and Problem Solving: A/B

- $\frac{1}{2}$
- $\frac{1}{3}$
- 0.3
- $\frac{7}{9}$
- D
- C
- E
- B
- A
- $\frac{4}{23}$
- $\frac{18}{23}$
- $1 - \frac{4}{23} = \frac{19}{23}$
- 0

#### Practice and Problem Solving: C

- $\frac{9}{14}$
- $\frac{4}{13}$
- $\frac{3}{4}$
- 20
- 250

- 10 cats
- $\frac{4}{17}$
- $\frac{9}{34}$
- $\frac{34}{34}$  or 1. Since there are no goldfish in the show, it is certain that one will not be picked.

#### Practice and Problem Solving: D

- $\frac{7}{25}$
- $\frac{1}{5}$
- $\frac{1}{4}; \frac{3}{4}$
- $\frac{3}{40}; \frac{37}{40}$
- $\frac{3}{10}; 0.3; 30\%$
- $\frac{1}{10}; 0.1; 10\%$
- $\frac{6}{10}$  or  $\frac{3}{5}; 0.6; 60\%$

#### Reteach

- $\frac{8}{15}$
- 12 bottles of orange juice and cranberry juice
- a.  $\frac{7}{20}$   
b.  $\frac{13}{20}$
- 0.75
- 0.05

#### Reading Strategies

- a. heads or tails  
b. heads  
c. 0.5 or  $\frac{1}{2}$
- a. any of the 9 players



b. an outfielder

c.  $\frac{3}{9}$  or  $\frac{1}{3}$

3. a. outcomes

b. event

c. theoretical probability

### Success for English Learners

1.  $\frac{6}{18}$  or  $\frac{1}{3}$

2.  $\frac{5}{13}$

### LESSON 13-2

#### Practice and Problem Solving: A/B

1. (Taco, Cheese), (Taco, Salsa),  
(Taco, Veggie)

2. (Burrito, Cheese), (Taco, Cheese),  
(Wrap, Cheese)

3.  $P(\text{Burrito/Cheese}) = \frac{1}{9}$ ;  $P(\text{Taco or Wrap with salsa}) = \frac{2}{9}$ ;

$P(\text{Burrito/Cheese and Taco or Wrap with Salsa}) = \frac{1}{9} \times \frac{2}{9} = \frac{2}{81}$ , since these are independent events.

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

5.  $1 - \frac{3}{20} = \frac{17}{20}$

6.  $P = \frac{1}{8} \times \frac{17}{20} = \frac{17}{160}$ , since these are independent events.

7.  $P = 0$ . There are no pliers in the second basket.

#### Practice and Problem Solving: C

1.  $P(\text{blue}) + P(\text{white}) = P(\text{blue or white}) = 1$

2. Let  $B = \text{blue}$  and  $W = \text{white}$ .  $P(X) \cdot P(B) = 0.18$ ;  $P(X) \cdot P(W) = 0.12$ ;  $0.18 \cdot P(W) = 0.12 \cdot P(B)$  and from Ex. 1,  $P(B) + P(W) = 1$ , which gives  $P(B) = 0.6$  and  $P(W) = 0.4$ .

3. The values of  $P(B)$  and  $P(W)$  can be used with either row of brands X, Y, and Z to find those values by a process of elimination:

$$P(X) = 0.3; P(Y) = 0.2; P(Z) = 0.5$$

4.  $P(B) \cdot P(Y) = 0.6 \cdot 0.2 = 0.12$

5.  $P(W) \cdot P(Z) = 0.4 \cdot 0.5 = 0.2$

6. a.  $P(\text{metamorphic}) \cdot P(\text{pebbles}) = 0.6 \cdot 0.6 = 0.36$

b.  $P(\text{igneous}) = 0.25$ , so pebbles:  $(0.25)(0.6) = 0.15$ ; small rocks:  $(0.25)(0.2) = 0.05$ ; medium rocks:  $(0.25)(0.15) = 0.0375$ ; boulders:  $(0.25)(0.05) = 0.0125$

#### Practice and Problem Solving: D

1. calculator:  $\frac{1}{4}; \frac{1}{4}; \frac{1}{4}; \frac{1}{4}$ ; ruler:

$$\frac{1}{3}; \frac{1}{3}; \frac{1}{3}; \frac{1}{3}; \frac{1}{3}; \frac{1}{3}; \frac{1}{3}; \frac{1}{3}; \frac{1}{3}; \frac{1}{3}; \frac{1}{3}; \frac{1}{3}$$

each combination of calculator and

ruler:  $\frac{1}{12}; \frac{1}{12}; \frac{1}{12}; \frac{1}{12}; \frac{1}{12}; \frac{1}{12}; \frac{1}{12}; \frac{1}{12}; \frac{1}{12}; \frac{1}{12}$ ;

$$\frac{1}{12}; \frac{1}{12}; \frac{1}{12}$$

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

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

4.  $\frac{1}{3} \times \frac{1}{4} = \frac{1}{12}$

5. a. two: (heads, tails)

b. six: (1, 2, 3, 4, 5, 6)

c. twelve: (H1, H2, H3, H4, H5, H6, T1, T2, T3, T4, T5, T6)

#### Reteach

1–2.

		Ellen				
		M	P	R	S	W
Sam	M	○	⊗	⊗	○	○
	P		×	×		
	R		×	×		
	S	○	⊗	⊗	○	○
	W		×	×		

3. 4 possibilities

4.  $P = \frac{4}{25}$

### Reading Strategies

1. There are 3 events: picking pants, shirts, and scarves;  $2 \text{ pants} \times 2 \text{ shirts} \times 2 \text{ scarves}$  give 8 choices. Answers will vary. Sample answer: Use a tree diagram.
2. There are two events: person, movie genre;  $2 \text{ people} \times 2 \text{ movie genres}$  give 4 choices. Answers will vary. Sample answer: Use a list.
3. There are more than three events: 36 products and 36 sums. For an even product, there are 27 choices; for an even sum, there are 18 choices. Use a table.

### Success for English Learners

1. They are duplicates.
2. Sample answer: The “doubles” such as C-C and GO-GO form a diagonal from upper left to lower right.
3. Sample answer: tree diagram

### LESSON 13-3

#### Practice and Problem Solving: A/B

1.  $\frac{1}{2}$
2. 32
3.  $\frac{1}{5}$
4. 12
5.  $\frac{1}{3}$
6. 13
7.  $\frac{5}{8}$
8. 125
9. 26
10. about 26
11. about 153
12. 4

#### Practice and Problem Solving: C

1. a. 36  
b.  $\frac{5}{36}$   
c. 25  
d. 25
2. a. 36  
b. 20  
c. 30  
d. 85
3. a. 16  
b. 36  
c. 24

#### Practice and Problem Solving: D

1.  $\frac{1}{2}$
2.  $\frac{1}{3}$
3.  $\frac{1}{5}$
4.  $\frac{2}{5}$
5.  $\frac{1}{2} \times 4 = \frac{1}{2} \times \frac{4}{1} = \frac{4}{2} = 2$
6.  $\frac{1}{4} \times 16 = \frac{1}{4} \times \frac{16}{1} = \frac{16}{4} = 4$
7.  $\frac{1}{6} \times 12 = \frac{1}{6} \times \frac{12}{1} = \frac{12}{6} = 2$
8.  $\frac{1}{3} \times 15 = \frac{1}{3} \times \frac{15}{1} = \frac{15}{3} = 5$

#### Reteach

1.  $\frac{1}{2}$
2. 10
3.  $\frac{1}{4}$
4. 20

## Reading Strategies

- 4
- 5
- 8
- 8

## Success for English Learners

- Theoretical probability is based on what should happen. Experimental probability is based on what has already happened.
- To make a prediction, multiply the theoretical probability times the number of trials.
- Answers may vary. Sample answer: Max rolls a number cube labeled 1–6 a total of 60 times. How many times can he expect the cube to land on 6? (10)

## LESSON 13-4

### Practice and Problem Solving: A/B

- He or she runs multiple trials with 5 random numbers between 1 and 10 in each.
  -

Trial	Numbers Generated	Shrimp Caught	Trial	Numbers Generated	Shrimp Caught
1	7, 3, 2, 7, 10	1	6	8, 4, 7, 6, 5	0
2	2, 4, 5, 3, 10	1	7	6, 10, 1, 7, 6	1
3	9, 9, 7, 6, 6	0	8	7, 9, 8, 3, 8	0
4	7, 9, 6, 6, 4	0	9	1, 4, 4, 8, 9	1
5	10, 6, 4, 6, 4	0	10	7, 8, 9, 5, 3	0

- $\frac{4}{10}$  or 0.4
- Let “1” represent seats with a prize and numbers 2 – 10 seats without a prize. Run multiple trials with the numbers 1 – 10 until a “1” appears. Record the number of seats reserved with each trial until the “1” appears.
  - Answers will vary, but a “1” has to appear in the list.

### Practice and Problem Solving: C

- Results will vary, but model should use randomly generated numbers 1–10. Since the chance of making more than 4 goals is 30%, the chance of making 4 goals or less is 70% or 7 out of 10, so generate

7 numbers for each trial. Count the number of trials in which 4 appears, and divide it by the number of trials (5) to find the experimental probability. Sample answer:

Trial	Numbers Generated	Result
1	5, 9, 2, 1, 1, 5, 7	0
2	1, 8, 5, 10, 5, 8, 3	0
3	4, 6, 6, 8, 8, 7, 6	1
4	5, 7, 9, 3, 9, 10, 6	0
5	6, 7, 9, 9, 2, 4, 3	1

- The experimental probability for 5 trials of a trial containing a 4 is  $\frac{2}{5}$ , or 0.4.
- Answers will vary. Sample answer: It will be the same because the chance of getting a 4 is the same.
- Results will vary. Sample answer:

Trial	Numbers Generated	Result
6	8, 9, 10, 9, 1, 6, 3	0
7	6, 5, 5, 8, 5, 7, 10	0
8	5, 7, 8, 10, 6, 4, 9	1
9	7, 7, 6, 1, 9, 1, 9	0
10	6, 8, 7, 7, 2, 4, 9	1

- The experimental probability for 10 trials of a trial containing a 4 is  $\frac{4}{10}$ , or 0.4.

### Practice and Problem Solving: D

- $\frac{1}{4}$
  - Answers will vary. Sample answer: 1
  - Answers will vary. Sample answer: 2, 3, and 4
- Results will vary. Sample answer:

Trial	Numbers Generated	Pizzas Bought	Trial	Numbers Generated	Pizzas Bought
1	3, 1, 1, 3	4	6	4, 2, 4, 3	4
2	3, 2, 4, 2	4	7	1, 1, 1, 2	4
3	2, 4, 3, 3	4	8	3, 4, 1, 4	4
4	3, 4, 2, 1	4	9	3, 2, 3, 4	4
5	2, 3, 1, 2	4	10	2, 3, 2, 2	4

Trial 1 is a winner since it has at least one 1. Trial 2 is not a winner, because it does not have a 1.

3. 5; 0.5 or  $\frac{1}{2}$

### Reteach

1. Results will vary. Sample answer:

Trial	Numbers Generated	Result	Trial	Numbers Generated	Result
1	1, 1, 1, 1, 1	5	6	1, 0, 1, 0, 0	2
2	0, 0, 1, 1, 1	3	7	1, 1, 0, 1, 1	4
3	1, 0, 1, 0, 1	3	8	1, 1, 0, 0, 1	3
4	0, 0, 1, 0, 0	1	9	0, 1, 1, 0, 0	2
5	1, 0, 0, 0, 0	1	10	0, 1, 0, 0, 1	2

The experimental probability is 5 out of 10, 0.5, 50 percent, or one half or more that an outcome has a 50–50 chance or greater of occurring.

2. Results will vary. Sample answer: Let 1 and 2 represent the probability that an event occurs; let 3–5 be the probability that it does not occur.

Trial	Numbers Generated	Result	Trial	Numbers Generated	Result
1	4, 4, 3, 4, 4	0	6	3, 2, 1, 5, 3	2
2	3, 5, 2, 4, 2	1	7	2, 1, 3, 4, 2	3
3	2, 5, 5, 4, 3	1	8	2, 2, 1, 5, 3	3
4	3, 3, 4, 4, 1	1	9	2, 3, 2, 4, 1	3
5	2, 2, 1, 4, 1	4	10	2, 5, 5, 1, 3	1

The experimental probability is 3 out of 10, 0.3, 30 percent, or three tenths that an outcome has a 3 in 5 chance of occurring.

### Reading Strategies

- 1 out of 4; use the numbers 1–4 for randomization with 1 being the favorable outcome. Experimental probability results will vary, but only the outcome of 1 will be counted as a favorable result when it occurs exactly twice out of 10 randomizations of the numbers 1–4, e.g. **1, 2, 4, 2, 1, 3, 4, 2, 2, 4**
- 2 out of 8; use the numbers 1–8 for randomization with 1–7 being favorable outcomes. Experimental probability results will vary, but only one of the outcomes 1–7 will be counted as a favorable result out of 10 randomizations of the numbers 1–8, e.g. **6, 5, 4, 6, 3, 8, 1, 5, 3, 7**

### Success for English Learners

- Answers will vary. Results or outcomes of 5 should be counted. Experimental probability should be near 17%.
- Answers will vary. Results or outcomes of 1, 3, and 5 should be counted. Experimental probability should be near 50%.
- Choices will vary. Some possibilities include the number 3, numbers less than 4, and numbers divisible by 3.

### MODULE 13 Challenge

- The probability that the arrow will land inside the circle is equal to the area of the circle divided by the area of the square. Let the side of the square have length  $x$ . The area of the square is then  $x(x) = x^2$ . The diameter of the circle is  $x$ , since the circle is inscribed in the square.

The radius of the circle is half the length of the diameter, or  $\frac{x}{2}$ .

The area of the circle is given by the

$$\text{formula } A = \pi r^2; \pi \left(\frac{x}{2}\right)^2 = \frac{\pi x^2}{4}.$$

The probability of the arrow landing inside

$$\text{the circle equals } \frac{\pi x^2}{x^2} = \frac{\pi}{4} \approx 0.785.$$

- Tobias is not correct. According to the simulation the probability of two or more days of rain per week equals 0.3 (Trials 1, 8, and 10 are weeks in which there were two or more rainy days). The probability of no rainy days in a week is 0.3 (Trials 4, 6, and 7 produced no rainy days). The probability of no rainy days is the same as the probability of two or more rainy days.
- The probability of 0 rainy days is 0.3 (Trials 4, 6, 7).  
The probability of 1 rainy day is 0.4 (Trials 2, 3, 5 and 9).  
The probability of 2 rainy days is 0.  
The probability of 3 rainy days is 0.2 (Trials 1 and 8).  
The probability of 4 rainy days is 0.1 (Trial 10).  
The probability of 5, 6 or 7 rainy days is 0.  
One rainy day per week is most likely.