1-1 Practice

Variables and Expressions

Write an algebraic expression for each verbal expression.

1. the difference of 10 and u **2.** the sum of 18 and a number

3. the product of 33 and j **4.** 74 increased by 3 times y

5. 15 decreased by twice a number   **6.** 91 more than the square of a number

7. three fourths the square of b **8.** two fifths the cube of a number

Evaluate each expression.

9. 11^2 **10.** 8^3 **11.** 5^4

12. 4^5 **13.** 9^3 **14.** 6^4

15. 10^5 **16.** 12^3 **17.** 100^4

Write a verbal expression for each algebraic expression.

18. $23f$ **19.** 7^3

20. $5m^2 + 2$ **21.** $4d^3 - 10$

22. $x^3 \cdot y^4$ **23.** $b^2 - 3c^3$

24. $\dfrac{k^5}{6}$ **25.** $\dfrac{4n^2}{7}$

26. BOOKS A used bookstore sells paperback fiction books in excellent condition for $2.50 and in fair condition for $0.50. Write an expression for the cost of buying e excellent-condition paperbacks and f fair-condition paperbacks.

27. GEOMETRY The surface area of the side of a right cylinder can be found by multiplying twice the number π by the radius times the height. If a circular cylinder has radius r and height h, write an expression that represents the surface area of its side.

Lesson 1-1

1-2 **Practice**

Order of Operations

Evaluate each expression.

1. $(15 - 5) \cdot 2$

2. $9 \cdot (3 + 4)$

3. $5 + 7 \cdot 4$

4. $12 + 5 - 6 \cdot 2$

5. $7 \cdot 9 - 4(6 + 7)$

6. $8 \div (2 + 2) \cdot 7$

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

8. $22 \div 11 \cdot 9 - 3^2$

9. $6^2 + 3 \cdot 7 - 9$

10. $3[10 - (27 \div 9)]$

11. $2[5^2 + (36 \div 6)]$

12. $162 \div [6(7 - 4)^2]$

13. $\dfrac{5^2 \cdot 4 - 5 \cdot 4^2}{5(4)}$

14. $\dfrac{(2 \cdot 5)^2 + 4}{3^2 - 5}$

15. $\dfrac{7 + 3^2}{4^2 \cdot 2}$

Evaluate each expression if $a = 12$, $b = 9$, and $c = 4$.

16. $a^2 + b - c^2$

17. $b^2 + 2a - c^2$

18. $2c(a + b)$

19. $4a + 2b - c^2$

20. $(a^2 \div 4b) + c$

21. $c^2 \cdot (2b - a)$

22. $\dfrac{bc^2 + a}{c}$

23. $\dfrac{2c^3 - ab}{4}$

24. $\dfrac{2(a - b)^2}{5c}$

25. $\dfrac{b^2 - 2c^2}{a + c - b}$

CAR RENTAL For Exercises 26 and 27, use the following information.

Ann Carlyle is planning a business trip for which she needs to rent a car. The car rental company charges \$36 per day plus \$0.50 per mile over 100 miles. Suppose Ms. Carlyle rents the car for 5 days and drives 180 miles.

26. Write an expression for how much it will cost Ms. Carlyle to rent the car.

27. Evaluate the expression to determine how much Ms. Carlyle must pay the car rental company.

GEOMETRY For Exercises 28 and 29, use the following information.

The length of a rectangle is $3n + 2$ and its width is $n - 1$. The perimeter of the rectangle is twice the sum of its length and its width.

28. Write an expression that represents the perimeter of the rectangle.

29. Find the perimeter of the rectangle when $n = 4$ inches.

16

1-3 Practice

Open Sentences

Find the solution of each equation if the replacement sets are $A = \left\{0, \frac{1}{2}, 1, \frac{3}{2}, 2\right\}$ and $B = \{3, 3.5, 4, 4.5, 5\}$.

1. $a + \dfrac{1}{2} = 1$

2. $4b - 8 = 6$

3. $6a + 18 = 27$

4. $7b - 8 = 16.5$

5. $120 - 28a = 78$

6. $\dfrac{28}{b} + 9 = 16$

Find the solution of each equation using the given replacement set.

7. $\dfrac{7}{8} + x = \dfrac{17}{12}; \left\{\dfrac{1}{2}, \dfrac{13}{24}, \dfrac{7}{12}, \dfrac{5}{8}, \dfrac{2}{3}\right\}$

8. $\dfrac{3}{4}(x + 2) = \dfrac{27}{8}; \left\{\dfrac{1}{2}, 1, 1\dfrac{1}{2}, 2, 2\dfrac{1}{2}\right\}$

9. $1.4(x + 3) = 5.32; \{0.4, 0.6, 0.8, 1.0, 1.2\}$

10. $12(x + 4) = 76.8 ; \{2, 2.4, 2.8, 3.2, 3.6\}$

Solve each equation.

11. $x = 18.3 - 4.8$

12. $w = 20.2 - 8.95$

13. $\dfrac{37 - 9}{18 - 11} = d$

14. $\dfrac{97 - 25}{41 - 23} = k$

15. $y = \dfrac{4(22 - 4)}{3(6) + 6}$

16. $\dfrac{5(2^2) + 4(3)}{4(2^3 - 4)} = p$

Find the solution set for each inequality using the given replacement set.

17. $a + 7 < 10; \{2, 3, 4, 5, 6, 7\}$

18. $3y \geq 42; \{10, 12, 14, 16, 18\}$

19. $4x - 2 < 5; \{0.5, 1, 1.5, 2, 2.5\}$

20. $4b - 4 > 3; \{1.2, 1.4, 1.6, 1.8, 2.0\}$

21. $\dfrac{3y}{5} \leq 2; \{0, 2, 4, 6, 8, 10\}$

22. $4a \geq 3; \left\{\dfrac{1}{8}, \dfrac{1}{4}, \dfrac{3}{8}, \dfrac{1}{2}, \dfrac{5}{8}, \dfrac{3}{4}\right\}$

23. TEACHING A teacher has 15 weeks in which to teach six chapters. Write and then solve an equation that represents the number of lessons the teacher must teach per week if there is an average of 8.5 lessons per chapter.

LONG DISTANCE For Exercises 24 and 25, use the following information.

Gabriel talks an average of 20 minutes per long-distance call. During one month, he makes eight in-state long-distance calls averaging $2.00 each. A 20-minute state-to-state call costs Gabriel $1.50. His long-distance budget for the month is $20.

24. Write an inequality that represents the number of 20 minute state-to-state calls Gabriel can make this month.

25. What is the maximum number of 20-minute state-to-state calls that Gabriel can make this month?

1-4 Practice

Identity and Equality Properties

Name the property used in each equation. Then find the value of *n*.

1. $n + 9 = 9$

2. $(8 + 7)(4) = n(4)$

3. $5n = 1$

4. $n \cdot 0.5 = 0.1 \cdot 0.5$

5. $49n = 0$

6. $12 = 12 \cdot n$

Evaluate each expression. Name the property used in each step.

7. $2 + 6(9 - 3^2) - 2$

8. $5(14 - 39 \div 3) + 4 \cdot \dfrac{1}{4}$

SALES For Exercises 9 and 10, use the following information.

Althea paid $5.00 each for two bracelets and later sold each for $15.00. She paid $8.00 each for three bracelets and sold each of them for $9.00.

9. Write an expression that represents the profit Althea made.

10. Evaluate the expression. Name the property used in each step.

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

Mr. Katz harvested 15 tomatoes from each of four plants. Two other plants produced four tomatoes each, but Mr. Katz only harvested one fourth of the tomatoes from each of these.

11. Write an expression for the total number of tomatoes harvested.

12. Evaluate the expression. Name the property used in each step.

1-5 Practice

The Distributive Property

Rewrite each expression using the Distributive Property. Then simplify.

1. $9(7 + 8)$

2. $7(6 - 4)$

3. $6(b + 4)$

4. $(9 - p)3$

5. $(5y - 3)7$

6. $15\left(f + \dfrac{1}{3}\right)$

7. $16(3b - 0.25)$

8. $m(n + 4)$

9. $(c - 4)d$

Use the Distributive Property to find each product.

10. $9 \cdot 499$

11. $7 \cdot 110$

12. $21 \cdot 1004$

13. $12 \cdot 2.5$

14. $27\left(2\dfrac{1}{3}\right)$

15. $16\left(4\dfrac{1}{4}\right)$

Simplify each expression. If not possible, write *simplified*.

16. $w + 14w - 6w$

17. $3(5 + 6h)$

18. $14(2r - 3)$

19. $12b^2 + 9b^2$

20. $25t^3 - 17t^3$

21. $c^2 + 4d^2 - d^2$

22. $3a^2 + 6a + 2b^2$

23. $4(6p + 2q - 2p)$

24. $x + \dfrac{2}{3}x + \dfrac{x}{3}$

DINING OUT For Exercises 25 and 26, use the following information.

The Ross family recently dined at an Italian restaurant. Each of the four family members ordered a pasta dish that cost $11.50, a drink that cost $1.50, and dessert that cost $2.75.

25. Write an expression that could be used to calculate the cost of the Ross' dinner before adding tax and a tip.

26. What was the cost of dining out for the Ross family?

ORIENTATION For Exercises 27 and 28, use the following information.

Madison College conducted a three-day orientation for incoming freshmen. Each day, an average of 110 students attended the morning session and an average of 160 students attended the afternoon session.

27. Write an expression that could be used to determine the total number of incoming freshmen who attended the orientation.

28. What was the attendance for all three days of orientation?

Lesson 1-5

1-6 Practice

Commutative and Associative Properties

Evaluate each expression.

1. $13 + 23 + 12 + 7$

2. $6 \cdot 5 \cdot 10 \cdot 3$

3. $7.6 + 3.2 + 9.4 + 1.3$

4. $3.6 \cdot 0.7 \cdot 5$

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

6. $3\frac{3}{4} \cdot 3\frac{1}{3} \cdot 16$

Simplify each expression.

7. $9s^2 + 3t + s^2 + t$

8. $(p + 2n) + 7p$

9. $6y + 2(4y + 6)$

10. $2(3x + y) + 5(x + 2y)$

11. $3(2c + d) + 4(c + 4d)$

12. $6s + 2(t + 3s) + 5(s + 4t)$

13. $5(0.6b + 0.4c) + b$

14. $\frac{1}{2}q + 2\left(\frac{1}{4}q + \frac{1}{2}r\right)$

15. Write an algebraic expression for *four times the sum of 2a and b increased by twice the sum of 6a and 2b*. Then simplify, indicating the properties used.

SCHOOL SUPPLIES For Exercises 16 and 17, use the following information.

Kristen purchased two binders that cost $1.25 each, two binders that cost $4.75 each, two packages of paper that cost $1.50 per package, four blue pens that cost $1.15 each, and four pencils that cost $.35 each.

16. Write an expression to represent the total cost of supplies before tax.

17. What was the total cost of supplies before tax?

GEOMETRY For Exercises 18 and 19, use the following information.

The lengths of the sides of a pentagon in inches are 1.25, 0.9, 2.5, 1.1, and 0.25.

18. Using the commutative and associative properties to group the terms in a way that makes evaluation convenient, write an expression to represent the perimeter of the pentagon.

19. What is the perimeter of the pentagon?

1-7 Practice

Logical Reasoning and Counterexamples

Identify the hypothesis and conclusion of each statement.

1. If it is raining, then the meteorologist's prediction was accurate.

2. If $x = 4$, then $2x + 3 = 11$.

Identify the hypothesis and conclusion of each statement. Then write the statement in if-then form.

3. When Joseph has a fever, he stays home from school.

4. Two congruent triangles are similar.

Determine whether a valid conclusion follows from the statement *If two numbers are even, then their product is even* for the given condition. If a valid conclusion does not follow, write *no valid conclusion* and explain why.

5. The product of two numbers is 12.

6. Two numbers are 8 and 6.

Find a counterexample for each statement.

7. If the refrigerator stopped running, then there was a power outage.

8. If $6h - 7 < 5$, then $h \le 2$.

GEOMETRY For Exercises 9 and 10, use the following information.

If the perimeter of a rectangle is 14 inches, then its area is 10 square inches.

9. State a condition in which the hypothesis and conclusion are valid.

10. Provide a counterexample to show the statement is false.

11. ADVERTISING A recent television commercial for a car dealership stated that "no reasonable offer will be refused." Identify the hypothesis and conclusion of the statement. Then write the statement in if-then form.

Lesson 1-7

1-8 Practice

Number Systems

Find each square root. If necessary, round to the nearest hundredth.

1. $\sqrt{324}$

2. $-\sqrt{62}$

3. $\pm\sqrt{25}$

4. $-\sqrt{84}$

5. $\pm\sqrt{\dfrac{4}{289}}$

6. $-\sqrt{\dfrac{7}{12}}$

7. $-\sqrt{0.081}$

8. $\pm\sqrt{3.06}$

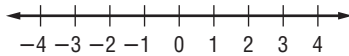**Name the set or sets of numbers to which each real number belongs.**

9. $\sqrt{93}$

10. $-\sqrt{0.0625}$

11. $\dfrac{8}{7}$

12. $-\dfrac{144}{3}$

Graph each solution set.

13. $x < -0.5$

$$\overset{\longleftrightarrow}{\quad -4\ -3\ -2\ -1\ \ 0\ \ 1\ \ 2\ \ 3\ \ 4 \quad}$$

14. $x \geq -3.5$

$$\longleftrightarrow$$

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

15. $0.\overline{93}$ ● $\sqrt{0.93}$

16. $8.\overline{17}$ ● $\sqrt{66}$

17. $\dfrac{5}{6}$ ● $\dfrac{\sqrt{5}}{}$

Write each set of numbers in order from least to greatest.

18. $\sqrt{0.03}, \dfrac{\sqrt{2}}{8}, 0.\overline{17}$

19. $-\dfrac{84}{30}, -\sqrt{8}, -\dfrac{\sqrt{7}}{8}$

20. $-\sqrt{8.5}, -\dfrac{\sqrt{35}}{2}, -2\dfrac{19}{20}$

21. **SIGHTSEEING** The distance you can see to the horizon is given by the formula $d = \sqrt{1.5h}$, where d is the distance in miles and h is the height in feet above the horizon line. Mt. Whitney is the highest point in the contiguous 48 states. Its elevation is 14,494 feet. The lowest elevation, at -282 feet, is located near Badwater, California. With a clear enough sky and no obstructions, could you see from the top of Mt. Whitney to Badwater if the distance between them is 135 miles? Explain.

22. **SEISMIC WAVES** A *tsunami* is a seismic wave caused by an earthquake on the ocean floor. You can use the formula $s = 3.1\sqrt{d}$, where s is the speed in meters per second and d is the depth of the ocean in meters, to determine the speed of a tsunami. If an earthquake occurs at a depth of 200 meters, what is the speed of the tsunami generated by the earthquake?
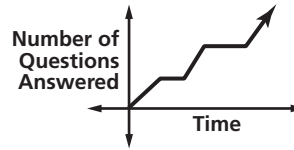
1-9 Practice

Functions and Graphs

1. The graph below represents the height of a tsunami (tidal wave) as it approaches shore. Describe what is happening in the graph.
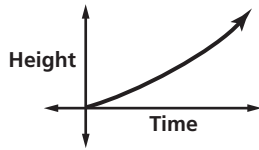
2. The graph below represents a student taking an exam. Describe what is happening in the graph.

3. FOREST FIRES A forest fire grows slowly at first, then rapidly as the wind increases. After firefighters answer the call, the fire grows slowly for a while, but then the firefighters contain the fire before extinguishing it. Which graph represents this situation?
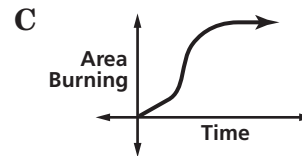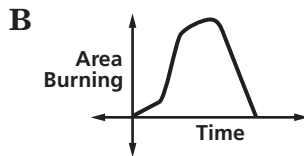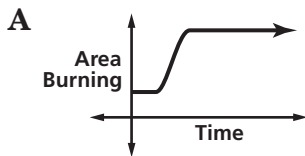
INTERNET NEWS SERVICE **For Exercises 4–6, use the table that shows the monthly charges for subscribing to an independent news server.**

Number of Months	1	2	3	4	5
Total Cost ($)	4.50	9.00	13.50	18.00	22.50

4. Write the ordered pairs the table represents.

5. Draw a graph of the data. Is the function discrete or continuous?

6. Use the data to predict the cost of subscribing for 9 months.
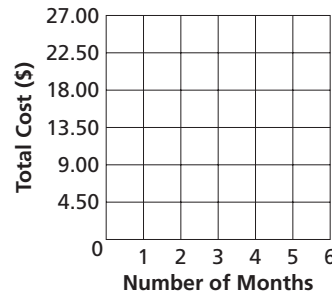
7. SAVINGS Jennifer deposited a sum of money in her account and then deposited equal amounts monthly for 5 months, nothing for 3 months, and then resumed equal monthly deposits. Sketch a reasonable graph of the account history.
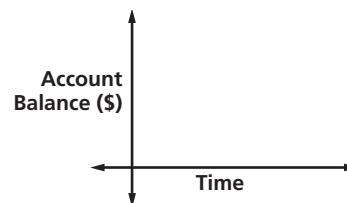
2-1 Practice

Writing Equations

Translate each sentence into an equation.

1. Fifty-three plus four times c is as much as 21.

2. The sum of five times h and twice g is equal to 23.

3. One fourth the sum of r and ten is identical to r minus 4.

4. Three plus the sum of the squares of w and x is 32.

Translate each sentence into a formula.

5. Degrees Kelvin K equals 273 plus degrees Celsius C.

6. The total cost C of gas is the price p per gallon times the number of gallons g.

7. The sum S of the measures of the angles of a polygon is equal to 180 times the difference of the number of sides n and 2.

Translate each equation into a verbal sentence.

8. $q - (4 + p) = \frac{1}{3}q$

9. $\frac{3}{5}t + 2 = t$

10. $9(y^2 + x) = 18$

11. $2(m - n) = v + 7$

Write a problem based on the given information.

12. a = cost of one adult's ticket to zoo
$a - 4$ = cost of one children's ticket to zoo
$2a + 4(a - 4) = 38$

13. c = regular cost of one airline ticket
$0.20c$ = amount of 20% promotional discount
$3(c - 0.20c) = 330$

14. GEOGRAPHY About 15% of all federally-owned land in the 48 contiguous states of the United States is in Nevada. If F represents the area of federally-owned land in these states, and N represents the portion in Nevada, write an equation for this situation.

FITNESS For Exercises 15–17, use the following information.
Deanna and Pietra each go for walks around a lake a few times per week. Last week, Deanna walked 7 miles more than Pietra.

15. If p represents the number of miles Pietra walked, write an equation that represents the total number of miles T the two girls walked.

16. If Pietra walked 9 miles during the week, how many miles did Deanna walk?

17. If Pietra walked 11 miles during the week, how many miles did the two girls walk together?

2-2 Practice

Solving Equations by Using Addition and Subtraction

Solve each equation. Then check your solution.

1. $d - 8 = 17$

2. $v + 12 = -5$

3. $b - 2 = -11$

4. $-16 = s + 71$

5. $29 = a - 76$

6. $-14 + y = -2$

7. $8 - (-c) = 1$

8. $78 + r = -15$

9. $f + (-3) = -9$

10. $4.2 = n + 7.3$

11. $w + 1.9 = -2.5$

12. $4.6 - (-b) = -0.4$

13. $y - (-1.5) = 0.5$

14. $a - 0.13 = -0.58$

15. $k + (-4.21) = -19$

16. $r + \dfrac{1}{5} = \dfrac{9}{10}$

17. $\dfrac{5}{9} + q = \dfrac{2}{3}$

18. $\dfrac{1}{3} = h + \dfrac{2}{5}$

19. $\dfrac{1}{4} + x = -\dfrac{7}{12}$

20. $y + \dfrac{4}{5} = \dfrac{3}{4}$

21. $-\dfrac{7}{8} - (-n) = -\dfrac{7}{12}$

Write an equation for each problem. Then solve the equation and check your solution.

22. What number minus 9 is equal to -18?

23. A number plus 15 equals -12. What is the number?

24. The sum of a number and -3 is equal to -91. Find the number.

25. Negative seventeen equals 63 plus a number. What is the number?

26. The sum of negative 14, a number, and 6 is -5. What is the number?

27. What number plus one half is equal to three eighths?

HISTORY For Exercises 28 and 29, use the following information.

Galileo Galilei was born in 1564. Many years later, in 1642, Sir Isaac Newton was born.

28. Write an addition equation to represent the situation.

29. How many years after Galileo was born was Isaac Newton born?

HURRICANES For Exercises 30 and 31, use the following information.

The day after a hurricane, the barometric pressure in a coastal town has risen to 29.7 inches of mercury, which is 2.9 inches of mercury higher than the pressure when the eye of the hurricane passed over.

30. Write an addition equation to represent the situation.

31. What was the barometric pressure when the eye passed over?

2-3 Practice

Solving Equations by Using Multiplication and Division

Solve each equation. Then check your solution.

1. $8j = 96$

2. $-13z = -39$

3. $-180 = 15m$

4. $243 = 27c$

5. $\dfrac{y}{9} = -8$

6. $-\dfrac{j}{12} = -8$

7. $\dfrac{a}{15} = \dfrac{4}{5}$

8. $\dfrac{g}{27} = \dfrac{2}{9}$

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

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

11. $-\dfrac{3}{8}w = -9$

12. $-\dfrac{3}{15}s = 4$

13. $-3x = \dfrac{3}{2}$

14. $\dfrac{8}{5}a = \dfrac{4}{3}$

15. $\dfrac{5}{3}h = \dfrac{11}{6}$

16. $5n = \dfrac{11}{4}$

17. $2.5k = 20$

18. $-3.4e = -3.74$

19. $-1.7b = 2.21$

20. $0.26p = 0.104$

21. $4.2q = -3.36$

Write an equation for each problem. Then solve the equation.

22. Negative nine times a number equals -117. Find the number.

23. Negative one eighth of a number is $-\dfrac{3}{4}$. What is the number?

24. Five sixths of a number is $-\dfrac{5}{9}$. Find the number.

25. 2.7 times a number equals 8.37. What is the number?

26. One and one fourth times a number is one and one third. What is the number?

27. PUBLISHING Two units of measure used in publishing are the *pica* and the *point*. A pica is one sixth of an inch. There are 12 points in a pica, so Points = 12 · Picas. How many picas are equivalent to 108 points?

ROLLER COASTERS For Exercises 28 and 29, use the following information.

Kingda Ka in New Jersey is the tallest and fastest roller coaster in the world. Riders travel at an average speed of 61 feet per second for 3118 feet. They reach a maximum speed of 187 feet per second.

28. If x represents the total time that the roller coaster is in motion for each ride, write an expression to represent the sitation. (*Hint*: Use the distance formula $d = rt$.)

29. How long is the roller coaster in motion?

Lesson 2-3

2-4 Practice

Solving Multi-Step Equations

Solve each problem by working backward.

1. Three is added to a number, and then the sum is multiplied by 4. The result is 16. Find the number.

2. A number is divided by 4, and the quotient is added to 3. The result is 24. What is the number?

3. Two is subtracted from a number, and then the difference is multiplied by 5. The result is 30. Find the number.

4. BIRD WATCHING While Michelle sat observing birds at a bird feeder, one fourth of the birds flew away when they were startled by a noise. Two birds left the feeder to go to another stationed a few feet away. Three more birds flew into the branches of a nearby tree. Four birds remained at the feeder. How many birds were at the feeder initially?

Solve each equation. Then check your solution.

5. $-12n - 19 = 77$

6. $17 + 3f = 14$

7. $15t + 4 = 49$

8. $\frac{u}{5} + 6 = 2$

9. $\frac{d}{-4} + 3 = 15$

10. $\frac{b}{3} - 6 = -2$

11. $\frac{1}{2}y - \frac{1}{8} = \frac{7}{8}$

12. $-32 - \frac{3}{5}f = -17$

13. $8 - \frac{3}{8}k = -4$

14. $\frac{r + 13}{12} = 1$

15. $\frac{15 - a}{3} = -9$

16. $\frac{3k - 7}{5} = 16$

17. $\frac{x}{7} - 0.5 = 2.5$

18. $2.5g + 0.45 = 0.95$

19. $0.4m - 0.7 = 0.22$

Write an equation and solve each problem.

20. Seven less than four times a number equals 13. What is the number?

21. Find two consecutive odd integers whose sum is 116.

22. Find two consecutive even integers whose sum is 126.

23. Find three consecutive odd integers whose sum is 117.

24. COIN COLLECTING Jung has a total of 92 coins in his coin collection. This is 8 more than three times the number of quarters in the collection. How many quarters does Jung have in his collection?

2-5 Practice

Solving Equations with the Variable on Each Side

Solve each equation. Then check your solution.

1. $5x - 3 = 13 - 3x$

2. $-4c - 11 = 4c + 21$

3. $1 - s = 6 - 6s$

4. $14 + 5n = -4n + 17$

5. $\frac{1}{2}k - 3 = 2 - \frac{3}{4}k$

6. $\frac{1}{2}(6 - z) = z$

7. $3(-2 - 3x) = -9x - 4$

8. $4(4 - w) = 3(2w + 2)$

9. $9(4b - 1) = 2(9b + 3)$

10. $3(6 + 5y) = 2(-5 + 4y)$

11. $-5x - 10 = 2 - (x + 4)$

12. $6 + 2(3j - 2) = 4(1 + j)$

13. $\frac{5}{2}t - t = 3 + \frac{3}{2}t$

14. $1.4f + 1.1 = 8.3 - f$

15. $\frac{2}{3}x - \frac{1}{6} = \frac{1}{2}x + \frac{5}{6}$

16. $2 - \frac{3}{4}z = \frac{1}{8}z + 9$

17. $\frac{1}{2}(3g - 2) = \frac{g}{6}$

18. $\frac{1}{3}(c + 1) = \frac{1}{6}(3c - 5)$

19. $\frac{1}{4}(5 - 2h) = \frac{h}{2}$

20. $\frac{1}{9}(2m - 16) = \frac{1}{3}(2m + 4)$

21. $3(d - 8) - 5 = 9(d + 2) + 1$

22. $2(a - 8) + 7 = 5(a + 2) - 3a - 19$

23. Two thirds of a number reduced by 11 is equal to 4 more than the number. Find the number.

24. Five times the sum of a number and 3 is the same as 3 multiplied by 1 less than twice the number. What is the number?

25. NUMBER THEORY Tripling the greater of two consecutive even integers gives the same result as subtracting 10 from the lesser even integer. What are the integers?

26. GEOMETRY The formula for the perimeter of a rectangle is $P = 2\ell + 2w$, where ℓ is the length and w is the width. A rectangle has a perimeter of 24 inches. Find its dimensions if its length is 3 inches greater than its width.

Lesson 2-5

2-6 Practice

Ratios and Proportions

Use cross products to determine whether each pair of ratios forms a proportion. Write *yes* or *no*.

1. $\dfrac{7}{6}, \dfrac{52}{48}$

2. $\dfrac{3}{11}, \dfrac{15}{66}$

3. $\dfrac{18}{24}, \dfrac{36}{48}$

4. $\dfrac{12}{11}, \dfrac{108}{99}$

5. $\dfrac{8}{9}, \dfrac{72}{81}$

6. $\dfrac{1.5}{9}, \dfrac{1}{6}$

7. $\dfrac{3.4}{5.2}, \dfrac{7.14}{10.92}$

8. $\dfrac{1.7}{1.2}, \dfrac{2.9}{2.4}$

9. $\dfrac{7.6}{1.8}, \dfrac{3.9}{0.9}$

Solve each proportion. If necessary, round to the nearest hundredth.

10. $\dfrac{5}{a} = \dfrac{30}{54}$

11. $\dfrac{v}{46} = \dfrac{34}{23}$

12. $\dfrac{40}{56} = \dfrac{k}{7}$

13. $\dfrac{28}{49} = \dfrac{4}{w}$

14. $\dfrac{3}{u} = \dfrac{27}{162}$

15. $\dfrac{y}{3} = \dfrac{48}{9}$

16. $\dfrac{2}{y} = \dfrac{10}{60}$

17. $\dfrac{5}{11} = \dfrac{35}{x}$

18. $\dfrac{3}{51} = \dfrac{z}{17}$

19. $\dfrac{6}{61} = \dfrac{12}{h}$

20. $\dfrac{g}{16} = \dfrac{6}{4}$

21. $\dfrac{14}{49} = \dfrac{2}{a}$

22. $\dfrac{7}{9} = \dfrac{8}{c}$

23. $\dfrac{3}{q} = \dfrac{5}{6}$

24. $\dfrac{m}{6} = \dfrac{5}{8}$

25. $\dfrac{v}{0.23} = \dfrac{7}{1.61}$

26. $\dfrac{3}{0.72} = \dfrac{12}{b}$

27. $\dfrac{6}{n} = \dfrac{3}{0.51}$

28. $\dfrac{7}{a-4} = \dfrac{14}{6}$

29. $\dfrac{3}{12} = \dfrac{2}{y+6}$

30. $\dfrac{m-1}{8} = \dfrac{2}{4}$

31. $\dfrac{5}{12} = \dfrac{x+1}{4}$

32. $\dfrac{r+2}{7} = \dfrac{5}{7}$

33. $\dfrac{3}{7} = \dfrac{x-2}{6}$

34. PAINTING Ysidra paints a room that has 400 square feet of wall space in $2\frac{1}{2}$ hours. At this rate, how long will it take her to paint a room that has 720 square feet of wall space?

35. VACATION PLANS Walker is planning a summer vacation. He wants to visit Petrified National Forest and Meteor Crater, Arizona, the 50,000-year-old impact site of a large meteor. On a map with a scale where 2 inches equals 75 miles, the two areas are about $1\frac{1}{2}$ inches apart. What is the distance between Petrified National Forest and Meteor Crater?

Glencoe Algebra 1

2-7 Practice

Percent of Change

State whether each percent of change is a percent of increase or a percent of decrease. Then find each percent of change. Round to the nearest whole percent.

1. original: 18
new: 10

2. original: 140
new: 160

3. original: 200
new: 320

4. original: 10
new: 25

5. original: 76
new: 60

6. original: 128
new: 120

7. original: 15
new: 35.5

8. original: 98.6
new: 64

9. original: 58.8
new: 65.7

Find the total price of each item.

10. concrete blocks: $95.00
tax: 6%

11. crib: $240.00
tax: 6.5%

12. jacket: $125.00
tax: 5.5%

13. class ring: $325.00
tax: 6%

14. blanket: $24.99
tax: 7%

15. kite: $18.90
tax: 5%

Find the discounted price of each item.

16. dry cleaning: $25.00
discount: 15%

17. computer game: $49.99
discount: 25%

18. luggage: $185.00
discount: 30%

19. stationery: $12.95
discount: 10%

20. prescription glasses: $149
discount: 20%

21. pair of shorts: $24.99
discount: 45%

Find the final price of each item.

22. television: $375.00
discount: 25%
tax: 6%

23. DVD player: $269.00
discount: 20%
tax: 7%

24. printer: $255.00
discount: 30%
tax: 5.5%

25. INVESTMENTS The price per share of a stock decreased from $90 per share to $36 per share early in 2006. By what percent did the price of the stock decrease?

26. HEATING COSTS Customers of a utility company received notices in their monthly bills that heating costs for the average customer had increased 125% over last year because of an unusually severe winter. In January of last year, the Garcia's paid $120 for heating. What should they expect to pay this January if their bill increased by 125%?

2-8   Practice

Solving Equations and Formulas

Solve each equation or formula for the variable specified.

1. $d = rt$, for r

2. $6w - y = 2z$, for w

3. $mx + 4y = 3c$, for x

4. $9s - 5g = -4u$, for s

5. $ab + 3c = 2d$, for b

6. $2p = kx - q$, for x

7. $\frac{2}{3}m + a = a + c$, for m

8. $\frac{2}{5}h + g = d$, for h

9. $\frac{2}{3}y + v = s$, for y

10. $\frac{3}{4}a - q = k$, for a

11. $\frac{rx + 9}{5} = h$, for x

12. $\frac{3b - 4}{2} = c$, for b

13. $2w - y = 7w - 2$, for w

14. $3\ell + y = 5 + 5\ell$, for ℓ

Write an equation and solve for the variable specified.

15. Three times a number s plus 4 times a number y is 1 more than 6 times the number s. Solve for s.

16. Five times a number k minus 9 is two thirds of a number j. Solve for j.

ELECTRICITY For Exercises 17 and 18, use the following information.

The formula for Ohm's Law is $E = IR$, where E represents voltage measured in volts, I represents current measured in amperes, and R represents resistance measured in ohms.

17. Solve the formula for R.

18. Suppose a current of 0.25 ampere flows through a resistor connected to a 12-volt battery. What is the resistance in the circuit?

MOTION For Exercises 19 and 20, use the following information.

In *uniform circular motion*, the speed v of a point on the edge of a spinning disk is $v = \frac{2\pi}{T}r$, where r is the radius of the disk and T is the time it takes the point to travel once around the circle.

19. Solve the formula for r.

20. Suppose a merry-go-round is spinning once every 3 seconds. If a point on the outside edge has a speed of 12.56 feet per second, what is the radius of the merry-go-round? (Use 3.14 for π.)

2-9 Practice

Weighted Averages

GRASS SEED For Exercises 1–4, use the following information.

A nursery sells Kentucky Blue Grass seed for $5.75 per pound and Tall Fescue seed for $4.50 per pound. The nursery sells a mixture of the two kinds of seed for $5.25 per pound. Let k represent the amount of Kentucky Blue Grass seed the nursery uses in 5 pounds of the mixture.

1. Complete the table representing the problem.

	Number of Pounds	Price per Pound	Cost
Kentucky Blue Grass			
Tall Fescue			
Mixture			

2. Write an equation to represent the problem.

3. How much Kentucky Blue Grass does the nursery use in 5 pounds of the mixture?

4. How much Tall Fescue does the nursery use in 5 pounds of the mixture?

TRAVEL For Exercises 5–7, use the following information.

Two commuter trains carry passengers between two cities, one traveling east, and the other west, on different tracks. Their respective stations are 150 miles apart. Both trains leave at the same time, one traveling at an average speed of 55 miles per hour and the other at an average speed of 65 miles per hour. Let t represent the time until the trains pass each other.

5. Copy and complete the table representing the problem.

	r	t	d = rt
First Train			
Second Train			

6. Write an equation using t that describes the distances traveled.

7. How long after departing will the trains pass each other?

8. TRAVEL Two trains leave Raleigh at the same time, one traveling north, and the other south. The first train travels at 50 miles per hour and the second at 60 miles per hour. In how many hours will the trains be 275 miles apart?

9. JUICE A pineapple drink contains 15% pineapple juice. How much pure pineapple juice should be added to 8 quarts of the drink to obtain a mixture containing 50% pineapple juice?

Lesson 2-9

3-1 **Practice**

Representing Relations

Express each relation as a table, a graph, and a mapping. Then determine the domain and range.

1. $\{(4, 3), (-1, 4), (3, -2), (2, 3), (-2, 1)\}$
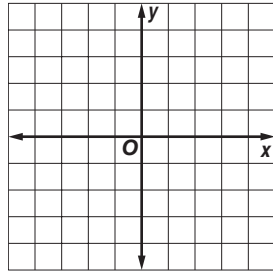
Express the relation shown in each table, mapping, or graph as a set of ordered pairs. Then write the inverse of the relation.

2.

x	y
0	9
-8	3
2	-6
1	4

3.

4.
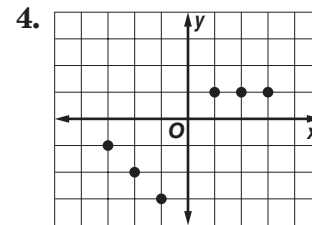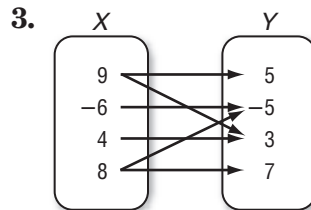
BASEBALL For Exercises 5 and 6, use the graph that shows the number of homeruns hit by Andruw Jones of the Atlanta Braves.

5. Find the domain and estimate the range.

6. Which seasons did Jones have the least and greatest number of homeruns?

Andruw Jones' Homeruns
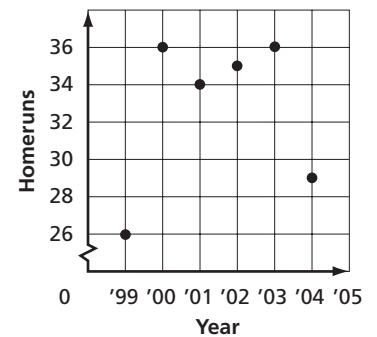
METEORS For Exercises 7 and 8, use the table that shows the number of meteors Ann observed each hour during a meteor shower.

7. What are the domain and range?

8. Graph the relation.

Time (A.M.)	Number of Meteors
12	15
1	26
2	28
3	28
4	15

Meteor Shower
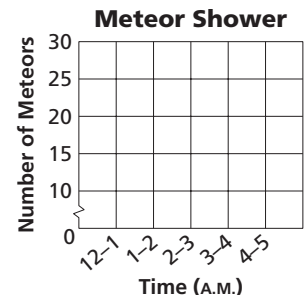
3-2 Practice

Representing Functions

Determine whether each relation is a function.

1.

X   Y
−3   0
−2   3
1   −2
5

2.

x	y
1	−5
−4	3
7	6
1	−2

3.
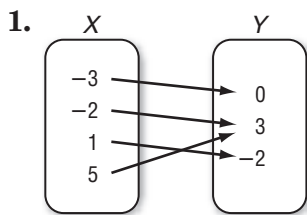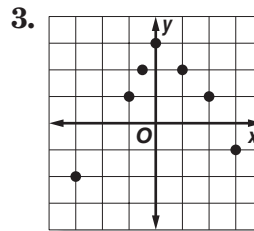
4. $\{(1, 4), (2, -2), (3, -6), (-6, 3), (-3, 6)\}$ **5.** $\{(6, -4), (2, -4), (-4, 2), (4, 6), (2, 6)\}$

6. $x = -2$ **7.** $y = 2$

If $f(x) = 2x - 6$ and $g(x) = x - 2x^2$, find each value.

8. $f(2)$ **9.** $f\left(-\dfrac{1}{2}\right)$ **10.** $g(-1)$

11. $g\left(-\dfrac{1}{3}\right)$ **12.** $f(7) - 9$ **13.** $g(-3) + 13$

14. $f(h + 9)$ **15.** $g(3y)$ **16.** $2[g(b) + 1]$

WAGES For Exercises 17 and 18, use the following information.

Martin earns \$7.50 per hour proofreading ads at a local newspaper. His weekly wage w can be described by the equation $w = 7.5h$, where h is the number of hours worked.

17. Write the equation in functional notation.

18. Find $f(15)$, $f(20)$, and $f(25)$.

ELECTRICITY For Exercises 19–21, use the following information.

The table shows the relationship between resistance R and current I in a circuit.

Resistance (ohms)	120	80	48	6	4
Current (amperes)	0.1	0.15	0.25	2	3

19. Is the relationship a function? Explain.

20. If the relation can be represented by the equation $IR = 12$, rewrite the equation in functional notation so that the resistance R is a function of the current I.

21. What is the resistance in a circuit when the current is 0.5 ampere?

3-3 Practice

Linear Functions

Determine whether each equation is a linear equation. If so, write the equation in standard form and determine the *x*-intercept and *y*-intercept.

1. $4xy + 2y = 9$

2. $8x - 3y = 6 - 4x$

3. $7x + y + 3 = y$

4. $5 - 2y = 3x$

5. $\dfrac{x}{4} - \dfrac{y}{3} = 1$

6. $\dfrac{5}{x} - \dfrac{2}{y} = 7$

Graph each equation using any method.

7. $\dfrac{1}{2}x - y = 2$

8. $5x - 2y = 7$

9. $1.5x + 3y = 9$
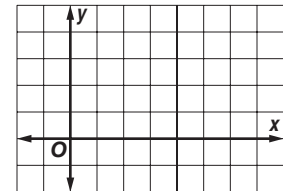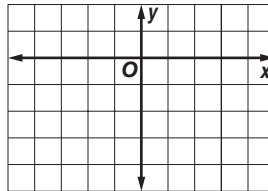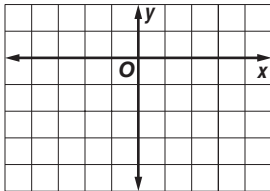
COMMUNICATIONS For Exercises 10–12, use the following information.

A telephone company charges $4.95 per month for long distance calls plus $0.05 per minute. The monthly cost c of long distance calls can be described by the equation $c = 0.05m + 4.95$, where m is the number of minutes.

10. Find the *y*-intercept of the graph of the equation.

11. Graph the equation.

12. If you talk 140 minutes, what is the monthly cost?

Long Distance
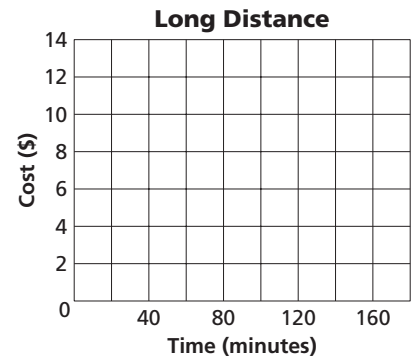
MARINE BIOLOGY For Exercises 13 and 14, use the following information.

Killer whales usually swim at a rate of 3.2–9.7 kilometers per hour, though they can travel up to 48.4 kilometers per hour. Suppose a migrating killer whale is swimming at an average rate of 4.5 kilometers per hour. The distance d the whale has traveled in t hours can be predicted by the equation $d = 4.5t$.

13. Graph the equation.

14. Use the graph to predict the time it takes the killer whale to travel 30 kilometers.

Lesson 3-3
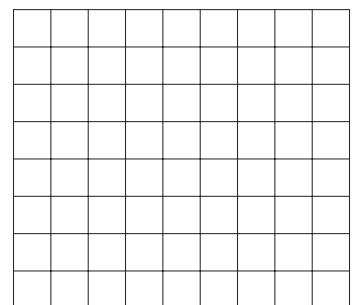
3-4 **Practice**

Arithmetic Sequences

Determine whether each sequence is an arithmetic sequence. If it is, state the common difference.

1. 21, 13, 5, −3, …   **2.** −5, 12, 29, 46, …   **3.** −2.2, −1.1, 0.1, 1.3, …

Find the next three terms of each arithmetic sequence.

4. 82, 76, 70, 64, …   **5.** −49, −35, −21, −7, …   **6.** $\frac{3}{4}, \frac{1}{2}, \frac{1}{4}, 0, …$

Find the *n*th term of each arithmetic sequence described.

7. $a_1 = 7, d = 9, n = 18$ **8.** $a_1 = -12, d = 4, n = 36$

9. −18, −13, −8, −3, … for $n = 27$ **10.** 4.1, 4.8, 5.5, 6.2, … for $n = 14$

11. $a_1 = \frac{3}{8}, d = \frac{1}{4}, n = 15$ **12.** $a_1 = 2\frac{1}{2}, d = 1\frac{1}{2}, n = 24$

Write an equation for the *n*th term of each arithmetic sequence. Then graph the first five terms of the sequence.

13. 9, 13, 17, 21, …   **14.** −5, −2, 1, 4, …   **15.** 19, 31, 43, 55, …
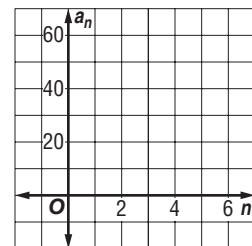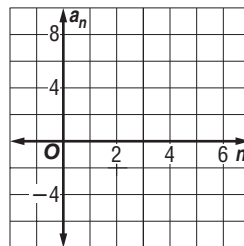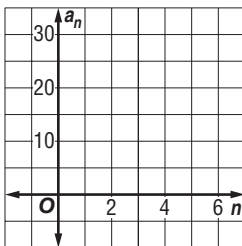
BANKING For Exercises 16 and 17, use the following information.

Chem deposited $115.00 in a savings account. Each week thereafter, he deposits $35.00 into the account.

16. Write a formula to find the total amount Chem has deposited for any particular number of weeks after his initial deposit.

17. How much has Chem deposited 30 weeks after his initial deposit?

18. STORE DISPLAY Tamika is stacking boxes of tissue for a store display. Each row of tissues has 2 fewer boxes than the row below. The first row has 23 boxes of tissues. How many boxes will there be in the tenth row?

Lesson 3-4

3-5 Practice

Describing Number Patterns

1. Give the next two items for the pattern. Then find the 21st figure in the pattern.

Find the next three terms in each sequence

2. $-5, -2, -3, 0, -1, 2, 1, 4, \ldots$

3. $0, 1, 3, 6, 10, 15, \ldots$

4. $0, 1, 8, 27, \ldots$

5. $3, 2, 4, 3, 5, 4, \ldots$

6. $a + 1, a + 4, a + 9, \ldots$

7. $3d - 1, 4d - 2, 5d - 3, \ldots$

Write an equation in function notation for each relation.

8.

9.

10.
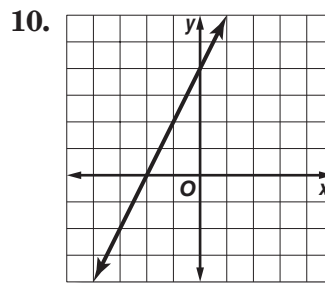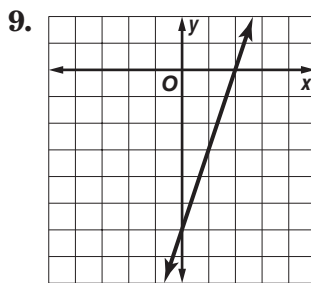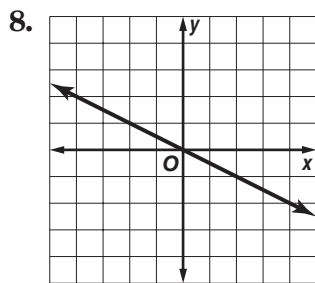
BIOLOGY **For Exercises 11 and 12, use the following information.**

Male fireflies flash in various patterns to signal location and perhaps to ward off predators. Different species of fireflies have different flash characteristics, such as the intensity of the flash, its rate, and its shape. The table below shows the rate at which a male firefly is flashing.

Time (seconds)	1	2	3	4	5
Number of Flashes	2	4	6	8	10

11. Write an equation in function notation for the relation.

12. How many times will the firefly flash in 20 seconds?

13. GEOMETRY The table shows the number of diagonals that can be drawn from one vertex in a polygon. Write an equation in function notation for the relation and find the number of diagonals that can be drawn from one vertex in a 12-sided polygon.

Sides	3	4	5	6
Diagonals	0	1	2	3

4-1 Practice

Rate of Change and Slope

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

1.

2.

3.
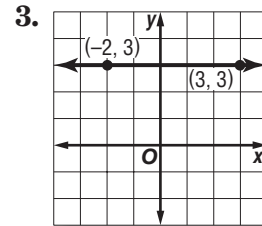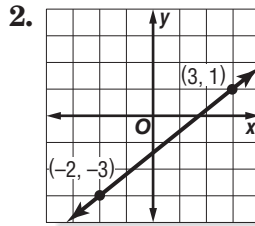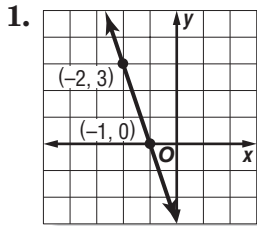
4. $(6, 3), (7, -4)$

5. $(-9, -3), (-7, -5)$

6. $(6, -2), (5, -4)$

7. $(7, -4), (4, 8)$

8. $(-7, 8), (-7, 5)$

9. $(5, 9), (3, 9)$

10. $(15, 2), (-6, 5)$

11. $(3, 9), (-2, 8)$

12. $(-2, -5), (7, 8)$

13. $(12, 10), (12, 5)$

14. $(0.2, -0.9), (0.5, -0.9)$

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

Find the value of *r* so the line that passes through each pair of points has the given slope.

16. $(-2, r), (6, 7), m = \frac{1}{2}$

17. $(-4, 3), (r, 5), m = \frac{1}{4}$

18. $(-3, -4), (-5, r), m = -\frac{9}{2}$

19. $(-5, r), (1, 3), m = \frac{7}{6}$

20. $(1, 4), (r, 5), m$ undefined

21. $(-7, 2), (-8, r), m = -5$

22. $(r, 7), (11, 8), m = -\frac{1}{5}$

23. $(r, 2), (5, r), m = 0$

24. ROOFING The *pitch* of a roof is the number of feet the roof rises for each 12 feet horizontally. If a roof has a pitch of 8, what is its slope expressed as a positive number?

25. SALES A daily newspaper had 12,125 subscribers when it began publication. Five years later it had 10,100 subscribers. What is the average yearly rate of change in the number of subscribers for the five-year period?
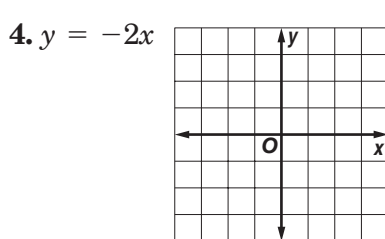
4-2 Practice

Slope and Direct Variation

Name the constant of variation for each equation. Then determine the slope of the line that passes through each pair of points.
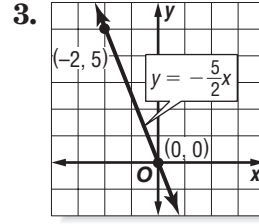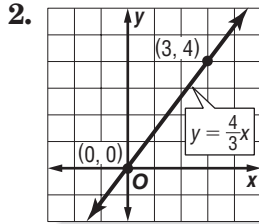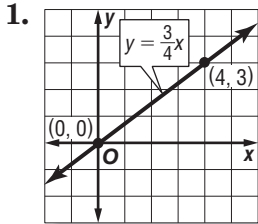
1.

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

$(4, 3)$

$(0, 0)$

2.

$(3, 4)$

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

$(0, 0)$

3.

$(-2, 5)$

$y = -\frac{5}{2}x$

$(0, 0)$

Graph each equation.

4. $y = -2x$

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

6. $y = -\frac{5}{3}x$
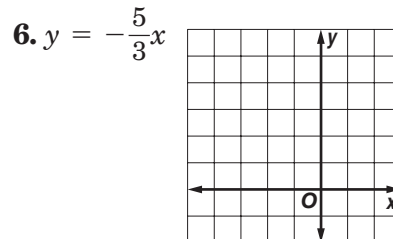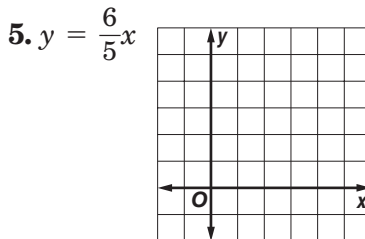
Write a direct variation equation that relates x and y. Assume that y varies directly as x. Then solve.

7. If $y = 7.5$ when $x = 0.5$, find y when $x = -0.3$.

8. If $y = 80$ when $x = 32$, find x when $y = 100$.

9. If $y = \frac{3}{4}$ when $x = 24$, find y when $x = 12$.

Write a direct variation equation that relates the variables. Then graph the equation.

10. MEASURE The width W of a rectangle is two thirds of the length ℓ.

Rectangle Dimensions

Width

10
8
6
4
2

0 2 4 6 8 10 12 ℓ

Length
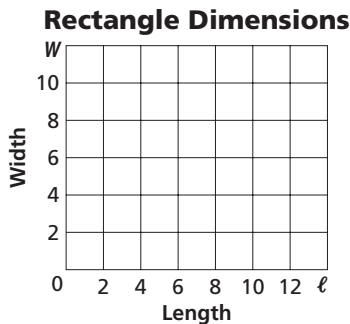
11. TICKETS The total cost C of tickets is $4.50 times the number of tickets t.
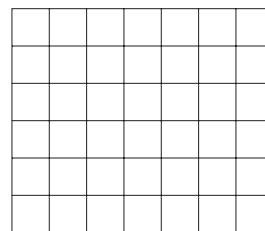
12. PRODUCE The cost of bananas varies directly with their weight. Miguel bought $3\frac{1}{2}$ pounds of bananas for $1.12. Write an equation that relates the cost of the bananas to their weight. Then find the cost of $4\frac{1}{4}$ pounds of bananas.

4-3 Practice

Graphing Equations in Slope-Intercept Form

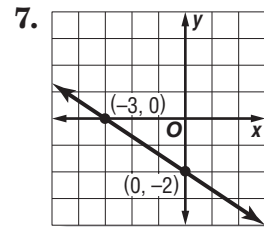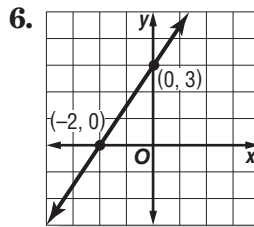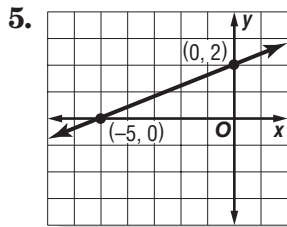**Write an equation of the line with the given slope and *y*-intercept.**

1. slope: $\dfrac{1}{4}$, *y*-intercept: 3

2. slope: $\dfrac{3}{2}$, *y*-intercept: -4

3. slope: 1.5, *y*-intercept: -1

4. slope: -2.5, *y*-intercept: 3.5
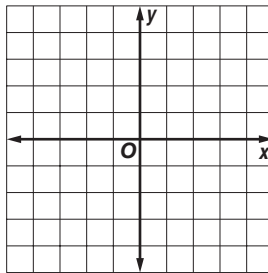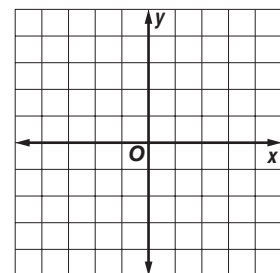
Write an equation of the line shown in each graph.

5.

6.

7.

Graph each equation.

8. $y = -\dfrac{1}{2}x + 2$
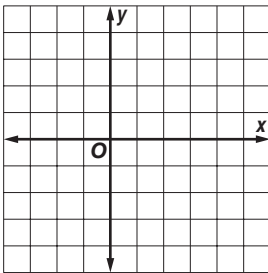
9. $3y = 2x - 6$

10. $6x + 3y = 6$

Write a linear equation in slope-intercept form to model each situation.

11. A computer technician charges $75 for a consultation plus $35 per hour.

12. The population of Pine Bluff is 6791 and is decreasing at the rate of 7 per year.

WRITING For Exercises 13–15, use the following information.
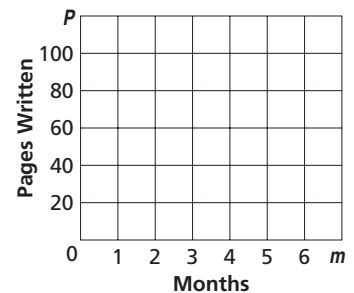
Carla has already written 10 pages of a novel. She plans to write 15 additional pages per month until she is finished.

13. Write an equation to find the total number of pages *P* written after any number of months *m*.

14. Graph the equation on the grid at the right.

15. Find the total number of pages written after 5 months.
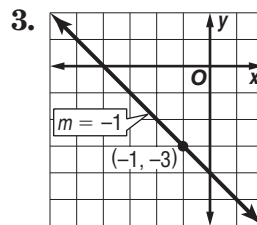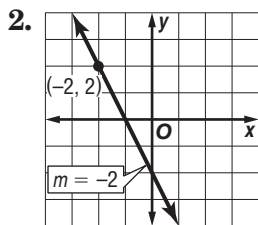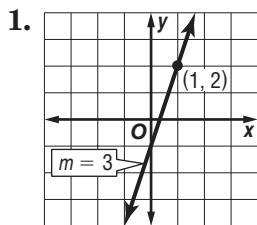
Carla's Novel

Lesson 4-3

4-4 Practice

Writing Equations in Slope-Intercept Form

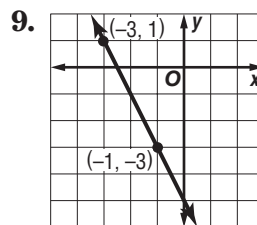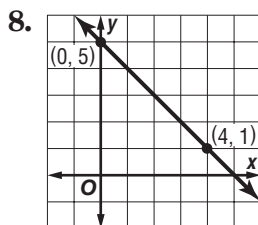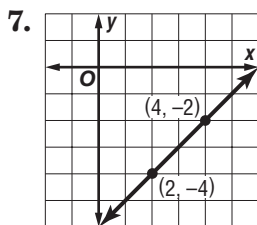**Write an equation of the line that passes through each point with the given slope.**

1.

2.

3.

4. $(-5, 4)$, $m = -3$

5. $(4, 3)$, $m = \dfrac{1}{2}$

6. $(1, -5)$, $m = -\dfrac{3}{2}$

Write an equation of the line that passes through each pair of points.

7.

8.

9.

10. $(0, -4)$, $(5, -4)$

11. $(-4, -2)$, $(4, 0)$

12. $(-2, -3)$, $(4, 5)$

13. $(0, 1)$, $(5, 3)$

14. $(-3, 0)$, $(1, -6)$

15. $(1, 0)$, $(5, -1)$

Write an equation of the line that has each pair of intercepts.

16. x-intercept: 2, y-intercept: -5

17. x-intercept: 2, y-intercept: 10

18. x-intercept: -2, y-intercept: 1

19. x-intercept: -4, y-intercept: -3

20. DANCE LESSONS The cost for 7 dance lessons is $82. The cost for 11 lessons is $122. Write a linear equation to find the total cost C for ℓ lessons. Then use the equation to find the cost of 4 lessons.

21. WEATHER It is 76°F at the 6000-foot level of a mountain, and 49°F at the 12,000-foot level of the mountain. Write a linear equation to find the temperature T at an elevation e on the mountain, where e is in thousands of feet.

4-5   Practice

Writing Equations in Point-Slope Form

Write the point-slope form of an equation for a line that passes through each point with the given slope.

1. $(2, 2)$, $m = -3$

2. $(1, -6)$, $m = -1$

3. $(-3, -4)$, $m = 0$

4. $(1, 3)$, $m = -\dfrac{3}{4}$

5. $(-8, 5)$, $m = -\dfrac{2}{5}$

6. $(3, -3)$, $m = \dfrac{1}{3}$

Write each equation in standard form.

7. $y - 11 = 3(x - 2)$

8. $y - 10 = -(x - 2)$

9. $y + 7 = 2(x + 5)$

10. $y - 5 = \dfrac{3}{2}(x + 4)$

11. $y + 2 = -\dfrac{3}{4}(x + 1)$

12. $y - 6 = \dfrac{4}{3}(x - 3)$

13. $y + 4 = 1.5(x + 2)$

14. $y - 3 = -2.4(x - 5)$

15. $y - 4 = 2.5(x + 3)$

Write each equation in slope-intercept form.

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

17. $y + 1 = -7(x + 1)$

18. $y - 3 = -5(x + 12)$

19. $y - 5 = \dfrac{3}{2}(x + 4)$

20. $y - \dfrac{1}{4} = -3\left(x + \dfrac{1}{4}\right)$

21. $y - \dfrac{2}{3} = -2\left(x - \dfrac{1}{4}\right)$

CONSTRUCTION For Exercises 22–24, use the following information.

A construction company charges $15 per hour for debris removal, plus a one-time fee for the use of a trash dumpster. The total fee for 9 hours of service is $195.

22. Write the point-slope form of an equation to find the total fee y for any number of hours x.

23. Write the equation in slope-intercept form.

24. What is the fee for the use of a trash dumpster?

MOVING For Exercises 25–27, use the following information.

There is a set daily fee for renting a moving truck, plus a charge of $0.50 per mile driven. It costs $64 to rent the truck on a day when it is driven 48 miles.

25. Write the point-slope form of an equation to find the total charge y for any number of miles x for a one-day rental.

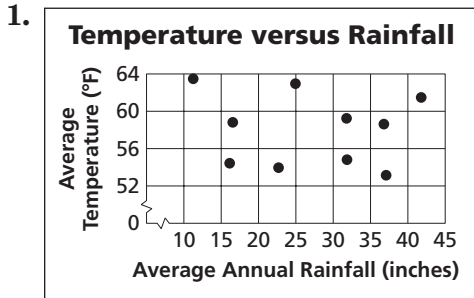**26.** Write the equation in slope-intercept form.

**27.** What is the daily fee?

Lesson 4-5

4-6 Practice

Statistics: Scatter Plots and Lines of Fit

Determine whether each graph shows a *positive correlation*, a *negative correlation*, or *no correlation*. If there is a positive or negative correlation, describe its meaning in the situation.

1.

Temperature versus Rainfall

Source: National Oceanic and Atmospheric Administration

2.

State Elevations
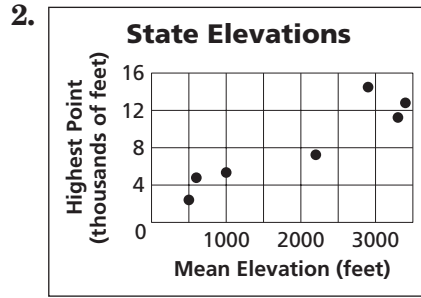
Source: U.S. Geological Survey

DISEASE For Exercises 3–5, use the table that shows the number of cases of mumps in the United States for the years 1995 to 2003.

U.S. Mumps Cases					
Year	1995	1997	1999	2001	2003
Cases	906	683	387	116	56

Source: Centers for Disease Control and Prevention

3. Draw a scatter plot and determine what relationship, if any, exists in the data.

4. Draw a line of fit for the scatter plot.

5. Write the slope-intercept form of an equation for the line of fit.

U.S. Mumps Cases
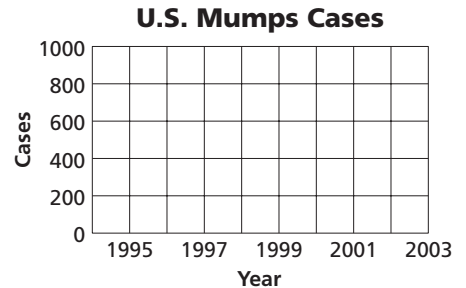
ZOOS For Exercises 6–9, use the table that shows the average and maximum longevity of various animals in captivity.

Longevity (years)								
Avg.	12	25	15	8	35	40	41	20
Max.	47	50	40	20	70	77	61	54

Source: *Walker's Mammals of the World*

6. Draw a scatter plot and determine what relationship, if any, exists in the data.

7. Draw a line of fit for the scatter plot.

8. Write the slope-intercept form of an equation for the line of fit.

9. Predict the maximum longevity for an animal with an average longevity of 33 years.
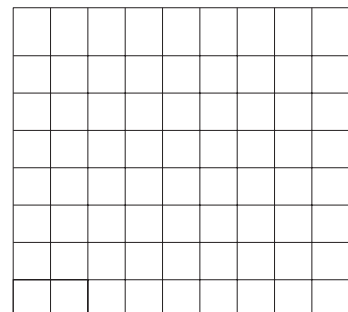
4-7 Practice

Geometry: Parallel and Perpendicular Lines

Write the slope-intercept form of an equation of the line that passes through the given point and is parallel to the graph of each equation.

1. $(3, 2), y = x + 5$

2. $(-2, 5), y = -4x + 2$

3. $(4, -6), y = -\dfrac{3}{4}x + 1$

4. $(5, 4), y = \dfrac{2}{5}x - 2$

5. $(12, 3), y = \dfrac{4}{3}x + 5$

6. $(3, 1), 2x + y = 5$

7. $(-3, 4), 3y = 2x - 3$

8. $(-1, -2), 3x - y = 5$

9. $(-8, 2), 5x - 4y = 1$

10. $(-1, -4), 9x + 3y = 8$

11. $(-5, 6), 4x + 3y = 1$

12. $(3, 1), 2x + 5y = 7$

Write the slope-intercept form of an equation of the line that passes through the given point and is perpendicular to the graph of each equation.

13. $(-2, -2), y = -\dfrac{1}{3}x + 9$

14. $(-6, 5), x - y = 5$

15. $(-4, -3), 4x + y = 7$

16. $(0, 1), x + 5y = 15$

17. $(2, 4), x - 6y = 2$

18. $(-1, -7), 3x + 12y = -6$

19. $(-4, 1), 4x + 7y = 6$
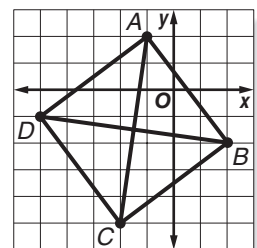
20. $(10, 5), 5x + 4y = 8$

21. $(4, -5), 2x - 5y = -10$

22. $(1, 1), 3x + 2y = -7$

23. $(-6, -5), 4x + 3y = -6$

24. $(-3, 5), 5x - 6y = 9$

25. GEOMETRY Quadrilateral $ABCD$ has diagonals $\overline{AC}$ and $\overline{BD}$. Determine whether $\overline{AC}$ is perpendicular to $\overline{BD}$. Explain.
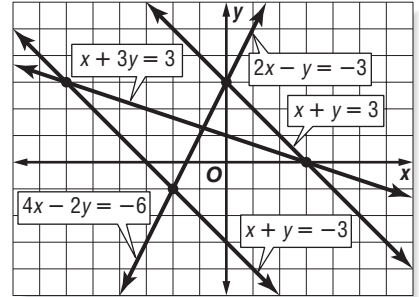

26. GEOMETRY Triangle ABC has vertices $A(0, 4)$, $B(1, 2)$, and $C(4, 6)$. Determine whether triangle ABC is a right triangle. Explain.

Lesson 4-7

5-1 **Practice**

Graphing Systems of Equations

Use the graph at the right to determine whether
each system has *no* solution, *one* solution, or
infinitely many solutions.

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

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

3. $x + 3y = 3$
   $x + y = -3$

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

Graph each system of equations. Then determine whether the system has *no*
solution, *one* solution, or *infinitely many* solutions. If the system has one solution,
name it.

5. $3x - y = -2$
   $3x - y = 0$

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

7. $x + 2y = 3$
   $3x - y = -5$
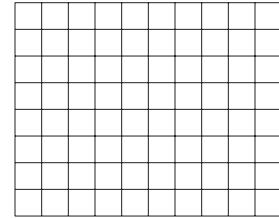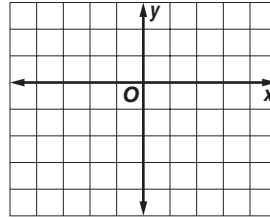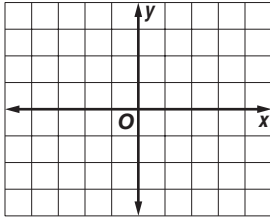
**BUSINESS For Exercises 8 and 9, use the following
information.**

Nick plans to start a home-based business producing and
selling gourmet dog treats. He figures it will cost $20 in
operating costs per week plus $0.50 to produce each treat.
He plans to sell each treat for $1.50.

8. Graph the system of equations $y = 0.5x + 20$ and
   $y = 1.5x$ to represent the situation.

9. How many treats does Nick need to sell per week to
   break even?

Dog Treats
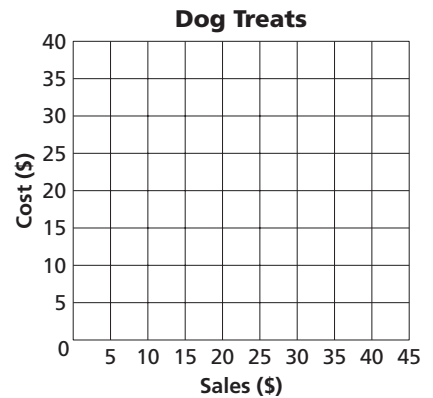
**SALES For Exercises 10–12, use the following
information.**

A used book store also started selling used CDs and videos.
In the first week, the store sold 40 used CDs and videos, at
$4.00 per CD and $6.00 per video. The sales for both CDs
and videos totaled $180.00

10. Write a system of equations to
   represent the situation.

11. Graph the system of equations.

12. How many CDs and videos did the store sell in the first
   week?

Lesson 5-1
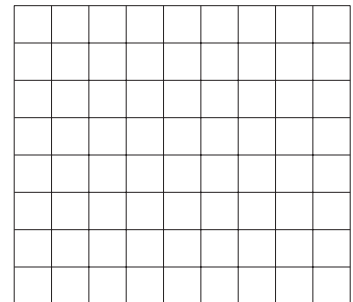
5-2 Practice

Substitution

Use substitution to solve each system of equations. If the system does *not* have exactly one solution, state whether it has *no* solution or *infinitely many* solutions.

1. $y = 6x$
$2x + 3y = -20$

2. $x = 3y$
$3x - 5y = 12$

3. $x = 2y + 7$
$x = y + 4$

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

5. $y = 2x + 6$
$2x - y = 2$

6. $3x + y = 12$
$y = -x - 2$

7. $x + 2y = 13$
$-2x - 3y = -18$

8. $x - 2y = 3$
$4x - 8y = 12$

9. $x - 5y = 36$
$2x + y = -16$

10. $2x - 3y = -24$
$x + 6y = 18$

11. $x + 14y = 84$
$2x - 7y = -7$

12. $0.3x - 0.2y = 0.5$
$x - 2y = -5$

13. $0.5x + 4y = -1$
$x + 2.5y = 3.5$

14. $3x - 2y = 11$
$x - \frac{1}{2}y = 4$

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

16. $\frac{1}{3}x - y = 3$
$2x + y = 25$

17. $4x - 5y = -7$
$y = 5x$

18. $x - 3y = -4$
$2x + 6y = 5$

EMPLOYMENT For Exercises 19–21, use the following information.

Kenisha sells athletic shoes part-time at a department store. She can earn either $500 per month plus a 4% commission on her total sales, or $400 per month plus a 5% commission on total sales.

19. Write a system of equations to represent the situation.

20. What is the total price of the athletic shoes Kenisha needs to sell to earn the same income from each pay scale?

21. Which is the better offer?

MOVIE TICKETS For Exercises 22 and 23, use the following information.

Tickets to a movie cost $7.25 for adults and $5.50 for students. A group of friends purchased 8 tickets for $52.75.

22. Write a system of equations to represent the situation.

23. How many adult tickets and student tickets were purchased?

5-3 Practice

Elimination Using Addition and Subtraction

Use elimination to solve each system of equations.

1. $x - y = 1$
$x + y = -9$

2. $p + q = -2$
$p - q = 8$

3. $4x + y = 23$
$3x - y = 12$

4. $2x + 5y = -3$
$2x + 2y = 6$

5. $3x + 2y = -1$
$4x + 2y = -6$

6. $5x + 3y = 22$
$5x - 2y = 2$

7. $5x + 2y = 7$
$-2x + 2y = -14$

8. $3x - 9y = -12$
$3x - 15y = -6$

9. $-4c - 2d = -2$
$2c - 2d = -14$

10. $2x - 6y = 6$
$2x + 3y = 24$

11. $7x + 2y = 2$
$7x - 2y = -30$

12. $4.25x - 1.28y = -9.2$
$x + 1.28y = 17.6$

13. $2x + 4y = 10$
$x - 4y = -2.5$

14. $2.5x + y = 10.7$
$2.5x + 2y = 12.9$

15. $6m - 8n = 3$
$2m - 8n = -3$

16. $4a + b = 2$
$4a + 3b = 10$

17. $-\dfrac{1}{3}x - \dfrac{4}{3}y = -2$
$\dfrac{1}{3}x - \dfrac{2}{3}y = 4$

18. $\dfrac{3}{4}x - \dfrac{1}{2}y = 8$
$\dfrac{3}{2}x + \dfrac{1}{2}y = 19$

19. The sum of two numbers is 41 and their difference is 5. What are the numbers?

20. Four times one number added to another number is 36. Three times the first number minus the other number is 20. Find the numbers.

21. One number added to three times another number is 24. Five times the first number added to three times the other number is 36. Find the numbers.

22. LANGUAGES English is spoken as the first or primary language in 78 more countries than Farsi is spoken as the first language. Together, English and Farsi are spoken as a first language in 130 countries. In how many countries is English spoken as the first language? In how many countries is Farsi spoken as the first language?

23. DISCOUNTS At a sale on winter clothing, Cody bought two pairs of gloves and four hats for $43.00. Tori bought two pairs of gloves and two hats for $30.00. What were the prices for the gloves and hats?

5-4 Practice

Elimination Using Multiplication

Use elimination to solve each system of equations.

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

2. $5x - 2y = -10$
$3x + 6y = 66$

3. $7x + 4y = -4$
$5x + 8y = 28$

4. $2x - 4y = -22$
$3x + 3y = 30$

5. $3x + 2y = -9$
$5x - 3y = 4$

6. $4x - 2y = 32$
$-3x - 5y = -11$

7. $3x + 4y = 27$
$5x - 3y = 16$

8. $0.5x + 0.5y = -2$
$x - 0.25y = 6$

9. $2x - \frac{3}{4}y = -7$
$x + \frac{1}{2}y = 0$

10. Eight times a number plus five times another number is -13. The sum of the two numbers is 1. What are the numbers?

11. Two times a number plus three times another number equals 4. Three times the first number plus four times the other number is 7. Find the numbers.

Determine the best method to solve each system of equations. Then solve the system.

12. $5x + 7y = 3$
$2x - 7y = -38$

13. $7x + 2y = 2$
$2x - 3y = -28$

14. $-6x - 2y = 14$
$6x + 8y = -20$

15. $x = 2y + 6$
$\frac{1}{2}x - y = 3$

16. $4x + 3y = -2$
$4x + 3y = 3$

17. $y = \frac{1}{2}x$
$\frac{5}{2}x - 2y = 9$

18. FINANCE Gunther invested $10,000 in two mutual funds. One of the funds rose 6% in one year, and the other rose 9% in one year. If Gunther's investment rose a total of $684 in one year, how much did he invest in each mutual fund?

19. CANOEING Laura and Brent paddled a canoe 6 miles upstream in four hours. The return trip took three hours. Find the rate at which Laura and Brent paddled the canoe in still water.

20. NUMBER THEORY The sum of the digits of a two-digit number is 11. If the digits are reversed, the new number is 45 more than the original number. Find the number.

Lesson 5-4

5-5 Practice

Applying systems of Linear Equations

Determine the best method to solve each system of equations. Then solve the system.

1. $1.5x - 1.9y = -29$
   $x - 0.9y = 4.5$

2. $1.2x - 0.8y = -6$
   $4.8x + 2.4y = 60$

3. $18x - 16y = -312$
   $78x - 16y = 408$

4. $14x + 7y = 217$
   $14x + 3y = 189$

5. $x = 3.6y + 0.7$
   $2x + 0.2y = 38.4$

6. $5.3x - 4y = 43.5$
   $x + 7y = 78$

7. BOOKS   A library contains 2000 books. There are 3 times as many non-fiction books as fiction books. Write and solve a system of equations to determine the number of non-fiction and fiction books.

8. SCHOOL CLUBS   The chess club has 16 members and gains a new member every month. The film club has 4 members and gains 4 new members every month. Write and solve a system of equations to find when the number of members in both clubs will be equal.

For Exercises 9 and 10, use the information below.

Tia and Ken each sold snack bars and magazine subscriptions for a school fund-raiser, as shown in the table. Tia earned $132 and Ken earned $190.

Item	Number Sold	
	Tia	Ken
snack bars	16	20
magazine subscriptions	4	6

9. Define variable and formulate a system of linear equation from this situation.

10. What was the price per snack bar? Determine the reasonableness of your solution.

38

6-1 Practice

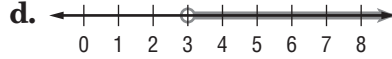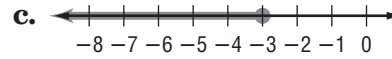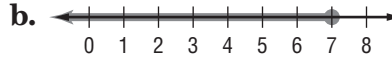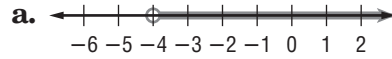### *Solving Inequalities by Addition and Subtraction*

Match each inequality with its corresponding graph.

1. $-8 \geq x - 15$

a.

$$\text{---+---}\circ\text{---+---+---+---+---+---+---}$$
$$-6\ -5\ -4\ -3\ -2\ -1\ \ 0\ \ 1\ \ 2$$

2. $4x + 3 < 5x$

b.

$$\text{---+---+---+---+---+---+---}\bullet\text{---+---}$$
$$0\ \ 1\ \ 2\ \ 3\ \ 4\ \ 5\ \ 6\ \ 7\ \ 8$$

3. $8x > 7x - 4$

c.

$$\text{---+---+---+---+---+---}\bullet\text{---+---+---}$$
$$-8\ -7\ -6\ -5\ -4\ -3\ -2\ -1\ \ 0$$

4. $12 + x \leq 9$

d.

$$\text{---+---+---}\circ\text{---+---+---+---+---}$$
$$0\ \ 1\ \ 2\ \ 3\ \ 4\ \ 5\ \ 6\ \ 7\ \ 8$$

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

5. $r - (-5) > -2$

$$\text{---+---+---+---+---+---+---+---+---}$$
$$-8\ -7\ -6\ -5\ -4\ -3\ -2\ -1\ \ 0$$

6. $3x + 8 \geq 4x$

$$\text{---+---+---+---+---+---+---+---+---}$$
$$2\ \ 3\ \ 4\ \ 5\ \ 6\ \ 7\ \ 8\ \ 9\ \ 10$$

7. $n - 2.5 \geq -5$

$$\text{---+---+---+---+---+---+---+---+---}$$
$$-4\ -3\ -2\ -1\ \ 0\ \ 1\ \ 2\ \ 3\ \ 4$$

8. $1.5 < y + 1$

$$\text{---+---+---+---+---+---+---+---+---}$$
$$-4\ -3\ -2\ -1\ \ 0\ \ 1\ \ 2\ \ 3\ \ 4$$
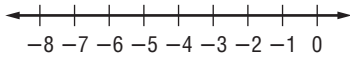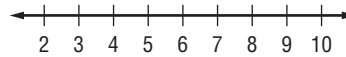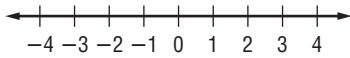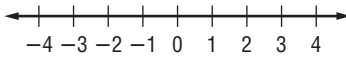
9. $z + 3 > \dfrac{2}{3}$

$$\text{---+---+---+---+---+---+---+---+---}$$

10. $\dfrac{1}{2} \leq c - \dfrac{3}{4}$

$$\text{---+---+---+---+---+---+---+---+---}$$

Define a variable, write an inequality, and solve each problem. Then check your solution.

11. The sum of a number and 17 is no less than 26.

12. Twice a number minus 4 is less than three times the number.

13. Twelve is at most a number decreased by 7.

14. Eight plus four times a number is greater than five times the number.

15. ATMOSPHERIC SCIENCE The troposphere extends from the earth's surface to a height of 6–12 miles, depending on the location and the season. If a plane is flying at an altitude of 5.8 miles, and the troposphere is 8.6 miles deep in that area, how much higher can the plane go without leaving the troposphere?

16. EARTH SCIENCE Mature soil is composed of three layers, the uppermost being topsoil. Jamal is planting a bush that needs a hole 18 centimeters deep for the roots. The instructions suggest an additional 8 centimeters depth for a cushion. If Jamal wants to add even more cushion, and the topsoil in his yard is 30 centimeters deep, how much more cushion can he add and still remain in the topsoil layer?

6-2 Practice

Solving Inequalities by Multiplication and Division

Match each inequality with its corresponding statement.

1. $-4n \geq 5$ **a.** Negative four times a number is less than five.

2. $\frac{4}{5}n > 5$ **b.** Four fifths of a number is no more than five.

3. $4n \leq 5$ **c.** Four times a number is fewer than five.

4. $\frac{4}{5}n \leq 5$ **d.** Negative four times a number is no less than five.

5. $4n < 5$ **e.** Four times a number is at most five.

6. $-4n < 5$ **f.** Four fifths of a number is more than five.

Solve each inequality. Then check your solution.

7. $-\frac{a}{5} < -14$ **8.** $-13h \leq 52$ **9.** $\frac{s}{16} \geq -6$ **10.** $39 > 13p$

11. $\frac{2}{3}n > -12$ **12.** $-\frac{5}{9}t < 25$ **13.** $-\frac{3}{5}m \leq -6$ **14.** $\frac{10}{3}k \geq -10$

15. $-3b \leq 0.75$ **16.** $-0.9c > -9$ **17.** $0.1x \geq -4$ **18.** $-2.3 < \frac{j}{4}$

19. $-15y < 3$ **20.** $2.6v \geq -20.8$ **21.** $0 > -0.5u$ **22.** $\frac{7}{8}f \leq -1$

Define a variable, write an inequality, and solve each problem. Then check your solution.

23. Negative three times a number is at least 57.

24. Two thirds of a number is no more than -10.

25. Negative three fifths of a number is less than -6.

26. FLOODING A river is rising at a rate of 3 inches per hour. If the river rises more than 2 feet, it will exceed flood stage. How long can the river rise at this rate without exceeding flood stage?

27. SALES Pet Supplies makes a profit of $5.50 per bag on its line of natural dog food. If the store wants to make a profit of no less than $5225 on natural dog food, how many bags of dog food does it need to sell?

6-3 Practice

Solving Multi-Step Inequalities

Justify each indicated step.

1. $x > \dfrac{5x - 12}{8}$

$8x > (8)\dfrac{5x - 12}{8}$ **a.** __?__

$8x > 5x - 12$

$8x - 5x > 5x - 12 - 5x$ **b.** __?__

$3x > -12$

$\dfrac{3x}{3} > \dfrac{-12}{3}$ **c.** __?__

$x > -4$

2. $2(2h + 2) < 2(3h + 5) - 12$

$4h + 4 < 6h + 10 - 12$ **a.** __?__

$4h + 4 < 6h - 2$

$4h + 4 - 6h < 6h - 2 - 6h$ **b.** __?__

$-2h + 4 < -2$

$-2h + 4 - 4 < -2 - 4$ **c.** __?__

$-2h < -6$

$\dfrac{-2h}{-2} > \dfrac{-6}{-2}$ **d.** __?__

$h > 3$

Solve each inequality. Then check your solution.

3. $-5 - \dfrac{t}{6} \geq -9$

4. $4u - 6 \geq 6u - 20$

5. $13 > \dfrac{2}{3}a - 1$

6. $\dfrac{w + 3}{2} < -8$

7. $\dfrac{3f - 10}{5} > 7$

8. $h \leq \dfrac{6h + 3}{5}$

9. $3(z + 1) + 11 < -2(z + 13)$

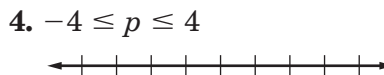**10.** $3e + 2(4e + 2) \leq 2(6e + 1)$
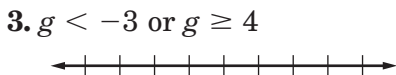
11. $5n - 3(n - 6) \geq 0$

Define a variable, write an inequality, and solve each problem. Then check your solution.

12. A number is less than one fourth the sum of three times the number and four.

13. Two times the sum of a number and four is no more than three times the sum of the number and seven decreased by four.

14. GEOMETRY The area of a triangular garden can be no more than 120 square feet. The base of the triangle is 16 feet. What is the height of the triangle?

15. MUSIC PRACTICE Nabuko practices the violin at least 12 hours per week. She practices for three fourths of an hour each session. If Nabuko has already practiced 3 hours in one week, how many sessions remain to meet or exceed her weekly practice goal?

Lesson 6-3

6-4 Practice

Solving Compound Inequalities

Graph the solution set of each compound inequality.

1. $-4 \le e \le 1$

$$-6\ -5\ -4\ -3\ -2\ -1\ 0\ 1\ 2$$

2. $x > 0$ or $x < 3$

$$-4\ -3\ -2\ -1\ 0\ 1\ 2\ 3\ 4$$

3. $g < -3$ or $g \ge 4$

4. $-4 \le p \le 4$
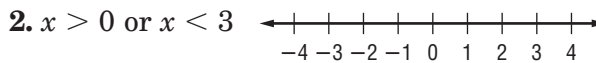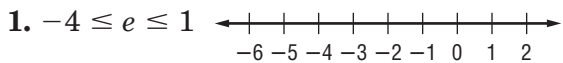
Write a compound inequality for each graph.

5.

$$-4\ -3\ -2\ -1\ 0\ 1\ 2\ 3\ 4$$

6.

$$-2\ -1\ 0\ 1\ 2\ 3\ 4\ 5\ 6$$

7.

$$-2\ -1\ 0\ 1\ 2\ 3\ 4\ 5\ 6$$

8.

$$-6\ -5\ -4\ -3\ -2\ -1\ 0\ 1\ 2$$

Solve each compound inequality. Then graph the solution set.

9. $k - 3 < -7$ or $k + 5 \ge 8$

$$-4\ -3\ -2\ -1\ 0\ 1\ 2\ 3\ 4$$

10. $-n < 2$ or $2n - 3 > 5$

$$-4\ -3\ -2\ -1\ 0\ 1\ 2\ 3\ 4$$
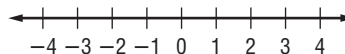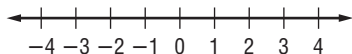
11. $5 < 3h + 2 \le 11$

12. $2c - 4 > -6$ and $3c + 1 < 13$

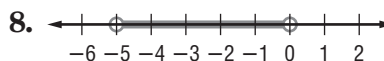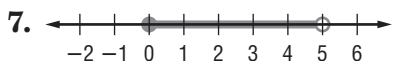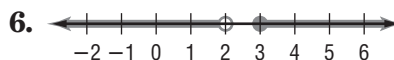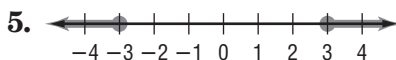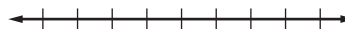**Define a variable, write an inequality, and solve each problem. Then check your solution.**

13. Two times a number plus one is greater than five and less than seven.

14. A number minus one is at most nine, or two times the number is at least twenty-four.

METEOROLOGY For Exercises 15 and 16, use the following information.
Strong winds called the prevailing westerlies blow from west to east in a belt from 40° to 60° latitude in both the Northern and Southern Hemispheres.

15. Write an inequality to represent the latitude of the prevailing westerlies.

16. Write an inequality to represent the latitudes where the prevailing westerlies are *not* located.

17. NUTRITION A cookie contains 9 grams of fat. If you eat no fewer than 4 and no more than 7 cookies, how many grams of fat will you consume?

6-5 Practice

Solving Open Sentences Involving Absolute Value

Match each open sentence with the graph of its solution set.

1. $|x + 7| = 3$

2. $|x - 3| \geq 1$

3. $|2x + 1| < 5$

4. $|5 - x| \geq 3$

a. (number line −5 to 5)

b. (number line −2 to 8)

c. (number line −10 to 0)

d. (number line −5 to 5)
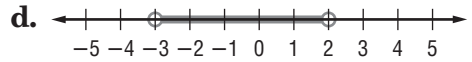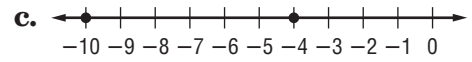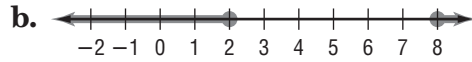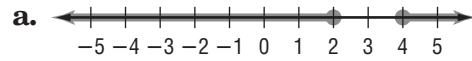
Express each statement using an inequality involving absolute value. Do *not* solve.

5. The height of the plant must be within 2 inches of the standard 13-inch show size.

6. The majority of grades in Sean's English class are within 4 points of 85.

Solve each open sentence. Then graph the solution set.

7. $|2z - 9| \leq 1$

(number line −5 to 5)

8. $|3 - 2r| > 7$

(number line −5 to 5)

9. $|3t + 6| < 9$

(number line)

10. $|2g - 5| \geq 9$

(number line)
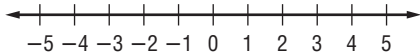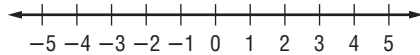
For each graph, write an open sentence involving absolute value.

11. (number line 1 to 11)

12. (number line −8 to 2)

13. (number line −8 to 2)

14. (number line −3 to 7)
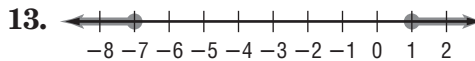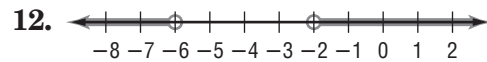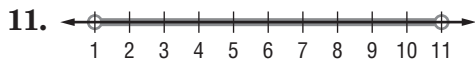
15. FITNESS Taisha uses the elliptical cross-trainer at the gym. Her general goal is to burn 280 Calories per workout, but she varies by as much as 25 Calories from this amount on any given day. What is the range of the number of Calories burned for Taisha's cross-trainer workout?

16. TEMPERATURE A thermometer is guaranteed to give a temperature no more than 1.2°F from the actual temperature. If the thermometer reads 28°F, what is the range for the actual temperature?

Lesson 6-5

6-6   Practice

Graphing Inequalities in Two Variables

Determine which ordered pairs are part of the solution set for each inequality.

1. $3x + y \geq 6$, $\{(4, 3), (-2, 4), (-5, -3), (3, -3)\}$

2. $y \geq x + 3$, $\{(6, 3), (-3, 2), (3, -2), (4, 3)\}$

3. $3x - 2y < 5$, $\{(4, -4), (3, 5), (5, 2), (-3, 4)\}$

Match each inequality with its graph.

4. $5y - 2x \leq 10$

5. $3y > 3x + 9$

6. $y - 2x < 3$

7. $x + 2y \geq -6$

a.

b.

c.

d.
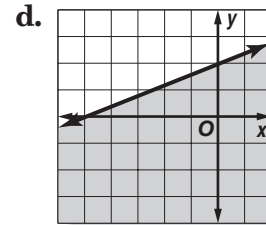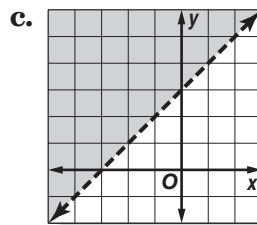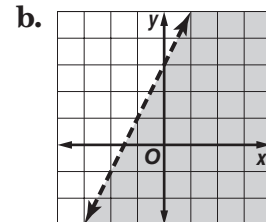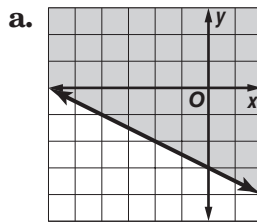
Graph each inequality.

8. $2y - x < -4$
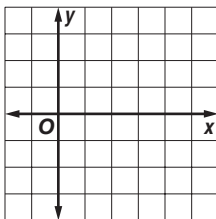
9. $2x - 2y \geq 8$
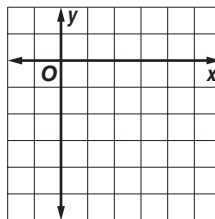
10. $3y > 2x - 3$
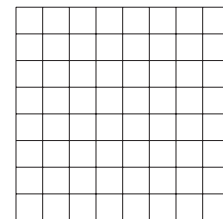
11. MOVING A moving van has an interior height of 7 feet (84 inches). You have boxes in 12 inch and 15 inch heights, and want to stack them as high as possible to fit. Write an inequality that represents this situation.

BUDGETING For Exercises 12 and 13, use the following information.

Satchi found a used bookstore that sells pre-owned videos and CDs. Videos cost $9 each, and CDs cost $7 each. Satchi can spend no more than $35.

12. Write an inequality that represents this situation.

13. Does Satchi have enough money to buy 2 videos and 3 CDs?

6-7 Practice

Graphing Systems of Inequalities

Solve each system of inequalities by graphing.

1. $y > x - 2$
$y \leq x$
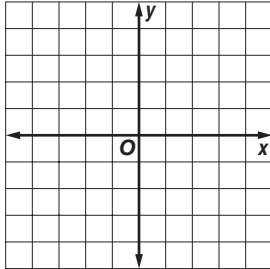
2. $y \geq x + 2$
$y > 2x + 3$
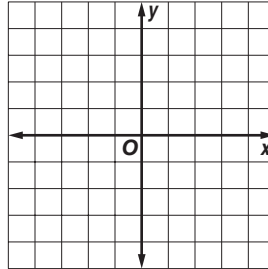
3. $x + y \geq 1$
$x + 2y > 1$
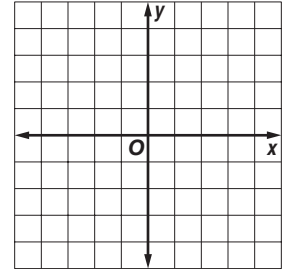
4. $y < 2x - 1$
$y > 2 - x$
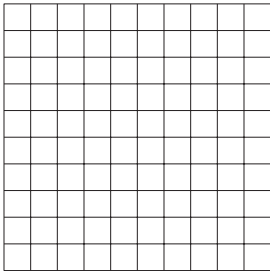
5. $y > x - 4$
$2x + y \leq 2$
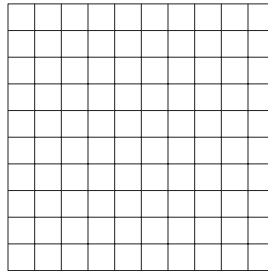
6. $2x - y \geq 2$
$x - 2y \geq 2$
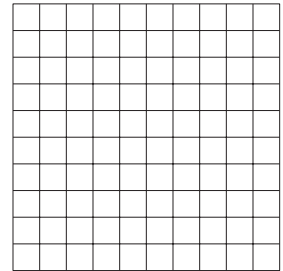
FITNESS For Exercises 7 and 8, use the following information.

Diego started an exercise program in which each week he works out at the gym between 4.5 and 6 hours and walks between 9 and 12 miles.

7. Make a graph to show the number of hours Diego works out at the gym and the number of miles he walks per week.

8. List three possible combinations of working out and walking that meet Diego's goals.

Diego's Routine
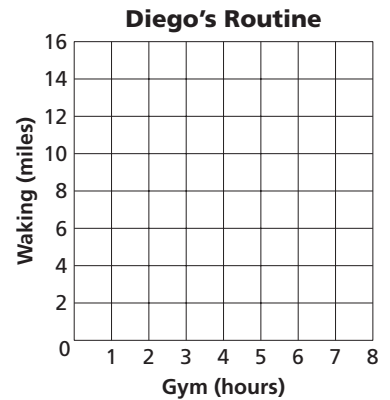
SOUVENIRS For Exercises 9 and 10, use the following information.

Emily wants to buy turquoise stones on her trip to New Mexico to give to at least 4 of her friends. The gift shop sells stones for either $4 or $6 per stone. Emily has no more than $30 to spend.

9. Make a graph showing the numbers of each price of stone Emily can purchase.

10. List three possible solutions.
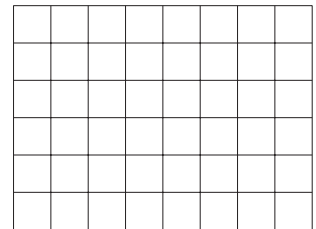
7-1 Practice

Multiplying Monomials

Determine whether each expression is a monomial. Write *yes* or *no*. Explain.

1. $\dfrac{21a^2}{7b}$

2. $\dfrac{b^3c^2}{2}$

Simplify.

3. $(-5x^2y)(3x^4)$ 　　　　　　　**4.** $(2ab^2c^2)(4a^3b^2c^2)$

5. $(3cd^4)(-2c^2)$ 　　　　　　　**6.** $(4g^3h)(-2g^5)$

7. $(-15xy^4)\left(-\dfrac{1}{3}xy^3\right)$ 　　　　**8.** $(-xy)^3(xz)$

9. $(-18m^2n)^2\left(-\dfrac{1}{6}mn^2\right)$ 　　　**10.** $(0.2a^2b^3)^2$

11. $\left(\dfrac{2}{3}p\right)^2$ 　　　　　　　　**12.** $\left(\dfrac{1}{4}cd^3\right)^2$

13. $(0.4k^3)^3$ 　　　　　　　　**14.** $[(4^2)^2]^2$

GEOMETRY Express the area of each figure as a monomial.

15. 　　　　　　　**16.** 　　　　　　　**17.**

$3ab^2$ / $6a^2b^4$ 　　　$5x^3$ 　　　$6ac^3$ / $4a^2c$
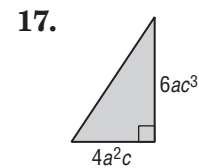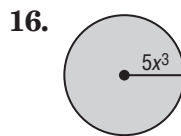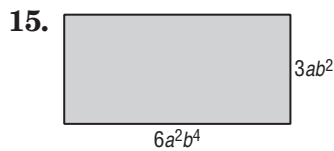
GEOMETRY Express the volume of each solid as a monomial.

18. 　　　　　　**19.** 　　　　　　**20.**

$3h^2$ / $3h^2$ / $3h^2$ 　　　n / mn^3 / m^3n 　　　$3g$ / $7g^2$
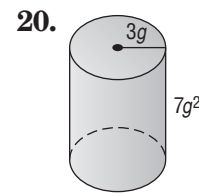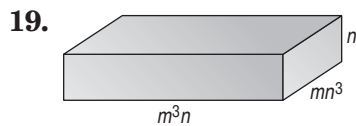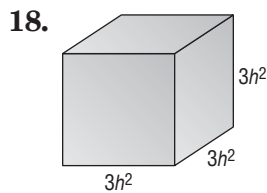
21. COUNTING A panel of four light switches can be set in 2^4 ways. A panel of five light switches can set in twice this many ways. In how many ways can five light switches be set?

22. HOBBIES Tawa wants to increase her rock collection by a power of three this year and then increase it again by a power of two next year. If she has 2 rocks now, how many rocks will she have after the second year?

7-2 Practice

Dividing Monomials

Simplify. Assume that no denominator is equal to zero.

1. $\dfrac{8^8}{8^4}$

2. $\dfrac{a^4b^6}{ab^3}$

3. $\dfrac{xy^2}{xy}$

4. $\dfrac{m^5np}{m^4p}$

5. $\dfrac{5c^2d^3}{-4c^2d}$

6. $\dfrac{8y^7z^6}{4y^6z^5}$

7. $\left(\dfrac{4f^3g}{3h^6}\right)^3$

8. $\left(\dfrac{6w^5}{7p^6s^3}\right)^2$

9. $\dfrac{-4c^2}{24c^5}$

10. $x^3(y^{-5})(x^{-8})$

11. $p(q^{-2})(r^{-3})$

12. 12^{-2}

13. $\left(\dfrac{3}{7}\right)^{-2}$

14. $\left(\dfrac{4}{3}\right)^{-4}$

15. $\dfrac{22r^3s^2}{11r^2s^{-3}}$

16. $\dfrac{-15w^0u^{-1}}{5u^3}$

17. $\dfrac{8c^3d^2f^4}{4c^{-1}d^2f^{-3}}$

18. $\left(\dfrac{x^{-3}y^5}{4^{-3}}\right)^0$

19. $\dfrac{6f^{-2}g^3h^5}{54f^{-2}g^{-5}h^3}$

20. $\dfrac{-12t^{-1}u^5v^{-4}}{2t^{-3}uv^5}$

21. $\dfrac{r^4}{(3r)^3}$

22. $\dfrac{m^{-2}n^{-5}}{(m^4n^3)^{-1}}$

23. $\dfrac{(j^{-1}k^3)^{-4}}{j^3k^3}$

24. $\dfrac{(2a^{-2}b)^{-3}}{5a^2b^4}$

25. $\left(\dfrac{q^{-1}r^3}{qr^{-2}}\right)^{-5}$

26. $\left(\dfrac{7c^{-3}d^3}{c^5de^{-4}}\right)^{-1}$

27. $\left(\dfrac{2x^3y^2z}{3x^4yz^{-2}}\right)^{-2}$

28. **BIOLOGY** A lab technician draws a sample of blood. A cubic millimeter of the blood contains 22^3 white blood cells and 22^5 red blood cells. What is the ratio of white blood cells to red blood cells?

29. **COUNTING** The number of three-letter "words" that can be formed with the English alphabet is 26^3. The number of five-letter "words" that can be formed is 26^5. How many times more five-letter "words" can be formed than three-letter "words"?

7-3 Practice

Polynomials

State whether each expression is a polynomial. If the expression is a polynomial, identify it as a *monomial*, a *binomial*, or a *trinomial*.

1. $7a^2b + 3b^2 - a^2b$ **2.** $\frac{1}{5}y^3 + y^2 - 9$ **3.** $6g^2h^3k$

GEOMETRY Write a polynomial to represent the area of each shaded region.

4.

5.
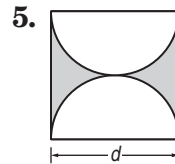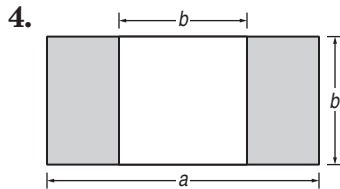
Find the degree of each polynomial.

6. $x + 3x^4 - 21x^2 + x^3$

7. $3g^2h^3 + g^3h$

8. $-2x^2y + 3xy^3 + x^2$

9. $5n^3m - 2m^3 + n^2m^4 + n^2$

10. $a^3b^2c + 2a^5c + b^3c^2$

11. $10s^2t^2 + 4st^2 - 5s^3t^2$

Arrange the terms of each polynomial so that the powers of x are in ascending order.

12. $8x^2 - 15 + 5x^5$

13. $10bx - 7b^2 + x^4 + 4b^2x^3$

14. $-3x^3y + 8y^2 + xy^4$

15. $7ax - 12 + 3ax^3 + a^2x^2$

Arrange the terms of each polynomial so that the powers of x are in descending order.

16. $13x^2 - 5 + 6x^3 - x$

17. $4x + 2x^5 - 6x^3 + 2$

18. $g^2x - 3gx^3 + 7g^3 + 4x^2$

19. $-11x^2y^3 + 6y - 2xy + 2x^4$

20. $7a^2x^2 + 17 - a^3x^3 + 2ax$

21. $12rx^3 + 9r^6 + r^2x + 8x^6$

22. MONEY Write a polynomial to represent the value of t ten-dollar bills, f fifty-dollar bills, and h one-hundred-dollar bills.

23. GRAVITY The height above the ground of a ball thrown up with a velocity of 96 feet per second from a height of 6 feet is $6 + 96t - 16t^2$ feet, where t is the time in seconds. According to this model, how high is the ball after 7 seconds? Explain.

Lesson 7-3

7-4 Practice

Adding and Subtracting Polynomials

Find each sum or difference.

1. $(4y + 5) + (-7y - 1)$

2. $(-x^2 + 3x) - (5x + 2x^2)$

3. $(4k^2 + 8k + 2) - (2k + 3)$

4. $(2m^2 + 6m) + (m^2 - 5m + 7)$

5. $(5a^2 + 6a + 2) - (7a^2 - 7a + 5)$

6. $(-4p^2 - p + 9) + (p^2 + 3p - 1)$

7. $(x^3 - 3x + 1) - (x^3 + 7 - 12x)$

8. $(6c^2 - c + 1) - (-4 + 2c^2 + 8c)$

9. $(4y^2 + 2y - 8) - (7y^2 + 4 - y)$

10. $(w^2 - 4w - 1) + (-5 + 5w^2 - 3w)$

11. $(4u^2 - 2u - 3) + (3u^2 - u + 4)$

12. $(5b^2 - 8 + 2b) - (b + 9b^2 + 5)$

13. $(4d^2 + 2d + 2) + (5d^2 - 2 - d)$

14. $(8x^2 + x - 6) - (-x^2 + 2x - 3)$

15. $(3h^2 + 7h - 1) - (4h + 8h^2 + 1)$

16. $(4m^2 - 3m + 10) + (m^2 + m - 2)$

17. $(x^2 + y^2 - 6) - (5x^2 - y^2 - 5)$

18. $(7t^2 + 2 - t) + (t^2 - 7 - 2t)$

19. $(k^3 - 2k^2 + 4k + 6) - (-4k + k^2 - 3)$

20. $(9j^2 + j + jk) + (-3j^2 - jk - 4j)$

21. $(2x + 6y - 3z) + (4x + 6z - 8y) + (x - 3y + z)$

22. $(6f^2 - 7f - 3) - (5f^2 - 1 + 2f) - (2f^2 - 3 + f)$

23. BUSINESS The polynomial $s^3 - 70s^2 + 1500s - 10{,}800$ models the profit a company makes on selling an item at a price s. A second item sold at the same price brings in a profit of $s^3 - 30s^2 + 450s - 5000$. Write a polynomial that expresses the total profit from the sale of both items.

24. GEOMETRY The measures of two sides of a triangle are given. If P is the perimeter, and $P = 10x + 5y$, find the measure of the third side.

$3x + 4y$

$5x - y$

Lesson 7-4
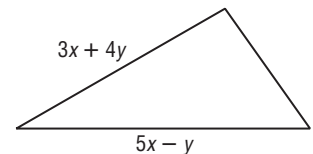
7-5 Practice

Multiplying a Polynomial by a Monomial

Find each product.

1. $2h(-7h^2 - 4h)$

2. $6pq(3p^2 + 4q)$

3. $5jk(3jk + 2k)$

4. $-3rs(-2s^2 + 3r)$

5. $-\dfrac{1}{4}m(8m^2 + m - 7)$

6. $-\dfrac{2}{3}n^2(-9n^2 + 3n + 6)$

Simplify.

7. $-2\ell(3\ell - 4) + 7\ell$

8. $5w(-7w + 3) + 2w(-2w^2 + 19w + 2)$

9. $6t(2t - 3) - 5(2t^2 + 9t - 3)$

10. $-2(3m^3 + 5m + 6) + 3m(2m^2 + 3m + 1)$

11. $-3g(7g - 2) + 3(g^2 + 2g + 1) - 3g(-5g + 3)$

Solve each equation.

12. $5(2s - 1) + 3 = 3(3s + 2)$

13. $3(3u + 2) + 5 = 2(2u - 2)$

14. $4(8n + 3) - 5 = 2(6n + 8) + 1$

15. $8(3b + 1) = 4(b + 3) - 9$

16. $t(t + 4) - 1 = t(t + 2) + 2$

17. $u(u - 5) + 8u = u(u + 2) - 4$

18. NUMBER THEORY Let x be an integer. What is the product of twice the integer added to three times the next consecutive integer?

INVESTMENTS For Exercises 24–26, use the following information.

Kent invested $5,000 in a retirement plan. He allocated x dollars of the money to a bond account that earns 4% interest per year and the rest to a traditional account that earns 5% interest per year.

19. Write an expression that represents the amount of money invested in the traditional account.

20. Write a polynomial model in simplest form for the total amount of money T Kent has invested after one year. (*Hint:* Each account has $A + IA$ dollars, where A is the original amount in the account and I is its interest rate.)

21. If Kent put $500 in the bond account, how much money does he have in his retirement plan after one year?

7-6 Practice

Multiplying Polynomials

Find each product.

1. $(q + 6)(q + 5)$ 2. $(x + 7)(x + 4)$

3. $(n - 4)(n - 6)$ 4. $(s + 5)(s - 6)$

5. $(4c + 6)(c - 4)$ 6. $(2x - 9)(2x + 4)$

7. $(6a - 3)(7a - 4)$ 8. $(2x - 2)(5x - 4)$

9. $(3a - b)(2a - b)$ 10. $(4g + 3h)(2g + 3h)$

11. $(m + 5)(m^2 + 4m - 8)$ 12. $(t + 3)(t^2 + 4t + 7)$

13. $(2h + 3)(2h^2 + 3h + 4)$ 14. $(3d + 3)(2d^2 + 5d - 2)$

15. $(3q + 2)(9q^2 - 12q + 4)$ 16. $(3r + 2)(9r^2 + 6r + 4)$

17. $(3c^2 + 2c - 1)(2c^2 + c + 9)$ 18. $(2\ell^2 + \ell + 3)(4\ell^2 + 2\ell - 2)$

19. $(2x^2 - 2x - 3)(2x^2 - 4x + 3)$ 20. $(3y^2 + 2y + 2)(3y^2 - 4y - 5)$

GEOMETRY Write an expression to represent the area of each figure.

21.
2x − 2
4x + 2
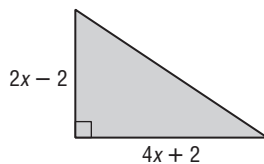
22.
5x − 4
x + 1
3x + 2
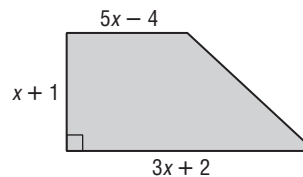
23. **NUMBER THEORY** Let x be an even integer. What is the product of the next two consecutive even integers?

24. **GEOMETRY** The volume of a rectangular pyramid is one third the product of the area of its base and its height. Find an expression for the volume of a rectangular pyramid whose base has an area of $3x^2 + 12x + 9$ square feet and whose height is $x + 3$ feet.

7-7 Practice

Special Products

Find each product.

1. $(n + 9)^2$

2. $(q + 8)^2$

3. $(\ell - 10)^2$

4. $(r - 11)^2$

5. $(p + 7)^2$

6. $(b + 6)(b - 6)$

7. $(z + 13)(z - 13)$

8. $(4e + 2)^2$

9. $(5w - 4)^2$

10. $(6h - 1)^2$

11. $(3s + 4)^2$

12. $(7v - 2)^2$

13. $(7k + 3)(7k - 3)$

14. $(4d - 7)(4d + 7)$

15. $(3g + 9h)(3g - 9h)$

16. $(4q + 5t)(4q - 5t)$

17. $(a + 6u)^2$

18. $(5r + s)^2$

19. $(6c - m)^2$

20. $(k - 6y)^2$

21. $(u - 7p)^2$

22. $(4b - 7v)^2$

23. $(6n + 4p)^2$

24. $(5q + 6s)^2$

25. $(6a - 7b)(6a + 7b)$

26. $(8h + 3d)(8h - 3d)$

27. $(9x + 2y^2)^2$

28. $(3p^3 + 2m)^2$

29. $(5a^2 - 2b)^2$

30. $(4m^3 - 2t)^2$

31. $(6e^3 - c)^2$

32. $(2b^2 - g)(2b^2 + g)$

33. $(2v^2 + 3e^2)(2v^2 + 3e^2)$

34. GEOMETRY Janelle wants to enlarge a square graph that she has made so that a side of the new graph will be 1 inch more than twice the original side s. What trinomial represents the area of the enlarged graph?

GENETICS For Exercises 35 and 36, use the following information.
In a guinea pig, pure black hair coloring B is dominant over pure white coloring b. Suppose two hybrid Bb guinea pigs, with black hair coloring, are bred.

35. Find an expression for the genetic make-up of the guinea pig offspring.

36. What is the probability that two hybrid guinea pigs with black hair coloring will produce a guinea pig with white hair coloring?

Lesson 7-7

8-1 Practice

Monomials and Factoring

Find the factors of each number. Then classify each number as *prime* or *composite*.

1. 18   **2.** 37   **3.** 48

4. 116   **5.** 138   **6.** 211

Find the prime factorization of each integer.

7. 52   **8.** -96 **9.** 108

10. 225   **11.** 286   **12.** -384

Factor each monomial completely.

13. $30d^5$ **14.** $-72mn$

15. $81b^2c^3$ **16.** $145abc^3$

17. $168pq^2r$ **18.** $-121x^2yz^2$

Find the GCF of each set of monomials.

19. 18, 49   **20.** 18, 45, 63   **21.** 16, 24, 48

22. 12, 30, 114   **23.** 9, 27, 77   **24.** 24, 72, 108

25. $24fg^5$, $56f^3g$ **26.** $72r^2s^2$, $36rs^3$ **27.** $15a^2b$, $35ab^2$

28. $28m^3n^2$, $45pq^2$ **29.** $40xy^2$, $56x^3y^2$, $124x^2y^3$ **30.** $88c^3d$, $40c^2d^2$, $32c^2d$

GEOMETRY For Exercises 31 and 32, use the following information.

The area of a rectangle is 84 square inches. Its length and width are both whole numbers.

31. What is the minimum perimeter of the rectangle?

32. What is the maximum perimeter of the rectangle?

RENOVATION For Exercises 33 and 34, use the following information.

Ms. Baxter wants to tile a wall to serve as a splashguard above a basin in the basement. She plans to use equal-sized tiles to cover an area that measures 48 inches by 36 inches.

33. What is the maximum-size square tile Ms. Baxter can use and not have to cut any of the tiles?

34. How many tiles of this size will she need?

8-2 Practice

Factoring Using the Distributive Property

Factor each polynomial.

1. $64 - 40ab$

2. $4d^2 + 16$

3. $6r^2s - 3rs^2$

4. $15cd + 30c^2d^2$

5. $32a^2 + 24b^2$

6. $36xy^2 - 48x^2y$

7. $30x^3y + 35x^2y^2$

8. $9c^3d^2 - 6cd^3$

9. $75b^2c^3 + 60bc^3$

10. $8p^2q^2 - 24pq^3 + 16pq$

11. $5x^3y^2 + 10x^2y + 25x$

12. $9ax^3 + 18bx^2 + 24cx$

13. $x^2 + 4x + 2x + 8$

14. $2a^2 + 3a + 6a + 9$

15. $4b^2 - 12b + 2b - 6$

16. $6xy - 8x + 15y - 20$

17. $-6mn + 4m + 18n - 12$

18. $12a^2 - 15ab - 16a + 20b$

Solve each equation. Check your solutions.

19. $x(x - 32) = 0$

20. $4b(b + 4) = 0$

21. $(y - 3)(y + 2) = 0$

22. $(a + 6)(3a - 7) = 0$

23. $(2y + 5)(y - 4) = 0$

24. $(4y + 8)(3y - 4) = 0$

25. $2z^2 + 20z = 0$

26. $8p^2 - 4p = 0$

27. $9x^2 = 27x$

28. $18x^2 = 15x$

29. $14x^2 = -21x$

30. $8x^2 = -26x$

LANDSCAPING For Exercises 31 and 32, use the following information.

A landscaping company has been commissioned to design a triangular flower bed for a mall entrance. The final dimensions of the flower bed have not been determined, but the company knows that the height will be two feet less than the base. The area of the flower bed can be represented by the equation $A = \frac{1}{2}b^2 - b$.

31. Write this equation in factored form.

32. Suppose the base of the flower bed is 16 feet. What will be its area?

33. PHYSICAL SCIENCE Mr. Alim's science class launched a toy rocket from ground level with an initial upward velocity of 60 feet per second. The height h of the rocket in feet above the ground after t seconds is modeled by the equation $h = 60t - 16t^2$. How long was the rocket in the air before it returned to the ground?

8-3 Practice

Factoring Trinomials: $x^2 + bx + c$

Factor each trinomial.

1. $a^2 + 10a + 24$

2. $h^2 + 12h + 27$

3. $x^2 + 14x + 33$

4. $g^2 - 2g - 63$

5. $w^2 + w - 56$

6. $y^2 + 4y - 60$

7. $b^2 + 4b - 32$

8. $n^2 - 3n - 28$

9. $c^2 + 4c - 45$

10. $z^2 - 11z + 30$

11. $d^2 - 16d + 63$

12. $x^2 - 11x + 24$

13. $q^2 - q - 56$

14. $x^2 - 6x - 55$

15. $32 + 18r + r^2$

16. $48 - 16g + g^2$

17. $j^2 - 9jk - 10k^2$

18. $m^2 - mv - 56v^2$

Solve each equation. Check your solutions.

19. $x^2 + 17x + 42 = 0$

20. $p^2 + 5p - 84 = 0$

21. $k^2 + 3k - 54 = 0$

22. $b^2 - 12b - 64 = 0$

23. $n^2 + 4n = 32$

24. $h^2 - 17h = -60$

25. $c^2 - 26c = 56$

26. $z^2 - 14z = 72$

27. $y^2 - 84 = 5y$

28. $80 + a^2 = 18a$

29. $u^2 = 16u + 36$

30. $17s + s^2 = -52$

31. Find all values of k so that the trinomial $x^2 + kx - 35$ can be factored using integers.

CONSTRUCTION For Exercises 32 and 33, use the following information.

A construction company is planning to pour concrete for a driveway. The length of the driveway is 16 feet longer than its width w.

32. Write an expression for the area of the driveway.

33. Find the dimensions of the driveway if it has an area of 260 square feet.

WEB DESIGN For Exercises 34 and 35, use the following information.

Janeel has a 10-inch by 12-inch photograph. She wants to scan the photograph, then reduce the result by the same amount in each dimension to post on her Web site. Janeel wants the area of the image to be one eighth that of the original photograph.

34. Write an equation to represent the area of the reduced image.

35. Find the dimensions of the reduced image.

Lesson 8-3

8-4 Practice

Factoring Trinomials: $ax^2 + bx + c$

Factor each trinomial, if possible. If the trinomial cannot be factored using integers, write *prime*.

1. $2b^2 + 10b + 12$

2. $3g^2 + 8g + 4$

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

4. $8b^2 - 5b - 10$

5. $6m^2 + 7m - 3$

6. $10d^2 + 17d - 20$

7. $6a^2 - 17a + 12$

8. $8w^2 - 18w + 9$

9. $10x^2 - 9x + 6$

10. $15n^2 - n - 28$

11. $10x^2 + 21x - 10$

12. $9r^2 + 15r + 6$

13. $12y^2 - 4y - 5$

14. $14k^2 - 9k - 18$

15. $8z^2 + 20z - 48$

16. $12q^2 + 34q - 28$

17. $18h^2 + 15h - 18$

18. $12p^2 - 22p - 20$

Solve each equation. Check your solutions.

19. $3h^2 + 2h - 16 = 0$

20. $15n^2 - n = 2$

21. $8q^2 - 10q + 3 = 0$

22. $6b^2 - 5b = 4$

23. $10c^2 - 21c = -4c + 6$

24. $10g^2 + 10 = 29g$

25. $6y^2 = -7y - 2$

26. $9z^2 = -6z + 15$

27. $12k^2 + 15k = 16k + 20$

28. $12x^2 - 1 = -x$

29. $8a^2 - 16a = 6a - 12$

30. $18a^2 + 10a = -11a + 4$

31. DIVING Lauren dove into a swimming pool from a 15-foot-high diving board with an initial upward velocity of 8 feet per second. Find the time t in seconds it took Lauren to enter the water. Use the model for vertical motion given by the equation $h = -16t^2 + vt + s$, where h is height in feet, t is time in seconds, v is the initial upward velocity in feet per second, and s is the initial height in feet. (*Hint:* Let $h = 0$ represent the surface of the pool.)

32. BASEBALL Brad tossed a baseball in the air from a height of 6 feet with an initial upward velocity of 14 feet per second. Enrique caught the ball on its way down at a point 4 feet above the ground. How long was the ball in the air before Enrique caught it? Use the model of vertical motion from Exercise 31.

8-5 Practice

Factoring Differences of Squares

Factor each polynomial, if possible. If the polynomial cannot be factored, write *prime*.

1. $k^2 - 100$ **2.** $81 - r^2$ **3.** $16p^2 - 36$

4. $4x^2 + 25$ **5.** $144 - 9f^2$ **6.** $36g^2 - 49h^2$

7. $121m^2 - 144n^2$ **8.** $32 - 8y^2$ **9.** $24a^2 - 54b^2$

10. $32s^2 - 18u^2$ **11.** $9d^2 - 32$ **12.** $36z^3 - 9z$

13. $45q^3 - 20q$ **14.** $100b^3 - 36b$ **15.** $3t^4 - 48t^2$

Solve each equation by factoring. Check your solutions.

16. $4y^2 = 81$ **17.** $64p^2 = 9$ **18.** $98b^2 - 50 = 0$

19. $32 - 162k^2 = 0$ **20.** $s^2 - \dfrac{64}{121} = 0$ **21.** $\dfrac{16}{49} - v^2 = 0$

22. $\dfrac{1}{36}x^2 - 25 = 0$ **23.** $27h^3 = 48h$ **24.** $75g^3 = 147g$

25. EROSION A rock breaks loose from a cliff and plunges toward the ground 400 feet below. The distance d that the rock falls in t seconds is given by the equation $d = 16t^2$. How long does it take the rock to hit the ground?

26. FORENSICS Mr. Cooper contested a speeding ticket given to him after he applied his brakes and skidded to a halt to avoid hitting another car. In traffic court, he argued that the length of the skid marks on the pavement, 150 feet, proved that he was driving under the posted speed limit of 65 miles per hour. The ticket cited his speed at 70 miles per hour. Use the formula $\dfrac{1}{24}s^2 = d$, where s is the speed of the car and d is the length of the skid marks, to determine Mr. Cooper's speed when he applied the brakes. Was Mr. Cooper correct in claiming that he was not speeding when he applied the brakes?

8-6 Practice

Perfect Squares and Factoring

Determine whether each trinomial is a perfect square trinomial. If so, factor it.

1. $m^2 + 16m + 64$

2. $9s^2 - 6s + 1$

3. $4y^2 - 20y + 25$

4. $16p^2 + 24p + 9$

5. $25b^2 - 4b + 16$

6. $49k^2 - 56k + 16$

Factor each polynomial, if possible. If the polynomial cannot be factored, write _prime_.

7. $3p^2 - 147$

8. $6x^2 + 11x - 35$

9. $50q^2 - 60q + 18$

10. $6t^3 - 14t^2 - 12t$

11. $6d^2 - 18$

12. $30k^2 + 38k + 12$

13. $15b^2 - 24bc$

14. $12h^2 - 60h + 75$

15. $9n^2 - 30n - 25$

16. $7u^2 - 28m^2$

17. $w^4 - 8w^2 - 9$

18. $16c^2 + 72cd + 81d^2$

Solve each equation. Check your solutions.

19. $4k^2 - 28k = -49$

20. $50b^2 + 20b + 2 = 0$

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

22. $g^2 + \frac{2}{3}g + \frac{1}{9} = 0$

23. $p^2 - \frac{6}{5}p + \frac{9}{25} = 0$

24. $x^2 + 12x + 36 = 25$

25. $y^2 - 8y + 16 = 64$

26. $(h + 9)^2 = 3$

27. $w^2 - 6w + 9 = 13$

28. GEOMETRY The area of a circle is given by the formula $A = \pi r^2$, where r is the radius. If increasing the radius of a circle by 1 inch gives the resulting circle an area of 100π square inches, what is the radius of the original circle?

29. PICTURE FRAMING Mikaela placed a frame around a print that measures 10 inches by 10 inches. The area of just the frame itself is 69 square inches. What is the width of the frame?
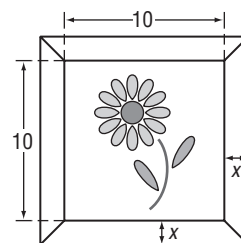
9-1 Practice

Graphing Quadratic Functions

Use a table of values to graph each function. Determine the domain and range.

1. $y = -x^2 + 2$
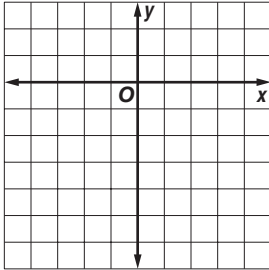
2. $y = x^2 - 6x + 3$
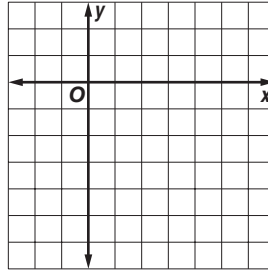
3. $y = -2x^2 - 8x - 5$
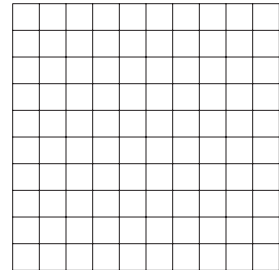
Write the equation of the axis of symmetry, and find the coordinates of the vertex of the graph of each function. Identify the vertex as a maximum or minimum. Then graph the function.

4. $y = -x^2 + 3$
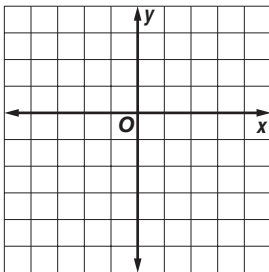
5. $y = -2x^2 + 8x - 3$
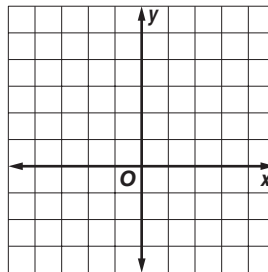
6. $y = 2x^2 + 8x + 1$
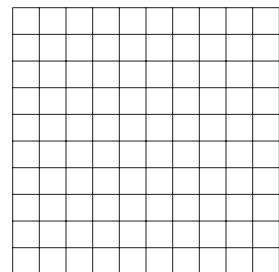
PHYSICS For Exercises 7–9, use the following information.

Miranda throws a set of keys up to her brother, who is standing on a balcony 38 feet above the ground. The equation $h = -16t^2 + 40t + 5$ gives the height h of the keys after t seconds.

7. How long does it take the keys to reach their highest point?

8. How high do the keys reach?

9. Will her brother be able to catch the keys? Explain.

10. What is a reasonable domain and range for this problem?

BASEBALL For Exercises 11–13, use the following information.

A player hits a baseball into the outfield. The equation $h = -0.005x^2 + x + 3$ gives the path of the ball, where h is the height and x is the horizontal distance the ball travels.

11. What is the equation of the axis of symmetry?

12. What is the maximum height reached by the baseball?

13. An outfielder catches the ball three feet above the ground. How far has the ball traveled horizontally when the outfielder catches it?

Lesson 9-1

9-2 Practice

Solving Quadratic Equations by Graphing

Solve each equation by graphing.

1. $x^2 - 5x + 6 = 0$
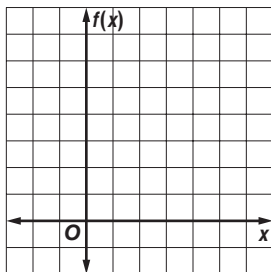
2. $w^2 + 6w + 9 = 0$
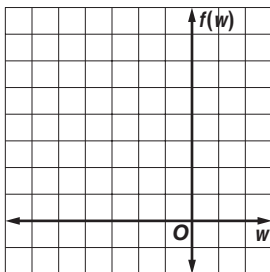
3. $b^2 - 3b + 4 = 0$
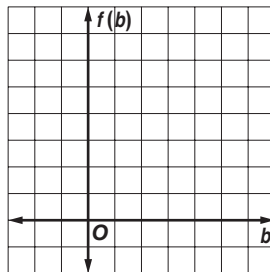
Solve each equation by graphing. If integral roots cannot be found, estimate the roots by stating the consecutive integers between which the roots lie.

4. $p^2 + 4p = 3$
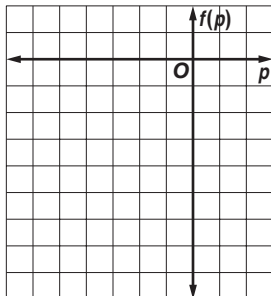
5. $2m^2 + 5 = 10m$
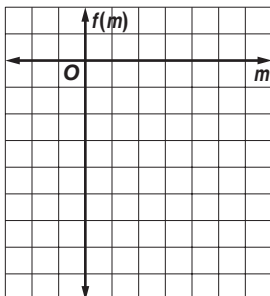
6. $2v^2 + 8v = -7$
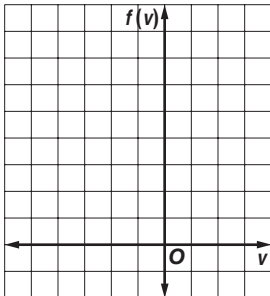
NUMBER THEORY For Exercises 7 and 8, use the following information.

Two numbers have a sum of 2 and a product of -8. The quadratic equation $-n^2 + 2n + 8 = 0$ can be used to determine the two numbers.

7. Graph the related function $f(n) = -n^2 + 2n + 8$ and determine its x-intercepts.

8. What are the two numbers?

DESIGN For Exercises 9 and 10, use the following information.

A footbridge is suspended from a parabolic support. The function $h(x) = -\dfrac{1}{25}x^2 + 9$ represents the height in feet of the support above the walkway, where $x = 0$ represents the midpoint of the bridge.

9. Graph the function and determine its x-intercepts.

10. What is the length of the walkway between the two supports?
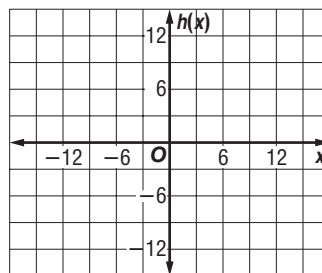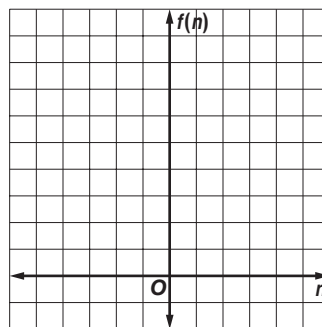
9-3   Practice

Solving Quadratic Equations by Completing the Square

Solve each equation by taking the square root of each side. Round to the nearest tenth if necessary.

1. $b^2 - 14b + 49 = 64$ **2.** $s^2 + 16s + 64 = 100$ **3.** $h^2 - 8h + 16 = 15$

4. $a^2 + 6a + 9 = 27$ **5.** $p^2 - 20p + 100 = 28$ **6.** $u^2 + 10u + 25 = 90$

Find the value of c that makes each trinomial a perfect square.

7. $t^2 - 24t + c$ **8.** $b^2 + 28b + c$ **9.** $y^2 + 40y + c$

10. $m^2 + 3m + c$ **11.** $g^2 - 9g + c$ **12.** $v^2 - v + c$

Solve each equation by completing the square. Round to the nearest tenth if necessary.

13. $w^2 - 14w + 24 = 0$ **14.** $p^2 + 12p = 13$ **15.** $s^2 - 30s + 56 = -25$

16. $v^2 + 8v + 9 = 0$ **17.** $t^2 - 10t + 6 = -7$ **18.** $n^2 + 18n + 50 = 9$

19. $3u^2 + 15u - 3 = 0$ **20.** $4c^2 - 72 = 24c$ **21.** $0.9a^2 + 5.4a - 4 = 0$

22. $0.4h^2 + 0.8h = 0.2$ **23.** $\frac{1}{2}x^2 - \frac{1}{2}x - 10 = 0$ **24.** $\frac{1}{4}x^2 + \frac{3}{2}x - 2 = 0$

BUSINESS For Exercises 25 and 26, use the following information.

Jaime owns a business making decorative boxes to store jewelry, mementos, and other valuables. The function $y = x^2 + 50x + 1800$ models the profit y that Jaime has made in month x for the first two years of his business.

25. Write an equation representing the month in which Jaime's profit is $2400.

26. Use completing the square to find out in which month Jaime's profit is $2400.

27. PHYSICS From a height of 256 feet above a lake on a cliff, Mikaela throws a rock out over the lake. The height H of the rock t seconds after Mikaela throws it is represented by the equation $H = -16t^2 + 32t + 256$. To the nearest tenth of a second, how long does it take the rock to reach the lake below? (*Hint:* Replace H with 0.)

Lesson 9-3

9-4 Practice

Solving Quadratic Equations by Using the Quadratic Formula

Solve each equation by using the Quadratic Formula. Round to the nearest tenth if necessary.

1. $g^2 + 2g - 3 = 0$

2. $a^2 + 8a + 7 = 0$

3. $v^2 - 4v + 6 = 0$

4. $d^2 - 6d + 7 = 0$

5. $2z^2 + 9z - 5 = 0$

6. $2r^2 + 12r + 10 = 0$

7. $2b^2 - 9b = -12$

8. $2h^2 - 5h = 12$

9. $3p^2 + p = 4$

10. $3m^2 - 1 = -8m$

11. $4y^2 + 7y = 15$

12. $1.6n^2 + 2n + 2.5 = 0$

13. $4.5k^2 + 4k - 1.5 = 0$

14. $\frac{1}{2}c^2 + 2c + \frac{3}{2} = 0$

15. $3w^2 - \frac{3}{4}w = \frac{1}{2}$

State the value of the discriminant for each equation. Then determine the number of real roots of the equation.

16. $a^2 + 8a + 16 = 0$

17. $c^2 + 3c + 12 = 0$

18. $2w^2 + 12w = -7$

19. $2u^2 + 15u = -30$

20. $4n^2 + 9 = 12n$

21. $3g^2 - 2g = 3.5$

22. $2.5k^2 + 3k - 0.5 = 0$

23. $\frac{3}{4}d^2 - 3d = -4$

24. $\frac{1}{4}s^2 = -s - 1$

CONSTRUCTION For Exercises 25 and 26, use the following information.

A roofer tosses a piece of roofing tile from a roof onto the ground 30 feet below. He tosses the tile with an initial downward velocity of 10 feet per second.

25. Write an equation to find how long it takes the tile to hit the ground. Use the model for vertical motion, $H = -16t^2 + vt + h$, where H is the height of an object after t seconds, v is the initial velocity, and h is the initial height. (*Hint:* Since the object is thrown down, the initial velocity is negative.)

26. How long does it take the tile to hit the ground?

27. PHYSICS Lupe tosses a ball up to Quyen, waiting at a third-story window, with an initial velocity of 30 feet per second. She releases the ball from a height of 6 feet. The equation $h = -16t^2 + 30t + 6$ represents the height h of the ball after t seconds. If the ball must reach a height of 25 feet for Quyen to catch it, does the ball reach Quyen? Explain. (*Hint:* Substitute 25 for h and use the discriminant.)

9-5 Practice

Exponential Functions

Graph each function. State the *y*-intercept. Then use the graph to determine the approximate value of the given expression. Use a calculator to confirm the value.

1. $y = \left(\frac{1}{10}\right)^x; \left(\frac{1}{10}\right)^{-0.5}$
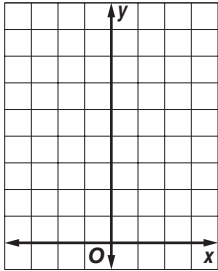
2. $y = 3^x; 3^{1.9}$
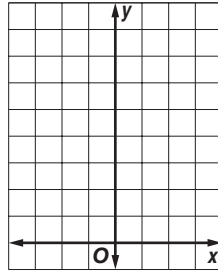
3. $y = \left(\frac{1}{4}\right)^x; \left(\frac{1}{4}\right)^{-1.4}$
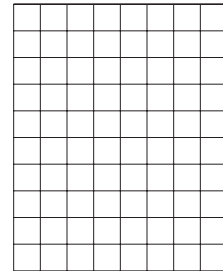
Graph each function. State the *y*-intercept.

4. $y = 4(2^x) + 1$
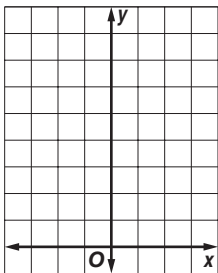
5. $y = 2(2^x - 1)$
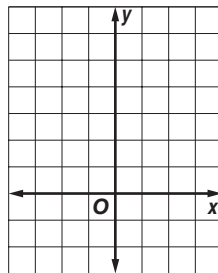
6. $y = 0.5(3^x - 3)$
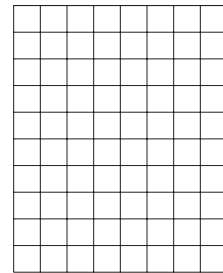
Determine whether the data in each table display exponential behavior. Explain why or why not.

7.

x	2	5	8	11
y	480	120	30	7.5

8.

x	21	18	15	12
y	30	23	16	9

9. LEARNING Ms. Klemperer told her English class that each week students tend to forget one sixth of the vocabulary words they learned the previous week. Suppose a student learns 60 words. The number of words remembered can be described by the function $W(x) = 60\left(\frac{5}{6}\right)^x$, where x is the number of weeks that pass. How many words will the student remember after 3 weeks?

10. BIOLOGY Suppose a certain cell reproduces itself in four hours. If a lab researcher begins with 50 cells, how many cells will there be after one day, two days, and three days? (*Hint:* Use the exponential function $y = 50(2^x)$.)

Lesson 9-5

9-6 Practice

Growth and Decay

COMMUNICATIONS For Exercises 1 and 2, use the following information.

Sports radio stations numbered 220 in 1996.

1. Write an equation for the number of sports radio stations for t years after 1996.

2. If the trend continues, predict the number of sports radio stations in this format for the year 2010.

3. INVESTMENTS Determine the amount of an investment if $500 is invested at an interest rate of 4.25% compounded quarterly for 12 years.

4. INVESTMENTS Determine the amount of an investment if $300 is invested at an interest rate of 6.75% compounded semiannually for 20 years.

5. HOUSING The Greens bought a condominium for $110,000 in 2005. If its value appreciates at an average rate of 6% per year, what will the value be in 2010?

DEFORESTATION For Exercises 6 and 7, use the following information.

During the 1990s, the forested area of Guatemala decreased at an average rate of 1.7%.

6. If the forested area in Guatemala in 1990 was about 34,400 square kilometers, write an equation for the forested area for t years after 1990.

7. If this trend continues, predict the forested area in 2015.

8. BUSINESS A piece of machinery valued at $25,000 depreciates at a steady rate of 10% yearly. What will the value of the piece of machinery be after 7 years?

9. TRANSPORTATION A new car costs $18,000. It is expected to depreciate at an average rate of 12% per year. Find the value of the car in 8 years.

10. POPULATION The population of Osaka, Japan declined at an average annual rate of 0.05% for the five years between 1995 and 2000. If the population of Osaka was 11,013,000 in 2000 and it continues to decline at the same rate, predict the population in 2050.

10-1 Practice

Simplifying Radical Expressions

Simplify.

1. $\sqrt{24}$

2. $\sqrt{60}$

3. $\sqrt{108}$

4. $\sqrt{8} \cdot \sqrt{6}$

5. $\sqrt{7} \cdot \sqrt{14}$

6. $3\sqrt{12} \cdot 5\sqrt{6}$

7. $4\sqrt{3} \cdot 3\sqrt{18}$

8. $\sqrt{27su^3}$

9. $\sqrt{50p^5}$

10. $\sqrt{108x^6y^4z^5}$

11. $\sqrt{56m^2n^4o^5}$

12. $\dfrac{\sqrt{8}}{\sqrt{6}}$

13. $\sqrt{\dfrac{2}{10}}$

14. $\sqrt{\dfrac{5}{32}}$

15. $\sqrt{\dfrac{3}{4}} \cdot \sqrt{\dfrac{4}{5}}$

16. $\sqrt{\dfrac{1}{7}} \cdot \sqrt{\dfrac{7}{11}}$

17. $\dfrac{\sqrt{3k}}{\sqrt{8}}$

18. $\sqrt{\dfrac{18}{x^3}}$

19. $\sqrt{\dfrac{4y}{3y^2}}$

20. $\sqrt{\dfrac{9ab}{4ab^4}}$

21. $\dfrac{3}{5 - \sqrt{2}}$

22. $\dfrac{8}{3 + \sqrt{3}}$

23. $\dfrac{5}{\sqrt{7} + \sqrt{3}}$

24. $\dfrac{3\sqrt{7}}{-1 - \sqrt{27}}$

25. SKY DIVING When a skydiver jumps from an airplane, the time t it takes to free fall a given distance can be estimated by the formula $t = \sqrt{\dfrac{2s}{9.8}}$, where t is in seconds and s is in meters. If Julie jumps from an airplane, how long will it take her to free fall 750 meters?

METEOROLOGY For Exercises 26 and 27, use the following information.

To estimate how long a thunderstorm will last, meteorologists can use the formula $t = \sqrt{\dfrac{d^3}{216}}$, where t is the time in hours and d is the diameter of the storm in miles.

26. A thunderstorm is 8 miles in diameter. Estimate how long the storm will last. Give your answer in simplified form and as a decimal.

27. Will a thunderstorm twice this diameter last twice as long? Explain.

10-2 Practice

Operations with Radical Expressions

Simplify.

1. $8\sqrt{30} - 4\sqrt{30}$

2. $2\sqrt{5} + 7\sqrt{5} - 5\sqrt{5}$

3. $7\sqrt{13x} - 14\sqrt{13x} + 2\sqrt{13x}$

4. $2\sqrt{45} + 4\sqrt{20}$

5. $\sqrt{40} - \sqrt{10} + \sqrt{90}$

6. $2\sqrt{32} + 3\sqrt{50} - 3\sqrt{18}$

7. $\sqrt{27} + \sqrt{18} + \sqrt{300}$

8. $5\sqrt{8} + 3\sqrt{20} - \sqrt{32}$

9. $\sqrt{14} - \sqrt{\dfrac{2}{7}}$

10. $\sqrt{50} + \sqrt{32} - \sqrt{\dfrac{1}{2}}$

11. $5\sqrt{19} + 4\sqrt{28} - 8\sqrt{19} + \sqrt{63}$

12. $3\sqrt{10} + \sqrt{75} - 2\sqrt{40} - 4\sqrt{12}$

Find each product.

13. $\sqrt{6}(\sqrt{10} + \sqrt{15})$

14. $\sqrt{5}(5\sqrt{2} - 4\sqrt{8})$

15. $2\sqrt{7}(3\sqrt{12} + 5\sqrt{8})$

16. $(5 - \sqrt{15})^2$

17. $(\sqrt{10} + \sqrt{6})(\sqrt{30} - \sqrt{18})$

18. $(\sqrt{8} + \sqrt{12})(\sqrt{48} + \sqrt{18})$

19. $(\sqrt{2} + 2\sqrt{8})(3\sqrt{6} - \sqrt{5})$

20. $(4\sqrt{3} - 2\sqrt{5})(3\sqrt{10} + 5\sqrt{6})$

SOUND For Exercises 21 and 22, use the following information.

The speed of sound V in meters per second near Earth's surface is given by $V = 20\sqrt{t + 273}$, where t is the surface temperature in degrees Celsius.

21. What is the speed of sound near Earth's surface at 15°C and at 2°C in simplest form?

22. How much faster is the speed of sound at 15°C than at 2°C?

GEOMETRY For Exercises 23 and 24, use the following information.

A rectangle is $5\sqrt{7} + 2\sqrt{3}$ centimeters long and $6\sqrt{7} - 3\sqrt{3}$ centimeters wide.

23. Find the perimeter of the rectangle in simplest form.

24. Find the area of the rectangle in simplest form.

10-3 Practice

Radical Equations

Solve each equation. Check your solution.

1. $\sqrt{-b} = 8$

2. $4\sqrt{3} = \sqrt{x}$

3. $2\sqrt{4c} + 3 = 11$

4. $6 - \sqrt{2y} = -2$

5. $\sqrt{k + 2} - 3 = 7$

6. $\sqrt{m - 5} = 4\sqrt{3}$

7. $\sqrt{6t + 12} = 8\sqrt{6}$

8. $\sqrt{3j - 11} + 2 = 9$

9. $\sqrt{2x + 15} + 5 = 18$

10. $\sqrt{\dfrac{3s}{5}} - 4 = 2$

11. $6\sqrt{\dfrac{3x}{3}} - 3 = 0$

12. $6 + \sqrt{\dfrac{5r}{6}} = -2$

13. $y = \sqrt{y + 6}$

14. $\sqrt{15 - 2x} = x$

15. $\sqrt{w + 4} = w + 4$

16. $\sqrt{17 - k} = k - 5$

17. $\sqrt{5m - 16} = m - 2$

18. $\sqrt{24 + 8q} = q + 3$

19. $\sqrt{4s + 17} - s - 3 = 0$

20. $4 - \sqrt{3m + 28} = m$

21. $\sqrt{10p + 61} - 7 = p$

22. $\sqrt{2x^2 - 9} = x$

ELECTRICITY For Exercises 23 and 24, use the following information.
The voltage V in a circuit is given by $V = \sqrt{PR}$, where P is the power in watts and R is the resistance in ohms.

23. If the voltage in a circuit is 120 volts and the circuit produces 1500 watts of power, what is the resistance in the circuit?

24. Suppose an electrician designs a circuit with 110 volts and a resistance of 10 ohms. How much power will the circuit produce?

FREE FALL For Exercises 25 and 26, use the following information.
Assuming no air resistance, the time t in seconds that it takes an object to fall h feet can be determined by the equation $t = \dfrac{\sqrt{h}}{4}$.

25. If a skydiver jumps from an airplane and free falls for 10 seconds before opening the parachute, how many feet does the skydiver fall?

26. Suppose a second skydiver jumps and free falls for 6 seconds. How many feet does the second skydiver fall?

Lesson 10-3

10-4 **Practice**

The Pythagorean Theorem

Find the length of each missing side. If necessary, round to the nearest hundredth.

1.

32
c
60

2.

a
11
19

3.

4
12
b
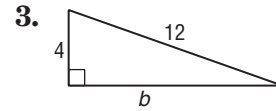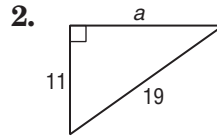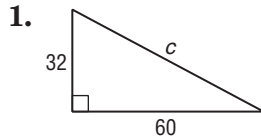
If c is the measure of the hypotenuse of a right triangle, find each missing measure. If necessary, round to the nearest hundredth.

4. $a = 24, b = 45, c = ?$

5. $a = 28, b = 96, c = ?$

6. $b = 48, c = 52, a = ?$

7. $c = 27, a = 18, b = ?$

8. $b = 14, c = 21, a = ?$

9. $a = \sqrt{20}, b = 10, c = ?$

10. $a = \sqrt{75}, b = \sqrt{6}, c = ?$

11. $b = 9x, c = 15x, a = ?$

Determine whether the following side measures form right triangles. Justify your answer.

12. 11, 18, 21

13. 21, 72, 75

14. 7, 8, 11

15. 9, 10, $\sqrt{161}$

16. 9, $2\sqrt{10}$, 11

17. $\sqrt{7}$, $2\sqrt{2}$, $\sqrt{15}$

18. STORAGE The shed in Stephan's back yard has a door that measures 6 feet high and 3 feet wide. Stephan would like to store a square theater prop that is 7 feet on a side. Will it fit through the door diagonally? Explain.

SCREEN SIZES For Exercises 19–21, use the following information.

The size of a television is measured by the length of the screen's diagonal.

19. If a television screen measures 24 inches high and 18 inches wide, what size television is it?

20. Darla told Tri that she has a 35-inch television. The height of the screen is 21 inches. What is its width?

21. Tri told Darla that he has a 5-inch handheld television and that the screen measures 2 inches by 3 inches. Is this a reasonable measure for the screen size? Explain.

Lesson 10-4

10-5 Practice

The Distance Formula

Find the distance between each pair of points with the given coordinates. Express answers in simplest radical form and as decimal approximations rounded to the nearest hundredth if necessary.

1. $(4, 7)$, $(1, 3)$

2. $(0, 9)$, $(-7, -2)$

3. $(4, -6)$, $(3, -9)$

4. $(-3, -8)$, $(-7, 2)$

5. $(0, -4)$, $(3, 2)$

6. $(-13, -9)$, $(-1, -5)$

7. $(6, 2)$, $\left(4, \frac{1}{2}\right)$

8. $(-1, 7)$, $\left(\frac{1}{3}, 6\right)$

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

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

11. $\left(\sqrt{3}, 3\right)$, $\left(2\sqrt{3}, 5\right)$

12. $\left(2\sqrt{2}, -1\right)$, $\left(3\sqrt{2}, 3\right)$

Find the possible values of a if the points with the given coordinates are the indicated distance apart.

13. $(4, -1)$, $(a, 5)$; $d = 10$

14. $(2, -5)$, $(a, 7)$; $d = 15$

15. $(6, -7)$, $(a, -4)$; $d = \sqrt{18}$

16. $(-4, 1)$, $(a, 8)$; $d = \sqrt{50}$

17. $(8, -5)$, $(a, 4)$; $d = \sqrt{85}$

18. $(-9, 7)$, $(a, 5)$; $d = \sqrt{29}$

BASEBALL For Exercises 19–21, use the following information.

Three players are warming up for a baseball game. Player B stands 9 feet to the right and 18 feet in front of Player A. Player C stands 8 feet to the left and 13 feet in front of Player A.

19. Draw a model of the situation on the coordinate grid. Assume that Player A is located at $(0, 0)$.

20. To the nearest tenth, what is the distance between Players A and B and between Players A and C?

21. What is the distance between Players B and C?
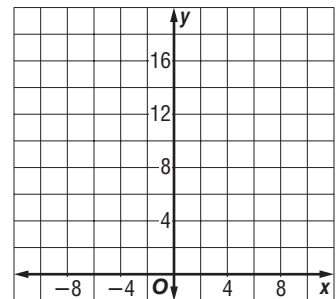
22. MAPS Maria and Jackson live in adjacent neighborhoods. If they superimpose a coordinate grid on the map of their neighborhoods, Maria lives at $(-9, 1)$ and Jackson lives at $(5, -4)$. If each unit on the grid is equal to approximately 0.132 mile, how far apart do Maria and Jackson live?

Lesson 10-5

10-6 Practice

Similar Triangles

Determine whether each pair of triangles is similar. Justify your answer.

1.
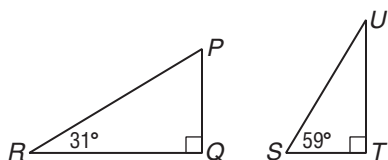
2.
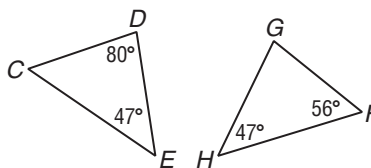
For each set of measures given, find the measures
of the missing sides if $\triangle ABC \sim \triangle DEF$.

3. $c = 4, d = 12, e = 16, f = 8$

4. $e = 20, a = 24, b = 30, c = 15$

5. $a = 10, b = 12, c = 6, d = 4$

6. $a = 4, d = 6, e = 4, f = 3$

7. $b = 15, d = 16, e = 20, f = 10$

8. $a = 16, b = 22, c = 12, f = 8$

9. $a = \frac{5}{2}, b = 3, f = \frac{11}{2}, e = 7$

10. $c = 4, d = 6, e = 5.625, f = 12$
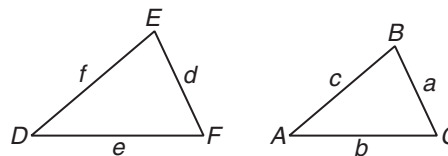
11. SHADOWS Suppose you are standing near a building and you want to know its height.
The building casts a 66-foot shadow. You cast a 3-foot shadow. If you are 5 feet 6 inches
tall, how tall is the building?

12. MODELS Truss bridges use triangles in their support beams. Molly made a model of a
truss bridge in the scale of 1 inch = 8 feet. If the height of the triangles on the model is
4.5 inches, what is the height of the triangles on the actual bridge?

11-1 Practice

Inverse Variation

Graph each variation if *y* varies inversely as *x*.

1. $y = -2$ when $x = -12$
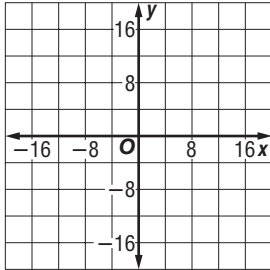
2. $y = -6$ when $x = -5$
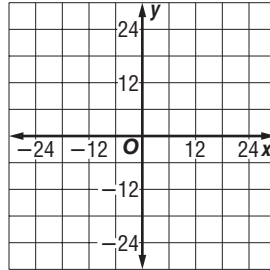
3. $y = 2.5$ when $x = 2$
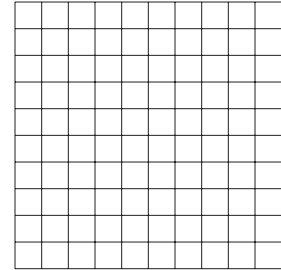
Write an inverse variation equation that relates *x* and *y*. Assume that *y* varies inversely as *x*. Then solve.

4. If $y = 124$ when $x = 12$, find y when $x = -24$.

5. If $y = -8.5$ when $x = 6$, find y when $x = -2.5$.

6. If $y = 3.2$ when $x = -5.5$, find y when $x = 6.4$.

7. If $y = 0.6$ when $x = 7.5$, find y when $x = -1.25$.

8. If $y = 6$ when $x = \dfrac{1}{2}$, find x when $y = 4$.

9. If $y = 8$ when $x = \dfrac{1}{4}$, find x when $y = -12$.

10. If $y = 4$ when $x = -2$, find x when $y = -10$.

11. If $y = -7$ when $x = 4$, find x when $y = -6$.

EMPLOYMENT For Exercises 12 and 13, use the following information.

The manager of a lumber store schedules 6 employees to take inventory in an 8-hour work period. The manager assumes all employees work at the same rate.

12. Suppose 2 employees call in sick. How many hours will 4 employees need to take inventory?

13. If the district supervisor calls in and says she needs the inventory finished in 6 hours, how many employees should the manager assign to take inventory?

14. TRAVEL Jesse and Joaquin can drive to their grandparents' home in 3 hours if they average 50 miles per hour. Since the road between the homes is winding and mountainous, their parents prefer they average between 40 and 45 miles per hour. How long will it take to drive to the grandparents' home at the reduced speed?

Lesson 11-1

11-2 Practice

Rational Expressions

State the excluded values for each rational expression.

1. $\dfrac{4n - 28}{n^2 - 49}$

2. $\dfrac{p^2 - 16}{p^2 - 13p + 36}$

3. $\dfrac{a^2 - 2a - 15}{a^2 + 8a + 15}$

Simplify each expression. State the excluded values of the variables.

4. $\dfrac{12a}{48a^3}$

5. $\dfrac{6xyz^3}{3x^2y^2z}$

6. $\dfrac{36m^3np^2}{20m^2np^5}$

7. $\dfrac{5c^3d^4}{40cd^2 + 5c^4d^2}$

8. $\dfrac{p^2 - 8p + 12}{p - 2}$

9. $\dfrac{m^2 - 4m - 12}{m - 6}$

10. $\dfrac{m + 3}{m^2 - 9}$

11. $\dfrac{2b - 14}{b^2 - 9b + 14}$

12. $\dfrac{x^2 - 7x + 10}{x^2 - 2x - 15}$

13. $\dfrac{y^2 + 6y - 16}{y^2 - 4y + 4}$

14. $\dfrac{r^2 - 7r + 6}{r^2 + 6r - 7}$

15. $\dfrac{t^2 - 81}{t^2 - 12t + 27}$

16. $\dfrac{r^2 + r - 6}{r^2 + 4r - 12}$

17. $\dfrac{2x^2 + 18x + 36}{3x^2 - 3x - 36}$

18. $\dfrac{2y^2 + 9y + 4}{4y^2 - 4y - 3}$

ENTERTAINMENT For Exercises 19 and 20, use the following information.

Fairfield High spent d dollars for refreshments, decorations, and advertising for a dance. In addition, they hired a band for $550.

19. Write an expression that represents the cost of the band as a fraction of the total amount spent for the school dance.

20. If d is $1650, what percent of the budget did the band account for?

PHYSICAL SCIENCE For Exercises 21–23, use the following information.

Mr. Kaminksi plans to dislodge a tree stump in his yard by using a 6-foot bar as a lever. He places the bar so that 0.5 foot extends from the fulcrum to the end of the bar under the tree stump. In the diagram, b represents the total length of the bar and t represents the portion of the bar beyond the fulcrum.
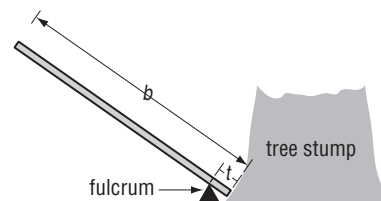
21. Write an equation that can be used to calculate the mechanical advantage.

22. What is the mechanical advantage?

23. If a force of 200 pounds is applied to the end of the lever, what is the force placed on the tree stump?

11-3 Practice

Multiplying Rational Expressions

Find each product.

1. $\dfrac{18x^2}{10y^2} \cdot \dfrac{15y^3}{24x}$

2. $\dfrac{24st^2}{8s^4t^3} \cdot \dfrac{12s^3t^2}{36s^2t}$

3. $\dfrac{14xy^2}{27m^2n} \cdot \dfrac{36m^4n^2}{7x^2y}$

4. $\dfrac{12a^2b}{4} \cdot \dfrac{4(a + 2b)}{20a^2b^3}$

5. $\dfrac{(x + 2)(x + 2)}{8} \cdot \dfrac{72}{(x + 2)(x - 2)}$

6. $\dfrac{m + 7}{(m - 6)(m + 2)} \cdot \dfrac{(m - 6)(m + 4)}{(m + 7)}$

7. $\dfrac{c^2 - 1}{2c - 6} \cdot \dfrac{c^2 - 9}{3c - 3}$

8. $\dfrac{x^2 - 16}{x^2 - 4} \cdot \dfrac{x + 2}{x - 4}$

9. $\dfrac{a - 4}{a^2 - a - 12} \cdot \dfrac{a + 3}{a - 6}$

10. $\dfrac{4x + 8}{x^2} \cdot \dfrac{x}{x^2 - 5x - 14}$

11. $\dfrac{n^2 + 10n + 16}{5n - 10} \cdot \dfrac{n - 2}{n^2 + 9n + 8}$

12. $\dfrac{3y - 9}{y^2 - 9y + 20} \cdot \dfrac{y^2 - 8y + 16}{y - 3}$

13. $\dfrac{b^2 + 5b + 4}{b^2 - 36} \cdot \dfrac{b^2 + 5b - 6}{b^2 + 2b - 8}$

14. $\dfrac{t^2 + 6t + 9}{t^2 - 10t + 25} \cdot \dfrac{t^2 - t - 20}{t^2 + 7t + 12}$

Find each product.

15. $\dfrac{450 \text{ gallons}}{1 \text{ hour}} \cdot \dfrac{128 \text{ ounces}}{1 \text{ gallon}} \cdot \dfrac{1 \text{ hour}}{60 \text{ minutes}} \cdot \dfrac{1 \text{ minute}}{60 \text{ seconds}}$

16. $\dfrac{81 \text{ kilometers}}{1 \text{ day}} \cdot \dfrac{1000 \text{ meters}}{1 \text{ kilometer}} \cdot \dfrac{1 \text{ day}}{24 \text{ hours}} \cdot \dfrac{1 \text{ hour}}{60 \text{ minutes}}$

17. ANIMAL SPEEDS The maximum speed of a coyote is 43 miles per hour over a distance of approximately a quarter mile. What is a coyote's maximum speed in feet per second? Round to the nearest tenth.

18. BIOLOGY The heart of an average person pumps about 9000 liters of blood per day. How many quarts of blood does the heart pump per hour? (*Hint:* One quart is equal to 0.946 liter.) Round to the nearest whole number.

Lesson 11-3

11-4 Practice

Dividing Rational Expressions

Find each quotient.

1. $\dfrac{28a^2}{7b^2} \div \dfrac{21a^3}{35b}$

2. $\dfrac{mn^2p^3}{x^4y^2} \div \dfrac{mnp^2}{x^3y}$

3. $\dfrac{2a}{a-1} \div (a+1)$

4. $\dfrac{z^2-16}{3z} \div (z-4)$

5. $\dfrac{4y+20}{y-3} \div \dfrac{y+5}{2y-6}$

6. $\dfrac{4x+12}{6x-24} \div \dfrac{2x+6}{x+3}$

Complete.

7. $1.75 \text{ m}^2 = $ ___ cm^2

8. $0.54 \text{ tons/yd}^3 = $ ___ lb/ft^3

Find each quotient.

9. $\dfrac{s^2-8s-20}{7} \div \dfrac{s+2}{s-2}$

10. $\dfrac{n^2-9n+8}{9n-9} \div \dfrac{n+8}{27}$

11. $\dfrac{y^2-3y-10}{y^2-9y+8} \div \dfrac{2y+4}{y-1}$

12. $\dfrac{n-1}{n^2+2n-15} \div \dfrac{n^2-6n+5}{4n-12}$

13. $\dfrac{b^2+2b-8}{b^2-11b+18} \div \dfrac{2b-8}{2b-18}$

14. $\dfrac{3x-3}{x^2-6x+9} \div \dfrac{6x-6}{x^2-5x+6}$

15. $\dfrac{a^2+8a+12}{a^2-7a+10} \div \dfrac{a^2-4a-12}{a^2+3a-10}$

16. $\dfrac{y^2+6y-7}{y^2+8y-9} \div \dfrac{y^2+9y+14}{y^2+7y-18}$

TRAFFIC **For Exercises 17 and 18, use the following information.**

On Saturday, it took Ms. Torres 24 minutes to drive 20 miles from her home to her office. During Friday's rush hour, it took 75 minutes to drive the same distance.

17. What was Ms. Torres's speed in miles per hour on Saturday?

18. What was her speed in miles per hour on Friday?

SHOPPING **For Exercises 19 and 20, use the following information.**

Ashley wants to buy some treats for her dog Foo. She can purchase a $1\frac{1}{4}$-pound box of dog treats for $2.99. She can purchase the same treats in a 2-pound package on sale for $4.19.

19. What is the cost of each in cents per ounce? Round to the nearest tenth.

20. If a box of treats costs $3.49 at a rate of 14.5 cents per ounce, how much does the box weigh in ounces and in pounds?

11-5 Practice

Dividing Polynomials

Find each quotient.

1. $(6q^2 - 18q - 9) \div (9q)$ **2.** $(y^2 + 6y + 2) \div (3y)$ **3.** $\dfrac{12a^2b - 3ab^2 + 42ab}{6a^2b}$

4. $\dfrac{2m^3n^2 + 56mn - 4m^2n^3}{8m^3n}$ **5.** $(x^2 - 3x - 40) \div (x + 5)$ **6.** $(3m^2 - 20m + 12) \div (m - 6)$

7. $(a^2 + 5a + 20) \div (a - 3)$ **8.** $(x^2 - 3x - 2) \div (x + 7)$ **9.** $(t^2 + 9t + 28) \div (t + 3)$

10. $(s^2 - 9s + 25) \div (s - 4)$ **11.** $\dfrac{6r^2 - 5r - 56}{3r + 8}$ **12.** $\dfrac{20w^2 + 39w + 18}{5w + 6}$

13. $(x^3 + 2x^2 - 16) \div (x - 2)$ **14.** $(s^3 - 11s - 6) \div (s + 3)$

15. $\dfrac{x^3 + 6x^2 + 3x + 1}{x - 2}$ **16.** $\dfrac{6d^3 + d^2 - 2d + 17}{2d + 3}$

17. $\dfrac{2k^3 + 7k^2 - 7}{2k + 3}$ **18.** $\dfrac{9y^3 - y - 1}{3y + 2}$

LANDSCAPING For Exercises 19 and 20, use the following information.

Jocelyn is designing a bed for cactus specimens at a botanical garden. The total area can be modeled by the expression $2x^2 + 7x + 3$, where x is in feet.

19. Suppose in one design the length of the cactus bed is $4x$, and in another, the length is $2x + 1$. What are the widths of the two designs?

20. If $x = 3$ feet, what will be the dimensions of the cactus bed in each of the designs?

21. FURNITURE Teri is upholstering the seats of four chairs and a bench. She needs $\dfrac{1}{4}$ square yard of fabric for each chair, and $\dfrac{1}{2}$ square yard for the bench. If the fabric at the store is 45 inches wide, how many yards of fabric will Teri need to cover the chairs and the bench if there is no waste?

11-6 Practice

Rational Expressions with Like Denominators

Find each sum.

1. $\dfrac{n}{8} + \dfrac{3n}{8}$

2. $\dfrac{7u}{16} + \dfrac{5u}{16}$

3. $\dfrac{w + 9}{9} + \dfrac{w + 4}{9}$

4. $\dfrac{s - 8}{4} + \dfrac{s - 4}{4}$

5. $\dfrac{4c}{c + 1} + \dfrac{4}{c + 1}$

6. $\dfrac{n + 6}{n - 2} + \dfrac{-8}{n - 2}$

7. $\dfrac{x - 5}{x + 2} + \dfrac{-2}{x + 2}$

8. $\dfrac{r + 5}{r - 5} + \dfrac{2r - 1}{r - 5}$

9. $\dfrac{4p + 14}{p + 4} + \dfrac{2p + 10}{p + 4}$

10. $\dfrac{2y + 1}{3y - 2} + \dfrac{4y - 5}{3y - 2}$

11. $\dfrac{5a + 2}{2a - 2} + \dfrac{2a - 4}{2a - 2}$

12. $\dfrac{6t - 5}{3t + 1} + \dfrac{4t + 3}{3t + 1}$

Find each difference.

13. $\dfrac{3y}{8} - \dfrac{y}{8}$

14. $\dfrac{9n}{5} - \dfrac{4n}{5}$

15. $\dfrac{r + 2}{3} - \dfrac{r + 5}{3}$

16. $\dfrac{x - 6}{2} - \dfrac{x - 7}{2}$

17. $\dfrac{s + 14}{5} - \dfrac{s - 14}{5}$

18. $\dfrac{6}{c - 1} - \dfrac{-2}{c - 1}$

19. $\dfrac{7}{d + 6} - \dfrac{6}{d + 6}$

20. $\dfrac{2y}{2y - 3} + \dfrac{3}{3 - 2y}$

21. $\dfrac{4p}{p - 5} - \dfrac{4p}{5 - p}$

22. $\dfrac{2y}{y - 2} - \dfrac{7y}{2 - y}$

23. $\dfrac{6a - 4}{2a + 2} - \dfrac{4a - 6}{2a + 2}$

24. $\dfrac{30t}{6t - 1} - \dfrac{5}{1 - 6t}$

25. GEOMETRY Find an expression for the perimeter of rectangle *ABCD*. Use the formula $P = 2\ell + 2w$.
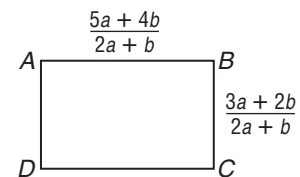
26. MUSIC Kerrie is burning an 80-minute CD-R containing her favorite dance songs. Suppose she has burned 41 minutes of songs and has five more songs in the queue that total *x* minutes. When she is done, write an expression for the fraction of the CD that has been filled with music.

11-7 Practice

Rational Expressions with Unlike Denominators

Find the LCM for each pair of expressions.

1. $3a^3b^2$, $18ab^3$

2. $w - 4$, $w + 2$

3. $5d - 20$, $d - 4$

4. $6p + 1$, $p - 1$

5. $x^2 + 5x + 4$, $(x + 1)^2$

6. $s^2 + 3s - 10$, $s^2 - 4$

Find each sum.

7. $\dfrac{7}{6x^2y} + \dfrac{10}{3xy^2}$

8. $\dfrac{b + 5}{4b} + \dfrac{b - 2}{b}$

9. $\dfrac{n}{n + 2} + \dfrac{7}{n - 6}$

10. $\dfrac{8}{n^2 - 9} + \dfrac{2}{2n + 6}$

11. $\dfrac{y + 3}{y^2 - 16} + \dfrac{3y - 2}{y^2 + 8y + 16}$

12. $\dfrac{p + 1}{p^2 + 3p - 4} + \dfrac{p}{p + 4}$

13. $\dfrac{2a + 6}{a - 5} + \dfrac{6a + 24}{a^2 - 10a + 25}$

14. $\dfrac{h - 3}{h^2 + 6h + 9} + \dfrac{h - 2}{h + 3}$

Find each difference.

15. $\dfrac{6p}{5x^2} - \dfrac{2p}{3x}$

16. $\dfrac{m + 4}{m - 3} - \dfrac{2}{m - 6}$

17. $\dfrac{s + 1}{s^2 - 9} - \dfrac{2s + 3}{4s + 12}$

18. $\dfrac{b - 3}{b^2 + 6b + 9} - \dfrac{-3}{b - 3}$

19. $\dfrac{t + 3}{t^2 - 3t - 10} - \dfrac{4t - 8}{t^2 - 10t + 25}$

20. $\dfrac{4y}{y^2 - y - 6} - \dfrac{3y + 3}{y^2 - 4}$

21. SERVICE Members of the ninth grade class at Pine Ridge High School are organizing into service groups. What is the minimum number of students who must participate for all students to be divided into groups of 4, 6, or 9 students with no one left out?

22. SAFETY When the Cooper family goes on vacation, they set the house lights on timers from 5 P.M. until 11 P.M. The lights come on at different times in each of three rooms: every 40 minutes, every 50 minutes, and every 100 minutes, respectively. The timer turns each of them off after 30 minutes. After 5 P.M., how many times do all the lights come on at the same time in one evening? at what time(s)?

11-8 Practice

Mixed Expressions and Complex Fractions

Write each mixed expression as a rational expression.

1. $14 - \dfrac{9}{u}$

2. $7d + \dfrac{4d}{p}$

3. $3n + \dfrac{6-n}{n}$

4. $5b - \dfrac{b+3}{2b}$

5. $3 + \dfrac{t+5}{t^2-1}$

6. $2s + \dfrac{s-1}{s+1}$

7. $2p + \dfrac{p+1}{p-3}$

8. $4n^2 + \dfrac{n-1}{n^2-1}$

9. $(t+1) + \dfrac{4}{t+5}$

Simplify each expression.

10. $\dfrac{3\frac{2}{5}}{2\frac{5}{6}}$

11. $\dfrac{\frac{m^2}{6n}}{\frac{3m}{n^2}}$

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

13. $\dfrac{\frac{a-4}{a^2}}{\frac{a^2-16}{a}}$

14. $\dfrac{\frac{q^2-7q+12}{q^2-16}}{q-3}$

15. $\dfrac{\frac{k^2+6k}{k^2+4k-5}}{\frac{k-8}{k^2-9k+8}}$

16. $\dfrac{\frac{b^2+b-12}{b^2+3b-4}}{\frac{b-3}{b^2-b}}$

17. $\dfrac{g - \frac{10}{g+9}}{g - \frac{5}{g+4}}$

18. $\dfrac{y + \frac{6}{y-7}}{y - \frac{7}{y+6}}$

TRAVEL For Exercises 19 and 20, use the following information.

Ray and Jan are on a $12\frac{1}{2}$-hour drive from Springfield, Missouri, to Chicago, Illinois. They stop for a break every $3\frac{1}{4}$ hours.

19. Write an expression to model this situation.

20. How many stops will Ray and Jan make before arriving in Chicago?

21. CARPENTRY Tai needs several $2\frac{1}{4}$-inch wooden rods to reinforce the frame on a futon.

She can cut the rods from a $24\frac{1}{2}$-inch dowel purchased from a hardware store. How many wooden rods can she cut from the dowel?

Lesson 11-8

11-9 Practice

Solving Rational Equations

Solve each equation. State any extraneous solutions.

1. $\dfrac{5}{n+2} = \dfrac{7}{n+6}$

2. $\dfrac{x}{x-5} = \dfrac{x+4}{x-6}$

3. $\dfrac{k+5}{k} = \dfrac{k-1}{k+9}$

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

5. $\dfrac{4y}{3} + \dfrac{1}{2} = \dfrac{5y}{6}$

6. $\dfrac{y-2}{4} - \dfrac{y+2}{5} = -1$

7. $\dfrac{2q-1}{6} - \dfrac{q}{3} = \dfrac{q+4}{18}$

8. $\dfrac{5}{p-1} - \dfrac{3}{p+2} = 0$

9. $\dfrac{3t}{3t-3} - \dfrac{1}{9t+3} = 1$

10. $\dfrac{4x}{2x+1} - \dfrac{2x}{2x+3} = 1$

11. $\dfrac{d-3}{d} - \dfrac{d-4}{d-2} = \dfrac{1}{d}$

12. $\dfrac{3y-2}{y-2} + \dfrac{y^2}{2-y} = -3$

13. $\dfrac{2}{m+2} - \dfrac{m+2}{m-2} = \dfrac{7}{3}$

14. $\dfrac{n+2}{n} + \dfrac{n+5}{n+3} = -\dfrac{1}{n}$

15. $\dfrac{1}{z+1} - \dfrac{6-z}{6z} = 0$

16. $\dfrac{2p}{p-2} + \dfrac{p+2}{p^2-4} = 1$

17. $\dfrac{x+7}{x^2-9} - \dfrac{x}{x+3} = 1$

18. $\dfrac{2n}{n-4} - \dfrac{n+6}{n^2-16} = 1$

PUBLISHING For Exercises 19 and 20, use the following information.

Tracey and Alan publish a 10-page independent newspaper once a month. At production, Alan usually spends 6 hours on the layout of the paper. When Tracey helps, layout takes 3 hours and 20 minutes.

19. Write an equation that could be used to determine how long it would take Tracey to do the layout by herself.

20. How long would it take Tracey to do the job alone?

TRAVEL For Exercises 21 and 22, use the following information.

Emilio made arrangements to have Lynda pick him up from an auto repair shop after he dropped his car off. He called Lynda to tell her he would start walking and to look for him on the way. Emilio and Lynda live 10 miles from the auto shop. It takes Emilio $2\frac{1}{4}$ hours to walk the distance and Lynda 15 minutes to drive the distance.

21. If Emilio and Lynda leave at the same time, when should Lynda expect to spot Emilio on the road?

22. How far will Emilio have walked when Lynda picks him up?

12-1 **Practice**

Sampling and Bias

Identify each sample, suggest a population from which it was selected, and state whether it is *unbiased* (random) or *biased*. If unbiased, classify the sample as *simple*, *stratified*, or *systematic*. If biased, classify as *convenience* or *voluntary response*.

1. **GOVERNMENT** At a town council meeting, the chair asks 5 citizens attending for their opinions on whether to approve rezoning for a residential area.

2. **BOTANY** To determine the extent of leaf blight in the maple trees at a nature preserve, a botanist divides the reserve into 10 sections, randomly selects a 200-foot by 200-foot square in the section, and then examines all the maple trees in the section.

3. **FINANCES** To determine the popularity of online banking in the United States, a polling company sends a mail-in survey to 5000 adults to see if they bank online, and if they do, how many times they bank online each month.

4. **SHOES** A shoe manufacturer wants to check the quality of its shoes. Every twenty minutes, 20 pairs of shoes are pulled off the assembly line for a thorough quality inspection.

5. **BUSINESS** To learn which benefits employees at a large company think are most important, the management has a computer select 50 employees at random. The employees are then interviewed by the Human Relations department.

6. **BUSINESS** An insurance company checks every hundredth claim payment to ensure that claims have been processed correctly.

7. **ENVIRONMENT** Suppose you want to know if a manufacturing plant is discharging contaminants into a local river. Describe an unbiased way in which you could check the river water for contaminants.

8. **SCHOOL** Suppose you want to know the issues most important to teachers at your school. Describe an unbiased way in which you could conduct your survey.

12-2 Practice

Counting Outcomes

Draw a tree diagram to show the sample space for each event. Determine the number of possible outcomes.

1. dining at an Italian, Mexican, or French restaurant, for lunch, early bird (early dinner special), or dinner, and with or without dessert

Find the value of each expression.

2. 5!   **3.** 8!   **4.** 10!   **5.** 12!

6. How many different vacation plans are possible when choosing one each of 12 destinations, 3 lengths of stay, 5 travel options, and 4 types of accommodations?

7. How many different ways can you arrange your work if you can choose from 7 weekly schedules, 6 daily schedules, and one of 3 types of duties?

8. How many different ways can you treat a minor cut if you can choose from 3 methods of cleansing the cut, 5 antibiotic creams, 2 antibacterial sprays, and 6 types of bandages?

9. **TESTING**   A teacher gives a quick quiz that has 4 true/false questions and 2 multiple choice questions, each of which has 5 answer choices. In how many ways can the quiz be answered if one answer is given for each question?

CLASS RINGS   Students at Pacific High can choose class rings in one each of 8 styles, 5 metals, 2 finishes, 14 stones, 7 cuts of stone, 4 tops, 3 printing styles, and 30 inscriptions.

10. How many different choices are there for a class ring?

11. If a student narrows the choice to 2 styles, 3 metals, 4 cuts of stone, and 5 inscriptions (and has already made the remaining decisions), how many different choices for a ring remain?

12-3 Practice

Permutations and Combinations

Determine whether each situation involves a *permutation* or *combination*. Explain your reasoning.

1. choosing two dogs from a litter of two males and three females

2. a simple melody formed by playing the notes on 8 different piano keys

3. a selection of nine muffins from a shelf of twenty-three

4. the selection of a four-letter acronym (word formed from the initial letters of other words) in which two of the letters cannot be C or P

5. choosing an alphanumeric password to access a website

Evaluate each expression.

6. $_{11}P_3$ **7.** $_6P_3$ **8.** $_{15}P_3$

9. $_{10}C_9$ **10.** $_{12}C_9$ **11.** $_7C_3$

12. $_7C_4$ **13.** $_{12}C_4$ **14.** $_{13}P_3$

15. $\left(_8C_4\right)\left(_8C_5\right)$ **16.** $\left(_{17}C_2\right)\left(_8C_6\right)$ **17.** $\left(_{16}C_{15}\right)\left(_{16}C_1\right)$

18. $\left(_8P_3\right)\left(_8P_2\right)$ **19.** $\left(_5P_4\right)\left(_6P_5\right)$ **20.** $\left(_{13}P_1\right)\left(_{15}P_1\right)$

21. $\left(_{10}C_3\right)\left(_{10}P_3\right)$ **22.** $\left(_{15}P_4\right)\left(_4C_3\right)$ **23.** $\left(_{14}C_7\right)\left(_{15}P_3\right)$

24. SPORT In how many orders can the top five finishers in a race finish?

JUDICIAL PROCEDURE The court system in a community needs to assign 3 out of 8 judges to a docket of criminal cases. Five of the judges are male and three are female.

25. Does the selection of judges involve a permutation or a combination?

26. In how many ways could three judges be chosen?

27. If the judges are chosen randomly, what is the probability that all 3 judges are male?

12-4 **Practice**

Probability of Compound Events

A bag contains 5 red, 3 brown, 6 yellow, and 2 blue marbles. Once a marble is selected, it is not replaced. Find each probability.

1. P(brown, then yellow, then red)

2. P(red, then red, then blue)

3. P(yellow, then yellow, then *not* blue)

4. P(brown, then brown, then *not* yellow)

A die is rolled and a card is drawn from a standard deck of 52 cards. Find each probability.

5. P(6 and king)

6. P(odd number and black)

7. P(less than 3 and heart)

8. P(greater than 1 and black ace)

One card is drawn from a standard deck of 52 cards. Find each probability.

9. P(spade or numbered card)

10. P(ace or red queen)

11. P(red or *not* face card)

12. P(heart or *not* queen)

Tiles numbered 1 through 25 are placed in a box. Tiles numbered 11 through 30 are placed in a second box. The first tile is randomly drawn from the first box. The second tile is randomly drawn from the second box. Find each probability.

13. P(both are greater than 15 and less than 20)

14. The first tile is greater than 10 and the second tile is less than 25 or even.

15. The first tile is a multiple of 3 or prime and the second tile is a multiple of 5.

16. The first tile is less than 9 or odd and the second tile is a multiple of 4 or less than 21.

17. WEATHER The forecast predicts a 40% chance of rain on Tuesday and a 60% chance on Wednesday. If these probabilities are independent, what is the chance that it will rain on both days?

FOOD Tomaso places favorite recipes in a bag for 4 pasta dishes, 5 casseroles, 3 types of chili, and 8 desserts.

18. If Tomaso chooses one recipe at random, what is the probability that he selects a pasta dish or a casserole?

19. If Tomaso chooses one recipe at random, what is the probability that he does *not* select a dessert?

20. If Tomaso chooses two recipes at random without replacement, what is the probability that the first recipe he selects is a casserole and the second recipe he selects is a dessert?

12-5 Practice

Probability Distributions

**For Exercises 1–3, the spinner shown is spun two times.**
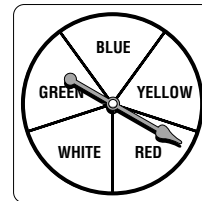
1. Write the sample space with all possible outcomes.

2. Find the probability distribution X, where X represents the number of times the spinner lands on blue for $X = 0$, $X = 1$, and $X = 2$.

3. Make a probability histogram.

Spinner Probability Distribution

$P(X)$	0.8		
	0.6		
	0.4		
	0.2		
	0		

0   1   2

X = Number of Times Spinner Lands on Blue
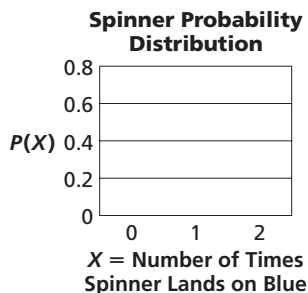
TELECOMMUNICATIONS For Exercises 4–6, use the table that shows the probability distribution of the number of telephones per student's household at Wilson High.

X = Number of Telephones	1	2	3	4	5+
Probability	0.01	0.16	0.34	0.39	0.10

4. Show that this is a valid probability distribution.

5. If a student is chosen at random, what is the probability that there are more than 3 telephones at the student's home?

6. Make a probability histogram.

Wilson High Households

$P(X)$	0.4
	0.3
	0.2
	0.1
	0

1   2   3   4   5

X = Number of Telephones per Household
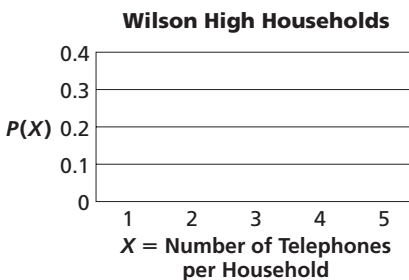
LANDSCAPING For Exercises 7–9, use the table that shows the probability distribution of the number of shrubs (rounded to the nearest 50) ordered by corporate clients of a landscaping company over the past five years.

Number of Shrubs	50	100	150	200	250
Probability	0.11	0.24	0.45	0.16	0.04

7. Define a random variable and list its values.

8. Show that this is a valid probability distribution.

9. What is the probability that a client's (rounded) order was at least 150 shrubs?

12-6 Practice

Probability Simulations

For Exercises 1–3, place 5 red, 4 yellow, and 7 green marbles in a box. Randomly draw two marbles from the box, record each color, and then return the marbles to the box. Repeat this procedure 50 times.

1. Based on your results, what is the experimental probability of selecting two yellow marbles?

2. Based on your results, what is the experimental probability of selecting a green marble and a yellow marble?

3. Compare your results to the theoretical probabilities.

4. Color blindness occurs in 4% of the male population. What could you use to simulate this situation?

SCHOOL CURRICULUM For Exercises 5–8, use the following information.

Laurel Woods High randomly selected students for a survey to determine the most important school issues among the student body. The school wants to develop a curriculum that addresses these issues. The survey results are shown in the table.

School Issues	
Issue	Number Ranking Issue Most Important
Grades	37
School Standards	17
Popularity	84
Dating	76
Violence	68
Drugs, including tobacco	29

5. Find the experimental probability distribution of the importance of each issue.

6. Based on the survey, what is the experimental probability that a student chosen at random thinks the most important issue is grades or school standards?

7. The enrollment in the 9th and 10th grades at Laurel Woods High is 168. If their opinions are reflective of those of the school as a whole, how many of them would you expect to have chosen popularity as the most important issue?

8. Suppose the school develops a curriculum incorporating the top three issues. What is the probability that a student selected at random will think the curriculum addresses the most important issue at school?