1-1 Practice

Using a Problem-Solving Plan

Solve each problem.

1. **RETAIL** At a school bookstore, a ballpoint pen costs $0.28 and a notepad costs $0.23. What could you buy and spend for exactly 0.74?

2. **SOCCER** At soccer practice, each player must kick the ball to every other player present at least once. If there are 17 players at practice, what is the minimum number of kicks required?

3. **MONEY** Mr. Jasper asked his neighbor, Mark, to feed his cat each day while he went on a two-week vacation. Suppose Mr. Jasper offered Mark two payment options. The first option would pay Mark $5 per day up front. The second option would pay $0.01 the first day, then double the pay each day for two weeks. He would pay this option when he returned. Which option should Mark choose?

4. **NUMBER THEORY** Use the following clues to find the secret number.

   I am a 3-digit number.

   All of my digits are odd.

   I am less than 600.

   I am greater than 400.

   If you add my digits you get 15.

   My last digit is 7.

   What am I?

Find the next term in each list.

5. 9, 13, 17, 21, 25, . . .

6. 88, 86, 84, 82, 80, . . .

7. 0, 7, 14, 21, 28, . . .

8. 3, 6, 12, 24, 48, . . .

GEOMETRY   Draw the next figure in each pattern.

9.

10.

1-2 **Practice**

Numbers and Expressions

Find the value of each expression.

1. $4 + 2 \cdot 8$
             2. $30 - 12 \cdot 2$

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

5. $6(6) \div (2 \cdot 9)$
    6. $6(6 \div 2 \cdot 9)$

7. $12 - 2 \cdot 5 + 3$
    8. $(4 + 5) \cdot (4 + 5)$

9. $100 \div (16 + 9) \cdot 6$
    10. $25 + 30 \div 6 \cdot 5$

11. $16 - 49 \div 7 \cdot 2$
    12. $(2 \cdot 11 + 1) - (3 \cdot 6 + 5)$

13. $\dfrac{4(10 + 2)}{2(24 \div 3)}$
    14. $2 + 4 \cdot 6 - 3 \cdot 5 + 6 \cdot 2$

15. $(8 + 4) \cdot (6 - 3)$
    16. $\dfrac{2(6 + 4)}{2(8 - 6)}$

17. $4(8 + 2 \cdot 5 - 6)$
    18. $2(105 \div 15 - 6)$

19. $14 \div 2 \cdot 5 + 3$
    20. $4(4 + 5) \div 3(10 - 7)$

Write a numerical expression for each verbal phrase.

21. thirty-one increased by fourteen

22. the difference of sixteen and nine

23. the sum of seven, four, and eighteen

24. three times forty

25. the quotient of eighty-one and three

26. four more than the product of seven and eight

27. the cost of three slices of pizza at $2 each

28. the number of days in six weeks

29. BOWLING Alicia rented bowling shoes for $3 and played 4 games at $2 each. Write and evaluate an expression for the total cost of bowling.

30. TICKETS Adult tickets for a movie cost $6 and children's tickets cost $3. If two adults and three children go to the movies, how much will they pay?

1-3 Practice

Variables and Expressions

ALGEBRA Evaluate each expression if $x = 12$, $y = 20$, and $z = 4$.

1. $x + y + z$ **2.** $4x - y$

3. $3x + 2y$ **4.** $y - 3z$

5. $x + y \div z$ **6.** $yz + x$

7. $(y - x) + (y - z)$ **8.** $\frac{y}{z} + \frac{x}{z}$

9. $\frac{5x}{3y}$ **10.** $z(y - x) + 4z$

ALGEBRA Evaluate each expression if $a = 3$, $b = 6$, $c = 5$, and $d = 9$.

11. $a + b + c + d$ **12.** $\frac{(a + b + c)}{2}$

13. $ab + bc$ **14.** $6d - c \cdot c$

15. $3(a + b + c)$ **16.** $\frac{100}{5c}$

17. abc **18.** $10(6c - 3d)$

19. $\frac{2(a + b)}{6(b - c)}$ **20.** $4[(d - a) + c]$

ALGEBRA Translate each phrase into an algebraic expression.

21. six times a number minus eleven

22. the product of eight hundred and a number

23. the quotient of thirty and the product of ten times a number

24. five times the sum of three and some number

25. half the distance to the school.

26. RECYCLING In order to encourage recycling, the city is offering five cents for every pound of newspapers collected, twenty-five cents per pound for cans, and ten cents per pound for glass bottles or jars.

    a. Write an expression for the total amount earned from recycling.

    b. If Chen brings in ten pounds of newspapers, eight pounds of cans, and two pounds of glass, how much will he receive?

1-4 Practice

Properties

Name the property shown by each statement.

1. $55 + 6 = 6 + 55$

2. $6 \cdot 7 = 7 \cdot 6$

3. $(x + 3) + y = x + (3 + y)$

4. $1 \cdot mp = mp$

5. $9 + (5 + 35) = (9 + 5) + 35$

6. $67 + 0 = 67$

7. $7x \cdot 0 = 0$

8. $4(3 \cdot z) = (4 \cdot 3)z$

Find each sum or product mentally.

9. $18 + 17 + 22$

10. $12 + 15 + 8 + 5$

11. $60 \cdot 4 \cdot 2$

12. $49 \cdot 0 \cdot 16$

13. $2 \cdot 157 \cdot 5$

14. $14 + 25 + 16$

ALGEBRA Simplify each expression.

15. $(m + 11) + 19$

16. $(9 \cdot b) \cdot 10$

17. $19 + (v + 8)$

18. $(28 + 12) + x$

19. $8s \cdot 0$

20. $4 \cdot (r \cdot 5)$

21. **GEOMETRY** The volume of a box is given by $V = \ell \cdot w \cdot h$ where ℓ = length, w = width, and h = height. Find the volume of a box if length is 25 cm, width is 13 cm, and height is 4 cm.

22. **SCHOOL** In math class each assignment is worth 20 points. David got 17, 20, 19, and 13 points on his last four assignments. How many points did David score altogether?

23. State whether the following statement is true or false: Multiplying any number by one produces the original number. Explain.

Lesson 1–4

1-5 Practice

Variables and Equations

ALGEBRA Find the solution of each equation from the list given.

1. $w + 16 = 31$; 13, 15, 17   **2.** $z + 31 = 72$; 37, 39, 41

3. $25 - p = 0$; 21, 23, 25   **4.** $s - 14 = 2$; 12, 14, 16

5. $19 = t - 21$; 40, 42, 44   **6.** $b = 15 - 3$; 12, 14, 16

7. $9q = 72$; 6, 8, 10   **8.** $35 = 5m$; 7, 9, 11

9. $\dfrac{75}{n} = 15$; 5, 7, 9   **10.** $\dfrac{p}{8} = 10$; 80, 84, 88

ALGEBRA Solve each equation mentally.

11. $g + 19 = 29$ **12.** $26 + h = 35$

13. $n - 6 = 12$ **14.** $36 \div a = 12$

15. $\dfrac{90}{45} = u$ **16.** $3t = 39$

17. $15 + r = 30$ **18.** $34 - v = 20$

ALGEBRA Define a variable. Then write an equation and solve.

19. The sum of 3, 5, and a number is 15.

20. The difference of a number and 16 is 5.

21. The quotient of 56 and a number is 7.

22. A number increased by 30 is 63.

23. Eight times a number is 32.

24. A number decreased by 4 is 41.

25. WEATHER During the month of July, meteorologists recorded 5 inches of rainfall. This is 6 inches below average. Define a variable and write an equation that can be used to determine the average rainfall for July. Find the average rainfall for July**.**

26. FOOD Junot and Lisa ordered a pizza and cut it into six slices. If Junot ate one slice and Lisa ate one slice, how many slices are left?

Lesson 1–5

1-6 Practice

Ordered Pairs and Relations

Graph each point on the coordinate system.

1. $Q(4, 2)$ **2.** $V(3, 7)$

3. $T(0, 3)$ **4.** $B(8, 6)$

5. $R(5, 0)$ **6.** $L(4, 4)$
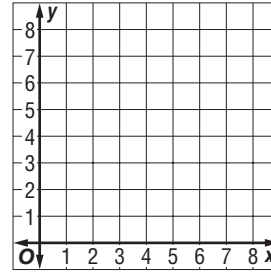
Write the ordered pair that names each point.

7. J **8.** X

9. R **10.** B

11. K **12.** H

13. D **14.** N
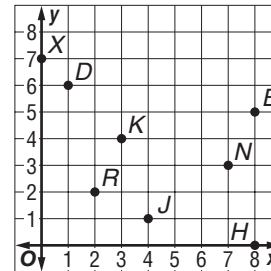
Express each relation as a table and as a graph. Then determine the domain and range.

15. {(3, 7), (1, 1), (6, 5), (2, 4)}   **16.** {(0, 2), (4, 6), (3, 7)}

x	y
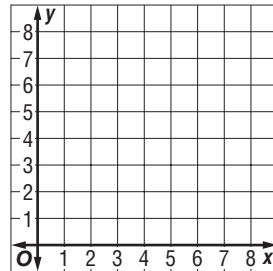
x	y
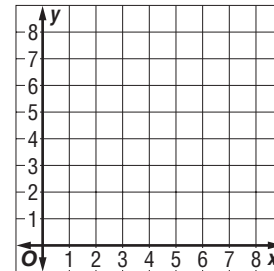
17. GEOMETRY Graph (2, 1), (2, 4), and (5,1) on the coordinate system.

    a. Connect the points with line segments. What figure is formed?

    b. Multiply each number in the set of ordered pairs by 2. Graph and connect the new ordered pairs. What figure is formed?

    c. Compare the two figures you drew. Write a sentence that tells how the figures are the same and how they are different.
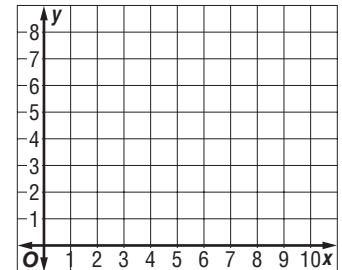
1-7 Practice

Scatter Plots

Determine whether a scatter plot of the data for the following might show a *positive*, *negative*, or *no* relationship.

1. a person's jogging speed and time spent jogging

2. the size of a family and the weekly grocery bill

3. the size of a car and the cost

4. a person's weight and percent body fat

5. time spent playing video games and time spent on outdoor activity

6. Draw a scatter plot with ten ordered pairs that shows a negative relationship.
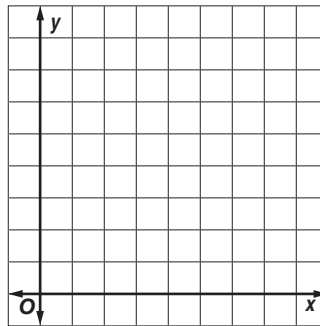
EMPLOYMENT For Exercises 7–9, use the table below, which shows the federal minimum wage rates from 1950 to 2000.

Year	Minimum Wage
1950	$0.75
1955	$0.75
1960	$1.00
1965	$1.25
1970	$1.60
1975	$2.10
1980	$3.10
1985	$3.35
1990	$3.80
1995	$4.25
2000	$5.15

Source: U.S. Census Bureau

7. Make a scatter plot of the data.

Minimum Wage

8. Does there appear to be a relationship between year and minimum wage?

9. Based on the graph, predict what the minimum wage will be for the year 2010.

2-1 Practice

Integers and Absolute Value

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

1. $0 ● -5$ 2. $10 ● -10$ 3. $-8 ● 3$ 4. $11 ● 11$

5. $-18 ● -18$ 6. $-18 ● 18$ 7. $18 ● -18$ 8. $18 ● 18$

9. $-120 ● -95$ 10. $35 ● -12$ 11. $-35 ● 12$ 12. $41 ● 17$

Order the integers in each set from least to greatest.

13. $\{-14, -6, -22, 0\}$ 14. $\{-3, 19, 0, -5\}$ 15. $\{-7, 20, -21, 7\}$

16. $\{15, -1, 4, -3\}$ 17. $\{0, -1, 2, -3, 4\}$ 18. $\{55, 0, -60, 12\}$

19. $\{-48, -30, -49, -8, 3, -4\}$ 20. $\{27, -9, 3, 0, -2, 29\}$

Evaluate each expression.

21. $|-7|$ 22. $|14|$ 23. $|-11|$

24. $|-9| - |6|$ 25. $|-18| - |-8|$ 26. $|-12| + |1|$

27. $|8 - 4|$ 28. $|23| - |18|$ 29. $|-16| + |-22|$

Evaluate each expression if $a = -3$, $b = 0$, and $c = 1$.

30. $|a| - |c|$ 31. $|a| + |c|$ 32. $|ab| + c$

33. $5 - |ac|$ 34. $c + |-5|$ 35. $c + |5|$

36. **WEATHER** At 6:15 a.m. the temperature was $-8°$F. At 12:15 p.m. the temperature was $-12°$F. At 6:16 p.m. the temperature was $-10°$F. Order the temperatures from least to greatest.

2-2 Practice

Adding Integers

Find each sum.

1. $-19 + (-7)$　　　**2.** $-29 + 30$　　　　**3.** $-32 + 9$　　　　　**4.** $10 + 37$

5. $34 + 22$　　　　**6.** $-16 + (-28)$　　　**7.** $-4 + (-50)$　　　**8.** $-12 + (-63)$

9. $26 + (-9)$　　**10.** $-17 + (-23)$　　**11.** $12 + (-22)$　　**12.** $18 + (-56)$

13. $-36 + (-36)$　　**14.** $-54 + 45$　　**15.** $-34 + 17$　　**16.** $-16 + (-24)$

17. $70 + (-108)$　　**18.** $-52 + 36$　　**19.** $-71 + (-86)$　　**20.** $-39 + (-40)$

21. $25 + 18 + (-23)$　　　**22.** $-65 + (-2) + 9$　　　**23.** $80 + 15 + (-26)$

24. $-5 + 4 + (-27)$　　　**25.** $-29 + 12 + 44$　　　**26.** $-1 + (-8) + (-49)$

27. $-16 + (-56) + (-90)$　　**28.** $-18 + 13 + (-35)$　　**29.** $10 + (-34) + 17$

30. $30 + (-9) + 1$　　　**31.** $-24 + 7 + 47$　　　**32.** $51 + (-21) + (-12)$

33. TEMPERATURE At 4:00 A.M., the outside temperature was $-28°$F. By 4:00 P.M. it rose 38 degrees. What was the temperature at 4:00 P.M.?

34. HEALTH Three friends decided to exercise together four times a week to lose fat and increase muscle mass. While all three were healthier after six weeks, one had lost 5 pounds, another had gained 3 pounds, and one had lost 4 pounds. What was the total number of pounds gained or lost by the three friends?

35. ROLLER COASTERS The latest thrill ride at a popular theme park takes roller coaster fans on an exciting ride. In the first 20 seconds, it carries its passengers up a 100-meter hill, plunges them 72 meters down, and quickly takes them back up a 48-meter rise. How much higher or lower from the start of the ride are they after these 20 seconds?

2-3 Practice

Subtracting Integers

Find each difference.

1. $-26 - (-30)$ **2.** $25 - 32$ **3.** $-18 - 54$ **4.** $59 - (-19)$

5. $-41 - (-19)$ **6.** $-20 - 13$ **7.** $31 - (-56)$ **8.** $15 - (-40)$

9. $-32 - 28$ **10.** $10 - (-23)$ **11.** $-14 - 64$ **12.** $-12 - (-36)$

13. $-81 - 4$ **14.** $9 - 30$ **15.** $-44 - (-21)$ **16.** $140 - (-9)$

Evaluate each expression if $a = -11$, $b = 8$, and $c = -6$.

17. $a - 17$ **18.** $10 - b$ **19.** $-30 - c$ **20.** $b - a$

21. $a - b$ **22.** $c - b$ **23.** $b - c + a$ **24.** $b - c - a$

25. $c - a - b$ **26.** $b + a - c$ **27.** $b + c - a$ **28.** $c - a + b$

29. $a - b + c$ **30.** $b - a + c$ **31.** $a - b - c$ **32.** $c + b - a$

33. $c - b + a$ **34.** $a + b - c$ **35.** $16 + a + c$ **36.** $a - b + 14$

37. ELEVATORS Linda entered an elevator on floor 9. She rode down 8 floors. Then she rode up 11 floors and got off. What floor was she on when she left the elevator?

38. INVESTMENTS The NASDAQ lost 36 points on a Monday, but rebounded the next day, gaining 24 points. What was the total change in points?

39. OFFICE BUILDINGS Randi takes the stairs at work whenever possible instead of the elevator. She must climb up 51 steps from her office to get to the accounting department. The human resources department is 34 steps below her office. How many steps are there between human resources and accounting?

2-4 Practice

Multiplying Integers

Find each product.

1. $8(16)$ **2.** $-4(17)$ **3.** $-1(-40)$ **4.** $-5(-7)$

5. $0(-54)$ **6.** $29(-2)$ **7.** $-20(-20)$ **8.** $-31(-4)$

9. $-2(-15)(-6)$ **10.** $3(-5)(-8)$ **11.** $-10(17)(-2)$ **12.** $-2(-2)(-2)$

13. $12(10)(5)$ **14.** $-50(-21)(2)$ **15.** $-8(-13)(-25)$ **16.** $-5(16)(4)$

ALGEBRA Simplify each expression.

17. $-6r \cdot (12s)$ **18.** $-15 \cdot (9v)$ **19.** $2ab \cdot (-25)$ **20.** $-27y \cdot (-z)$

21. $-60m(-2)(-3n)$ **22.** $-9u(-4)(-w)$ **23.** $29g(0)(-15)$ **24.** $-b(-12)(11)$

25. $19h(-1)(-2s)$ **26.** $-h(-jk)$ **27.** $(-1)(-a)(-bc)$ **28.** $(-1)(-fg)(-xy)$

ALGEBRA Evaluate each expression if $a = -1$, $b = -6$, and $c = 5$.

29. $-11a$ **30.** $4ab$ **31.** $-8bc$ **32.** $-10ac$

33. $15ab$ **34.** $12ac$ **35.** abc **36.** $-abc$

37. $-11a(-bc)$ **38.** $4ab(-8c)$ **39.** $9a(-2b)(5c)$ **40.** $-3a(-2b)(-c)$

41. REAL ESTATE In Montyville, the value of homes has experienced an annual increase of -2 percent. If the rate continues, what will be the increase over 10 years?

42. RETAIL The Good Food n' More grocery store loses an average of $210 a day due to breakage, shoplifting, and food expiration. How much money does the store lose on average per 7-day week?

2-5 Practice

Dividing Integers

Find each quotient.

1. $-44 \div 4$ **2.** $0 \div (-5)$ **3.** $-21 \div 21$ **4.** $32 \div 8$

5. $-17 \div -17$ **6.** $-49 \div 7$ **7.** $80 \div -4$ **8.** $-64 \div -8$

9. $\dfrac{72}{-9}$ **10.** $\dfrac{-100}{-5}$ **11.** $\dfrac{-90}{6}$ **12.** $\dfrac{360}{12}$

13. $\dfrac{-400}{-25}$ **14.** $\dfrac{-525}{5}$ **15.** $\dfrac{84}{-6}$ **16.** $\dfrac{215}{5}$

Evaluate each expression if $a = -2$, $b = 5$, and $c = -4$.

17. $-35 \div b$ **18.** $54 \div a$ **19.** $-56 \div c$ **20.** $205 \div b$

21. $\dfrac{c}{-2}$ **22.** $\dfrac{b}{5}$ **23.** $\dfrac{2}{a}$ **24.** $\dfrac{-4}{c}$

25. $\dfrac{-28}{c}$ **26.** $\dfrac{ac}{-8}$ **27.** $\dfrac{bc}{a}$ **28.** $\dfrac{250}{ab}$

Find the average (mean) of each group of numbers.

29. 23, 20, 27, 18   **30.** $-8, 9, 4, 0, 2, -1$ **31.** 17, 21, 4

32. $-20, -15, -12, -1, 1, 12, 15, 20$ **33.** $-7, -3, -9, 0, 21, -2, -14$

34. TESTS Miranda earned scores of 84, 91, 95, 78, and 92 on her math tests. Find her average (mean) score.

35. TEMPERATURE At noon on Friday, the temperature was 0°F. Six hours later the temperature was -18°F. On average, what was the temperature change per hour?

36. BUSINESS The architecture firm of Stuart and Maxwell, Ltd., had monthly profits of $1200, $755, $-$450, $210, and $-$640 over 5 months. What was the average profit for those months?

2-6 Practice

The Coordinate System

Graph and label each point on the coordinate plane. Name the quadrant in which each point is located.

1. A $(8, 6)$

2. B $(-8, 6)$

3. C $(-4, -11)$

4. D $(3, -6)$

5. E $(9, 0)$

6. F $(-4, 1)$

7. G $(-10, -10)$

8. H $(0, -8)$

9. I $(6, -2)$

10. J $(2, 13)$
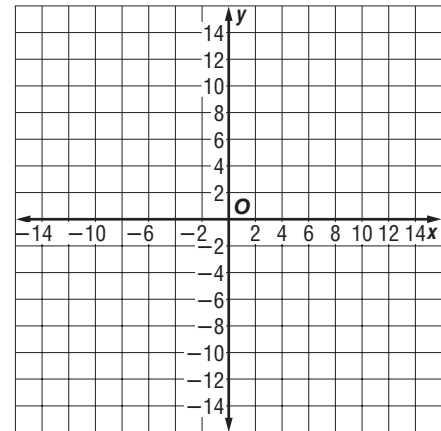
11. ALGEBRA Make a table of values and graph six sets of ordered pairs for the equation $y = 5 - x$. Describe the graph.

$y = 5 - x$		
x	y	(x, y)
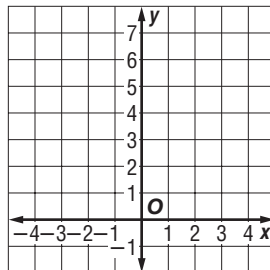
12. GEOMETRY On the coordinate plane, draw a rectangle $ABCD$ with vertices at $A(1, 4)$, $B(5, 4)$, $C(5, 1)$, and $D(1, 1)$. Then graph and describe the new rectangle formed when you subtract 3 from each coordinate of the vertices in rectangle $ABCD$.
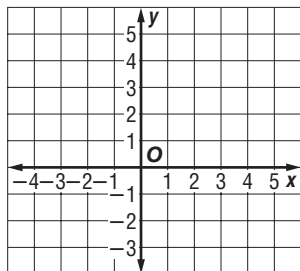
3-1 Practice

The Distributive Property

Use the Distributive Property to write each expression as an equivalent expression. Then evaluate the expression.

1. $6(80 + 1)$ **2.** $7(70 - 4)$ **3.** $(300 + 6)4$ **4.** $(100 + 10)9$

5. $5(400 - 90)$ **6.** $-8(700 - 3)$ **7.** $4(20 - 9)$ **8.** $(100 - 3)(-7)$

9. $-1(75 - 9)$ **10.** $14(21 - 11)$ **11.** $-25(80 + 2)$ **12.** $31(450 - 18)$

Use the Distributive Property to write each expression as an equivalent algebraic expression.

13. $7(y + 11)$ **14.** $-6(t - 1)$ **15.** $-8(u - 2)$ **16.** $(r + 9)(-4)$

17. $-1(-h + 5)$ **18.** $-2(f + 3)$ **19.** $-4(b - 1)$ **20.** $1(7 - v)$

21. $-2(d - 5)$ **22.** $22(n + 10)$ **23.** $-50(z - 1)$ **24.** $-12(g + 12)$

25. $17(p + 4)$ **26.** $(k - 21)(-8)$ **27.** $(-32 - s)(-9)$ **28.** $-28(a - 5)$

29. $-20(19 - a)$ **30.** $33(d + 4)$ **31.** $-18(-q - 5)$ **32.** $-16(c + 45)$

33. $-19(v - 1)$ **34.** $-1(r + 27)$ **35.** $53(x + 11)$ **36.** $-17(-n + 1)$

37. PLANTS   A planter weighs 2 pounds and holds 3 pounds of soil. Write two equivalent expressions for the total weight of nine planters. Then find the weight.

38. UNIFORMS   A uniform costs $42 for the sweater and $29 for the slacks. Write two equivalent expressions for the total cost of six uniforms. Then find the cost.

3-2 Practice

Simplifying Algebraic Expressions

Simplify each expression.

1. $6y - 4 + y$ 　　　　**2.** $8u + 2u - 3u$ 　　　　**3.** $-12 + 5g + 8 - g$

4. $-21w + 5 + 3w - 1$ 　　**5.** $r + r + r + r + r$ 　　**6.** $f - 3f + 2 - f + 1$

7. $-8q + 6 + 5q - 3$ 　　**8.** $h + 5h - 3 - 6h$ 　　**9.** $2a - 5(a + 1)$

10. $b - 2(b - 2)$ 　　**11.** $9 - t - 3(t + 3)$ 　　**12.** $-8 + 5(g + 2) - 2$

13. $12m + 9 - 2m - 16$ 　　**14.** $4(y - 3) + 9 - 3y$ 　　**15.** $8a + b - 3a + 4b$

16. $-11x + 4 + 8x - 4 + 3x$ 　　　　**17.** $-14y + 12(x + y) - 12x$

18. $19g - 4h + 4 - 20(g - 1)$ 　　　　**19.** $-5(c + d) - 4d + 5c - d$

20. $(8 - b)(-3) + 6b + 12 - 10b$ 　　　　**21.** $-p + q + 2(p + q) - p - q$

22. $-55n + 28n + 21n + 7n - n$ 　　　　**23.** $-12z + 4(z - 9) + 30 + z$

24. $-9 + w - v + 5w + 2v + 5$ 　　　　**25.** $-6(y - 1) + 2y + 7 - y + 4$

26. $x - 10 + y - 2(x + y) + y$

Write an expression in simplest form that represents the total amount in each situation.

27. LUNCH You bought 3 pieces of chicken that cost x dollars each, a salad for \$3, and a drink for \$1.

28. SOCCER Sal has scored g goals this season. Ben has scored four times as many goals as Sal. Chun has scored three fewer goals than Ben.

3-3 Practice

Solving Equations by Adding or Subtracting

Solve each equation. Check your solution.

1. $z + 6 = -5$ **2.** $x - 8 = -3$ **3.** $c - 2 = 21$ **4.** $v + 9 = 0$

5. $q + 10 = -30$ **6.** $w + 15 = 0$ **7.** $z + 12 = -19$ **8.** $b - 11 = 8$

9. $a - 12 = 0$ **10.** $r + 11 = 12$ **11.** $p + (-9) = 33$ **12.** $n - 16 = -16$

13. $s + 13 = -5$ **14.** $t - (-15) = 21$ **15.** $r - 14 = -23$ **16.** $m + (-3) = 9$

17. $d - 19 = 1$ **18.** $y + 30 = -1$ **19.** $u - 21 = 0$ **20.** $k - 18 = 2$

21. $f - 23 = 23$ **22.** $g - 24 = -24$ **23.** $h + 35 = 7$ **24.** $j + 40 = 25$

25. $x + 3 = -15$ **26.** $c + 22 = -27$ **27.** $v - 18 = -4$ **28.** $b - 41 = -30$

29. $h - 10 = 19$ **30.** $y - (-12) = 0$ **31.** $g + 58 = 9$ **32.** $n + 29 = 4$

33. $j + (-14) = 1$ **34.** $p - 21 = -2$ **35.** $k - (-13) = -8$ **36.** $m + 33 = 16$

37. SAVINGS ACCOUNT Jhumpa has \$55 in her savings account. This is \$21 more than David. Write and solve an equation to find the amount David has in his savings account.

38. WEATHER The temperature fell 16° between noon and 3:00 P.M. At 3:00, the temperature was −3°F. Write an equation to determine the temperature at noon.

3-4 Practice

Solving Equations by Multiplying or Dividing

Solve each equation. Check your solution.

1. $8y = 56$

2. $\dfrac{w}{4} = 12$

3. $-3u = -12$

4. $\dfrac{r}{-5} = 15$

5. $9d = -9$

6. $-8f = 0$

7. $\dfrac{n}{-1} = 31$

8. $\dfrac{v}{14} = -7$

9. $-1b = 24$

10. $-12h = -72$

11. $\dfrac{r}{24} = -5$

12. $\dfrac{p}{-6} = -3$

13. $-15x = 90$

14. $-4g = -20$

15. $\dfrac{z}{20} = -1$

16. $11t = 0$

17. $23g = -92$

18. $-7d = -28$

19. $\dfrac{m}{-15} = 7$

20. $9k = -9$

21. $6w = 0$

22. $-4r = 120$

23. $\dfrac{u}{12} = 1$

24. $-11q = -99$

25. $16y = -192$

26. $\dfrac{n}{-8} = 0$

27. $-7j = 84$

28. $-21p = -231$

Write and solve an equation for each sentence.

29. The product of a number and -6 is -54.

30. The quotient of a number and 6 is -14.

31. CLASS REPORTS Each student needs 12 minutes to give a report. A class period is 48 minutes long. Write and solve an equation to determine the number of students who could give a report in one class period.

32. COOKING One pound of ground beef makes four hamburger patties. Write and solve an equation to determine how many pounds of beef are needed to make 36 hamburgers.

3-5 Practice

Solving Two-Step Equations

Solve each equation. Check your solution.

1. $6p + 22 = 10$

2. $\dfrac{r}{3} - 4 = 2$

3. $5d - 9 = -24$

4. $21q - 11 = 10$

5. $\dfrac{v}{-6} + 1 = 0$

6. $7h + 20 = -8$

7. $8k - 40 = 16$

8. $\dfrac{w}{2} - 16 = 5$

9. $\dfrac{s}{4} - 5 = 1$

10. $\dfrac{x}{8} + 7 = 9$

11. $\dfrac{z}{10} - 20 = -20$

12. $\dfrac{r}{-2} + 11 = 15$

13. $9q + 10 = 118$

14. $\dfrac{n}{5} - 4 = -10$

15. $6w - 125 = 1$

16. $\dfrac{r}{3} - 16 = 2$

17. $9y - 11 - 5y = 25$

18. $20 - 15d = 35$

19. $\dfrac{u}{-9} - 8 = -4$

20. $-6h + 4 - 3 + h = 11$

21. $5p - 4p = 7$

22. $18 - \dfrac{x}{3} = -7$

23. $21 + 9j - 10 = -277$

24. $12b - 9 + 2b - b = -87$

25. $1 + \dfrac{a}{-9} - 4 = 0$

26. $4w - w - 26 = 19$

27. $5 - 4y + y - 1 = -23$

28. RENTAL AGREEMENTS A furniture rental store charges a down-payment of $100 and $75 per month for a table. Hilde paid $550 to rent the table. Solve $75n + 100 = 550$ to find the number of months Hilde rented the table.

29. BUSINESS At work, Jack must stuff 1000 envelopes with advertisements. He can stuff 12 envelopes in one minute, and he has 112 envelopes already finished. Solve $1000 = 12n + 112$ to find how many minutes it will take Jack to complete the task.

3-6 Practice

Writing Two-Step Equations

Translate each sentence into an equation. Then find each number.

1. Eight less than 7 times a number is -29.

2. Twenty more than twice a number is 52.

3. The difference between three times a number and 11 is 10.

4. One more than the difference between 18 and seven times a number is -9.

5. Eight times a number plus 6 less than twice the number is 34.

6. 26 more than the product of a number and 17 is -42.

7. Twelve less than the quotient of a number and 8 is -1.

Solve each problem by writing and solving an equation.

8. **ANIMAL TRAINING**   Last summer, Gary trained 32 more dogs than Zina. Together they trained 126 dogs. How many dogs did Gary train?

9. **SALES**   Julius sold five times as many computers as Sam sold last year. In total, they sold 78 computers. How many computers did Julius sell?

10. **TRACK**   In one season, Ana ran 18 races. This was four fewer races than twice the number of races Kelly ran. How many races did Kelly run?

11. **BASEBALL**   André hit four more home runs than twice the number of home runs Larry hit. Together they hit 10 home runs. How many home runs did André hit?

3-7 Practice

Sequences and Equations

Describe each sequence using words and symbols.

1. 46, 52, 58, 64, …

2. 5, 13, 21, 29, …

3. 9, 14, 19, 24, …

4. 11, 14, 17, 20, …

5. 3, 5, 7, 9, …

6. 44, 60, 76, 92, …

Write an equation that describes each sequence. Then find the indicated term.

7. 20, 33, 46, 59, …; 17th term

8. 29, 38, 47, 56, …; 21st term

9. 101, 103, 105, 107, …; 30th term

10. 64, 67, 70, 73, …; 44th term

11. 26, 29, 32, 35, …; 57th term

12. 112, 140, 168, 196, …; 74th term

13. RUNNING Luisa ran 3 miles on the 3rd day of a month, and she repeated her run every 4 days for the rest of the month. What equation describes the sequence of days of that month that Luisa ran?

14. DEPRECIATION A new hybrid car costs $25,000. If it depreciates at $2,000 of its value each year, find the value of the car over the next 5 years.

3-8 Practice

Using Formulas

1. **AIR TRAVEL** What is the rate, in miles per hour, of a plane that travels 1680 miles in 3 hours?

2. **TRAVEL** A train is traveling at 54 miles per hour. How long will it take to go 378 miles?

3. **SWIMMING** What is the rate, in feet per second, of a swimmer who crosses a 164-foot-long pool in 41 seconds?

4. **BALLOONING** A balloon is caught in a wind traveling at 25 feet per second. If the wind is constant, how long will it take the balloon to travel 1000 feet?

Find the perimeter and area of each rectangle.

5.
14 cm
15 cm

6.
22 yd
22 yd

7.
61 mi
54 mi

8.
48 mm
48 mm
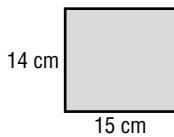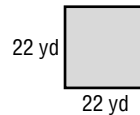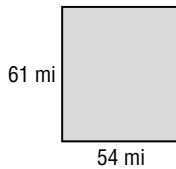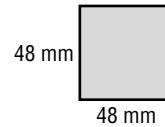
9. a rectangle that is 92 meters long and 18 meters wide

10. a rectangle that is 30 inches long and 29 inches wide

Find the missing dimension in each rectangle.

11.
20 mi
Perimeter = 46 mi

12.
12 cm
Area = 276 cm^2

13.
Area = 1125 ft^2
25 ft

14.
13 m
Perimeter = 68 m
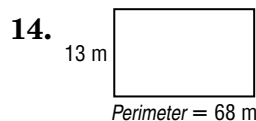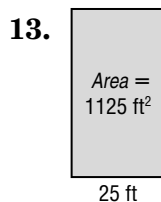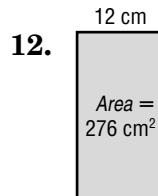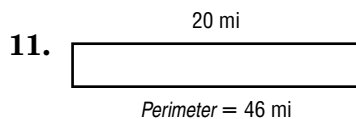
15. **GEOMETRY** The area of a rectangle is 1260 square inches. Its length is 36 inches. Find the width.

Lesson 3–8

4-1 Practice

Powers and Exponents

Write each expression using exponents.

1. $11 \cdot 11 \cdot 11$

2. $2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2$

3. 5

4. $(-4)(-4)$

5. $a \cdot a \cdot a \cdot a$

6. $n \cdot n \cdot n \cdot n \cdot n$

7. $4 \cdot 4 \cdot 4$

8. $(b \cdot b)(b \cdot b)(b \cdot b)$

9. $(-v)(-v)(-v)(-v)$

10. $x \cdot x \cdot z \cdot z \cdot z$

11. $2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot t \cdot t$

12. $m \cdot m \cdot m \cdot n \cdot p \cdot p$

Express each number in expanded form.

13. 13

14. 1006

15. $17{,}629$

16. 897

Evaluate each expression if $x = 3$, $y = -2$, and $z = 4$.

17. y^x

18. 51^0

19. z^2

20. x^2

21. 9^x

22. $z^2 \cdot 2^2$

23. y^5

24. $z^2 - y^4$

25. $x^2 + y^2 + z^2$

26. $z^2 - x^2$

FAMILY TREE **For Exercises 27 and 28, refer to the following information.**

When examining a family tree, the branches are many. You are generation "now." One generation ago, your 2 parents were born. Two generations ago, your 4 grandparents were born.

27. How many great-grandparents were born three generations ago?

28. How many "great" grandparents were born ten generations ago?

4-2 Practice

Prime Factorization

Determine whether each number is *prime* or *composite*.

1. 11

2. 63

3. 73

4. 75

5. 49

6. 69

7. 53

8. 83

Write the prime factorization of each number. Use exponents for repeated factors.

9. 33

10. 24

11. 72

12. 276

13. 85

14. 1024

15. 95

16. 200

17. 243

18. 735

Factor each monomial.

19. $35v$

20. $49c^2$

21. $-14b^3$

22. $-81h^2$

23. $33wz$

24. $-56ghj$

25. NUMBER THEORY   *Twin primes* are a pair of consecutive odd primes, which differ by 2. For example, 3 and 5 are twin primes. Find the twin primes less than 100. (*Hint*: There are 8 pairs of twins less than 100.)

Lesson 4–2

4-3 Practice

Greatest Common Factor (GCF)

Find the GCF of each set of numbers or monomials.

1. 9, 36

2. 42, 60

3. 16, 60

4. 29, 58

5. 18, 35

6. 90, 480

7. 80, 45

8. 700, 200

9. 17, 85

10. 24, 84, 168

11. 55, 105

12. 252, 126

13. $5p, 20p^2$

14. $28a, 49ab$

15. $8b, 5c$

16. $6a^2, 18b^2$

17. $88s^2t, 40st^2$

18. $42a^2b, 60ab^2$

Factor each expression.

19. $10x + 40$

20. $8v + 56$

21. $9t + 9$

22. $13m + 39$

23. $90 + 45n$

24. $15p + 60$

25. $48 + 8r$

26. $11z - 55$

27. $18q - 54$

28. $125 - 25h$

29. $42a - 77$

30. $30 + 45s$

31. $50n + 30$

32. $18 + 12d$

33. $27m + 105$

34. $65 - 39b$

35. $21d - 63$

36. $48 + 84m$

37. SCHOOL TRIP Thirty-two seventh graders, 48 eighth graders, and 60 ninth graders are taking a ski trip. In order to help students get better acquainted, students from each grade level are to ride each bus. What is the greatest number of buses that can be used if students from each grade level are divided equally among the buses?

Lesson 4–3

4-4 Practice

Simplifying Algebraic Fractions

Write each fraction in simplest form. If the fraction is already in simplest form, write _simplified_.

1. $\dfrac{9}{36}$

2. $\dfrac{6}{10}$

3. $\dfrac{19}{57}$

4. $\dfrac{21}{24}$

5. $\dfrac{6}{39}$

6. $\dfrac{85}{100}$

7. $\dfrac{16}{72}$

8. $\dfrac{32}{136}$

9. $\dfrac{45}{72}$

10. $\dfrac{46}{92}$

11. $\dfrac{35}{55}$

12. $\dfrac{64}{80}$

13. $\dfrac{57}{60}$

14. $\dfrac{17}{56}$

15. $\dfrac{33}{63}$

16. $\dfrac{34}{60}$

17. $\dfrac{24}{52}$

18. $\dfrac{96}{108}$

19. $\dfrac{45}{48}$

20. $\dfrac{14}{29}$

21. $\dfrac{x^3}{x^7}$

22. $\dfrac{m^4}{m^5}$

23. $\dfrac{a^7}{a^4}$

24. $\dfrac{u^5}{u}$

25. $\dfrac{21y}{24y}$

26. $\dfrac{4q^2}{14q^2}$

27. $\dfrac{15x^2}{18x^2}$

28. $\dfrac{63c}{126c}$

29. $\dfrac{11v^2}{121v}$

30. $\dfrac{42b^2}{49}$

31. $\dfrac{e^2f^2}{e^3f}$

32. $\dfrac{m^2}{p^3}$

33. $\dfrac{2a^3b^4}{10a^5b}$

34. **SKI RESORT** A local ski resort is open for business 13 weeks in the winter. Write a fraction in simplest form that represents the fraction of a year the resort is open.

Lesson 4–4

4-5 Practice

Multiplying and Dividing Monomials

Find each product or quotient. Express your answer using exponents.

1. $4^2 \cdot 4^3$

2. $9^8 \cdot 9^6$

3. $7^4 \cdot 7^2$

4. $13^2 \cdot 13^4$

5. $(-8)^5(-8)^3$

6. $(-21)^9(-21)^5$

7. $t^9 \cdot t^3$

8. $h^4 \cdot h^{13}$

9. $(m^6)(m^6)$

10. $(u^{11})(u^{10})$

11. $(-r)^7(-r)^{20}$

12. $(-w)(-w)^9$

13. $4d^5 \cdot 8d^6$

14. $7j^{50} \cdot 6j^{50}$

15. $-5b^9 \cdot 6b^2$

16. $12^1 \cdot 12^2$

17. $\dfrac{6^{11}}{6^3}$

18. $\dfrac{15^3}{15^2}$

19. $\dfrac{9^9}{9^7}$

20. $\dfrac{18^4}{18^4}$

21. $\dfrac{(-7)^6}{(-7)^5}$

22. $\dfrac{95^{21}}{95^{18}}$

23. $\dfrac{v^{30}}{v^{20}}$

24. $\dfrac{n^{19}}{n^{11}}$

25. the product of five cubed and five to the fourth power

26. the quotient of eighteen to the ninth power and eighteen squared

27. the product of z cubed and z cubed

28. the quotient of x to the fifth power and x cubed

29. SOUND Decibels are units used to measure sound. The softest sound that can be heard is rated as 0 decibels (or a relative loudness of 1). Ordinary conversation is rated at about 60 decibels (or a relative loudness of 10^6). A rock concert is rated at about 120 decibels (or a relative loudness of 10^{12}). How many times greater is the relative loudness of a rock concert than the relative loudness of ordinary conversation?

Lesson 4–5

4-6 Practice

Negative Exponents

Write each expression using a positive exponent.

1. 7^{-8}

2. 10^{-6}

3. 23^{-1}

4. $(-5)^{-2}$

5. $(-18)^{-10}$

6. m^{-99}

7. $(-1)^{-12}$

8. c^{-6}

9. p^{-5}

10. g^{-17}

11. $5z^{-4}$

12. $3t^{-1}$

Write each fraction as an expression using a negative exponent.

13. $\dfrac{1}{2^{10}}$

14. $\dfrac{1}{29^3}$

15. $\dfrac{1}{4^4}$

16. $\dfrac{1}{39}$

17. $\dfrac{1}{81^7}$

18. $\dfrac{1}{m^4}$

19. $\dfrac{1}{x^3}$

20. $\dfrac{1}{a^2}$

21. $\dfrac{1}{49}$

22. $\dfrac{1}{8}$

23. $\dfrac{1}{144}$

24. $\dfrac{1}{169}$

Evaluate each expression if $x = 3$, $y = -2$, and $z = 4$.

25. x^{-4}

26. y^{-2}

27. y^{-5}

28. z^{-4}

29. 5^y

30. 10^y

31. $3z^{-1}$

32. z^y

33. $(xz)^{-2}$

34. HAIR Hair grows at a rate of $\dfrac{1}{64}$ inch per day. Write this number using negative exponents.

4-7 Practice

Scientific Notation

Express each number in standard form.

1. 2.4×10^4 **2.** 9.0×10^3

3. 4.385×10^7 **4.** 1.03×10^8

5. 3.05×10^2 **6.** 5.11×10^{10}

7. 6.000032×10^6 **8.** 1.0×10^1

9. 8.75×10^5 **10.** 8.49×10^{-2}

11. 7.1×10^{-6} **12.** 1.0×10^{-3}

13. 4.39×10^{-7} **14.** 1.25×10^{-4}

Express each number in scientific notation.

15. 40,000   **16.** 16

17. 876,000,000   **18.** 4500

19. 151   **20.** 0.00037

21. 83,000,000   **22.** 919,100

23. 5,000,000,000,000   **24.** 0.13

25. 0.0000007   **26.** 0.0067

NIAGARA FALLS   **For Exercises 27 and 28, use the following information.**

Every minute, 840,000,000,000 drops of water flow over Niagara Falls.

27. Write this number in scientific notation.

28. How many drops flow over the falls in a day?

Lesson 4–7

5-1 Practice

Writing Fractions as Decimals

Write each fraction or mixed number as a decimal. Use a bar to show a repeating decimal.

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

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

3. $\frac{9}{11}$

4. $-\frac{3}{16}$

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

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

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

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

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

10. $-\frac{11}{15}$

11. $-\frac{12}{16}$

12. $\frac{13}{60}$

13. $\frac{1}{45}$

14. $-\frac{5}{24}$

15. $\frac{13}{20}$

16. $\frac{17}{18}$

17. $-11\frac{1}{4}$

18. $23\frac{5}{11}$

19. $-18\frac{2}{3}$

20. $5\frac{7}{8}$

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

21. $-\frac{13}{2}$ ● -6.4

22. $\frac{6}{7}$ ● $\frac{5}{6}$

23. -0.75 ● $-\frac{15}{20}$

24. $-4\frac{3}{8}$ ● -4.40

25. $\frac{7}{8}$ ● $\frac{8}{9}$

26. $-\frac{33}{100}$ ● $-0.\overline{3}$

27. Order $\frac{4}{9}, \frac{444}{1000}$, and 0.4 from least to greatest.

28. Order $-\frac{8}{9}, -\frac{8}{10}$, and $-0.\overline{80}$ from least to greatest.

29. **OPINION** In a school survey, 787 out of 1000 students preferred hip-hop music to techno. Is this figure more or less than $\frac{7}{9}$ of those surveyed? Explain.

5-2 Practice

Rational Numbers

Write each number as a fraction.

1. 29

2. 0

3. $3\frac{7}{8}$

4. -47

5. $-5\frac{6}{7}$

6. $4\frac{3}{20}$

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

8. $10\frac{2}{9}$

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

9. 0.32

10. 0.42

11. $0.\overline{8}$

12. $-6.\overline{3}$

13. 0.91

14. 17.875

15. $-0.666\ldots$

16. 0.07

17. $9.\overline{7}$

18. 7.75

19. 0.525

20. -8.26

21. $6.\overline{5}$

22. -4.12

23. 13.006

24. $3.\overline{34}$

Identify all sets to which each number belongs (W = whole numbers, I = integers, Q = rational numbers).

25. 15

26. $-3.\overline{8}$

27. -5.075

28. $\frac{50}{25}$

29. π

30. $-\frac{4}{2}$

31. BOTANY The smallest flowering plant is the flowering aquatic duckweed found in Australia. It is 0.0236 inch long and 0.0129 inch wide. Write these dimensions as fractions in simplest form.

Lesson 5–2

5-3 Practice

Multiplying Rational Numbers

Find each product. Write in simplest form.

1. $\dfrac{3}{4} \cdot \dfrac{2}{3}$

2. $\dfrac{3}{7} \cdot \dfrac{21}{39}$

3. $-\dfrac{3}{4} \cdot \dfrac{10}{27}$

4. $\dfrac{11}{14} \cdot \dfrac{7}{33}$

5. $-\dfrac{18}{24} \cdot \dfrac{3}{4}$

6. $\dfrac{9}{10} \cdot \dfrac{20}{21}$

7. $-50 \cdot \dfrac{3}{1000}$

8. $\dfrac{16}{17} \cdot \left(-\dfrac{5}{8}\right)$

9. $-\dfrac{1}{2} \cdot \left(-\dfrac{20}{27}\right)$

10. $-\dfrac{14}{15} \cdot \left(-\dfrac{10}{28}\right)$

11. $4\dfrac{4}{7} \cdot 9\dfrac{1}{3}$

12. $-2\dfrac{14}{25} \cdot 4\dfrac{3}{8}$

13. $4\dfrac{1}{8} \cdot \left(-1\dfrac{5}{11}\right)$

14. $-5 \cdot \dfrac{17}{25}$

15. $2\dfrac{9}{10} \cdot 1\dfrac{1}{5}$

16. $\dfrac{6m}{13} \cdot \dfrac{2}{mn}$

17. $\dfrac{p}{3} \cdot \dfrac{1}{q}$

18. $\dfrac{2u}{v^2} \cdot \dfrac{3}{u}$

19. $\dfrac{4x}{3y} \cdot \dfrac{9y}{2x}$

20. $\dfrac{2a}{b} \cdot \dfrac{c}{2d}$

21. $\dfrac{rs}{9t} \cdot \dfrac{3}{s^2}$

22. $2x \cdot \dfrac{1}{4x^2}$

23. $\dfrac{x^2}{4y} \cdot \dfrac{16y^2}{3x}$

24. $\dfrac{2}{r} \cdot \dfrac{3}{r}$

25. **WEIGHTS** How many ounces are in $3\dfrac{3}{4}$ pounds?

26. **FOOTBALL** The total length of 17.6 football fields equals 1 mile. How long is a mile? (*Hint*: length of a football field = 100 yd)

27. **AIRPLANES** The fastest airliner, the Concorde, has the capability of cruising at speeds of up to 1450 mph. While cruising at this top speed, how far would the Concorde travel in $2\dfrac{1}{2}$ hours?

Lesson 5-3

5-4 Practice

Dividing Rational Numbers

Find each quotient. Write in simplest form.

1. $\dfrac{1}{2} \div \dfrac{1}{10}$

2. $-\dfrac{3}{8} \div \dfrac{9}{24}$

3. $-\dfrac{15}{16} \div \dfrac{7}{12}$

4. $\dfrac{17}{20} \div \left(-\dfrac{3}{10}\right)$

5. $-\dfrac{3}{8} \div \left(-\dfrac{3}{9}\right)$

6. $\dfrac{25}{32} \div \dfrac{15}{56}$

7. $0 \div \dfrac{17}{18}$

8. $-1\dfrac{1}{2} \div \dfrac{1}{4}$

9. $\dfrac{8}{9} \div \dfrac{22}{81}$

10. $8\dfrac{4}{9} \div 2\dfrac{1}{9}$

11. $4\dfrac{3}{5} \div \dfrac{2}{5}$

12. $-\dfrac{100}{63} \div \dfrac{10}{81}$

13. $18\dfrac{1}{3} \div \left(-4\dfrac{1}{6}\right)$

14. $-3\dfrac{2}{9} \div \dfrac{4}{27}$

15. $-2\dfrac{5}{6} \div \dfrac{3}{51}$

16. $4\dfrac{11}{12} \div 4\dfrac{5}{6}$

17. $\dfrac{2x}{3} \div \dfrac{1}{9}$

18. $\dfrac{a}{4} \div \dfrac{a}{8}$

19. $\dfrac{4k}{5} \div \dfrac{25}{2k}$

20. $\dfrac{ab}{8} \div \dfrac{b}{a}$

21. $\dfrac{2c}{b} \div \dfrac{4a}{b}$

22. $\dfrac{y}{x} \div y^2$

23. $\dfrac{3st}{r} \div \dfrac{4t}{r}$

24. $\dfrac{a^2}{b^2} \div \dfrac{c^2}{b^2}$

25. $-\dfrac{2x}{y} \div \dfrac{4}{y}$

26. $\dfrac{m^2}{2np} \div \dfrac{n}{4p}$

27. Evaluate $x \div y$ if $x = 3\dfrac{1}{2}$ and $y = \dfrac{3}{4}$.

28. Evaluate $w \div z$ if $w = \dfrac{6}{7}$ and $z = 3$.

29. **TRAVEL** What is the average speed that Robin must drive to reach her friend's house 170 miles away in $2\dfrac{1}{2}$ hours?

30. **SEWING** How many choir robes can be made from $20\dfrac{1}{4}$ yards of fabric if each robe needs $1\dfrac{1}{8}$ yards?

Lesson 5–4

5-5 Practice

Adding and Subtracting Like Fractions

Find each sum or difference. Write in simplest form.

1. $\dfrac{5}{7} + \dfrac{2}{7}$

2. $\dfrac{5}{11} - \dfrac{1}{11}$

3. $\dfrac{13}{20} - \dfrac{3}{20}$

4. $\dfrac{5}{16} + \dfrac{15}{16}$

5. $-\dfrac{19}{40} + \dfrac{21}{40}$

6. $-\dfrac{7}{9} - \dfrac{4}{9}$

7. $\dfrac{14}{23} - \dfrac{16}{23}$

8. $\dfrac{25}{36} + \left(-\dfrac{7}{36}\right)$

9. $\dfrac{21}{25} + \dfrac{9}{25}$

10. $10\dfrac{4}{7} + 11\dfrac{5}{7}$

11. $9\dfrac{3}{8} + 4\dfrac{1}{8}$

12. $-8\dfrac{7}{10} + 2\dfrac{3}{10}$

13. $23\dfrac{17}{20} - 4\dfrac{7}{20}$

14. $22\dfrac{3}{8} - 18\dfrac{5}{8}$

15. $7\dfrac{9}{10} + 3\dfrac{3}{10}$

16. $6\dfrac{1}{6} - 3\dfrac{5}{6}$

17. $5\dfrac{1}{4} + 3\dfrac{1}{4} + 9\dfrac{3}{4}$

18. $6\dfrac{7}{8} + \left(-7\dfrac{3}{8}\right)$

19. $\dfrac{h}{6} + \dfrac{4h}{6}$

20. $\dfrac{5c}{22} + \dfrac{5c}{22}$

21. $\dfrac{35}{d} - \dfrac{17}{d}, d \neq 0$

22. $\dfrac{4r}{9} + \dfrac{5r}{9}$

23. $\dfrac{6s}{t} + \dfrac{s}{t}$

24. $\dfrac{5p}{9} - \dfrac{4p}{9}$

25. $\dfrac{6r^2}{s^2} + \dfrac{5r^2}{s^2}$

26. $4\dfrac{5}{7a} - 2\dfrac{3}{7a}$

27. **PICTURE FRAMING** Matt plans to paste a picture that is $6\dfrac{7}{8}$ inches wide on a sheet of paper that is $8\dfrac{4}{8}$ inches wide. If he wants to have at least $\dfrac{5}{8}$ inch of margin on each side, will the picture fit? Explain.

Lesson 5–5

5-6 Practice

Least Common Multiple

Find the least common multiple (LCM) of each pair of numbers or monomials.

1. 10, 12

2. 9, 15

3. 20, 24

4. 30, 45

5. 14, 15

6. 35, 75

7. 12, 63

8. 48, 20

9. $15q,\ 3q^2t$

10. $9,\ 18b$

11. $8y,\ 10y^2$

12. $20p,\ 100p^2$

Find the least common denominator (LCD) of each pair of fractions.

13. $\frac{1}{2}, \frac{2}{3}$

14. $\frac{9}{14}, \frac{3}{7}$

15. $\frac{5}{12}, \frac{8}{15}$

16. $\frac{13}{18}, \frac{6}{45}$

17. $\frac{5}{32}, \frac{17}{24}$

18. $\frac{1}{x}, \frac{3}{xy}$

19. $\frac{3}{8m}, \frac{1}{4mn^2}$

20. $\frac{12}{25ab}, \frac{3}{100b^2}$

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

21. $\frac{2}{5}$ ● $\frac{7}{15}$

22. $\frac{4}{9}$ ● $\frac{8}{18}$

23. $\frac{9}{36}$ ● $\frac{4}{8}$

24. $\frac{4}{8}$ ● $\frac{5}{9}$

25. $\frac{4}{18}$ ● $\frac{3}{15}$

26. $\frac{3}{28}$ ● $\frac{5}{32}$

27. VOTING During a student council meeting, $\frac{7}{12}$ of the members voted to hold a bake sale. If a $\frac{2}{3}$ vote is required to pass, will a bake sale be held?

5-7 Practice

Adding and Subtracting Unlike Fractions

Find each sum or difference. Write in simplest form.

1. $\frac{9}{10} + \frac{1}{2}$

2. $\frac{7}{8} + \frac{1}{10}$

3. $-\frac{3}{4} + \frac{5}{16}$

4. $\frac{4}{5} - \frac{2}{6}$

5. $\frac{5}{8} - \frac{3}{16}$

6. $\frac{1}{3} + \frac{5}{36}$

7. $\frac{7}{10} - \frac{14}{100}$

8. $\frac{17}{21} - \frac{4}{6}$

9. $\frac{11}{14} - \frac{1}{6}$

10. $\frac{4}{15} - \left(-\frac{3}{12}\right)$

11. $\frac{7}{15} + \frac{3}{6}$

12. $-\frac{7}{8} + \frac{9}{10}$

13. $10\frac{1}{2} + 7\frac{1}{3}$

14. $7\frac{1}{2} - 2\frac{7}{10}$

15. $8\frac{1}{6} + 5\frac{3}{4}$

16. $7\frac{7}{12} - 5\frac{1}{3}$

17. $6\frac{4}{5} + \left(-2\frac{3}{8}\right)$

18. $16\frac{3}{5} + 3\frac{11}{15}$

19. $18\frac{3}{5} - 7\frac{1}{4}$

20. $12\frac{2}{7} - 3\frac{5}{6}$

21. $2\frac{5}{8} + 6\frac{3}{4}$

22. $29\frac{8}{33} + \left(-3\frac{1}{3}\right)$

23. $-6\frac{2}{7} - 5\frac{3}{14}$

24. $-16\frac{2}{7} - 3\frac{20}{21}$

25. $-10\frac{1}{9} + 9\frac{7}{45}$

26. $\frac{1}{3} + \frac{5}{6} + \frac{1}{2}$

27. $9\frac{2}{7} - 11\frac{18}{21}$

28. $-17\frac{2}{3} - \left(-5\frac{4}{18}\right)$

29. $11\frac{3}{16} - 5\frac{1}{12}$

30. $\frac{64}{143} - \frac{21}{208}$

31. **SEWING** The inseam on Juan's pants is $34\frac{1}{4}$ inches. If he has them shortened by $2\frac{7}{8}$ inches, what is the new length?

Lesson 5–7

5-8 Practice

Solving Equations With Rational Numbers

Solve each equation. Check your solution.

1. $y + 6.1 = 19.5$

2. $m + 5.8 = 19.9$

3. $8.7 + x = 9.6$

4. $t - 4.82 = 5.36$

5. $\dfrac{1}{2} + x = \dfrac{4}{7}$

6. $-11 = x - 8$

7. $\dfrac{11}{12} = \dfrac{3}{8} + v$

8. $-2.9 = m - 3.6$

9. $\dfrac{x}{5.09} = 0$

10. $6 = \dfrac{3}{7} + u$

11. $\dfrac{4}{5}x = \dfrac{16}{25}$

12. $\dfrac{q}{3.2} = -20$

13. $9\dfrac{3}{4} = r - 6\dfrac{2}{9}$

14. $\dfrac{14}{25} = v + \dfrac{1}{2}$

15. $0.8p = 6$

16. $y + 2\dfrac{2}{5} = 5\dfrac{4}{15}$

17. $10 = \dfrac{5}{9}u$

18. $6\dfrac{2}{3} = n - 10\dfrac{1}{9}$

19. $b - \dfrac{7}{10} = -\dfrac{1}{4}$

20. $-5.2 = 20.8c$

21. $\dfrac{3}{8} + g = \dfrac{7}{12}$

22. $3\dfrac{3}{4} + h = -8\dfrac{1}{2}$

23. $9 = -\dfrac{1}{4}w$

24. $1\dfrac{1}{2} = 6q$

25. ELECTRICITY   If a television uses $\dfrac{3}{20}$ kilowatt-hours of electricity per hour, how long will it take to use 14 kilowatt-hours of electricity?

26. COMPUTER DISKS   Mr. Rosenthal bought 15 computer disks and a carrying case for $28.50. If the carrying case cost $6.75, what was the cost of each disk?

5-9 Practice

Measures of Central Tendency

Find the mean, median, and mode for each set of data. If necessary, round to the nearest tenth.

1. 4, 6, 12, 5, 8

2. 16, 18, 15, 16, 21, 16

3. 55, 46, 50, 42, 39

4. 17, 16, 13, 17, 17, 10, 10, 13, 10

5. 25, 25, 25, 20

6. 3.1, 4.5, 4.5, 4.3, 6.0, 3.2

Find the mean, median, and mode for each set of data. If necessary, round to the nearest tenth.

7.

```
            ×
    ×   ×   ×               ×
    ×   ×   ×   ×   ×   ×
◄───┼───┼───┼───┼───┼───┼──►
    0   1   2   3   4   5
```

8.

```
                ×                       ×
                ×           ×   ×       ×
        ×       ×       ×   ×   ×
◄───────┼───┼───┼───┼───┼───┼───┼──────►
      10.1 10.2 10.3 10.4 10.5 10.6 10.7
```
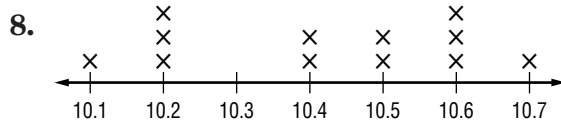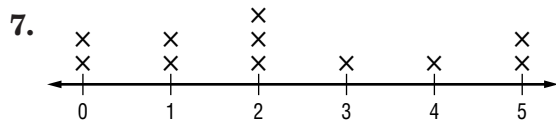
9. TORNADOES The table below shows the number of tornadoes reported in the United States from 1980–1990. Find the mean, median, and mode for the number of tornadoes.

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Number of Tornadoes	866	783	1046	931	907	684	764	656	702	858	1132

Source: *The Universal Almanac*

6-1 Practice

Ratios and Rates

Express each ratio as a fraction in simplest form.

1. 56 pencils out of 64 erasers

2. 25 calculators to 20 students

3. 36 cassettes to 60 CDs

4. 18 minnows to 27 fish

5. 6 pounds to 256 ounces

6. 5 hours to 720 minutes

7. 9 gallons to 48 quarts

8. 24 feet to 30 yards

Express each ratio as a unit rate. Round to the nearest tenth or nearest cent, if necessary.

9. $4.60 for 5 cans of soup

10. $51 for a box of 75 tiles

11. 652 miles in 9 days

12. 116 meters in 12 seconds

13. 176 new employees in 22 years

14. 34 yards for 6 costumes

15. 55 pages in 25 minutes

16. $3015 from 36 people

Convert each rate using dimensional analysis.

17. 18 m/min = __?__ cm/s

18. 5.7 gal/h = __?__ c/min

19. 264 yd/s = __?__ mi/h

20. 2 qt/min = __?__ gal/h

21. 99 in./s = __?__ mi/day (1 day = 24 h)

22. 154 mi/h = __?__ in./s

23. TRACK AND FIELD Rita sprinted 77 feet in 10 seconds. How many miles per hour is this?

6-2 Practice

Proportional and Nonproportional Relationships

Determine whether the set of numbers in each table are proportional.

1.

Cups of Rice	1	2	2.5	3
Cups of Water	1.5	3	3.75	4.5

2.

Miles driven	1	2	6	9
Toll fare	$1.07	$1.14	$1.42	$1.63

For Exercises 3 and 4, write and solve an equation.

3. **JOBS** Sharif started a new job working 15 hours a week. After how many weeks will he have worked a total of 75 hours?

4. **GARDENING** During its first 50 days of growth, a sunflower grows about 4 cm per day. Using this rate, after how many days will a sunflower be 60 cm tall?

For Exercises 5–6, complete each table. Determine whether the pattern forms a proportion.

5. **TEXT MESSAGING** It costs Victoria $0.10 to send a text message.

Number of Messages	4				
Cost					

6. **WATER CONSUMPTION** Water flows out of a kitchen faucet at about 1.5 gallons per minute.

Minutes	0.5				
Gallons of Water					

7. **COOKING** The amount of time it takes to cook a turkey increases with the weight of the turkey. It is recommended that you cook a 10 lb turkey for 3 hours. An extra 12 minutes of cooking time is necessary for each additional pound of turkey. Is the cooking time proportional to the weight of the turkey? Explain your reasoning.

6-3 Practice

Using Proportions

Determine whether each pair of ratios forms a proportion.

1. $\dfrac{5}{8}, \dfrac{20}{32}$

2. $\dfrac{12}{28}, \dfrac{27}{63}$

3. $\dfrac{8}{50}, \dfrac{1}{43}$

4. $\dfrac{40}{48}, \dfrac{56}{42}$

5. $\dfrac{6.4}{16}, \dfrac{32}{80}$

6. $\dfrac{12}{18}, \dfrac{90}{135}$

7. $\dfrac{21}{24}, \dfrac{56}{64}$

8. $\dfrac{9}{16}, \dfrac{3}{4}$

9. $\dfrac{12}{32}, \dfrac{8}{3}$

10. $\dfrac{2.6}{4}, \dfrac{4.6}{8}$

11. $\dfrac{5.1}{1.7}, \dfrac{7.5}{2.5}$

12. $\dfrac{8.5}{25}, \dfrac{17}{50}$

ALGEBRA Solve each proportion.

13. $\dfrac{n}{12} = \dfrac{6}{18}$

14. $\dfrac{8}{v} = \dfrac{56}{105}$

15. $\dfrac{15}{35} = \dfrac{s}{7}$

16. $\dfrac{24}{30} = \dfrac{8}{w}$

17. $\dfrac{c}{28} = \dfrac{5}{7}$

18. $\dfrac{3}{r} = \dfrac{39}{65}$

19. $\dfrac{9}{15} = \dfrac{m}{25}$

20. $\dfrac{7.5}{6.0} = \dfrac{3.6}{x}$

21. $\dfrac{12}{25} = \dfrac{u}{40}$

22. $\dfrac{1}{a} = \dfrac{33}{132}$

23. $\dfrac{f}{5} = \dfrac{16}{40}$

24. $\dfrac{r}{6.5} = \dfrac{0.2}{1.3}$

25. $\dfrac{30}{14} = \dfrac{k}{1.54}$

26. $\dfrac{3.5}{7.2} = \dfrac{k}{57.6}$

27. $\dfrac{2.1}{42} = \dfrac{7}{t}$

28. **FOOD** Gayle is making fruit punch that consists of 2 quarts of juice and 1 quart of soda water. How much soda water does she need if she has 5 quarts of juice?

6-4 Practice

Scale Drawings and Models

On a map, the scale is 5 centimeters = 2 kilometers. Find the missing distances.

	Location	Map Distance	Actual Distance
1.	Town A to Town B	10 cm	
2.	Town A to Town C		10 km
3.	Town A to Town D		5.6 km
4.	Town A to Town E	2 cm	
5.	Town A to Town F	0.5 cm	
6.	Town A to Town G		3.2 km
7.	Town A to Town H	0.25 cm	
8.	Town A to Town I		2.4 km
9.	Town A to Town J		0.04 km
10.	Town A to Town K	1 cm	
11.	Town A to Town L	2.5 cm	
12.	Town A to Town M		0.48 km

13. Refer to Exercises 1–12. What is the scale factor?

14. What is the scale factor if the scale is 15 inches = 1 yard?

15. STRUCTURES A barn is 50 feet wide by 80 feet long. Make a scale drawing of the barn that has a scale of $\frac{1}{2}$ inch = 10 feet.

16. PHOTOGRAPHY A man in a photograph is 1.5 inches in height. If the man is 6 feet tall, what is the scale?

6-5 Practice

Fractions, Decimals, and Percents

Express each percent as a fraction or mixed number in simplest form and as a decimal.

1. 35%

2. $8\frac{5}{6}\%$

3. $10\frac{1}{2}\%$

4. 8.4%

5. 500%

6. 32%

7. 80%

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

9. 65%

10. 48.5%

11. 0.15%

12. 0.9%

13. 2.5%

14. $25\frac{1}{3}\%$

15. $\frac{1}{20}\%$

16. 820%

Express each decimal or fraction as a percent. Round to the nearest tenth percent, if necessary.

17. 0.95

18. 0.255

19. 0.7

20. 8.75

21. 0.0048

22. 0.06

23. 19.8

24. 0.54

25. 0.27

26. 0.802

27. 0.0007

28. 71

29. $\frac{33}{40}$

30. $\frac{9}{32}$

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

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

33. $\frac{35}{8}$

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

35. $\frac{14}{25}$

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

37. SURVEYS In a survey, 44% of the people said they voted for Mr. Johnson, while $\frac{2}{5}$ of the people said they voted for Ms. Smith. Which group is larger? Explain.

Lesson 6-5

6-6 Practice

Using the Percent Proportion

Use the percent proportion to solve each problem. Round to the nearest tenth.

1. 128 is what percent of 640?

2. What percent of 21 is 28?

3. 3.4 is what percent of 5?

4. What percent of 930 is 720?

5. 15 is what percent of 120?

6. What percent of 24 is 21?

7. 36 is what percent of 40?

8. What percent of 48 is 0.6?

9. 12 is 80% of what number?

10. 15 is 4% of what number?

11. 33 is 90% of what number?

12. 0.24 is 36% of what number?

13. 19 is 10% of what number?

14. 49 is 77% of what number?

15. 42 is 7.5% of what number?

16. 65 is 5% of what number?

17. 27.5 is 2% of what number?

18. What is 15.8% of 21?

19. What is 65% of 441.1?

20. What is 0.4% of 82?

21. What is 7% of 329.8?

22. What is 88% of 1?

23. What is 35% of 20?

24. What is 20% of 35?

25. PAINT About 42% of a paint mix is white. A painter orders 18 gallons of the paint mix. How much of it is white?

6-7 Practice

Finding Percents Mentally

Find the percent of each number mentally.

1. 10% of 812

2. 50% of 1044

3. 40% of 25

4. 20% of 45

5. $62\frac{1}{2}$% of 80

6. 80% of 15

7. 30% of 400

8. 75% of 880

9. $16\frac{2}{3}$% of 72

10. $33\frac{1}{3}$% of 150

11. 60% of 2500

12. $37\frac{1}{2}$% of 48

13. 25% of 244

14. 900% of 3

15. 150% of 260

Estimate.

16. 31% of 62

17. 65% of 83

18. 87% of 850

19. 32% of 26

20. 47% of 213

21. 22% of 536

22. 68% of 12

23. 11% of 29

24. 78% of 4

25. $\frac{1}{2}$% of 381

26. $\frac{1}{6}$% of 567

27. $\frac{2}{3}$% of 856

28. 210% of 425

29. 153% of 801

30. 689% of 2981

31. MONEY Last week a waitress made $204 in tips. This week she made 135% of that. How much did she make this week?

Lesson 6-7

6-8 Practice

Using Percent Equations

Solve each problem using the percent equation.

1. What is 5% of 224?

2. What is 18% of 65?

3. What is 63% of 300?

4. What is 40% of 980?

5. What is 18% of 650?

6. Find 2% of 820.

7. Find 75% of 312.

8. Find 312% of 75.

9. Find 5.6% of 1050.

10. Find 21.4% of 855.

11. 52.3 is what percent of 1046?

12. 48 is what percent of 75?

13. 100 is what percent of 250?

14. 96 is what percent of 400?

15. 10 is what percent of 625?

16. 49.8 is what percent of 415?

17. 0.4 is what percent of 5?

18. 157 is what percent of 2512?

19. 1206 is what percent of 8040?

20. 63 is what percent of 60?

21. 13 is 50% of what number?

22. 121 is 22% of what number?

23. 11 is 4% of what number?

24. 438 is 24% of what number?

25. 612 is 25% of what number?

26. 960 is 30% of what number?

27. 3570 is 42% of what number?

28. 8 is 1% of what number?

29. SHOPPING A jacket is on sale at 15% off the original price of $68.00. What is the sale price?

Lesson 6-8

6-9 Practice

Percent of Change

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

1. from 4 m to 5 m

2. from 75 minutes to 100 minutes

3. from $9.25 to $6.50

4. from 45 quarts to 8 quarts

5. from 21 mm to 13 mm

6. from $457 to $1000

7. from $39.50 to $40.00

8. from 9 students to 856 students

9. from 24 kittens to 7 kittens

10. from 15 songs to 105 songs

11. from 31 mph to 25 mph

12. from 4 paintings to 13 paintings

13. from 55 teachers to 41 teachers

14. from 9780 birds to 8011 birds

15. from 524 sales to 315 sales

16. from 28 houses to 460 houses

17. from 2 miles to 10 miles

18. from 1000 voters to 840 voters

19. from 3 lizards to 21 lizards

20. from 300 horses to 2100 horses

21. from 25 disks to 22 disks

22. from 250 movies to 220 movies

23. from $34 to $31

24. from $3400 to $3100

25. COOKIES On Tuesday, a baker sold 132 cookies. On Wednesday, she sold 108 cookies. Find the percent of change to the nearest tenth of a percent.

Lesson 6-9

6-10 Practice

Using Sampling to Predict

Identify each sample as *biased* or *unbiased* and describe its type. Explain your reasoning.

1. To determine how many people in a town support a new tax levy, 200 people are randomly selected from a phone book and then surveyed over the phone.

2. To determine the number of households in a town that recycle, 40 households from the same street are polled.

3. To determine the usual demand of a Web site, the number of users currently visiting the Web site is recorded every hour.

4. **ANALYZE GRAPHS** The yearbook staff wanted to find out how many students would buy a yearbook. So, the staff surveyed 15 students who were in the school library after school. The results are in the graph. Is this sampling method valid? If so, about how many of the 1287 students in the school will buy yearbooks?

Would You Buy a Yearbook?
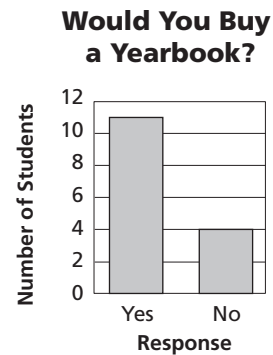
5. **LIBRARIES** A library would like to see how many of its patrons would be interested in regularly checking out books from an enlarged print section. They randomly surveyed 200 patrons and 6 patrons responded that they would regularly check out books from an enlarged print section. If the library has a total of 3200 patrons, how many people can they expect to regularly check out books from an enlarged print section?

7-1 Practice

Functions

Determine whether each relation is a function. Explain.

1. {(4, −5), (0, −9), (1, 0), (7, 0)}

2. {(5, −12), (−1, −2), (8, −5), (4, −2), (3, −5)}

3. {(−2, −3), (6, −8), (4, 2), (6, −5), (2, −5)}

4. {(5, 2), (−2, 15), (−7, 15), (1, 5), (4, 15), (−7, 2)}

5.

x	4	−5	11	−5	23
y	−3	1	1	0	6

6.

x	7	14	11	−10	−1
y	−3	−9	−4	−3	15

7.

x	−3.0	3.5	4.1	−3.0	3.4
y	4.2	3.7	−3.8	3.7	4.0

8.

x	11	4	−2	4	−7
y	−7	−2	2	2	6

EMPLOYMENT For Exercises 9–12, use the table, which shows the percent of employed men and women in the U.S. labor force every five years from 1980 to 2000.

9. Is the relation (year, percent of men) a function? Explain.

10. Describe how the percent of employed men is related to the year.

Employed Members of Labor Force		
Year	Men (% of male population)	Women (% of female population)
1980	77.4	51.5
1985	76.3	54.5
1990	76.4	57.5
1995	75.0	58.9
2000	78.9	67.3

Source: U.S. Census Bureau

11. Is the relation (year, percent of women) a function? Explain.

12. Describe how the percent of employed women is related to the year.

7-2 Practice

Representing Linear Functions

Find four solutions of each equation. Write the solutions as ordered pairs.

1. $y = x - 5$

2. $y = -7$

3. $y = -3x + 1$

4. $x - y = 6$

5. $y = 2x + 4$

6. $7x - y = 14$

Graph each equation by plotting ordered pairs.

7. $y = 2x - 1$
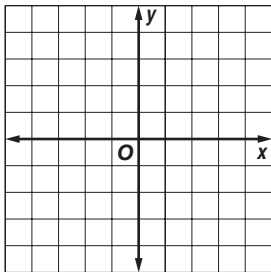
8. $y = -6x + 2$
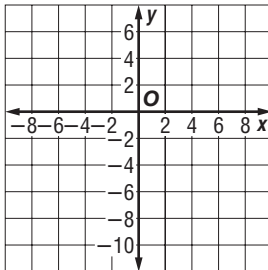
9. $y = x + 4$
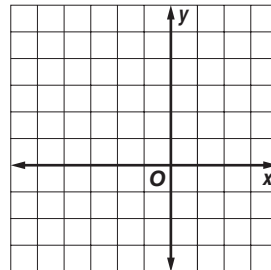
10. $y = 7$
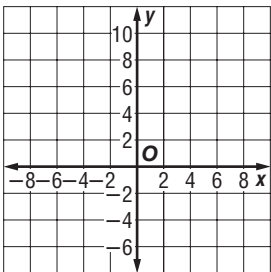
11. $y = 3x - 9$
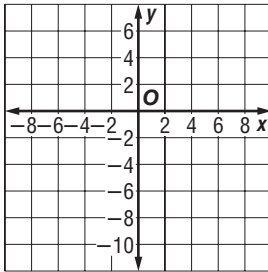
12. $y = \dfrac{1}{2}x - 6$
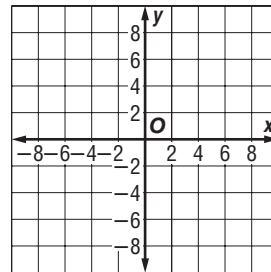
COOKING **For Exercises 13–15, use the following information.**

Kirsten is making gingerbread cookies using her grandmother's recipe and needs to convert grams to ounces. The equation $y = 0.04x$ describes the approximate number of ounces y in x grams.

13. Find three ordered pairs of values that satisfy this equation.

14. Draw the graph that contains these points.

15. Do negative values of x make sense in this case? Explain.
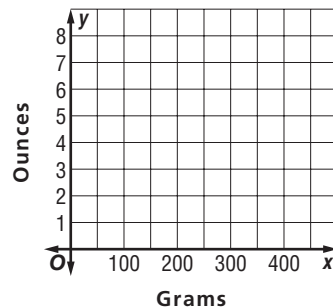
7-3 **Practice**

Rate of Change

Find the rate of change for each linear function.

1.

Air in Tires (psi) vs Time (min)
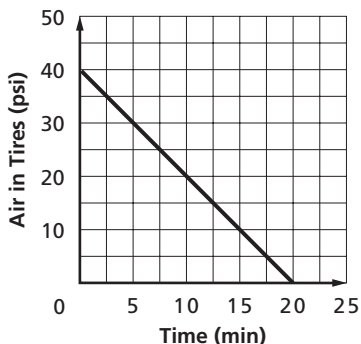
2.

Time (h)	Distance (km)
x	**y**
0	0
5	510
10	1020
15	1530

TRADE **The graph shows the total U.S. exports from 1970 to 2000.**

U.S. Exports

Exports (billions of dollars) vs Year

Source: *World Almanac*

3. Find the approximate rate of change between 1970 and 1975.

4. Find the approximate rate of change between 1995 and 2000.

5. Between which two years was the rate of change the least?
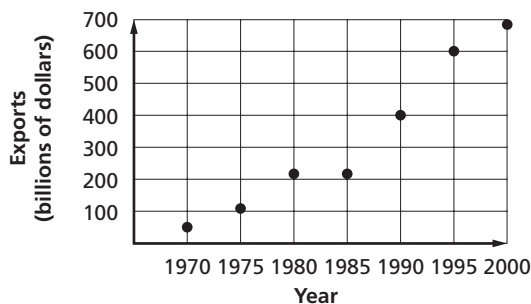
TRAFFIC MANAGEMENT **For Exercises 6 and 7, use the following information.**

San Diego reserves express lanes on the freeways for the use of carpoolers. In order to increase traffic flow during rush hours, other drivers may use the express lanes for a fee. The toll increases with the number of cars on the road. The table shows a sample of possible tolls.

Toll ($)	Traffic Volume (vehicles/h)
1.00	521
2.00	1122
3.00	1551
4.00	2204

6. Find the rate of change in the toll between 521 vehicles/h and 1122 vehicles/h.

7. Find the rate of change in the toll between 2204 vehicles/h and 1551 vehicles/h.

7-4 Practice

Constant Rate of Change and Direct Variation

Find the constant rate of change for each linear function and interpret its meaning.

1.   **Fundraiser Profits**
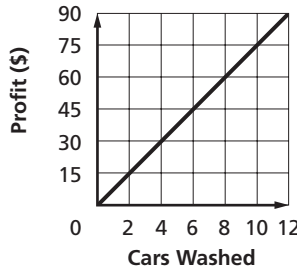
2.

Time (seconds)	Distance (yards)
x	y
1.2	6
2.4	8
3.6	10
4.8	12

Determine whether a proportional linear relationship exists between the two quantities shown in each of the functions indicated. Explain your reasoning.

5. Exercise 1

6. Exercise 2

PAPER COSTS The cost of paper varies directly with the number of reams bought. Suppose 2 reams cost $5.10.

7. Write an equation that could be used to find the cost of x reams of paper.

8. Find the cost of 15 reams of paper.

PHYSICAL SCIENCE Recall that the length spring stretches varies directly with the amount of weight attached to it. A certain spring stretches 5 cm when a 10-gram weight is attached.

9. Write a direct variation equation relating the weight x and the amount of stretch y.

10. Estimate the stretch of the spring when it has a 42-gram weight attached.

Lesson 7-4

7-5 Practice

Slope

Find the slope of each line.

1.

2.

3.
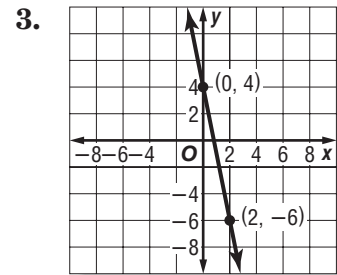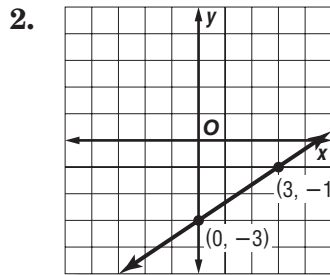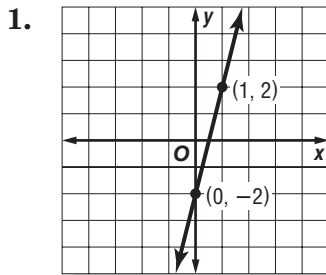
Find the slope of the line that passes through each pair of points.

4. $A(-10, 6), B(-5, 8)$

5. $C(7, -3), D(11, -4)$

6. $E(5, 2), F(12, -3)$

7. $G(-15, 7), H(-10, 6)$

8. $J(13, 0), K(-3, -12)$

9. $L(-5, 3), M(-4, 9)$

10. $P(12, 2), Q(18, -2)$

11. $R(-2, -3), S(-2, -5)$

12. $T(-13, 8), U(21, 8)$

13. CAKES   A wedding cake measures 2 feet high in the center and the diameter of the bottom tier is 12 inches. What is the slope of the cake?

14. INSECTS   One particularly large ant hill found in 1997 measured 40 inches wide at the base and 18 inches high. What was the slope of the ant hill?

15. ARCHAEOLOGY   Today, the Great Pyramid at Giza near Cairo, Egypt, stands 137 meters tall, coming to a point. Its base is a square with each side measuring 230 meters wide. What is the slope of the pyramid?

16. BUSINESS   One warehouse uses 7-foot long ramps to load its forklifts onto the flat beds of trucks for hauling. If the bed of a truck is 2 feet above the ground and the ramp is secured to the truck at its end, what is the slope of the ramp while in operation? Round to the nearest hundredth.

Lesson 7-5

7-6 Practice

Slope-Intercept Form

Given the slope and *y*-intercept, graph each line.

1. slope $= \dfrac{3}{4}$,
y-intercept $= -3$
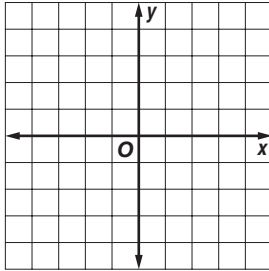
2. slope $= \dfrac{5}{6}$,
y-intercept $= 1$
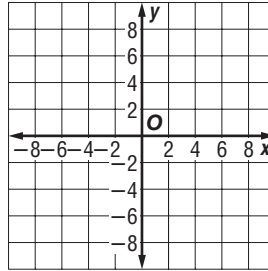
3. slope $= 1$,
y-intercept $= 5$
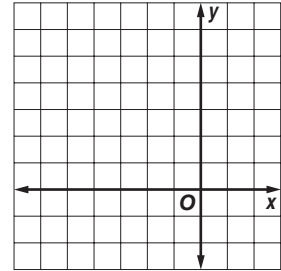
Graph each equation using the slope and *y*-intercept.

4. $y = -\dfrac{1}{2}x - 4$
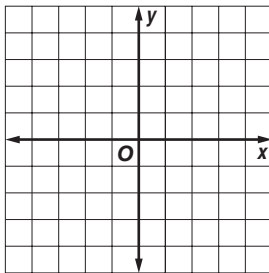
5. $y = x - 4$
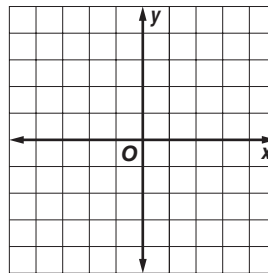
6. $y = -6x + 3$
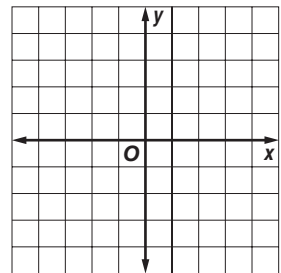
EXERCISE   For Exercises 7 and 8, use the following information.

A person weighing 150 pounds burns about 320 Calories per hour walking at a moderate pace. Suppose that the same person burns an average of 1500 Calories per day through basic activities. The total Calories y burned by that person can be represented by the equation $y = 320x + 1500$, where x represents the number of hours spent walking.

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

Calories Burned (thousands)

Time Walking (h)
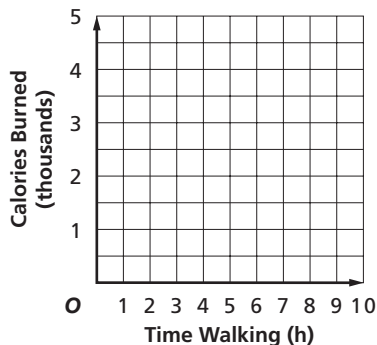
8. State the slope and y-intercept of the graph of the equation and describe what they represent.

7-7 Practice

Writing Linear Functions

Write an equation in slope-intercept form for each line.

1. slope = 3,
y-intercept = −2

2. slope = 0,
y-intercept = 7

3.

4.
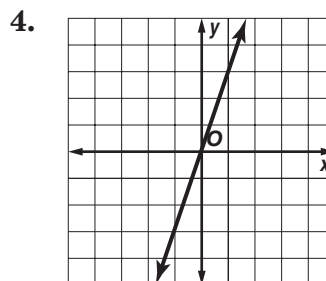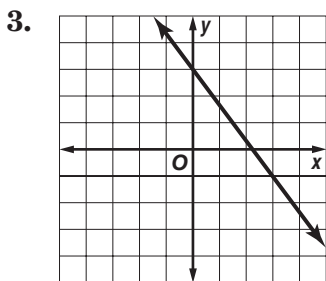
Write an equation in slope-intercept form for the line passing through each pair of points.

5. (9, 0) and (6, −1)

6. (8, 6) and (−8, 2)

7. (7, −5) and (−4, −5)

8. (2, 7) and (−1, 4)

9. (4, 4) and (−8, 10)

10. (0, 2) and (−3, 14)

BUSINESS   For Exercises 11 and 12, use the following information.

Flourishing Flowers charges $125 plus $60 for each standard floral arrangement to deliver and set up flowers for a banquet.

11. Write an equation in slope-intercept form that shows the cost y for flowers for x number of arrangements.

12. Find the cost of providing 20 floral arrangements.

INSULATION   For Exercises 13 and 14, use the following information.

Renata González wants to increase the energy efficiency of her house by adding to the insulation previously installed. The better a material protects against heat loss, the higher its R-value, or resistance to heat flow. The table shows the R-value of fiberglass blanket insulation per inch of thickness. The existing insulation in Renata's attic has an R-value of 10.

R-value	Thickness (in.)
0.0	0
3.2	1
6.4	2
9.6	3

Source: Oak Ridge National Laboratory

13. Write an equation in slope-intercept form that shows the total R-value y in the attic if she adds x number of inches of additional insulation.

14. Estimate the total R-value in the attic if she adds 6 inches of insulation.

Lesson 7-7

7-8 Practice

Prediction Equations

BEVERAGES For Exercises 1 and 2, use the table that shows the amount of whole milk consumed per person in the United States.

Year	Gallons per Person
1990	10.2
1995	8.3
2000	7.7
2001	7.4
2002	7.3

Source: U.S. Census Bureau

1. Make a scatter plot and draw a best-fit line.
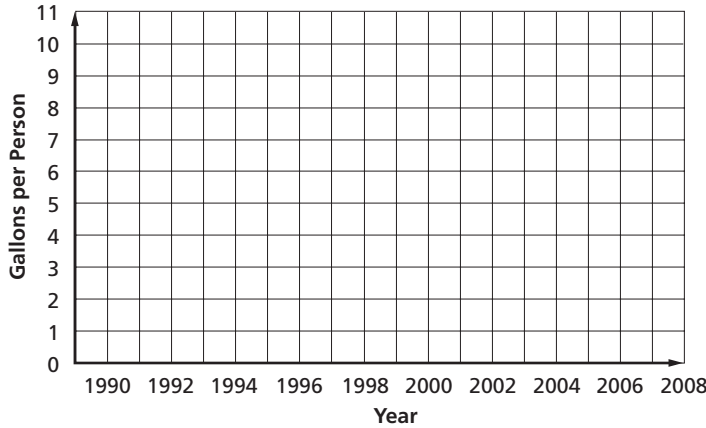
2. Use the best-fit line to predict the amount of whole milk consumed per person in 2008.

EDUCATION For Exercises 3 and 4, use the table that shows the number of students graduating from medical school in the United States from 1980 to 2000.

Year	Graduates
1980	15,113
1985	16,318
1990	15,398
1995	15,888
2000	16,112

Source: U.S. Census Bureau

3. Make a scatter plot and draw a best-fit line.
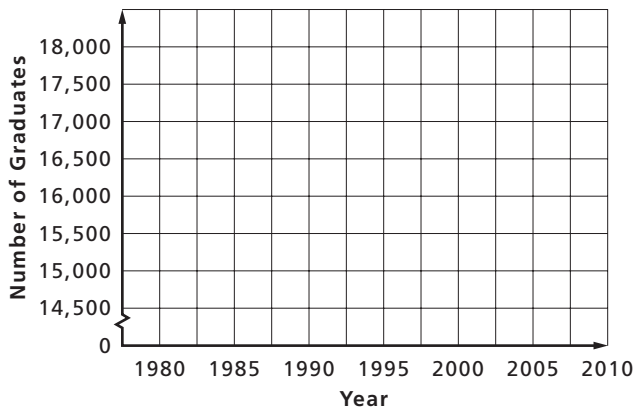
Source: U.S. Census Bureau

4. Write an equation for the best-fit line and use it to predict the number of medical school graduates in 2010.

8-1 Practice

Solving Equations with Variables on Each Side

Solve each equation. Check your solution.

1. $3g - 12 = 9g$

2. $14m = 18 + 12m$

3. $7c - 7 = 4c + 17$

4. $-11t = 15 - 6t$

5. $20s + 4 = 13s - 10$

6. $-2h - 16 = 3h - 6$

7. $27j - 6 = 14j + 7$

8. $-1 + 19w = 11w + 23$

9. $8 - p = -12 - 3p$

10. $9k - 26 = 6k - 8$

11. $28 - 4d = 5d - 17$

12. $2y + 7 = y$

13. $11.7 - 2x = x$

14. $3b + 4.4 = 2.6 - 6b$

15. $\frac{3}{4}y - 6 = \frac{1}{4}y + 10$

16. $2c + 7.5 = 6.2 - 3c$

17. $5d - 11 = 2d + 2$

18. $6a - 10 = 2a - 7$

19. $8n - 6 = -9n + 11$

20. $2f - 9 = 14f + 1$

Define a variable and write an equation to find each number. Then solve.

21. Twice a number is 60 more than five times the number. What is the number?

22. Four times a number is 21 more than the number. What is the number?

23. Eight less than three times a number equals the number. What is the number?

24. A number equals six less than four times a number. What is the number?

25. TENNIS The area of a tennis court is 2808 ft^2, or 8 square feet more than 3.5 times the size of the area of a racquetball court. What is the area of a raquetball court?

26. CELLULAR PHONES One cellular phone carrier charges $26.50 a month plus $0.15 a minute for local calls. Another carrier charges $14.50 a month and $0.25 a minute for local calls. For how many minutes is the cost of the plans the same?

8-2 Practice

Solving Equations with Grouping Symbols

Solve each equation. Check your solution.

1. $4(j - 7) = 12$

2. $5(2k + 10) = 40$

3. $7(2p + 3) - 8 = 6p + 29$

4. $7(g - 4) = 3$

5. $3(4c + 5) = 24$

6. $2(a - 1) = 3(a + 1)$

7. $3(x - 3) = 5(1.5 + x)$

8. $2(1.5m + 3) = 3.5m - 1$

9. $a - \dfrac{5}{10} = 2a - \dfrac{3}{5}$

10. $2.2x - 5 = 2(1.4x + 3)$

11. $\dfrac{d}{0.2} = 3d + 2.1$

12. $5n + 3 = 2(n + 2) - 3n$

13. $\dfrac{2}{3}a + 2 = \dfrac{1}{3}(4a + 1)$

14. $y - 7 = \dfrac{1}{4}(y + 2)$

15. $5(f + 2) = 9 + 5f$

Find the dimensions of each rectangle. The perimeter is given.

16. $P = 122$ m

w

w + 35

17. $P = 244$ yd

3w − 18

w

18. $P = 698$ cm

w

w + 23

19. $P = 86$ in.

w + 3

w
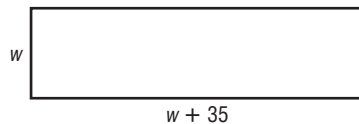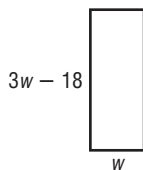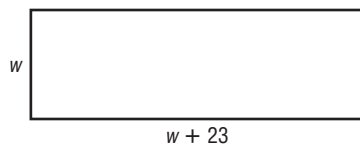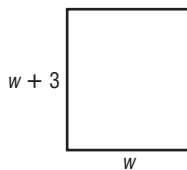
20. GEOMETRY   The perimeter of a rectangle is 80 feet. Find the dimensions if the length is 5 feet longer than four times the width. Then find the area of the rectangle.

21. NUMBER THEORY   Five times the sum of three consecutive integers is 150. What are the integers?

8-3 Practice

Inequalities
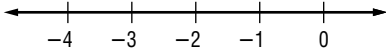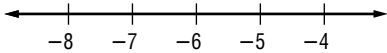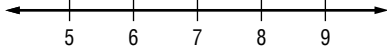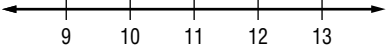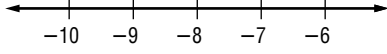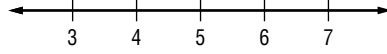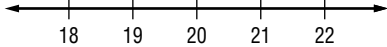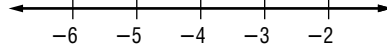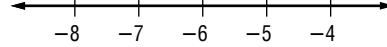
Write an inequality for each sentence.

1. More than 3400 people attended the flea market.

2. Her earnings at $11 per hour were no more than $121.

3. The 10-km race time of 84 minutes was at least twice as long as the winner's time.

4. A savings account increased by $70 is now more than $400.

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

5. $9 - x > 3, x = 6.5$

6. $9.5 + n < 19, n = 10$

7. $3k < 27\frac{1}{2}, k = 8$

8. $21 \le 4c, c = 5.2$

9. $\frac{x}{4} \le 8, x = 32$

10. $\frac{9}{c} > 2, c = 3\frac{1}{2}$

Graph each inequality on a number line.

11. $a < -2$

12. $t > -6$

13. $d \ge 7$

14. $b \ge 11$

15. $x \le -8$

16. $w > 5$

17. $n < 20$

18. $b \le -4$

19. $a \ge -6$

Write the inequality for each graph.

20.

21.

22.

23.

8-4 Practice

Solving Inequalities by Adding or Subtracting

Solve each inequality. Check your solution.

1. $h + 1 < 7$

2. $c + 3 > -4$

3. $22 \le m - 9$

4. $-6 \ge g + 4$

5. $15 + d > 10$

6. $p + (-8) \le -12$

7. $-13 < k - (-16)$

8. $-1 + s \le 5$

9. $12 > w - (-0.3)$

10. $-1\frac{7}{8} < d + (-2)$

11. $z - 0.9 > -4.8$

12. $b - \frac{1}{5} < 3\frac{1}{10}$

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

13. $5 + a > 16$
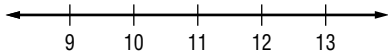
14. $c + 12 \le 14$
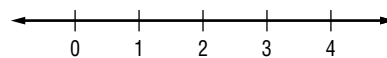
15. $-20 > h - 3$
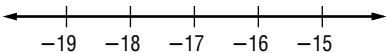
16. $16 \ge k + (-17)$
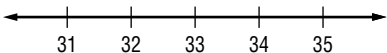
17. $p - (-2) \ge -4\frac{1}{2}$
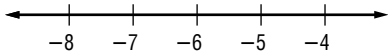
18. $-2 + z < 3\frac{3}{4}$
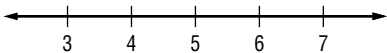
19. TRANSPORTATION A certain minivan has a maximum carrying capacity of 1200 pounds. If the luggage weighs 150 pounds, what is the maximum weight allowable for passengers?

20. DRINKS A large punch bowl holds 12 gallons of liquids. If five gallons of ginger ale have already been poured into the bowl, what is the most fruit juice that can be added?

21. FUND-RAISING A neighborhood association wants to replace the playground equipment at a park. The playground equipment they would like to buy starts at $4500. If they have already raised $2700, what is the least they must still collect?

Lesson 8-4

8-5 Practice

Solving Inequalities by Multiplying or Dividing

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

1. $9x > 18$
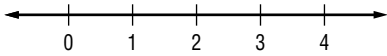
2. $10d \leq 80$
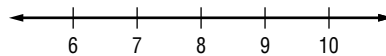
3. $25 \leq 5c$
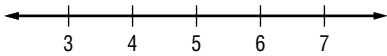
4. $\dfrac{t}{13} > 3$
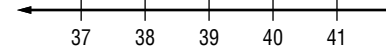
5. $24 \geq \dfrac{g}{-4}$
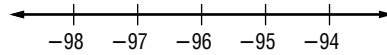
6. $-78 > 6h$
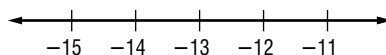
7. $\dfrac{f}{-5} < -12$
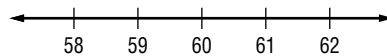
8. $100 \geq -4s$
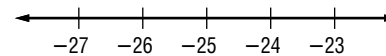
9. $\dfrac{p}{-36} < 6$
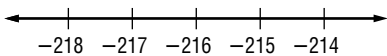
10. $-4 > \dfrac{c}{-3.5}$
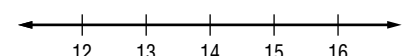
11. $-24 < \dfrac{1}{2}b$
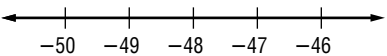
12. $-3 \leq \dfrac{c}{-1.5}$
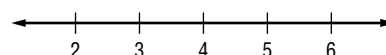
13. DISCOUNTS To qualify for a store discount, Jorge's soccer team must spend at least $560 for new jerseys. The team needs 20 jerseys.

a. Write an inequality to represent how much the team should spend on each jersey to qualify for the discount.

b. How much should the team spend for each jersey?

14. POLITICS Mi-Ling wants to mail at least 850 fliers encouraging voters to vote for the upcoming school levy. She has five days to get them all in the mail.

a. Write an inequality to represent how many fliers Mi-Ling must mail every day.

b. How many fliers should Mi-Ling mail each day?

Lesson 8-5

8-6 Practice

Solving Multi-Step Inequalities

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

1. $2x + 12 < -12$
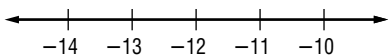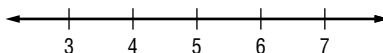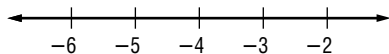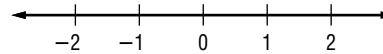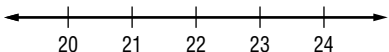
(number line: −14 −13 −12 −11 −10)

2. $6 + 2p \leq 16$

(number line: 3 4 5 6 7)

3. $5 - 4k \leq 21$

(number line: −6 −5 −4 −3 −2)

4. $3(d + 2) > 6$

(number line: −2 −1 0 1 2)

5. $\dfrac{m}{2} - 7 > 4$

(number line: 20 21 22 23 24)

6. $0.5c - 2 \leq 4.5$

(number line: 11 12 13 14 15)

7. $\dfrac{2}{3}(12 - x) > 4$

(number line: 4 5 6 7 8)

8. $\dfrac{1}{2}(8 - c) < 7.5$

(number line: −9 −8 −7 −6 −5)

9. $\dfrac{c}{3} + 7 > 5\dfrac{1}{2}$

(number line: −6 −5 −4 −3 −2)

10. $7 + 2p < -14$

(number line: −13 −12 −11 −10 −9)

11. $-3(x + 3) > 7.5$

(number line: −8 −7 −6 −5 −4)

12. $5 - 3c \leq c + 17$

(number line: −5 −4 −3 −2 −1)

13. $2(n - 5) \leq -7$

(number line: −1 0 1 2 3)

14. $\dfrac{18 - n}{2} \leq 6$

(number line: 4 5 6 7 8)
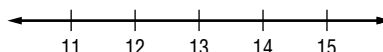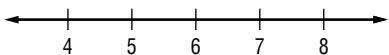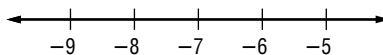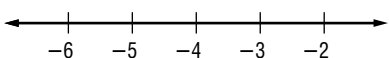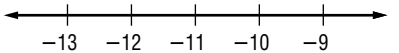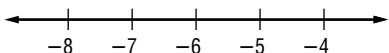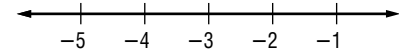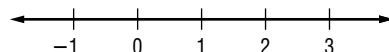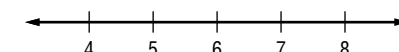
15. Two times a number less 10 is greater than five times the same number plus 2. For what number or numbers is this true?

16. One-half of the sum of a number and 12 is less than 27. What is the number?

17. **STATE FAIR** Admission to the state fair costs $5 and each ride costs $0.75. If Ahmed wants to spend no more than $14 at the fair, how many rides can he ride?

18. **GIFTS** Yuko wants to buy teddy bears that cost $8.50 each for her eight nieces and nephews. She would like to get a hat for each teddy bear, also. If Yuko wants to spend no more than $94, how much can she spend on each hat?

9-1 Practice

Squares and Square Roots

Find each square root, if possible.

1. $\sqrt{100}$ **2.** $\sqrt{144}$ **3.** $\sqrt{-36}$

4. $\sqrt{121}$ **5.** $\sqrt{-148}$ **6.** $-\sqrt{4}$

7. $-\sqrt{9}$ **8.** $-\sqrt{49}$ **9.** $\sqrt{256}$

10. $\sqrt{529}$ **11.** $\sqrt{361}$ **12.** $-\sqrt{196}$

Use a calculator to find each square root to the nearest tenth.

13. $-\sqrt{2.25}$ **14.** $\sqrt{38}$ **15.** $\sqrt{249}$

16. $\sqrt{131}$ **17.** $\sqrt{7}$ **18.** $\sqrt{52}$

19. $\sqrt{168}$ **20.** $\sqrt{499}$ **21.** $-\sqrt{217}$

22. $\pm\sqrt{218}$ **23.** $\pm\sqrt{42}$ **24.** $\pm\sqrt{94}$

25. $\pm\sqrt{50}$ **26.** $\pm\sqrt{137}$ **27.** $\pm\sqrt{208}$

28. Find the negative square root of 840 to the nearest tenth.

29. If $x^2 = 476$, what is the value of x to the nearest tenth?

30. The number $\sqrt{22}$ lies between which two consecutive whole numbers? Do not use a calculator.

Estimate each square root to the nearest whole number. Do not use a calculator.

31. $\sqrt{76}$ **32.** $\sqrt{123}$ **33.** $\sqrt{300}$

34. $\sqrt{90}$ **35.** $\sqrt{19}$ **36.** $\sqrt{248}$

37. GEOMETRY A square tarpaulin covering a softball field has an area of 441 m². What is the length of one side of the tarpaulin?

38. MONUMENTS Refer to Example 4 on page 466 of your textbook. The highest observation deck on the Eiffel Tower in Paris is about 899 feet above the ground. About how far could a visitor see on a clear day?

9-2 Practice

The Real Number System

Name all of the sets of numbers to which each real number belongs. Let N = natural numbers, W = whole numbers, Z = integers, Q = rational numbers, and I = irrational numbers.

1. 15

2. -41

3. $\dfrac{1}{4}$

4. $\dfrac{1}{3}$

5. $0.212121\ldots$

6. $\sqrt{8}$

7. $\sqrt{45}$

8. $\dfrac{36}{9}$

9. $-\dfrac{28}{7}$

10. 2.31

11. 45.6

12. $0.090090009\ldots$

Determine whether each statement is *sometimes*, *always*, or *never* true.

13. A decimal number is an irrational number.

14. An integer is a whole number.

15. A natural number is an integer.

16. A negative integer is a natural number.

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

17. 3.2 ● $\sqrt{9.5}$

18. $1\dfrac{1}{2}$ ● $\sqrt{3}$

19. $\sqrt{17}$ ● 4.1

20. $\sqrt{7.84}$ ● 2.8

21. $1\dfrac{3}{4}$ ● $\sqrt{3.0625}$

22. 3.67 ● $\sqrt{12}$

Order each set of numbers from least to greatest.

23. $\sqrt{49},\ 6.\overline{91},\ 7\dfrac{1}{8},\ \dfrac{15}{2}$

24. $4\dfrac{1}{3},\ \sqrt{43},\ \dfrac{12}{3},\ 4.13$

25. $-2,\ -1.5,\ -1\dfrac{8}{10},\ -\sqrt{6}$

ALGEBRA Solve each equation. Round to the nearest tenth, if necessary.

26. $h^2 = 361$

27. $k^2 = 10.24$

28. $c^2 = 111$

29. $330 = t^2$

30. $0.089 = u^2$

31. $w^2 = 0.0144$

32. GARDENING Ray planted a square garden that covers an area of 200 ft². How many feet of fencing does he need to surround the garden?

9-3 Practice

Triangles

Classify each angle as *acute*, *obtuse*, *right*, or *straight*.

1. ∠MTN

2. ∠MTO

3. ∠MTP

4. ∠MTQ

5. ∠MTR

6. ∠NTO
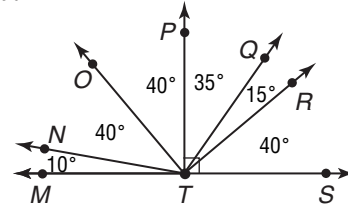
Find the value of *x* in each triangle. Then classify each triangle as *acute*, *right*, or *obtuse*.

7.

8.

9.

10.
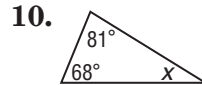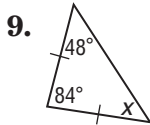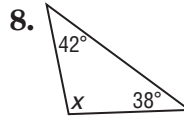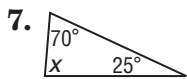
11. **ALGEBRA** The measures of the angles of a triangle are in the ratio 5:6:9. What is the measure of each angle?

12. **ALGEBRA** Determine the measures of the angles of △MNO if the measures of the angles are in the ratio 2:4:6.

Classify each triangle by its angles and by its sides.

13.

14.

15.

16.

Lesson 9–3
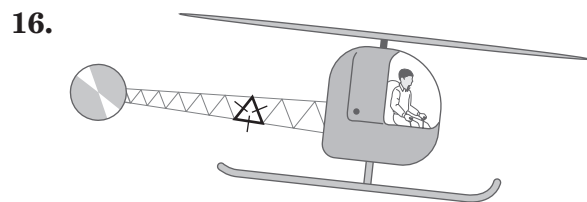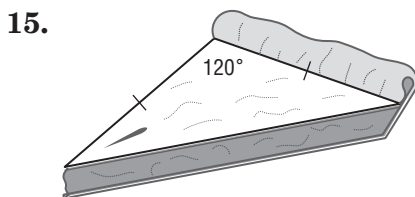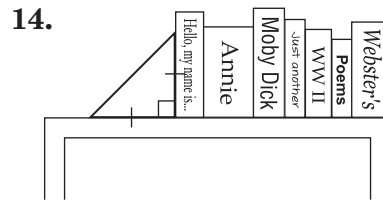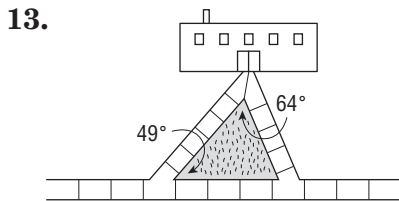
9-4 Practice

The Pythagorean Theorem

Find the length of the hypotenuse in each right triangle. Round to the nearest tenth, if necessary.

1.

15 ft, c ft, 20 ft

2.

c m, 30 m, 16 m

3.

31 in., 22 in., c in.

4.

6 ft, c ft, 7.3 ft

5.

c cm, 15.2 cm, 12.2 cm

6.

c in., 71.4 in., 58.6 in.
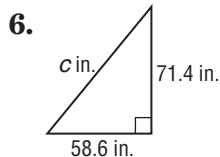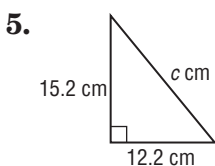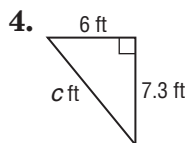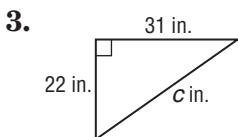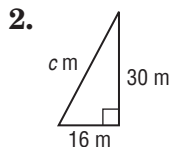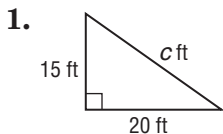
If c is the measure of the hypotenuse, find each missing measure. Round to the nearest tenth, if necessary.

7. $a = ?, b = 15, c = 31$

8. $a = 8, b = ?, c = 16$

9. $a = 11, b = 16, c = ?$

10. $a = ?, b = 13, c = 19$

11. $a = 10, b = ?, c = 18$

12. $a = 21, b = 23, c = ?$

13. $a = ?, b = 27, c = 35$

14. $a = 48, b = ?, c = 61$

15. $a = 26, b = \sqrt{596}, c = ?$

16. $a = ?, b = 12, c = \sqrt{318}$

The lengths of three sides of a triangle are given. Determine whether each triangle is a right triangle.

17. 5 m, 5 m, 10 m

18. 9 in., 12 in., 15 in.

19. ARCHITECTURE The diagonal distance covered by a flight of stairs is 21 ft. If the stairs cover 10 ft horizontally, how tall are they?

20. KITES A kite is flying at the end of a 300-foot string. It is 120 feet above the ground. About how far away horizontally is the person holding the string from the kite?

Lesson 9–4

9-5 Practice

The Distance Formula

Find the distance between each pair of points. Round to the nearest tenth, if necessary.

1. $A(5,2)$, $B(3,4)$
2. $C(-2, -4)$, $D(1, 3)$

3. $E(-3, 4)$, $F(-2, 1)$
4. $G(0, 0)$, $H(-7, 8)$

5. $R(-4, -8)$, $S(2, -3)$
6. $G(9, 9)$, $H(-9, -9)$

7. $M(1, 1)$, $N(-10, -10)$
8. $P\left(1\frac{1}{2}, 3\right)$, $Q\left(5, 6\frac{1}{4}\right)$

9. $R\left(7, 4\frac{1}{2}\right)$, $S\left(6\frac{1}{2}, 3\frac{1}{4}\right)$
10. $T\left(-3\frac{1}{2}, -4\frac{1}{4}\right)$, $U\left(5\frac{1}{2}, 1\frac{1}{2}\right)$

11. $A(5, 1)$, $B(-4, -3)$
12. $V(4, 6)$, $W(-8, -12)$

13. $C(-2, -4)$, $D(-5, 6)$
14. $X(1, -7)$, $Y(-1, 7)$

15. $E(5, -3)$, $F(-7, 8)$
16. $A(8, 8)$, $B(-8, -8)$

GEOMETRY Find the perimeter of each figure.

17.

18.
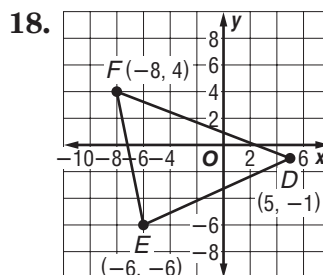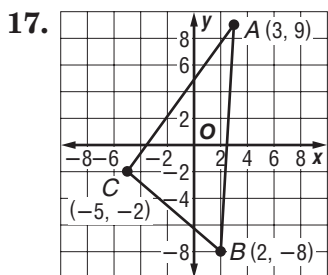
19. **MAPS** On a map of the school, the baseball field is located at the coordinates $(1, 7)$. The front entrance of the school is located at $(5, 2)$. If each coordinate unit corresponds to 10 yards, how far is it from the front entrance to the baseball field?

20. Determine whether $\triangle XYZ$ with vertices $X(3, 4)$, $Y(2, -3)$, and $Z(-5, -2)$ is isosceles. Explain your answer.

21. Is $\triangle DEF$ with vertices $D(1, 4)$, $E(6, 2)$, $F(-1, 3)$ a scalene triangle? Explain.

Lesson 9–5

9-6 Practice

Similar Polygons and Indirect Measurement

In Exercises 1–8, the triangles are similar. Find each value of *x*.

1.
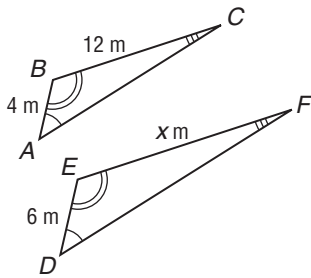
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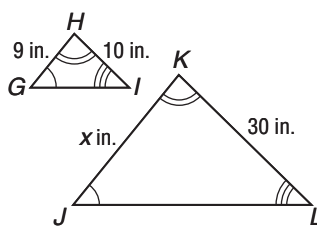
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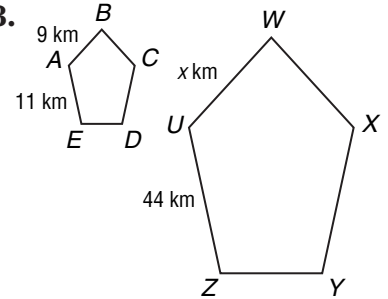
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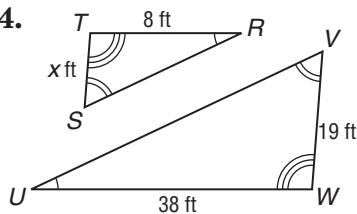
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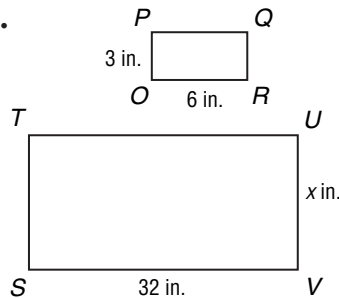
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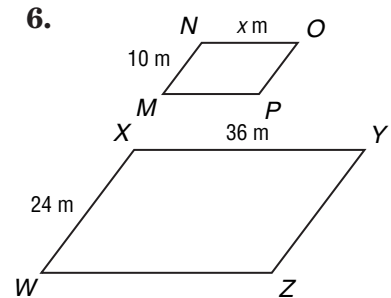
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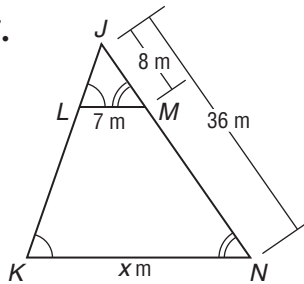
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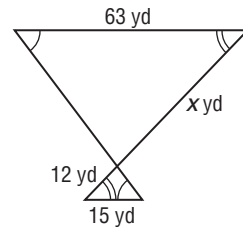
For Exercises 9–12, write a proportion. Then determine the missing measure.

9. CHIMNEYS A 6-ft observer casts a 4-ft shadow at the same time a chimney casts a 238-foot shadow. How tall is the chimney?

10. BUILDINGS The May Road Apartments in Hong Kong cast a 90-meter shadow at the same time a 1.5-meter tall tenant casts a 0.75-meter shadow. How tall is the apartment building?

11. WORLD RECORDS The world's tallest man lived from 1918 to 1940. He cast a 4-foot $5\frac{1}{2}$ inch shadow when a 6-foot pole cast a 3-foot shadow. How tall was he?

12. SHADOWS A man casts a 14-foot shadow. A 4-foot child casts a 9-foot 4-inch shadow at the same time. How tall is the man?

10-1 Practice

Line and Angle Relationships

In the figure at the right, $m \parallel n$ and r is a transversal.
If $m\angle 2 = 45°$, find the measure of each angle.
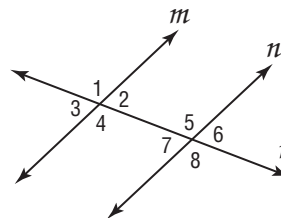
1. $\angle 4$ 2. $\angle 5$

3. $\angle 7$ 4. $\angle 8$

5. $\angle 6$ 6. $\angle 3$

In the figure at the right, $d \parallel e$ and a is a transversal.
If $m\angle 5 = 143°$, find the measure of each angle.
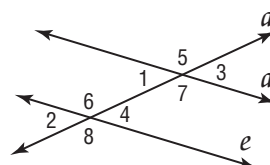
7. $\angle 7$ 8. $\angle 6$

9. $\angle 4$ 10. $\angle 2$

11. $\angle 1$ 12. $\angle 8$

Find the value of x in each figure.

13.
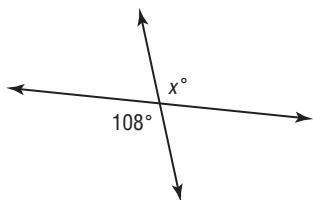
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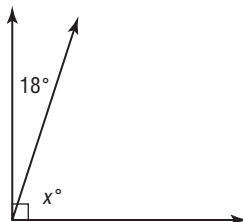
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16.
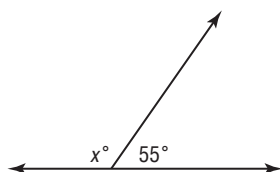
17.
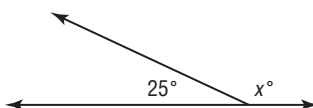
18.
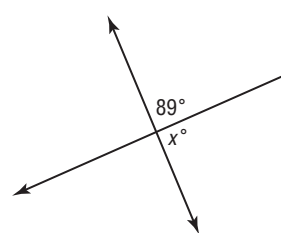
19. Angles Q and R are complementary. Find $m\angle R$ if $m\angle Q = 24°$.

20. Find $m\angle J$ if $m\angle K = 29°$ and $\angle J$ and $\angle K$ are supplementary.

21. The measures of angles A and B are equal and complementary. What is the measure of each angle?

22. **ALGEBRA** Angles G and H are complementary. If $m\angle G = 3x + 6$ and $m\angle H = 2x - 11$, what is the measure of each angle?

10-2 **Practice**

Congruent Triangles

Complete the congruence statement if $\triangle CMH \cong \triangle PLF$ **and** $\triangle DNO \cong \triangle AET.$

1. $\angle M \cong$ __?__
2. $\overline{MC} \cong$ __?__
3. $\overline{DN} \cong$ __?__
4. $\angle A \cong$ __?__

5. $\overline{FL} \cong$ __?__
6. $\angle C \cong$ __?__
7. $\overline{TE} \cong$ __?__
8. $\angle O \cong$ __?__

Find the value of x for each pair of congruent triangles.

9.

10.

11.
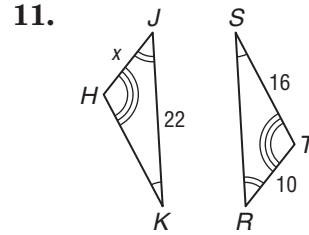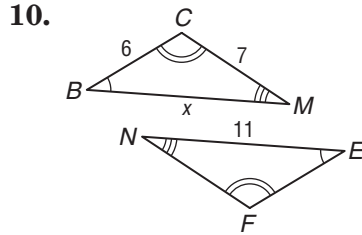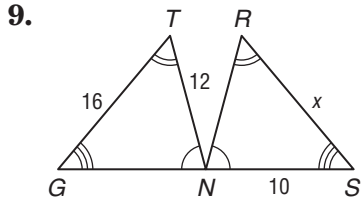
12. ALGEBRA If $\triangle DEC \cong \triangle PRM$, what is the value of x?
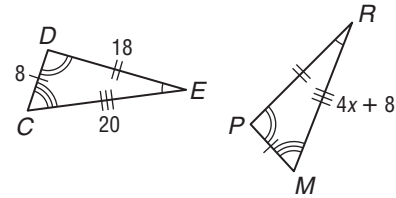
13. ALGEBRA If $\triangle AHB \cong \triangle KJP$, what is the value of x?
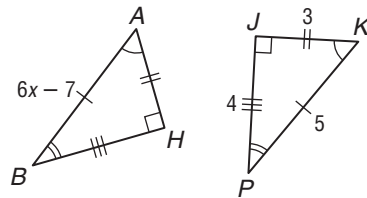
KALEIDOSCOPE For Exercises 14–19, use the kaleidoscope pattern at the right. Name a triangle that appears to be congruent to each triangle listed.

14. $\triangle GEH$

15. $\triangle FCH$

16. $\triangle DEC$

17. $\triangle ABD$

18. $\triangle HEF$

19. $\triangle CBE$
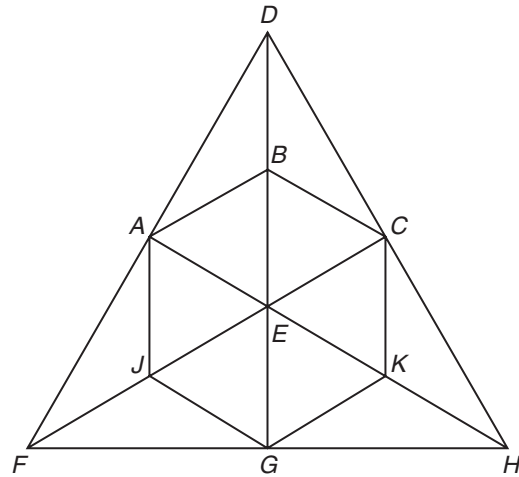
10-3 Practice

Transformations on the Coordinate Plane

Find the coordinates of the vertices of each figure after a reflection over the given axis. Then graph the reflection image.

1. *y*–axis
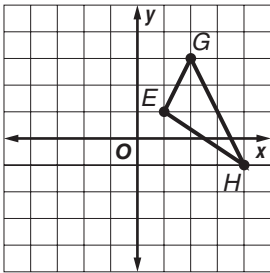
2. *x*–axis
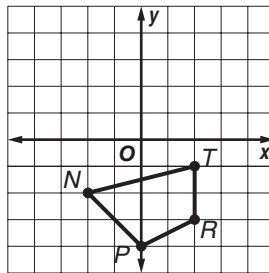
3. *x*–axis
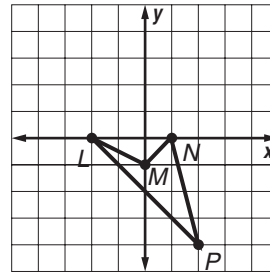
For Exercises 4–6, use the graph shown.

4. Graph the image of the figure after a dilation centered at the origin with a scale factor of 2.

5. Graph the image of the figure after a dilation centered at the origin with a scale factor of 1.5.

6. Find the coordinates of the vertices of the figure after a dilation centered at the origin with a scale factor of $\frac{1}{2}$.
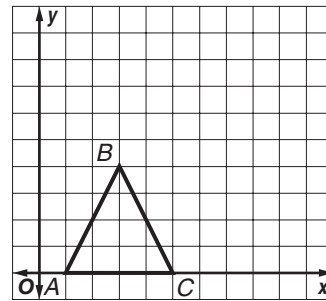
For Exercises 7–9, use the graph shown.

7. Graph the image of the figure after a dilation centered at the origin with a scale factor of $\frac{1}{3}$.

8. Find the coordinates of the vertices of the figure after a dilation centered at the origin with a scale factor of 4.

9. Graph the image of the figure after a dilation centered at the origin with a scale factor of $\frac{4}{3}$.
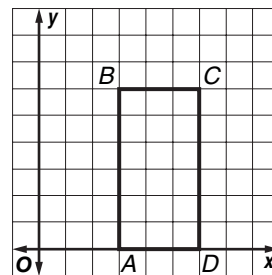
10-4 Practice

Quadrilaterals

ALGEBRA Find the value of *x*. Then find the missing angle measures.

1.

50°   65°

130°   *x*°

2.

120° 2*x*°

x°   60°

3.

20°

8*x*°   160°

x°

4.

8*x*°   2*x*°

60°   10*x*°

5.

60°

x°

100°

65°

6.

x°

75°

80°

7.

60° 2*x*°

120°   *x*°

8.

62°

155°

25°   *x*°

9.

97°

x°   100°

70°
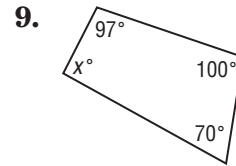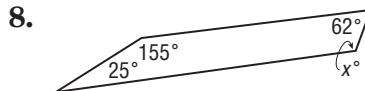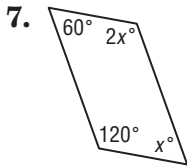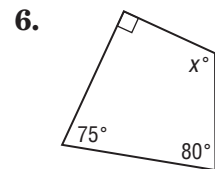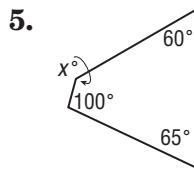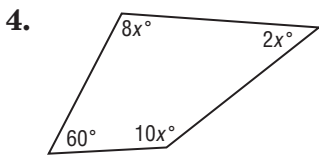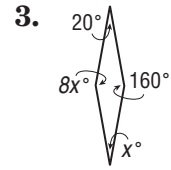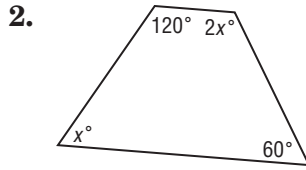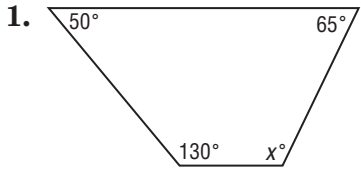
Tell whether each statement is *sometimes, always,* or *never* true.

10. A parallelogram is a trapezoid.

11. A square is a quadrilateral.

12. A rhombus is a rectangle.

13. A quadrilateral is a rectangle.

Make a drawing of each quadrilateral. Then classify each quadrilateral using the name that *best* describes it.

14. In quadrilateral $ACFG$, $m\angle A = 60°$, $m\angle C = 120°$, $m\angle F = 115°$, and $m\angle G = 65°$.

15. In quadrilateral $EMNP$, $m\angle E = 90°$, $m\angle M = 80°$, $m\angle N = 60°$, and $m\angle P = 130°$.

Lesson 10–4

10-5 Practice

Polygons

Find the sum of the measures of the interior angles of each polygon.

1. quadrilateral   2. decagon   3. 12-gon

4. heptagon   5. pentagon   6. hexagon

7. 25-gon   8. 100-gon

Find the measure of an interior angle of each polygon.

9. regular nonagon   10. regular octagon   11. regular hexagon

12. regular 12–gon   13. regular quadrilateral   14. regular decagon

TESSELLATIONS   For Exercises 15 and 16, identify the polygons used to create each tessellation.

15.

16.
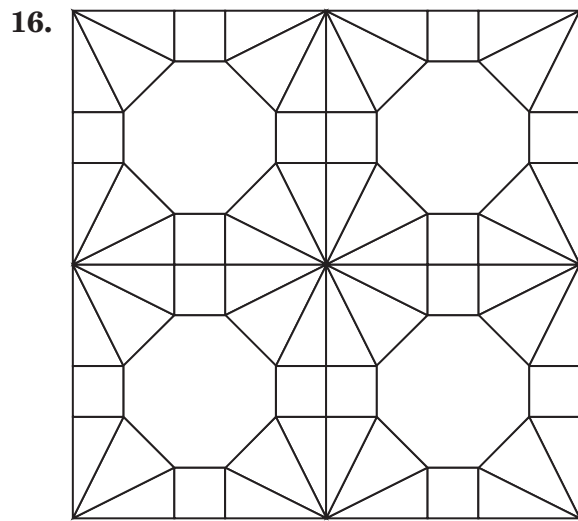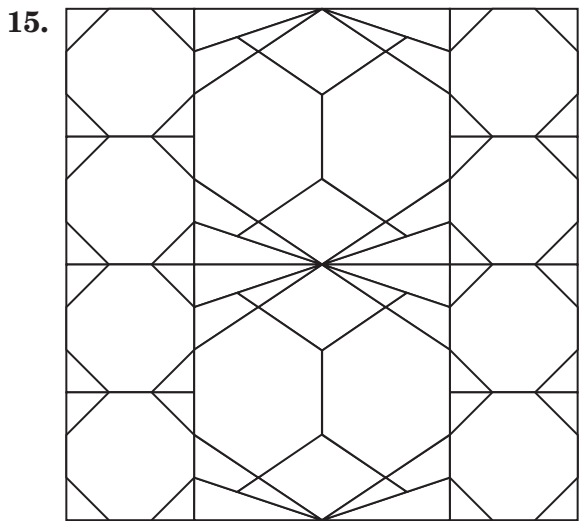
17. Which figure best represents a regular polygon?

A   B   C   D

Lesson 10–5
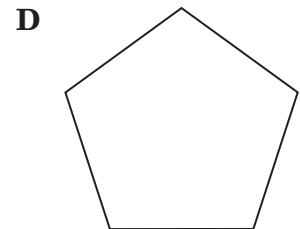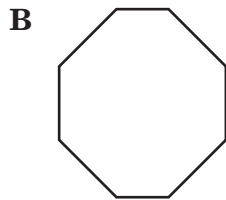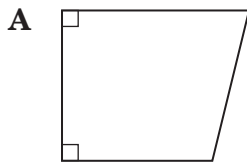
10-6 Practice

Area: Parallelograms, Triangles, and Trapezoids

Find the area of each figure described.

1. parallelogram: base, 12 m; height, 10 m

2. trapezoid: height, 13 cm; bases, 3 cm, 7 cm

3. triangle: base, 9.4 ft; height, 5 ft

4. triangle: base, 8.5 km; height, 14 km

5. parallelogram: base, 15 yd; height, 7 yd

6. trapezoid: height, 7 m; bases, 6 m, 9 m

Find the area of each figure.

7.

3 cm
5 cm
10 cm

8.

8 ft
2 ft
4 ft
7 ft

9.

8 yd
24 yd
8 yd
8 yd
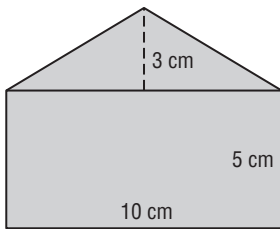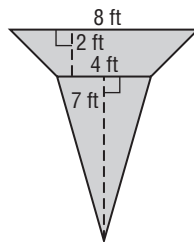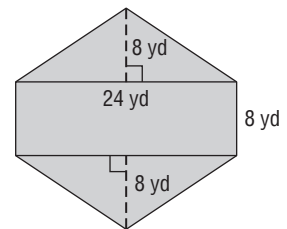
GEOGRAPHY For Exercises 10–12, use the approximate measurements to estimate the area of each state.

10. Maine

225 km
310 km

11. Idaho

790 km
175 km
280 km
480 km

12. North Carolina

490 km
200 km
850 km
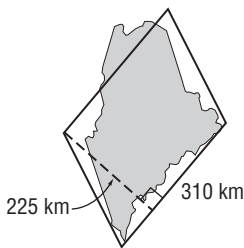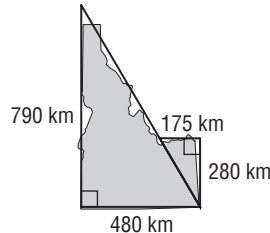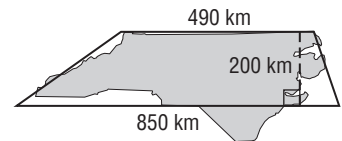
13. Suppose a triangle has an area of 220 square meters. What is the measure of the height if the base measures 20 meters?

14. A trapezoid has an area of 27.5 square centimeters. What is the measure of the height if the bases measure 7 centimeters and 4 centimeters?

15. Find the base of a parallelogram with a height of 10.5 feet and an area of 189 square feet.

10-7 Practice

Circumference and Area: Circles

Find the circumference and area of each circle. Round to the nearest tenth.

1. The diameter is 18 yards.

2. The radius is 4 meters.

3. The diameter is 4.2 meters.

4. The radius is 4.5 feet.
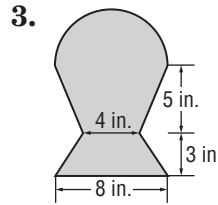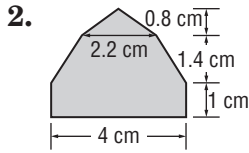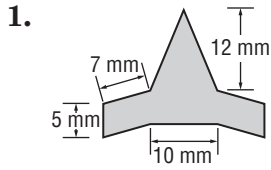
5. The radius is $9\frac{3}{4}$ miles.

6. The diameter is 6 kilometers.

Match each circle described in the column on the left with its corresponding measurement in the column on the right.

7. radius: 8.5 units

a. circumference: 53.4 units

8. diameter: 9 units

b. area: 33.2 units^2

9. diameter: 6.5 units

c. area: 63.6 units^2

10. radius: 12 units

d. circumference: 75.4 units

11. SPORTS A baseball has a radius of about 1.5 inches. Home plate is 16 inches wide. If a baseball were rolled across home plate, how many complete rotations would it take to cover the distance?

12. SPORTS A soccer ball has a circumference of about 28 inches, while the goal is 24 feet wide. How many soccer balls would be needed to cover the distance between the goalposts?

13. HISTORY Chariot races reached their peak in popularity in ancient Rome around the 1st and 2nd centuries A.D. A chariot wheel had a radius of about one foot. One lap around the track in the Circus Maximus was approximately 2,300 feet. How many chariot-wheel revolutions did it take to complete one lap?

14. CULTURE One of the artistic traditions of Tantric Buddhism is *dul–tson–kyil–khor,* which is the creation of intricately designed prayer circles (called mandalas) using colored sand. The sand is funneled through a hollow metal tube about 0.5 centimeter in diameter. If the prayer circle were a meter across, approximately how many funnel-tips of sand would be needed to cover its surface?
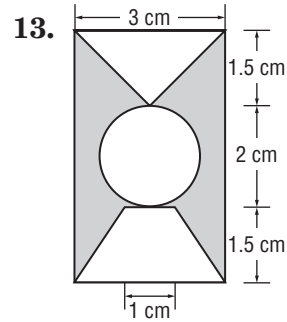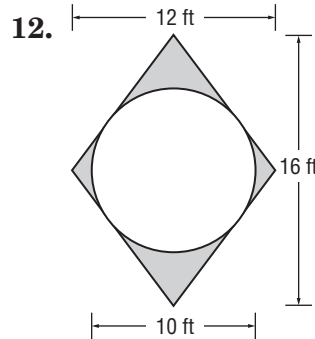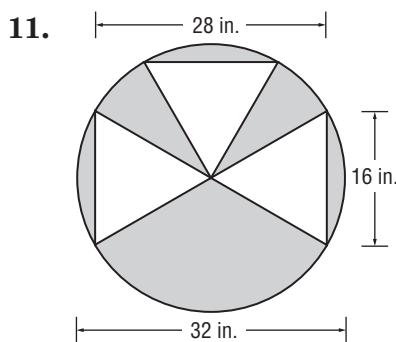
10-8 Practice

Area: Composite Figures

Find the area of each figure to the nearest tenth, if necessary.

1.

7 mm
12 mm
5 mm
10 mm

2.

0.8 cm
2.2 cm
1.4 cm
1 cm
4 cm

3.

5 in.
4 in.
3 in.
8 in.

4.

4 yd 4 yd 4 yd 3.5 yd
8 yd
4 yd
2 yd   2 yd

5.

1 m
3 m
1.5 m
1 m
3 m

6.

4 ft
6 ft 4 ft 6 ft

7.

6 in.
6 in. 6 in.

8.

10 m
7 m 7 m
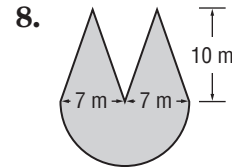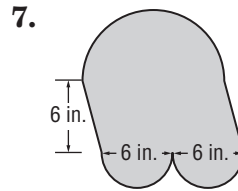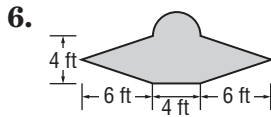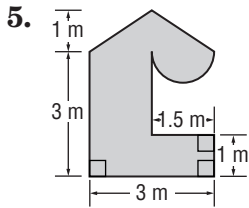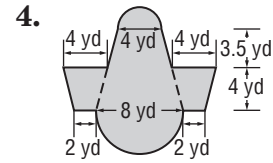
9. What is the area of a figure formed using a square with sides of 15 centimeters and four attached semicircles?

10. Find the area of a figure formed using a parallelogram with a base of 10 yards and a height of 12 yards and two triangles with bases of 10 yards and heights of 5 yards.

Find the area of each shaded area. Round to the nearest tenth, if necessary. (*Hint:* Find the total area and subtract the non-shaded area.)
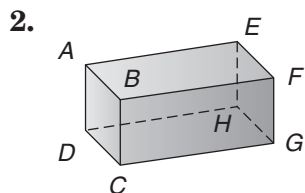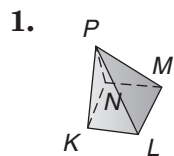
11.

28 in.
16 in.
32 in.

12.

12 ft
16 ft
10 ft

13.

3 cm
1.5 cm
2 cm
1.5 cm
1 cm

14. HISTORY What is the area of the track in the Circus Maximus as represented below? The center barrier was named the *spina*.
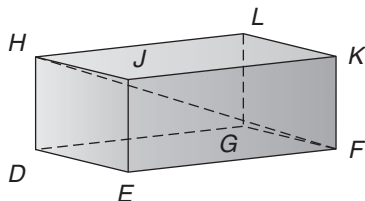
5 yd
334 yd
5 yd
35 yd
16 yd
35 yd
591 yd
43 yd
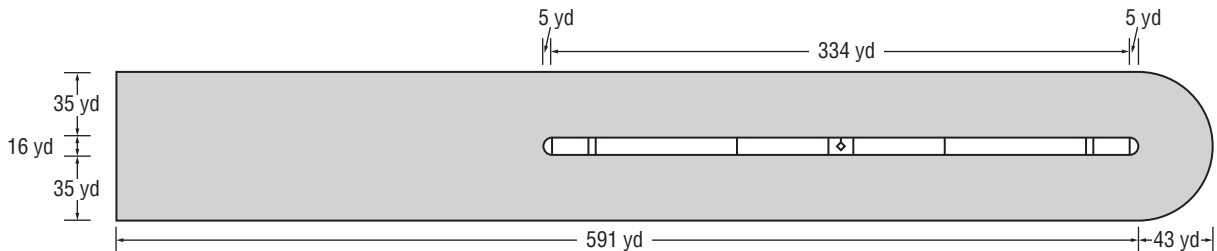
11-1 Practice

Three-Dimensional Figures

Identify each solid. Name the bases, faces, edges, and vertices.

1.

2.

3.
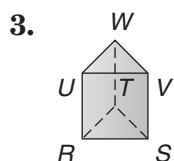
For Exercises 4–7, use the rectangular prism below.

4. Identify a diagonal.

5. Name four segments skew to $\overline{JK}$.

6. State whether $\overline{HJ}$ and $\overline{FG}$ are *parallel*, *skew*, or *intersecting*.

7. Name a segment that does *not* intersect plane $DGLH$.

8. ARCHITECTURE A sketch shows the plans for a new observation tower at an amusement park. Each unit on the drawing represents 10 feet.
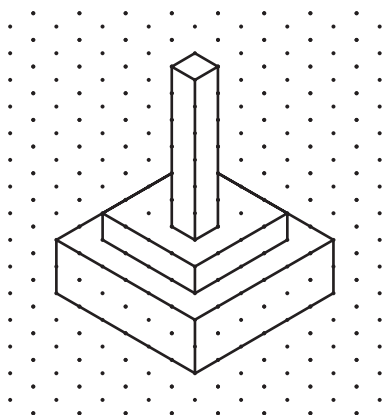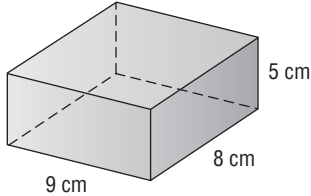
a. Draw a top view and find the area of the bottom section.

b. At the center of the tower, there is a staircase landing every 15 feet. How many landings are in the tower?
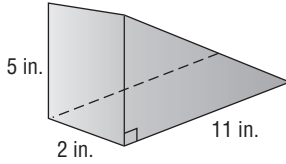
11-2 Practice

Volume: Prisms and Cylinders

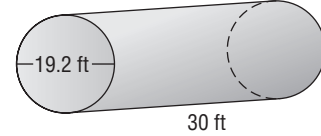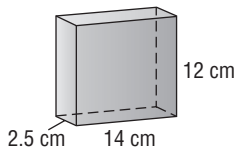**Find the volume of each solid shown or described. If necessary, round to the nearest tenth.**

1.

5 cm
8 cm
9 cm

2.
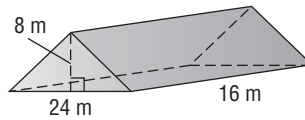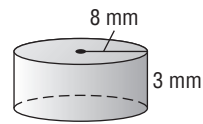
5 in.
11 in.
2 in.

3.

19.2 ft
30 ft

4.

12 cm
2.5 cm   14 cm

5.

8 m
24 m   16 m

6.

8 mm
3 mm

7.
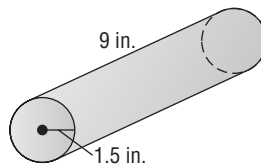
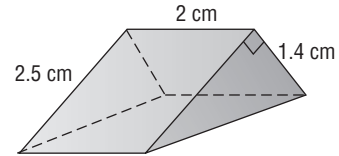9 mm
30 mm
19 mm

8.

9 in.
1.5 in.

9.

2 cm
2.5 cm
1.4 cm
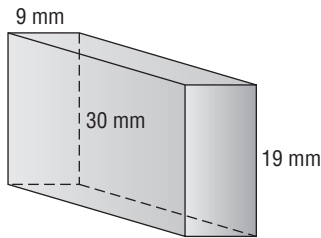
10. rectangular prism: length 22.5 ft, width 12.5 ft, height 1.2 ft

11. triangular prism: base of triangle 17 cm, altitude of triangle 3 cm, height of prism 10.2 cm

12. Find the height of a rectangular prism with a length of 11 meters, a width of 0.5 meter, and a volume of 23.1 m^3.

13. Find the height of a cylinder with a radius of 8.4 inches and a volume of 3546.7 in^3. Round to the nearest tenth.

14. A cube is 8 inches on each side. What is the height of a cylinder having the same volume, if its radius is 4 inches? Round to the nearest tenth.
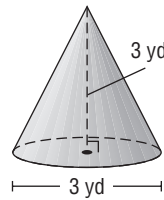
11-3 Practice

Volume: Pyramids, Cones, and Spheres

Find the volume of each solid. If necessary, round to the nearest tenth.

1.

17 in.

12 in.

12 in.

2.

3 yd

3 yd

3.

7 ft

4.

10 m

38 m

11 m

5.

4.5 cm

6.

10 m

12 m
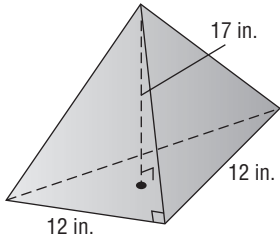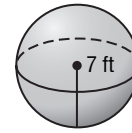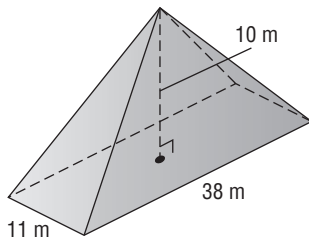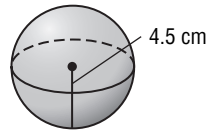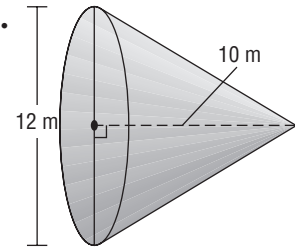
7. Find the volume of a rectangular pyramid with a length of 14 feet, a width of 12 feet, and a height of 9 feet.

8. Find the radius of a sphere with a volume of 972π cm^3.

9. Find the height of a cone with a radius of 12 in. and a volume of 408π in^3.

10. CONTAINERS A cone with a diameter of 3 inches has a height of 4 inches. A 2-inch square pyramid is being designed to hold nearly the same amount of ice cream. What will be the height of the square pyramid? Round to the nearest tenth.

Lesson 11-3

11-4 Practice

Surface Area: Prisms and Cylinders

Find the lateral area and surface area of each solid shown or described. If necessary, round to the nearest tenth.

1.

5 cm
24 cm
60 cm

2.

25 in.
26.9 in.
20 in.
9 in.

3.

11 mm
15 mm
12 mm
18.6 mm

4.

38 cm
20 cm
20 cm

5.

4 ft
36 ft

6.

18 mm
10 mm
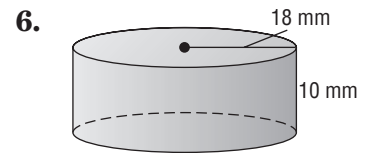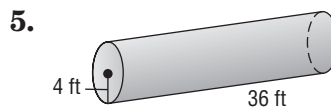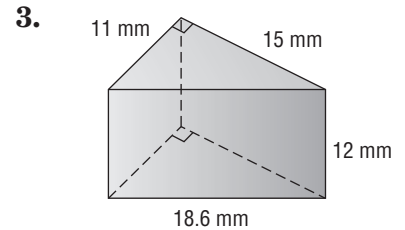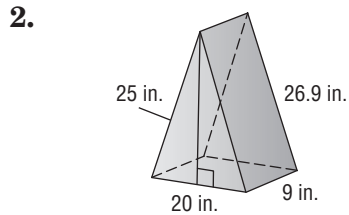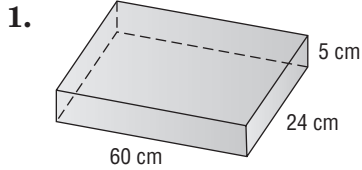
7. rectangular prism: length 10.2 m, width 8.5 m, height 9.1 m

8. rectangular prism: length 15.4 cm, width 14.9 cm, height 0.8 cm

9. cylinder: radius 28 mm, height 32 mm

10. cylinder: diameter 1.6 ft, height 4.2 ft

11. DECORATING A door that is 30 inches wide, 84 inches high, and 1.5 inches thick is to be decoratively wrapped in gift paper. How many square inches of gift paper are needed?

PACKAGING For Exercises 12 and 13, use the following information. A cardboard shipping container is in the form of a cylinder, with a radius of 6 centimeters and a volume of 8595.4 cubic centimeters.

12. Find the length of the shipping container. Round to the nearest tenth.

13. Find the surface area of the shipping container. Round to the nearest tenth.

Lesson 11-4

11-5 Practice

Surface Area: Pyramids and Cones

Find the surface area of each solid. If necessary, round to the nearest tenth.

1.

15 cm
9.2 cm
9.2 cm

2.

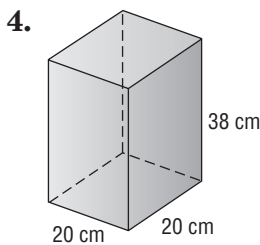1.5 m   2.5 m
1.5 m
1.5 m
$A = 1.0 \text{ m}^2$

3.

11 m   9 m
9 m
9 m
$A = 35.1 \text{ m}^2$

4.

17.5 cm
30 cm

5.

9.2 mm
4.2 mm

6.

7.5 in.
4.5 in.

7.

10 ft
6 ft
6 ft

8.

9 m
11 m

9.

4.3 cm
5 cm
5 cm
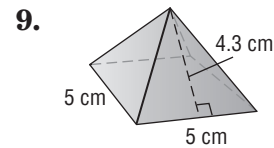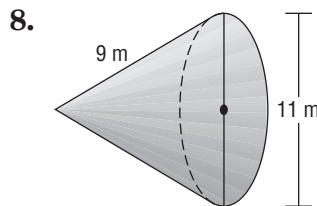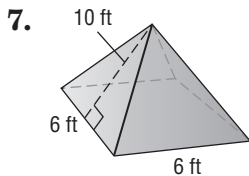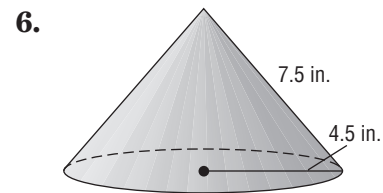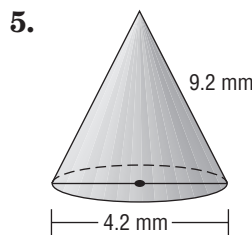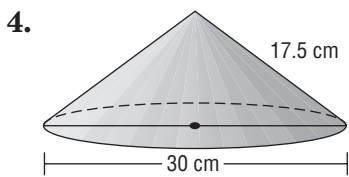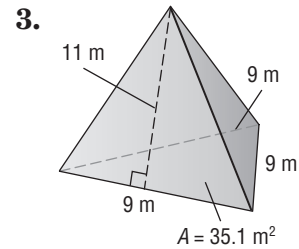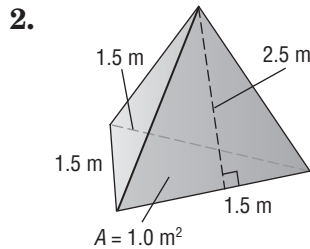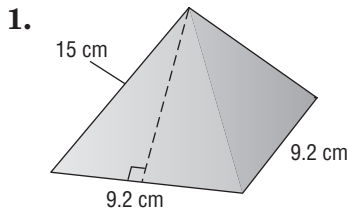
10. square pyramid: base side length 8.4 in., slant height 8.4 in.

11. cone: radius 9 ft, slant height 22 ft

12. cone: diameter 26 cm, slant height 15 cm

13. **PAINTING** A wooden structure at a miniature golf course is a square pyramid whose base is 5 feet on each side. The slant height is 4.75 feet. Find the lateral area to be painted.

14. **BAKING** A cone-shaped icicle on a gingerbread house will be dipped in frosting. The icicle is 1 centimeter in diameter and the slant height is 7 centimeters. What is its total surface area?

15. **HISTORY** The Great Pyramid in Egypt was built for the Pharaoh Khufu. The base of each side is 230 meters. The height from the base along the face to the top is 187 meters. Find the total surface area.

11-6 Practice

Similar Solids

Determine whether each pair of solids is similar.

1.

160 in.

32 in.

48 in.

240 in.

2.

6 m

6 m

6 m

15 m

4 m

4 m

4 m

4 m

10 m

3.

5 ft

2 ft   2 ft

20 ft

9 ft

9 ft

4.

10 m

5 m

28 m

14 m
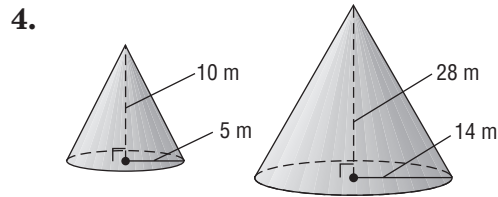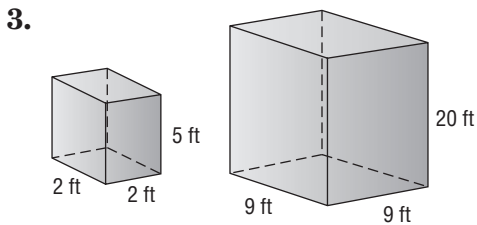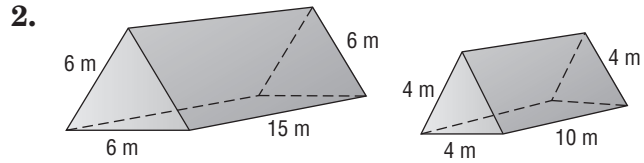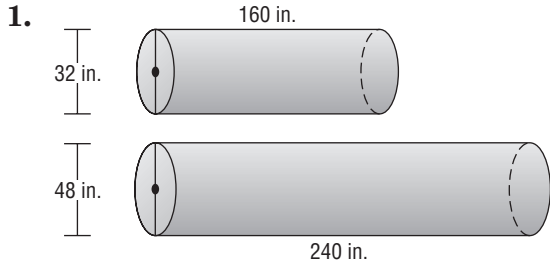
Find the missing measure for each pair of similar solids.

5.

32.4 ft

18 ft

15 ft   15 ft

x

6.

2.7 mm

6.3 mm

x

8.4 mm

7.

72 in.

45 in.

x

30 in.

8.

39 cm

27 cm

24 cm

50.7 cm

35.1 cm

x
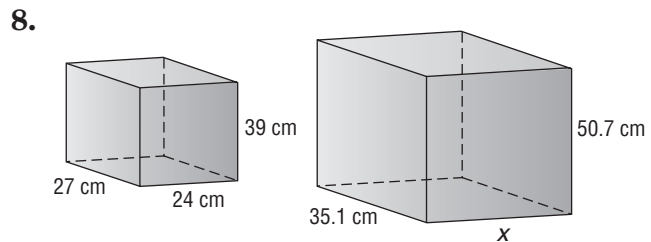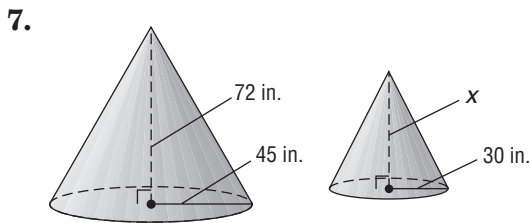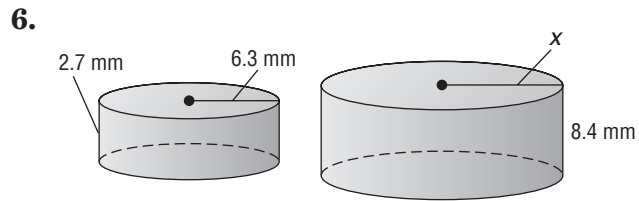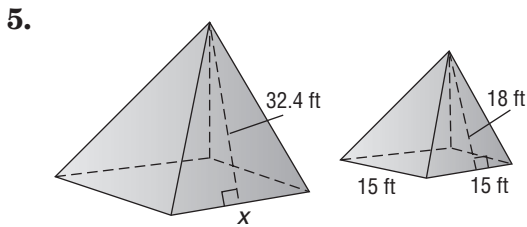
PLAYGROUNDS   For Exercises 9 and 10, use the following information.

In the miniature village at the playground, the model of the old school building is 6.6 feet long, 3.3 feet wide, and 4.6 feet high.

9. If the real building was 80 feet long and 40 feet wide, how high was it?

10. What was the volume of the old school building in cubic feet?

12-1 Practice

Stem-and-Leaf Plots

Display each set of data in a stem-and-leaf plot.

1. {68, 63, 70, 59,
78, 64, 68, 73,
61, 66, 70}

2. {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 and Team	**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.

5. The category with the lowest total expenditure in 1992 was motion pictures. What was its total?

6. What is the median total recreational spending for 1992? For 2002?

7. 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
      1 | 6 | 0
        | 7 |
        | 8 | 4
        | 9 |
```

7 | 2 = $27 billion   3 | 5 = $35 billion

12-2 Practice

Measures of Variation

Find the range, interquartile range, and any outliers for each set of data.

1. {3, 9, 11, 8, 6, 12, 5, 4}

2. {8, 3, 9, 14, 12, 11, 20, 23, 5, 26}

3. {42, 50, 46, 47, 38, 41}

4. {10.3, 9.8, 10.1, 16.2, 18.0, 11.4, 16.0, 15.8}

5. {107, 82, 93, 112, 120, 95, 98, 56, 109, 110}

6. {106, 103, 112, 109, 115, 118, 113, 108}

7.
Stem	Leaf
1	7 8
2	2 3 5 6 8
3	0

2 | 2 = 22

8.
Stem	Leaf
5	6 7
6	0 1 1 4 8 8 9
7	0 2 3 5 6 7

6 | 1 = 61

9.
Stem	Leaf
4	0 0 0 2 5 7
5	2 6
6	1 8 8
7	0 1 9

5 | 2 = 52

10.
Stem	Leaf
6	4 7 9
7	9
8	1 1 3 3 4 6
9	0 1 2 5

7 | 9 = 79

11.
Stem	Leaf
3	0 1 6 8
4	4
5	2
6	
7	3 3
8	9

5 | 2 = 52

12.
Stem	Leaf
4	3 3 5 7 9
5	0 0 1
6	2
7	4 4 6 8
8	
9	0 1 1 2 2 5

5 | 1 = 51

POPULATION For Exercises 13–15, use the data in the table at the right.

13. What is the range of populations shown?

14. What is the interquartile range for the annual growth rate?

15. Where does the city with the fastest growth rate fall in terms of population? The city with the slowest growth rate?

Populations of the World's Largest Cities 2000		
City	Population (millions)	Annual Growth Rate (%)
Tokyo, Japan	26.4	0.51
Mexico City, Mexico	18.1	1.81
Mumbai, India	18.1	3.54
Sao Paulo, Brazil	17.8	1.43
New York City, U.S.	16.6	0.37
Lagos, Nigeria	13.4	5.33
Los Angeles, U.S.	13.1	1.15
Calcutta, India	12.9	1.60
Shanghai, China	12.9	−0.35
Buenos Aires, Argentina	12.6	1.14

Source: *World Almanac*

Lesson 12-2

12-3 Practice

Box-and-Whisker Plots

Draw a box-and-whisker plot for each set of data.

1. {14, 30, 35, 8, 29, 28, 31, 42,
20, 36, 32}

2. {$105, $98, $83, $127, $115, $114,
$132, $93, $107, $101, $119}

3. {211, 229, 196, 230, 240, 212, 231, 233,
243, 214, 239, 238, 228, 237, 230, 234,
239, 240, 212, 232, 239, 240, 237}

4. {3.7, 6.2, 4.1, 2.4, 1.0, 1.5, 1.4, 2.1,
2.6, 3.0, 1.3, 1.7}

For Exercises 5–7, use the box-and-whisker plot shown.

5. How tall is the highest peak
of the Hindu Kush?

6. What is the median height of the
major peaks?

Major Peaks of the Hindu Kush
(height in feet)

19,000 20,000 21,000 22,000 23,000 24,000 25,000 26,000

Source: www.peakware.com

7. Write a sentence describing what the
box-and-whisker plot tells about the major peaks of the Hindu Kush.
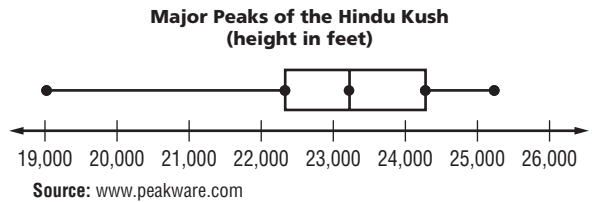
For Exercises 8–10, use the box-and-whisker plot shown.

8. In which year was the corn yield more
varied? Explain.

Corn Yield by State
(bushels per acre)

9. How does the median yield in 2003
compare with the median yield in 1999?

70 80 90 100 110 120 130 140 150 160 170

Source: U.S. Census Bureau
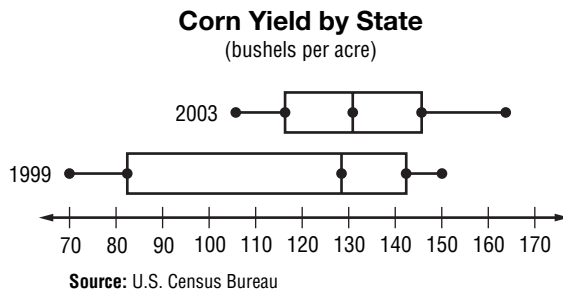
10. Write a few sentences that compare the 1999 yields with the 2003 yields.

Lesson 12-3

12-4 Practice

Histograms

Display each set of data in a histogram.

1.

Ages of Zoo Volunteers		
Age	**Tally**	**Frequency**
18–27	III	3
28–37	JHT III	8
38–47	JHT JHT JHT I	16
48–57	JHT II	12
58–67	JHT	5
68–77	II	2

2.

Crossword Puzzle Solving Times		
Time (min)	**Tally**	**Frequency**
0–4	III	3
5–9	I	1
10–14	JHT I	6
15–19	JHT JHT IIII	14
20–24		0
25–29	II	2

For Exercises 3–6, use the histogram at the right.

3. What size are the intervals?

4. How many countries have nine or fewer threatened species?

5. Which interval contains the median number of endangered species?

6. Can you tell from the histogram whether any of the countries have zero threatened species? Explain.

Threatened Species of Mammals in Europe
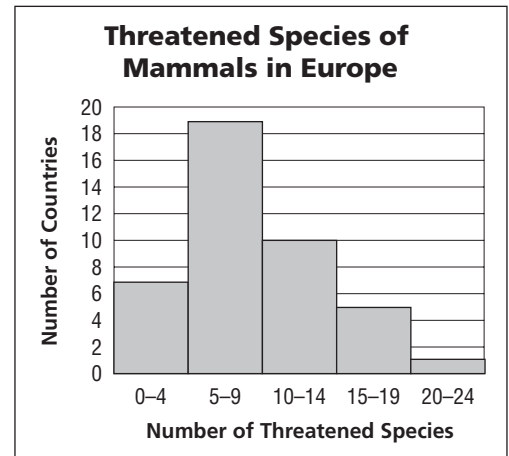
Source: www.redlist.org

Lesson 12-4

12-5 Practice

Choosing an Appropriate Display

Choose an appropriate style of display for each data set. Justify your choice.

1. the monthly price of apples over a two year period.

2. results of a poll of 30 students favorite type of candy

3. the income of the middle 50% of U.S. households

4. the number of terms served by current senators

5. the number of runners who finished a marathon in each ten-minute interval

Choose an appropriate style of display for each data set. Then make a display.

6. Winning times for the 200-Meter backstroke event at the Olympics.

Year	Winning Time
1976	1:59.19
1980	2:01.93
1984	2:00.23
1988	1:59.37
1992	1:58.47
1996	1:58.54
2000	1:56.76
2004	1:54.95

Source: *World Almanac*

7.

Monthly Park Visitors (in thousands)		
6	7	12
15	25	40
46	46	37
22	19	8

12-6 Practice

Misleading Graphs

For Exercises 1–3, refer to the graphs below.

U.S. Consumption of Hydroelectric Power, 1960–2002 Graph A
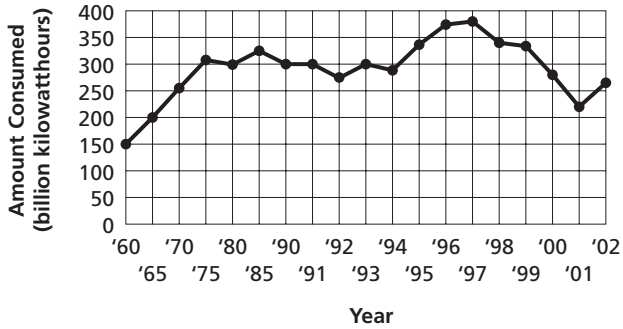
U.S. Consumption of Hydroelectric Power, 1960–2002 Graph B
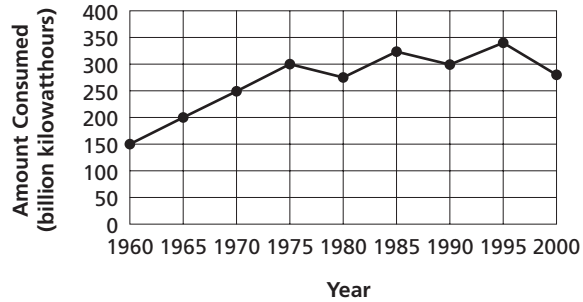
1. What was the U.S. consumption of hydroelectric power in 1990?

2. Which graph gives the impression that the use of hydroelectric power in the United States has experienced many dips as well as rises between 1975 and 2002?

3. What causes the graphs to differ in their appearance?

World Population Graph A

Source: www.pbs.org
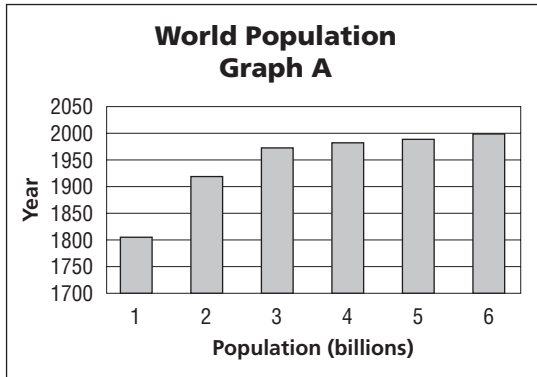
World Population Graph B
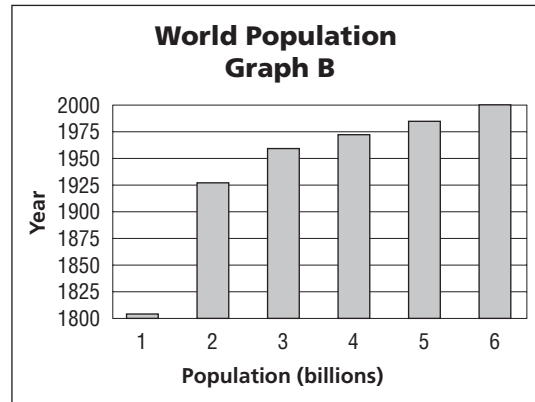
Source: www.pbs.org

For Exercises 4–6, refer to the graphs below.

4. What was the world's population in 1999?

5. Which graph gives the impression that the world's population skyrocketed between 1800 and 1925? Explain.

6. Are the vertical axis and the horizontal axis in either graph misleading? Explain.

12-7 Practice

Simple Probability

A spinner like the one shown is used in a game.
Determine the probability of each outcome if the
spinner is equally likely to land on each section.
Express each probability as a fraction and as
a percent.

1. $P(15)$

2. $P(\text{even})$

3. $P(\text{greater than } 10)$

4. $P(\text{perfect square})$

5. $P(1 \text{ or } 2)$

6. $P(\text{less than } 9)$

7. $P(\text{not shaded})$

8. $P(\text{shaded})$

There are 8 red marbles, 5 blue marbles, 11 green marbles, and 1 yellow marble in
a bag. Suppose one marble is selected at random. Find the probability of each
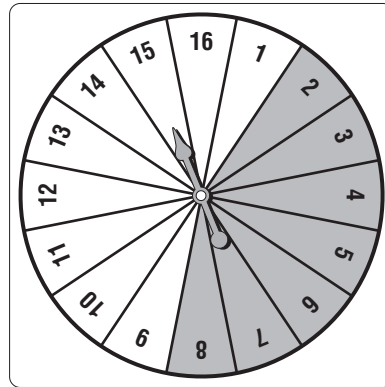outcome. Express each probability as a fraction and as a percent.

9. $P(\text{red})$

10. $P(\text{blue})$

11. $P(\text{yellow})$

12. $P(\text{red or blue})$

13. $P(\text{black})$

14. $P(\text{red, blue, or green})$

Suppose two 1–6 number cubes are rolled. Find the probability of each outcome.
Express each probability as a fraction and as a percent. (*Hint:* Make a table to
show the sample space as in Example 2.) Round to the nearest tenth if necessary.

15. $P(1 \text{ or } 5)$

16. $P(\text{both odd})$

17. $P(\text{even product})$

18. $P(\text{sum more than } 8)$

19. $P(\text{both different})$

20. $P(\text{sum is a square})$

21. To the nearest tenth of a percent, what is the probability that today is a weekday?

12-8 Practice

Counting Outcomes

Find the number of possible outcomes for each situation.

1. Joan randomly dials a seven-digit phone number.

2. First-year students at a school must choose one each of 5 English classes, 4 history classes, 5 math classes, and 3 physical education classes.

3. One card each is drawn from four different standard decks of cards.

4. A store offers running shoes with either extra stability or extra cushioning from four different manufacturers.

5. A winter sweater comes in wool or fleece, with a zipper or a crew neck, and in three colors.

6. One spinner can land on red, green, blue, or yellow and another can land on right foot, left foot, right hand, or left hand. Each spinner is spun once.

Find the probability of each event.

7. A number cube is rolled. What is the probability of rolling a 4 or lower?

8. A number cube is rolled. What is the probability of getting a five or higher?

9. An eight-sided die is rolled and a coin is tossed. What is the probability of landing on an even number and getting heads?

10. A coin is tossed and a card is drawn from a standard deck of cards. What is the probability of landing on heads and choosing a heart?

11. **REFRESHMENTS** How many fruit smoothies are possible from 6 choices of fruit, 4 choices of milk, and 3 sizes?

12. **MONOGRAMS** A school's class rings can include a student's initials in an engraved monogram on the ring. How many different monograms are possible from 2 sizes, 5 type styles, and 3 border styles?

13. **MOBILE PHONES** The table shows the features you can choose for a pay-as-you go phone plan.

    a. How many phone plans have national long distance?

    b. How many customized phone plans include 100 minutes per month talkingtime and paging capabilities?

Phone	Features	Calling Area	Monthly Talk Time
Brand A; Brand B	e-mail only; paging only; deluxe: paging and e-mail	local only; local and regional; national long distance	30 min; 60 min; 100 min

12-9 Practice

Permutations and Combinations

Tell whether each situation is a *permutation* or *combination*. Then solve.

1. How many ways can you make a sandwich by choosing 4 of 10 ingredients?

2. How many ways can 11 photographs be arranged horizontally?

3. How many ways can you buy 2 software titles from a choice of 12?

4. How many ways can a baseball manager make a 9-player batting order from a group of 16 players?

5. How many ways can 30 students be arranged in a 4-student line?

6. How many ways can 3 cookie batches be chosen out of 6 prize-winning batches?

7. **SCHOOL TRIPS**   Students are chosen in groups of 6 to tour a local business. How many ways can 6 students be selected from 3 classes totaling 53 students?

8. **CONTESTS**   In a raffle, 5 winners get to choose from 5 prizes, starting with the first name drawn. If 87 people entered the raffle, how many ways can the winners be arranged?

9. **RESTAURANTS**   A local restaurant specializes in simple and tasty meals.
   a. How many sandwiches are possible if the restaurant lets you build a sandwich by choosing any 4 of 10 sandwich ingredients?
   b. If there are 6 soups to choose from, how many soup-and build-a-sandwich specials are possible?

10. **SPORTS**   An inline skate has 4 wheels. How many ways could 4 replacement wheels be chosen from a pack of 10 wheels and fitted to a skate?

GIFT WRAPPING   For Exercises 11–14, use the following information.

An upscale department offers its customers free gift wrapping on any day that they spend at least $100. The store offers 5 box sizes (XS, S, M, L, XL), 6 wrapping themes (birthday, wedding, baby girl, baby boy, anniversary, and all-occasion), and 3 styles of bow (classic, modern, and jazzy).

11. How many ways can packages be gift-wrapped at the store?

12. What is the probability that any wrapped package will be in a large box?

13. What is the probability that any wrapped package will *not* have a jazzy bow?

14. What is the probability that a customer will request wrapping for a baby-boy gift?

12-10 Practice

Probability of Composite Events

An eight-sided die is rolled and the spinner is spun. Find each probability.

1. P(4 and yellow fruit or vegetable)

2. P(an odd number and a pumpkin)

3. P(a prime number and a red fruit or vegetable)

4. P(a number less than 4 and a blue fruit or vegetable)
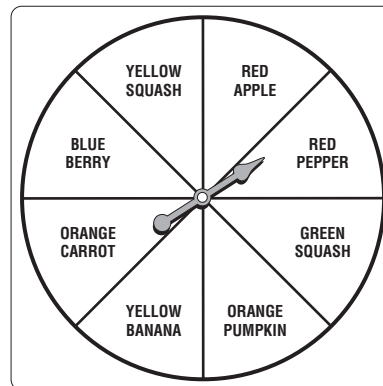
There are 6 orange marbles, 2 red marbles, 3 white marbles, and 4 green marbles in a bag. Once a marble is drawn, it is replaced. Find the probability of each outcome.

5. a red then a white marble

6. a white then a green marble

7. two orange marbles in a row

8. two marbles in a row that are *not* white

9. a green then a *not* green marble

10. a red then an orange then a green marble

There are 2 green marbles, 7 blue marbles, 3 white marbles, and 4 purple marbles in a bag. Once a marble is drawn, it is *not* replaced. Find the probability of each outcome.

11. a green then a white marble

12. a blue then a purple marble

13. two blue marbles in a row

14. two marbles in a row that are *not* purple

15. a white then a purple marble

16. three purple marbles in a row

The chart shows the letter-number combinations for bingo. The balls are randomly drawn one at a time. Balls are *not* replaced after they are drawn. Find the probability of each outcome.

B	I	N	G	O
1	13	25	37	49
2	14	26	38	50
3	15	27	39	51
4	16	28	40	52
5	17	29	41	53
6	18	30	42	54
7	19	31	43	55
8	20	32	44	56
9	21	33	45	57
10	22	34	46	58
11	23	35	47	59
12	24	36	48	60

17. a B-1

18. a G

19. an N or a B-2

20. an I or an O

21. *not* a G

22. a B-6, then a G, then another G

13-1 Practice

Polynomials

Determine whether each expression is a polynomial. If it is, classify it as a *monomial, binomial,* or *trinomial*.

1. $-3n^2$

2. $v^2 - 9v$

3. $g + 2h + jk$

4. $6b + 2 + \dfrac{8}{b}$

5. $m + 10$

6. $a^2b^2 + 9$

7. $1 + \sqrt{s}$

8. q

9. $h + h^2 + 1$

10. $m + n - p$

11. $y^4 + 5y - 2$

12. $x - \sqrt{x}$

13. $-5w^7t$

14. $41 - qr^4$

15. $p^4 + p^2 + p$

16. $\dfrac{2x^2}{7} + \dfrac{5x}{7} + \dfrac{3}{7}$

17. $\dfrac{v}{5} + \dfrac{1}{2}$

18. $10k - \sqrt{6}$

19. 4

20. $\dfrac{3}{c^2} - \dfrac{5}{c} - \dfrac{1}{2}$

21. $7g^2h^7$

Find the degree of each polynomial.

22. -52

23. xy

24. c

25. $2c^5 - c^3 - c - 9$

26. ab^3

27. $2xy^4z^3 + 7$

28. $r - 25$

29. $\dfrac{-4}{9}$

30. 12.4

31. $12 + 9t - t^2$

32. $5a^3 - a + 8$

33. $1 - c^2 + c^4$

34. $xy^2 - 3x^2y + xy$

35. $b^5 + b - 1.5$

36. $15k + 2$

37. $cde^8 + c^4 + 2e$

38. $wxyz - 2wx - 5y - yz + 4$

39. $-6g^2h^8 + gh^5 + 3$

40. METEOROLOGY *Summer simmer index* measures the discomfort level due to temperature and humidity. Meteorologists calculate this value by using a polynomial similar to $1.98x^2 - 115.93x + 0.01xy - 0.63y + 6.33$. The variable x is the temperature in °F and y is the relative humidity expressed as a whole number. What is the degree of the polynomial?

13-2 Practice

Adding Polynomials

Find each sum.

1. $\begin{aligned}&8q + 3\\ (+)\ &4q - 2\end{aligned}$

2. $\begin{aligned}&9f - \ \ 3\\ (+)\ &-f - 15\end{aligned}$

3. $\begin{aligned}&4r^2 + 11r\\ (+)\ 5r^2 - \ &3r - 7\end{aligned}$

4. $\begin{aligned}&n^2 - 3n\\ (+)\ \ \ \ \ &3n - 10\end{aligned}$

5. $\begin{aligned}&6w^2 + 2w + 7\\ (+)&8w^2 + 3w - 9\end{aligned}$

6. $\begin{aligned}&8c^2 - 3c + 15\\ (+)\ &3c^2 + 3c - 11\end{aligned}$

7. $\begin{aligned}&-5p^2 - 2p + 4\\ (+)\ &5p^2 + 2p - 4\end{aligned}$

8. $\begin{aligned}&7v^2 \ - 2v\\ (+)\ &7v^2 \ - \ v + 5\end{aligned}$

9. $\begin{aligned}&5m^2 + 6m - 3\\ (+)&8m^2 + 9m - 2\end{aligned}$

10. $\begin{aligned}&7d^2 + 8d - 3\\ (+)\ &d^2 + \ d + 3\end{aligned}$

11. $(r^2 + 9) + (-4r^2 + 6r + 10)$

12. $(g^2 + 3g - 6) + (6g^2 - 6g + 1)$

13. $(-2m + 10) + (5m - 3)$

14. $(4x^2 - 7x) + (8x + 5)$

15. $(3k^2 + 9k) + (k^2 - 2k - 4)$

16. $(2a^2 - 3ab) + (4ab - 8b^2)$

17. $(c + 4) + (c^2 - c + 6)$

18. $(5x^2 - 3xy) + (2xy + 9y^2)$

19. $(2y^3 + y^2 + 5) + (2y^2 + 3y)$

20. $(-5p^2 + 6p - 7) + (p^2 - 2)$

21. $(3ab^2 - 2a - 1) + (a^2 + ab + 3)$

22. $(6rs^3 + 4r) + (5rs^3 + 7)$

23. **GEOMETRY** The lengths of the sides of a triangle are $(x^2 - 5)$, $(7x - 1)$, and x.
    Find the perimeter of the triangle.

13-3 **Practice**

Subtracting Polynomials

Find each difference.

1. $\quad 4y + 1$
    $(-)\ 3y + 8$

2. $\quad 2k + 3$
    $(-)\ 7k - 6$

3. $\quad 5j^2 + 2j - 2$
    $(-)\ j^2 + 9j + 2$

4. $\quad c^2 + 5c - 3$
    $(-)\ -c^2 - 5c - 1$

5. $\quad d^2 - 4d + 6$
    $(-)\ d^2 + 3d - 8$

6. $\quad 2n^2 - 3n - 10$
    $(-)\ -n^2 - 3n + 8$

7. $\quad 9m^2 - 4m + 13$
    $(-)\ 7m^2 - 2m - 3$

8. $\quad d^2 + 3d - 6$
    $(-)\ d^2 + 3d + 6$

9. $\quad -6q^2 - 3q + 2$
    $(-)\ 3q^2 + 4q + 4$

10. $\quad v^2 - v$
    $(-)\ 2v^2 - 9v - 3$

11. $(4n^2 - n - 6) - (-2n^2 - 3n - 14)$

12. $(3k^2 + 9k) - (8k^2 - 12)$

13. $(k^2 - 7) - (k - 11)$

14. $(9x^2 - x - 2) - (3x^2 - x - 4)$

15. $(k^2 - 12) - (k^2 + 6k - 9)$

16. $(k^2 + 4kb) - (5kb + 2b^2)$

17. $(3u^2 - 9) - (u^2 + 21u + 2)$

18. $(5m^2 - 4mn) - (4mn + 8n^2)$

19. $(h^2 + 8h + 5) - (h^2 - 3h - 7)$

20. $(2x^2 - 4x - 8) - (2x - 8x^2)$

21. $(6g^2 + 3g + 2) - (g^2 + g - 4)$

22. $(b^3 + b^2 - ab) - (b^3 + 3b^2 + 5)$

23. **POOLS**   A swimming pool is $(4w^2 - 16)$ feet long and $(w - 16)$ feet wide. How much longer is the length than the width?

13-4 Practice

Multiplying a Polynomial by a Monomial

Find each product.

1. $5(3k + 8)$

2. $(3h + 6)2$

3. $-2(q - 4)$

4. $(3v - 5)(-7)$

5. $11(4d - 7)$

6. $-8(12c - 6)$

7. $(5g - 10)(-5)$

8. $2(5p - 10)$

9. $-9(3f^2 - 2f - 1)$

10. $2.5(8w + 5)$

11. $(4r^3 - 3r)(-8)$

12. $-6(3x^2 - 2x + 7)$

13. $n(7n + 3)$

14. $(6u - 15)(-u)$

15. $-h(8h + 2)$

16. $(8y + 3)(-y)$

17. $a(4a - 4)$

18. $(5p + 15)(-p)$

19. $-d(-5d + 1)$

20. $-g(1.8g + 10)$

21. $m(0.9m^2 - 0.5)$

22. $(2q^3 - 5q^2 - 2q)(-q)$

23. $k^3(7k^4 - 2k^2 + 6)$

24. $ab(10a^2b + 3a)$

25. $y^2(5x - 2xy + y)$

26. $n(8 - m - 12mn^2)$

27. $(4gh^2 - 2g^2 - h)(-g^2)$

28. $(20q - 4)(-2q)$

29. $14k(2k + 5)$

30. $(9p - 7)(-3p^2)$

31. $(0.2c - 1)(-1.5c^2)$

32. $-6.5n(4n^2 - 8)$

33. $-6x^2(4x^2 - 10x)$

34. $5h^2(2h^3 - h^2 - 7h + 8)$

35. $(4y^2 - 3y + 9)(-2y)$

36. $6gh(8g^2 + 4gh + 3h^2)$

37. $10a(2a^2 - 5ab + 4a)$

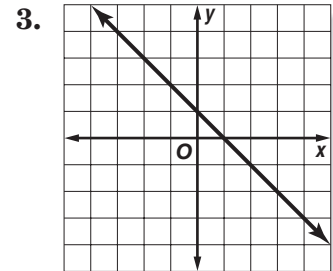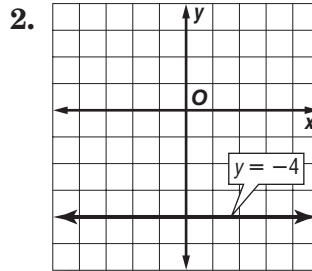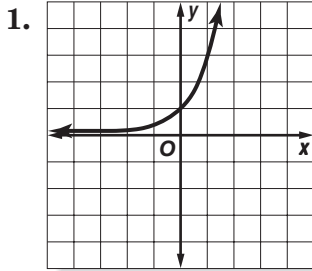**38.** $(8x^2 - 3xy - xy^2)(-7x)$

39. $-5c^2(2cd - d^2 + 1)$

40. Find the area of a porch that is $3x$ feet wide and $4x + 9$ feet long.

13-5 Practice

Linear and Nonlinear Functions

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

1.

2.

3.

4. $5x - y = 15$

5. $3y + 12x^2 = 0$

6. $5y - x + 3 = 0$

7. $y = 6\sqrt{x} + 10$

8. $y = \dfrac{8}{x}$

9. $y = -x^2 + 2$

10.

x	y
1	1.0
2	0.8
3	0.6
4	0.4

11.

x	y
44	0
48	2.5
52	5.0
56	7.5

12.

x	y
3	1
6	−2
9	−5
12	−14

13. GEOMETRY The graph shows how the area of a square increases as the perimeter increases. Is this relationship linear or nonlinear? Explain.
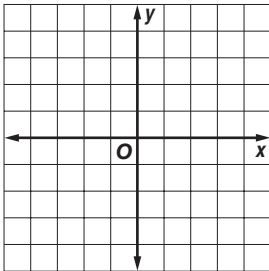
Lesson 13-5
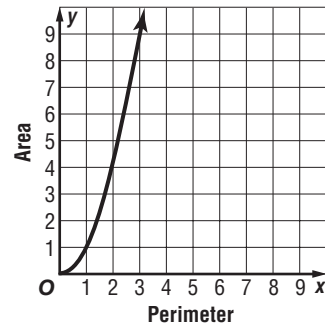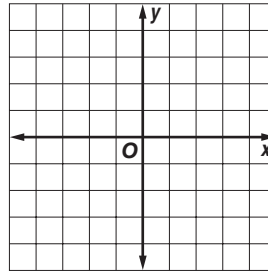
13-6 Practice

Graphing Quadratic and Cubic Functions
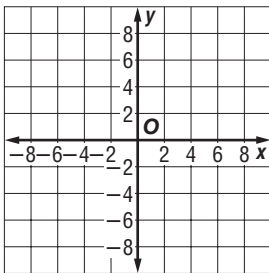
Graph each function.
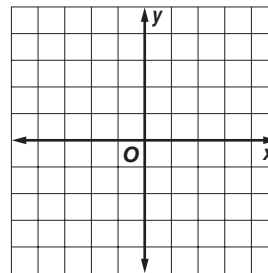
1. $y = 0.4x^2$
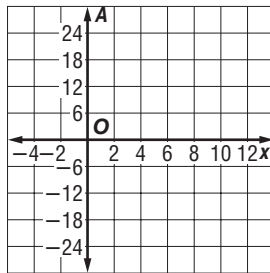
2. $y = 0.4x^3$

3. $y = -2x^2 - 1$

4. $y = -2x^3 - 1$

5. WINDOWS A window maker has 25 feet of wire to frame a window. One side of the window is x feet and the other side is $9 - x$ feet.

a. Write an equation to represent the area A of the window.

b. Graph the equation you wrote in part **a**.

c. If the area of the window is 18 square feet, what are the two possible values of x?