

Glencoe McGraw-Hill

California Mathematics

Grade 7

Practice Workbook



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TO THE STUDENT This *Practice Workbook* gives you additional examples and problems for the concept exercises in each lesson. The exercises are designed to aid your study of mathematics by reinforcing important mathematical skills needed to succeed in the everyday world. The materials are organized by chapter and lesson, with one *Practice* worksheet for every lesson in *Glencoe California Mathematics, Grade 7*.

Always keep your workbook handy. Along with your textbook, daily homework, and class notes, the completed *Practice Workbook* can help you review for quizzes and tests.

TO THE TEACHER These worksheets are the same as those found in the Chapter Resource Masters for *Glencoe California Mathematics, Grade 7*. The answers to these worksheets are available at the end of each Chapter Resource Masters booklet as well as in your Teacher Wraparound Edition interleaf pages.



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Practice Workbook, Grade 7

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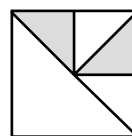
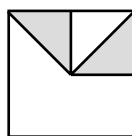
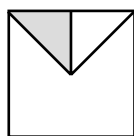
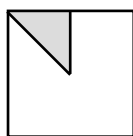
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1-1**Practice****7MRI.1, 6AF2.3*****A Plan for Problem Solving*****Use the four-step plan to solve each problem.**

- 1. FOOD** The table shows a portion of the price list for a local pizzeria. Tony has \$17 that he can spend to buy one large pizza. If the pattern in the prices continues, what is the greatest number of toppings that Tony can order on his pizza? What is the cost of that pizza?

Toppings	Price
1	\$12.99
2	\$13.79
3	\$14.59
4	\$15.39

- 2. MOVIES** Mr. Sedgwick paid \$13 for one adult ticket and one child ticket for a movie. Mrs. Wong paid \$18 for one adult ticket and two child tickets to see the same movie, and Mr. Gomez paid \$23 for one adult ticket and three child tickets. If the pattern continues, how much should Mrs. Beauregard expect to pay for one adult ticket and four child tickets?
- 3. SPORTS** The track coach must buy at least two bottles of water for each participant in a track meet. One team has 35 members, and the other team has 28 members. If each case of water contains 24 bottles, what is the fewest number of full cases that the coach can buy?
- 4. GEOGRAPHY** The land area of Washington, D.C., is 61 square miles. In 2003, the population of Washington, D.C., was 563,384. If one square mile is equal to 640 acres, about how many people per acre were there in Washington, D.C., in 2003?
- 5. ART SUPPLIES** At the craft store, a paint brush costs \$0.79, and a small bottle of paint costs \$0.89. What combination of paint brushes and bottles of paint could you buy for exactly \$4.15?
- 6. GEOMETRY** Draw the next two figures in the pattern.



1-2**Practice**

7AF1.2, 7AF1.3, 7AF1.4

Variables, Expressions, and Properties**Evaluate each expression if $r = 3$, $s = 5$, and $t = 2$.**

1. $3r + s$

2. $4s - 5t$

3. $8 + 6t - r$

4. rs^2

5. $(st)^2$

6. $\frac{r^2 + 1}{t + 3}$

7. $s(7 + t) - r$

8. $2s^2 - 8s + 3$

Name the property shown by each statement.

9. $6(5 + 1) = 6(5) + 6(1)$

10. $1(2 + 3) = 2 + 3$

11. $(10 + 7) + 4 = 10 + (7 + 4)$

12. $5 + (1 + 9) = 5 + (9 + 1)$

State whether each conjecture is *true* or *false*. If *false*, provide a counter example.

13. The sum of an even number and an odd number is always even.

14. Multiplication of whole numbers is associative.

Rewrite each expression using the indicated property.

15. $(x + 7) + 3$, Associative Property

16. $5(3) + 5(4)$, Distributive Property

17. **INTERNET** A bookstore offers wireless Internet access to its customers for a charge. The cost of using this service is given by the expression $\$1.50 + \frac{m}{20}$, where m is the number of minutes online. How much would it cost to be online 40 minutes?

18. **TEMPERATURE** When a temperature in degrees Celsius C is known, the expression $\frac{9C + 160}{5}$ can be used to find the temperature in degrees Fahrenheit. If a thermometer shows that a temperature is 20°C , what is the temperature in degrees Fahrenheit?

1-3**Practice****7NS2.5*****Integers and Absolute Value*****Replace each $\bullet$ with $<$, $>$, or $=$ to make a true sentence.**

1. $0 \bullet 8$

2. $-5 \bullet -3$

3. $1 \bullet -7$

4. $-4 \bullet -4$

5. $-12 \bullet 10$

6. $5 \bullet -6$

7. $-6 \bullet -7$

8. $0 \bullet -8$

9. $-10 \bullet -10$

Order each set of integers from least to greatest.

10. $\{-5, -7, 0, 5, 7\}$

11. $\{-1, 2, -3, 4\}$

12. $\{-2, -4, -6, -8, -10, -12\}$

13. $\{0, -9, -3, -7, 1, -1\}$

Evaluate each expression.

14. $|-19|$

15. $|15|$

16. $|0|$

17. $|-1| + |3|$

18. $|-19| + |-8|$

19. $|-12| - |4|$

Evaluate each expression if $k = 4$, $m = -2$, $n = 7$, and $p = -5$.

20. $|m| + 6$

21. $n - |p|$

22. $k + |p|$

23. $5|n| + k$

24. $|n| - 4$

25. $9|m| - 14$

TEMPERATURE For Exercises 26 and 28, use the following information.

During a five-day cold spell, Jose recorded the temperature each day at noon. The temperature was -3°F on Monday, -5°F on Tuesday, -4°F on Wednesday, -1°F on Thursday, and 0°F on Friday.

26. On which day was it the coldest at noon?**27.** On which day was it the warmest at noon?**28.** The temperature at noon on Saturday was 25° warmer than the temperature on Tuesday. What was the temperature on Saturday? Justify your answer using a number line.

1-4**Practice****7NS1.2, 7AF1.3*****Adding Integers*****Find each sum.**

1. $-1 + (-8)$
2. $13 + 15$
3. $19 + (-7)$
4. $-14 + (-14)$
5. $-12 + 10$
6. $-5 + (-26)$
7. $-46 + 27$
8. $-33 + 55$
9. $-29 + (-25)$
10. $6 + 14 + (-12)$
11. $-15 + (-17) + 10$
12. $-13 + (-13) + (-18)$
13. $-5 + 8 + (-1) + (-6)$
14. $8 + (-7) + (-8) + (-9)$
15. $-15 + 10 + (-16) + 12$

POPULATION For Exercises 16 and 17, use the table below that shows the change in population for four cities between 2000 and 2005.

City	2000 Population (thousands)	Change as of 2005 (thousands)
Boston, Massachusetts	589	-30
Las Vegas, Nevada	478	+67
Pittsburgh, Pennsylvania	335	-18
Rochester, New York	220	-8

Source: U.S. Census Bureau

16. What is the population in thousands of each of these cities as of 2005?
17. What was the total population change for these four cities?

Write an addition expression to describe each situation. Then find each sum and explain its meaning.

18. **GAMES** On one turn, you move 10 spaces forward around the game board. On the next turn, you move 4 spaces backward.
19. **CAMPING** While hiking down into a canyon, Manuel passed a sign stating that the elevation was 100 feet below sea level. He descended another 56 feet before reaching his campsite.
20. **WEATHER** Before you went to sleep last night, the temperature was -3°F . During the night the temperature dropped by 5° .
21. **ELEVATOR** Mrs. Brown parked in the parking garage 30 feet below street level. She then got in an elevator and went up 80 feet to her office.

1-5**Practice**

7NS1.2

Subtracting Integers**Subtract.**

1. $15 - 7$

2. $3 - 12$

3. $-8 - 9$

4. $4 - (-12)$

5. $18 - (-7)$

6. $-8 - (-9)$

7. $-14 - (-18)$

8. $-19 - (-13)$

9. $8 - (-22)$

10. $-1 - 15$

11. $12 - 19$

12. $-10 - (-5)$

Evaluate each expression if $d = -4$, $f = -7$, and $g = 11$.

13. $d - 10$

14. $g - 15$

15. $d - g$

16. $d - f$

17. $d - f - g$

18. $g - d - f$

GEOGRAPHY For Exercises 19–21, use the table that shows the elevations above sea level of the lowest and highest points on six continents.

19. How far below the highest point in Australia is the lowest point in Australia?

20. How far below the highest point in North America is the lowest point in Asia?

21. Find the difference between the lowest point in South America and the lowest point in Africa.

Continent	Lowest Point (m)	Highest Point (m)
Africa	-156	5,895
Asia	-400	8,850
Australia	-12	2,228
Europe	-28	5,642
North America	-86	6,194
South America	-42	6,960

Source: www.worldoffacts.com**Simplify.**

22. $29 - (-4) - (-15)$

23. $-10 - [8 + (-16)]$

24. $25 - [16 + (-9)]$

25. $[22 - (-18)] - (-5 + 11)$

26. $(-5 + 9) - (-20 - 12)$

27. $[-15 + (-7)] - (-8 - 11)$

1-6**Practice****7NS1.2, 7AF1.3*****Multiplying and Dividing Integers*****Multiply.**

1. $5(-7)$

2. $-3 \cdot 12$

3. $-8(-9)$

4. $-4(-12)$

5. $(-7)^2$

6. $-2(-5)(-3)$

Divide.

7. $-14 \div 2$

8. $35 \div (-7)$

9. $-48 \div (-6)$

10. $\frac{-66}{6}$

11. $\frac{56}{-7}$

12. $\frac{-80}{-5}$

Evaluate each expression if $r = -4$, $s = 11$, and $t = -7$.

13. $s + 5t$

14. $10 - rt$

15. $\frac{5s}{t-4}$

16. $\frac{-42}{r-t}$

17. $-r^2 - 16$

18. $(2t + 4)^2 \div 4$

Find the mean of each set of integers.

19. $-8, -5, 3, -9, 5, 2$

20. $11, -15, -16, 17, -20, -18, -22$

21. $-5, 4, 8, -12, 10$

22. $-22, -19, -14, -17, -18$

Find each product or quotient.

23. $(3)^2 \cdot (-4)^2$

24. $-3(-5)^2$

25. $-5(-2)(4)(-3)$

26. $\frac{-10(15)}{6}$

27. $\frac{12^2}{-12}$

28. $\frac{-4 \cdot 12}{8}$

29. **MONEY** If you have \$216 and you spend \$12 each day, how long would it be until you had no money left?

30. **WEATHER** During a six hour period, the temperature dropped 18°F . Find the average hourly change in the temperature.

1-7**Practice****7AF1.1, 7AF1.4****Writing Equations****Define a variable. Then write an equation to model each situation.**

1. After receiving \$25 for her birthday, Latisha had \$115.
2. At 14 years old, Adam is 3 years younger than his brother Michael.
3. A class of 30 students separated into equal sized teams results in 5 students per team.
4. When the bananas were divided evenly among the 6 monkeys, each monkey received 4 bananas.

Define a variable. Then write an equation that could be used to solve each problem.

5. **GRADES** Kelly's test score was 6 points higher than Michelle's. If Kelly's test score was 88, what was Michelle's test score?
6. **GEOMETRY** A rectangle's width is one-third its length. If the width is 8 inches, what is the length of the rectangle?
7. **FOOTBALL** A team had a total gain of -15 yards over several plays with an average gain of -5 yards per play. How many plays are represented?

Write an equation to model the relationship between the quantities in each table.

8.

Kilograms, k	Grams, g
1	1,000
2	2,000
3	3,000
4	4,000
k	g

9.

Feet, f	Yards, y
3	1
6	2
9	3
12	4
f	y

10. **MONEY** Carlotta earns \$3 for every hour that she baby sits. Complete the table of values showing the amount she earns for baby sitting 1, 2, 3, 4, and h hours. Given h , a number of hours, write an equation to find a , the amount that Carlotta earns.

Hours, h	Amount, a

1-8**Practice****7MRI.1, 7NSI.2****Problem-Solving Investigation: Work Backward****Mixed Problem Solving**

Use the work backward strategy to solve Exercises 1 and 2.

- 1. TRAVEL** Rajiv and his family left home on a trip and drove for 2 hours before they stopped to eat. After 1.5 hours, they were back on the road. They arrived at their destination 3 hours later at 5:00 P.M. What time did they leave home?
- 2. GRADES** Kumiko had an average of 92 on her first three math tests. Her scores on the second and third tests were 97 and 89. What was her score on the first test?

Use any strategy to solve Exercises 3 and 4. Some strategies are shown below.

Problem-Solving Strategies

- Use the four-step plan.
- Work backward.

- 3. BAKING** Isabel doubled her recipe for chocolate chip cookies. After her brothers ate 8 cookies, she set aside half of the remaining cookies for a school party. Isabel then gave 2 dozen cookies to her neighbor. She had 12 cookies left over. How many cookies does one recipe make?

- 4. ANALYZE TABLES** The table below gives the results from a poll taken at school about the times in minutes that boys and girls spend using the Internet for school work and the total time spent using the Internet each week.

Gender	Time Used for School Work	Total Time per Week
Boys	33 min	255 min
Girls	72 min	213 min

How many more minutes per week do boys spend using the Internet for purposes other than school work than girls?

Select the Operation

For Exercises 5 and 6, select an appropriate operation to solve the problem. Justify your solution and solve the problem.

- 5. MOVIES** The two animated films with the highest box office receipts brought in a total of \$775 million. If one film brought in \$97 million more than the other, how much did the film with the highest receipts bring in?
- 6. U.S. PRESIDENTS** Harry S Truman was elected president in 1944. He died in 1972 at the age of 88. How old was he at the time he was elected?

1-9**Practice****6AF1.1*****Solving Addition and Subtraction Equations*****Solve each equation. Check your solution.**

1. $t + 7 = 12$

2. $h - 3 = 8$

3. $8 = b - 9$

4. $k - 4 = -14$

5. $m + 9 = -7$

6. $y - 10 = -3$

7. $-14 = 2 + d$

8. $15 + n = 10$

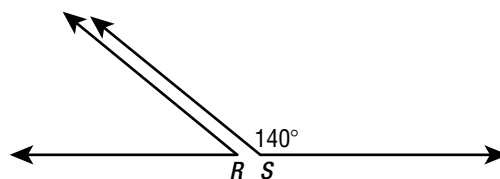
9. $-8 = r - 6$

10. $11 = w - 5$

11. $-9 = g + 9$

12. $12 + c = 16$

- 13. GEOMETRY** Two angles are supplementary if the sum of their measures is 180° . The two angles shown are supplementary. Write and solve an equation to find the measure of angle R .



- 14. ARCHITECTURE** The Sears Tower in Chicago was the tallest building in the world when it was completed. Twenty-three years later, a taller building was completed in 1996 on Taiwan. Write and solve an equation to find the year that the Sears Tower was completed.
- 15. FUND RAISING** During a five-day fund raiser, Shantell sold 8 boxes of greeting cards the first day, 6 boxes the second day, 10 boxes the third day, and 7 boxes the fourth day. If she sold a total of 45 boxes of greeting cards during the five days, write an equation that can be used to find the number of boxes Shantell sold the fifth day. Explain two methods of solving this equation. Then solve the equation.

- 16. ANALYZE TABLES** The total points scored by both teams in the 2006 Super Bowl was 14 less than the total points for 2005. Write and solve an equation to find the total points for 2005.

Total Points Scored by Both Teams in Super Bowl	
Year	Points
2005	p
2006	31

Source: www.superbowl.com

1-10**Practice****6AF1.1*****Solving Multiplication and Division Equations*****Solve each equation. Check your solution.**

1. $5s = 45$

2. $8h = 64$

3. $36 = 9b$

4. $-3p = 24$

5. $-12m = -72$

6. $-56 = 7d$

7. $\frac{x}{5} = 11$

8. $\frac{v}{4} = 20$

9. $\frac{c}{-2} = 43$

10. $16 = \frac{y}{-3}$

11. $-9 = \frac{n}{8}$

12. $\frac{a}{25} = -3$

13. CARS Mrs. Alvarez bought a new car. Her monthly payments are \$525. If she will pay a total of \$25,200 in payments, write and solve a multiplication equation to find the number of payments.

14. POPULATION The population of South Africa is four times the population of Greece. If the population of South Africa is 44 million, write and solve a multiplication equation to find the population of Greece.

MEASUREMENT For Exercises 15 and 16, refer to the table. Write and solve an equation to find each quantity.

15. the number of quarts in 24 pints

16. the number of gallons in 104 pints

Customary System Conversions (capacity)
1 pint = 2 cups
1 quart = 2 pints
1 quart = 4 cups
1 gallon = 4 quarts
1 gallon = 8 pints

Solve each equation.

17. $3 = \frac{g}{-28}$

18. $\frac{x}{0.5} = -8$

19. $\frac{r}{9} = -16$

2-1**Practice****7NS1.3, 7NS1.5*****Rational Numbers*****Write each fraction or mixed number as a decimal.**

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

2. $\frac{5}{8}$

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

4. $\frac{37}{50}$

5. $-\frac{11}{16}$

6. $-\frac{9}{32}$

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

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

9. $\frac{5}{33}$

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

11. $-8\frac{11}{18}$

12. $-9\frac{11}{30}$

Write each decimal as a fraction or mixed number in simplest form.

13. -0.8

14. 0.44

15. 1.35

16. $0.\overline{8}$

17. $-1.\overline{5}$

18. $4.\overline{4}$

POPULATION For Exercises 19–21, refer to the table at the right.

19. Express the fraction for Asian as a decimal.
20. Find the decimal equivalent for the fraction of the population that is African American.
21. Write the fraction for Hispanic as a decimal. Round to the nearest thousandth.

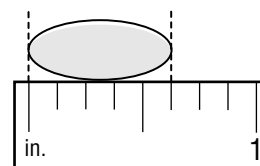
Population of California by Race	
Race	Fraction of Total Population
Asian	$\frac{1}{10}$
African American	$\frac{1}{16}$
Hispanic	$\frac{1}{3}$

Source: U.S. Census Bureau

MEASUREMENTS For Exercises 22 and 23, use the figure at the right.

22. Write the width of the jellybean as a fraction.

23. Write the width of the jellybean as a decimal.



2-2 Practice

7NS1.1

Comparing and Ordering Rational NumbersReplace each ● with $<$, $>$, or $=$ to make a true sentence.

1. $\frac{3}{5}$ ● $\frac{5}{7}$

2. $\frac{4}{9}$ ● $\frac{5}{11}$

3. $3\frac{2}{11}$ ● $3\frac{1}{9}$

4. $5\frac{7}{15}$ ● $5\frac{8}{17}$

5. 0.2 ● $\frac{2}{11}$

6. 0.25 ● $\frac{5}{21}$

7. $8\frac{10}{27}$ ● 8.3

8. $4\frac{8}{30}$ ● 4.3

9. $-\frac{8}{13}$ ● $-\frac{5}{13}$

10. $-\frac{3}{8}$ ● $-\frac{7}{8}$

11. $-\frac{2}{5}$ ● $-\frac{6}{7}$

12. $-\frac{2}{9}$ ● $-\frac{9}{11}$

13. -4.5 ● -4.55

14. -6.14 ● -6.15

15. -3.57 ● -3.5

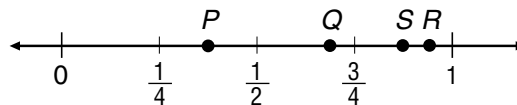
16. -1.9 ● -1.99

17. Which is least: $\frac{3}{8}$, 0.4 , $\frac{4}{11}$, $0.03\overline{5}$, or $\frac{5}{13}$?18. Which is greatest: $\frac{7}{9}$, 0.778 , $0.\overline{78}$, $\frac{11}{13}$, or 0.787 ?

Order each set of rational numbers from least to greatest.

19. -5.81 , $-5\frac{3}{4}$, $-5\frac{3}{5}$, -5.69

20. -1.01 , -1.1 , $-1\frac{1}{9}$, $-1\frac{1}{11}$

21. Which point on the number line is the graph of 0.875 ?

22. **STATISTICS** If you order a set of numbers from least to greatest, the middle number is the *median*. Find the median of 43.7, 41.3, 44.5, $42\frac{4}{5}$, and $43\frac{3}{4}$.

2-3**Practice**

7NS1.2, 7MG1.3

Multiplying Positive and Negative Fractions**Find each product. Write in simplest form.**

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

2. $\frac{6}{7} \cdot \frac{1}{2}$

3. $\frac{3}{10} \cdot \frac{2}{3}$

4. $-\frac{15}{16} \cdot \frac{4}{5}$

5. $\left(-\frac{8}{25}\right)\frac{15}{16}$

6. $\left(-\frac{7}{8}\right)\left(-\frac{1}{7}\right)$

7. $1\frac{1}{4} \cdot \frac{1}{5}$

8. $1\frac{1}{4} \cdot 1\frac{1}{5}$

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

10. $\frac{1}{4} \cdot \left(-\frac{4}{15}\right) \cdot \frac{5}{7}$

11. $2\frac{2}{5} \cdot 2\frac{1}{3} \cdot 2$

12. $10 \cdot 8.56 \cdot \frac{1}{2}$

ALGEBRA Evaluate each expression if $a = -\frac{1}{5}$, $b = \frac{2}{3}$, $c = \frac{7}{8}$, and $d = -\frac{3}{4}$.

13. bc

14. ab

15. abc

16. abd

17. COOKING A recipe calls for $2\frac{1}{4}$ cups of flour. How much flour would you need to make $\frac{1}{3}$ of the recipe?

18. FARMING A farmer has $6\frac{1}{2}$ acres of land for growing crops. If she plants corn on $\frac{3}{5}$ of the land, how many acres of corn will she have?

ALGEBRA Evaluate each expression if $e = -1\frac{1}{4}$, $f = 2\frac{2}{3}$, $g = -2\frac{1}{6}$, and $h = 1\frac{1}{5}$.

19. efh^2

20. e^2h^2

21. $\frac{1}{8}f^2g$

22. $-2ef(-gh)$

2-4**Practice****7NS1.2, 7MG1.3*****Dividing Positive and Negative Fractions*****Write the multiplicative inverse of each number.**

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

2. $\frac{7}{12}$

3. -20

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

Find each quotient. Write in simplest form.

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

6. $\frac{2}{5} \div \frac{5}{6}$

7. $\frac{3}{7} \div \frac{6}{11}$

8. $\frac{3}{10} \div \frac{4}{5}$

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

10. $\frac{6}{7} \div 3$

11. $\frac{4}{5} \div 10$

12. $\frac{6}{11} \div 8$

13. $-\frac{4}{5} \div \frac{5}{6}$

14. $\frac{5}{12} \div \left(-\frac{3}{5}\right)$

15. $-\frac{3}{10} \div \left(-\frac{2}{5}\right)$

16. $-\frac{13}{18} \div \left(-\frac{8}{9}\right)$

17. $4\frac{1}{5} \div 1\frac{3}{4}$

18. $8\frac{1}{3} \div 3\frac{3}{4}$

19. $-10\frac{1}{2} \div 2\frac{1}{3}$

20. OFFICE SUPPLIES A regular paper clip is $1\frac{1}{4}$ inches long, and a jumbo paper clip is $1\frac{7}{8}$ inches long. How many times longer is the jumbo paper clip than the regular paper clip?

21. STORAGE The ceiling in a storage unit is $7\frac{2}{3}$ feet high. How many boxes may be stacked in a single stack if each box is $\frac{3}{4}$ foot tall?

ALGEBRA Evaluate each expression for the given values.

22. $r \div s$ if $r = -\frac{7}{20}$ and $s = \frac{7}{15}$

23. $m \div n$ if $m = \frac{4}{9}$ and $n = \frac{11}{12}$

2-5**Practice****7NS1.2*****Adding and Subtracting Like Fractions*****Add or subtract. Write in simplest form.**

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

2. $-\frac{3}{8} + \left(-\frac{1}{8}\right)$

3. $-\frac{8}{11} + \frac{10}{11}$

4. $-\frac{5}{7} - \frac{4}{7}$

5. $\frac{11}{12} - \frac{7}{12}$

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

7. $4\frac{3}{4} + 6\frac{3}{4}$

8. $5\frac{7}{10} + 9\frac{9}{10}$

9. $7\frac{4}{9} + \left(-3\frac{5}{9}\right)$

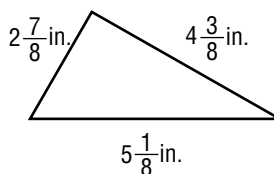
10. $-1\frac{8}{9} - 4\frac{8}{9}$

11. $-4\frac{4}{5} - 5\frac{4}{5}$

12. $8\frac{5}{6} - 3\frac{5}{6}$

- 13. SEWING** Naomi needs $2\frac{3}{4}$ yards of fabric to make a banner for a football game. The fabric store has $6\frac{1}{4}$ yards of the fabric she wants. How much of the fabric will remain at the store after Naomi buys her fabric?

- 14. GEOMETRY** Find the perimeter of the triangle.

**Simplify each expression.**

15. $-5\frac{4}{7} + 2\frac{1}{7} - \left(3\frac{5}{7}\right)$

16. $-7\frac{1}{12} - \left(-4\frac{11}{12}\right) + 9\frac{7}{12}$

ALGEBRA Evaluate each expressions for the given values.

17. $r + s$ if $r = 8\frac{4}{5}$ and $s = -3\frac{2}{5}$

18. $b - c$ if $b = -2\frac{7}{9}$ and $c = -9\frac{5}{9}$

2-6 Practice**7NS1.2, 7NS2.2*****Adding and Subtracting Unlike Fractions*****Add or subtract. Write in simplest form.**

1. $-\frac{1}{2} + \frac{7}{10}$

2. $\frac{5}{6} + \left(-\frac{5}{9}\right)$

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

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

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

6. $-\frac{7}{8} - \left(-\frac{2}{3}\right)$

7. $4\frac{1}{5} + 6\frac{3}{4}$

8. $1\frac{7}{10} + \left(-5\frac{3}{5}\right)$

9. $7\frac{3}{5} - \left(-5\frac{1}{3}\right)$

10. $-3\frac{2}{3} - 4\frac{5}{9}$

11. $-4\frac{3}{5} - 5\frac{9}{10}$

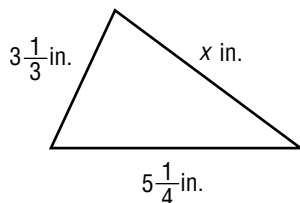
12. $-18\frac{5}{12} + 14\frac{3}{4}$

- 13. POPULATION** About $\frac{1}{5}$ of the world's population lives in China, and $\frac{1}{6}$ of the world's population lives in India. What fraction of the world's population lives in other countries?

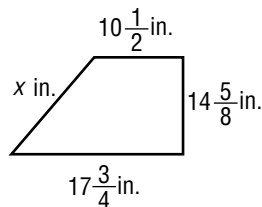
ALGEBRA For Exercises 14 and 15, evaluate each expression using the given information.

14. $m - n$ if $m = -\frac{3}{5}$ and $n = -10\frac{7}{10}$

15. $j - k$ if $j = -\frac{5}{9}$ and $k = 4\frac{5}{6}$

GEOMETRY Find the missing measure for each figure.**16.**

perimeter = $12\frac{23}{24}$ in.

17.

perimeter = $59\frac{1}{4}$ in.

2-7**Practice**

7AF1.1, 7NS1.2

Solving Equations with Rational Numbers**Solve each equation. Check your solution.**

1. $m + 0.88 = 1.64$

2. $t - 2.89 = 9.15$

3. $-\frac{3}{5} = d - \frac{5}{6}$

4. $-\frac{7}{16} = b + \frac{1}{4}$

5. $h - (-6.3) = 8.12$

6. $-2.5 = n - (-5.37)$

7. $-\frac{5}{8}k = 25$

8. $-\frac{3}{7}v = -27$

9. $-2.94 = -0.42a$

10. $-8.4 = 1.4y$

11. $\frac{f}{2.4} = -7.5$

12. $\frac{p}{-6.25} = -3.6$

13. $2.5x = -\frac{13}{16}$

14. $-4.5w = -8\frac{1}{3}$

15. $8\frac{2}{3} = -1.\bar{3}g$

- 16. MONEY** The currency in Switzerland is called a franc. On a certain day, one U.S. dollar equaled $1\frac{1}{4}$ Swiss francs. Write and solve a multiplication equation to find the number of U.S. dollars that would equal 15 Swiss francs.

FOOTBALL For Exercise 17, refer to the table.

- 17.** Let s equal the number of additional seats that the Pittsburgh Steelers' stadium needs to equal the number of seats in Kansas City Chiefs' stadium. Write and solve an addition equation to determine the number of seats that the Steelers' stadium needs to equal the number of seats in the Chiefs' stadium.

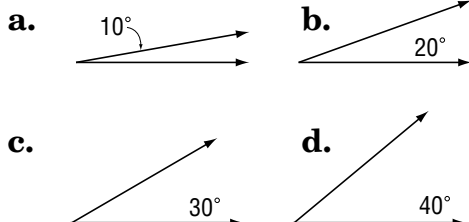
NFL Stadiums Seating Capacity	
Stadium	Seats (thousands)
Dallas Cowboys	65.7
Kansas City Chiefs	79.4
Pittsburgh Steelers	64.5
San Diego Chargers	71.3

Source: stadiumsofnfl.com

2-8 Practice**7MR2.4, 7NS1.2****Problem-Solving Investigation: Look for a Pattern****Mixed Problem Solving**

For Exercises 1 and 2, look for a pattern. Then use the pattern to solve the problem.

1. **GEOMETRY** Draw the next two angles in the pattern.



2. **ANALYZE TABLES** A falling object continues to fall faster until it hits the ground. How far will an object fall during the fifth second?

Time Period	Distance Fallen
1st second	16 feet
2nd second	48 feet
3rd second	80 feet
4th second	112 feet

Use any strategy to solve Exercises 3 and 4. Some strategies are shown below.

PROBLEM-SOLVING STRATEGIES

- Use the four-step plan.
- Look for a pattern.

3. **YARD WORK** Denzel can mow $\frac{1}{8}$ of his yard every 7 minutes. If he has 40 minutes to mow $\frac{3}{4}$ of the yard, will he have enough time?

4. **READING** Ling read 175 pages by 1:00 P.M., 210 pages by 2:00 P.M., and 245 pages by 3:00 P.M. If she continues reading at this rate, how many pages will Ling have read by 4:00 P.M.?

Select the Operation

For Exercises 5 and 6, select an appropriate operation to solve the problem. Justify your solution and solve the problem.

5. **MOVIES** The land area of Alaska is about 570 thousand square miles. The land area of Washington, D.C., is about 0.06 thousand square miles. How many times larger is Alaska than Washington, D.C.?
6. **U.S. PRESIDENTS** President Clinton served 5 two-year terms as governor of Arkansas and 2 four-year terms as President of the United States. How many total years did he serve in these two government offices?

2-9**Practice**

7NS1.2, 7NS2.1, 7AF2.1

Powers and Exponents**Write each expression using exponents.**

1. $3 \cdot 3 \cdot m$

2. $2 \cdot d \cdot 5 \cdot d \cdot d \cdot 5$

3. $p \cdot 9 \cdot 3 \cdot q \cdot p \cdot 9$

4. $g \cdot 7 \cdot 7 \cdot g \cdot h \cdot 7 \cdot h$

5. $2 \cdot 5 \cdot r \cdot 7 \cdot s \cdot r \cdot 5 \cdot r \cdot 7 \cdot r \cdot s$

6. $x \cdot 8 \cdot y \cdot x \cdot 5 \cdot x \cdot 5 \cdot y \cdot 8 \cdot y \cdot y \cdot 5$

Evaluate each expression.

7. 2^4

8. 5^3

9. $2^2 \cdot 6^2$

10. $2^3 \cdot 5^2$

11. 3^{-4}

12. 8^{-3}

13. 9^{-2}

14. 5^{-3}

15. $7 \cdot 2^2 \cdot 5^2$

16. $3^2 \cdot 6 \cdot 10^2$

17. $3^{-2} \cdot 2^{-3}$

18. $7 \cdot 3^3 \cdot 5^{-4}$

ALGEBRA Evaluate each expression.

19. $r^3 \cdot s$, if $r = 5$ and $s = 4$

20. $m^2 \cdot n^3$, if $m = 6$ and $n = 2$

21. $f^4 \cdot g^5$, if $f = 3$ and $g = 1$

22. $x^5 \cdot y$, if $x = 2$ and $y = 8$

23. Complete the following pattern.

$5^4 = 625, 5^3 = 125, 5^2 = 25, 5^1 = 5, 5^0 = \underline{\quad}, 5^{-1} = \underline{\quad}, 5^{-2} = \underline{\quad}, 5^{-3} = \underline{\quad}$

24. **MONEY** Suppose \$100 is deposited into an account and the amount doubles every 8 years. How much will be in the account after 40 years?25. **EPIDEMICS** At the beginning of an epidemic, 50 people are sick. If the number of sick people triples every other day, how many people will be sick at the end of 2 weeks?

2-10 Practice**7NS1.1****Scientific Notation****Write each number in standard form.**

1. 9.03×10^2

2. 7.89×10^3

3. 4.115×10^5

4. 3.201×10^6

5. 5.1×10^{-2}

6. 7.7×10^{-5}

7. 3.85×10^{-4}

8. 1.04×10^{-3}

Write each number in scientific notation.

9. 4,400

10. 75,000

11. 69,900,000

12. 575,000,000

13. 0.084

14. 0.0099

15. 0.000000515

16. 0.0000307

17. Which number is greater: 3.5×10^4 or 2.1×10^6 ?18. Which number is less: 7.2×10^7 or 9.9×10^5 ?

19. **POPULATION** The table lists the populations of five countries. List the countries from least to greatest population.

Country	Population
Australia	2.0×10^7
Brazil	1.9×10^8
Egypt	7.7×10^7
Luxembourg	4.7×10^5
Singapore	4.4×10^6

Source: *The World Factbook*

20. **SOLAR SYSTEM** Pluto is 3.67×10^9 miles from the Sun. Write this number in standard form.

21. **MEASUREMENT** One centimeter is equal to about 0.0000062 mile. Write this number in scientific notation.

22. **DISASTERS** In 2005, Hurricane Katrina caused over \$125 billion in damage in the southern United States. Write \$125 billion in scientific notation.

3-1 Practice**7NS2.4*****Square Roots*****Find each square root.**

1. $\sqrt{36}$

2. $-\sqrt{144}$

3. $-\sqrt{\frac{9}{16}}$

4. $\sqrt{1.96}$

5. $\pm\sqrt{2.25}$

6. $\pm\sqrt{\frac{121}{289}}$

7. $\sqrt{\frac{81}{100}}$

8. $\pm\sqrt{0.0025}$

9. $-\sqrt{0.49}$

10. $-\sqrt{3.24}$

11. $-\sqrt{\frac{25}{441}}$

12. $\pm\sqrt{361}$

ALGEBRA Solve each equation. Check your solution(s).

13. $h^2 = 121$

14. $324 = a^2$

15. $x^2 = \frac{81}{169}$

16. $0.0196 = m^2$

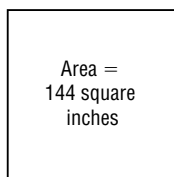
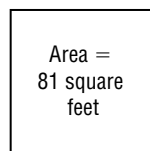
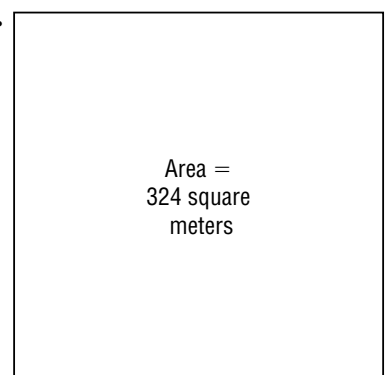
17. $\sqrt{y} = 6$

18. $\sqrt{z} = 8.4$

19. GARDENING Moesha has 196 pepper plants that she wants to plant in square formation. How many pepper plants should she plant in each row?

20. RESTAURANTS A new restaurant has ordered 64 tables for its outdoor patio. If the manager arranges the tables in a square formation, how many will be in each row?

GEOMETRY The formula for the perimeter of a square is $P = 4s$, where s is the length of a side. Find the perimeter of each square.

21.**22.****23.**

3-2**Practice****7NS2.4*****Estimating Square Roots*****Estimate to the nearest whole number.**

1. $\sqrt{38}$

2. $\sqrt{53}$

3. $\sqrt{99}$

4. $\sqrt{227}$

5. $\sqrt{8.5}$

6. $\sqrt{35.1}$

7. $\sqrt{67.3}$

8. $\sqrt{103.6}$

9. $\sqrt{86.4}$

10. $\sqrt{45.2}$

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

12. $\sqrt{27\frac{3}{8}}$

Order from least to greatest.

13. 8, 10, $\sqrt{61}$, $\sqrt{73}$

14. $\sqrt{45}$, 9, 6, $\sqrt{63}$

15. $\sqrt{50}$, 7, $\sqrt{44}$, 5

ALGEBRA Estimate the solution of each equation to the nearest integer.

16. $d^2 = 61$

17. $z^2 = 85$

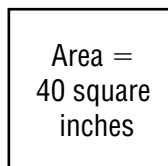
18. $r^2 = 3.7$

19. GEOMETRY The radius of a cylinder with volume V and height 10 centimeters is approximately $\sqrt{\frac{V}{30}}$. If a can that is 10 centimeters tall has a volume of 900 cubic centimeters, estimate its radius.

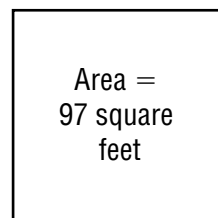
20. TRAVEL The formula $s = \sqrt{18d}$ can be used to find the speed s of a car in miles per hour when the car needs d feet to come to a complete stop after slamming on the brakes. If it took a car 12 feet to come to a complete stop after slamming on the brakes, estimate the speed of the car.

GEOMETRY The formula for the area of a square is $A = s^2$, where s is the length of a side. Estimate the length of a side for each square.

21.



22.



3-3**Practice****7MR2.5, 7NS1.2*****Problem Solving Investigation: Use a Venn Diagram*****Mixed Problem Solving****Use a Venn diagram to solve Exercises 1 and 2.**

- 1. SPORTS** Of the 25 baseball players on the Baltimore Orioles 2005 roster, 17 threw right handed, 12 were over 30 years old, and 9 both threw right handed and were over 30 years old. How many players on the team neither threw right handed nor were over 30 years old?
- 2. GRADES** The principal noticed that 45 students earned As in English, 49 students earned As in math, and 53 students earned As in science. Of those who earned As in exactly two of the subjects, 8 earned As in English and math, 12 earned As in English and science, and 18 earned As in math and science. Seventeen earned As in all three subjects. How many earned As in English only?

Use any strategy to solve Exercises 3 and 4. Some strategies are shown below.**PROBLEM-SOLVING STRATEGIES**

- Use the four-step plan.
- Look for a pattern.
- Use a Venn diagram.

- 3. NUMBERS** What are the next two numbers in the pattern?

486, 162, 54, 18, ____, ____

- 4. GEOGRAPHY** Of the 50 U.S. states, 30 states border a major body of water and 14 states border a foreign country. Seven states border both a major body of water and a foreign country. How many states border on just a major body of water and how many border on just a foreign country?

Select the Operation**For Exercises 5 and 6, select an appropriate operation to solve the problem. Justify your solution and solve the problem.**

- 5. LANDSCAPING** Three different landscaping companies treat lawns for weeds. Company A charges \$35 per treatment and requires 3 treatments to get rid of weeds. Company B charges \$30 per treatment and requires 4 treatments. Company C charges \$50 per treatment and requires only two treatments to eliminate weeds. If you want to use the company that charges the least, which company should you choose?
- 6. RECEIVING** Marc unloaded 7,200 bottles of water from delivery trucks today. If each truck contained 50 cases and each case contained 24 bottles of water, how many trucks did he unload?

3-4 Practice**7NS1.4*****The Real Number System*****Name all sets of numbers to which the real number belongs.**

1. -9

2. $\sqrt{144}$

3. $\sqrt{35}$

4. $\frac{8}{11}$

5. 9.55

6. $5.\bar{3}$

7. $\frac{20}{5}$

8. $-\sqrt{44}$

Estimate each square root to the nearest tenth. Then graph the square root on a number line.

9. $\sqrt{7}$

10. $\sqrt{19}$

11. $-\sqrt{33}$

Replace each $\bullet$ with $<$, $>$, or $=$ to make a true sentence.

12. $\sqrt{8} \bullet 2.7$

13. $\sqrt{15} \bullet 3.9$

14. $5\frac{2}{5} \bullet \sqrt{30}$

15. $2\frac{3}{10} \bullet \sqrt{5.29}$

16. $\sqrt{9.8} \bullet 3.\bar{1}$

17. $8.\bar{2} \bullet 8\frac{2}{9}$

Order each set of numbers from least to greatest.

18. $\sqrt{10}, \sqrt{8}, 2.75, 2.\bar{8}$

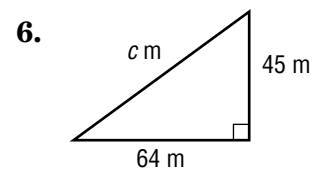
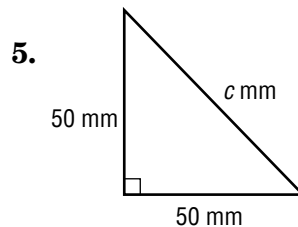
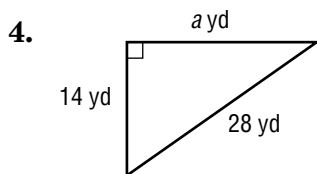
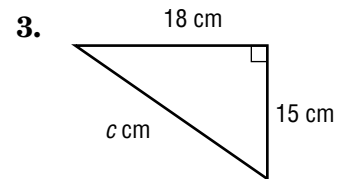
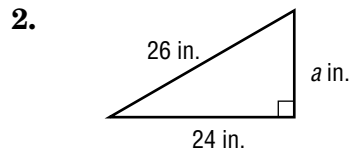
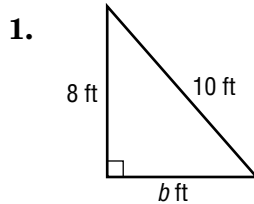
19. $5.01, 5.0\bar{1}, 5.\bar{01}, \sqrt{26}$

20. $-\sqrt{12}, \sqrt{13}, -3.5, 3.5$

21. ALGEBRA The *geometric mean* of two numbers a and b is $\sqrt{ab}$. Find the geometric mean of 32 and 50.**22. ART** The area of a square painting is 600 square inches. To the nearest hundredth inch, what is the perimeter of the painting?

3-5 Practice**7MG3.3, 7MR3.2*****The Pythagorean Theorem***

Write an equation you could use to find the length of the missing side of each right triangle. Then find the missing length. Round to the nearest tenth if necessary.



7. a , 65 cm; c , 95 cm

8. a , 16 yd; b , 22 yd

Determine whether each triangle with sides of given lengths is a right triangle.

9. 18 ft, 23 ft, 29 ft

10. 7 yd, 24 yd, 25 yd

11. The hypotenuse of a right triangle is 15 inches, and one of its legs is 11 inches. Find the length of the other leg.

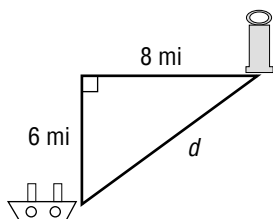
12. A leg of a right triangle is 30 meters long, and the hypotenuse is 35 meters long. What is the length of the other leg?

13. **TELEVISIONS** The diagonal of a 27-inch television measures 27 inches. If the width of a 27-inch television is 22 inches, calculate its height to the nearest inch.

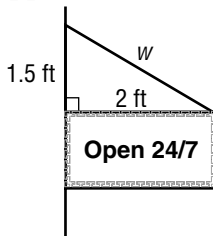
3-6 Practice**7MG3.3****Using the Pythagorean Theorem**

Write an equation that can be used to answer the question. Then solve. Round to the nearest tenth if necessary.

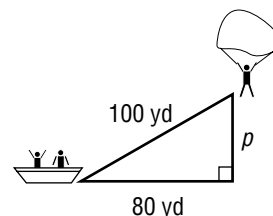
1. How far is the ship from the lighthouse?



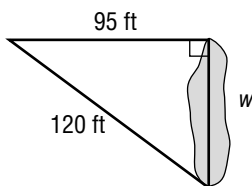
2. How long is the wire supporting the sign?



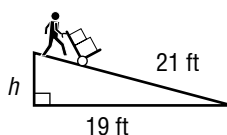
3. How far above the water is the person parasailing?



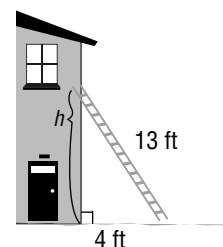
4. How wide is the pond?



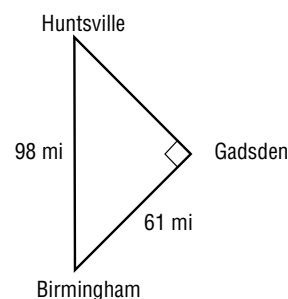
5. How high is the ramp?



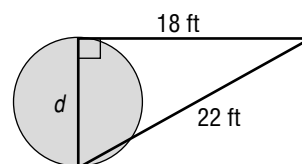
6. How high is the end of the ladder against the building?

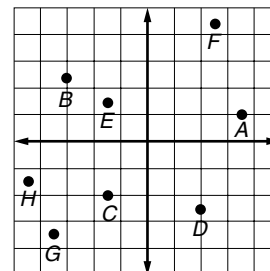


7. **GEOGRAPHY** Suppose Birmingham, Huntsville, and Gadsden, Alabama, form a right triangle. What is the distance from Huntsville to Gadsden? Round to the nearest tenth if necessary.



8. **GEOMETRY** Find the diameter d of the circle in the figure at the right. Round to the nearest tenth if necessary.



3-7**Practice****7MG3.2*****Distance on the Coordinate Plane*****Name the ordered pair for each point.**1. *A*2. *B*3. *C*4. *D*5. *E*6. *F*7. *G*8. *H***Graph and label each point.**

9. $J\left(2\frac{1}{4}, \frac{1}{2}\right)$

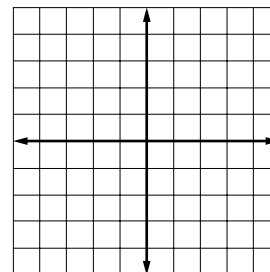
10. $K\left(3, -1\frac{2}{3}\right)$

11. $M\left(-3\frac{3}{4}, 4\frac{1}{4}\right)$

12. $N\left(-3\frac{2}{5}, -2\frac{3}{5}\right)$

13. $P(-2.1, 1.8)$

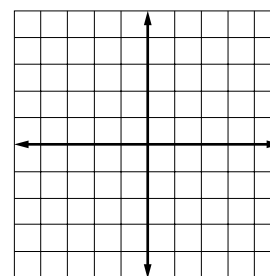
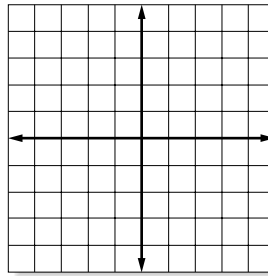
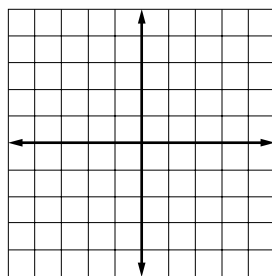
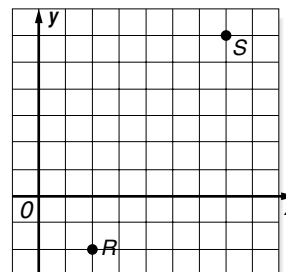
14. $Q(1.75, -3.5)$

**Graph each pair of ordered pairs. Then find the distance between the points. Round to the nearest tenth if necessary.**

15. $(4, 3), (1, -1)$

16. $(3, 2), (0, -4)$

17. $(-4, 3.5), (2, 1.5)$

18. Find the distance between points *R* and *S* shown at the right. Round to the nearest tenth.19. **GEOMETRY** If one point is located at $(-6, 2)$ and another point is located at $(6, -3)$, find the distance between the points.

4-1 Practice**7AF4.2, 7MG1.3*****Ratios and Rates*****Express each ratio in simplest form.**

1. 32 out of 200 adults like opera
2. 20 picked out of 65 who tried out
3. 48 robins to 21 blackbirds seen
4. 10 rock musicians to 22 classical musicians in the concert
5. 2 feet long to 64 inches wide
6. 45 millimeters out of 10 centimeters
7. 10 ounces sugar for 1 pound apples
8. 2 quarts out of 4 gallons leaked out

Express each rate as a unit rate.

9. 110 inches of snow in 8 days
10. 38 feet in 25 seconds
11. 594 cars crossing the bridge in 3 hours
12. 366 miles on 12 gallons
13. **SHOPPING** An 8-ounce box of Crispy Crackers costs \$1.59 and a 2-pound box costs \$6.79. Which box is the better buy? Explain your reasoning.

14. **ANIMALS** Which animal listed in the table consumes the least amount of food compared to its body weight? Explain your reasoning.

Animal	Body Weight (lb)	Amount of Food per Day (lb)
African Elephant	12,000	500
Blue Whale	286,000	8,000
Koala	22	2
Komodo Dragon	300	240

Source: Scholastic Book of World Records

4-2**Practice**

7AF3.4

Proportional and Nonproportional Relationships

For Exercises 1–3, use a table of values to explain your reasoning.

- 1. ANIMALS** The world's fastest fish, a sailfish, swims at a rate of 69 miles per hour. Is the distance a sailfish swims proportional to the number of hours it swims?

FOSSILS For Exercises 2 and 3, use the following information.

In July, a paleontologist found 368 fossils at a dig. In August, she found about 14 fossils per day.

- 2.** Is the number of fossils the paleontologist found in August proportional to the number of days she spent looking for fossils that month?
- 3.** Is the total number of fossils found during July and August proportional to the number of days the paleontologist spent looking for fossils in August?

4-3**Practice****7AF4.2*****Solving Proportions*****Solve each proportion.**

1. $\frac{b}{5} = \frac{8}{16}$

2. $\frac{18}{x} = \frac{6}{10}$

3. $\frac{t}{5} = \frac{12}{80}$

4. $\frac{11}{10} = \frac{n}{14}$

5. $\frac{2.5}{35} = \frac{2}{d}$

6. $\frac{3.5}{18} = \frac{z}{36}$

7. $\frac{0.45}{4.2} = \frac{p}{14}$

8. $\frac{2.4}{6} = \frac{2.8}{s}$

9. $\frac{3.6}{k} = \frac{0.2}{0.5}$

- 10. CLASSES** For every girl taking classes at the martial arts school, there are 3 boys who are taking classes at the school. If there are 236 students taking classes, write and solve a proportion to predict the number of boys taking classes at the school.
- 11. BICYCLES** An assembly line worker at Rob's Bicycle factory adds a seat to a bicycle at a rate of 2 seats in 11 minutes. Write an equation relating the number of seats s to the number of minutes m . At this rate, how long will it take to add 16 seats? 19 seats?
- 12. PAINTING** Lisa is painting a fence that is 26 feet long and 7 feet tall. A gallon of paint will cover 350 square feet. Write and solve a proportion to determine how many gallons of paint Lisa will need.

4-4**Practice****7MR2.5, 7AF4.2****Problem-Solving Investigation: Draw a Diagram****Mixed Problem Solving**

Use the **draw a diagram** strategy to solve Exercises 1 and 2.

- 1. SWIMMING** Jon is separating the width of the swimming pool into equal-sized lanes with rope. It took him 30 minutes to create 6 equal-sized lanes. How long would it take him to create 4 equal-sized lanes in a similar swimming pool?

- 2. TRAVEL** Two planes are flying from San Francisco to Chicago, a distance of 1,800 miles. They leave San Francisco at the same time. After 30 minutes, one plane has traveled 25 more miles than the other plane. How much longer will it take the slower plane to get to Chicago than the faster plane if the faster plane is traveling at 500 miles per hour?

Use any strategy to solve Exercises 3 and 4. Some strategies are shown below.

PROBLEM-SOLVING STRATEGIES

- Use the four-step plan.
- Look for a pattern.
- Use a Venn diagram.
- Draw a diagram.

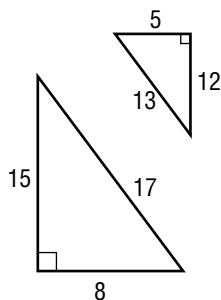
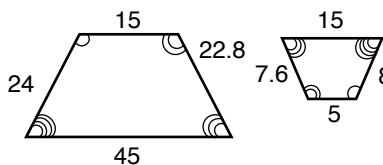
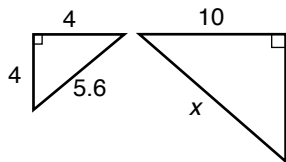
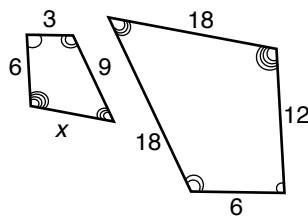
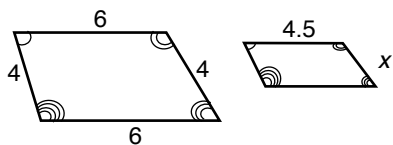
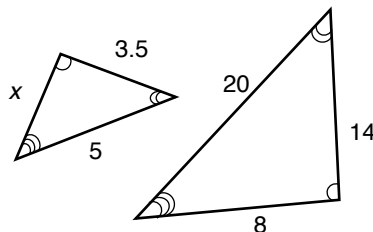
- 3. TALENT SHOW** In a solo singing and piano playing show, 18 people sang and 14 played piano. Six people both sang and played piano. How many people were in the singing and piano playing show?

- 4. LETTERS** Suppose you have three strips of paper as shown. How many capital letters of the alphabet could you form using one or more of these three strips for each letter? List them according to the number of strips.

**Select the Operation**

For Exercises 5 and 6, select the appropriate operation(s) to solve the problem. Justify your selection(s) and solve the problem.

- 5. CLOTHING** A store has 255 wool ponchos to sell. There are 112 adult-sized ponchos that sell for \$45 each. The rest are kid-sized and sell for \$32 each. If the store sells all the ponchos, how much money will the store receive?
- 6. DINOSAURS** Brad made a model of a *Stegosaurus*. If you multiply the model's length by 8 and subtract 4, you will find the length of an average *Stegosaurus*. If the actual *Stegosaurus* is 30 ft long, how long is Brad's model.

4-5 Practice**6NS1.3****Similar Polygons****Determine whether each pair of polygons is similar. Explain.****1.****2.****Each pair of polygons is similar. Write and solve a proportion to find each missing measure.****3.****4.****5.****6.**

- 7. TILES** A blue rectangular tile and a red rectangular tile are similar. The blue tile has a length of 10 inches and a perimeter of 30 inches. The red tile has a length of 6 inches. What is the perimeter of the red tile?

4-6**Practice****7MG1.1****Converting Measures****Complete each conversion.**

1. 42 in. = ■ ft

2. 1,475 mL = ■ L

3. 0.45 kg = ■ g

4. $1\frac{1}{2}$ hr = ■ sec

5. 20 pt = ■ gal

6. 7,450 mg = ■ g

7. $2\frac{3}{4}$ mi = ■ ft

8. 3 gal = ■ c

9. 850 cm = ■ m

10. 228 oz = ■ lb

11. 2,300 lb = ■ T

12. 58 yd = ■ ft

13. 2 weeks = ■ hr

14. 4,500 L = ■ kL

Complete each conversion. Round to the nearest hundredth if necessary.

15. 4.5 L $\approx$ ■ gal

16. 460 g $\approx$ ■ oz

17. 100 mi $\approx$ ■ km

18. 12 yd $\approx$ ■ m

19. 25 kg $\approx$ ■ lb

20. 15 cm $\approx$ ■ in.

21. $9\frac{1}{4}$ fl oz $\approx$ ■ mL

22. 18.75 oz $\approx$ ■ g

23. 2,640 g $\approx$ ■ lb

24. 4 c $\approx$ ■ mL

25. 0.65 lb $\approx$ ■ kg

26. $\frac{3}{4}$ m $\approx$ ■ ft

27. 22 gal/day $\approx$ ■ mL/min

28. 23 km/hr $\approx$ ■ yd/sec

29. CHEETAHS The top speed of a cheetah is about 70 miles per hour. At this speed, how many meters will a cheetah travel in 1 second?

4-7**Practice****7MG1.1, 7MG2.4*****Converting Square and Cubic Units of Measure*****Complete each conversion. Round to the nearest hundredth.**

1. $56 \text{ in}^2 = \blacksquare \text{ ft}^2$
2. $172 \text{ cm}^2 = \blacksquare \text{ m}^2$
3. $7.4 \text{ km}^2 = \blacksquare \text{ m}^2$
4. $438 \text{ ft}^2 = \blacksquare \text{ yd}^2$
5. $3 \text{ yd}^2 = \blacksquare \text{ in}^2$
6. $3.5 \text{ ft}^2 = \blacksquare \text{ in}^2$
7. $0.0\bar{3} \text{ mi}^2 = \blacksquare \text{ yd}^2$
8. $51,000 \text{ cm}^3 = \blacksquare \text{ m}^3$
9. $2.2 \text{ yd}^3 = \blacksquare \text{ ft}^3$
10. $23,457 \text{ mm}^3 = \blacksquare \text{ cm}^3$
11. $48.7 \text{ in}^3 = \blacksquare \text{ ft}^3$
12. $0.00629 \text{ m}^3 = \blacksquare \text{ mm}^3$
13. $0.034 \text{ km}^3 = \blacksquare \text{ m}^3$
14. $5,000,000 \text{ in}^3 = \blacksquare \text{ yd}^3$

Complete each conversion. Round to the nearest hundredth.

15. $2 \text{ mi}^2 \approx \blacksquare \text{ km}^2$
16. $5 \text{ in}^2 \approx \blacksquare \text{ cm}^2$
17. $6 \text{ yd}^2 \approx \blacksquare \text{ m}^2$
18. $0.743 \text{ m}^2 \approx \blacksquare \text{ ft}^2$
19. $352.66 \text{ mm}^2 \approx \blacksquare \text{ in}^2$
20. $2.59 \text{ km}^2 \approx \blacksquare \text{ mi}^2$
21. $52 \text{ cm}^2 \approx \blacksquare \text{ in}^2$
22. $360 \text{ m}^2 \approx \blacksquare \text{ yd}^2$
23. $0.12 \text{ ft}^3 \approx \blacksquare \text{ cm}^3$
24. $749 \text{ cm}^3 \approx \blacksquare \text{ in}^3$
25. $37.89 \text{ m}^3 \approx \blacksquare \text{ ft}^3$
26. $0.75 \text{ yd}^3 \approx \blacksquare \text{ m}^3$
27. $0.012 \text{ yd}^3 \approx \blacksquare \text{ cm}^3$
28. $829.15 \text{ cm}^3 \approx \blacksquare \text{ ft}^3$
29. $1,000 \text{ in}^3 \approx \blacksquare \text{ cm}^3$
30. $423 \text{ ft}^3 \approx \blacksquare \text{ m}^3$

4-8**Practice****7MG1.2****Scale Drawings and Models**

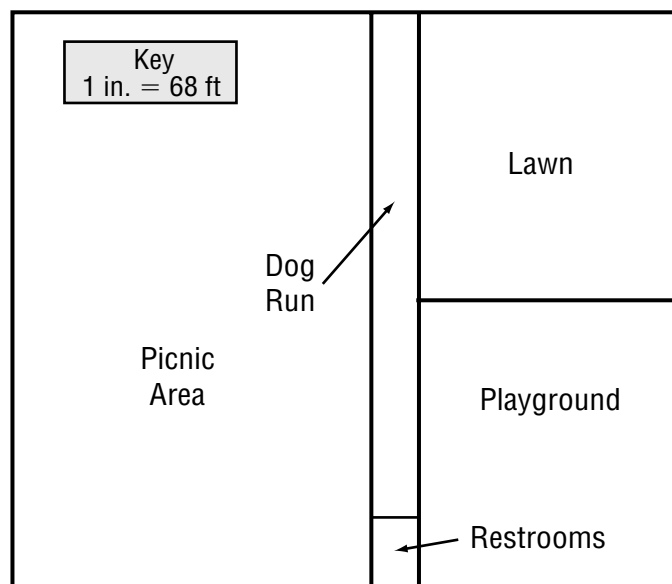
LANDSCAPE PLANS For Exercises 1–4, use the drawing and an inch ruler to find the actual length and width of each section of the park.
Measure to the nearest eighth of an inch.

1. Playground

2. Restrooms

3. Picnic Area

4. What is the scale factor of the park plan? Explain its meaning.



5. SPIDERS The smallest spider, the *Patu marples* of Samoa, is 0.43 millimeter long. A scale model of this spider is 8 centimeters long. What is the scale of the model? What is the scale factor of the model?

6. ANIMALS An average adult giraffe is 18 feet tall. A newborn giraffe is about 6 feet tall. Kayla is building a model of a mother giraffe and her newborn. She wants the model to be no more than 17 inches high. Choose an appropriate scale for a model of the giraffes. Then use it to find the height of the mother and the height of the newborn giraffe.

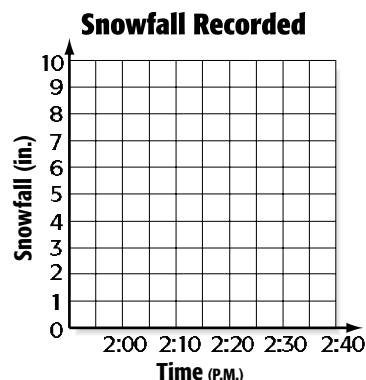
7. TRAVEL On a map, the distance between Charleston and Columbia, South Carolina, is 5 inches. If the scale of the map is $\frac{7}{8}$ inch = 20 miles, about how long would it take the Garcia family to drive from Charleston to Columbia if they drove 60 miles per hour?

4-9 Practice**7AF3.4****Rate of Change****SNOWFALL** For Exercises 1–3, use the following information.

The amount of snow that fell during five time periods is shown in the table.

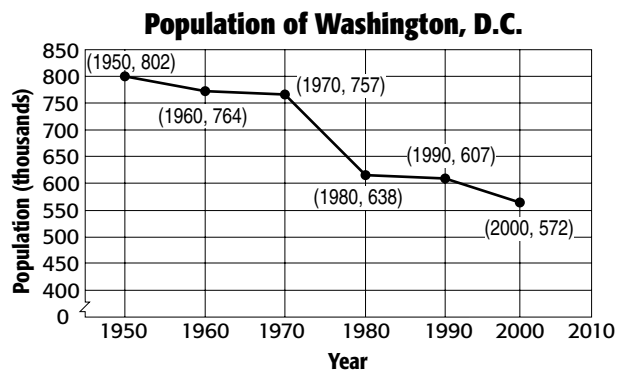
Time (P.M.)	2:00	2:10	2:20	2:30	2:40
Snowfall (in.)	3.8	5.1	5.5	7.8	8.3

- Find the rate of change in inches of snow that fell per minute between 2:00 P.M. and 2:10 P.M.
- Find the rate of change in inches of snow that fell per minute between 2:30 P.M. and 2:40 P.M.
- Make a graph of the data. During which time period did the rate of snowfall increase the greatest? Explain your reasoning.

**POPULATION** For Exercises 4–7, use the the information below and at the right.

The graph shows the population of Washington, D.C., every ten years from 1950 to 2000.

- Find the rate of change in population between 1950 and 1970.
- Between which two 10-year periods did the population decrease at the fastest rate?
- Find the rate of change in population between 1950 and 2000.



Source: U.S. Census Bureau

- If the rate of change in population between 1950 and 2000 were to continue, what would you expect the population to be in 2010? Explain your reasoning.

4-10 Practice

7AF3.4

Constant Rate of Change

Determine whether the relationship between the two quantities described in each table is linear. If so, find the constant rate of change. If not, explain your reasoning.

1. Fabric Needed for Costumes

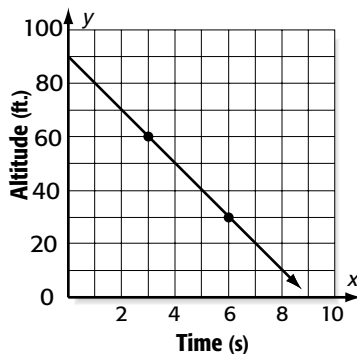
2. Distance Traveled on Bike Trip

Number of Costumes	2	4	6	8
Fabric (yd)	7	14	21	28

Day	1	2	3	4
Distance (mi)	21.8	43.6	68.8	90.6

For Exercises 3 and 4, refer to the graphs below.

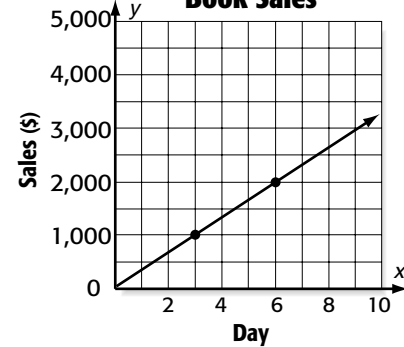
3. Hawk Diving Toward Prey



- Find the constant rate of change and interpret its meaning.
- Determine whether a proportional linear relationship exists between the two quantities shown in the graph. Explain your reasoning.

4.

Book Sales



- Find the constant rate of change and interpret its meaning.
- Determine whether a proportional linear relationship exists between the two quantities shown in the graph. Explain your reasoning.

5-1**Practice****7NS1.3*****Ratios and Percents*****Write each ratio or fraction as a percent.**

1. 47 out of 100 2. 115 per of 100 3. $\frac{33}{50}$ 4. $\frac{11}{25}$
5. 9 out of 20 6. 85 out of 500 7. 3:5 8. 3:10

Write each percent as a fraction in simplest form.

9. 19% 10. 53% 11. 30% 12. 80%
13. 55% 14. 48% 15. 84% 16. 95%
17. **GOVERNMENT** Two out of 100 U.S. Senators are from Utah. Write this ratio as a percent.
18. **ARCHITECTURE** Four out of the world's 25 tallest buildings are located in Hong Kong. Write this ratio as a percent.
19. **POPULATION** According to a recent census, the population of Montana is about 0.3% of the United States population. Write this percent as a fraction in simplest form.
20. **REASONING** Which is greatest: $\frac{3}{4}$, 19:25, or 74%? Explain your reasoning.
21. **GEOGRAPHY** Five of the 50 U.S. states border the Pacific Ocean. What percent of the U.S. states border the Pacific Ocean?

5-2 Practice

7NS1.1, 7NS1.3

Comparing Fractions, Decimals, and Percents**Write each percent as a decimal.**

1. 70%

2. 40%

3. 135%

4. 369%

5. 0.9%

6. 52.5%

7. 8%

8. 3%

Write each decimal as a percent.

9. 0.73

10. 0.84

11. 0.375

12. 0.232

13. 0.005

14. 0.008

15. 4.11

16. 3.52

Write each fraction as a percent.

17. $\frac{13}{25}$

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

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

20. $\frac{9}{5}$

21. $\frac{3}{40}$

22. $\frac{7}{125}$

23. $\frac{5}{9}$

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

Order each set of numbers from least to greatest.

25. $\frac{2}{5}$, 0.5, 4%, $\frac{3}{10}$

26. 0.6, 6%, $\frac{3}{20}$, $\frac{4}{25}$

27. 93%, 0.96, $\frac{47}{50}$, $\frac{19}{20}$

28. 77%, $\frac{3}{4}$, $\frac{19}{25}$, 0.73

Replace $\bullet$ with $<$, $>$, or $=$ to make a true statement.

29. $\frac{1}{200} \bullet \frac{1}{2}\%$

30. $2.24 \bullet 2\frac{2}{5}\%$

31. $\frac{7}{8} \bullet \frac{7}{8}\%$

32. TEST SCORES On a science test, Ali answered 38 of the 40 questions correctly, Jamar answered $\frac{9}{10}$ of the questions correctly, and Paco answered 92.5% of the questions correctly. Write Ali's and Jamar's scores as percents and list the students in order from the least to the highest score.

5-3**Practice****7NS1.3*****Algebra: The Percent Proportion***

Write a percent proportion and solve each problem. Round to the nearest tenth if necessary.

1. 6 is what percent of 24?
2. 125 is what percent of 375?
3. What is 20% of 80?
4. What is 14% of 440?
5. 28 is 35% of what number?
6. 63 is 63% of what number?
7. 16.24 is what percent of 14?
8. Find 350% of 49.
9. What percent of 120 is 24?
10. What percent of 84 is 6?
11. What is 7.5% of 225?
12. 9 is what percent of 660?
13. 110 is 21.1% of what number?
14. Find 6.4% of 72.
15. What percent of 160 is 1?
16. 83 is 12.5% of what number?
17. **GAMES** Before discarding, Carolee has 4 green cards, 3 red cards, 3 orange cards, and 1 gold card. If she discards the gold card, what percent of her remaining cards are red?

5-4**Practice****7NS1.3*****Finding Percents Mentally*****Compute mentally.**

1. 50% of 72
2. 25% of 60
3. $12\frac{1}{2}\%$ of 88
4. $33\frac{1}{3}\%$ of 84
5. 60% of 25
6. 20% of 150
7. $37\frac{1}{2}\%$ of 80
8. $83\frac{1}{3}\%$ of 120
9. 10% of 85
10. 10% of 149
11. 1% of 99
12. 1% of 78.2
13. 4% of 110
14. 6% of 310
15. 10% of 15.5
16. 10% of 18.4

Replace each ● with <, >, or = to make a true statement.

17. $62\frac{1}{2}\%$ of 40 ● 40% of 60
18. 10% of 85 ● 1% of 850

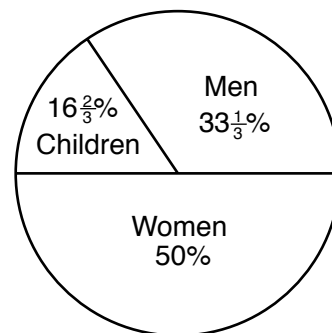
19. **POPULATION** The state of New York has a population of about 20,000,000 people. About 25% of the population of New York is under 18 years old. How many people in New York are under 18 years old?

20. **LIVESTOCK** In 2004, there were about 60,000,000 pigs and hogs in the United States. About 10% of the pigs and hogs were in Minnesota. How many pigs and hogs were in Minnesota in 2004?

MUSEUMS For Exercises 21–23, use the following information.

The graph shows the percents of men, women, and children visiting a modern art exhibit at a local museum. Suppose 600 people visited the exhibit.

21. How many men visited the exhibit?
22. How many women visited the exhibit?
23. How many children visited the exhibit?

Museum Visitors

5-5 Practice

7MR3.1, 7NS1.3

Problem-Solving Investigation: Reasonable Answers**Mixed Problem Solving**

Use the reasonable answer strategy to solve Exercises 1 and 2.

- 1. POPULATION** About 9.5% of the population of New Mexico is Native American. If the population of New Mexico is 1,874,614, would the number of Native Americans living in New Mexico be about 180,000, 360,000, or 900,000?
- 2. HOMES** Mr. and Mrs. Whatley want to buy a new home for \$245,000. The bank requires 20% of the price of the home as a down payment for the loan. Should the Whatleys plan to pay \$5,000, \$25,000, or \$50,000 as the down payment?

Use any strategy to solve Exercises 3 and 4. Some strategies are shown below.

PROBLEM-SOLVING STRATEGIES

- Use the four-step plan.
- Work backward.
- Look for a pattern.
- Use reasonable answers.

- 3. SPORTS** Three teams participating in a track meet have 25 members, 29 members, and 33 members. The coach of the hosting team wants to have three bottles of water for each athlete. If each case of water contains 24 bottles, should the coach buy 4, 12, or 20 cases of water?

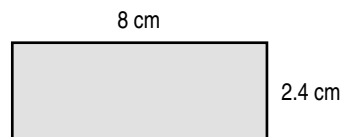
- 4. MONEY** After Latoya gave 35% of her allowance to her brother and 25% of her allowance to her sister, she had \$12 left. How much was Latoya's allowance?

Select the Operation

For Exercises 5 and 6, select the appropriate operation(s) to solve the problem. Justify your solution(s) and solve the problem.

- 5. ELECTIONS** A county with 31,500 registered voters is buying new voting machines. State law requires that the county have one polling place for every 750 registered voters and 4 voting machines per polling place. How many new voting machines should the county order?

- 6. GEOMETRY** Brandon is drawing a rectangle similar to the one below except that each side of his rectangle is $2\frac{1}{2}$ times longer. Find the area of Brandon's rectangle.



5-6**Practice****7NS1.3*****Percent and Estimation*****Estimate.**

1. 39% of 80 2. 66% of 72 3. 40% of 89 4. 75% of 35
5. 19% of 79 6. 72% of 51 7. 53% of 199 8. 23% of 162
9. 48.5% of 151 10. 76.5% of 303 11. 148% of 69 12. 226% of 81

Estimate each percent.

13. 8 out of 37 14. 4 out of 19 15. 10 out of 21 16. 29 out of 90
17. 7 out of 9 18. 29 out of 40 19. 9 out of 31 20. 11 out of 59

- 21. ANALYZE TABLES** The table gives the land area of one county in each state and the land area of the entire state. Estimate the percent of the land area of each state that is in the county. Then determine which county has the greatest percent of its state's land area. Round to the nearest tenth if necessary.

County	Land Area of County (square miles)	Land Area of Entire State (square miles)
Kent County, MD	279	9,774
Marion County, SC	489	30,109
Newport County, RI	104	1,045

Source: U.S. Census Bureau

5-7**Practice****7NS1.3, 7NS1.7*****Algebra: The Percent Equation*****Solve each problem using a percent equation.**

1. Find 80% of 40.
2. What is 30% of 70?
3. What percent of 80 is 32?
4. 36 is what percent of 120?
5. 35% of what number is 84?
6. 95 is 50% of what number?
7. What number is 18% of 72?
8. Find 32% of 96.
9. 8 is what percent of 4,000?
10. What percent of 6,000 is 15?
11. 4% of what number is 7?
12. 85 is 10% of what number?
13. Find $3\frac{1}{2}\%$ of 250.
14. What is $7\frac{1}{4}\%$ of 56?
15. 560 is what percent of 420?
16. $2\frac{1}{5}\%$ of what number is 44?
17. **VIDEO GAMES** A video game costs \$55. If 7.5% sales tax is added, what is the total cost of the video game?
18. **FOOTBALL** In the 2006 Super Bowl, Pittsburgh and Seattle each scored 7 points in the 4th quarter. Which team scored the higher percentage of their final score in the 4th quarter?

2006 Super Bowl

Team	Final Score
Pittsburgh	21
Seattle	10

Source: abcnews.com

5-8 Practice

7NS1.6, 7NS1.7

Percent of Change

Find each percent of change. Round to the nearest tenth if necessary. State whether the percent of change is an *increase* or a *decrease*.

- | | | |
|---|--|---------------------------------------|
| 1. original: 8 points
new: 10 points | 2. original: 45 inches
new: 48 inches | 3. original: \$60
new: \$48 |
| 4. original: \$750
new: \$690 | 5. original: 25 miles
new: 36 miles | 6. original: 12 fouls
new: 8 fouls |

Find the selling price for each item given the cost to the store and the percent of markup.

- | | |
|-------------------------------|----------------------------------|
| 7. backpack: \$14, 40% markup | 8. soccer ball: \$22, 35% markup |
| 9. music CD: \$9, 45% markup | 10. sweatshirt: \$27, 20% markup |

Find the sale price of each item to the nearest cent.

- | | |
|-----------------------------|-------------------------------|
| 11. book: \$29, 25% off | 12. sofa: \$975, 30% off |
| 13. jeans: \$34.95, 40% off | 14. stereo: \$459.99, 15% off |

Find each percent of change. Round to the nearest tenth if necessary.

15. What is the percent of markup on a \$120 cell phone that sells for \$149?
16. Find the percent of markup on a \$50 pair of shoes that sells for \$60.
17. Find the percent of discount on a \$45 jacket that regularly sells for \$75.
18. What is the percent of discount on a \$290 television that regularly sells for \$349?

5-9**Practice****7NS1.7*****Simple Interest*****Find the simple interest to the nearest cent.**

1. \$350 at 5% for 4 years
2. \$750 at 6.5% for 3 years
3. \$925 at 4.75% for 3 months
4. \$2,050 at 7.65% for 36 months
5. \$1,000 at $5\frac{1}{2}\%$ for 18 months
6. \$8,500 at $10\frac{3}{8}\%$ for $2\frac{1}{2}$ years

Find the total amount in each account to the nearest cent, assuming simple interest.

7. \$1,500 at 6% for 5 years
8. \$4,010 at 5.2% for 4 years
9. \$925 at 7.25% for 6 months
10. \$850 at 8.38% for 8 months
11. \$16,000 at $3\frac{1}{4}\%$ for 42 months
12. \$3,200 at $6\frac{2}{3}\%$ for $5\frac{1}{2}$ years
13. **COINS** The value of a rare coin increased in value from \$350 to \$420 in only 6 months. Find the simple interest rate for the value of the coin.
14. **HOUSING** Mrs. Landry bought a house for \$35,000 in 1975. She sold the house for \$161,000 in 2005. Find the simple interest rate for the value of the house.
15. **CARS** Brent's older brother took out a 4-year loan for \$16,000 to buy a car. If the simple interest rate was 8%, how much total will he pay for the car including interest?
16. **MORTGAGE** The Fongs need to borrow \$200,000 to purchase a home. A local bank is offering a 20-year mortgage at 6.75% interest, while an online lender is offering a 30-year mortgage at 5.25% interest. Assuming simple interest, which loan will result in the lower interest?

6-2**Practice****7MRI.2, 7NSI.3****Problem-Solving Investigation: Use Logical Reasoning****Mixed Problem Solving**

For Exercises 1 and 2, solve each problem using logical reasoning.

- 1. NUMBER SENSE** Simplify each product of powers. Then use logical reasoning to simplify $10^4 \times 0.1^4$, $10^5 \times 0.1^5$, and $10^{12} \times 0.1^{12}$.

Product of Powers	Simplified Form
$10^2 \times 0.1^2$	
$10^3 \times 0.1^3$	
$10^7 \times 0.1^7$	

- 2. MEASUREMENT** You have a pen that is 6 inches long and a pencil that is 7 inches long. Explain how you can use the pen and pencil to draw a line segment that is 3 inches long.

Use any strategy to solve Exercises 3 and 4. Some strategies are shown below.

PROBLEM-SOLVING STRATEGIES

- Use the four-step plan.
- Look for a pattern.
- Draw a diagram.
- Use logical reasoning.

- 3. SPORTS** At the end of a baseball game, the winning team had three more runs than their opponents. If they had scored 1 more run, they would have had twice as many as their opponents. How many runs did each team have?

- 4. SHOPPING** Brittany bought five items at the grocery store for her mother. From the given clues, list the items from least expensive to most expensive.

- The peanut butter cost less than the sliced turkey.
- The sliced turkey cost half as much as the birthday cake.
- The peanut butter cost \$0.20 more than the milk.
- The price of the lettuce was 40% of the price of the milk.

Select the Operation

For Exercises 5 and 6, select the appropriate operation(s) to solve the problem. Justify your solution(s) and solve the problem.

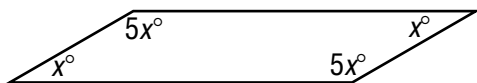
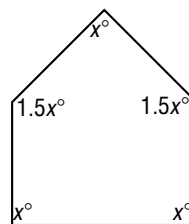
- 5. SOLAR SYSTEM** Jupiter is the largest planet in the solar system with a diameter of 88,736 miles. Saturn is the second largest planet with a diameter of 74,978 miles. How much greater is the diameter of Jupiter than the diameter of Saturn?
- 6. TRAVEL** Mr. Bradley often flies from Chicago to San Francisco and back again, a total distance of 3,716 miles. If he made this trip 25 times last year, find the total distance Mr. Bradley traveled on these trips.

6-3 Practice**7MR3.3, 7AF1.1****Polygons****Find the sum of the measures of the interior angles of each polygon.**

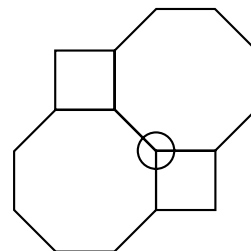
- | | | |
|-----------|-----------|-----------|
| 1. 13-gon | 2. 16-gon | 3. 17-gon |
| 4. 18-gon | 5. 20-gon | 6. 25-gon |

Find the measure of one interior angle in each regular polygon. Round to the nearest tenth if necessary.

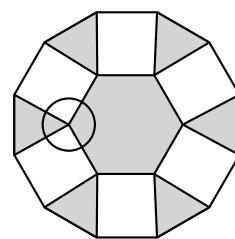
- | | | |
|-------------|------------|-----------|
| 7. pentagon | 8. hexagon | 9. 24-gon |
|-------------|------------|-----------|

ALGEBRA For Exercises 10 and 11, determine the angle measures in each polygon.**10.****11.**

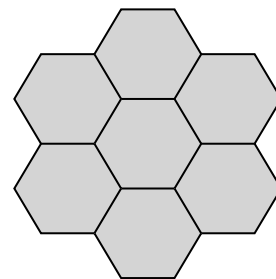
- 12. FLOORING** A floor is tiled with a pattern consisting of regular octagons and squares as shown. Find the measure of each angle at the circled vertex. Then find the sum of the angles.



- 13. ART** Jose is laying out a pattern for a stained glass window. So far he has placed the 13 regular polygons shown. Find the measure of each angle at the circled vertex. Then find the sum of the angles.

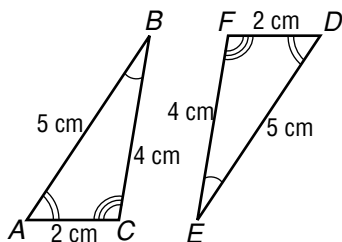
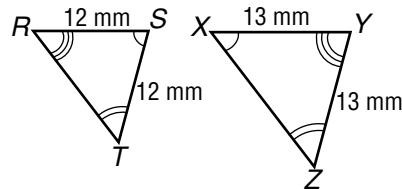
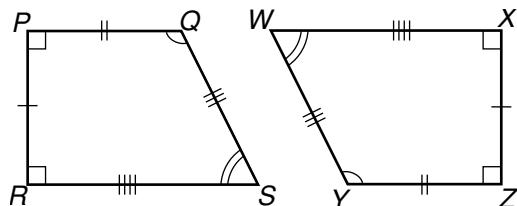
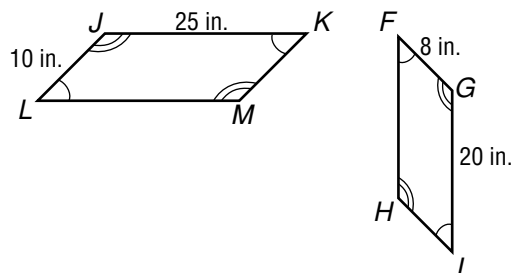


- 14. REASONING** Vanessa's mother made a quilt using a pattern of repeating regular hexagons as shown. Will Vanessa be able to make a similar quilt with a pattern of repeating regular pentagons? Explain your reasoning.



6-4 Practice**7MG3.4*****Congruent Polygons***

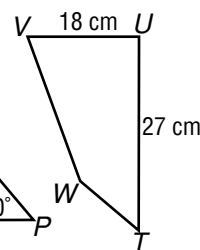
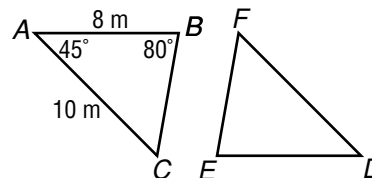
Determine whether the polygons are congruent. If so, name the corresponding parts and write a congruence statement.

1.**2.****3.****4.**

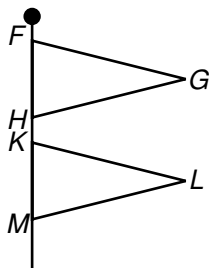
In the figure, $\triangle ABC \cong \triangle DEF$. Find each measure.

5. DF **6.** DE **7.** $m\angle D$ **8.** $m\angle E$

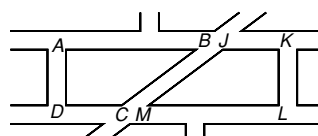
In the figure, quadrilateral $PQRS$ is congruent to quadrilateral $TUVW$. Find each measure.

9. PQ **10.** QR **11.** $m\angle U$ **12.** $m\angle V$ 

- 13. FLAGS** The two flags flying on the pole are in the shape of triangles. If $\triangle FGH \cong \triangle KLM$, $m\angle HFG = 80^\circ$, and $m\angle FHG = 80^\circ$, find $m\angle L$.



- 14. FLOORING** Tevin designed custom tiles for his shower as shown. The tiles are congruent quadrilaterals. Write a congruence statement. Then find $m\angle J$ if $m\angle A = 90^\circ$, $m\angle B = 60^\circ$, and $m\angle D = 90^\circ$.



6-5 Practice**7MG3.2****Symmetry****GEOMETRY** For Exercises 1–6, complete parts a and b for each figure.

- a. Determine whether the figure has line symmetry. If it does, draw all lines of symmetry. If not, write *none*.
- b. Determine whether the figure has rotational symmetry. Write *yes* or *no*. If *yes*, name its angle(s) of rotation.

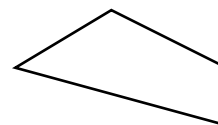
1.



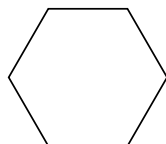
2.



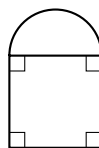
3.



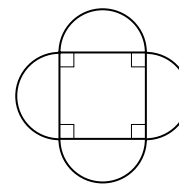
4.



5.



6.

**GREEK LETTERS** For Exercises 7 and 8, use the Greek letters below.

a. gamma

b. chi

c. psi

d. omega

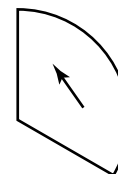
Γ

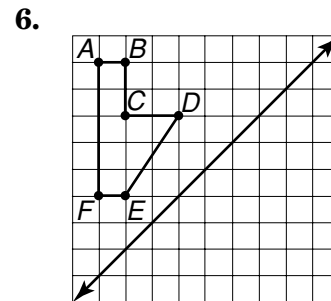
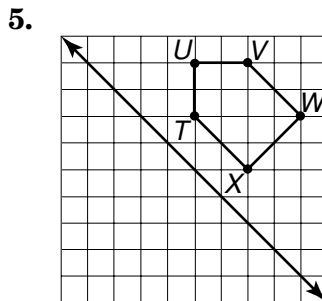
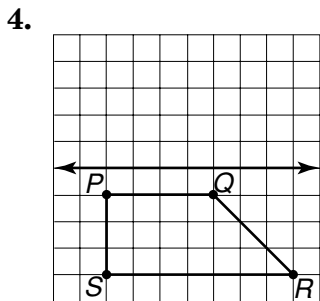
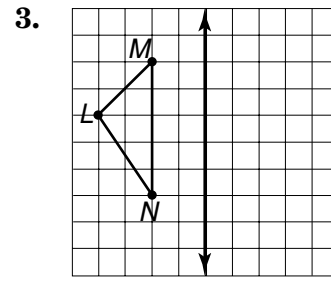
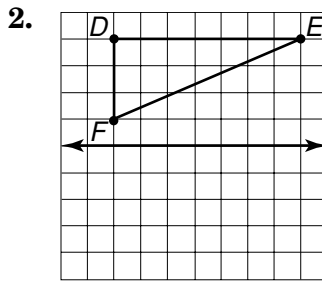
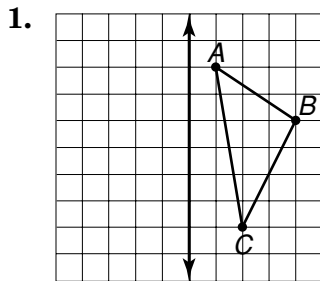
Χ

Ψ

Ω

7. Determine whether each Greek letter has line symmetry. If it does, draw all lines of symmetry. If not, write *none*.
8. Which of the Greek letters could be rotated and still look the same? If any, name the angle(s) of rotation.
9. **PATTERNS** Part of a pattern is shown at the right. Complete the pattern so that the entire pattern has rotational symmetry of 120° and 240° .

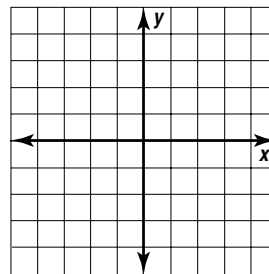
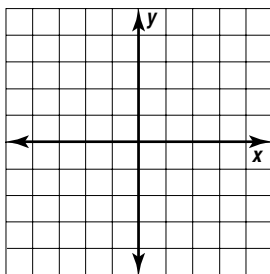


6-6 Practice**7MG3.2****Reflections****Draw the image of the figure after a reflection across the given line.**

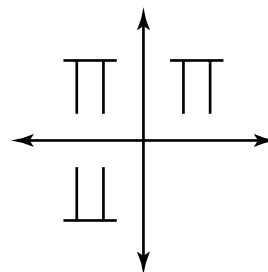
Graph the figure with the given vertices. Then graph the image of the figure after a reflection over the given axis, and write the coordinates of the image's vertices.

7. triangle FGH with vertices $F(-1, 1)$, $G(-3, 3)$, and $H(-4, 2)$; y -axis

8. square $PQRS$ with vertices $P(2, -1)$, $Q(3, -2)$, $R(2, -3)$, and $S(1, -2)$; y -axis

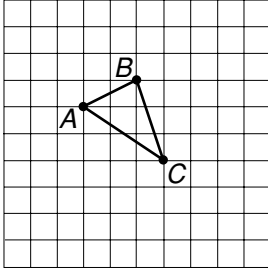


9. **GREEK ALPHABET** The Greek letter pi, Π , shown in the figure at the right, looks the same after a reflection over a vertical line. It does not look the same after a reflection over a horizontal line. Which of the Greek letters Γ , Φ , Θ , Z , Ω , and Ψ look the same after a reflection over a vertical line? Which look the same after a reflection over a horizontal line?

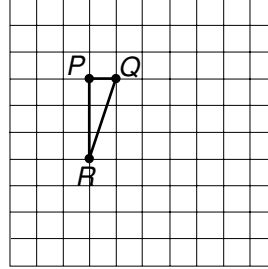


6-7 Practice**7MG3.2****Translations****Draw the image of the figure after the indicated translation.**

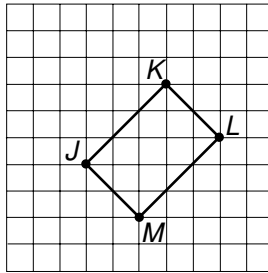
- 1.**
- 3 units right and 2 units up



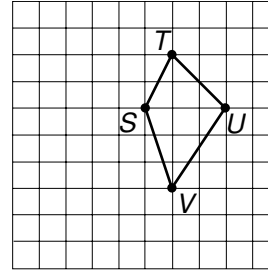
- 2.**
- 5 units right and 3 units down



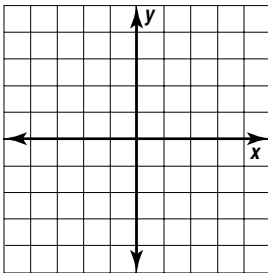
- 3.**
- 2 units left and 1 unit up



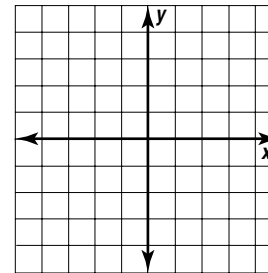
- 4.**
- 4 units left and 2 units down

**Graph the figure with the given vertices. Then graph the image of the figure after the indicated translation, and write the coordinates of its vertices.**

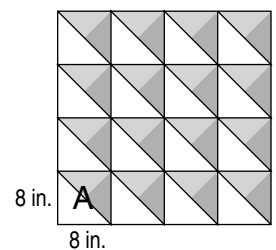
- 5.**
- $\triangle FGH$
- with vertices
- $F(1, 3)$
- ,
- $G(2, 4)$
- , and
- $H(3, 2)$
- ; translated 3 units left and 1 unit down

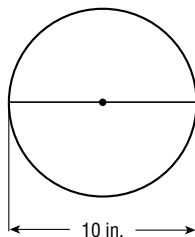
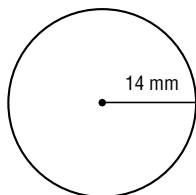
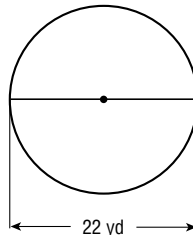
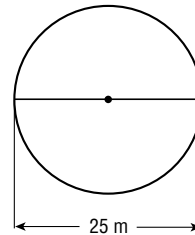
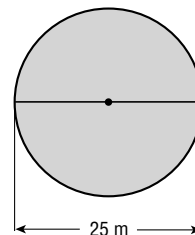
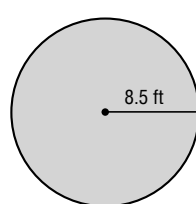
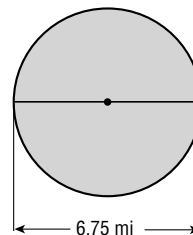
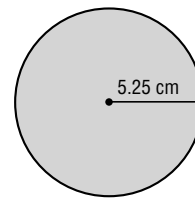
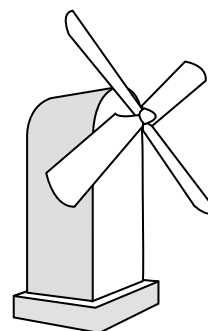


- 6.**
- rectangle
- $PQRS$
- with vertices
- $P(-4, -1)$
- ,
- $Q(0, 1)$
- ,
- $R(1, -1)$
- , and
- $S(-3, -3)$
- translated 2 units right and 3 units up



- 7. QUILTS**
- The quilt design at the right is a traditional American design. Describe the minimum number of translations of the original pattern, A, needed to create the section shown.



7-1 Practice**7MG2.1, 7MG3.1****Circumference and Area of Circles****Find the circumference of each circle. Use 3.14 for π . Round to the nearest tenth.****1.****2.****3.****4.****Find the area of each circle. Use 3.14 for π . Round to the nearest tenth.****5.****6.****7.****8.****Find the circumference and area of each circle. Round to the nearest tenth.****9.** The diameter is 8 centimeters.**10.** The radius is 4.7 inches.**11.** The radius is 0.9 feet.**12.** The diameter is 6.8 kilometers.**Another approximate value for π is $\frac{22}{7}$. Use this value to find the circumference and area of each circle.****13.** The diameter is 14 yards.**14.** The radius is $1\frac{1}{6}$ millimeters.**15. WINDMILL** Each sail on a windmill is 5 meters in length. How much area do the wings cover as they turn from the force of the wind?**16. ALGEBRA** Find the radius of a circle if its area is 314 square miles.

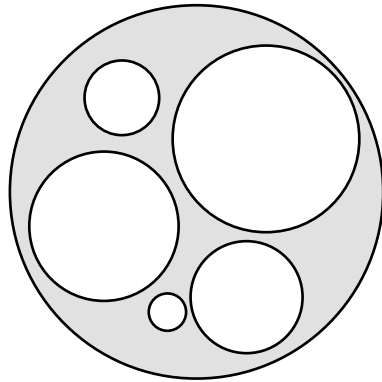
7-2 Practice

7MRI.3, 7MR2.2, 7AF4.2

Problem-Solving Investigation: Solve a Simpler Problem**Mixed Problem Solving**

Use the solve a simpler problem strategy to solve Exercises 1 and 2.

- 1. ASSEMBLY** A computer company has two locations that assemble computers. One location assembles 13 computers in an hour and the other location assembles 12 computers in an hour. Working together, how long will it take both locations to assemble 80 computers?
- 2. AREA** Determine the area of the shaded region if the radii of the six circles are 1, 2, 3, 4, 5, and 10 centimeters. Use 3.14 for π . Round to the nearest tenth if necessary.



Use any strategy to solve Exercises 3 and 4. Some strategies are shown below.

PROBLEM-SOLVING STRATEGIES

- Use the four-step plan.
- Look for a pattern.
- Use a Venn diagram.
- Use reasonable answers.
- Solve a simpler problem.

- 3. NUMBER SENSE** Find the sum of all the even numbers from 2 to 50, inclusive.

- 4. ANALYZE TABLES** Mr. Brown has \$1,050 to spend on computer equipment. Does Mr. Brown have enough money to buy the computer, scanner, and software if a 20% discount is given and the sales tax is 5%? Explain.

Item	Cost
Computer	\$899
Scanner	\$54
Software	\$278

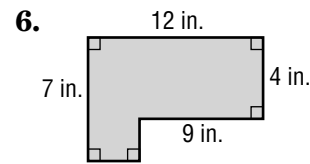
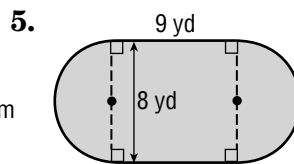
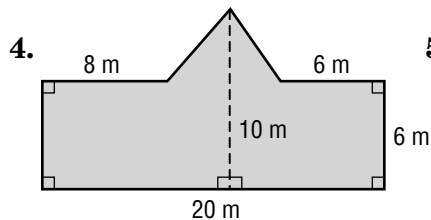
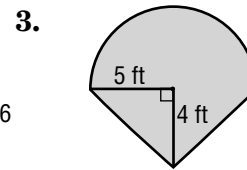
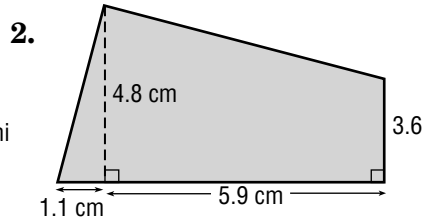
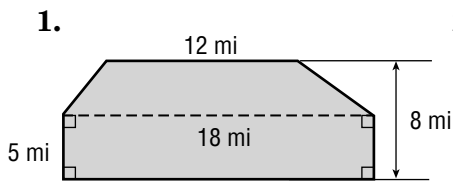
Select the Operation

For Exercises 5 and 6, select the appropriate operation to solve the problem. Justify your solution and solve the problem.

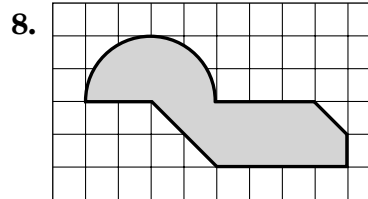
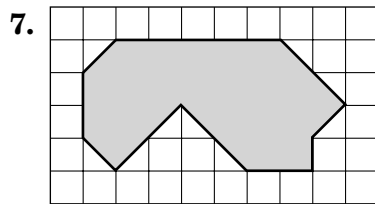
- 5. COPIER** The counter on a business copier read 18,678 at the beginning of the week and read 20,438 at the end of the week. If the business was in operation 40 hours that week, what was the average number of copies made each hour?
- 6. HUMMINGBIRD** In normal flight a hummingbird can flap its wings 75 times each second. At this rate, how many times does a hummingbird flap its wings in a 20-minute flight?

7-3 Practice**7MG2.1, 7MG2.2****Area of Complex Figures**

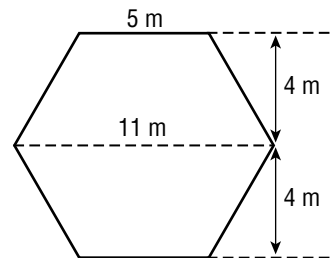
Find the area of each figure. Use 3.14 for π . Round to the nearest tenth if necessary.



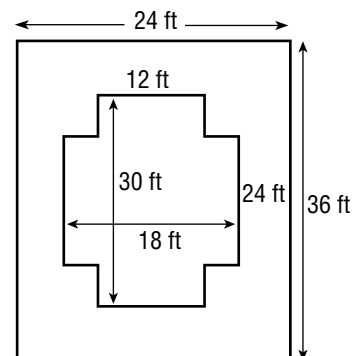
In each diagram, one square unit represents 10 square centimeters. Find the area of each figure. Round to the nearest tenth if necessary.



9. **GAZEBO** The Parks and Recreation department is building a gazebo in the local park with the dimensions shown in the figure. What is the area of the floor?



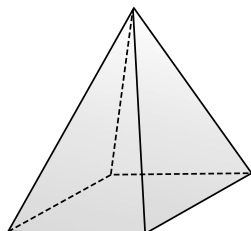
10. **DECK** The Pueyo family wants to paint the deck around their swimming pool with the dimensions shown in the figure. If a gallon covers 200 square feet, how many gallons of paint are needed to apply two coats of paint?



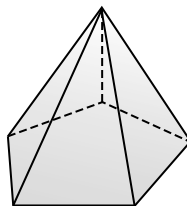
7-4**Practice****7MG3.6****Three-Dimensional Figures**

Identify each solid. Name the number and shapes of the faces. Then name the number of edges and vertices.

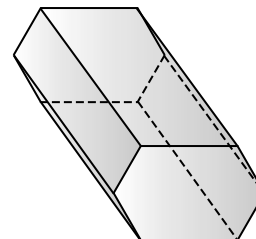
1.



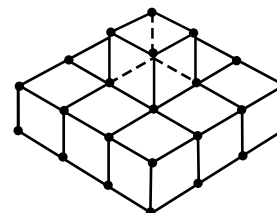
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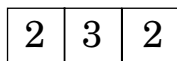


4. **FLAGS** The plans for the base of a flag pole are shown. Draw and label the top, front, and side views.

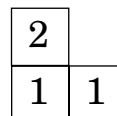


The top-count views of three-dimensional figures are shown. Draw each figure on isometric dot paper.

5.



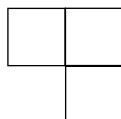
6.



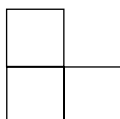
The top view, a side view, and the front view of a three-dimensional figure are shown. Draw the figure on isometric dot paper.

7.

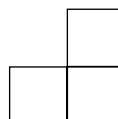
top



side



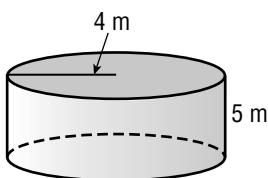
front



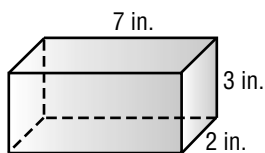
7-5 Practice**7MG2.1, 7MG2.2*****Volume of Prisms and Cylinders***

Find the volume of each solid. Use 3.14 for π . Round to the nearest tenth if necessary.

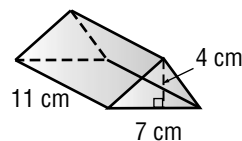
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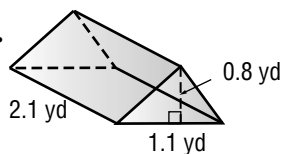
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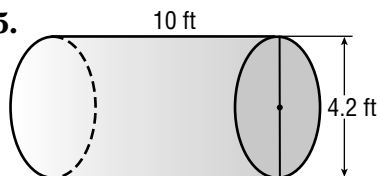
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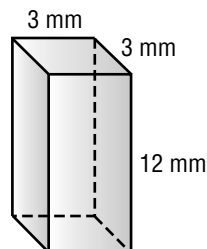
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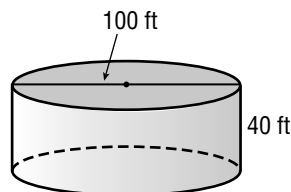
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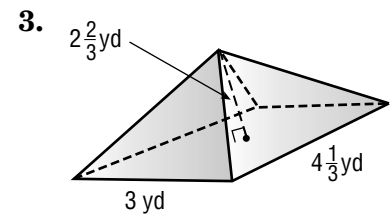
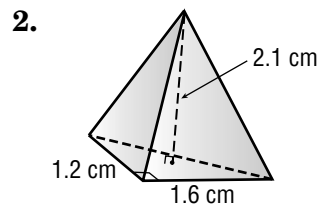
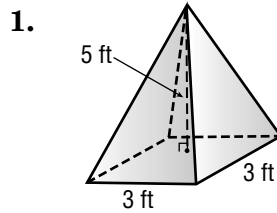
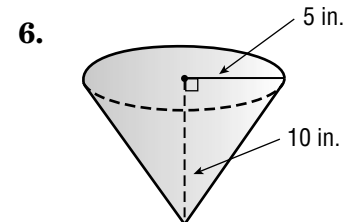
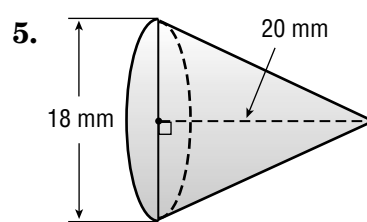
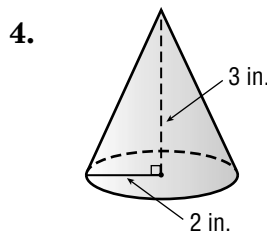
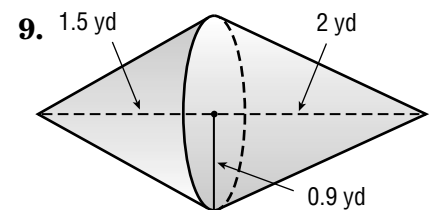
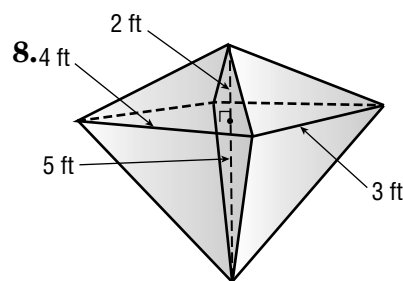
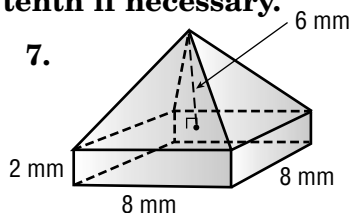


6.



7. rectangular prism: length, 10 m; width, 5 m; height, 5 m
8. triangular prism: base of triangle, 8 in; altitude, 8 in; height of prism, 6 in
9. cylinder: radius, 7 ft; height, 4 ft
10. cylinder: diameter, 6.4 cm; height, 4.9 cm
11. **ALGEBRA** Find the base of the triangle of a triangular prism with a height of 8 yards, altitude of 4 yards, and a volume of 16 cubic yards.
12. **ALGEBRA** Find the height of a cylinder with a diameter of 5 meters, and a volume of 49.1 cubic meters.
13. **WATER TANK** About 7.5 gallons of water occupy one cubic foot. About how many gallons of water are in a cylindrical water tank with dimensions shown in the figure?

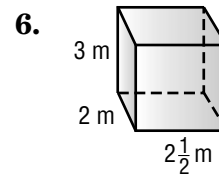
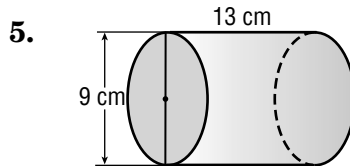
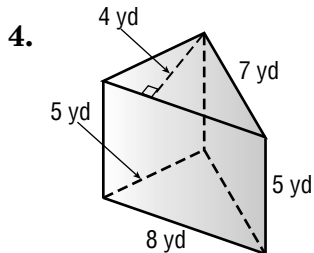
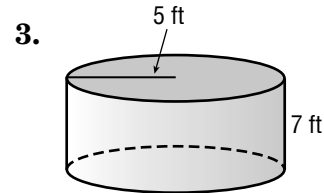
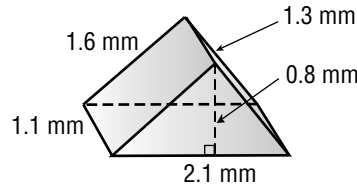
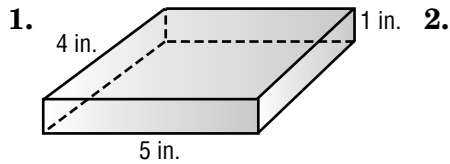


7-6 Practice**7MG2.1*****Volume of Pyramids and Cones*****Find the volume of each pyramid. Round to the nearest tenth if necessary.****Find the volume of each cone. Use 3.14 for π . Round to the nearest tenth if necessary.****Find the volume of each solid. Use 3.14 for π . Round to the nearest tenth if necessary.**

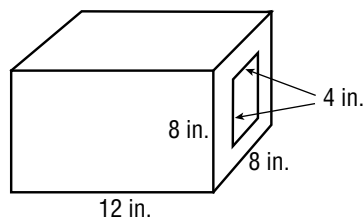
10. **PYRAMIDS** The Great Pyramid has an astounding volume of about 84,375,000 cubic feet above ground. At ground level the area of the base is about 562,500 square feet. What is the approximate height of the Great Pyramid?

7-7**Practice****7MG2.1, 7MG3.5****Surface Area of Prisms and Cylinders**

Find the lateral and total surface areas of each solid. Use 3.14 for π .
Round to the nearest tenth if necessary.



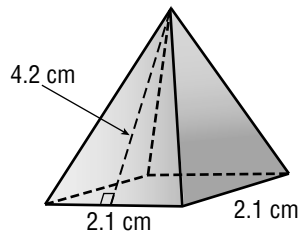
7. **ALGEBRA** A rectangular prism has height 4 millimeters and width 5 millimeters. If the total surface area is 166 square millimeters, what is the length of the prism?
8. **WATER** A cylindrical-shaped water storage tank with diameter 60 feet and height 20 feet needs to be painted on the outside. If the tank is on the ground, find the surface area that needs painting.
9. **CONCRETE** Find the total surface area of the hollow concrete casing shown, including the interior.



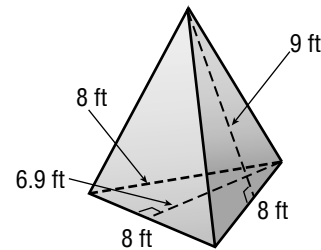
7-8 Practice**7MG2.1****Surface Area of Pyramids**

Find the lateral and total surface areas of each regular pyramid. Round to the nearest tenth if necessary.

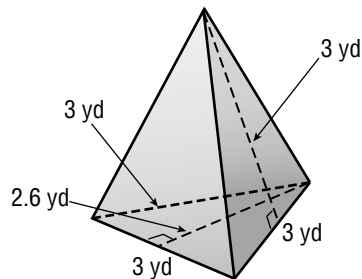
1.



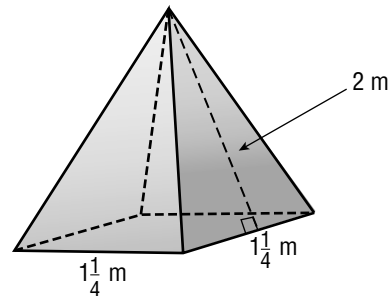
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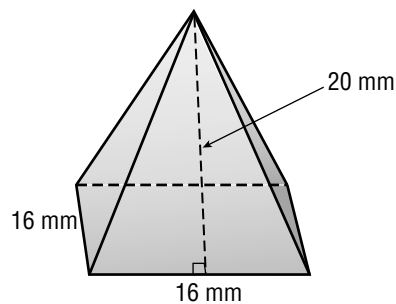
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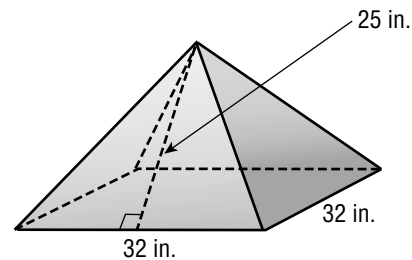
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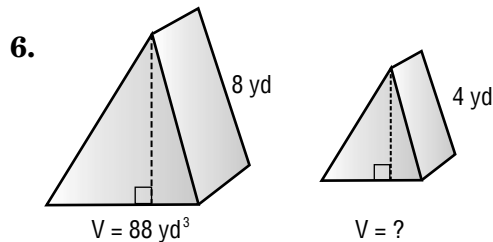
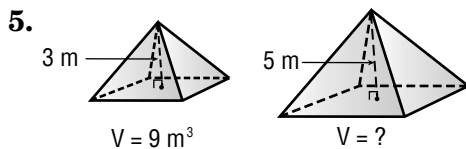
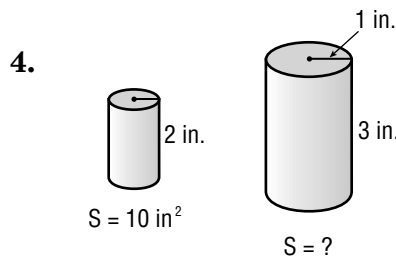
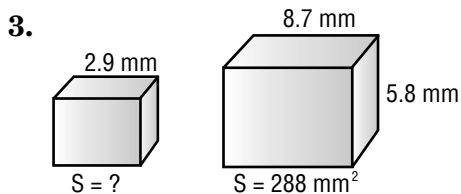
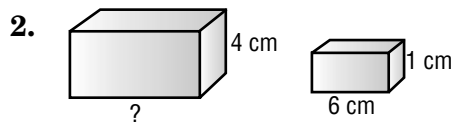
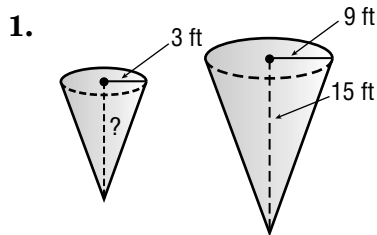


7. ALGEBRA A square pyramid has a lateral surface area of 20 square yards. If the slant height is 2 yards, what is the total surface area of the pyramid?

8. PYRAMIDS When the Great Pyramid was built, the slant height was about 610 feet and the length of the base was about 750 feet. Find the approximate lateral surface area of the Great Pyramid when it was built.

7-9**Practice****7MG2.3****Similar Solids**

Find the missing measure for each pair of similar solids. Round to the nearest tenth if necessary.

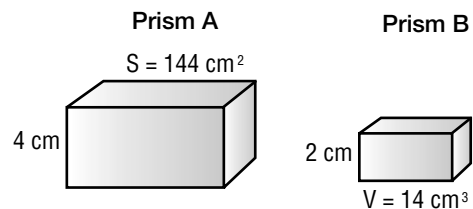


7. **MODEL TRAINS** The caboose of an N scale model train is $4\frac{1}{2}$ inches long. In the N scale, 1 inch represents $13\frac{1}{2}$ feet. What is the length of the original caboose?

8. **ALGEBRA** The volumes of two similar cylinders are 7 cubic meters and 56 cubic meters. Find their scale factor.

For Exercises 9-11, use the similar prisms shown.

9. Write the ratio of the surface areas and the ratio of the volumes of Prism B to Prism A.



10. Find the surface area of prism B.

11. Find the volume of prism A.

8-1 Practice**7AF1.1, 7AF1.3, 7AF1.4*****Simplifying Algebraic Expressions*****Use the Distributive Property to rewrite each expression.**

1. $6(z + 4)$

2. $-7(c + 2)$

3. $(d + 5)9$

4. $(h + 8)(-3)$

5. $5(y - 2)$

6. $3(6 - n)$

7. $-4(s - 4)$

8. $-9(2 - p)$

9. $2(3x + 1)$

10. $-5(4n - 5)$

11. $8(u - 2v)$

12. $3a(7b + 6c)$

Identify the terms, like terms, coefficients, and constants in each expression.

13. $4b + 7b + 5$

14. $8 + 6t - 3t + t$

15. $-5x + 4 - x - 1$

Simplify each expression.

16. $h + 6h$

17. $10k - k$

18. $3b + 8 + 2b$

19. $4 + 5v + v$

20. $-2f + 3 - 2f - 8$

21. $-7s - 5 - 7s + 9$

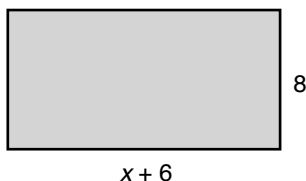
22. $-\frac{3}{4}x - \frac{1}{3} + \frac{7}{8}x - \frac{1}{2}$

23. $5c - 3d - 12c + d$

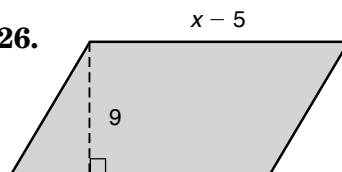
24. $-y + 9z - 16y - 25z$

Write two equivalent expressions for the area of each figure.

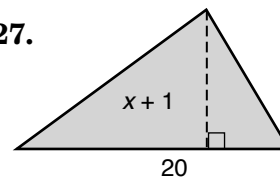
25.



26.



27.



28. **PAINTING** Mr. Torres paid \$43 for supplies to paint his office. He paid one person \$8 per hour to prepare the office to be painted and another person \$10 per hour to paint the office. If both people worked h hours, write two expressions that you could use to represent the total cost of painting the office.

8-2 Practice

7AF4.1

Solving Two-Step Equations**Solve each equation. Check your solution.**

1. $3g + 5 = 17$

2. $9 = 4a + 13$

3. $13 = 5m - 2$

4. $-15 = 2t - 11$

5. $7k - 5 = -19$

6. $13 = 4x - 11$

7. $10 = \frac{z}{2} + 7$

8. $6 + \frac{n}{5} = -4$

9. $4 - 3y = 31$

10. $15 - 2b = -9$

11. $-\frac{1}{3}y - 6 = -11$

12. $16 - \frac{r}{7} = 21$

13. $30 = 5d - 8d$

14. $w + 3w = 20$

15. $5 - 7m + 9m = 11$

16. $-18 = 8x - 9 - 5x$

17. $25 = s + 13 - 4s$

18. $6a + 7 - a = -18$

19. $3(y + 5) = 21$

20. $7(p - 3) = 35$

21. $-48 = 6(v + 2)$

22. $\frac{k - 3}{4} = 10$

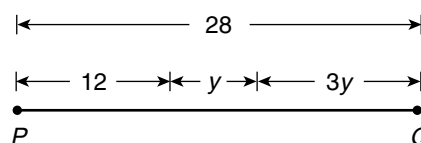
23. $\frac{z + 5}{7} = -3$

24. $\frac{9 + t}{12} = -3$

25. SHOPPING Mrs. Williams shops at a store that has an annual membership fee of \$30. Today she paid her annual membership and bought several fruit baskets costing \$15 each as gifts for her coworkers. Her total was \$105. Solve the equation $15b + 30 = 105$ to find the number of fruit baskets Mrs. Williams purchased.

26. GAMES A card game has 50 cards. After dealing 7 cards to each player, Tupi has 15 cards left over. Solve the equation $50 - 7p = 15$ to find the number of players.

27. GEOMETRY Write an equation to represent the length of $\overline{PQ}$. Then find the value of y .



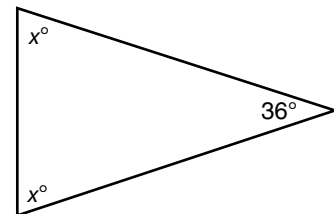
8-3**Practice****7AF1.1****Writing Two-Step Equations****Translate each sentence into an equation.**

1. Three more than eight times a number is equal to 19.
2. Twelve less than seven times a number is 16.
3. Four more than twice a number is -10 .
4. Nine less than five times a number is equal to -30 .
5. **ART** Ishi bought a canvas and 8 tubes of paint for \$24.95. If the canvas cost \$6.95, how much did each tube of paint cost?
6. **ENGINEERING** The world's two highest dams are both in Tajikistan. The Rogun dam is 35 meters taller than the Nurek dam. Together they are 635 meters tall. Find the height of the Nurek dam.

U.S. PRESIDENTS For Exercises 7 and 8, use the information at the right.

President	Age at First Inauguration
J. Carter	52
R. Reagan	69
G. H. W. Bush	
W. Clinton	46
G. W. Bush	54

7. If you double President Reagan's age at the time of his first inauguration and subtract his age at the time he died, the result is 45 years. How old was President Reagan when he died?
8. If you divide the age of the first President Bush when he was inaugurated by 2 and add 14 years, you get the age of President Clinton when he was first inaugurated. How old was President G. H. W. Bush when he was inaugurated?
9. **GEOMETRY** Find the value of x in the triangle at the right.
10. **ALGEBRA** Three consecutive integers can be represented by n , $n + 1$, and $n + 2$. If the sum of three consecutive integers is 57, what are the integers?



8-4**Practice****7AF1.1, 7AF4.1*****Solving Equations with Variables on Each Side*****Solve each equation. Check your solution.**

1. $9m + 14 = 2m$

2. $13x = 32 + 5x$

3. $8d - 25 = 3d$

4. $t - 27 = 4t$

5. $7p - 5 = 6p + 8$

6. $11z - 5 = 9z + 7$

7. $12 - 5h = h + 6$

8. $4 - 7f = f - 12$

9. $-6y + 17 = 3y - 10$

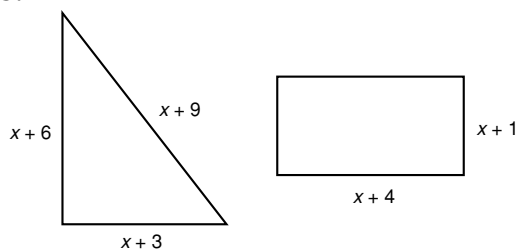
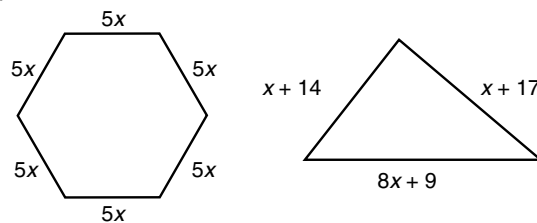
10. $3x - 32 = -7x + 28$

11. $3.2a - 16 = 4a$

12. $16.8 - v = 6v$

Find each number.

13. Fourteen less than five times a number is three times the number. Define a variable, write an equation, and solve to find the number.
14. Twelve more than seven times a number equals the number less six. Define a variable, write an equation, and solve to find the number.

Write an equation to find the value of x so that each pair of polygons has the same perimeter. Then solve.**15.****16.**

17. **GOLF** For an annual membership fee of \$500, Mr. Bailey can join a country club that would allow him to play a round of golf for \$35. Without the membership, the country club charges \$55 for each round of golf. Write and solve an equation to determine how many rounds of golf Mr. Bailey would have to play for the cost to be the same with and without a membership.
18. **MUSIC** Marc has 45 CDs in his collection, and Andrea has 61. If Marc buys 4 new CDs each month and Andrea buys 2 new CDs each month, after how many months will Marc and Andrea have the same number of CDs?

8-5**Practice**

7MR2.8, 7AF1.1

Problem-Solving Investigation: Guess and Check**Mixed Problem Solving**

For Exercises 1 and 2, solve using the guess and check strategy.

- 1. NUMBER THEORY** A number is squared and the result is 676. Find the number.

- 2. CRAFTS** Sabrina has 12 spools of ribbon. Each spool has either 3 yards of ribbon, 5 yards of ribbon, or 8 yards of ribbon. If Sabrina has a total of 68 yards of ribbon, how many spools of each length of ribbon does she have?

Use any strategy to solve Exercises 3–5. Some strategies are shown below.

PROBLEM-SOLVING STRATEGIES

- Draw a diagram.
- Use reasonable answers.
- Make a table.
- Guess and check.

- 3. NUMBERS** Among all pairs of whole numbers with product 66, find the pair with the smallest sum.
- 4. SHOPPING** You are buying a jacket that costs \$69.95. If the sales tax rate is 7.75%, would it be more reasonable to expect the sales tax to be about \$4.90 or \$5.60?

- 5. STATES** Of the 50 United States, 13 have coastlines only on the Atlantic Ocean, 4 have coastlines only on the Gulf of Mexico, and one state has coastlines on both. How many states do not have coastlines on either the Atlantic Ocean or the Gulf of Mexico?

Select the Operation

For Exercises 6 and 7, select the appropriate operation(s) to solve the problem. Justify your selection(s) and solve the problem.

- 6. TIME** Melissa spent $7\frac{1}{2}$ minutes of the last hour downloading songs from the Internet. What percent of the last hour did she spend downloading songs?
- 7. VOLUNTEERING** Greg helps his mother deliver care baskets to hospital patients each Saturday. Last Saturday at noon they had three times as many baskets left to deliver as they had already delivered. If they were delivering a total of 64 baskets that day, how many had they delivered by noon?

8-6**Practice****7AF1.1*****Inequalities*****Write an inequality for each sentence.**

1. **JOBS** Applicants with less than 5 years of experience must take a test.
2. **FOOTBALL** The home team needs more than 6 points to win.
3. **VOTING** The minimum voting age is 18.
4. **GAMES** You must answer at least 10 questions correctly to stay in the game.
5. **DINING** A tip of no less than 10% is considered acceptable.
6. **MONEY** The cost including tax is no more than \$75.

For the given value, state whether the inequality is true or false.

7. $9 + b < 16$, $b = 8$
8. $14 - f > 8$, $f = 5$
9. $-5t < 24$, $t = 5$
10. $51 \leq 3m$, $m = 17$
11. $\frac{z}{5} \leq 7$, $z = 40$
12. $\frac{-28}{d} > 7$, $d = -4$

Graph each inequality on a number line.

13. $y > 5$
14. $h < 5$
15. $c \leq 1$
16. $t \geq 2$
17. $x \geq 4$
18. $r < 9$

For Exercises 19 and 20, use the table that shows the literacy rate in several countries.

19. In which country or countries is the literacy rate less than 90%?
20. In which country or countries is the literacy rate at least 88%?

Country	Literacy Rate
Albania	87%
Jamaica	88%
Panama	93%
Senegal	40%

Source: infoplease.com

8-7 Practice

7AF1.1, 7AF4.1

Solving Inequalities by Adding or Subtracting**Solve each inequality. Check your solution.**

1. $p + 7 < 9$

2. $t + 6 > -3$

3. $-13 \geq 9 + b$

4. $16 > -11 + k$

5. $3 \geq -2 + y$

6. $25 < n + (-12)$

7. $r - 5 \leq 2$

8. $a - 6 < 13$

9. $j - 8 \leq -12$

10. $-8 > h - 1$

11. $22 > w - (-16)$

12. $-30 \leq d + (-5)$

13. $1 + y \leq 2.4$

14. $b - \frac{3}{4} < 2\frac{1}{2}$

15. $f - 4 \geq 1.4$

Write an inequality and solve each problem.

16. Five less than a number is more than twenty.

17. Four more than a number is no more than twelve.

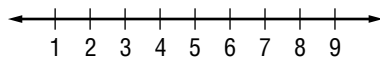
18. The sum of a number and 3.5 is at least 14.5.

19. The difference of a number and -5 is less than 7.20. The sum of -12 and a number is at least 6.

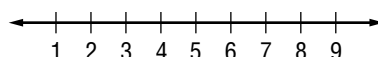
21. Eleven less than a number is more than fifteen.

Solve each inequality and check your solution. Then graph the solution on a number line.

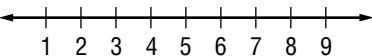
22. $n + 4 < 9$



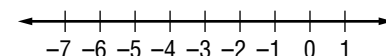
23. $t + 7 > 12$



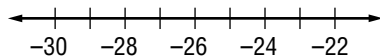
24. $p + (-5) > -3$



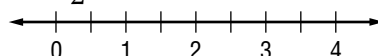
25. $-13 \geq x - 8$



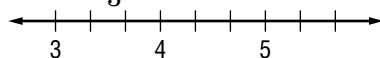
26. $-32 \geq a + (-5)$



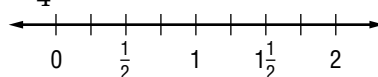
27. $3 \leq \frac{1}{2} + m$



28. $4 \geq s - \frac{2}{3}$



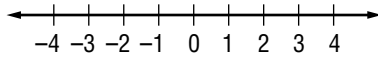
29. $-\frac{3}{4} < w - 1$



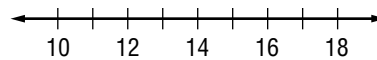
8-8 Practice**7AF1.1, 7AF4.1*****Solving Inequalities by Multiplying or Dividing***

Solve each inequality and check your solution. Then graph the solution on a number line.

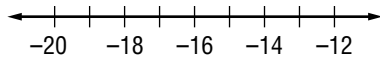
1. $-8 \leq 4w$



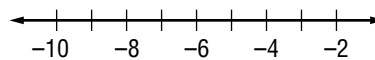
2. $-6a > -78$



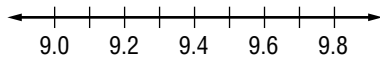
3. $-25t \leq 400$



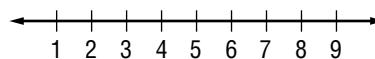
4. $18 > -2g$



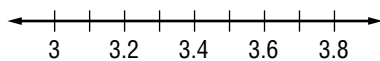
5. $\frac{y}{4} \geq 2.4$



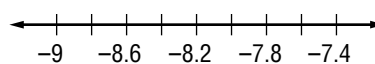
6. $\frac{r}{-2} < -2$



7. $-8 > \frac{k}{-0.4}$



8. $\frac{m}{-7} \leq 1.2$



Solve each inequality. Check your solution.

9. $13a \geq -26$

10. $-15 \leq 5b$

11. $-3m > -33$

12. $-8z \leq -24$

13. $\frac{n}{-5} \geq 0.8$

14. $6 > \frac{x}{-7}$

15. $-5 \geq \frac{c}{4.5}$

16. $-19 > \frac{y}{-0.3}$

17. $-\frac{1}{3}x \geq -9$

Write an inequality for each sentence. Then solve the inequality.

18. Five times a number is more than 55.

19. The quotient of a number and 12 is no more than three.

20. The product of -6 and a number is at least 54.

21. The product of $-\frac{1}{3}$ and a number is less than -36 .

22. The quotient of a number and 3 is at least -5 .

23. A number divided by 4 is more than 16.

9-1 Practice

Functions

7AF3.3, 7MR2.5

Find each function value.

1. $f(6)$ if $f(x) = 4x$

2. $f(8)$ if $f(x) = x + 11$

3. $f(3)$ if $f(x) = 2x + 4$

4. $f(5)$ if $f(x) = 3x - 2$

5. $f(-6)$ if $f(x) = 4x + 7$

6. $f(-14)$ if $f(x) = 2x - 3$

7. $f(\frac{2}{9})$ if $f(x) = 3x + \frac{1}{3}$

8. $f(\frac{3}{4})$ if $f(x) = 2x - \frac{1}{4}$

9. $f(\frac{4}{5})$ if $f(x) = 4x - \frac{1}{5}$

Complete each function table. Then state the domain and range of the function.

10. $f(x) = 5x - 4$

x	$5x - 4$	$f(x)$
-4		
-1		
3		
6		

11. $f(x) = 2 - 3x$

x	$2 - 3x$	$f(x)$
-3		
0		
2		
5		

12. $f(x) = 6 + 2x$

x	$6 + 2x$	$f(x)$
-3		
-1		
1		
4		

13. $f(x) = x - 7$

x	$x - 7$	$f(x)$
-3		
-2		
5		
10		

14. $f(x) = 9x$

x	$9x$	$f(x)$
-6		
-4		
1		
3		

15. $f(x) = 3x + 5$

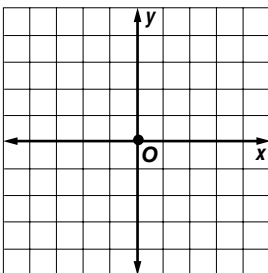
x	$3x + 5$	$f(x)$
-5		
-1		
2		
6		

- 16. JACKETS** The school baseball team wants to have each player's name imprinted on the player's jacket. The cost is \$75 plus \$8.50 for each name. Write a function to represent the cost c for n names. What is the cost to have names imprinted on 25 jackets?

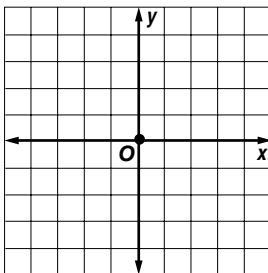
- 17. LEMONADE** Gene sold 10 glasses of lemonade while setting up his lemonade stand. After opening, he sold an average of 20 glasses each hour. Write a function to represent the approximate number of glasses g sold after h hours. About when did he sell the 100th glass of lemonade?

9-2 Practice**7AF1.5****Representing Linear Functions****Graph each function.**

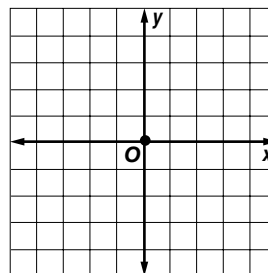
1. $y = 2x$



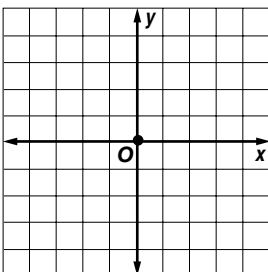
2. $y = -4x$



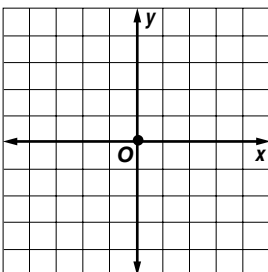
3. $y = x - 4$



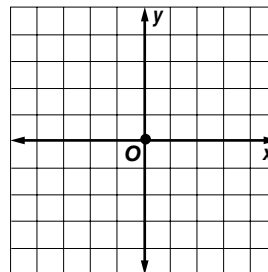
4. $y = x + 3$



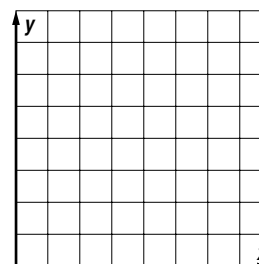
5. $y = 3x + 1$



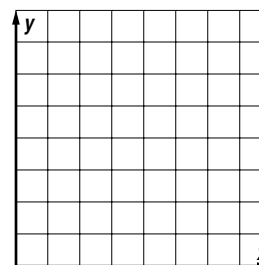
6. $y = \frac{1}{4}x + 2$

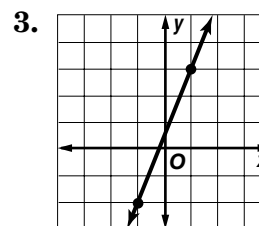
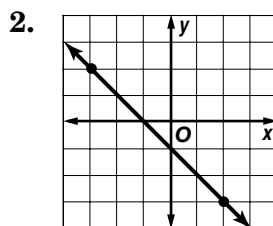
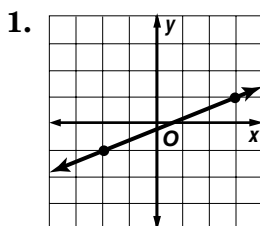


- 7. CARPENTRY** Mrs. Valdez can assemble a chair in 1 day and a table in 4 days. Graph the function $1x + 4y = 20$ to determine how many of each type of furniture Mrs. Valdez can assemble in 20 days.



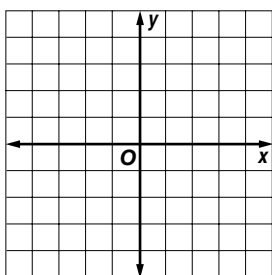
- 8. FITNESS** A fitness center has set a goal to have 500 members. The fitness center already has 150 members and adds an average of 25 members per month. The function $f(x) = 25x + 150$ represents the membership after x months. Graph the function to determine the number of months it will take for the fitness center to reach its membership goal.



9-3 Practice**7AF3.3****Slope****Find the slope of each line.****The points given in each table lie on a line. Find the slope of the line. Then graph the line.**

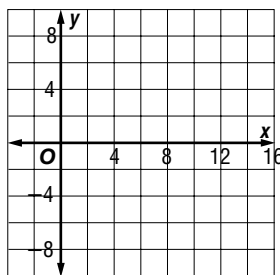
4.

x	-1	1	3	5
y	-2	0	2	4



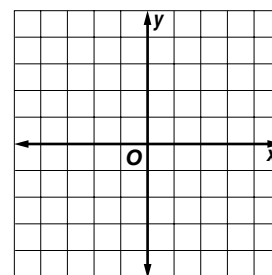
5.

x	-2	3	8	13
y	-2	-1	0	1

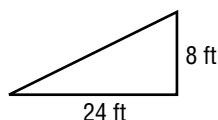


6.

x	-1	2	5	8
y	3	-1	-5	-9



7. **HOMES** Find the slope of the roof of a home that rises 8 feet for every horizontal change of 24 feet.



8. **MOUNTAINS** Find the slope of a mountain that descends 100 meters for every horizontal distance of 1,000 meters.

**Find the slope of the line that passes through each pair of points.**

9. $A(1, 3), B(4, 7)$

10. $C(3, 5), D(2, 6)$

11. $E(4, 0), F(5, 5)$

12. $P(-2, -5), R(2, 3)$

13. $S(-7, 4), T(5, 2)$

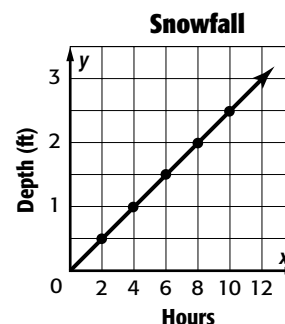
14. $V(9, -1), W(7, 6)$

SNOWFALL For Exercises 15–17, use the graph at the right. It shows the depth in feet of snow after each two-hour period during a snowstorm.

15. Find the slope of the line.

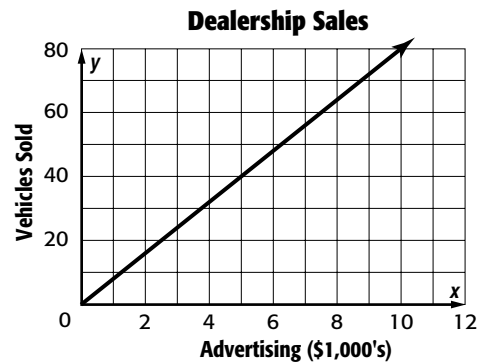
16. Does the graph show a constant rate of change? Explain.

17. If the graph is extended to the right, could you expect the slope to remain constant? Explain.



9-4 Practice**7AF3.4, 7AF4.2****Direct Variation**

1. **ADVERTISING** The number of vehicles a dealership sells is directly proportional to the money spent on advertising. How many vehicles does a dealership sell for each \$1,000 spent on advertising?



2. **SNOWMOBILES** Jerry rents snowmobiles to tourists. He charges \$135 for 4 hours and \$202.50 for 6 hours. What is the hourly rate Jerry charges to rent a snowmobile?
3. **SOLAR ENERGY** The power absorbed by a solar panel varies directly with its area. If an 8 square meter panel absorbs 8,160 watts of power, how much power does a 12 square meter solar panel absorb?
4. **INSECT CONTROL** Mr. Malone used 40 pounds of insecticide to cover 1,760 square feet of lawn and 60 pounds to cover an additional 2,640 square feet. How many pounds of insecticide would Mr. Malone need to cover his whole lawn of 4,480 square feet?

Determine whether each linear function is a direct variation. If so, state the constant of variation.

5.

Volume x	2	4	6	8
Mass y	10	20	30	40

6.

Gallons x	5	10	15	20
Miles y	95	190	285	380

7.

Time x	8	9	10	11
Temp y	68	71	74	77

8.

Age x	3	6	9	12
Height y	28	40	52	64

ALGEBRA If y varies directly with x , write an equation for the direct variation. Then find each value.

9. If $y = -5$ when $x = 2$, find y when $x = 8$.
10. Find y when $x = 1$, if $y = 3$ when $x = 2$.
11. If $y = -7$ when $x = -21$, what is the value of x when $y = 9$?
12. Find x when $y = 18$, if $y = 5$ when $x = 4$.

9-5 Practice**7AF3.3*****Slope-Intercept Form*****State the slope and the y-intercept for the graph of each equation.**

1. $y = 4x + 1$

2. $y = -3x + 5$

3. $-x + y = 4$

4. $y = -\frac{5}{6}x - 3$

5. $y + 3x = -7$

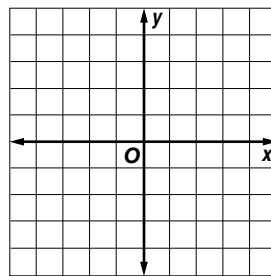
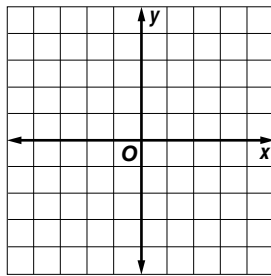
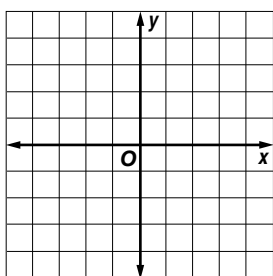
6. $y = \frac{1}{5}x + 2$

Graph each equation using the slope and the y-intercept.

7. $y = -2x + 2$

8. $y + x = -3$

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

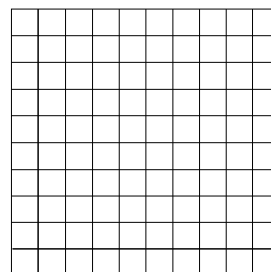
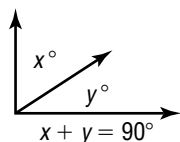
**CAMPING For Exercises 10–12, use the following information.**

The entrance fee to the national park is \$15. A campsite fee is \$15 per night. The total cost y for a camping trip for x nights can be represented by the equation $y = 15x + 15$.

10. Graph the equation.

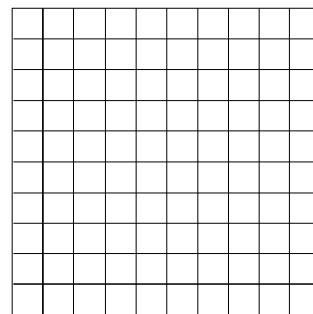
11. Use the graph to find the total cost for 4 nights.

12. What do the slope and the y-intercept represent?

**GEOMETRY For Exercises 13–15, use the diagram shown.**

13. Write the equation in slope-intercept form.

14. Graph the equation.

15. Use the graph to find the value of y if $x = 30$.

9-6**Practice****7AF1.1*****Writing Systems of Equations and Inequalities***

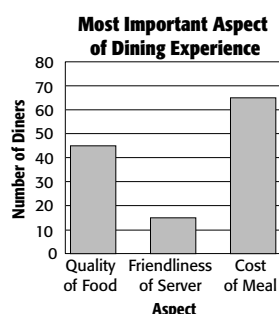
Write a system of equations or inequalities to represent each situation. Write the systems in standard form and line up the variables.

1. Reggie and Miguel scored a total of 54 points in the basketball game. Miguel scored four more points than Reggie.
2. Morgan is 15 years younger than Mrs. Santos. Their combined age is 44.
3. Mr. Conti doesn't want to spend any more than \$50 on pencils and pens for the school year. Pencils cost \$0.89 per box and pens cost \$1.24 per box. Mr. Conti knows he needs at least twenty-five boxes of pencils.
4. Mrs. Jackson gave her son Ronald some money to spend on clothes. Ronald was allowed to spend up to \$450. Ronald was only interested in buying jeans and shoes. The jeans cost \$55 each and the shoes cost \$110 each. He needs to buy at least one more pair of jeans than shoes.
5. Kiara and Elizabeth had a total of 56 awards throughout high school. Kiara had 2 more than twice the number Elizabeth had.
6. Jason's dog weighs 10 pounds less than twice his brother's dog. The dogs' combined weight is 50 pounds less than one hundred pounds.
7. Jenny won the ping-pong championship eight more times than Gerardo. They have won a combined total of 32 championships.

9-7 Practice**7MR2.5, 7SDAP1.2****Problem-Solving Investigation: Use a Graph****Mixed Problem Solving**

For Exercises 1 and 2, solve by using a graph.

- 1. RESTAURANTS** Diners were asked which aspect of a dining experience was the most important, the quality of food, the friendliness of the server, or the cost of the meal. The graph shows the results of the survey. How many diners were surveyed?



- 2. COMMUTING** Ms. Bonilla recorded the amount of time it took her to drive to work each morning. Make a graph of the data in the table. Does the earliest departure time have the least travel time?

Day	Departure Time (A.M.)	Travel Time (min)
1st Week Monday	7:21	17
1st Week Tuesday	7:38	26
1st Week Wednesday	7:32	22
1st Week Thursday	7:20	15
1st Week Friday	7:35	22
2nd Week Monday	7:26	20
2nd Week Tuesday	7:25	18
2nd Week Wednesday	7:38	24
2nd Week Thursday	7:34	21
2nd Week Friday	7:23	17

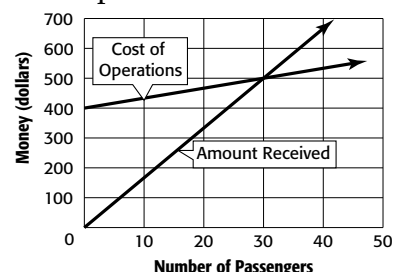
Use any strategy to solve Exercises 3 and 4. Some strategies are shown below.

PROBLEM-SOLVING STRATEGIES

- Use the four-step plan.
- Look for a pattern.
- Use a reasonable answer.
- Use a graph.

- 3. FLORIST** Ms. Parker charges \$29.95 for a bouquet of one dozen roses. Last year, she paid her supplier \$4.50 per dozen roses. This year, she paid \$3.25 more per dozen. How much less profit did she make this year on 20 dozen bouquets?

- 4. TOUR BUS** One line in the graph shows the cost of operating a tour bus. The other line shows the amount of money received from the passengers. How many passengers must ride the tour bus to make a profit?

**Select the Operation**

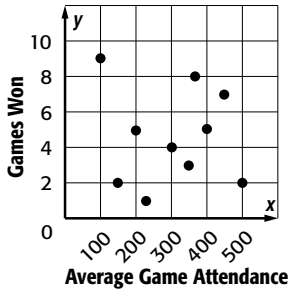
For Exercise 5, select the appropriate operation(s) to solve the problem. Justify your selection(s) and solve the problem.

- 5. TOWN MEETING** The Waynesville auditorium seats 375 people. In a survey of 50 residents, 6 stated that they plan to attend the next town hall meeting. If the town has 4,200 residents, how many would you expect to attend? Is the auditorium large enough?

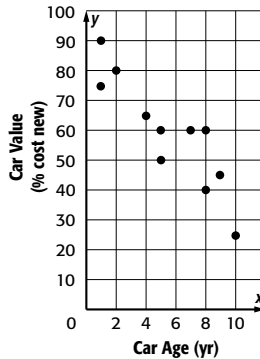
9-8 Practice**7SDAP1.2****Scatter Plots**

Explain whether the scatter plot of the data for each of the following shows a *positive*, *negative*, or *no* relationship.

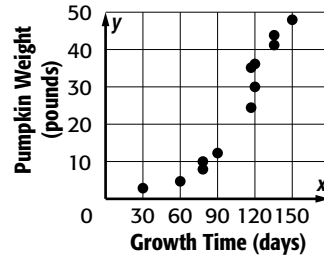
1.



2.



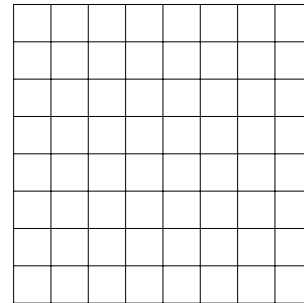
3.



For Exercises 4–6, use the following table.

River Width (m)	15	18	20	28	30	32	38	40	42	45
Water Speed (km/h)	12.6	10.7	11.2	9.7	8.1	8.7	6.9	5.4	3.9	4.1

- Draw a scatter plot for the data. Then draw a line of fit.
- Write an equation for the line of fit.
- Use your equation to estimate the speed of the water when the river is 50 meters wide.



Explain whether a scatter plot of the data for each of the following would show a *positive*, *negative*, or *no* relationship.

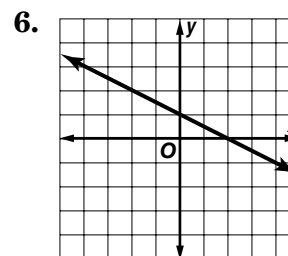
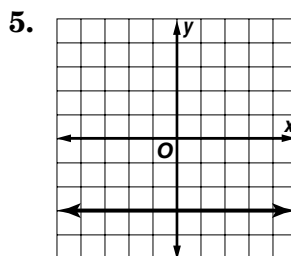
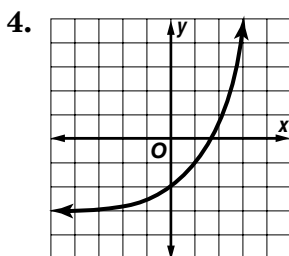
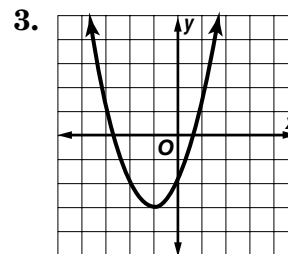
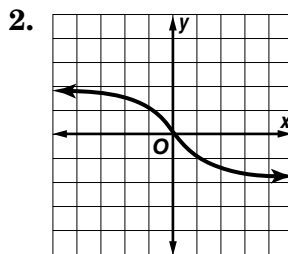
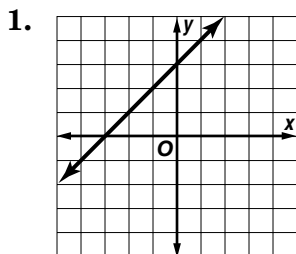
- daily attendance at an outdoor carnival and the number of hours of rain
- number of diagonals of a polygon and the number of sides of a polygon

10-1 Practice

AF1.5

Linear and Nonlinear Functions

Determine whether each graph, equation, or table represents a linear or nonlinear function. Explain.



7. $y = 9 - x^2$

8. $y = -2.3x$

9. $y = \frac{x}{9}$

10. $y = \frac{3}{x}$

11. $2x + 3y = 6$

12. $2xy = 12$

13.

x	2	4	6	8
y	12	9	6	3

14.

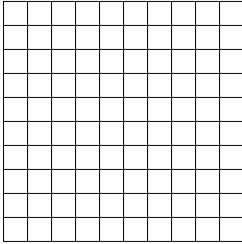
x	1.5	3	4.5	6
y	2	4	8	16

15. **MINIMUM WAGE** The state of Washington has the highest hourly minimum wage in the United States. The graphic shows Washington's minimum wage from 1999 to 2006. Would you describe the yearly increase as linear or nonlinear? Explain your reasoning.

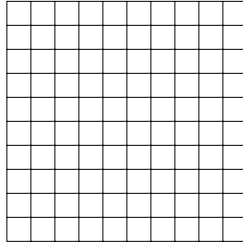


10-2 Practice**7AF1.5, 7AF3.1****Graphing Quadratic Functions****Graph each function.**

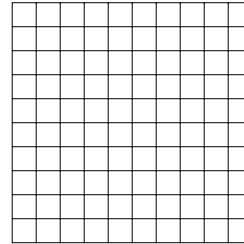
1. $y = x^2$



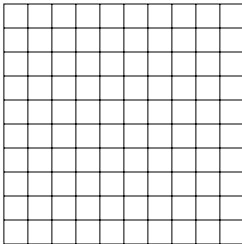
2. $y = -x^2$



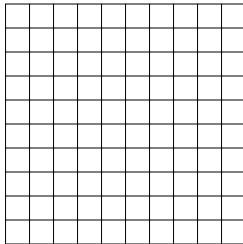
3. $y = x^2 + 3$



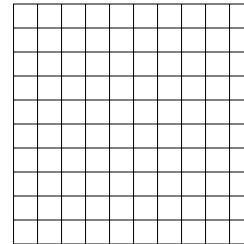
4. $y = -x^2 + 3$



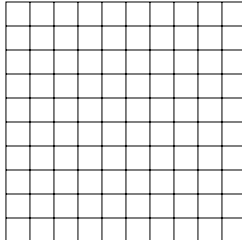
5. $y = x^2 - 5$



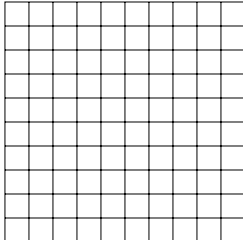
6. $y = 3x^2 - 4$



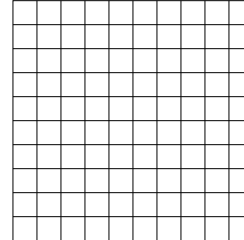
7. $y = 2.5x^2 - 3$



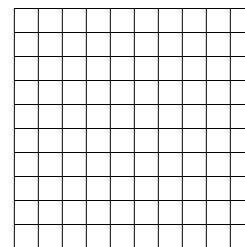
8. $y = -\frac{1}{3}x^2$



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



- 10. GEOMETRY** The surface area of a cube is a function of the edge length a . Write a function for the surface area of a cube. Then graph the function in the first quadrant. Use your graph to estimate the edge length of a cube with a surface area of 150 square meters.



10-3 Practice

7MR2.5, 7AF1.1

Problem-Solving Investigation: Make a Model**Mixed Problem Solving**

For Exercises 1 and 2, solve using the make-a-model strategy.

- 1. QUILTS** Mrs. Renoir has completed the interior portion of a quilt top measuring 4 feet by 6 feet. She is outlining this with squares measuring 4 inches on each side. How many such squares will she need?
- 2. GEOMETRY** Kumiko has four plastic shapes, a circle, a square, a triangle, and a pentagon. In how many ways can she line up the four shapes if the circle cannot be next to the square?

Use any strategy to solve Exercises 3 and 4. Some strategies are shown below.

PROBLEM-SOLVING STRATEGIES

- Draw a diagram.
- Determine reasonable answers.
- Act it out.
- Make a model.

- 3. FOOTBALL** The attendance at the first two football games of the season are shown in the table. Did the attendance increase by about 1% or about 10%?

Football Attendance

Game 1	5,049
Game 2	5,582

- 4. GAMES** Jamal has a deck of 40 cards. After giving each player in the game an equal number of cards, he has four cards left over, which is not enough to give each player another card. How many players could be in the game?

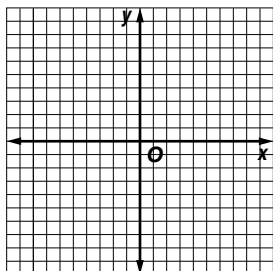
Select the Operation

For Exercises 5 and 6, select the appropriate operation(s) to solve the problem. Justify your selection(s) and solve the problem.

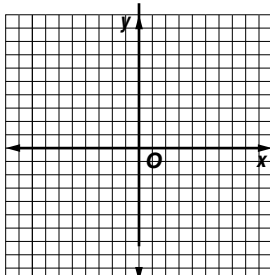
- 5. CLOTHING** Salome has 5 T-shirts, 3 pairs of jeans, and 2 pairs of sneakers. In how many ways can she choose one T-shirt, one pair of jeans, and one pair of sneakers to wear today?
- 6. NUMBER THEORY** After adding 8 to a number and then dividing by 3, the result is 19. What is the number?

10-4 Practice**7AF3.1, 7AF3.2****Graphing Cubic Functions****Graph each function.**

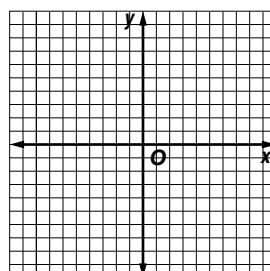
1. $y = 0.1x^3 + 1$



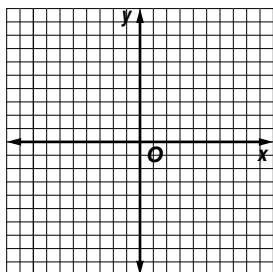
2. $y = \frac{1}{4}x^3$



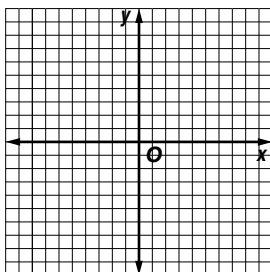
3. $y = 0.2x^3$



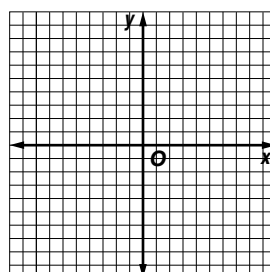
4. $y = \frac{1}{3}x^3$



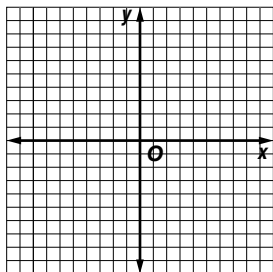
5. $y = -4x^3$



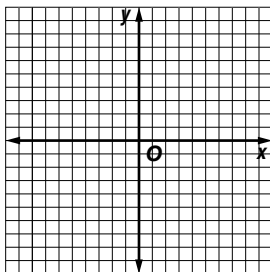
6. $y = \frac{1}{2}x^3$



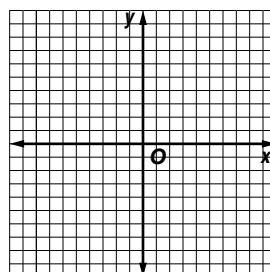
7. $y = -\frac{1}{4}x^3$



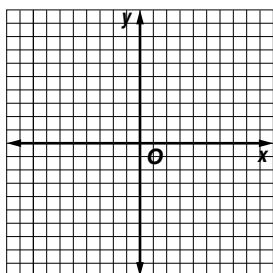
8. $y = -0.2x^3$



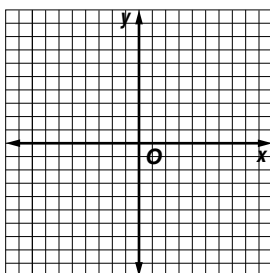
9. $y = 0.1x^3$



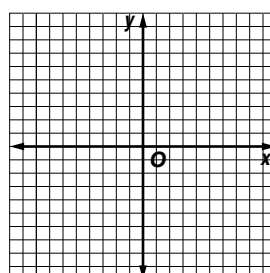
10. $y = -\frac{1}{2}x^3$



11. $y = \frac{1}{3}x^3 + 3$



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



10-5 Practice**7NS2.3, 7AF2.1, 7AF2.2*****Multiplying Monomials*****Multiply. Express using exponents.**

1. $5^9 \cdot 5^3$

2. $3^8 \cdot 3$

3. $c \cdot c^6$

4. $m^5 \cdot m^2$

5. $3x \cdot 4x^4$

6. $(2h^7)(7h)$

7. $-5d^6(8d^6)$

8. $(6k^5)(-k^4)$

9. $(-w)(-10w^3)$

10. $-7z^4(-3z^8)$

11. $bc^3(b^2c)$

12. $3a^4 \cdot 6a^2$

13. $3m^3n^2(8mn^3)$

14. $\frac{3}{7} \times \left(\frac{3}{7}\right)^{-1}$

15. $(-4k^{-5})(5k^{-6})$

16. $7t^5(-6t^5)$

17. $(-6d^{-4})(-9d^5e^{-5})$

18. $(3s^5)(-4s^{-6})$

19. $(-8b^{-2})(2b^{-3})$

20. $\left(\frac{2}{9}\right)^{-2} \times \left(\frac{2}{9}\right)^{-4}$

21. $(3ab^2)(a^2c^5)$

22. $(9p^4)(-8p^2)$

23. $(6f^5)(-f^{-2}g^3)$

24. $-10v^4(2v^5)$

25. CAR LOANS After making a down payment, Mr. Valle will make 6^2 monthly payments of 6^3 dollars each to pay for his new car. What is the total of the monthly payments?

26. MEASUREMENT Find the area of a rectangle with a width of $4x$ and a length of $6x$.

10-6 Practice**7NS2.3, 7AF2.1, 7AF2.2*****Dividing Monomials*****Divide. Express using exponents.**

1. $\frac{5^9}{5^3}$

2. $\frac{3^8}{3}$

3. $\frac{b^6}{b^4}$

4. $\frac{g^{15}}{g^7}$

5. $\frac{18v^5}{9v}$

6. $\frac{24a^6}{6a^5}$

7. $\frac{30s^7t}{5st}$

8. $\frac{28p^5q^4}{14p^4q^3}$

9. $(9j^7k^4) \div (3j^6k)$

10. $(32x^9y^5) \div (16x^5y^3)$

11. $\frac{\left(\frac{2}{7}\right)^2 \times \left(\frac{2}{7}\right)^{-5}}{\left(\frac{2}{7}\right)^3}$

12. $\frac{4b^5}{2b^{-8}}$

13. $\frac{5^8 \cdot 5^2 \cdot 5^4}{5^7 \cdot 5^4 \cdot 5^6}$

14. $\frac{36^{-6}}{36^2}$

15. $\frac{p}{p^4}$

16. $\frac{7^{-3}}{7^{-6}}$

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

18. $\frac{95^{21}}{95^{18}}$

19. $\frac{v^{20}}{v^{30}}$

20. $(8b^6d^9) \div (2b^2d^3)$

21. $\frac{n^{19}}{n^{11}}$

22. $\frac{32s^6t^4}{16s^4t^3}$

23. $y^6 \div y^3$

24. $\frac{a^2b^2}{b^2}$

25. **BONUSES** A company has set aside 10^7 dollars for annual employee bonuses. If the company has 10^4 employees and the money is divided equally among them, how much will each employee receive?

26. **ACIDITY** For each increase of one in pH level, the acidity of a substance is 10 times greater. The pH level of baking soda is 8, and the pH level of lye is 13. How many times greater is the alkalinity of lye than that of baking soda?

10-7**Practice****7AF2.2*****Powers of Monomials*****Simplify.**

1. $(6t^5)^2$

2. $(4w^9)^4$

3. $(12k^6)^3$

4. $(15m^8)^3$

5. $(4d^3e^5)^7$

6. $(-4r^6s^{15})^4$

7. $[(7^2)^2]^2$

8. $[(3^2)^2]^3$

9. $\left(\frac{3}{5}a^{-6}b^9\right)^2$

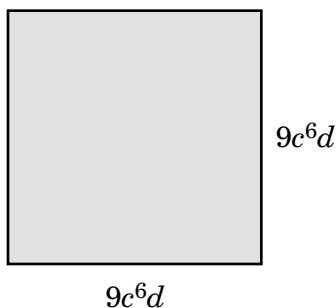
10. $(4x^{-2})^3(3x^6)^4$

11. $(0.6p^5)^3$

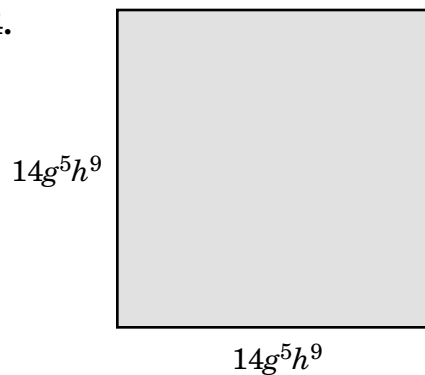
12. $\left(\frac{1}{5}w^5z^3\right)^2$

GEOMETRY Express the area of each square below as a monomial.

13.



14.



- 15. MEASUREMENT** In the Metric System, you would need to have $(10^4)^2$ grams just to equal 1 metric ton. Simplify this measurement by multiplying the exponents, then simplify by finding the actual number of grams needed to equal 1 metric ton.

10-8**Practice****7AF2.2*****Roots of Monomials*****Simplify.**

1. $\sqrt{n^6}$

2. $\sqrt{y^8}$

3. $\sqrt{169p^4}$

4. $\sqrt{0.36a^6b^2}$

5. $\sqrt{2.25f^{10}g^{12}}$

6. $\sqrt{\frac{1}{49}j^4k^6m^8}$

7. $\sqrt[3]{x^9}$

8. $\sqrt[3]{c^{18}}$

9. $\sqrt[3]{27m^{15}}$

10. $\sqrt[3]{0.027t^{12}u^6}$

11. $\sqrt[3]{\frac{1}{64}y^{21}z^{27}}$

12. $\sqrt[3]{0.216e^{12}f^{18}}$

13. MEASUREMENT Express the side of one side of a square whose area is $64s^6t^8$ square units as a monomial.

14. MEASUREMENT Express the side of one side of a square whose volume is $64x^{15}y^{18}$ cubic units as a monomial.

Write a radical expression for each square root.

15. $6|j^5|k^4$

16. $13|n^7p^{11}|$

17. $10s^8t^{12}$

Write a radical expression for each cube root.

18. $7y^4z^5$

19. $5a^2b^7$

20. $6c^3d^8e^4$

11-1 Practice**7MR2.5, 7SDAP1.1****Problem-Solving Investigation: Make a Table****Mixed Problem Solving**

Use the make a table strategy to solve Exercises 1 and 2.

- 1. LIZARDS** Biologists recorded the lengths of lizards they found in the desert. About what percent of the lizard lengths are from 3.0 to 6.9 inches?

Lengths of Lizards Found		
Length (in.)	Tally	Frequency
1.0–1.9	3	3
2.0–2.9	4	4
3.0–3.9	5	5
4.0–4.9	4	4
5.0–5.9	4	4
6.0–6.9	2	2
7.0–7.9	2	2

- 2. BOOKS** The list below shows book prices for various books at a used book sale. Organize the data in a table using intervals \$1.00–\$1.99, \$2.00–\$2.99, \$3.00–\$3.99, and so on. What is the most common interval of book prices?

\$3.78	\$1.05	\$6.52	\$1.65	\$4.99	\$2.83
\$1.52	\$4.85	\$4.64	\$5.10	\$3.09	\$1.90
\$6.29	\$3.72	\$6.50	\$3.39	\$2.55	\$1.89
\$3.22	\$4.26	\$5.29	\$4.99	\$1.10	\$2.50

Use any strategy to solve Exercises 3 and 4. Some strategies are shown below.

PROBLEM-SOLVING STRATEGIES

- Use the four-step plan.
- Use logical reasoning.
- Act it out.
- Make a table.

- 3. ART FAIR** At the art fair, 95 artists exhibited their work. Of those 95 artists, 25 showed sculptures and 48 showed paintings. If 12 showed both sculptures and paintings, how many artists showed only sculptures or paintings?

- 4. NUMBER CUBE** Jacy tossed a number cube several times and recorded the number shown after each toss. His results are listed below. Find the number that was tossed most frequently.

3	6	1	3	5	3	4	2	6
1	5	4	4	5	6	6	1	4
4	2	5	6	1	1	2	3	6

Select the Operation

For Exercise 5, select the appropriate operation(s) to solve the problem. Justify your selection(s) and solve the problem.

- 5. GEOGRAPHY** Finland has a land area of 117,943 square miles. If the total area of Finland is 130,128 square miles, what percent of Finland's total area is water, to the nearest tenth of a percent?

11-2 Practice**7SDAP1.1****Histograms**

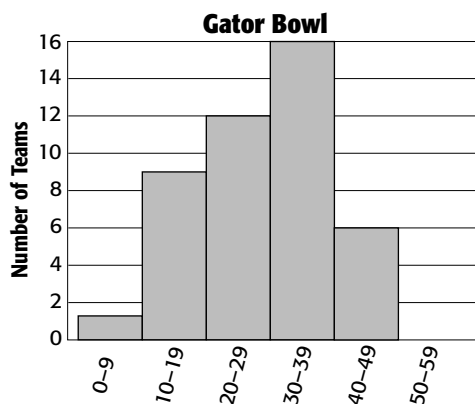
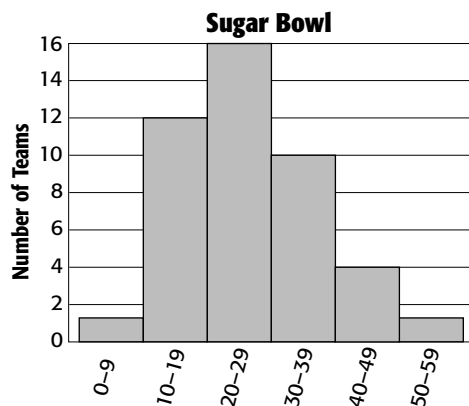
- 1. GOVERNMENT** The list gives the year of birth for each state governor in the United States in 2005. Choose intervals and make a frequency table. Then construct a histogram to represent the data.

1944	1933	1957	1955	1947	1950	1946	1935
1953	1946	1953	1951	1956	1949	1950	1948
1952	1942	1955	1957	1947	1959	1960	1947
1970	1955	1948	1936	1952	1946	1947	1945
1950	1957	1942	1963	1940	1944	1942	1960
1954	1943	1950	1960	1951	1954	1947	1947
1945	1950						

Source: The National Governor's Association

Birth Years of U.S. State Governors, 2005

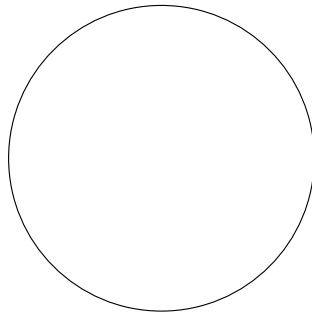
FOOTBALL For Exercises 2–5, use the histograms shown.

Scores of Winning Teams, 1960–2004Source: *The World Almanac 2005*

- Which bowl game had the higher winning team score?
- In which bowl game was the winning team score in the interval 30-39 points more often?
- Determine which bowl game has had a winning team score of at least 30 points more often.
- What was the lowest winning team score in each bowl game? Explain.

11-3 Practice**7SDAP1.1****Circle Graphs**

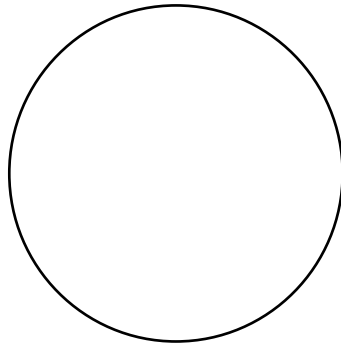
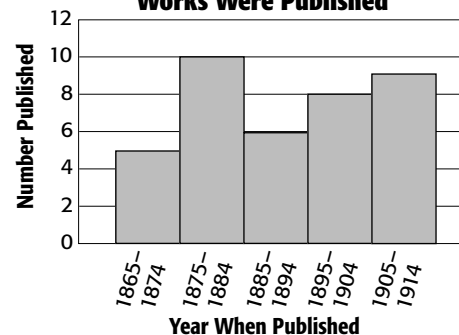
- 1. ENERGY** Construct a circle graph for the data in the table.

U.S. Energy Sources

U.S. Energy Sources	
Petroleum	39.2%
Natural Gas	23.7%
Coal	22.8%
Nuclear Power	8.4%
Hydropower	2.7%
Other	3.2%

Source: *The World Almanac for Kids 2005*

- 2. LITERATURE** Construct a circle graph for the data in the histogram.

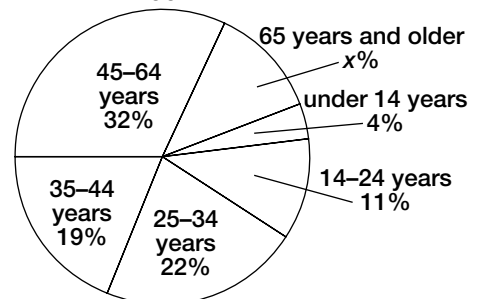
When Mark Twain's Major Works Were Published**When Mark Twain's Major Works Were Published**

Source: wikipedia.org

GOLF For Exercises 3 and 4, use the circle graph at the right.

- 3.** Find the percent of golf equipment buyers who are 65 years or older. Then find the measure in degrees of the angle of the 65 years and older section of the graph to the nearest tenth degree.

- 4.** Describe the buyers of golf equipment.

Golf Equipment Buyers 2004

Source: National Sporting Goods Association

11-4 Practice

7SDAP1.3

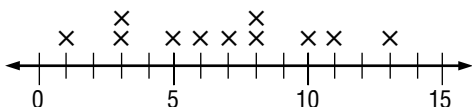
Measures of Central Tendency and Range

Find the mean, median, mode, and range of each set of data. Round to the nearest tenth if necessary.

1. The prices, in dollars, of day packs
37, 43, 41, 36, 43

2. Points on quizzes
13, 6, 9, 8, 14, 5, 10, 7

3.



4.



For Exercises 5 and 6, select the appropriate measure of central tendency or range to describe the data in each table. Justify your reasoning. Sample answers are given.

5.

Known Mountains on Mars	
Mountain	Height (km)
Alba Patera	3
Arsia Mons	9
Ascraeus Mons	11
Olympus Mons	27
Pavonis Mons	7

Source: wikipedia.org

6.

Average Lengths of Wild Cats			
Cat	Length	Cat	Length
Cheetah	50.5 in.	Lion	102 in.
Eurasian Wildcat	24.3 in.	Puma	60 in.
Jaguar	57.5 in.	Serval	33.5 in.
Leopard	57 in.	Tiger	128 in.

Source: Facts on File: Animal Fact File

7. **MARS** Refer to the table of mountains on Mars in Exercise 5. Describe how the mean, median, mode, and range are each affected if the data for Olympus Mons is not included.

11-5 Practice**7SDAP1.3****Measures of Variation****WILD CATS** For Exercises 1–4, use the data in the table.

1. What is the range of the data?
2. Find the median, the upper and lower quartiles, and the interquartile range of the data.
3. Identify any outliers.
4. Use the measures of variation to describe the data in the table.

Average Birth Weights of Wild Cats			
Cat	Weight (oz)	Cat	Weight (oz)
Cheetah	7.5	Lion	48
Eurasian Wildcat	1.4	Puma	12
Jaguar	28	Serval	8.5
Leopard	17.5	Tiger	40

Source: *Facts on File: Animal Fact File***PRECIPITATIONS** For Exercises 5–8, use the data in the table.

5. What is the range of the data?
6. Find the median, the upper and lower quartiles, and the interquartile range of the data.
7. Identify any outliers.
8. Use the measures of variation to describe the data in the table.

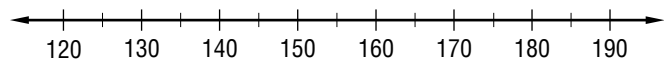
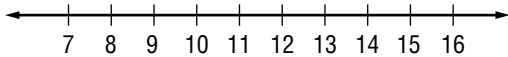
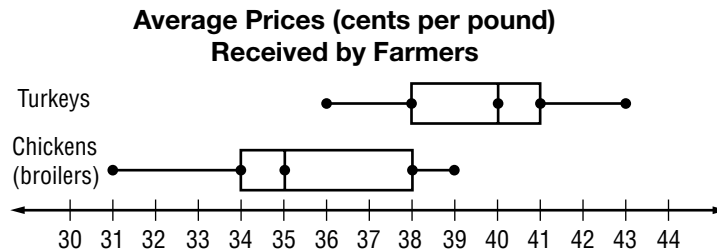
Death Valley Average Monthly Precipitations			
0.19	0.13	0.35	0.12
0.12	0.05	0.42	0.18
0.11	0.42	0.14	0.10

Source: weather.com

11-6 Practice**7SDAP1.1****Box-and-Whisker Plots****Construct a box-and-whisker plot for each set of data.**

1. Ages of children already signed up for swimming classes:
10, 12, 9, 7, 10, 12, 14, 14, 10, 16

2. Prices, in dollars, of bicycles on sale:
150, 134, 132, 120, 145, 170, 125, 130,
145, 185, 140

**POULTRY For Exercises 3–7, use the box-and-whisker plot below.**Source: *The World Almanac 2005*

- How many outliers are in the data?
- How do the range in chicken prices and the range in turkey prices compare?
- In the chicken prices, which quartiles show the greatest spread of data?
- What percent of the data for the turkey prices is above the upper quartile for the chicken prices?
- In general, do farmers get higher prices for chickens or for turkeys? Justify your reasoning.

11-7 Practice**7SDAP1.1****Stem-and-Leaf Plots****Display each set of data in a stem-and-leaf plot.**

- {68, 63, 70, 59, 78, 64, 68, 73, 61, 66, 70}
- {27, 32, 42, 31, 36, 37, 47, 23, 39, 31, 41, 38, 30, 34, 29, 42, 37}

3.

Major League Baseball Leading Pitchers, 2005	
Player	Wins
C. Capuano	18
C. Carpenter	21
B. Colon	21
J. Garland	18
R. Johnson	17
C. Lee	18
J. Lieber	17
R. Oswalt	20
A. Pettitte	17
D. Willis	22

Source: sports.espn.go.com

4.

Average Prices Received by U.S. Farmers, 2004	
Commodity	Price (dollars per 100 pounds)
Beef Cattle	86
Hogs	49
Lambs	101
Milk	16
Veal Calves	119

Source: U. S. Department of Agriculture

RECREATION For Exercises 5–7, use the information in the back-to-back stem-and-leaf plot shown at the right.

- The category with the lowest total expenditure in 1992 was motion pictures. What was its total?
- What is the median total recreational spending for 1992? For 2002?
- Compare the total spending on recreation in 1992 with that in 2002.

Total U.S. Spending on Personal Recreation (by Category)

1992		2002
7 5 5	0	9
8 7 2 0	1	0 2 8
7 2	2	2
4 0	3	4 5 7
	4	4
	5	6
	6	0
1	7	
	8	4
	9	

7 | 2 = \$27 billion

3 | 5 = \$35 billion

11-8 Practice

7SDAP1.1

Select an Appropriate Display

Select an appropriate type of display for each situation. Justify your reasoning.

- prices of athletic shoes in the store arranged by intervals
- the numbers of teens who spend Saturdays doing homework, playing, and/or doing chores
- the number of each of four kinds of trees found in the forest
- the spread of the run times for the first $\frac{1}{4}$ of the runners completing a marathon

Select an appropriate type of display for each situation. Justify your reasoning. Then construct the display.

5.

Heights of Mountains on the Moon	
Height	Percent of the Mts.
Less than 1 km	11.8%
1-2 km	17.7%
2-3 km	17.7%
3-4 km	35.3%
More than 4 km	17.7%

Source: wikipedia.com

6. **WORK** Jim worked 1 hour on Monday. On Tuesday, he worked 2 more hours than he worked on Monday. On Wednesday, he worked 2 more hours than he worked on Tuesday. The pattern continued through Friday.

12-1**Practice****6SDAP3.1****Counting Outcomes**

Draw a tree diagram to determine the number of possible outcomes.

1. A coin is tossed and one of the vowels A, E, I, O, and U is chosen at random.
2. Peanut butter comes in smooth or chunky and in small, regular, and family-size containers.

Use the Fundamental Counting Principle to find the number of possible outcomes.

3. A month of the year is picked at random and a coin is tossed.
4. A quarter and a dime are tossed and a number cube is rolled.
5. There are 8 true-false questions on a science quiz.

GIFT BASKETS For Exercises 6–9, use the following information.

Gina made gift baskets to sell at her electronics store. Each basket had a CD of either classical or jazz music, a DVD of a comedy or an action film, a video game or a financial software package, and a small, medium, or large T-shirt with her store's logo. An equal number of baskets of each possible combination were made.

6. How many different basket combinations were there?
7. Find the number of combinations that had a video game.
8. If a basket was chosen randomly, what is the probability that the basket contained an action film?
9. What is the probability of choosing a basket with classical music and a large T-shirt?

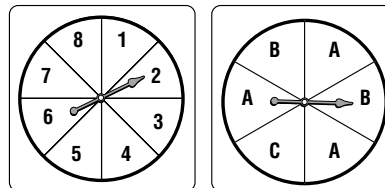
12-2 Practice**6SDAP3.1****Probability of Compound Events****The two spinners at the right are spun. Find each probability.**

1. $P(4 \text{ and } C)$

2. $P(1 \text{ and } A)$

3. $P(\text{even and } C)$

4. $P(\text{odd and } A)$



5. $P(\text{greater than 3 and } B)$

6. $P(\text{less than 5 and } B)$

GAMES There are 10 yellow, 6 green, 9 orange, and 5 red cards in a stack of cards turned face down. Once a card is selected, it is not replaced. Find each probability.

7. $P(\text{two yellow cards})$

8. $P(\text{two green cards})$

9. $P(\text{a yellow card and then a green card})$

10. $P(\text{a red card and then an orange card})$

11. $P(\text{two cards that are not orange})$

12. $P(\text{two cards that are neither red nor green})$

13. OFFICE SUPPLIES A store sells a box of highlighters that contains 4 yellow, 3 blue, 2 pink, and 1 green highlighter. What is the probability of randomly picking 1 blue and 1 pink highlighter from the box?**14. BASKETBALL** Angelina makes 70% of her free throws. What is the probability that she will make her next two free throws?**CAR RENTALS** For Exercises 15 and 16, use the following information and the information in the table.

At a car rental office, 63% of the customers are men and 37% are women.

15. What is the probability that the next customer will be a woman who requests a convertible?

Car Requests	
Compact	25%
Full-size	37%
Convertible	10%
SUV	16%
Luxury	12%

16. What is the probability that the next customer will be a man who requests either a compact car or luxury car?

12-3 Practice**6SDAP3.2*****Experimental and Theoretical Probability*****TELEPHONES** For Exercises 1 and 2, use the following information.

Of the last 45 telephone calls received at a bank, 6 involved questions about Automatic Teller Machines (ATM) locations.

1. What is the probability that the next call will involve a question about the location of an ATM?
2. If 500 calls are received in one day, how many would you expect to be questions about ATM locations?
3. **ARCHERY** Julius hit the center of the target with 8 of his last 36 arrows. What is the experimental probability that he will hit the center with his next arrow?

DRINKS For Exercises 4 and 5, use the information about drinks ordered by 200 customers at a restaurant.

Drinks Ordered	
Drink	Number
Water	64
Milk	22
Coffee	35
Soft Drink	68
Other	11

4. What is the probability that a customer ordered milk?
5. On a day when the restaurant has 800 customers, how many would you expect to order milk?
6. **NEWSPAPERS** In the last 40 days, Mr. Neptune's newspaper has been delivered late 6 times. What is the experimental probability that it will be delivered late tomorrow?

TECHNOLOGY For Exercises 7 and 8, use the results of a survey of 80 teens at a school shown at the right.

Technology Device	Number Who Own
Cell Phone	45
Digital Camera	32
DVD Player	65
Laptop Computer	18

7. What is the probability that a teen at the school owns a digital camera?
8. Out of 750 students at the school, how many would you expect to own a digital camera?

12-4 Practice**7MR2.5, 6SDAP3.2****Problem-Solving Investigation: Act It Out****Mixed Problem Solving****For Exercises 1 and 2, use the act it out strategy.**

- 1. BILLS** Joaquin bought a DVD for \$21. He gave the cashier two \$20 bills. How many different combinations of \$1, \$5, and \$10 bills can the cashier give him for change?

- 2. TENNIS** Felix, Lolita, Tetsuo, Ling, and Maxine are on the school tennis team. When ranked from first to fifth, how many ways can they be ranked if Maxine is always first and Felix is always ranked above Tetsuo?

Use any strategy to solve Exercises 3 and 4. Some strategies are shown below.**PROBLEM-SOLVING STRATEGIES**

- Use the four-step plan.
- Work Backward.
- Look for a pattern.
- Use logical reasoning.
- Act it out.

- 3. PUMPKINS** Mr. Greene harvested pumpkins for selling at four markets. He sold one-fifth of his crop at the first market, 40 at the second, 25% of the remaining at the third, and twice what he sold at the second at the fourth market. If Mr. Greene has one pumpkin remaining, how many pumpkins did he sell?

- 4. CHORES** Kimberley has the choice of washing the car, mowing the lawn, or raking leaves on Saturday and baking a cake, washing the dishes, or doing the laundry on Sunday. In how many ways can she choose one chore for each day?

Select the Operation**For Exercises 5 and 6, select the appropriate operation(s) to solve the problems. Justify your solution(s) and solve the problem.**

- 5. FUND-RAISER** The drama club is selling 100 T-shirts for \$15 each for a fund-raiser. The T-shirts cost a total of \$623. If they sell all the T-shirts, how much money will be raised for the drama club?

- 6. DELICATESSEN** A delicatessen offers the possibility of 180 kinds of sandwiches made with wheat, rye, white, or sourdough breads. If the delicatessen adds multi-grain bread to the menu, find the number of possible kinds of sandwiches the delicatessen now offers.

12-5 Practice**6SDAP2.5*****Using Sampling to Predict*****Determine if each conclusion is valid. Then describe each sample.**

1. To determine the most common injury cared for in an emergency room, a reporter goes to the same hospital every afternoon for one month during the summer and observes people entering the emergency room. She concludes that second degree sunburn is the most common injury.
2. To evaluate customer satisfaction, a grocery store gives double coupons to anyone who completes a survey as they enter the store. The store manager determines that customers are very satisfied with their shopping experience in his store.
3. To evaluate the integrity of underground water lines, the department of public works randomly selects 20 sites in each of 5 sectors of the city to unearth and observe the water lines. At 24 of the sites, the water lines needed repair. The department of public works concludes that one-fourth of underground water lines throughout the city need repair.
4. **DOWNLOADS** A guidance counselor asked students who owned mobile phones, which was the last type of download each one downloaded to their mobile phone. The results are shown in the table. If there are 420 students in the school, how many can be expected to download *ringtones*?

Mobile Phone Downloads	
Type	Frequency
Games	10
Ringtones	25
Screensavers	14
Music	36

DENTISTRY A survey is to be conducted to determine the reasons dental patients are hesitant to go to the dentist. Describe the sample and explain why each sampling method might not be valid.

5. Adults that are randomly selected from an office complex are asked to go online and fill out a questionnaire.
6. A randomly selected dentist asks his patients why they may be hesitant to go to a dentist.
7. Randomly selected dental patients from different age groups who are having a routine check-up are asked to write down their feelings.

