To the Student

This *Skills, Concepts, and Problem Solving Workbook* gives you additional examples and problems for the exercises in each lesson. The exercises are designed to aid your study of mathematics by reinforcing important mathematical concepts and skills needed to succeed in the everyday world. The materials are organized by chapter and lesson, with one Practice worksheet for every lesson in Chapters 1–8 of *California Algebra Readiness*.

Always keep your completed workbook handy. Along with your textbook, daily homework, and class notes, the completed *Skills, Concepts, and Problem Solving Workbook* can help you in reviewing for quizzes and tests.

To the Teacher

These worksheets are the same ones found in the Chapter Resource Masters for *California Algebra Readiness*. The answers to these worksheets are available at the end of each Chapter Resource Masters booklet as well as in your Teacher Wraparound Edition interleaf pages.

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1-1 Practice: Skills, Concepts, and Problem Solving

A Plan for Problem Solving

Use the four-step plan to solve each problem.

1. **ENGINES** A car engine turns 900 revolutions per minute while idling. How many revolutions does a car engine turn in one second while idling?

2. **DISTANCE** While traveling in Montana from Butte to Sidney, Mr. Kowalski, recorded that the distance from Butte to Sidney was about 6 times the distance from Butte to Bozeman. Bozeman lies between Butte and Sidney. If the distance from Butte to Bozeman is 82 miles, what is the approximate distance from Bozeman to Sidney?

3. **MOVIES** Mr. Sedgwick paid $13 for one adult ticket and one child ticket for a movie. Mrs. Wong paid $18 for one adult ticket and two child tickets to see the same movie, and Mr. Gomez paid $23 for one adult ticket and three child tickets. If the pattern continues, how much should Mrs. Beauregard expect to pay for one adult ticket and four child tickets?

4. **GEOGRAPHY** The land area of Washington, D.C., is 61 square miles. In 2003, the population of Washington, D.C., was 563,384. One square mile is equal to 640 acres. About how many people per acre were there in Washington, D.C., in 2003?

5. **BASKETBALL** If team A won by 2 points, what was the number of points scored by team A in the 3rd quarter?

Team	Quarter Scores 1st 2nd 3rd 4th				Final Score
A	21	18	?	17	?
B	15	19	20	25	79

6. **COOKING** A cake recipe requires a total 16 tablespoons of butter for one cake, some for the batter and some for the frosting. Samantha wants to bake three cakes. If 4 tablespoons of butter are needed for the batter for one cake, how many tablespoons of butter are needed for the frosting?

1-2   Practice: Skills, Concepts, and Problem Solving

Expressions and Equations

Write a verbal phrase for each algebraic expression.

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

2. $2x + 9$

3. $6 - \frac{1}{2}n$

4. $3x - 4$

Write a numerical expression for each verbal phrase.

5. thirty-one increased by fourteen

6. the difference of sixteen and nine

7. the sum of seven, four, and eighteen

8. three times forty

9. the quotient of eighty-one and three

10. four more than the product of seven and eight

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

12. the number of days in six weeks

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

14. **TICKETS** Adult tickets for a movie cost $6 and children's tickets cost $3. If two adults and three children go to the movies, write an expression to show how much they will pay.

Write an equation for each sentence.

15. Four times a number, n, is the same as 40.

16. Eight less than z is equal to 22.

1-3　Practice: Skills, Concepts, and Problem Solving

Order of Operations

Evaluate each expression.

1. $(2 + 9) \cdot 4$

2. $8 - (5 + 2)$

3. $(15 \div 3) + 7$

4. $(14 + 7) \div 7$

5. $5 \cdot 6 - 12 \div 4$

6. $8 \div 2 + 8 - 2$

7. $16 - 8 \div 2 + 5$

8. $15 - 3 \cdot 5 + 7$

9. $7 \cdot 10^3$

10. $2 \cdot 5^2 + 6$

11. $7 \cdot 2^3 - 9$

12. $27 \div 3 \cdot 2 + 4^2$

13. $6^3 - 12 \cdot 4 \cdot 3$

14. $(15 - 3) \div (8 + 4)$

15. $(9 - 4) \cdot (7 - 7)$

16. $8 + 3(5 + 2) - 7 \cdot 2$

17. $5(6 - 1) - 4 \cdot 6 \div 3$

18. $(5 + 7)^2 \div 12$

19. $12 \div (8 - 6)^2$

20. $(7 + 2)^2 \div 3^2$

21. $(11 - 9)^2 \cdot (8 - 5)^2$

22. $64 \div 8 - 3(4 - 3) + 2$

23. $8 \cdot 5.1 - (4.1 + 1.4) + 7.1$

For Exercises 24 and 25, write an expression for each situation. Then evaluate the expression to find the solution.

24. LAWN AREA The Solomons need to find the area of their front and side yards since they want to reseed the lawn. Both side yards measure 3 meters by 10 meters, while the front yard is a square with a side of 9 meters. They do not need to reseed a portion of the front yard covering 16 square meters where a flower bed is located. What is the area of the yard that the Solomons want to reseed?

25. COMMUNITY SERVICE Jariah volunteers at the hospital during the week. She volunteers 3 hours on Monday and Thursday, 4 hours on Saturday and Sunday, and 2 hours on Tuesday. How many hours does Jariah volunteer at the hospital during the week?

1-4 Practice: Skills, Concepts, and Problem Solving

Commutative and Associative Properties

Name the property shown by each statement.

1. $55 + 6 = 6 + 55$

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

3. $67 + 0 = 0 + 67$

4. $(5 \cdot 6) \cdot 3 = 5 \cdot (6 \cdot 3)$

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

6. $42 + 84 + 60 = 84 + 42 + 60$

7. $(34 + 8) + 6 = 34 + (8 + 6)$

8. $3 \cdot 2 \cdot 10 = 3 \cdot 10 \cdot 2$

9. $12 + 15 + 8 + 5 = 15 + 12 + 5 + 8$

10. $49 \cdot 0 \cdot 16 = 49 \cdot 16 \cdot 0$

11. $14 + (25 + 16) = (14 + 25) + 16$

12. $(9 \cdot 4) \cdot 10 = 9 \cdot (4 \cdot 10)$

13. $(28 + 12) + 3 = 3 + (28 + 12)$

14. $4 \cdot (2 \cdot 5) = (4 \cdot 2) \cdot 5$

15. $(400 + 20) + 80 = 400 + (20 + 80)$

16. $35 \cdot 4 = 4 \cdot 35$

1-5 Practice: Skills, Concepts, and Problem Solving

Distributive Property

Write an equation that shows the Distributive Property.

1. $4(5 + 7)$

2. $6(3 + 1)$

3. $(10 + 8)2$

4. $5(8 - 3)$

5. $7(4 - 1)$

6. $(9 - 2)3$

7. $5(7 - 4)$

8. $(12 + 4)3$

9. $6(10 - 4)$

10. $6(10 + 2)$

11. $4(12 - 9)$

12. $(8 - 5)6$

Complete each equation.

13. $18(4 - 1) = 18 \cdot \underline{?} - 18 \cdot 1$

14. $5(9 - 1) = 5 \cdot \underline{?} - 5 \cdot 1$

15. $13(12 + 5) = \underline{?} \cdot 12 + 13 \cdot 5$

16. $7(6 + 2) = \underline{?} \cdot 6 + \underline{?} \cdot 2$

17. $(6 + 3)9 = 6 \cdot 9 + \underline{?} \cdot 9$

18. $(4 + \underline{?})5 = 4 \cdot 5 + 3 \cdot 5$

19. $(6 + 2)7 = (6)\underline{?} + (2)7$

20. GROCERY   A grocery store sells an imported specialty cheesecake for $11 and its own store-baked cheesecake for $5. Use the Distributive Property to mentally find the total cost for 6 of each type of cheesecake.

1-6 Practice: Skills, Concepts, and Problem Solving

Problem-Solving Strategy: Guess and Check

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

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

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

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

PROBLEM-SOLVING STRATEGIES
• Draw a diagram.
• Use reasonable answers.
• Make a table.
• Reasonable answers
• Guess and check.

3. **NUMBERS** Among all pairs of numbers with product 66, find the pair with the smallest sum.

4. **STATES** Of the 50 United States, 14 have coastlines on the Atlantic Ocean, 5 have coastlines on the Gulf of Mexico, and one state has coastlines on both. How many states do not have coastlines on either the Atlantic Ocean or the Gulf of Mexico?

Select the Operation

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

5. **CRAFTS** Melissa is making gift bags for a party. Each gift bag will contain 4 sheets of stickers. She needs gift bags for 12 people. How many sheets of stickers does Melissa need?

6. **VOLUNTEERING** Greg helps his mother deliver care baskets to hospital patients each Saturday. Last Saturday at noon they had three times as many baskets left to deliver as they had already delivered. If they were delivering a total of 64 baskets that day, how many had they delivered by noon?

1-7 Practice: Skills, Concepts, and Problem Solving

Other Properties

Name the property shown by each statement.

1. $9 \times 1 = 9$

2. $7 \times 3 = 3 \times 7$

3. $(7 + 8) + 2 = 7 + (8 + 2)$

4. $6(3 + 2) = 6(3) + 6(2)$

5. $15 + 12 = 12 + 15$

6. $1 \times 20 = 20$

7. $(9 \times 5) \times 2 = 9 \times (5 \times 2)$

8. $3 = 0 + 3$

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

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

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

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

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

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

14. Multiplication of whole numbers is associative.

Rewrite each expression using the indicated property.

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

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

1-8   Practice: Skills, Concepts, and Problem Solving

Simplifying Expressions

Simplify each expression.

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

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

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

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

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

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

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

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

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

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

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

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

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

2-1 Practice: Skills, Concepts, and Problem Solving

Equations

Solve each equation mentally.

1. $a + 5 = 14$ **2.** $7 + y = 24$ **3.** $t - 13 = 33$

4. $b - 17 = 11$ **5.** $12 - r = 0$ **6.** $x + 18 = 59$

7. $63 = 9g$ **8.** $8d = 96$ **9.** $n = \dfrac{42}{7}$

10. $9 = \dfrac{z}{7}$ **11.** $10 = h \div 4$ **12.** $55 \div m = 11$

13. $12 + k = 30$ **14.** $27 = f - 11$ **15.** $v - 22 = 36$

16. $126 - c = 70$ **17.** $88 + j = 187$ **18.** $w + 135 = 160$

19. WEATHER   The temperature was 78°F. A cold front moved in, and the temperature dropped to 54°F. Solve the equation $78 - d = 54$ to find the drop in temperature.

20. HOBBIES   Elissa can cut out the pieces of cloth to make four pillows in one hour. Solve the equation $4h = 20$ to find how many hours Elissa needs to cut cloth for 20 pillows.

21. BOWLING   Jean Conrad is an amateur bowler with an average score of 187. She recently bowled a perfect 300 score. Write an equation that can be used to find how much the perfect score was above her average score and then solve the equation.

2-2   Practice: Skills, Concepts, and Problem Solving

Integers

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

1. 0 ● −5   **2.** 10 ● −10   **3.** −8 ● 3   **4.** 11 ● 11

5. −18 ● −18   **6.** −18 ● 18   **7.** 18 ● −18   **8.** 18 ● 18

9. −120 ● −95   **10.** 35 ● −12   **11.** −35 ● 12   **12.** 41 ● 17

Order the integers in each set from least to greatest.

13. {−14, −6, −22, 0}   **14.** {−3, 19, 0, −5}   **15.** {−7, 20, −21, 7}

16. {15, −1, 4, −3}   **17.** {0, −1, 2, −3, 4}   **18.** {55, 0, −60, 12}

19. {−48, −30, −49, −8, 3, −4}   **20.** {27, −9, 3, 0, −2, 29}

Evaluate each expression.

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

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

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

Write an integer for each situation.

30. a profit of $12   **31.** 1,440 feet below sea level

32. 22°F below 0   **33.** a gain of 31 yards

34. WEATHER At 6:15 A.M. the temperature was −8°F. At 12:15 P.M. the temperature was −12°F. At 6:16 P.M. the temperature was −10°F. Order the temperatures from least to greatest.

2-3 Practice: Skills, Concepts, and Problem Solving

Adding and Subtracting Integers

Find each sum.

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

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

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

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

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

Find each difference.

21. $-26 - (-30)$ **22.** $25 - 32$ **23.** $-18 - 54$ **24.** $59 - (-19)$

25. $-41 - (-19)$ **26.** $-20 - 13$ **27.** $31 - (-56)$ **28.** $15 - (-40)$

29. $-32 - 28$ **30.** $10 - (-23)$ **31.** $-14 - 64$ **32.** $-12 - (-36)$

33. $-81 - 4$ **34.** $9 - 30$ **35.** $-44 - (-21)$ **36.** $140 - (-9)$

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

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

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

2-4 Practice: Skills, Concepts, and Problem Solving

Multiplying Integers

Find each product.

1. $8(16)$

2. $-4(17)$

3. $-1(-40)$

4. $-5(-7)$

5. $0(-54)$

6. $29(-2)$

7. $-20(-20)$

8. $-31(-4)$

9. $-2(-15)(-6)$

10. $3(-5)(-8)$

11. $-10(17)(-2)$

12. $-2(-2)(-2)$

13. $12(10)(5)$

14. $-50(-21)(2)$

15. $-8(-13)(-25)$

16. $-5(16)(4)$

17. $4(-7)$

18. $-14(5)$

19. $9(-12)$

20. $-6(-8)$

21. $27(-3)$

22. $-11(-13)$

23. $-55(0)$

24. $(-7)(-7)$

25. $78(-1)$

26. $(-3)^3$

27. $(-1)^4$

28. $(-8)^2$

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

29. $-11a$

30. $4ab$

31. $-8bc$

32. $-10ac$

33. $15ab$

34. $12ac$

35. abc

36. $-abc$

37. $-11a(-bc)$

38. $4ab(-8c)$

39. $9a(-2b)(5c)$

40. $-3a(-2b)(-c)$

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

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

2-5 Practice: Skills, Concepts, and Problem Solving

Dividing Integers

Find each quotient.

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

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

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

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

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

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

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

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

Evaluate each expression if $m = -32$, $n = 2$, and $p = -8$.

29. $m \div n$ **30.** $p \div 4$ **31.** $p^2 \div m$

32. $m \div p$ **33.** $\dfrac{-p}{n}$ **34.** $p \div n^2$

35. $\dfrac{p^2}{n^2}$ **36.** $\dfrac{18 - n}{p}$ **37.** $m \div (np)$

2-6   Practice: Skills, Concepts, and Problem Solving
Problem-Solving Strategy: Look for a Pattern

1. MONEY In 2005, Trey had $7,200 in his saving-for-college account and Juan had $8,000. Each year, Trey will add $400 and Juan will add $200. In what year will they both have the same amount of money in their accounts, not counting interest earned? How much will it be?

2. BUTTONS Draw the next two figures in the pattern below.

3. MUSIC Last week Jason practiced playing his bassoon for 95 minutes. This week he practiced 5 more minutes than 3 times the number of minutes he practiced last week. How many minutes did Jason practice this week?

4. NUMBER SENSE Describe the pattern below. Then find the missing number.

$$5{,}000, \; 2{,}500, \; \blacksquare, \; 625, \ldots$$

5. SAVINGS Maria receives $50 for her birthday. She decides to put the money into a bank account and start saving her money from babysitting in order to buy a television that costs $200. After the first week she has $74. After the second week, she has $98. After the third week she has $122. How many weeks will she have to save at the same rate in order to buy the television?

6. TRAVEL An express bus left the station at 6:30 A.M. and arrived at its destination at 12:00 noon. It traveled a distance of 260 miles and made only one stop for a half hour to drop off and pick up passengers. What was the average speed of the bus?

7. MONEY Len spent $10 at the grocery store, $20 at the pet supply store, and $40 at the clothing store. If this pattern continues, how much will Len spend at the music store?

8. PHOTOGRAPHY Ms. Julian gives photography workshops. She collected $540 in fees for a workshop attended by 12 participants. Ms. Julian spent $15 per person for supplies for them and herself and $6 per person for box lunches for them and herself. How much money did Ms. Julian have left as profit?

9. ALGEBRA Read the table below to find a pattern relating x and y. Then write an equation to describe the pattern in general.

x	y
1	5
2	8
3	11
4	14
5	17

2-7 Practice: Skills, Concepts, and Problem Solving

Solving Equations

Solve each equation. Check your solution.

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

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

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

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

17. $23g = -92$ **18.** $-7d = -28$ **19.** $\dfrac{m}{-15} = 7$ **20.** $9k = -9$

21. $6w = 0$ **22.** $-4r = 120$ **23.** $\dfrac{u}{12} = 1$ **24.** $-11q = -99$

25. $16y = -192$ **26.** $\dfrac{n}{-8} = 0$ **27.** $-7j = 84$ **28.** $-21p = -231$

29. $12 - 7y = -2$ **30.** $11 - 3g = 32$ **31.** $12s + 13 = 25$ **32.** $2z - 4 - z = 4$

33. $10 - 5h + 2 = 32$ **34.** $\dfrac{r}{-7} - 5 = -6$ **35.** $-4a + 5 - 2a - 9 = 44$

36. $\dfrac{w}{-3} + 6 - 1 = 2$ **37.** $7k - 8k = 1$ **38.** $7f - 24 = 25$

39. $6 - \dfrac{m}{6} - 8 = 0$ **40.** $10 - d = 19$ **41.** $9x + 5 - 4x = -20$

42. $3 - 4t + 11 = 2$ **43.** $\dfrac{a}{3} - 4 + 9 = 7$ **44.** $6q - 4 = -16$

3-1 Practice: Skills, Concepts, and Problem Solving

Fractions

Use a number line to determine which number is greater.

1. $\frac{11}{21}$ ● $\frac{2}{3}$

2. $\frac{1}{2}$ ● $\frac{9}{18}$

3. $\frac{3}{8}$ ● $\frac{8}{24}$

4. $\frac{2}{3}$ ● $\frac{12}{15}$

5. $\frac{3}{4}$ ● $\frac{8}{12}$

6. $\frac{2}{3}$ ● $\frac{10}{18}$

7. $\frac{18}{14}$ ● $\frac{2}{7}$

8. $\frac{11}{12}$ ● $\frac{1}{3}$

9. $\frac{34}{18}$ ● $\frac{5}{6}$

Order the fractions from least to greatest.

10. $\frac{3}{5}, \frac{1}{5}, \frac{2}{5}$

11. $\frac{7}{9}, \frac{5}{9}, \frac{2}{9}$

12. $\frac{1}{8}, \frac{5}{8}, \frac{3}{8}$

13. $\frac{2}{15}, \frac{6}{15}, \frac{3}{15}$

14. **CARPENTRY** Ramundus is cutting boards to make a bookcase. He has found boards that are $\frac{5}{12}$ foot, $\frac{7}{12}$ foot, and $\frac{11}{12}$ foot long. What is the length of the longest board?

15. **DANCE** Alana practiced dancing for $\frac{1}{4}$ hour on Monday, $\frac{3}{4}$ hour on Wednesday, and $\frac{2}{4}$ hour on Friday. On which day did she practice the closest to 1 hour? Explain your reasoning.

Graph each fraction on a number line.

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

17. $\frac{8}{9}$

18. $\frac{2}{9}$

Write the additive inverse of each number.

19. $-\frac{4}{10}$

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

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

3-2 Practice: Skills, Concepts, and Problem Solving

Fractions and Mixed Numbers

Write each improper fraction as a mixed number or a whole number.

1. $\dfrac{14}{3}$ 　　　　　 2. $\dfrac{5}{2}$ 　　　　　 3. $\dfrac{38}{7}$ 　　　　　 4. $\dfrac{23}{6}$

5. $\dfrac{25}{4}$ 　　　　　 6. $\dfrac{28}{5}$ 　　　　　 7. $\dfrac{73}{9}$ 　　　　　 8. $\dfrac{27}{4}$

9. $\dfrac{13}{4}$ 　　　　　 10. $\dfrac{11}{10}$ 　　　　　 11. $\dfrac{10}{3}$

12. $\dfrac{23}{7}$ 　　　　　 13. $\dfrac{14}{14}$ 　　　　　 14. $\dfrac{16}{8}$

15. **SNAKES** The garden snake that Fumiko measured was $\dfrac{31}{4}$ inches long. Write the length as a mixed number.

16. Express *thirty-nine eighths* as a mixed number.

17. **TREES** A nursery is growing trees. Find the height of each tree in terms of feet. Write your answer as a mixed number in simplest form.

Trees in Nursery	
Tree	**Height (in.)**
Apricot	73
Peach	62
Pear	54
Plum	68

3-3 Practice: Skills, Concepts, and Problem Solving

Factors and Simplifying Fractions

Identify the common factors of each set of numbers.

1. 12 and 20

2. 12, 24, 36

3. 15, 33, 45

Find the GCF of each set of numbers.

4. 12 and 30

5. 50 and 40

6. 20 and 27

7. $\dfrac{55}{100}$

8. $\dfrac{150}{180}$

9. $\dfrac{35}{140}$

Find three numbers whose GCF is the indicated value.

10. 3

11. 16

12. 18

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

A store is organizing toys into bins. The toys must be put into bins such that each bin contains the same number of toys without mixing the toys.

13. What is the greatest number of toys that can be put in a bin?

Toys to Place in Bins	
Toy	**Number of Toys**
airplanes	36
boats	72
cars	60

14. How many bins are needed for each type of toy?

3-4 Practice: Skills, Concepts, and Problem Solving

Problem-Solving Strategy: Draw a Diagram

1. **ANTS** An ant went 2 meters away from its nest searching for food. The next time, the ant went 3 meters away. Each successive time the ant leaves the nest to search for food, the ant travels the sum of the two previous times. How far will the ant travel on his fifth trip?

2. **NECKLACES** The center bead of a pearl necklace has a 16 millimeter diameter. Each successive bead in each direction is $\frac{3}{4}$ the diameter of the previous one. Find the diameter of the beads that are two away from the center bead.

3. **TALENT SHOW** At a talent show, $\frac{3}{5}$ of the acts were singing. $\frac{1}{3}$ of the remaining acts were instrumental. If 12 acts were instrumental, how many acts were in the talent show?

4. **RUNNING** Five runners were far ahead in the marathon. Juanita crossed the finish line after Owen and Molly. Molly was first. Juanita was between Greta and Owen. Kenji was last. In what order did the runners cross the finish line?

5. **PLANTS** A nursery is planting seedlings in a plot that is 10 feet by 14 feet. How many seedlings will fit if each seedling is in a 1-foot square peat pot and each peat pot needs to be planted 3 feet apart from another?

6. **FOOD** A lunch shop offers 2 kinds of soups, 3 kinds of sandwiches, and 3 kinds of beverages. How many combinations of one soup, one sandwich, and one beverage are possible?

7. **GEOMETRY** Miss Greenwell is adding 4 feet to the length and width of her rectangular garden as shown in the diagram. How much additional area will the garden have?
   A. 16 ft^2 B. 104 ft^2
   C. 120 ft^2 D. 224 ft^2
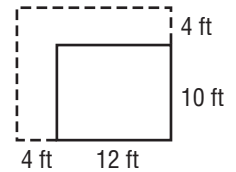
8. **COUNTRIES** The table shows the approximate total land area of five countries.

Country	Total Area
Brazil	9 million sq km
Canada	10 million sq km
China	10 million sq km
Russia	17 million sq km
United States	10 million sq km

Suppose you made a circle graph of the data. What fraction shows the portion of the graph that represents Brazil?

9. **ANIMALS** Jacy is building a fence to create a hexagonal dog pen. Each of the six sides needs four posts. How many posts are needed?

3-5　Practice: Skills, Concepts, and Problem Solving

Multiplying Fractions

Multiply.

1. $\dfrac{1}{4} \cdot \dfrac{3}{5}$

2. $\dfrac{7}{8} \cdot \dfrac{1}{3}$

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

4. $\dfrac{2}{3} \cdot \dfrac{2}{9}$

5. $\dfrac{1}{3} \cdot 11$

6. $\dfrac{1}{2} \cdot 12$

7. $\dfrac{5}{6} \cdot 21$

8. $\dfrac{3}{4} \cdot 10$

9. $\dfrac{1}{4} \cdot \dfrac{4}{5}$

10. $\dfrac{4}{9} \cdot \dfrac{3}{8}$

11. $\dfrac{7}{10} \cdot \dfrac{4}{21}$

12. $\dfrac{3}{5} \cdot \dfrac{5}{12}$

13. $\dfrac{1}{3} \cdot \dfrac{1}{4} \cdot \dfrac{1}{5}$

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

15. $\dfrac{2}{3} \cdot \dfrac{12}{17} \cdot \dfrac{1}{4}$

16. $\dfrac{1}{4} \cdot \dfrac{4}{5}$

17. $\dfrac{6}{7} \cdot \dfrac{1}{2}$

18. $\dfrac{3}{10} \cdot \dfrac{2}{3}$

19. $-\dfrac{15}{16} \cdot \dfrac{4}{5}$

20. $\left(-\dfrac{8}{25}\right)\dfrac{15}{16}$

21. $\left(-\dfrac{7}{8}\right)\left(-\dfrac{1}{7}\right)$

22. **PRESIDENTS** By 2005, 42 different men had been President of the United States. Of these men, $\dfrac{2}{21}$ had no children. How many presidents had no children?

23. $\left(\dfrac{1}{2}\right)^{4}$

24. $\left(\dfrac{3}{4}\right)^{2}$

25. $\left(\dfrac{1}{3}\right)^{3}$

3-6 Practice: Skills, Concepts, and Problem Solving

Dividing Fractions

Find the reciprocal of each number.

1. $\dfrac{2}{7}$ **2.** $\dfrac{1}{9}$ **3.** $\dfrac{3}{8}$ **4.** 2 **5.** 12

Divide. Write in simplest form.

6. $\dfrac{2}{3} \div \dfrac{1}{6}$ **7.** $\dfrac{1}{2} \div \dfrac{2}{5}$ **8.** $\dfrac{2}{3} \div \dfrac{1}{4}$

9. $\dfrac{3}{4} \div \dfrac{1}{10}$ **10.** $2 \div \dfrac{1}{4}$ **11.** $8 \div \dfrac{2}{5}$

12. $3 \div \dfrac{4}{5}$ **13.** $2 \div \dfrac{5}{8}$ **14.** $\dfrac{3}{7} \div 3$

15. $\dfrac{4}{5} \div 10$ **16.** $\dfrac{7}{9} \div 14$ **17.** $\dfrac{5}{7} \div 4$

18. $\dfrac{6}{7} \div 3$ **19.** $\dfrac{6}{11} \div 8$ **20.** $-\dfrac{4}{5} \div \dfrac{5}{6}$

21. $\dfrac{5}{12} \div \left(-\dfrac{3}{5}\right)$ **22.** $-\dfrac{3}{10} \div \left(-\dfrac{2}{5}\right)$ **23.** $-\dfrac{13}{18} \div \left(-\dfrac{8}{9}\right)$

3-7 Practice: Skills, Concepts, and Problem Solving

Adding and Subtracting Fractions with Like Denominators

Add or subtract. Write in simplest form.

1. $\frac{3}{7} + \frac{6}{7}$
2. $\frac{2}{5} + \frac{4}{5}$
3. $\frac{3}{4} + \frac{3}{4}$
4. $\frac{2}{3} + \frac{2}{3}$

5. $\frac{15}{8} + \frac{7}{8}$
6. $\frac{11}{16} + \frac{7}{16}$
7. $\frac{7}{8} - \frac{3}{8}$
8. $\frac{3}{10} - \frac{1}{10}$

9. $\frac{11}{15} - \frac{6}{15}$
10. $\frac{7}{9} - \frac{4}{9}$
11. $\frac{13}{11} - \frac{6}{11}$
12. $\frac{17}{18} - \frac{5}{18}$

13. $\frac{5}{7} + \frac{1}{7} + \frac{6}{7}$
14. $\frac{9}{10} + \frac{9}{10} - \frac{3}{10}$
15. $\frac{11}{12} - \frac{7}{12} + \frac{5}{12}$

Write an addition or subtraction expression for each model. Then add or subtract.

16.

17.

18. **WEATHER** In January through March, Death Valley gets a total of about $\frac{21}{25}$ inch of precipitation. In April through June, it gets a total of about $\frac{6}{25}$ inch. How much more precipitation occurs in January through March?

19. **ANALYZE GRAPHS** What part of the school population likes basketball, baseball, or football? How much larger is this than the part of the student population that prefers soccer?

Brown Middle School's Favorite Sports

Football $\frac{3}{12}$

Basketball $\frac{4}{12}$

Soccer $\frac{3}{12}$

Baseball $\frac{2}{12}$
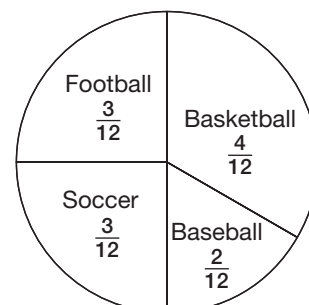
3-8   Practice: Skills, Concepts, and Problem Solving

Adding Fractions with Unlike Denominators

Add. Write in simplest form.

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

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

3. $\dfrac{1}{3} + \dfrac{5}{36}$

4. $\dfrac{7}{15} + \dfrac{3}{6}$

5. $\dfrac{2}{5} + \dfrac{11}{15}$

6. $\dfrac{1}{3} + \dfrac{7}{18}$

7. $\dfrac{2}{3} + \dfrac{3}{5}$

8. $\dfrac{1}{6} + \dfrac{5}{8}$

9. $\dfrac{3}{5} + \dfrac{17}{25}$

10. $\dfrac{7}{10} + \dfrac{17}{100}$

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

12. $\dfrac{5}{6} + \dfrac{9}{30}$

13. $\dfrac{11}{14} + \dfrac{5}{7}$

14. $2 + \dfrac{4}{5}$

15. $\dfrac{1}{6} + \dfrac{1}{2}$

16. $\dfrac{1}{4} + \dfrac{7}{8}$

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

18. $\dfrac{7}{10} + \dfrac{1}{2}$

19. $\dfrac{3}{5} + \dfrac{1}{2}$

20. $\dfrac{3}{4} + \dfrac{7}{8}$

3-9 Practice: Skills, Concepts, and Problem Solving

Subtracting Fractions with Unlike Denominators

Subtract. Write in simplest form.

1. $\dfrac{4}{5} - \dfrac{2}{6}$

2. $\dfrac{5}{8} - \dfrac{3}{16}$

3. $\dfrac{7}{10} - \dfrac{14}{100}$

4. $\dfrac{17}{21} - \dfrac{4}{6}$

5. $\dfrac{11}{14} - \dfrac{1}{6}$

6. $\dfrac{14}{15} - \dfrac{1}{6}$

7. $\dfrac{1}{2} - \dfrac{3}{25}$

8. $\dfrac{3}{4} - \dfrac{1}{3}$

9. $\dfrac{3}{10} - \dfrac{7}{30}$

10. $\dfrac{18}{25} - \dfrac{3}{5}$

11. $\dfrac{4}{5} - \dfrac{3}{10}$

12. $1 - \dfrac{3}{8}$

13. $\dfrac{2}{3} - \dfrac{1}{8}$

14. $\dfrac{19}{24} - \dfrac{5}{8}$

15. $\dfrac{8}{9} - \dfrac{5}{6}$

16. $\dfrac{11}{12} - \dfrac{1}{6}$

17. $\dfrac{11}{20} - \dfrac{2}{5}$

18. $\dfrac{5}{6} - \dfrac{9}{30}$

19. $\dfrac{7}{10} - \dfrac{17}{100}$

20. $\dfrac{2}{3} - \dfrac{1}{2}$

3-10   Practice: Skills, Concepts, and Problem Solving

Fractions in Expressions and Equations

Add or subtract. Write in simplest form.

1. $\dfrac{3v}{8} + \dfrac{3v}{8}$

2. $\dfrac{7x}{10} - \dfrac{5x}{10}$

3. $\dfrac{9y}{10} + \dfrac{3y}{10}$

4. $\dfrac{4p}{7} - \dfrac{2p}{7}$

5. $\dfrac{2m}{3} + \dfrac{2m}{3}$

6. $\dfrac{5q}{9} - \dfrac{2q}{9}$

7. $\dfrac{8v}{15} - \dfrac{1v}{5}$

8. $\dfrac{5b}{6} + \dfrac{5b}{12}$

Solve each equation. Check your solution.

9. $\dfrac{a}{8} = 5$

10. $15 = \dfrac{y}{2}$

11. $\dfrac{9}{100} + h = \dfrac{1}{10}$

12. $\dfrac{4}{5}t = 8$

13. $v - \dfrac{4}{3} = \dfrac{9}{5}$

14. $\dfrac{5}{11}d = 35$

15. $\dfrac{3}{7}g = 9$

16. $28 = \dfrac{4}{5}d$

17. $\dfrac{3}{8}n = \dfrac{1}{4}$

18. $\dfrac{2}{5} = \dfrac{4}{5}c$

19. $\dfrac{2}{3}z = \dfrac{17}{4}$

20. $\dfrac{5}{6}b = \dfrac{15}{8}$

21. $\dfrac{p}{-4} = 7$

22. $-3 = \dfrac{w}{-5}$

23. $10 = \dfrac{3}{4}s$

24. ART Simone took some paintings to an art show to sell. She sold 18 paintings during the show. That number represents $\dfrac{2}{3}$ of the paintings that she brought to the show. How many paintings did she take to the show?

25. VOLUNTEERS   At a local shelter, 36 people volunteered to help prepare meals for disaster victims. If this represented $\dfrac{9}{16}$ of the volunteers at the shelter, write and solve an equation to determine how many volunteers helped at the local shelter.

4-1 Practice: Skills, Concepts, and Problem Solving

Fractions and Decimals

Write each fraction as a decimal. Use bar notation if the decimal is a repeating decimal.

1. $\dfrac{5}{8}$

2. $\dfrac{2}{9}$

3. $\dfrac{37}{16}$

4. $\dfrac{3}{4}$

5. $\dfrac{27}{50}$

6. $\dfrac{121}{25}$

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

8. $\dfrac{1}{33}$

9. $\dfrac{62}{11}$

10. $\dfrac{2}{3}$

11. $\dfrac{11}{40}$

12. $\dfrac{13}{20}$

13. $\dfrac{83}{5}$

14. $\dfrac{3}{10}$

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

16. $\dfrac{3}{7}$

17. $\dfrac{111}{24}$

18. $\dfrac{7}{32}$

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

19. 0.4

20. 0.83

21. 3.75

22. 2.42

23. 0.16

24. 0.65

25. **KILOMETERS** One kilometer is approximately 0.62 mile. What fraction represents this length?

26. **MARATHON** Jake completed a marathon race in 3 hours and 12 minutes. Write Jake's running time as a decimal.

4-2 Practice: Skills, Concepts, and Problem Solving

Adding and Subtracting Decimals

Find each sum.

1. $5.4 + 6.5$ **2.** $6.0 + 3.8$ **3.** $3.65 + 4$

4. $52.47 + 13.21$ **5.** $91.64 + 19.5$ **6.** $0.675 + 28$

Find each difference.

7. $7.8 - 4.5$ **8.** $69 - 12.88$ **9.** $17.46 - 6.79$

10. $74 - 59.29$ **11.** $87.31 - 25.09$ **12.** $19.75 - 12.98$

13. BIKE RIDING The table shows the distances the members of two teams rode their bicycles for charity.

    a. How many total miles did Lori's team ride?

Distances Ridden for Charity			
Lori's Team		**Tati's Team**	
Lori	13.8 mi	Tati	13.6 mi
Marcus	11.8 mi	Luis	15.1 mi
Hassan	15.4 mi		

    b. How many more miles did Lori's team ride than Tati's team?

Simplify each expression.

14. $4.2x + 2 + 36x$ **15.** $8z - 1.2z + 7$

16. $3.1b - 4.2b + 4$ **17.** $8 + 3.2m + 1.3m$

4-3 Practice: Skills, Concepts, and Problem Solving

Multiplying Decimals

Multiply.

1. 0.7
  × 8

2. 7.56
  × 3

3. 6.08
  × 9

4. 0.4
  × 0.9

5. 0.7
  × 1.9

6. 3.83
  × 0.5

7. 9.8
  × 3

8. 3.14
  × 6

9. 0.006 · 7

10. 6.67 · 3.3

11. 8.214 · 2.3

12. 43 · 0.0015

13. 4.3 · 5

14. 7.12 · 2

15. 0.019 · 4

16. 0.006 · 2.7

17. 7.1 · 8

18. 2.04 · 4

19. 2.45 · 3.1

20. 5.22 · 6.12

21. FITNESS Marcy exercised on the treadmill for 0.75 hours at an average speed of 3.6 miles per hour. How many miles did she go on the treadmill?

22. COOKING Miss Peredo needs to purchase ingredients for a fruit salad. She needs a pineapple, a melon, three oranges, and two apples. How much change will she receive if she pays using $8.00 in bills?

Fruit	Cost
Apple	$0.32
Melon	$1.49
Orange	$0.50
Pineapple	$3.75

4-4 Practice: Skills, Concepts, and Problem Solving

Dividing Decimals

Divide.

1. $4.9 \div 7$ **2.** $51.2 \div 16$ **3.** $10.2 \div 3$

4. $35.5 \div 5$ **5.** $3.44 \div 8$ **6.** $0.1016 \div 4$

7. $0.572 \div 2.6$ **8.** $60.075 \div 7.5$ **9.** $0.1485 \div 1.35$

10. $5 \overline{)1.49}$ **11.** $3 \overline{)3.66}$ **12.** $8 \overline{)24.4}$

13. $0.4 \overline{)7.28}$ **14.** $3.62 \overline{)186.43}$ **15.** $14.3 \overline{)1.001}$

16. $15.32 \div 5$ **17.** $98.2 \div 4$ **18.** $123.2 \div 8$

19. $13.09 \div 7$ **20.** $30.45 \div 1.5$ **21.** $33.3 \div 0.3$

22. MONEY Mr. Frederick bought five ceiling fans to install in his home. What is the cost for each fan if the total was $608.55?

23. AUTO RACING The lap lengths of two auto racing tracks are shown in the table. To the nearest tenth, how many times longer is a lap at Watkins Glen than at Bristol?

Watkins Glen	Bristol
2.45 miles	0.533 miles

Source: nascar.about.com

4-5   Practice: Skills, Concepts, and Problem Solving

Problem-Solving Strategy: Work Backward

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

1. NUMBER THEORY A number is divided by 5. Then 3 is added to the quotient. After subtracting 10, the result is 30. What is the number?

2. COUPONS Kendra used 35 cents more in coupons at the store than Leanne. Leanne used 75 cents less than Teresa, who used 50 cents more than Jaclyn. Jaclyn used 40 cents in coupons. What was the value of the coupons Kendra used?

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

PROBLEM-SOLVING STRATEGIES
• Use the four-step plan.
• Guess and check.
• Look for a pattern
• Choose the method of computation.
• Work backward

3. PATTERNS What are the next three numbers in the following pattern?

2, 3, 5, 9, 17, 33, . . .

4. AGES Mr. Gilliam is 3 years younger than his wife. The sum of their ages is 95. How old is Mr. Gilliam?

Select the Operation

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

5. GRAND CANYON The elevation of the North Rim of the Grand Canyon is 2,438 meters above sea level. The South Rim averages 304 meters lower than the North Rim. What is the average elevation of the South Rim?

6. WATER BILL The water company charges a residential customer $41 for the first 3,000 gallons of water used and $1 for every 200 gallons used over 3,000 gallons. If the water bill was $58, how many gallons of water were used?

4-6 Practice: Skills, Concepts, and Problem Solving

Decimals in Expressions and Equations

Solve each equation. Check your solution.

1. $m + 0.88 = 1.64$

2. $t - 2.89 = 9.15$

3. $-0.6 = d - 0.12$

4. $-0.4375 = b + 0.25$

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

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

7. $-0.625y = 25$

8. $5d - 3.3 = 7.2$

9. $-2.94 = -0.42a$

10. $-8.4 = 1.4y$

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

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

13. $2.5x = -0.8125$

14. $3 = 0.2m - 7$

15. $1.3z + 1.5 = 5.4$

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

FOOTBALL For Exercise 17, refer to the table.

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

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

Source: stadiumsofnfl.com

5-1 Practice: Skills, Concepts, and Problem Solving

Exponents

Write each expression using exponents.

  1. $3 \cdot 3 \cdot m$

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

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

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

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

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

Simplify.

  7. 2^4 **8.** 5^3 **9.** $2^2 \cdot 6^2$ **10.** $2^3 \cdot 5^2$

  11. 3^4 **12.** 8^3 **13.** 9^2 **14.** 5^3

  15. $7 \cdot 2^2 \cdot 5^2$ **16.** $3^2 \cdot 6 \cdot 10^2$ **17.** $3^2 \cdot 2^3$ **18.** $7 \cdot 3^3$

  19. $\dfrac{a^3}{a^2}$ **20.** $a^3 \cdot a^2$ **21.** $\dfrac{3^4}{3^3}$ **22.** $3^4 \cdot 3^3$

  23. 8^2 **24.** 2^4 **25.** 6^3 **26.** 3^5

  27. $\dfrac{18xy^3}{12y^2}$ **28.** $\dfrac{14a^3b^2}{2a^2}$ **29.** $\dfrac{g^3h^2i}{ghi}$ **30.** $\dfrac{34m^3n^4}{17m^3n^4}$

  31. **MONEY** Suppose $100 is deposited into an account and the amount doubles every 8 years. How much will be in the account after 40 years?

  32. **EPIDEMICS** At the beginning of an epidemic, 50 people are sick. Suppose the number of sick people triples every other day. How many people will be sick at the end of 2 weeks?

5-2 Practice: Skills, Concepts, and Problem Solving

Integer Exponents

Write each expression using a positive exponent.

1. 7^{-8}

2. 10^{-6}

3. 23^{-1}

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

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

6. m^{-99}

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

8. c^{-6}

9. p^{-5}

10. g^{-17}

11. $5z^{-4}$

12. $3t^{-1}$

Write each fraction as an expression using a negative exponent.

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

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

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

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

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

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

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

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

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

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

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

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

Find each quotient. Rewrite using positive exponents.

25. $\dfrac{x^{-4}}{x^{-3}}$

26. $\dfrac{y^{-2}}{y^{-2}}$

27. $\dfrac{y^{-5}}{y^{-3}}$

28. $\dfrac{z^{-4}}{z^6}$

29. $\dfrac{5^3}{5^2}$

30. $\dfrac{y^{10}}{y^{-2}}$

31. $3z^{-1}$

32. $(m^3 n^2 g^2)^3$

33. $(xz)^2$

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

5-3 Practice: Skills, Concepts, and Problem Solving

Problem-Solving Strategy: Solve a Simpler Problem

Use a simpler problem to solve Exercises 1–2. Use any strategy to solve Exercises 3–8.

1. **ART** An artist plans to make 1 clay pot the first week and triple the number of clay pots each week for 10 weeks. How many clay pots will the artist make the tenth week?

2. **EXERCISE** At the community center, 9 boys and 9 girls are playing singles table tennis. If each girl plays against each boy exactly once, how many games are played?

3. **SCIENCE** Sound travels through sea water at a speed of about 1,500 meters per second. At this rate, how far will sound travel in 2 minutes?

4. **MUSIC** Tanya scored 50 out of 50 points in her latest piano playing evaluation. She scored 42, 48, and 45 on previous evaluations. What score does she need on the next evaluation to have an average score of 45?

5. **GEOGRAPHY** The total area of Wisconsin is 65,498 square miles. Of that, about 80% is land area. About how much of Wisconsin is not land area?

6. **CLOCK** The clock in the bell tower rings every half hour. How many times will it ring in one week?

7. **VENN DIAGRAMS** The Venn diagram shows information about the sixth graders in the school.
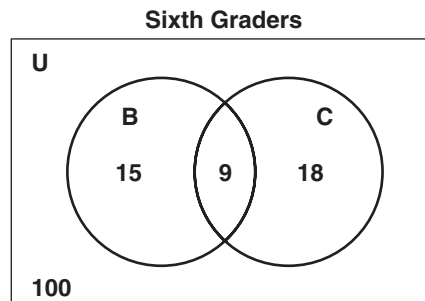
Sixth Graders

U = all sixth graders
B = sixth graders in the band
C = sixth graders in the chorus

How many more sixth graders in the school do not participate in band or chorus than do participate in band or chorus?

8. **MONEY** Kono wants to give $69 to charity. He will give each of 3 charities an equal amount of money. How much money will each charity receive?

5-4   **Practice: Skills, Concepts, and Problem Solving**
Roots

Find each value.

1. $\sqrt{100}$

2. $\sqrt{144}$

3. $\sqrt{-36}$

4. $\sqrt{121}$

5. $\sqrt{81}$

6. $-\sqrt{4}$

7. $-\sqrt{9}$

8. $-\sqrt{49}$

9. $\sqrt{256}$

10. $\sqrt{529}$

11. $\sqrt{361}$

12. $-\sqrt{196}$

13. $-\sqrt{0.25}$

14. $\sqrt{2.25}$

15. $\sqrt{169}$

16. $\sqrt{64}$

17. $\sqrt{16}$

18. $\sqrt{400}$

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

19. $h^2 = 121$

20. $324 = a^2$

21. $x^2 = 169$

22. $0.0144 = m^2$

23. $\sqrt{y} = 6$

24. $\sqrt{z} = 8$

25. **GEOMETRY** A square tarpaulin covering a softball field has an area of 441 m². What is the length of one side of the tarpaulin?

26. **MONUMENTS** The highest observation deck on the Eiffel Tower in Paris is about 900 feet above the ground. About how far could a visitor see on a clear day?

5-5 Practice: Skills, Concepts, and Problem Solving

Simplifying and Evaluating Expressions

Evaluate each expression if $x = -2$, $y = 6$, and $z = -3$.

1. $x^4 y^2 z^2$

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

3. $12x^2 - x + 8$

4. $12(4y - 5xz)^3$

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

5. y^x

6. z^2

7. $4x^2$

8. 9^x

9. $z^2 \cdot 2^2$

10. y^5

11. $z^2 - y^4$

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

13. $z^2 - x^2$

14. 51^0

FAMILY TREE For Exercises 15 and 16, refer to the following information.

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

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

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

5-6 Practice: Skills, Concepts, and Problem Solving

Comparing and Ordering Rational Numbers

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

1. $\dfrac{3}{5}$ ● $\dfrac{5}{7}$

2. $\dfrac{4}{9}$ ● $\dfrac{5}{11}$

3. $3\dfrac{2}{11}$ ● $3\dfrac{1}{9}$

4. $5\dfrac{7}{15}$ ● $5\dfrac{8}{17}$

5. 0.2 ● $\dfrac{2}{11}$

6. 0.25 ● $\dfrac{5}{21}$

7. $8\dfrac{10}{27}$ ● 8.3

8. $4\dfrac{8}{30}$ ● 4.3

9. $-\dfrac{8}{13}$ ● $-\dfrac{5}{13}$

10. $-\dfrac{3}{8}$ ● $-\dfrac{7}{8}$

11. $-\dfrac{2}{5}$ ● $-\dfrac{6}{7}$

12. $-\dfrac{2}{9}$ ● $-\dfrac{9}{11}$

13. -4.5 ● -4.55

14. -6.14 ● -6.15

15. -3.57 ● -3.5

16. -1.9 ● -1.99

17. 1.7 ● $\sqrt{4}$

18. $\sqrt{1}$ ● $2\dfrac{1}{2}$

19. $4\dfrac{2}{5}$ ● $\sqrt{16}$

20. $4.\overline{8}$ ● $\sqrt{25}$

21. $6\dfrac{1}{6}$ ● $\sqrt{36}$

22. $\sqrt{49}$ ● $7.4\overline{2}$

23. 2.1 ● $\sqrt{9}$

24. $2.\overline{7}$ ● $\sqrt{4}$

25. $\sqrt{4}$ ● $2\dfrac{3}{7}$

26. $\sqrt{1}$ ● 2.1

27. $-\sqrt{9}$ ● -3.5

28. $\sqrt{100}$ ● 10

Order each set of numbers from least to greatest.

29. $5\dfrac{1}{3}, 5.3, \sqrt{25}, 2\dfrac{1}{4}$

30. $\sqrt{64}, 7\dfrac{1}{4}, \dfrac{36}{5}, 7.27$

31. $-9.35, -\sqrt{64}, -9\dfrac{2}{10}, -9$

32. $-5.81, -5\dfrac{3}{4}, -5\dfrac{3}{5}, -5.69$

33. $-1.01, -1.1, -1\dfrac{1}{9}, -1\dfrac{1}{11}$

6-1   Practice: Skills, Concepts, and Problem Solving

Ratios and Rates

1. **FRUITS** Find the ratio of bananas to oranges in the graphic at the right. Write the ratio as a fraction in simplest form. Then explain its meaning.
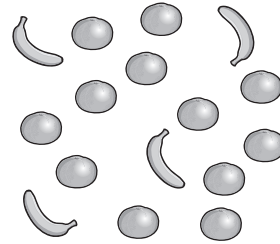
2. **MODEL TRAINS** Hiroshi has 4 engines and 18 box cars. Find the ratio of engines to box cars. Write the ratio as a fraction in simplest form. Then explain its meaning.

3. **ZOOS** A petting zoo has 5 lambs, 11 rabbits, 4 goats, and 4 piglets. Find the ratio of goats to the total number of animals. Then explain its meaning.

4. **FOOD** At the potluck, there were 6 pecan pies, 7 lemon pies, 13 cherry pies, and 8 apple pies. Find the ratio of apple pies to the total number of pies. Then explain its meaning.

Write each rate as a unit rate.

5. 3 inches of snow in 6 hours

6. $46 for 5 toys

7. **TRAINS** The Nozomi train in Japan can travel 558 miles in 3 hours. At this rate, how far can the train travel per hour?

ANALYZE TABLES **For Exercises 8 and 9, refer to the table showing tide pool animals.**

8. Find the ratio of limpets to snails. Then explain its meaning.

Animals Found in a Tide Pool	
Animal	**Number**
Anemones	11
Limpets	14
Snails	18
Starfish	9

9. Find the ratio of snails to the total number of animals. Then explain its meaning.

6-2 Practice: Skills, Concepts, and Problem Solving

Fractions, Decimals, and Percents

Write each percent as a fraction in simplest form.

1. 37%   **2.** 5%   **3.** 43.75%   **4.** 52.5%

5. 83%   **6.** 66%   **7.** $12\frac{1}{2}\%$ **8.** $21\frac{3}{4}\%$

9. 60%   **10.** $68\frac{3}{4}\%$ **11.** $27\frac{1}{2}\%$ **12.** 37.5%

Write each fraction as a percent. Round to the nearest hundredth if necessary.

13. $\frac{13}{20}$ **14.** $\frac{9}{25}$ **15.** $\frac{7}{8}$ **16.** $\frac{39}{40}$

17. $\frac{5}{9}$ **18.** $\frac{6}{7}$ **19.** $\frac{49}{200}$ **20.** $\frac{4}{15}$

21. $\frac{2}{5}$ **22.** $\frac{5}{8}$ **23.** $\frac{9}{16}$ **24.** $\frac{2}{3}$

25. **SAVINGS** Kayla has 14.5% of her salary placed into an Individual Retirement Account. What fraction is this?

26. **INTERNET** At home, 2 out of 5 people have access to broadband technology. What percent is this?

27. **SPORTS** A golfer made par on 13 of 18 holes. To the nearest tenth, on what percent of the holes did he make par?

ANALYZE TABLES For Exercises 28 and 29, use the table that shows the percent of households with the listed appliance.

28. What fraction of households have a clothes dryer?

29. Approximately 34 out of 67 households have a coffeemaker. Is this greater or less than the percent of households with dishwasher? Explain.

Appliance	Percent of Households
Refrigerator	99.3%
Washing Machine	82.0%
Dryer	77.8%
Dishwasher	56.0%

Source: census.gov

6-3 Practice: Skills, Concepts, and Problem Solving

Proportions and Proportional Reasoning

Determine whether each pair of ratios is equal. Use cross products.

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

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

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

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

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

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

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

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

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

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

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

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

ALGEBRA Solve each proportion.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

6-4 Practice: Skills, Concepts, and Problem Solving

The Percent Proportion

Find each number. Round to the nearest tenth if necessary.

1. What percent of 65 is 13?   **2.** $4 is what percent of $50?   **3.** What number is 35% of 22?

4. 14% of 81 is what number? **5.** 13 is 26% of what number? **6.** 55 is 40% of what number?

7. What percent of 45 is 72?   **8.** 1% of what number is 7?   **9.** 33 is 50% of what number?

10. What number is 3% of 100?   **11.** What percent of 200 is 0.5?

12. What number is 0.4% of 20?   **13.** What number is 6.1% of 60

14. What percent of 34 is 34?   **15.** 10.4% of what number is 13?

16. ALLOWANCE Monica has $3 in her wallet. If this is 10% of her monthly allowance, what is her monthly allowance?

17. WEDDING Of the 125 guests invited to a wedding, 104 attended the wedding. What percent of the invited guests attended the wedding?

18. CAMERA The memory card on a digital camera can hold about 430 pictures. Melcher used 18% of the memory card while taking pictures at a family reunion. About how many pictures did Melcher take at the family reunion? Round to the nearest whole number.

OCEANS For Exercises 19 and 20, use the table shown.

19. The area of the Indian Ocean is what percent of the area of the Pacific Ocean? Round to the nearest whole percent.

Ocean	Area (square miles)
Pacific	64 million
Atlantic	32 million
Indian	25 million

Source: worldatlas.com

20. If the area of the Arctic Ocean is 16% of the area of the Atlantic Ocean, what is the area of the Arctic Ocean? Round to the nearest whole million.

6-5   Practice: Skills, Concepts, and Problem Solving

Problems Involving Percents

Find the discounted selling price for each item to the nearest cent.

1. backpack: $28, 40% discount

2. soccer ball: $40, 35% discount

3. music DVD: $19, 45% discount

4. sweatshirt: $27, 20% discount

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

5. book: $29, 25% off

6. sofa: $975, 30% off

7. jeans: $34.95, 40% off

8. stereo: $459.99, 15% off

Find the simple interest to the nearest cent.

9. $350 at 5% for 4 years

10. $750 at 6.5% for 3 years

11. $925 at 4.75% for 3 months

12. $2,050 at 7.65% for 36 months

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

13. $1,500 at 6% for 5 years

14. $4,010 at 5.2% for 4 years

15. $925 at 7.25% for 6 months

16. $850 at 8.38% for 8 months

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

17. original: 8 points
    new: 10 points

18. original: 45 inches
    new: 48 inches

19. original: $60
    new: $48

20. original: $750
    new: $690

21. original: 25 miles
    new: 36 miles

22. original: 12 fouls
    new: 8 fouls

6-6 Practice: Skills, Concepts, and Problem Solving

Direct Variation

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

1.

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

2.

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

3.

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

4.

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

ALGEBRA y varies directly as x. Find each value.

5. If $y = -5$ when $x = 2$, find y when $x = 8$.

6. Find y when $x = 1$, if $y = 3$ when $x = 2$.

7. If $y = -7$ when $x = -21$, what is the value of x when $y = 9$?

8. Find x when $y = 18$, if $y = 5$ when $x = 4$.

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

Dealership Sales
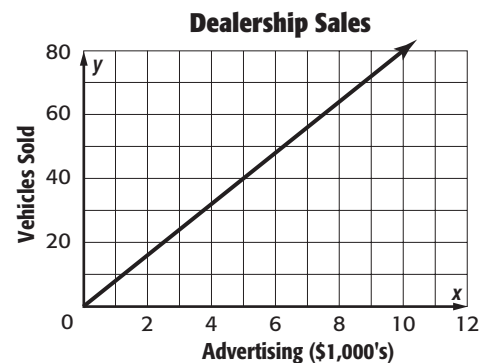
10. SNOWMOBILES   Jerry rents snowmobiles to tourists. He charges $135 for 4 hours and $202.50 for 6 hours. What is the hourly rate Jerry charges to rent a snowmobile?

11. SOLAR ENERGY   The power absorbed by a solar panel varies directly with its area. Suppose an 8 square meter panel absorbs 8,160 watts of power. How much power does a 12 square meter solar panel absorb?

12. INSECT CONTROL   Mr. Malone used 40 pounds of insecticide to cover 1,760 square feet of lawn and 60 pounds to cover an additional 2,640 square feet. How many pounds of insecticide would Mr. Malone need to cover his whole lawn of 4,480 square feet?

6-7 Practice: Skills, Concepts, and Problem Solving

Problem-Solving Strategy: Make a Table

For Exercises 1–3, use the ratio tables given to solve each problem.

1. CAMPING To disinfect 1 quart of stream water to make it drinkable, you need to add 2 tablets of iodine. How many tablets do you need to disinfect 4 quarts?

Number of Tablets	2			■
Number of Quarts	1			4

2. BOOKS A book store bought 160 copies of a book from the publisher for $4,000. If the store gives away 2 books, how much money will it lose?

Number of Copies	160		2
Cost in Dollars	4,000		■

3. BIRDS An ostrich can run at a rate of 50 miles in 60 minutes. At this rate, how long would it take an ostrich to run 18 miles?

Distance Run (mi)	50		18
Time (min)	60		■

4. DISTANCE The distance 10 miles is about 16 kilometers. The distance between two towns is 45 miles. Use a ratio table to find the distance between the towns in kilometers. Explain your reasoning.

5. SALARY Luz earns $400 for 40 hours of work. Use a ratio table to determine how much she earns for 6 hours of work.

RECIPES For Exercises 6–8, use the following information.

A soup that serves 16 people calls for 2 cans of chopped clams, 4 cups of chicken broth, 6 cups of milk, and 4 cups of cubed potatoes.

6. Create a ratio table to represent this situation.

7. How much of each ingredient would you need to make an identical recipe that serves 8 people? 32 people?

8. How much of each ingredient would you need to make an identical recipe that serves 24 people? Explain your reasoning.

7-1 Practice: Skills, Concepts, and Problem Solving

The Coordinate Plane

Use the coordinate plane at the right for Exercises 1–6.
Identify the point for each ordered pair.
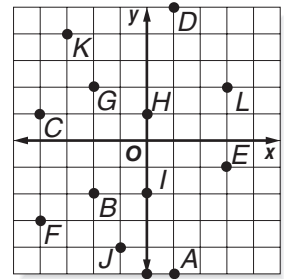
1. $(-3, 4)$ 2. $(-4, -3)$

3. $(-2, -2)$ 4. $(3, -1)$

5. $(0, 1)$ 6. $(-1, -4)$

For exercises 7–12, use the coordinate plane above.
Write the ordered pair that names each point. Then
identify the quadrant where each point is located.

7. C 8. L

9. D 10. A

11. G 12. I

Graph and label each point on the coordinate plane at
the right.
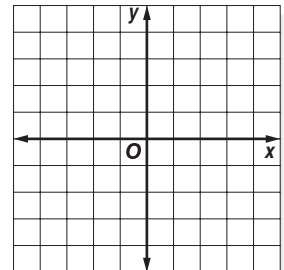
13. $L(-2, 0)$ 14. $M(5, 2)$

15. $N(-4, -3)$ 16. $P(1, -1)$

17. $Q(0, -4)$ 18. $R(3, -3)$

Use the map of the Alger Underwater
Preserve in Lake Superior to answer
the following questions. Each
increment represents one unit.
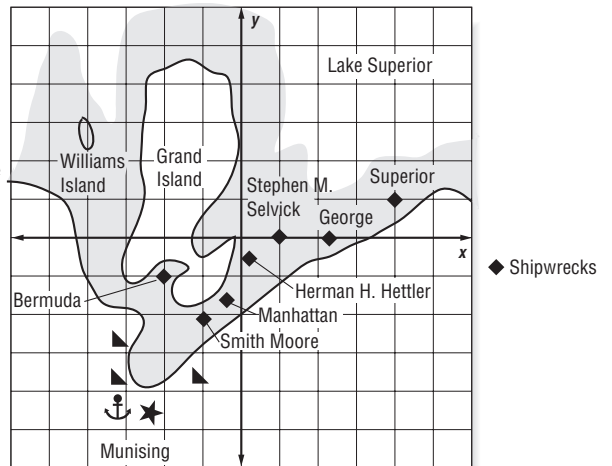
19. What is the ordered pair that represents the
location of the Stephen M. Selvick?

20. What is the ordered pair that represents
the location of the Bermuda? the Superior?

21. Which shipwreck is closest to the origin?

22. Which quadrant contains Williams Island?

7-2 Practice: Skills, Concepts, and Problem Solving

Problem-Solving Strategy: Draw a Graph

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

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

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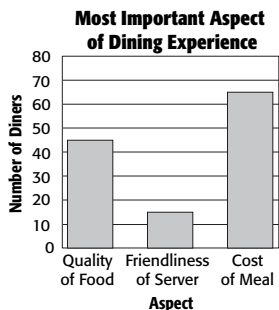
2. **COMMUTING** Ms. Bonilla recorded the amount of time it took her to drive to work each morning. Make a graph of the data in the table. Does the earliest departure time have the least travel time?

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

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

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

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

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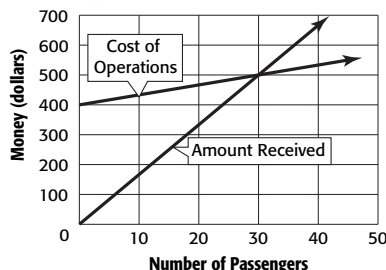
Select the Operation

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

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

7-3 Practice: Skills, Concepts, and Problem Solving

Relationships Involving Equal Ratios

WATER LEVEL **For Exercises 1 and 2, use the graph that shows the level of rising water in a lake after several days of rainy weather.**

1. If the water continues to rise, predict the day when the water level will be above flood stage of 20.5 feet.

2. How many days did it take for the water level to rise 4 feet?

Water Level
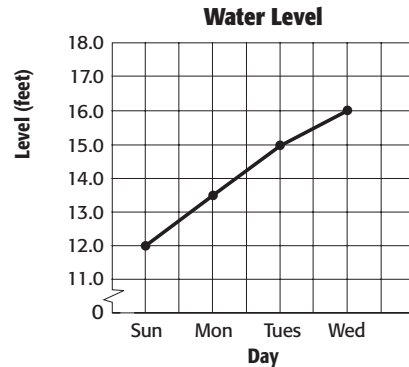
PROPERTY **For Exercises 3–5, use the table that shows the property value per acre for five years.**

3. Make a scatter plot of the data. Let the horizontal axis represent time. Let the vertical axis represent the property value.

Property Value (per acre)	
Time	Value
2001	$14,000
2002	$16,600
2003	$18,900
2004	$21,500
2005	$24,000

4. Describe the relationship, if any, between the two sets of data.

5. Predict the property value per acre in 2006.

FOOTBALL In football, each field goal made scores 3 points. The table shows this relationship.

6. Graph the ordered pairs. Then describe the graph.

Field Goals Made	Total Points
0	0
1	3
2	6
3	9

JEWELRY The table gives the number of beads needed to make bracelets of lengths 7, 7.5, 8, and 8.5 inches.

Bracelet Length (in.)	7	7.5	8	8.5
Number of Beads	28	30	32	34

7. Graph the ordered pairs. Then describe the graph.

7-4 Practice: Skills, Concepts, and Problem Solving

Measures as Rates and Products

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

1. $4.60 for 5 cans of soup

2. $51 for a box of 75 tiles

3. 652 miles in 9 days

4. 116 meters in 12 seconds

5. 176 new employees in 22 years

6. 34 yards for 6 costumes

7. 55 pages in 25 minutes

8. $3015 from 36 people

Convert each rate using dimensional analysis.

9. 18 m/min = __?__ cm/s

10. 5.7 gal/h = __?__ c/min

11. 264 yd/s = __?__ mi/h

12. 2 qt/min = __?__ gal/h

13. 99 in./s = __?__ mi/day (1 day = 24 h)

14. 154 mi/h = __?__ in./s

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

16. A group of 5 friends travel 250 miles together. How many passenger-miles is that?

17. A class of 22 students attend school for 10 days. How many student-days did they attend?

18. A family of 5 travels 140 miles to an amusement park. How many passenger-miles is that?

19. A scuba diver dives 20 feet in 4 seconds. How fast did the scuba diver descend?

20. A shuttle bus transports 10 people a distance of 4 miles to a car rental agency. How many passenger-miles is that?

7-5 Practice: Skills, Concepts, and Problem Solving

Slope

Find the slope.

1.
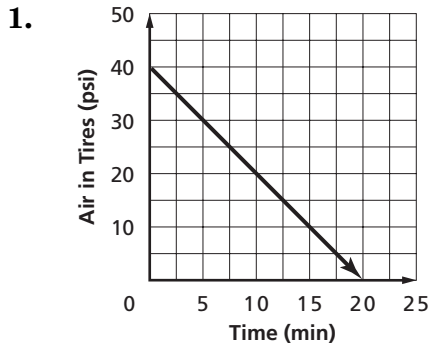
2.

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

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

3. Find the approximate slope between 1970 and 1975.

4. Find the approximate slope between 1995 and 2000.

5. Between which two years was the slope the least?

U.S. Exports
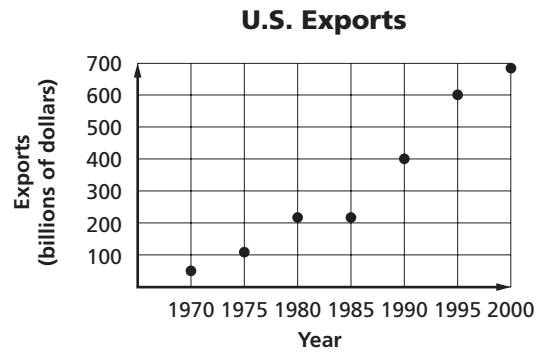
Source: *World Almanac*

TRAFFIC MANAGEMENT   For Exercises 6 and 7, use the following information.

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

6. Find the slope in the toll between 521 vehicles/h and 1122 vehicles/h.

7. Find the slope in the toll between 2204 vehicles/h and 1551 vehicles/h.

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

7-6 Practice: Skills, Concepts, and Problem Solving

Linear Functions

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

1.

2.

3.
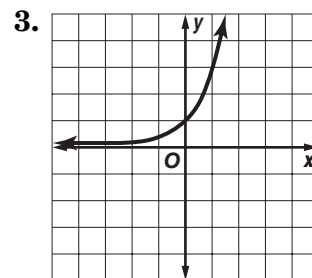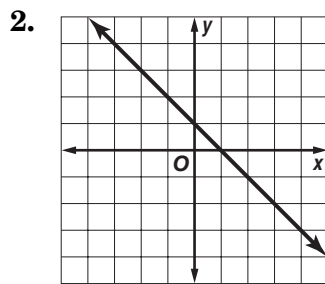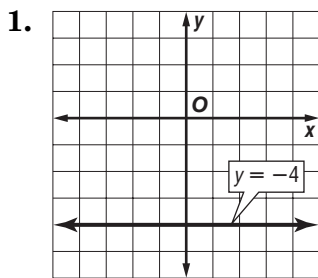
4.

x	y
1	1.0
2	0.8
3	0.6
4	0.4

5.

x	y
44	0
48	2.5
52	5.0
56	7.5

6.

x	y
3	1
6	−2
9	−5
12	−14

Complete each input-output table.

7. $y = 2x - 3$

x	2x − 3	y
−2		
2		
5		
8		

8. $y = 3x + 4$

x	3x + 4	y
−4		
−2		
1		
3		

9. $y = 7 - 3x$

x	7 − 3x	y
−3		
−1		
3		
5		

7-7 Practice: Skills, Concepts, and Problem Solving

The Pythagorean Theorem

Find the missing measure of each triangle. Round to the nearest tenth if necessary.

1.

6 cm, c cm, 8 cm

2.

26 m, a m, 24 m

3.

c ft, 23.8 ft, 24 ft
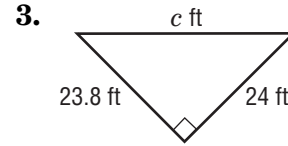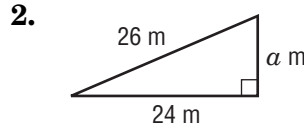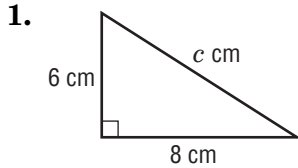
4. $a = 3$ in., $b = 4$ in.

5. $a = 21$ yd, $c = 29$ yd

6. $b = 2.9$ mm, $c = 4.4$ mm

7. $a = 2\frac{1}{5}$ ft, $c = 4\frac{2}{5}$ ft

8. $b = 7\frac{1}{4}$ in., $c = 7\frac{3}{4}$ in.

9. $a = 6\frac{1}{2}$ yd, $b = 10$ yd

If a triangle has sides *a*, *b*, and *c* so that $a^2 + b^2 = c^2$, then the triangle is a right triangle. Determine whether a triangle with the given side lengths is a right triangle. Write *yes* or *no*.

10. 9 cm, 12 cm, 18 cm

11. 7 ft, 24 ft, 25 ft

12. 5 in., 12 in., 13 in.

Find the missing measure in each figure. Round to the nearest tenth if necessary.

13.

18 m, x m, 9 m, 30 m

14.

1.8 yd, 2.5 yd, x yd
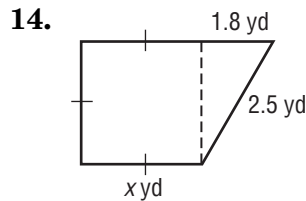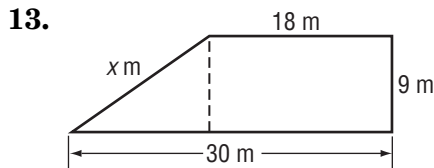
15. SOCCER Find the width of the soccer goal. Round to the nearest tenth.

11.2 ft, 5 ft, x ft
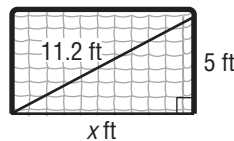
16. CONVEYOR BELT The diagram shows the horizontal distance a conveyor belt moves a load of gravel. If the conveyor belt takes 54 seconds to move gravel from the bottom of the conveyor belt to the top at a rate of 3 feet per second, how high does the conveyor belt lift the gravel? Round to the nearest tenth.

h ft, 150 ft
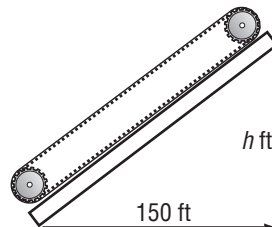
8-1   Practice: Skills, Concepts, and Problem Solving

Triangles and Quadrilaterals

Find the value of x.

1.

42° x°

2.
140° x°
22°

3.
x°
17°

4.
61°
x°
29°

5.
41°
x°   37°

6.
60°
60° x°
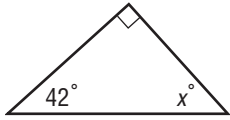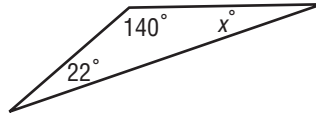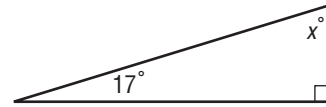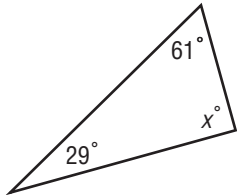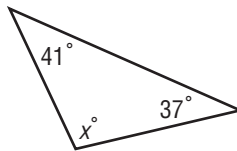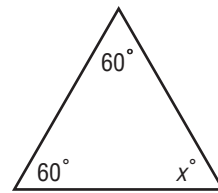
Find the missing angle measure of each quadrilateral.

7.
52°
x°

8.
135° 110°
x°   75°

9.
89° x°
92°   64°
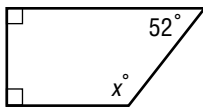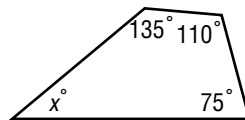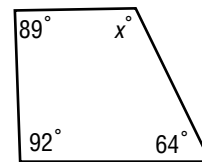
Classify the marked triangle in each object by its angles and by its sides.

10.

25°

11.

40°
50°

12.

30°   30°
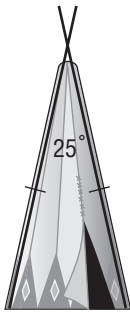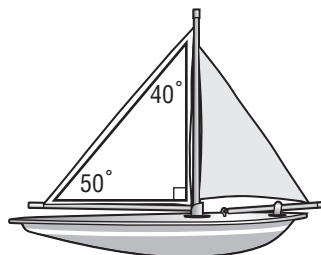
Classify the quadrilateral using the name that *best* describes it.
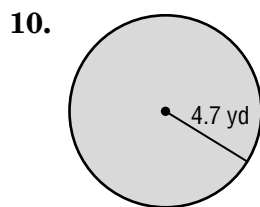
13.
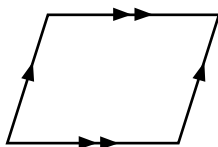
14.
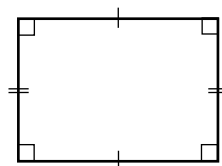
15.
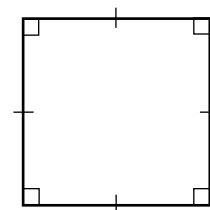
8-2 Practice: Skills, Concepts, and Problem Solving

Congruency and Similarity

Tell whether each pair of figures is *congruent*, *similar*, or *neither*.

1.
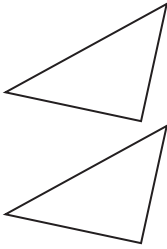
2.
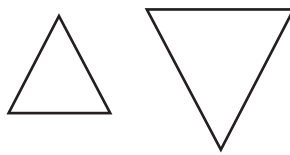
3.
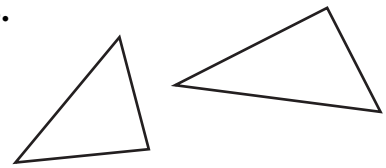
Find the value of x in each pair of similar figures.

4.
A
3 ft
B
4 ft
C

D
6 ft
E
x
F

5.
7 m
M
N
3 m
O
P
x
R
Q
9 m
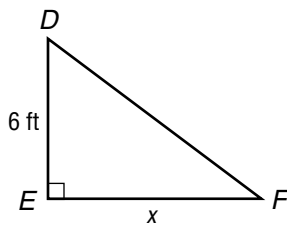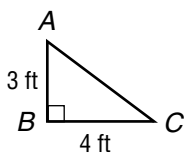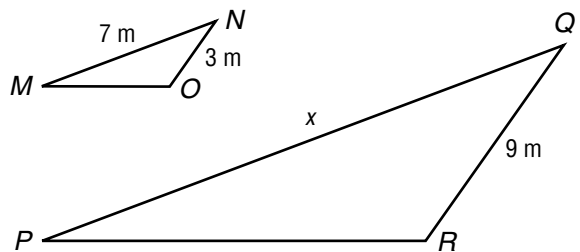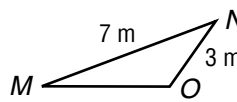
State whether each triangle is similar to triangle *RST*.

6.
15
25

7.
4
8

R
S
6
10
T
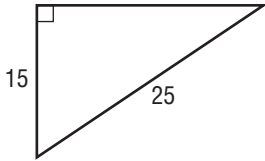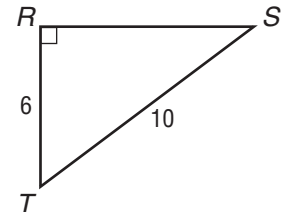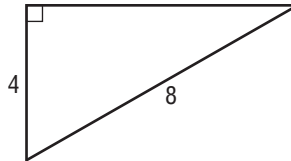
Find the value of x for each pair of congruent triangles.

8.
T
22
17
U
x
Q
R
31
S

9.
A B
10
8
x
F
6
G K
H

10.
U
10
11
W
T
x
V
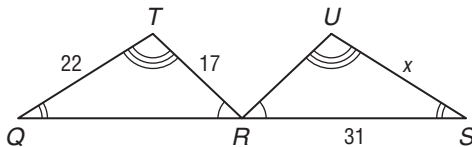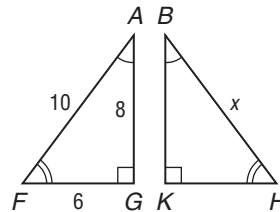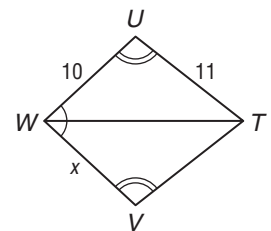
11. **MOBILE** Anh is making a mobile. She will make two sizes of similar triangles from colored wire as shown in the diagram. Find the total length of wire needed to make the larger triangle.

10 cm

5 cm

7 cm
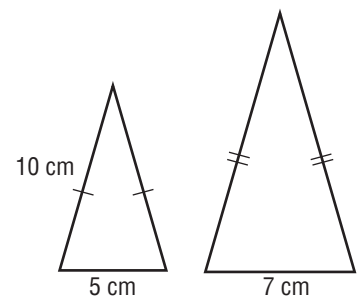
8-3   Practice: Skills, Concepts, and Problem Solving

Coordinate Geometry

Find the distance between each pair of points. Round to the nearest tenth, if necessary.

1. $A(0, 0), B(3, 4)$

2. $C(7, 11), D(1, 3)$

3. $E(-3, 4), F(3, -4)$

4. $G(0, 0), H(-3, 4)$

5. $R(-4, -8), S(2, -3)$

6. $G(9, 9), H(-9, -9)$

7. $A(5, 1), B(-4, -3)$

8. $V(4, 6), W(-8, -12)$

9. $C(-2, -4), D(-5, 6)$

10. $X(1, -7), Y(-1, 7)$

11. $E(5, -3), F(-7, 8)$

12. $A(8, 8), B(-8, -8)$

13. $R\left(7, 4\frac{1}{2}\right), S\left(6\frac{1}{2}, 3\frac{1}{4}\right)$

14. $T\left(-3\frac{1}{2}, -4\frac{1}{4}\right), U\left(5\frac{1}{2}, 1\frac{1}{2}\right)$

GEOMETRY   Find the perimeter of each figure.

15.

16.
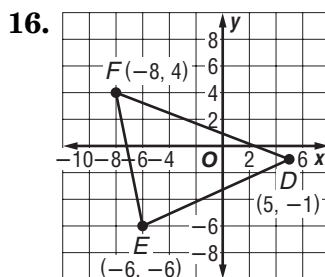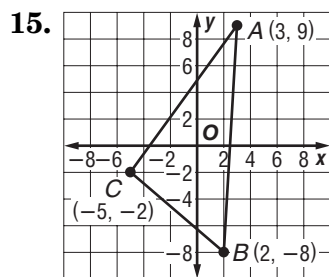
17. **MAPS** On a map of the school, the baseball field is located at the coordinates $(1, 7)$. The front entrance of the school is located at $(5, 2)$. Each coordinate unit corresponds to 10 yards. How far is it from the front entrance to the baseball field?

18. Determine whether $\triangle XYZ$ with vertices $X(3, 4)$, $Y(2, -3)$, and $Z(-5, -2)$ is isosceles. Explain your answer.

19. Is $\triangle DEF$ with vertices $D(1, 4)$, $E(6, 2)$, $F(-1, 3)$ a scalene triangle? Explain.

8-4 Practice: Skills, Concepts, and Problem Solving

Perimeter

Find the perimeter of each figure.

1.

38 cm

8 cm

2.

9 m

9 m
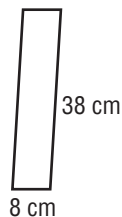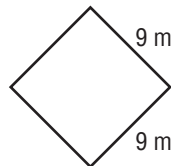
3. $\ell = 6$ yd, $w = 4$ yd

4. $\ell = 8.2$ m, $w = 7.1$ m

5. $\ell = 50$ in., $w = 10$ in.

6. $\ell = 10$ cm, $w = 4\frac{1}{2}$ cm

Find the circumference of each circle. Use $\pi = 3.14$. Round to the nearest tenth.

7.

2.4 cm

8.

28 ft

9.

1.5 yd

10.

4.2 mm

11.

12 m

12.

7 in.
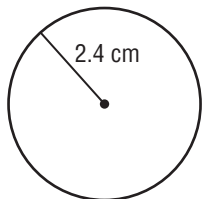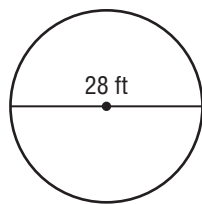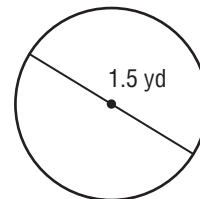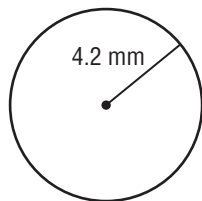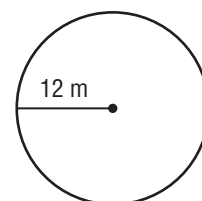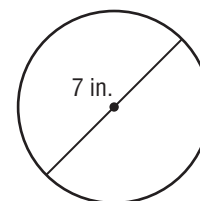
13. radius $= 2\frac{1}{3}$ ft

14. radius $= 11.9$ m

15. diameter$=5\frac{5}{6}$ mi

8-5 Practice: Skills, Concepts, and Problem Solving

Area

Find the area of each figure described.

1. parallelogram: base, 12 m; height, 10 m

2. trapezoid: height, 13 cm; bases, 3 cm, 7 cm

3. triangle: base, 9.4 ft; height, 5 ft

4. triangle: base, 8.5 km; height, 14 km

5. parallelogram: base, 15 yd; height, 7 yd

6. trapezoid: height, 7 m; bases, 6 m, 9 m

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

7.

3 cm

5 cm

10 cm

8.

8 ft

2 ft

4 ft

7 ft

9.

8 yd

24 yd

8 yd

8 yd

10.

4.7 yd

11.

22.5 in.

12.

2.1 mm
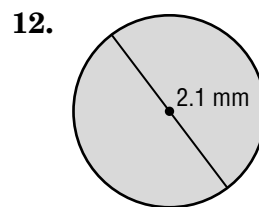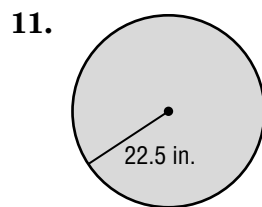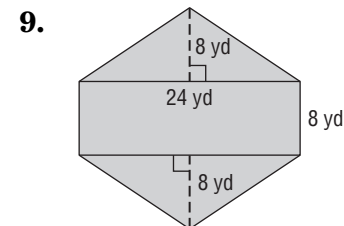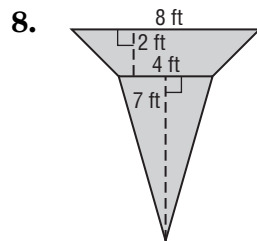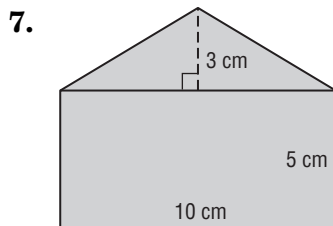
13. radius = 5.7 mm

14. radius = 8.2 ft

15. diameter = $3\frac{1}{4}$ in.

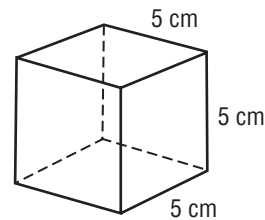16. Suppose a triangle has an area of 220 square meters. What is the measure of the height if the base measures 20 meters?

17. A trapezoid has an area of 27.5 square centimeters. What is the measure of the height if the bases measure 7 centimeters and 4 centimeters?

18. Find the base of a parallelogram with a height of 10.5 feet and an area of 189 square feet.

8-6 Practice: Skills, Concepts, and Problem Solving

Problem-Solving Strategy: Make a Model

Use a model to solve.

1. **AREA** Determine the area of the shaded region if the radii of the six circles are 1, 2, 3, 4, 5, and 10 centimeters.
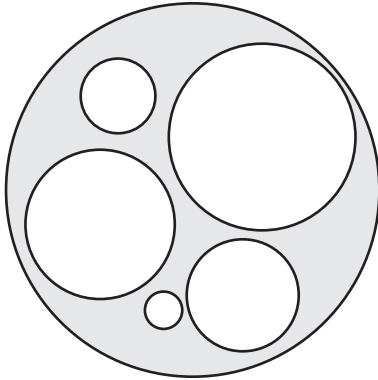
2. **CARPENTRY** Mr. Fernandez needs 7 boards that are 4 feet long and 6 inches wide to make one bookshelf. He buys lumber that is 8 feet long and 12 inches wide. How many pieces of lumber does he need to purchase to make 5 bookshelves?

3. **AREA** Stacey is making a stained glass window above her front doorway in the shape as shown in the figure. To the nearest tenth, what is the area of the shaded portion of the window?

1 ft

3 ft
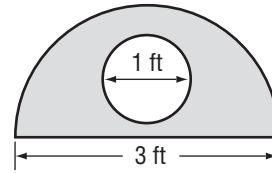
4. A restaurant has 10 triangular tables that can be pushed together in an alternating up-and-down pattern as shown below to form one long table for large parties. Each triangular table can seat 3 people per side. How many people can be seated at the combined tables?

8-7   Practice: Skills, Concepts, and Problem Solving

Solid Figures and Volume

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

1.

4 m

5 m

2.

7 in.

3 in.

2 in.

3.

5 ft

3 ft

3 ft

4.

4 cm

11 cm

7 cm

5.

0.8 yd

2.1 yd

1.1 yd

6.

5 cm

5 cm

5 cm

7.

$2\frac{2}{3}$ yd

$4\frac{1}{3}$ yd

3 yd

8.

10 ft

4.2 ft

9.

3 mm

3 mm

12 mm
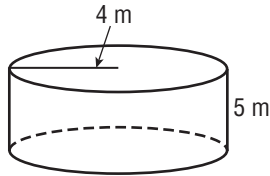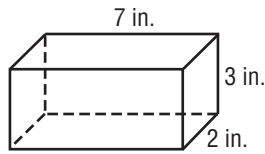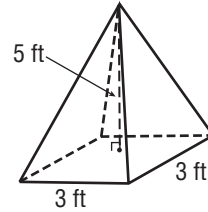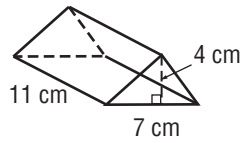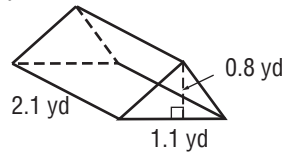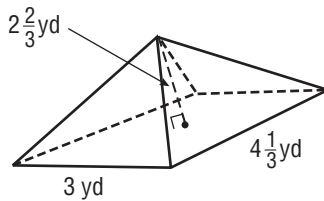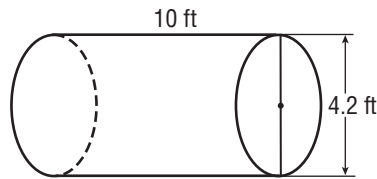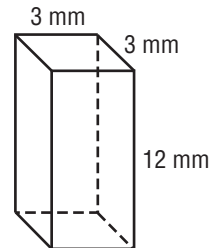
10. rectangular prism: length, 10 m; width, 5 m; height, 5 m

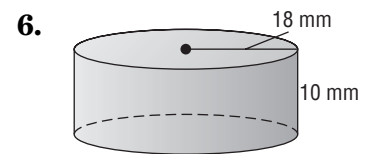**11.** triangular prism: base of triangle, 8 in; altitude, 8 in; height of prism, 6 in
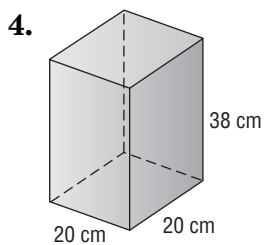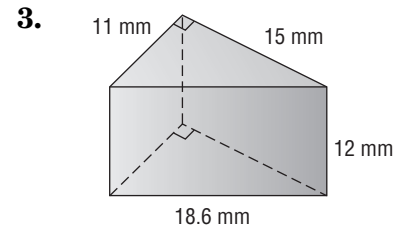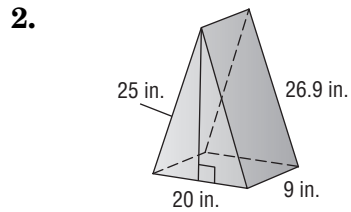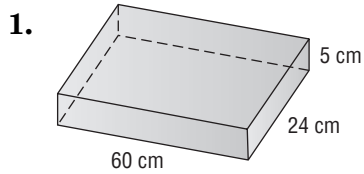
12. cylinder: radius, 7 ft; height, 4 ft

13. cylinder: diameter, 6.4 cm; height, 4.9 cm

8-8 Practice: Skills, Concepts, and Problem Solving

Surface Area

**Find the surface area of each solid shown or described. Use π = 3.14.
If necessary, round to the nearest tenth.**

1.

5 cm
24 cm
60 cm

2.

25 in.   26.9 in.
20 in.   9 in.

3.

11 mm   15 mm
12 mm
18.6 mm

4.

38 cm
20 cm   20 cm

5.

4 ft
36 ft

6.

18 mm
10 mm

7.

15 cm
9.2 cm
9.2 cm

8.

4 in.
4 in.
4 in.

9.

10 ft
15 ft
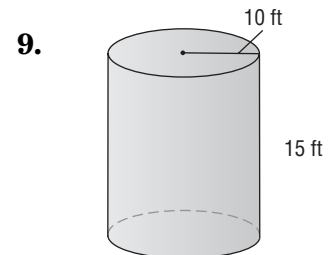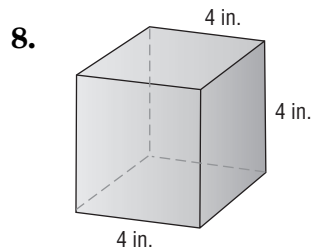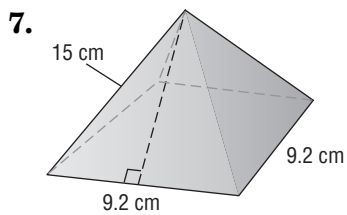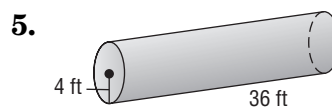
10. rectangular prism: length 10.2 m, width 8.5 m, height 9.1 m

11. rectangular prism: length 15.4 cm, width 14.9 cm, height 0.8 cm

12. cylinder: radius 28 mm, height 32 mm

13. cylinder: diameter 1.6 ft, height 4.2 ft