

Math 6 Answer Key

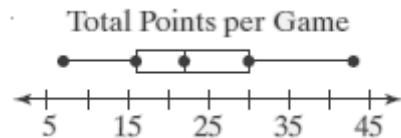
Textbook Answer Key

Course 1

CC-1 Box-and-Whisker-Plots (CC6-CC7)

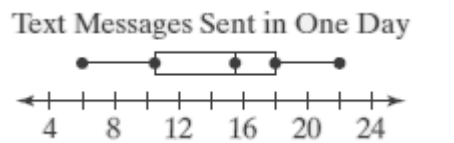
Activity 1

1. 11
2. 22
3. 16
4. 30
5. 7; 43
6. Check student's graphs. Sample:



Activity 2

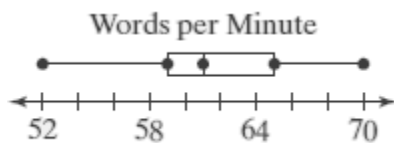
1. 12
2. number of text messages.
3. numbers from 6 to 22.
- 4.



5. They are the same.
6. The quartile of data just above the median is more closely clustered than the quartile of data just below the median.
7.
 - a. No; you cannot have a decimal number of text messages
 - b. No; you cannot have a fractional number of text messages.
 - c. No; you cannot have a negative number of text messages.
 - d. Yes; the possible numbers for text messages are all whole numbers.

Exercises

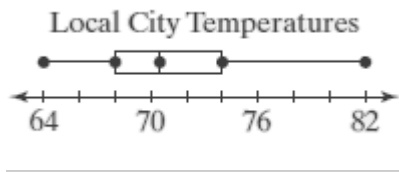
1.
 - a. 14
 - b.



Course 1

CC-1 Box-and-Whisker-Plots (CC6-CC7)

2.



Activity 1

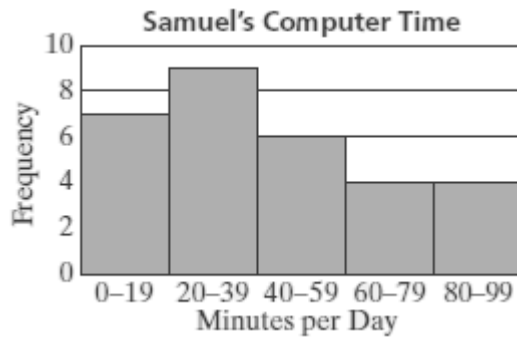
1. The number of students, 5, that have test scores of 81 to 85 inclusive
2. 91, 92, 93, 94, and 95.
3. no.
4. 25; the sum of the frequencies is $4 + 5 + 2 + 8 + 6 = 25$.
5.
 - a. 91-95
 - b. Cannot be determined.
 - c. 9
 - d. Cannot be determined.
 - e. Cannot be determined.
 - f. Cannot be determined.
 - g. Cannot be determined.
 - h. 24.
6. Sample: 76, 76, 78, 79, 81, 83, 84, 85, 85, 87, 88, 91, 91, 91, 92, 93, 95, 95, 95, 96, 96, 99, 100, 100, 100.
7. Check students' work. The median is always in the interval 91-95.

Activity 2

1. Minutes.
2. 30.
3. Sample: 0-19, 20-39, 40-59, 60-79, 80-99; All the observations fall between 0 and 100, so I divided this range into 5 equal intervals.
4. Sample:

Samuel's Computer Time	
Minutes per Day	Frequency
0-19	
20-39	
40-59	
60-79	
80-99	

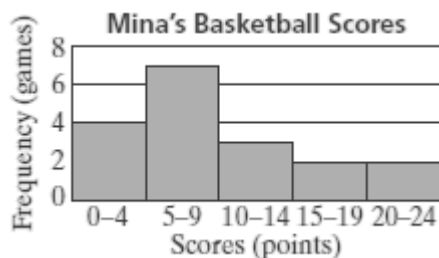
5. Sample:



6. The time, in minutes, that Samuel spent on the computer in a day.
7. The number of days that Samuel spent an amount of time on the computer within a given interval.
8. Yes; the number of observations is the sum of the frequencies within each interval.
9. Answers will vary. Sample: Each day, Samuel is more likely to spend less than 40 minutes on the computer than he is to spend over an hour on the computer.
10. A histogram displays the frequencies of intervals of data, showing the data is clustered to the left.

Exercises

1.
 - a. The number of times (4) that Mrs. Sanchez spent between \$35 and \$39.99 at the gas station.
 - b. 16
 - c. 10
2. a. Sample:



- b. Check students' answers.
- c. horizontal: points scored by Mina during a game. Vertical: number of games that Mina scored a number of points in each interval.

Course 1

CC-3 Shape and Variability of Data (CC10-CC13)

Activity 1

1. Step 1: 7 cm

Step 2:

Rainfall (cm)	5	6	8	16	7	6	1	5	9	7
Mean	7	7	7	7	7	7	7	7	7	7
Distance from Mean	2	1	1	9	0	1	6	2	2	0

Step 3: 2.4 cm

2. 15 cm
3. 3
4. 3.6 cm
5. a. 14 cm
b. 7 cm
6. July
7. a. MAD = 4.6 cm; IQR = 8 cm; Both measures are greater than the first set.
b. The MAD is more affected, because the outlier has a greater affect on the mean than on the quartiles.
8. MAD = 13; IQR = 23

Activity 2

1. 6 mi.
2. yes.
3. a. yes, 8 miles.
b. the right.
4. Cyclist A = 1, Cyclist B = 2
5. The MAD for Cyclist B is greater; Sample: For Cyclist A, the data values are grouped close to the center. For Cyclist B, the data on the left are farther away from the grouped data on the right.
6. Sample: The box for SUV is narrow, and its whiskers are short and are about the same length. The box for sedan is longer and one of its whiskers is much longer than the other.
7. 4; 7
8. The wider plot (sedans) has a greater interquartile range. Sample: This means that the data is more spread out from the median.
9. Sample: The data for ages 20-30 is grouped symmetrically around the 8-11 hours range. The data for all ages 50-60 is higher on the left side.
10. Sample: Ages 20-30: 8-11; because there are about the same number of data values above and below this range. Ages 50-60: 4-

Course 1

CC-3 Shape and Variability of Data (CC10-CC13)

7 because there are about the same number of data values above and below this range.

11. Sample: Ages 20-30; because the data is spread symmetrically around the median, the data values aren't as far from the median compared to the other graph.
12. Sample: Younger people spend more time on the internet.

Exercises

1. Test Score Before Tutoring: mean: 4, median: 3.5;
Test Score After Tutoring: mean: 6, median: 6.
2. Test Score Before Tutoring: MAD: 1.6, IQR: 3.
Test Score After Tutoring: MAD: 0.8, IQR: 2.
3. a. Sample: The scores after tutoring are higher and have less variation than the scores before tutoring.
b. The shape of the test scores after tutoring is taller and less wide than the scores before tutoring, meaning the data are more tightly clustered around the mean and median.
4. Sample: The data before tutoring is spread out without a visual pattern, and after tutoring the data clusters symmetrically around the value 6. Before tutoring, students most likely have different knowledge, so the data is spread out. Students learned the same concepts during tutoring, so after tutoring, the scores are higher and closer together.

Activity 1

1. yes.
2. yes.
3. There is only one correct answer to this question.
4.
 - a. Statistical; the number of siblings will vary.
 - b. Statistical; birthday month will vary.
 - c. Statistical; there are varying types of books.
 - d. Not statistical; this is a fact, so the data will not vary.
 - e. Not statistical; my shirt color does not vary.
 - f. Statistical; people can have different favorite colors.
 - g. Statistical; the number of dogs people own varies.
 - h. Statistical; people have different shoe sizes.
5. Yes; the ages will vary.
6.
 - a. Yes; there are a variety of answers.
 - b. Answers will vary. Sample: How far do you commute to work?

Activity 2

1. Leila's answers contain more results of London.
2. sunny and rainy.
3. Emelio's question is biased.
4.
 - a. Yes, the first question uses the words delicious and bitter; the second question uses the words healthy and unhealthy.
 - b. Do you prefer red grapes or strawberries?; Do you prefer fruit or chips as a snack?; What is your favorite snack food?
5.
 - a. Do you prefer action movies or drama movies?
 - b. Where do you prefer living?
 - c. delicious, bland; Do you want a chocolate or vanilla cake for your birthday?
 - d. cooler; Would you prefer to play the guitar or the clarinet?
 - e. tiring, fun; Do you want to go for a run or play soccer?

Course 1

CC-5 Expressions and the Distributive Property (CC16-CC17)

Quick Check

1. a. $6(3 + 4)$
b. $7(8 + 7)$
c. $12(7 + 5)$
2. a. $3(n + 7)$
b. $8(9 + 2h)$
c. $16(3y + 5)$
3. a. $12n + 24$
b. $56 + 32p$
c. $24a + 36b$

Homework Exercises

1. $4(3 + 4)$
2. $25(4 + 3)$
3. $22(3 + 2)$
4. $14(5 + 7)$
5. $3(3x + 4)$
6. $4(15x + 4)$
7. $6(13x + 6)$
8. $45(n + 2)$
9. $3x + 15$
10. $14x + 28$
11. $21 + 28n$
12. $16x - 24$
13. $5; 5(2v + 3w)$
14. $10(8p + 3q)$
15. $4x + 6, 2(2x + 3)$; The two expressions are equivalent.
16. $9x$
17. Substitute a value such as 2 for x , and evaluate to determine if both sides are equal. $\frac{2+4}{2} = 3; 2(2) + 2 = 6$; The expressions are not equivalent.

Quick Check

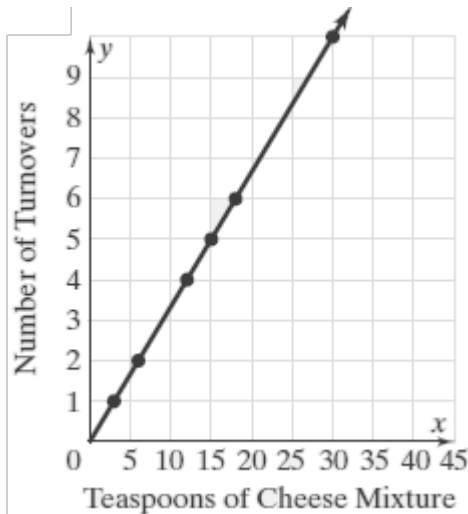
1. a. $9b$
b. $13x$
c. r
2. a. $6b + 5$
b. $2x$
c. $4r + 12$

Homework Exercises

1. $9b$
2. $11y$
3. $5x$
4. $7c$
5. 1
6. $4x$
7. $12j - 2$
8. $10 - 3w$
9. $14x + 8y + 4$
10. $15n + p$
11. $2x + 8y + 5$
12. $20a + 3$
13. $10x + 3y - 5$
14. $4s + 3t$
15. Sample: Use the Commutative Property of Addition to group the variables together:
 $6.7a + 0.9a + 8.1b - 2.8b + 2.5 + 7$.
Then use the Distributive Property to simplify the expression:
 $a(6.7 + 0.9) + b(8.1 - 2.8) + 2.5 + 7 = a(7.6) + b(5.3) + 9.5$.
Use the Commutative Property of Multiplication:
 $7.6a + 5.3b + 9.5$.
16. $2r + 8$; Sample: Madeline simplified $3r - r$ to 3. She should have used the Distributive Property to show $3r - r = r(3 - 1) = 2r$.
17. Answers may vary. Sample:
 $2x + y - x$
18. $6n + 6$

Activity

1. top row: 6, 15; bottom row: 4, 10
- 2.



3. 0 teaspoon of cheese mixture makes 0 turnovers.
4. Estimate the y-value on the line where x equals 24
5. Yes; $\frac{8 \text{ minutes}}{1 \text{ invitation}}$ shows the number of minutes needed per invitation.
6. The number of invitations that Jenny can make is on the top number line. The minutes Jenny needs to make the invitations is on the bottom number line. Find the number of invitations that corresponds to 56 minutes on the bottom number line.
7. Jamal worked the fastest. To make one invitation Carlos used $(50 \div 4) = 12.5$ minutes, Alyssa used $(105 \div 15) = 7$ minutes, Ming used $(24 \div 3) = 8$ minutes, and Jamal used $(96 \div 16) = 6$ minutes.
8. There are 30 rectangular tables and 5 round tables.
9. The diagram shows 7 equal parts totaling 35, so each part represents 5 tables. Since 6 parts represent rectangular tables, there are 30 rectangular tables, and since 1 part represents round tables, there are 5 round tables.

Exercises

1. a. Each serving has 4 shrimp.
b. top row: 8, 24; bottom row: 5, 8
2. 20 white, 12 red
3. 280 chairs; there are 8 chairs for every table so multiply 35 by 8.

Course 1

CC-7 Ratios and Rates (CC20-CC21)

4. a. 20
b. Answers may vary. Sample: I used a double number line because it helps me see the relationship between the quantities.

Course 1

CC-8 Solving Percent Problems (CC22-CC23)

Quick Check

1. 40 acres
2. 24

Homework Exercises

1. 15
2. 25
3. \$20
4. 80
5. 250
6. 72
7. 20
8. 200
9. \$50
10. \$50
11. 4
12. In the first case, n is the whole; in the second case, n is the part.

Course 1

CC-9 Converting Measurement Units (CC24-CC25)

Quick Check

1. a. 2.5 kg
b. 144 in.
2. 96 min

Homework Exercises

1. 8,000 mg
2. 3 lb
3. 1.55 km
4. $1\frac{1}{2}$ qt
5. 6,500 mL
6. 45,000 cm
7. 18 in
8. 5,500 lb
9. 6 min
10. 3 tsp
11. 5.5 miles
12. 13.5 L
13. 8 cups
14. 150 min
15. 396,000 yd
16. No; 16 ounces should be in the numerator, and 1 pound should be in the denominator.
17. When converting from a larger to a smaller unit, you have more units; when converting from a smaller to a larger unit, you have fewer units.

Course 1

CC-10 Prisms with Fractional Edge Lengths (CC26-CC27)

Activity 1

1. 8
2. 2
3. 2
4. 1
5. 16
6. $\frac{1}{8}$ cubic centimeter
7. 2 cubic centimeters
8. 2 cubic centimeters
9. They are equal.

Activity 2

1. 7
2. 2
3. 14
4. $7 \times 2 = 14$; Since $\left(7 \times \frac{1}{3}\right) \times \left(2 \times \frac{1}{3}\right)$ is the same as $\frac{7}{3} \times \frac{2}{3} = \frac{14}{9}$, they are the same.
5. 5
6. $5 \times 2 \times 7 = 70$
7. $\frac{1}{27}$ cubic centimeter
8. $\frac{70}{27}$ cubic centimeters
9. $\frac{70}{27}$ cubic centimeters
10. They are equal.

Activity 3

1. $\frac{1}{4}$, because a common unit is needed that can go into $\frac{3}{4}$ and $\frac{1}{2}$ and $\frac{1}{4}$.
2. $5 \times 6 \times 7 = 210$
3. $V = 1\frac{3}{4} \times 1\frac{1}{2} \times 1\frac{1}{4} = \frac{7}{4} \times \frac{6}{4} \times \frac{5}{4} = \frac{210}{64}$ cubic units, so 210 of the $\frac{1}{4}$ units is correct.

Exercises

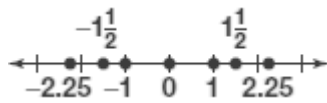
1. $V = Bh$; $\frac{819}{8}$ or $102\frac{3}{8}$ cubic meters
2. $15\frac{5}{8}$ cubic feet
3. $169\frac{13}{16}$; $166\frac{9}{16}$; the first cereal box

Course 1

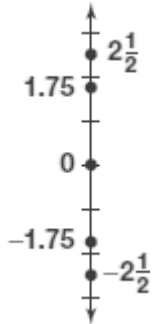
CC-11 Rational Numbers and the Coordinate Plane (CC28-CC29)

Activity 1

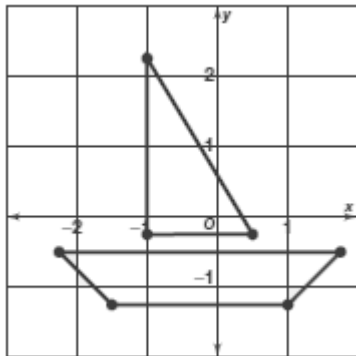
1.



2.



3.



Activity 2

1. Xiau, Jerry, Kim, Malika, Damon, Sasha
2. Malika, Kim/Damon, Jerry, Sasha, Xiau
3. Sample answer: When ordering by elevation, the sign of the number make a difference in ordering.
4. Sample: Comparing absolute value evaluates distances; ordering considers the sign of the numbers.

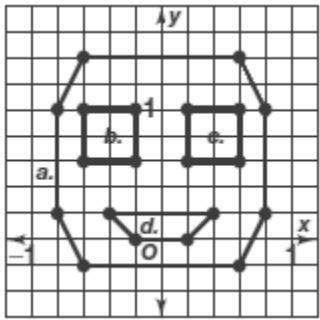
Exercises

1. A is 1.4, B is $\frac{1}{4}$, C is $-\frac{2}{5}$, D is $-1\frac{1}{8}$, and E is -2.2

Course 1

CC-11 Rational Numbers and the Coordinate Plane (CC28-CC29)

2. a to d



3. a. -13 meters, 9 meters, -5 meters, -2 meters, 3 meters, 5 meters, and 8 meters.
b. -2 meters, 3 meters, 5 and -5 meters, 8 meters, -9 meters, and -13 meters

Course 1

CC-12 Horizontal and Vertical Distances (CC30-CC31)

Activity 1

1. Sample: Points A and B have the same y -coordinates, but different x -coordinates
2. horizontal
3. 6 units
4. a. 2 units
b. 4 units
c. Sample: you can find the difference between the coordinates to find the distance.
5. a. Sample: vertical because they have the same x -coordinate
b. Point M is 2 units from the x -axis; point L is 6 units from the x -axis.
c. Sample: 4 units; the difference between -2 and -6 is 4.
d. 12 units

Activity 2

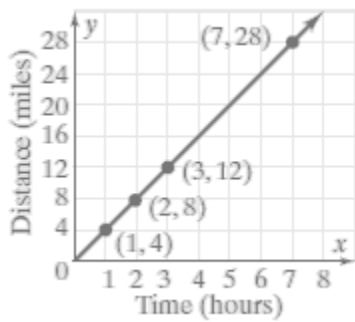
1. a. rectangle
b. vertical lengths 3 units; horizontal lengths 4 units.
c. 14 units.
2. a. 4 units
b. Sample: $(3, 3)$; $(-1, -1)$; and $(-1, 3)$
c. Sample: Yes, it depends on which corner $(3, -1)$ is at. Some other possible sets of three corners are $(3, 3)$, $(7, 3)$, and $(7, -1)$; $(-3, -5)$, $(7, -1)$, and $(7, -5)$; $(-1, -1)$, $(3, -5)$, and $(-1, -5)$.

Exercises

1. a. 6 units
b. 8 units
2. 7 units
3. 12 units
4. 27 units
5. 7 units
6. 7 units
7. 18.5 units
8. 4.8 units
9. 7 units
10. 35 units
11. 24 units
12. 12 units
13. 40 units

Activity

1. \$32
2. The amount earned for working 4 hours
3. hours worked, h
4. money earned, m
5. The point (3, 24) represents that Caroline gets paid \$24 for working 3 hours.
6. Substitute 6 for h , and multiply to find m .
7. a. missing values: 4; 8; 16; 7
b. the number of hours, h , is the independent variable; the distance, d , is the dependent variable.
c.

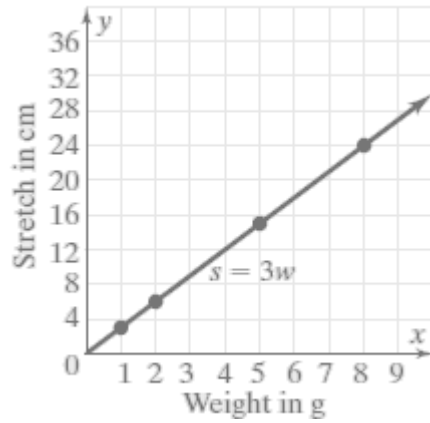


d. $d = 4t$

Students will need to check values in their equations in order to show that it generates values in the table and graph. If it does not, they will need to improve the equation until it does.

Homework Exercises

1. t is the independent variable; d is the dependent variable; $d = 3t$
2. m is the independent variable; t is the dependent variable; $t = m + 7$
3. w is the independent variable; l is the dependent variable; $l = w + 2$
4. a. 3; 6; 15; 8
b.

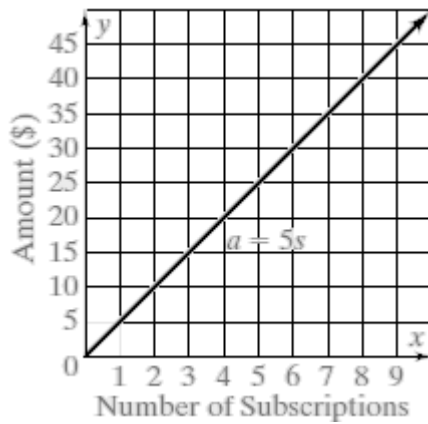


c. $s = 3w$

5. a. $a = 5s$

b. Sample Answer:

s	a
1	5
2	10
3	15
4	20



c. Check students' work; 35 subscriptions; \$175; it is faster to use an equation than to continue the table or extend the graph.

Prentice Hall

MATHEMATICS

Course 1



Solution Key

PEARSON

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To the Teacher

This *Solution Key* provides complete step-by-step solutions for all the exercises in Prentice Hall *Course 1*, including the Quick Check exercises.

Answers are also given in the Teacher's Edition, either in the margins of the pages where the exercises occur or in the Additional Answers section located in the back of the Teacher's Edition.

Selected answers are provided in the back of the Student Edition.

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CHECK YOUR READINESS

page 2

1. 310 2. 7,530 3. 40 4. 60 5. 700 6. 1,990 7. 175
8. 145 9. 14,192 10. 3,027 11. 10,000 12. 1,392
13. 747 14. 4,544 15. 43,700 16. 462 17. 5
18. 17 19. 32 20. 72

1-1 Understanding Whole Numbers

pages 4–7

Check Skills You'll Need For complete solutions see *Daily Skills Check and Lesson Quiz Transparencies* or *Presentation Pro CD-ROM*. 1. Answers may vary. Sample: 8, 3.5 2. 20 3. 2 4. 2,000 5. 200

Quick Check 1. twenty-six billion, two hundred thirty-six million, eight hundred forty-eight thousand, eighty dollars 2. On a number line, 129,631 is to the left of 143,832; $<$. 3. Compare digits with highest place value: 978; 9,897; 9,987 are ordered from least to greatest.

Exercises 1. 1,273 2. Answers may vary. Sample: the 7 in the tens place of 471 $>$ the 1 in the tens place of 417. 3. hundred; two 4. thousand; hundred 5. On a number line, 322 is to the left of 332; $<$. 6. On a number line, 745 is to the right of 734; $>$. 7. On a number line, 1,187 is to the left of 1,278; $<$. 8. thirty thousand, nine hundred eighty-seven 9. one hundred forty-five thousand, six hundred seventy-five 10. one million, three hundred forty-five thousand 11. seven million, three hundred forty-seven thousand, two hundred 12. nine billion, eight hundred seventy-one million, sixty thousand, five hundred forty 13. sixty-three billion, three hundred eighty million, five hundred nine thousand, seven hundred ten 14. four million, nine hundred thirty-seven thousand 15. On a number line, 366 is to the right of 36; $>$. 16. On a number line, 54,001 is to the left of 54,901; $<$. 17. On a number line, 8,801 is to the right of 810; $>$. 18. On a number line, 84,123 is to the right of 9,996; $>$. 19. On a number line, 29,286 is to the left of 29,826; $<$. 20. On a number line, 31,010 is to the right of 30,101; $>$. 21. Compare digits with highest place value: 901; 910; 990 are ordered from least to greatest. 22. Compare digits with highest place value: 1,142; 1,172; 1,472; 1,572 are ordered from least to greatest. 23. Compare digits with highest place value: 17,414; 17,444; 17,671 are ordered from least to greatest. 24. Compare digits with highest place value: 20,403; 23,040; 23,404 are ordered from least to greatest. 25. 149,476,000 kilometers 26. Compare digits with highest place value: 66,544; 68,667; and 68,886; Washington, Oklahoma, Missouri. 27. Compare digits with highest place value: 2,198,000; 2,739,000; 2,753,000; 3,212,000; and 3,304,000; Braeburn, Empire, Ida Red,

York, McIntosh. 28. Compare digits starting with highest place values to find which is greater: No; the 4,290-kilobyte file is greater than the 4,256 kilobytes of memory. 29. Digits that add to 12: 9 and 3, 8 and 4, 7 and 5, 6 and 6, 5 and 7, 4 and 8, 3 and 9, $9 \div 3 = 3$; 93. 30. Comparing hundreds digits disproves that the values are sorted from greatest to least; the correct choice is C. 31. $10 \times 22 = 220$, $220 - 160 = 60$; the correct choice is H. 32. $375 + 15 = 390$; 390 33. $1,820 + 309 = 2,129$; 2,129 34. $2,617 + 1,904 = 4,521$; 4,521

1-2 Estimating With Whole Numbers

pages 8–11

Check Skills You'll Need For complete solutions see *Daily Skills Check and Lesson Quiz Transparencies* or *Presentation Pro CD-ROM*. 1. hundreds 2. 50 3. 60 4. 140 5. 490

Quick Check 1a. 97 rounds up to 100; 22 rounds down to 20; 48 rounds up to 50; $100 + 20 + 50 = 170$; about 170 1b. 94 rounds down to 90; 32 rounds down to 30; 41 rounds down to 40; $90 - 30 - 40 = 20$; about 20 2a. 39 rounds up to 40; $8 \times 40 = 320$; about 320 2b. 672 rounds up to 700; 52 rounds down to 50; $700 \div 50 = 14$; about 14 3. 324 rounds down to 300; 12 rounds down to 10; $300 \div 10 = 30$; about 30

Exercises 1. Yes; 60 can be divided by 6 mentally. 2. Answers may vary. Sample: 29 was rounded down to 20; but should have been rounded up to 30. 3. Round 29 up to 30; $70 - 30 = 40$; 40 4. Round 812 down to 800; $200 + 800 = 1,000$; 1,000 5. Round 87 up to 90; $90 - 20 = 70$; 70 6. Round 189 up to 200; $200 + 400 = 600$; 600 7. 11 rounds to 10; 103 rounds down to 100; $100 \div 10 = 10$; 10; 10 8. 52 rounds down to 50; 18 rounds up to 20; $50 \times 20 = 1,000$; 50; 1,000 9. 597 rounds up to 600; 31 rounds down to 30; $600 \div 30 = 20$; 600; 20 10. 13 rounds down to 10; 94 rounds down to 90; $90 \times 10 = 900$; 10; 900 11. 47 rounds up to 50; 228 rounds up to 230; 23 rounds down to 20; $50 + 230 + 20 = 300$; about 300 12. 653 rounds up to 700; 295 rounds up to 300; $700 - 300 = 400$; about 400 13. 34 rounds down to 30; 68 rounds up to 70; 93 rounds down to 90; $30 + 70 + 90 = 190$; about 190 14. 59 rounds up to 60; 26 rounds up to 30; 23 rounds down to 20; $60 + 30 - 20 = 70$; about 70 15. 6,963 rounds up to 7,000; 3,098 rounds down to 3,000; $7,000 - 3,000 = 4,000$; about 4,000 16. 8,043 rounds down to 8,000; 5,983 rounds up to 6,000; $8,000 + 6,000 = 14,000$; about 14,000 17. 42 rounds down to 40; 86 rounds up to 90; 51 rounds down to 50; 38 rounds up to 40; $40 + 90 + 50 + 40 = 220$; about 220 18. 257 rounds up to 260; 109 rounds up to 110; 46 rounds up to 50; 21 rounds down to 20; $260 - 110 - 50 - 20 = 80$; about 80

19. 3,978 rounds up to 4,000; $2 \times 4,000 = 8,000$; about 8,000 **20.** 102 rounds down to 100; $100 \div 25 = 4$; about 4 **21.** 611 rounds down to 600; 58 rounds up to 60; $600 \div 60 = 10$; about 10 **22.** 997 rounds up to 1,000; $1,000 \times 5 = 5,000$; about 5,000 **23.** 1,089 rounds down to 1,000; 521 rounds down to 500; $1,000 \div 500 = 2$; about 2 **24.** 4,978 rounds up to 5,000; 983 rounds up to 1,000; $5,000 \div 1,000 = 5$; about 5 **25.** 48 rounds up to 50; 41 rounds down to 40; $50 \times 40 = 2,000$; about 2,000 **26.** 207 rounds down to 200; 51 rounds down to 50; $200 \div 50 = 4$; about 4 **27.** 69 rounds up to 70; $70 \div 7 = 10$; about 10 **28.** 93 rounds down to 90; round 16 down to 15 because 15 is a compatible number with 90; $90 \div 15 = 6$; about 6 **29.** 78 rounds up to 80; 9 rounds up to 10; 22 rounds down to 20; $80 - 10 - 20 = 50$; about \$50; You do not need to find an exact answer because the question asked "about" how much. **30.** 1,038 rounds down to 1,000; 284 rounds up to 300; 326 rounds down to 300; $1,000 - 300 - 300 = 400$; about 400 mi **31a.** 443 rounds up to 450; 52 rounds down to 50; $450 \div 50 = 9$; about \$9 **31b.** Compatible numbers make division easy to compute mentally. **32.** 85 rounds up to 90; 178 rounds up to 200; $90 \times 3 = 270$; $200 \times 2 = 400$; $270 + 400 = 670$; about 670 prizes **33–35.** Answers may vary. Samples are given. **33.** 429 rounds down to 400; 889 rounds up to 900; $400 + 900 = 1,300$; about 1,300 **34.** 1,142 rounds down to 1,000; 720 rounds down to 700; $1,100 - 700 = 400$; about 400 **35.** 551 rounds down to 540; 86 rounds up to 90 because 90 is a compatible number with 540; $540 \div 90 = 6$; about 6 **36.** Answers may vary. Sample: 37 rounds to 40; $40 \div 4 = 10$; \$10; the estimate is higher because \$37 was rounded up to \$40. **37.** 238 rounds down to 200; 9 rounds up to 10; $2,437$ rounds down to 2,400; $200 \times 10 = 2,000$; $2,400 - 2,000 = 400$; about 400 g **38.** 11 rounds down to 10; 18 rounds up to 20; $10 \times 20 = 200$; the correct choice is C. **39.** The number begins seven hundred seventy-eight million, so the written number should be 778 followed by 6 digits; 778,300,000; the correct choice is H. **40.** Compare highest place value digits; 275, 278, 281, 287 are ordered from least to greatest. **41.** Compare highest place value digits; 4,541; 4,567; 4,678; 4,687 are ordered from least to greatest.

1-3 Properties of Numbers

pages 12–15

Check Skills You'll Need For complete solutions see *Daily Skills Check and Lesson Quiz Transparencies* or *Presentation Pro CD-ROM*. **1.** addition **2.** 150 **3.** 90 **4.** 350

Quick Check **1.** $36 + 25 + 34 = (36 + 34) + 25 = 70 + 25 = 95$; **2.** $20 \times (6 \times 5) = (20 \times 5) \times 6 = 100 \times 6 = 600$; 600

Exercises **1.** Changing order does not change sum; Comm. Prop. of Add. **2.** Changing order of factors does not change product; Comm. Prop. of Mult.; Changing grouping of factors does not change product; Assoc. Prop. of Mult.; Order of Operations; multiply

inside the parentheses; simplify. **3.** Use the Comm. Prop. of Mult. and the Assoc. Prop. of Mult.; $(25 \times 9) \times 8 = (25 \times 8) \times 9$; now using mental math; $25 \times 8 = 200$; $200 \times 9 = 1,800$. **4.** $4 + 26 = 30$; 30 **5.** $33 + 0 + 17 = 33 + 17 = 50$; 50 **6.** $50 \times 7 \times 2 = (50 \times 2) \times 7 = 100 \times 7 = 700$; 700 **7.** $0 + 57 + 4 = 57 + 4 = 61$; 61 **8.** $32 + 48 = 80$; 80

$$\begin{aligned} \mathbf{9.} \quad & (18 + 6) + 42 \\ & = (18 + 42) + 6 \\ & = 60 + 6 \\ & = 66 \end{aligned}$$

$$\begin{aligned} \mathbf{11.} \quad & 81 + 23 + 19 \\ & = (81 + 19) + 23 \\ & = 100 + 23 \\ & = 123 \end{aligned}$$

$$\begin{aligned} \mathbf{13.} \quad & 837 + 14 + 26 \\ & = 837 + (14 + 26) \\ & = 837 + 40 \\ & = 877 \end{aligned}$$

$$\begin{aligned} \mathbf{15.} \quad & 160 + 0 + 2,740 \\ & = 0 + 160 + 2,740 \\ & = 160 + 2,740 \\ & = 2,900 \end{aligned}$$

$$\begin{aligned} \mathbf{17.} \quad & 5 \times 47 \times 2 \\ & = (5 \times 2) \times 47 \\ & = 10 \times 47 \\ & = 470 \end{aligned}$$

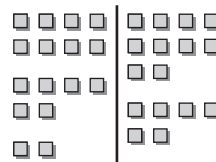
$$\begin{aligned} \mathbf{19.} \quad & 25 \times 13 \times 4 \\ & = 13 \times (4 \times 25) \\ & = 13 \times 100 \\ & = 1,300 \end{aligned}$$

$$\begin{aligned} \mathbf{21.} \quad & 40 \times (33 \times 25) \\ & = 33 \times (40 \times 25) \\ & = 33 \times 1,000 \\ & = 33,000 \end{aligned}$$

$$\begin{aligned} \mathbf{23.} \quad & 65 \times (100 \times 2) \\ & = (65 \times 2) \times 100 \\ & = 130 \times 100 \\ & = 13,000 \end{aligned}$$

$$\begin{aligned} \mathbf{25.} \quad & 5 \times 8 \times 25 \\ & = 5 \times (8 \times 25) \\ & = 5 \times 200 \\ & = 1,000 \end{aligned}$$

26. $183 + 144 + 117 + 146 = 590$; Clubs A & C can be added mentally, as well as Clubs B & D. $183 + 117 = 300$; $144 + 146 = 290$; 590 mi **27.** $41 + 29 = 70$; 70 = 70; = **28.** $737 + 373 = 1,110$; $4 \times 11 \times 25 = (4 \times 25) \times 11 = 100 \times 11 = 1,100$; $1,110 > 1,100$; > **29.** Check students' work.



30. $100 \times (5 + 9) = 100 \times 14 = 1,400$; $(100 \times 5) + 9 = 500 + 9 = 509$; $1,400 \neq 509$; Answers may vary. Sample: No; the assoc. prop. does not work when operations are combined. **31.** Answers may vary. Sample: calculator

because it is faster. **32.** $14 + 22 + (22 + 18) = 36 + 40 = 76$; 76 art pieces **33.** $10 \times 12 \times 3 = 10 \times 36 = 360$; \$360 **34.** Answers may vary. Sample: Subtraction and division are not commutative. $8 - 4 \neq 4 - 8$ and $8 \div 4 \neq 4 \div 8$. Subtraction and division are not associative. $(8 - 4) - 2 \neq 8 - (4 - 2)$ and $(8 \div 4) \div 2 \neq 8 \div (4 \div 2)$. **35.** $7 + 2 = 9$; $7 \times 2 = 14$; $9 \times 2 \neq 14$; The product of 7 and 2 is not double the sum; the correct choice is B. **36.** 29 rounds up to 30; 13 rounds down to 10; 22 rounds down to 20; $30 + 10 + 20 = 60$; 60 min = 1 hour; the correct choice is H. **37.** On a number line 98,410 is to the right of 98,140; $>$. **38.** On a number line 78,296 is to the right of 78,269; $>$. **39.** On a number line 40,000 is to the left of 300,009; $<$.

1-4 Order of Operations

pages 16–19

Check Skills You'll Need For complete solutions see *Daily Skills Check and Lesson Quiz Transparencies* or *Presentation Pro CD-ROM*. **1.** Comm. Prop. of Add. **2.** 57 **3.** 30 **4.** 175

Quick Check **1a.** $34 + 5 \times 2 - 17 = 34 + 10 - 17 = 44 - 17 = 27$; 27 **1b.** $(6 + 18) \div 3 \times 2 = 24 \div 3 \times 2 = 8 \times 2 = 16$; 16 **2.** $(7 \times 4) + (5 \times 3) = 28 + 15 = 43$; \$43

Exercises **1.** expression **2.** The student added before dividing. **3.** multiplication **4.** addition **5.** subtraction **6.** multiplication **7.** $(1 + 2) \times 2 = 3 \times 2 = 6$; $1 + 2 \times 2 = 1 + 4 = 5$; $6 > 5$; $>$ **8.** $3 \times (4 - 2) = 3 \times 2 = 6$; $3 \times 4 - 2 = 12 - 2 = 10$; $6 < 10$; $<$ **9.** $450 \div 45 + 5 = 10 + 5 = 15$; 15 **10.** $29 - 4 \times 7 = 29 - 28 = 1$; 1 **11.** $16 + 36 \div 12 = 16 + 3 = 19$; 19 **12.** $14 - (7 + 5) \div 2 = 14 - 12 \div 2 = 14 - 6 = 8$; 8 **13.** $(13 + 21) \times 2 = 34 \times 2 = 68$; 68 **14.** $400 \div (44 - 24) = 400 \div 20 = 20$; 20 **15.** $16 - (2 + 4) \times 2 = 16 - 6 \times 2 = 16 - 12 = 4$; 4 **16.** $26 + 5 - 4 \times 3 = 26 + 5 - 12 = 31 - 12 = 19$; 19 **17.** $13 + 5 \times 12 - 4 = 13 + 60 - 4 = 73 - 4 = 69$; 69 **18.** $4 \times 40 - 5 = 160 - 5 = 155$; \$155 **19.** $50 + 20 \div 2 = 50 + 10 = 60$; \$60 **20.** $100 - 2 \times 30 = 100 - 60 = 40$; \$40 **21.** $35 \times 2 + 42 \div 2 = 70 + 42 \div 2 = 70 + 21 = 91$; \$91 **22.** $3(28 + 32) - 10 = 3(60) - 10 = 180 - 10 = 170$; \$170 **23.** $15 \times 10 + 30 \times 2 = 150 + 30 \times 2 = 150 + 60 = 210$; \$210 **24.** $(45 \times 4 + 125 \times 3) \div 5 = (180 + 125 \times 3) \div 5 = (180 + 375) \div 5 = (555) \div 5 = 111$; \$111 **25.** $(75 \times 5) + (25 \times 6) - 10 = 375 + (25 \times 6) - 10 = 375 + 150 - 10 = 525 - 10 = 515$; \$515 **26.** $2 \times 0.50 + 3 \times 0.90 + 2 \times 0.65 = 1.00 + 3 \times 0.90 + 2 \times 0.65 = 1.00 + 2.70 + 2 \times 0.65 = 1.00 + 2.70 + 1.30 = 3.70 + 1.30 = 5.00$; \$5.00 **27.** $25 \times 6 + 3 \times 9 - 15 = 150 + 3 \times 9 - 15 = 150 + 27 - 15 = 177 - 15 = 162$; \$162 **28.** $(11 - 7) \div 2 = 4 \div 2 = 2$; 2 **29.** $(1 + 2) \times (15 - 4) = 3 \times 11 = 33$; 33 **30.** $(6 \div 3) \times 21 + (2 \div 1) \times 2 = 2 \times 21 + (2 \div 1) \times 2 = 2 \times 21 + 2 \times 2 = 42 + 2 \times 2 = 42 + 4 = 46$; 46 g

31. $(9 \div 3) \times 21 + (2 \div 1) \times 2 + 1 \times 9 = 3 \times 21 + (2 \div 1) \times 2 + 1 \times 9 = 3 \times 21 + 2 \times 2 + 1 \times 9 = 63 + 2 \times 2 + 1 \times 9 = 63 + 4 + 1 \times 9 = 63 + 4 + 9 = 67 + 9 = 76$; 76 g **32.** $(380 + 220) \div 300 = (600) \div 300 = 2$; 2 mm **33.** First subtract the numbers in parentheses (7 and 5). Then divide 8 by 4. Multiply that result (2) by 6. Then add to the difference found in the parentheses. **34.** $14 \div 7 + 2 + 3 = 2 + 2 + 3 = 4 + 3 = 7$ **35.** The number of people in the group is equal to the sum of the boys and girls, not the multiple; the correct choice is B. **36.** The multiple of 6 and 14 is the number of total spaces and the difference of that number and 11 equals the number of empty spaces; the correct choice is J. **37.** $280 + 1,375 + 466 \approx 300 + 1,400 + 500 = 1,700 + 500 = 2,200$; the correct choice is B. **38.** $57 \approx 60$; $60 \div 6 = 10$; about 10 **39.** $14 \approx 15$; $15 \times 4 = 60$; about 60 **40.** $627 \approx 600$; $23 \approx 20$; $600 \div 20 = 30$; about 30

CHECKPOINT QUIZ 1

page 20

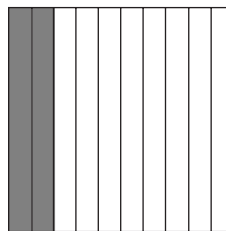
1. $>$ **2.** $<$ **3.** $>$ **4.** 553 rounds up to 600; 385 rounds up to 400; $600 - 400 = 200$; about 200. **5.** 5,964 rounds up to 6,000; 3,088 rounds down to 3,000; $6,000 + 3,000 = 9,000$; about 9,000. **6.** 1,085 rounds down to 1,000; 523 rounds down to 500; $1,000 \div 500 = 2$; about 2. **7.** $19 + 7 + 31 = (19 + 31) + 7 = 50 + 7 = 57$ **8.** $(6 + 18) + 14 = 18 + (6 + 14) = 18 + 20 = 38$ **9.** $25 \times 10 \times 4 = (25 \times 4) \times 10 = 100 \times 10 = 1,000$ **10.** $30 - 6 \times 5 = 30 - 30 = 0$; 0 **11.** $(12 + 23) \times 2 = 35 \times 2 = 70$; 70 **12.** $60 + 30 \div 3 = 60 + 10 = 70$; \$70 **13.** 280 rounds up to 300; $300 \times 4 = 1,200$; about 1,200 feet. **14.** Compare digits with highest place value: 6,893,000; 7,134,000; 7,283,000; 7,293,000 are ordered from least to greatest.

ACTIVITY LAB

page 21

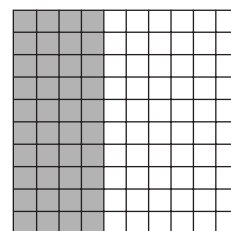
1. There are 10 sections and 3 are colored in which equals $\frac{3}{10}$; 0.3 **2.** There are 100 sections and 42 are colored in which equals $\frac{42}{100}$; 0.42 **3.** There are 100 sections and 87 are colored in which equals $\frac{87}{100}$; 0.87

4.

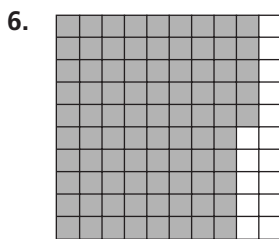


0.20

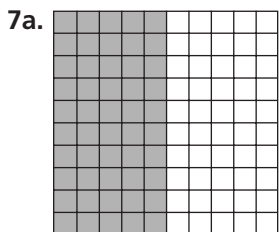
5.



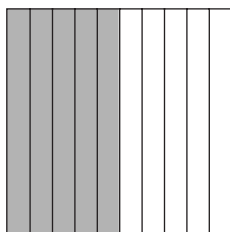
0.40



0.85



0.50



0.50

7b. Both include the same amount of shaded area.

1-5 Understanding Decimals

pages 22–25

Check Skills You'll Need For complete solutions see *Daily Skills Check and Lesson Quiz Transparencies* or *Presentation Pro CD-ROM*. **1.** 1,321 **2.** twenty-eight **3.** eight thousand, six hundred seventy-two **4.** six-hundred twelve thousand, nine hundred eighty **5.** fifty-eight thousand, twenty-six

Quick Check **1a.** sixty-seven and three tenths **1b.** six and seven hundred thirty-four thousandths **1c.** sixty-seven hundredths **2.** 0.15; $0.1 + 0.05$ **3a.** 2 rounds down; 2.34 **3b.** 7 rounds up; 0.1735 **3c.** 5 rounds up; 9.1

Exercises **1.** 5; it is in the hundredths place. 7 is in the thousandths place. **2.** Check students' work. Sample: one thousand two hundred fifty-eight ten-thousandths; $0.1 + 0.02 + 0.005 + 0.0008 = 0.1258$; 0.13 **3.** 3 tenths **4.** 3 hundredths **5.** 3 thousandths **6.** 3 ten-thousandths **7.** $1 + 0.2$ **8.** $8 + 0.4$ **9.** $7 + 0.5 + 0.02$ **10.** $0.2 + 0.03 + 0.009$ **11.** two and three tenths **12.** six and two hundredths **13.** six thousandths **14.** two and sixty-one thousandths **15.** three and eight hundredths **16.** forty hundredths **17.** fifty and six hundred three thousandths **18.** one and twenty-eight hundredths **19.** three and four thousandths **20.** twenty-three hundredths **21.** 40.009; $40 + 0.009$ **22.** 0.64; $0.6 + 0.04$ **23.** 0.700; 0.7 **24.** 9.20; $9 + 0.20$ **25.** 26.2; $26 + 0.2$ **26.** 3 rounds down; 0.68 **27.** 2 rounds down; 2.7 **28.** 9 rounds 6 up to 7; 3.4147 **29.** 6 rounds 5 up to 6; 10.96 **30.** 7 rounds 4 up to 5; 6.25 **31.** 5 rounds 5 up to 6; 0.6 **32.** 6 rounds 0 up to 1; 4.1 **33.** 9 rounds 8 up to 9; 4.9 **34.** 2 is less than 5; 2 rounds 1 down to 1; 0.001; $0.001 + 0.0002 = 0.0012$ **35.** B: \$0.9 million; \$900,000; C: \$1.6 million; \$1,600,000 **36a.** \$0.006 **36b.** \$0.207 **36c.** \$0.053 **37.** 4 tenths, or 0.4 **38.** 4 tens, or 40 **39.** 4 ten-thousandths, or 0.0004 **40.** 4 hundredths, or 0.04

41. 4 thousandths, or 0.004 **42.** 4 hundred, or 400 **43.** 0.618; 8 rounds 1 up to 2; 0.62 **44.** The value of each 2 is 10 times greater than the value of the 2 to its right. **45.** one ten-millionth **46.** $\$39 \div 3 = \13 ; $\$13 + \$5 = \$18$; the correct choice is C. **47.** The cost of the pizza is being divided by four people; the correct choice is H.

$$\begin{aligned} 48. (20 \times 3) \times 5 \\ = (20 \times 5) \times 3 \\ = 100 \times 3 \\ = 300 \end{aligned}$$

$$49. 70 + 0 = 70$$

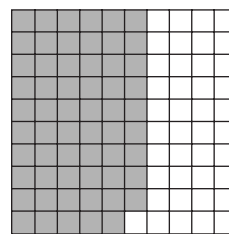
$$\begin{aligned} 50. 2 \times (42 \times 5) \\ = 42 \times (2 \times 5) \\ = 42 \times 10 \\ = 420 \end{aligned}$$

1-6 Comparing and Ordering Decimals

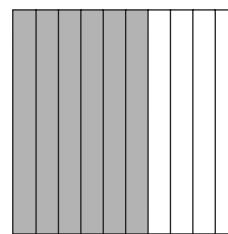
pages 26–30

Check Skills You'll Need For complete solutions see *Daily Skills Check and Lesson Quiz Transparencies* or *Presentation Pro CD-ROM*. **1.** Answers may vary. Sample: Compare the digits, starting with the greatest place value. **2.** $>$ **3.** $<$

Quick Check **1.** Models may vary. Sample:



0.59



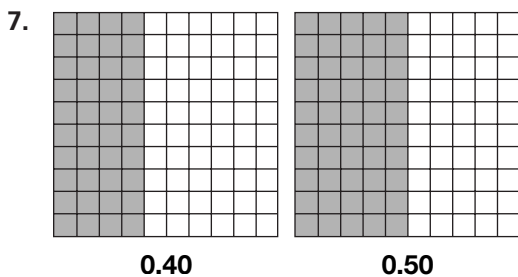
0.6

$$0.59 < 0.6$$

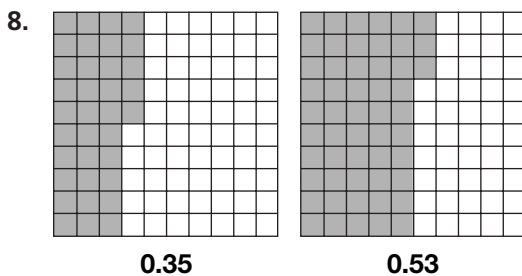
2. Since 6 hundredths $>$ 4 hundredths, $0.56 > 0.543$; $>$ **3.** Compare digits starting with the highest place values: 3.059, 3.46, 3.64 are in order from least to greatest.

More Than One Way Use mental math to compare digits starting with the highest place values: 0.059, 0.26, 0.264, 0.576, 0.9, 0.96, 0.964 are in order from least to greatest; check students' methods.

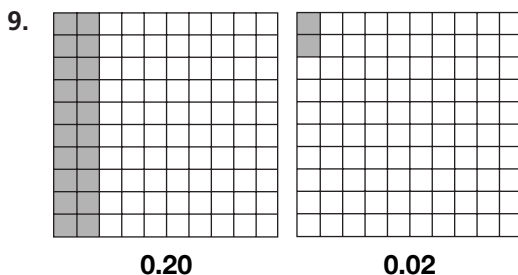
Exercises **1.** Answers may vary. Sample: I would compare the values of numbers in similar places. In the hundredths place, 1.697 has 9 hundredths. 1.679 has 7 hundredths. $1.697 > 1.679$ **2.** Find the number of units in each grid; 100 and 10. This indicates that the first decimal will be written in hundredths and the second in tenths. Find the number of shaded units in each grid; 57 and 4. Write a decimal using the number of shaded units in the place value indicated by the number of units; 0.57; 0.4 **3.** $0.57 > 0.4$; 0.57 **4.** Compare digits starting with the highest place values: $2.37 > 2.32$; 2.32. **5.** Compare digits starting with the highest place values; add zero to $0.57 = 0.570$; $0.570 < 0.575$; 0.575. **6.** Compare digits starting with the highest place values; 0.8, 0.9, 1.2, 1.3 are ordered from least to greatest.



0.5 is greater.



0.53 is greater.



0.2 is greater.

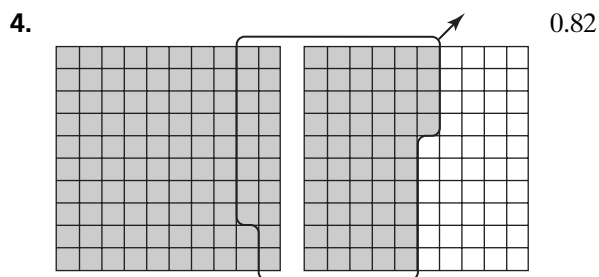
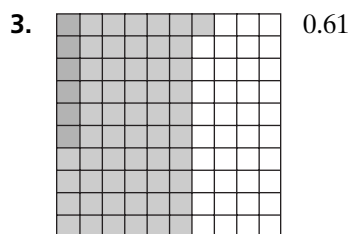
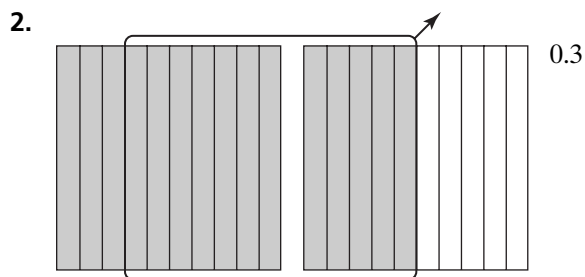
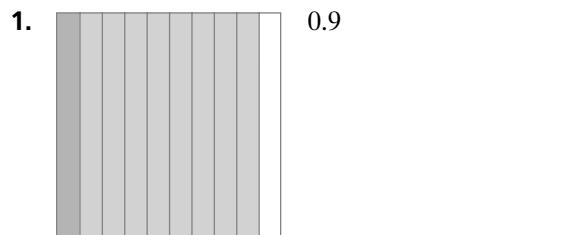
- 10.** $>$ **11.** $=$ **12.** $>$ **13.** $<$ **14.** $<$ **15.** $>$ **16.** Compare starting with the highest place values of digits; 0.5, 0.65, 0.7. **17.** Compare starting with the highest place values of digits; 13.7, 17.1, 17.7. **18.** Compare starting with the highest place values of digits; 0.503, 0.529, 0.53. **19.** Compare starting with the highest place values of digits; 9.02, 9.024, 9.2, 9.209. **20.** Compare starting with the highest place values of digits; 1.79, 1.979, 1.991, 2.185. **21.** Compare starting with the highest place values of digits; 5.5506, 5.561, 5.5660, 5.58. **22.** Compare starting with the highest place values of digits; the fastest time is the least time; tenths; 10.54 s. **23.** Compare starting with the highest place values of digits; *The Top...*: 031.02; *Going to...*: 370.973; *How Music...*: 398.2; *The Night...*: 398.9; *Art of...*: 709.52; *France...*: 944; *Japan...*: 952. **24.** Compare starting with the highest place values of digits; 4.198, 4.2025. **25.** Compare starting with the highest place values of digits; 0.6595, 0.6095, 0.62. **26.** Answers may vary. Sample: 2.21, 2.211, 2.212, 2.213, 2.214, 2.215. **27.** Compare starting with the highest place values of digits; Karachi, Jakarta, Delhi. **28.** Alia; $11.88 < 11.9$ **29.** Each tick is equal to 0.5. *A* is halfway between 0.2 and 0.3, so *A* is equal to about 0.25. *B* is just over halfway between 0.7 and 0.8, so *B* is equal to about 0.77. *C* is halfway between 1.0 and 1.1, so *C* is equal to about 1.05. *A*: 0.25; *B*: 0.77; *C*: 1.05 **30.** Compare starting with the highest place values of digits; the correct choice is A. **31.** $420 \div 60$; the correct choice is H. **32.** $(\$15 \times 4) - (\$5 \times 9) = \$60 - (\$5 \times 9) =$

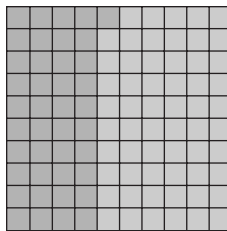
$$\$60 - \$45 = \$15; \$15 \quad 33. 15 + 4 \times 6 - 13 = 15 + 24 - 13 = 39 - 13 = 26; 26$$

ACTIVITY LAB

page 31

1–4. Models may vary. Samples are given.



- 5a.**  1.0 **5b.** Answers may vary. Sample: The sum completely fills all hundredths.

1-7 Adding and Subtracting Decimals

pages 32–35

Check Skills You'll Need For complete solutions see *Daily Skills Check and Lesson Quiz Transparencies* or *Presentation Pro CD-ROM*. **1.** Rounding **2.** 70 **3.** 110 **4.** 100 **5.** 3,200

Quick Check 1. $0.84 + 2.0 + 3.32 \approx 1.0 + 2.0 + 3.0 = 6$; about 6, $0.84 + 2.0 + 3.32 = 6.16$ 2. $3.98 + 9.08 + 9.08 \approx 4 + 9 + 9 = 22$; about \$22 3. $76.80 - 74.08 \approx 77.0 - 74.0 = 3.0$ m; $76.80 - 74.08 = 2.72$ m

Exercises 1. The decimal points were not lined up before subtracting. $5.8 - 2 = 3.8$ 2. $6.37 + 2.45 = 8.82$ 3. $8.90 - 7.52 = 1.38$ 4. $7.3 + 4.0 = 11.3$ 5. $6.70 + 2.40 \approx 7.0 + 2.0 = \9 6. $8.92 + 7.10 \approx 9.0 + 7.0 = \16 7. $7.10 + 4 \approx 7.0 + 4 = \11 8. $0.6 + 3.4 \approx 1 + 3$, or 4; about 4, $0.6 + 3.4 = 4.0$ 9. $6.2 + 0.444 \approx 6.0 + 0.0$, or 6; about 6, $6.2 + 0.44 = 6.644$ 10. $8.001 + 0.77 \approx 8.0 + 1.0$, or 9; about 9, $8.001 + 0.77 = 8.771$ 11. $7.0 + 11.436 + 3.08 \approx 7.0 + 11.0 + 3.0$, or 21; about 21, $7.0 + 11.436 + 3.08 = 21.516$ 12. $0.445 + 8.99 + 3 \approx 0.0 + 9 + 3$, or 12; about 12, $0.445 + 8.99 + 3 = 12.435$ 13. $0.33 + 1.11 + 3.2 \approx 0.0 + 1.0 + 3.0$, or 4; about 4, $0.33 + 1.11 + 3.2 = 4.64$ 14. $4.89 + 3.97 \approx 5.0 + 4.0 = 9$; about \$9 15. $6.15 + 8.86 \approx 6.0 + 9.0 = 15.0$; about \$15 16. $14.65 + 27.29 + 63.85 \approx 15.0 + 27.0 + 64.0 = 106$; about \$106 17. $16.81 + 19.94 + 11.49 \approx 17.0 + 20.0 + 11.0 = 48.0$; about \$48 18. $22.2 - 4.3 \approx 22.0 - 4.0$, or 18; about 18, $22.2 - 4.3 = 17.9$ 19. $8.91 - 6.08 \approx 9.0 - 6.0$, or 3.0; about 3, $8.91 - 6.08 = 2.83$ 20. $9.45 - 3.76 \approx 9.0 - 4.0$, or 5; about 5, $9.45 - 3.76 = 5.69$ 21. $9.1 - 6.05 \approx 9.0 - 6.0$, or 3.0; about 3, $9.1 - 6.05 = 3.05$ 22. $0.8 - 0.126 \approx 1.0 - 0.0$, or 1; about 1, $0.800 - 0.126 = 0.674$ 23. $4 - 1.29 \approx 4 - 1.0$, or 3; about 3, $4.00 - 1.29 = 2.71$ 24. $60 - 2.037 \approx 60.0 - 2.0$, or 58; about 58, $60.000 - 2.037 = 57.963$ 25. $9 - 0.45 \approx 9 - 0.0$, or 9; about 9, $9.00 - 0.45 = 8.55$ 26. $6.72 - 2.45 \approx 7.0 - 2.0$, or 5; about 5, $6.72 - 2.45 = 4.27$ 27. $222.98 - 174.99 = 47.99$; \$47.99 28. $340.87 + 52.00 - 38.72 = 392.87 - 38.72 = 354.15$; \$354.15 29. $0.041 + 0.009 = 0.050$; $0.050 < 0.5$ 30. $0.315 + 0.140 + 0.050 = 0.455 + 0.050 = 0.505$; $0.505 > 0.5$ 31. $669.583 + 204.222 = 873.805$; $873.805 > 873.8$ 32. $665.5 - 281.7 = 383.8$; $383.8 > 373.8$ 33. $13.92 - 3.41 - 6.35 - 1.24 - 1.05 - 0.61 = 1.26$ million 34a. $17.95 + 17.95 + 16.95 \approx 18 + 18 + 17 = 53$; about \$53 34b. $29.5 + 29.5 + 29.5 + 16.95 + 16.95 + 16.95 + 16.95 \approx 30 + 30 + 30 + 17 + 17 + 17 + 17 = 158$; about \$158 34c. $12.5 + 12.5 + 12.5 + 15 + 15 + 17.95 + 17.95 \approx 13 + 13 + 13 + 15 + 15 + 18 + 18 = 105$; about \$105 35. Answers may vary. Sample: mental math because it is quicker. 36a. $\frac{18}{1.2} = 15$ 36b. $\frac{11.25}{2.5} = 4.5$ 37. $5.00 - 3.25 = 1.75$; the correct choice is B. 38. $22 + 48 + 31 = 101$; \$100 is closest to \$101; the correct choice is G. 39. $11.942 > 11.924$; the correct choice is C. 40. 300 41. 800 42. 100 43. 1,400 44. 6,500

VOCABULARY BUILDER

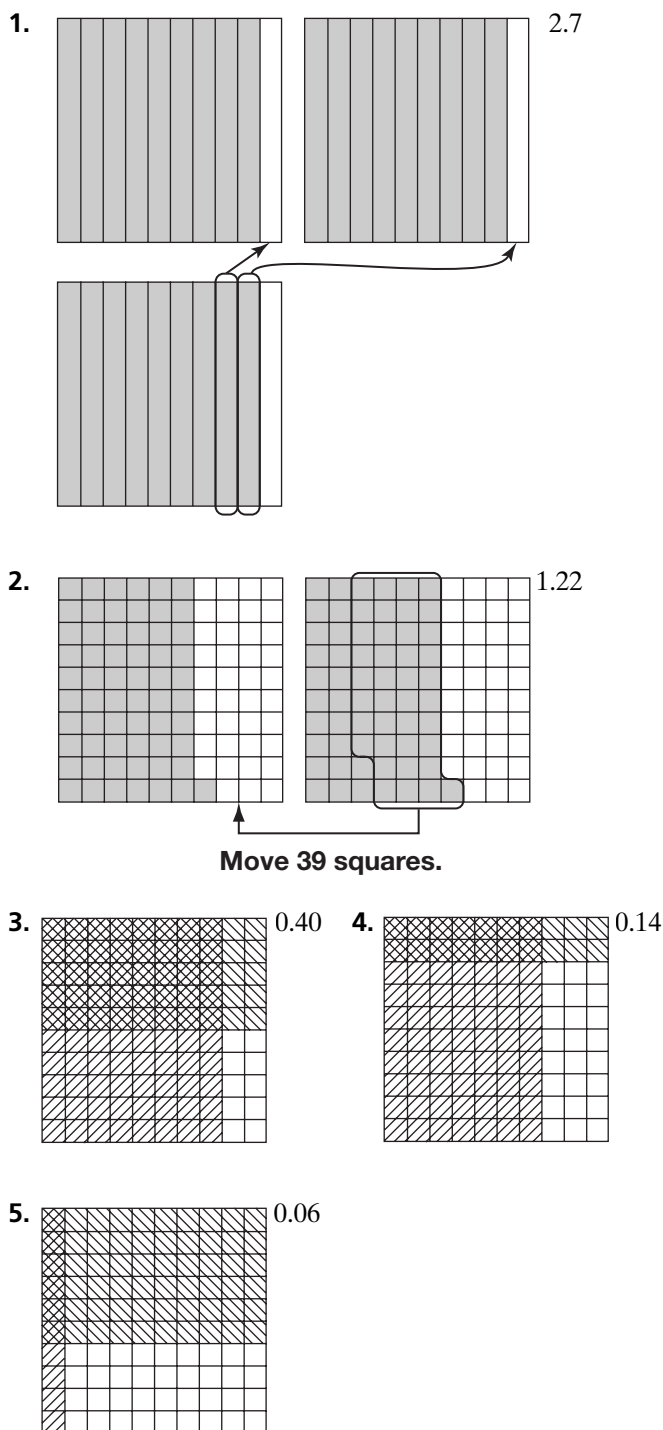
page 36

1–3. Check students' work. 4. Answers may vary.

Sample: Draw and label a number line that will include all the numbers. Graph each number. 5. $0.8 < 0.85$ 6. 1: tens, 1 ten or 10; 0: ones, 0 ones or 0; 9: tenths, 9 tenths or 0.9; 2: hundredths, 2 hundredths or 0.02 7a–c. Check students' work.

ACTIVITY LAB

page 37



6. Answers may vary. Sample: Draw a model showing 1, 1, and 0.6. This is 2.6. Shade 2 rows in each model. The shading overlaps 20 squares, 20 squares, and 12 squares, or 0.52.

1-8 Multiplying Decimals

pages 38–41

Check Skills You'll Need For complete solutions see *Daily Skills Check and Lesson Quiz Transparencies* or *Presentation Pro CD-ROM*. **1.** Yes; 130 is easy to divide by 5 mentally. **2.** about 600 **3.** about 180 **4.** about 100 **5.** about 10

Quick Check

1a. The product has two decimal places.

$$\begin{array}{r} 0.13 \\ \times 6 \\ \hline 0.78 \end{array}$$

2a. Each factor has one decimal place. The product has two decimal places.

$$\begin{array}{r} 0.3 \\ \times 0.2 \\ \hline 0.06 \end{array}$$

2c. One factor has one decimal place and the other factor has two decimal places. The product has three decimal places.

$$\begin{array}{r} 0.14 \\ \times 0.9 \\ \hline 0.126 \end{array}$$

3. Multiply $1.29 \times 2.75 = 3.5475$. Round 3.5475 to the nearest cent; \$3.55.

Exercises **1.** 7; there are 3 decimal places in the first number and 4 decimal places in the second number. So $3 + 4 = 7$. **2.** Answers may vary. Sample: No; I can estimate to check $20 \times 3 = 60$ and 60 is not close to 612.8. **3–5.** Explanations may vary. Samples are given.

3. < 1 ; $0.5 \times 2 = 1$ and $0.2 < 0.5$, so $0.2 \times 2 < 1$

4. > 1 ; $0.5 \times 2 = 1$ and $0.7 > 0.5$, so $2.2 \times 0.7 > 1$

5. $= 1$; $0.5 \times 2 = 1$

6. One factor has no decimal places and the other factor has three decimal places. The product has three decimal places.

$$\begin{array}{r} 0.403 \\ \times 5 \\ \hline 2.015 \end{array}$$

8. Both factors have two decimal places. The product has four decimal places.

$$\begin{array}{r} 0.15 \\ \times 0.31 \\ \hline 0.0465 \end{array}$$

1b. The product has two decimal places.

$$\begin{array}{r} 4.37 \\ \times 5 \\ \hline 21.85 \end{array}$$

2b. One factor has one decimal place and the other factor has two decimal places. The product has three decimal places.

$$\begin{array}{r} 5.32 \\ \times 1.9 \\ \hline 10.108 \end{array}$$

7. One factor has no decimal places and the other factor has one decimal place. The product has one decimal place.

$$\begin{array}{r} 524 \\ \times 0.5 \\ \hline 262.0 \end{array}$$

9. One factor has one decimal place and the other factor has two decimal places. The product has three decimal places.

$$\begin{array}{r} 8.42 \\ \times 6.7 \\ \hline 56.414 \end{array}$$

10. three decimal places in the product

$$\begin{array}{r} 0.018 \\ \times 4 \\ \hline 0.072 \end{array}$$

12. one decimal place in the product

$$\begin{array}{r} 35 \\ \times 5.6 \\ \hline 196.0 \end{array}$$

14. one decimal places in the product

$$\begin{array}{r} 358 \\ \times 0.7 \\ \hline 250.6 \end{array}$$

16. two decimal places in the product

$$\begin{array}{r} 53 \\ \times 0.04 \\ \hline 2.12 \end{array}$$

18. two decimal places in the product

$$\begin{array}{r} 0.2 \\ \times 0.7 \\ \hline 0.14 \end{array}$$

20. two decimal places in the product

$$\begin{array}{r} 0.3 \\ \times 0.3 \\ \hline 0.15 \end{array}$$

22. four decimal places in the product

$$\begin{array}{r} 0.12 \\ \times 0.96 \\ \hline 0.1152 \end{array}$$

24. four decimal places in the product

$$\begin{array}{r} 0.468 \\ \times 0.9 \\ \hline 0.4374 \end{array}$$

26. one decimal place in the product

$$\begin{array}{r} 230 \\ \times 4.5 \\ \hline 1,035.0 \end{array}$$

28. two decimal places in the product

$$\begin{array}{r} 4.5 \\ \times 3.2 \\ \hline 14.40 \end{array}$$

30. one decimal place in the product

$$\begin{array}{r} 420 \\ \times 3.3 \\ \hline 1,386.0 \end{array}$$

32. four decimal places in the product

$$\begin{array}{r} 6.18 \\ \times 4.25 \\ \hline 26.2650 \end{array}$$

11. one decimal place in the product

$$\begin{array}{r} 0.19 \\ \times 9 \\ \hline 1.71 \end{array}$$

13. two decimal places in the product

$$\begin{array}{r} 39 \\ \times 0.06 \\ \hline 2.34 \end{array}$$

15. two decimal places in the product

$$\begin{array}{r} 0.12 \\ \times 47 \\ \hline 5.64 \end{array}$$

17. two decimal places in the product

$$\begin{array}{r} 0.25 \\ \times 92 \\ \hline 23.00 \end{array}$$

19. two decimal places in the product

$$\begin{array}{r} 0.8 \\ \times 0.4 \\ \hline 0.32 \end{array}$$

21. two decimal places in the product

$$\begin{array}{r} 0.7 \\ \times 0.9 \\ \hline 0.63 \end{array}$$

23. four decimal places in the product

$$\begin{array}{r} 0.06 \\ \times 0.18 \\ \hline 0.0108 \end{array}$$

25. five decimal places in the product

$$\begin{array}{r} 0.574 \\ \times 0.03 \\ \hline 0.01722 \end{array}$$

27. four decimal places in the product

$$\begin{array}{r} 3.702 \\ \times 1.7 \\ \hline 6.2934 \end{array}$$

29. two decimal places in the product

$$\begin{array}{r} 8.1 \\ \times 1.3 \\ \hline 10.53 \end{array}$$

31. two decimal places in the product

$$\begin{array}{r} 15.5 \\ \times 3.2 \\ \hline 49.60 \end{array}$$

33. four decimal places in the product

$$\begin{array}{r} 2.065 \\ \times 1.2 \\ \hline 2.4780 \end{array}$$

- 34.** $365.3 \times 1.88 = 686.764$; 686.764 days
35. $(8.79 \times 2) + (9.48 \times 1.5) = 17.58 + 14.22 = 31.8$; \$31.80
36. $3.25 \times 0.2 = 0.65$; 0.65 g
37–39. Methods may vary. Samples are given.
37. 40; paper and pencil
38. 30; mental math
39. 298.1973; calculator
40. $(58.0 \times 13) - (13.5 \times 13) = 754 - 175.5 = 578.5$; 578.5 mi
41. Multiply 36 by 13.43. The unit of measurement in the product is millions of miles.

13.43

$\times 36$

483.48

The distance is

483.48 million mi.

- 42.** Answers may vary. Sample: In both cases, you multiply the same way; with 0.3×0.4 you need to show two decimal places. **43a.** $0.2 \times 0.7 = 0.14$, so $0.14 \div 0.2 = 0.7$; 0.14 **43b.** $0.03 \times 0.5 = 0.015$, so $0.015 \div 0.03 = 0.5$; 0.015 **44.** You should first count the number of adults and children. There are two adults so multiply 2×14 . There are four children so multiply 4×11 . The total cost is the sum of all admissions so add the products; the correct choice is B.
45. $214 + 92 + 56 \approx 210 + 90 + 50$; $300 + 50 = 350$; the correct choice is G. **46.** The statement $2.315 > 2.51$ is false; the correct choice is D. **47.** $7.32 + 4.29 = 11.61$
48. $11.07 - 1.2 = 9.87$ **49.** $6.5 - 0.32 = 6.18$

ACTIVITY LAB

page 42

- 1a.** Move the decimal point one, two, and three places to the right.

$$2.6 \times 10 = 26$$

$$2.6 \times 100 = 260$$

$$2.6 \times 1,000 = 2,600$$

- 1b.** Move the decimal point one, two, and three places to the right.

$$0.45 \times 10 = 4.5$$

$$0.45 \times 100 = 45$$

$$0.45 \times 1,000 = 450$$

- 2a.** When you multiply by 10, you move the decimal point to the right 1 place; multiplying by 100 moves the decimal 2 places; by 1,000 moves the decimal 3 places.

- 2b.** To multiply by 10, 100, or 1,000, move the decimal point to the right by the number of zeroes in either 10, 100, or 1,000.

- 3a.** Move the decimal point one, two, and three places to the left.

$$2.6 \div 10 = 0.26$$

$$2.6 \div 100 = 0.026$$

$$2.6 \div 1,000 = 0.0026$$

- 3b.** Move the decimal point one, two, and three places to the left.

$$0.45 \div 10 = 0.045$$

$$0.45 \div 100 = 0.0045$$

$$0.45 \div 1,000 = 0.00045$$

- 4a.** When you divide by 10, you move the decimal point to the left 1 place; multiplying by 100 moves the decimal 2 places; by 1,000 moves it 3 places. **4b.** To divide by 10, 100, or 1,000, move the decimal point to the left by the appropriate number of zeroes.

Exercises 1. 62 2. 12.29 3. 1.617 4. 4,300 5. 0.015

6. 890 **7a.** 52.7 **7b.** 5.27 **7c.** 0.527 **7d.** 0.0527

7e. Answers may vary. Sample: The number of decimal places in the product is the same as the factor that is not 527.

CHECKPOINT QUIZ 2

page 43

- 1.** twelve and thirty-five thousandths; $10 + 2 + 0.03 + 0.005$ **2.** 8.0; 8.05; 8.7; 9; 9.31 **3.** 7.8 **4.** 8.0 **5.** 17.1
6. $1.25 + 6.07 = 7.32$ **7.** $9.06 - 0.8 = 8.26$
8. $5.2 \times 6.3 = 32.76$ **9.** $1.7 - 0.28 = 1.42$
10. $7.00 - 3.25 - (3 \times 0.70) = 7.00 - 3.25 - 2.10 = 3.75 - 2.10 = 1.65$; 1.65 lb

1-9 Dividing Decimals

pages 44–47

Check Skills You'll Need For complete solutions see *Daily Skills Check and Lesson Quiz Transparencies* or *Presentation Pro CD-ROM*. **1.** A dividend is the number being divided. A divisor is the number that divides. **2.** 187 **3.** 37 **4.** 53

Quick Check

1a. $385.6 \div 8 = 48.2$

48.2

$8 \overline{)385.6}$

$\underline{-32}$

65

$\underline{-64}$

16

$\underline{-16}$

0

1b. $9.12 \div 6 = 1.52$

1.52

$6 \overline{)9.12}$

$\underline{-6}$

31

$\underline{-30}$

12

$\underline{-12}$

0

- 2.** $2.75 \div 0.25 = 275 \div 25 = 11$; 11 trading cards

11

$25 \overline{)275}$

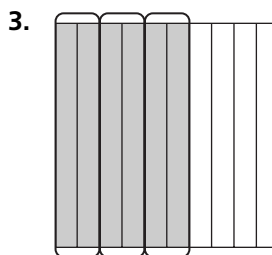
$\underline{-25}$

25

$\underline{-25}$

0

Exercises **1.** quotient **2.** < 3 ; when you divide a number more than 3 by a divisor a little more than 1, your answer will be less than 3.



- 4.** Use picture to solve: $0.8 \div 0.4 = 2$; $8 \div 4 = 2$.
5. Use picture to solve: $0.9 \div 0.3 = 3$; $9 \div 3 = 3$.
6. Use picture to solve: $0.40 \div 0.05 = 8$; $40 \div 5 = 8$.

7. $328.25 \div 13 = 25.25$

$$\begin{array}{r} 25.25 \\ 13 \overline{)328.25} \\ \underline{-26} \\ 68 \\ \underline{-65} \\ 32 \\ \underline{-26} \\ 65 \\ \underline{-65} \\ 0 \end{array}$$

9. $237.6 \div 33 = 7.2$

$$\begin{array}{r} 7.2 \\ 33 \overline{)237.6} \\ \underline{-231} \\ 66 \\ \underline{-66} \\ 0 \end{array}$$

11. $26.46 \div 84 = 0.315$

$$\begin{array}{r} .315 \\ 84 \overline{)26.46} \\ \underline{-252} \\ 126 \\ \underline{-84} \\ 420 \\ \underline{-420} \\ 0 \end{array}$$

13. $99.36 \div 27 = 3.68$

$$\begin{array}{r} 3.68 \\ 27 \overline{)99.36} \\ \underline{-81} \\ 183 \\ \underline{-162} \\ 216 \\ \underline{-216} \\ 0 \end{array}$$

8. $255.5 \div 7 = 36.5$

$$\begin{array}{r} 36.5 \\ 7 \overline{)255.5} \\ \underline{-21} \\ 45 \\ \underline{-42} \\ 35 \\ \underline{-35} \\ 0 \end{array}$$

10. $258.24 \div 32 = 8.07$

$$\begin{array}{r} 8.07 \\ 32 \overline{)258.24} \\ \underline{-256} \\ 22 \\ \underline{-0} \\ 224 \\ \underline{-224} \\ 0 \end{array}$$

12. $144.54 \div 6 = 24.09$

$$\begin{array}{r} 24.09 \\ 6 \overline{)144.54} \\ \underline{-12} \\ 24 \\ \underline{-24} \\ 05 \\ \underline{-0} \\ 54 \\ \underline{-54} \\ 0 \end{array}$$

14. $38.27 \div 43 = 0.89$

$$\begin{array}{r} 0.89 \\ 43 \overline{)38.27} \\ \underline{-344} \\ 387 \\ \underline{-387} \\ 0 \end{array}$$

15. $29.5 \div 0.4 =$
 $295 \div 4 = 73.75$

$$\begin{array}{r} 73.75 \\ 4 \overline{)295.00} \\ \underline{-28} \\ 15 \\ \underline{-12} \\ 30 \\ \underline{-28} \\ 20 \\ \underline{-20} \\ 0 \end{array}$$

17. $10.261 \div 3.1 =$
 $102.61 \div 31 = 3.31$

$$\begin{array}{r} 3.31 \\ 31 \overline{)102.61} \\ \underline{-93} \\ 96 \\ \underline{-93} \\ 31 \\ \underline{-31} \\ 0 \end{array}$$

19. $0.144 \div 0.96 =$
 $14.4 \div 96 = 0.15$

$$\begin{array}{r} 0.15 \\ 96 \overline{)14.4} \\ \underline{-96} \\ 48 \\ \underline{-48} \\ 0 \end{array}$$

21. $0.649 \div 5.9 =$
 $6.49 \div 59 = 0.11$

$$\begin{array}{r} 0.11 \\ 59 \overline{)6.49} \\ \underline{-59} \\ 59 \\ \underline{-59} \\ 0 \end{array}$$

23a. $0.90 \div 0.01 =$
 $90 \div 1 =$
 $90; 90 \text{ pieces}$

$$\begin{array}{r} 90 \\ 1 \overline{)90} \\ \underline{-90} \\ 0 \end{array}$$

16. $6.497 \div 8.9 =$
 $64.97 \div 89 = 0.73$

$$\begin{array}{r} 0.73 \\ 89 \overline{)64.97} \\ \underline{-623} \\ 267 \\ \underline{-267} \\ 0 \end{array}$$

18. $16.8 \div 2.4 =$
 $168 \div 24 = 7$

$$\begin{array}{r} 7 \\ 24 \overline{)168} \\ \underline{-168} \\ 0 \end{array}$$

20. $10.54 \div 0.17 =$
 $1,054 \div 17 = 62$

$$\begin{array}{r} 62 \\ 17 \overline{)1,054} \\ \underline{-102} \\ 34 \\ \underline{-34} \\ 0 \end{array}$$

22. $263.50 \div (17 \times 2) =$
 $263.50 \div 34 = 7.75;$
 $\$7.75; 34 \text{ tickets purchased}$

$$\begin{array}{r} 7.75 \\ 34 \overline{)263.50} \\ \underline{-238} \\ 255 \\ \underline{-238} \\ 170 \\ \underline{-170} \\ 0 \end{array}$$

23b. Yes; if 25 students each get 3 pieces, then 75 pieces are needed and 75 is less than 90.

- 24.** $9,368 \div 500 = 18.736$; $93.68 \div 100 = 93.68$;
 $93.68 - 18.736 = 74.944$; 74.944 min

$$\begin{array}{r} 18.736 \\ 500 \overline{)9368.000} \\ \underline{-500} \\ 4368 \\ \underline{-4000} \\ 3680 \\ \underline{-3500} \\ 1800 \\ \underline{-1500} \\ 3000 \\ \underline{-3000} \\ 0 \end{array}$$

$$\begin{array}{r} 93.68 \\ 100 \overline{)9368.00} \\ \underline{-900} \\ 368 \\ \underline{-300} \\ 680 \\ \underline{-600} \\ 800 \\ \underline{-800} \\ 0 \end{array}$$

- 25.** $12.75 \times 3 = 38.25$;
 $38.25 \div 5 = 7.65$; \$7.65

$$\begin{array}{r} 12.75 \\ \times 3 \\ \hline 38.25 \end{array}$$

$$\begin{array}{r} 7.65 \\ 5 \overline{)38.25} \\ \underline{-35} \\ 32 \\ \underline{-32} \\ 0 \end{array}$$

- 26.** $64.97 \div 3.2 =$
 $649.7 \div 32 = 20.303$
 3 rounds 0 to 0; 20.30

$$\begin{array}{r} 20.303 \\ 32 \overline{)649.700} \\ \underline{-64} \\ 09 \\ \underline{-00} \\ 97 \\ \underline{-96} \\ 10 \\ \underline{-00} \\ 100 \\ \underline{-96} \\ 4 \end{array}$$

- 27.** $10.126 \div 2.3 =$
 $101.26 \div 23 = 4.402$;
 2 rounds 0 to 0; 4.40

$$\begin{array}{r} 4.402 \\ 23 \overline{)101.260} \\ \underline{-92} \\ 92 \\ \underline{-92} \\ 06 \\ \underline{-0} \\ 60 \\ \underline{-46} \\ 14 \end{array}$$

- 28.** $26.81 \div 3.3 =$
 $268.1 \div 33 = 8.124$;
 4 rounds 2 to 2; 8.12

$$\begin{array}{r} 8.124 \\ 33 \overline{)268.100} \\ \underline{-264} \\ 41 \\ \underline{-33} \\ 80 \\ \underline{-66} \\ 140 \\ \underline{-132} \\ 8 \end{array}$$

- 29.** $5.637 \div 0.17 =$
 $563.7 \div 17 = 33.158$;
 8 rounds 5 up to 6; 33.16

$$\begin{array}{r} 33.158 \\ 17 \overline{)563.700} \\ \underline{-51} \\ 53 \\ \underline{-57} \\ 27 \\ \underline{-17} \\ 100 \\ \underline{-85} \\ 150 \\ \underline{-136} \\ 14 \end{array}$$

- 30.** $78.28 \div 6.24 =$
 $7,828 \div 624 = 12.544$;
 4 rounds 4 to 4; 12.54

$$\begin{array}{r} 12.544 \\ 624 \overline{)7828.000} \\ \underline{-624} \\ 1588 \\ \underline{-1248} \\ 3400 \\ \underline{-3120} \\ 2800 \\ \underline{-2496} \\ 3040 \\ \underline{-2496} \\ 544 \end{array}$$

- 31.** $1.2542 \div 0.12 =$
 $125.42 \div 12 = 10.451$;
 1 rounds 5 to 5; 10.45

$$\begin{array}{r} 10.451 \\ 12 \overline{)125.420} \\ \underline{-12} \\ 05 \\ \underline{-0} \\ 54 \\ \underline{-48} \\ 62 \\ \underline{-60} \\ 20 \\ \underline{-12} \\ 8 \end{array}$$

- 32.** $125.10 \div 0.12 =$
 $12,510 \div 12 = 1,042.5$

$$\begin{array}{r} 1042.5 \\ 12 \overline{)12510.0} \\ \underline{-12} \\ 05 \\ \underline{-0} \\ 51 \\ \underline{-48} \\ 30 \\ \underline{-24} \\ 60 \\ \underline{-60} \\ 0 \end{array}$$

- 33.** Answers may vary. Sample: $127.34 \div 0.671$; because 0.671 is smaller, it can go into 127.34 more times.

- 34.** Convert time into half hours. Divide how much you and your friend worked into the total paid. $38.25 \div 9 = 4.25$; this will be the rate per half hour, then multiply your half hours by the rate. $4.25 \times 5 = 21.25$; you: \$21.25; friend: \$17.00.

$$\begin{array}{r} 4.25 \\ 9 \overline{)38.25} \\ \underline{-36} \\ 22 \\ \underline{-18} \\ 45 \\ \underline{-45} \\ 0 \end{array}$$

$$\begin{array}{r} 4.25 \\ \times 5 \\ \hline 21.25 \end{array}$$

- 35.** Ben; he is the shortest out of all of them, and Charlie is not the shortest; the correct choice is A.

- 36.** Price of a shirt; the correct choice is F.

- 37.** Compare digits starting with the highest place value: 8.03, 8.035, 8.3, 8.308 are in order from least to greatest.

38. Compare digits starting with the highest place value: 1.081, 1.18, 1.8, 1.801 are in order from least to greatest.

ACTIVITY LAB

page 48

- 1.** 7 rounds up to 8; about 67.8 in.

$$\begin{array}{r} 35 \\ \times 2.9 \\ \hline 101.5 \end{array}$$

$$101.5 + 70.6 = 172.1$$

$$172.1 \div 2.54 = 17,210 \div 254 = 67.75$$

$$\begin{array}{r} 67.75 \\ 254 \overline{)17210.00} \\ \underline{-1524} \\ 1970 \\ \underline{-1778} \\ 1920 \\ \underline{-1778} \\ 1420 \\ \underline{-1270} \\ 150 \end{array}$$

- 2.** female 1: 65.27 in.; 2 rounds up to 3; about 65.3 in.; male 2: 63.75 in.; 7 rounds to 8; about 63.8 in.

Female 1:

$$\begin{array}{r} 32.5 \\ \times 2.8 \\ \hline 91.00 \end{array}$$

$$91.00 + 74.8 = 165.8$$

$$165.8 \div 2.54 =$$

$$16,580 \div 254 = 65.27$$

$$\begin{array}{r} 65.27 \\ 254 \overline{)16580.00} \\ \underline{-1524} \\ 1340 \\ \underline{-1270} \\ 700 \\ \underline{-508} \\ 1920 \\ \underline{-1778} \\ 142 \end{array}$$

Male 2:

$$\begin{array}{r} 31.5 \\ \times 2.9 \\ \hline 91.35 \end{array}$$

$$1.35 + 70.60 = 161.95$$

$$161.95 \div 2.54 =$$

$$16,195 \div 254 = 63.15$$

$$\begin{array}{r} 63.75 \\ 254 \overline{)16195.00} \\ \underline{-1524} \\ 955 \\ \underline{-762} \\ 1930 \\ \underline{-1778} \\ 1520 \\ \underline{-1270} \\ 250 \end{array}$$

- 3.** Check students' work.

- 4.** 26.14; 1 rounds to 1; 26.1 cm

$$148.0 - 74.8 = 73.2$$

$$73.2 \div 2.8 = 732 \div 28 = 26.14$$

$$\begin{array}{r} 26.14 \\ 28 \overline{)732.00} \\ \underline{-56} \\ 172 \\ \underline{-168} \\ 40 \\ \underline{-28} \\ 120 \\ \underline{-112} \\ 8 \end{array}$$

- 5.** male; $24.5 \times 2.9 + 70.6 = 71.05 + 70.60 = 141.65$; 141.65 rounds to 141.7 **6.** Check students' work.

GUIDED PROBLEM SOLVING

pages 49–50

- 1.** The diagram shows 0 to 550,000 rubber bands as the same length as 0 to 5 months because 550,000 rubber bands were used over 50 months. **2.** Each year is 12 months, so 4×12 is the number of months in 4 years. **3.** I can estimate 4 years and 2 months as 50 months and 550,000 rubber bands as 500,000 rubber bands. I can divide 500,000 by 50 and estimate that he used 10,000 rubber bands per month. **4.** $1 + 1 + 0 + 1 + 1 = 4$; $0.39 + 0.59 + 0.89 + 0.98 + 0.13 \approx 0.4 + 0.6 + 0.9 + 1.0 + 0.1 = (0.4 + 0.6) + 1 + (0.9 + 0.1) = 1 + 1 + 1 = 3$; $4 + 3 = 7$; about \$7.00 **5.** $38.5 - 34.8 = 3.7$; 3.7 inches **6.** $50 \times 240 \approx 50 \times 250 = 12,500$; about \$12,500 **7.** $63,360 \times 19.62 = 1,243,123.2$; 1,243,123.2 rounds up to 1,243,124; 1,243,124 paper clips because you have to have whole paperclips. **8.** $26.75 \times 60 \times 60 = 96,300$; $96,300 \div 60,650 \approx 1.59$; about 1.59 s

TEST-TAKING STRATEGIES

page 51

- 1.** $6.5 + 5.5 + 6.0 + 6.5 + 6.0 = (6.5 + 5.5) + (6.0 + 6.0) + 6.5 = 12.0 + (6.0 + 6.0) + 6.5 = 12.0 + 12.0 + 6.5 = 24.0 + 6.5 = 30.5$ **2.** Compare digits starting with the highest place value; 0.26. **3.** $9 \times 2 + 15 \times 3 = 18 + 45 = 63$; $100 - 63 = 37$ **4.** $32.4 - 6.8 = 25.6$

CHAPTER REVIEW

pages 52–53

- 1.** Ident. Prop. of Add. **2.** compatible numbers **3.** standard form **4.** expression **5.** Assoc. Prop. of Add. **6.** five million, twenty-five **7.** five thousand, twenty-five **8.** Compare digits starting with the highest place value; 1,001; 1,010; 1,100; 1,101 are in order from least to greatest. **9.** Compare digits starting with the highest place value; 2,232; 2,322; 2,323; 2,332 are in order from least to greatest. **10.** 5,021 rounds down to 5,000; 2,957 rounds up to 3,000; $5,000 + 3,000 = 8,000$; about 8,000 **11.** 52 rounds down to 50; 29 rounds up to 30; 97 rounds up to 100; $50 + 30 + 100 = 80 + 100 = 180$; about 180 **12.** 597 rounds up to 600; 201 rounds down to 200; $600 - 200 = 400$; about 400 **13.** 8,989 rounds up to 9,000; $9,000 \div 3 = 3,000$; about 3,000 **14.** 19 rounds up to 20; 52 rounds down 50; $20 \times 50 = 1,000$; about 1,000 **15.** 6,012 rounds down to 6,000; 99 rounds up to 100; $6,000 \div 100 = 60$; about 60 **16.** $1 + 250 + 99 = 250 + (1 + 99) = 250 + 100 = 350$ **17.** $2 \times 5 \times 13 = 10 \times 13 = 130$ **18.** $16 + 3 + 4 + 7 = (16 + 4) + (3 + 7) = 20 + 10 = 30$ **19.** $30 - 5 + 4 \times 3 = 30 - 5 + 12 = 25 + 12 = 37$ **20.** $6 - (27 - 9) \div 3 = 6 - 18 \div 3 = 6 - 6 = 0$ **21.** $5 \times 8 + 4 \div 2 = 40 + 4 \div 2 = 40 + 2 = 42$; 42 **22.** five hundred twenty-five and five tenths **23.** five thousand, two hundred fifty-five ten-thousandths **24.** five and twenty-five thousandths **25.** fifty and twenty-five ten-thousandths **26.** 1 rounds up to 2; 45.2 **27.** 6 rounds to 6; 98.6 **28.** 2 rounds up to 3; 5.13 **29.** 4 rounds up to 5; 1.25 **30.** Compare digits starting

with the highest place value; 0.06; 0.14; 0.4; 0.52 are in order from least to greatest. **31.** Compare digits starting with the highest place value; 23, 23.03; 23.2; 23.25 are in order from least to greatest.

32–37. Answers may vary. Samples are given.

32. $337 + 20 = 357$; $337.4 + 20.08 = 357.48$ about 357; 357.48 **33.** $2 - 1 = 1$; $1.741 - 0.81 = 0.931$; about 1; 0.931 **34.** using front end estimation $1 + 1 + 1 = 3$; $1.6 + 1.8 = 3.4$; about 3; 3.4 **35.** $10 - 8 = 2$; $9.6 - 7.9 = 1.7$; about 2; 1.7 **36.** $4 - 0 = 4$; $4.120 - 0.253 = 3.867$; about 4; 3.867 **37.** $2 + 5 = 7$; $2.01 + 5.39 = 7.4$; about 7; 7.4

38. $1.2 \times 29.5 = 35.4$

$$\begin{array}{r} 29.5 \\ \times 1.2 \\ \hline 35.40 \end{array}$$

39. $12.12 \div 6 = 2.02$

$$\begin{array}{r} 2.02 \\ 6 \overline{)12.12} \\ \underline{-12} \\ 01 \\ \underline{-00} \\ 12 \\ \underline{-12} \\ 0 \end{array}$$

40. $38.4 \div 0.08 =$
 $3,840 \div 8 = 480$

$$\begin{array}{r} 480 \\ 8 \overline{)3840} \\ \underline{-32} \\ 64 \\ \underline{-64} \\ 0 \end{array}$$

41. $0.54 \times 17 = 9.18$

$$\begin{array}{r} 17 \\ \times .54 \\ \hline 9.18 \end{array}$$

42. $27.76 \div 4 = 6.94$

$$\begin{array}{r} 6.94 \\ 4 \overline{)27.76} \\ \underline{-24} \\ 37 \\ \underline{-36} \\ 16 \\ \underline{-16} \\ 0 \end{array}$$

43. $3.21 \times 9.8 = 31.458$

$$\begin{array}{r} 3.21 \\ \times 9.8 \\ \hline 31.458 \end{array}$$

44. $13 \times 0.8 = 10.4$

$$\begin{array}{r} 13 \\ \times 0.8 \\ \hline 10.4 \end{array}$$

45. $8.5 \div 0.05 =$
 $850 \div 5 = 170$

$$\begin{array}{r} 170 \\ 5 \overline{)850} \\ \underline{-5} \\ 35 \\ \underline{-35} \\ 0 \end{array}$$

CHAPTER TEST

page 54

- 1.** six hundred twenty-three and seven tenths **2.** two million, eighty-six thousand, three hundred seventy-four
3. eighty-nine and one hundred twenty-three

thousandths **4.** thirty-five billion, seven hundred forty-three million, six hundred twenty thousand **5.** one hundred seventy-two thousand, two hundred fifty-four
6. three and twenty-four thousandths **7.** On a number line, 26,145 is to the right of 25, 641; $>$ **8.** On a number line, 32.12 is to the left of 32.42; $<$ **9.** On a number line, 9.7 and 9.70 are in the same place; $=$ **10.** On a number line, 1,247 is to the right of 1,241; $>$

11. Compare digits with highest place value: 6,425; 6,452; 6,524; 6,542; 7,642 are in order from least to greatest. **12.** Compare digits with highest place value: 0.212, 0.27, 0.276, 0.5, 0.56, 0.563 are in order from least to greatest. **13.** Compare digits with highest place value: 80.08, 80.3, 81, 81.1, 81.5, 82 are in order from least to greatest. **14.** Compare digits with highest place value: 0.163, 1, 1.036, 1.064, 1.63, 2, 2.136 are in order from least to greatest. **15–21.** Answers may vary.

Samples: **15.** 238.52 rounds up to 240; 42.56 rounds down to 40; 92.35 rounds down to 90; $240 + 40 - 90 = 280 - 90 = 190$; about \$190 **16.** 37 rounds up to 40; 42 rounds down to 40; 142 rounds down to 140; $40 + 40 + 140 = 80 + 140 = 220$; about 220
17. 50.32 rounds down to 50; 22.1 rounds down to 20; $50 \times 20 = 1,000$; about 1,000 **18.** 4.63 rounds up to 5; 50.491 rounds down to 50; $5 \times 50 = 250$; about 250
19. 98 rounds to 100; 25 is compatible with 100; $100 \div 25 = 4$; about 4 **20.** 1.01 rounds down to 1; 2.89 rounds up to 3; $1 + 3 = 4$; about 4 **21.** 62.85 rounds down to 60; 24.12 rounds down to 20; $60 - 20 = 40$; about 40 **22.** Greater than \$14. Answers may vary. Sample: $5 \times 14 = 70$, and $70 < 75$ **23.** $829 + 71 = 900$

24. $24 + (72 + 64) = 24 + 136 = 160$ **25.** $25 \times 6 \times 4 = 25 \times 4 \times 6 = 100 \times 6 = 600$ **26.** $10 \times 7 \times 20 = 70 \times 20 = 1,400$ **27.** $40 - (4 \times 7) = 40 - 28 = 12$; \$12
28. $16 \div (4 \times 4) = 16 \div 16 = 1$ **29.** $8 - 4 \div 2 = 8 - 2 = 6$ **30.** $5 + (32 - 16) = 5 + 16 = 21$
31. $(9 - 1 \times 3) \div 2 = (9 - 3) \div 2 = 6 \div 2 = 3$
32–35. Answers may vary. Samples are given.
32. $4 + 15 = 19$; $3.89 + 15.3 = 19.19$; about 19; 19.19
33. $5 - 2 = 3$; $4.6 - 2.07 = 2.53$; about 3; 2.53
34. $40 - 20 = 20$; $41.2 - 19.8 = 21.4$; about 20; 21.4
35. $50 + 30 = 80$; $53.7 + 28.6 = 82.3$; about 80; 82.3

36. $9.063 \times 24 = 217.512$

$$\begin{array}{r} 9.063 \\ \times 24 \\ \hline 217.512 \end{array}$$

37. $0.36(15) = 5.4$

$$\begin{array}{r} 15 \\ \times 0.36 \\ \hline 5.40 \end{array}$$

38. $21.6 \div 0.06 =$
 $2,160 \div 6 = 360$

$$\begin{array}{r} 360 \\ 6 \overline{)2,160} \\ \underline{-18} \\ 36 \\ \underline{-36} \\ 0 \end{array}$$

39. $7 \div 0.14 =$
 $700 \div 14 = 50$

$$\begin{array}{r} 50 \\ 14 \overline{)700} \\ \underline{-70} \\ 0 \end{array}$$

$$40. 6.24 \div 0.24 =$$

$$624 \div 24 = 26$$

$$\begin{array}{r} 26 \\ 24 \overline{)624} \\ \underline{-48} \\ 144 \\ \underline{-144} \\ 0 \end{array}$$

$$41. 40 \times 0.25 = 10.00$$

$$10 \times 9 = 90; \$90$$

$$\begin{array}{r} 40 \quad 10 \\ \times 0.25 \quad \times 9 \\ \hline 10.00 \quad 90 \end{array}$$

TEST PREP

page 55

1. There were 15.26 inches of rain in April and 6.2 inches of rain in June. $15.26 - 6.2 = 9.06$; the correct choice is C. 2..There were 0.12 inches of rain in May. $0.83 \div 0.12 \approx 7$; the correct choice is G. 3. Hilo receives 129.19 inches of rain in 1 year. $129.19 \cdot 10 = 1,291.9$; the correct choice is A. 4. Hilo receives 129.19 inches per year and Phoenix receives 7.66 inches of rain per year. $129.19 \div 7.66 \approx 16$; the correct choice is J. 5. Express the purity of the coin with units in the ten thousandth digit. $0.999 = 0.9990$; the correct choice is B. 6. The American Gold Eagle coin has a purity of 0.9166; $1 - 0.9166 = 0.0834$; the correct choice is G. 7. $0.9999 > 0.9995 > 0.999 > 0.9166$; Canadian Maple Leaf coins have the greatest portion of pure metal, so the correct choice is C. 8. A 1-ounce coin has 0.9166 ounces of gold so a 0.1-ounce American Gold Eagle coin

would have the same percent of gold in it. $0.1 \cdot 0.9166 = 0.09166$; the correct choice is J.

DK PROBLEM SOLVING APPLICATION

pages 56–57

1. There is only 1 20-gallon aquarium; the unit cost of a water filter: $\$64.98 \div 2$; $\$32.49$; 6 bags of gravel at $\$1.99$ each; total price of gravel: $6 \times \$1.99 = \11.94 ; subtotal: $\$119.99 + \$14.95 + \$64.98 + \$22.47 + \$11.94 + \$39.75 = \$274.08$; missing values are 1; $\$32.49$; 6; $\$11.94$; $\$274.08$. 2. Answers may vary. Samples are given. 2a. blue jeans, $\$39.99$; tee-shirts, $\$5.49$; winter coat, $\$117.29$; socks, $\$2.99$; sweatshirt, $\$36.89$; winter hat, $\$14.99$; running shoes, $\$56.79$; shorts, $\$22$; boots, $\$55.99$

2b–c.

Quantity	Description	Unit	Total
2	Blue Jeans	\$39.99	\$79.98
4	Tee-shirts	\$5.49	\$21.96
1	Winter Coat	\$117.29	\$117.29
6	Socks, pair	\$2.99	\$17.94
3	Sweatshirt	\$36.89	\$110.67
1	Winter Hat	\$14.99	\$14.99
1	Running Shoes, pair	\$56.79	\$56.79
1	Shorts, pair	\$22.00	\$22.00
1	Boots, pair	\$55.99	\$55.99

2d. Check students' work.

CHECK YOUR READINESS

page 58

1. Compare digits with highest place value: 0.12, 0.13, 0.21, 0.35, 0.45 are ordered from least to greatest.
2. Compare digits with highest place value: 44.0, 45.01, 45.1, 46.01 are ordered from least to greatest.
3. $13.2 + 23.6 + 26.3 = 36.8 + 26.3 = 63.1$
4. $152.3 + 143.6 + 128.0 = 295.9 + 128.0 = 423.9$
5. $49.00 + 22.20 + 11.22 + 23.40 = 71.2 + 11.22 + 23.4 = 82.42 + 23.40 = 105.82$
6. $6.09 + 1.50 + 4.68 + 13.60 = 7.59 + 4.68 + 13.60 = 12.27 + 13.60 = 25.87$
7. $109.55 - 89.34 = 20.21$
8. $10.42 - 9.36 = 1.06$
9. $75 - 73.2 = 75.0 - 73.2 = 1.8$
10. $142.03 \div 10 = 14.203$
11. $361.6 \div 16 = 22.6$
12. $100.75 \div 25 = 4.03$

ACTIVITY LAB

page 60

1. Check students' work.
2. 9 apples; answers may vary. Sample: You can add to find the total number of apples and then divide by 3.

3.



4. Answers may vary. Sample: The mean is the sum of the data divided by the number of data items.
5. Answers may vary. Sample: The sum is not divisible by 4. Since the mean is 16.5, you could cut two apples in half.

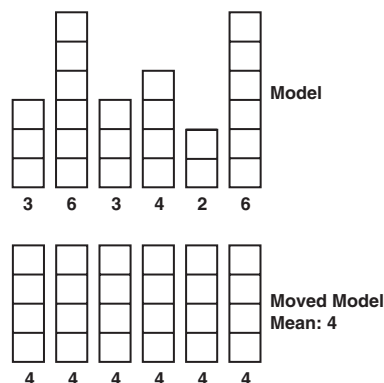
$$\begin{aligned}
 6. \quad & \frac{12 + 10 + 4 + ?}{4} = 9 \\
 & \frac{26 + ?}{4} = 9 \\
 & \frac{26 + ?}{4} \times 4 = 9 \times 4 \\
 & 26 + ? = 36 \\
 & 26 + ? - 26 = 36 - 26 \\
 & ? = 10 \text{ balloons}
 \end{aligned}$$

2-1 Finding the Mean pages 61–64

Check Skills You'll Need For complete solutions see *Daily Skills Check* and *Lesson Quiz Transparencies* or *Presentation Pro CD-ROM*. 1. quotient 2. 27.5 3. 42.75 4. 59.35

Quick Check

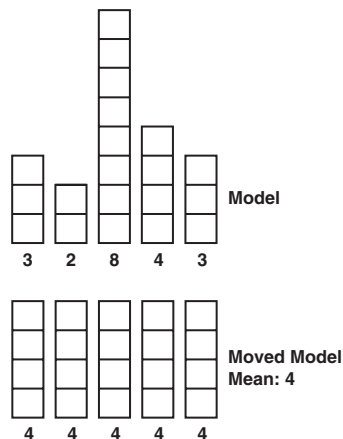
1.



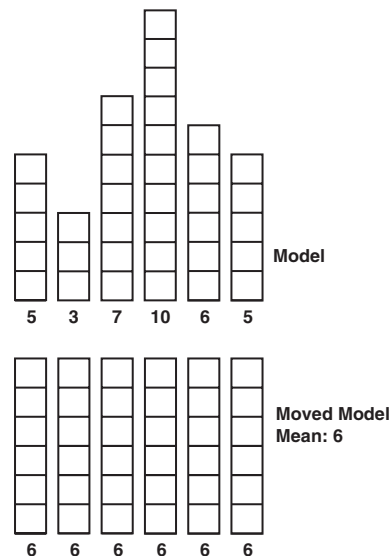
2. $\frac{12 + 23 + 13 + 32 + 20}{5} = \frac{100}{5} = 20$
3. The outlier increases the value of the mean.

Exercises 1. Answers may vary. Sample: Add the data and divide the sum by 5.

2.



3.



4. Answers may vary. Sample: An outlier can skew the mean. For example, in the data set 2, 4, 4, 30, the mean is 10, which is not close to any of the data.

$$5. \frac{3 + 4 + 7 + 2 + 5 + 9}{6} = \frac{30}{6} = 5$$

$$6. \frac{6 + 4 + 5 + 9 + 7 + 6 + 8 + 3}{8} = \frac{48}{8} = 6$$

$$7. \frac{12 + 9 + 11 + 8 + 9 + 12 + 9}{7} = \frac{70}{7} = 10$$

$$8. \frac{14 + 16 + 28 + 17 + 20}{5} = \frac{95}{5} = 19$$

$$9. \frac{121 + 95 + 115 + 92 + 113 + 108 + 91}{7} = \frac{735}{7} = 105$$

$$10. \frac{2.4 + 1.8 + 3.5 + 2.3 + 6.5}{5} = \frac{16.5}{5} = 3.3$$

$$11. \frac{500 + 450 + 475 + 450 + 500}{5} = \frac{2,375}{5} = 475$$

$$12. \frac{23 + 24 + 27 + 25 + 26 + 22 + 21}{7} = \frac{168}{7} = 24$$

$$13. \frac{58 + 36 + 44 + 37}{4} = \frac{175}{4} = 43.75; 43.75 \text{ minutes}$$

14. With the outlier:

$$\frac{95 + 90 + 87 + 85 + 79 + 82 + 87 + 40 + 90 + 80}{10} = 81.5$$

Without the outlier:

$$\frac{95 + 90 + 87 + 85 + 79 + 82 + 87 + 90 + 80}{9} = 86.111; 40;$$

decreases 15. With the outlier:

$$\frac{8 + 7 + 10 + 12 + 8 + 6 + 9 + 50 + 8 + 10 + 7 + 7}{14} =$$

11.5; Without the outlier:

$$\frac{8 + 7 + 10 + 12 + 8 + 11 + 8 + 6 + 8 + 10 + 7 + 7}{13} =$$

8.538; 50; increases 16. With the outlier:

$$\frac{200 + 225 + 3,000 + 500 + 325 + 311 + 295 + 485 + 359 + 325}{10} =$$

602.5; Without the outlier:

$$\frac{200 + 225 + 500 + 325 + 311 + 295 + 485 + 359 + 325}{9} \approx$$

336.111; 3,000; increases

$$17. \frac{1.99 + 2.29 + 2.19 + 1.88}{4} = \frac{835}{4} = 2.0875; \$2.09$$

The mean is \$2.09. This is a good measure because it is close to all the other prices. 18. Check students' work. 19.

$$\frac{10 + 4 + 11.7 + 30 + 7.9 + 11 + 8.2 + 3 + 8 + 9.2 + 14.2 + 5.2}{12} =$$

10.2 20.

$$\frac{2.4 + 5.3 + 3.5 + 2.6 + 2.3 + 3.5 + 2.8 + 4.3 + 4.5 + 3.8}{10} =$$

$$\frac{35}{10} = 3.5 \text{ 21a.}$$

$$\frac{5 + 1 + 15 + 43 + 9 + 9 + 11 + 11 + 14 + 12 + 36 + 6}{12} =$$

$$\frac{172}{12} \approx 14.333; 14 \text{ inches 21b. Answers may vary. Sample:}$$

With the outliers:

$$\frac{5 + 1 + 15 + 43 + 9 + 9 + 11 + 11 + 14 + 12 + 36 + 6}{12} =$$

$$\frac{172}{12} \approx 14.333; \text{Without the outliers:}$$

$$\frac{5 + 1 + 15 + 9 + 9 + 11 + 11 + 14 + 12 + 6}{10} = \frac{93}{10} = 9.300;$$

The outliers 36 and 43 increase the value of the mean.

$$22. \frac{22 + 19 + 25 + x}{4} = 23$$

$$\frac{66 + x}{4} = 23$$

$$\frac{66 + x}{4} \times 4 = 23 \times 4$$

$$66 + x = 92$$

$$66 + x - 66 = 92 - 66$$

$$x = 26$$

$$23. \frac{88 + 100 + 92 + 80 + 85 + 94 + 90 + x}{8} = 90$$

$$\frac{629 + x}{8} = 90$$

$$\frac{629 + x}{8} \times 8 = 90 \times 8$$

$$629 + x = 720$$

$$629 + x - 629 = 720 - 629$$

$$x = 91$$

91 is the lowest test score that will enable her to have a mean score of 90.

$$24. \frac{22.3 + 19.7 + 25.41 + x}{4} = 23.4$$

$$\frac{64.4 + x}{4} = 23.4$$

$$\frac{67.4 + x}{4} \times 4 = 23.4 \times 4$$

$$67.4 + x = 93.6$$

$$67.4 + x - 67.4 = 93.6 - 67.4$$

$$x = 26.2$$

25. Each segment is equal to 0.1; the two points are at 1.5 and 1.6; 1.55; the correct choice is B. 26. $5.2 - 2.3 = 2.9$; the correct choice is G. 27. Multiply 5 by 2; the correct choice is C. 28. $4.2 \times 9.6 = 40.32$ 29. $3.07 \times 6.3 = 19.341$ 30. $4.25 \times 1.04 = 4.42$

VOCABULARY BUILDER

page 65

1. Answers will vary. Sample: I will spend time cleaning, doing chores, watching TV, doing homework, and preparing lunch. 2. $1\frac{1}{2} + 3\frac{1}{2} + 2 + 2 + \frac{1}{2} = 5 + 2 + 2 +$

$\frac{1}{2} = 5 + 4 + \frac{1}{2} = 9 + \frac{1}{2} = 9\frac{1}{2}$ hours 3. Add 50, 86, 90, 94 and 95 and divide the sum by 5. 4. The outlier is 50. 5. It will decrease the mean. 6a–c. Check students' work.

2-2 Median and Mode

pages 66–69

Check Skills You'll Need For complete solutions see *Daily Skills Check and Lesson Quiz Transparencies or Presentation Pro CD-ROM*. 1. 5 2. 20 3. 22.4 4. 57

Quick Check 1. The median is the middle number in the ordered data: 9, 17, 19, 28, 32, 35, 39; 28 2. Since there are 5 pizza lunches, for taco to be the mode there would need to be at least a total of 6 taco lunches, so if 2 people switch from hamburger to taco, taco will become the mode; 2 3. Answers may vary. Sample: The median is the best measure, as 288.75 is an outlier that affects the mean, and there is no mode. The mean with the outlier: $\frac{288.75 + 261.83 + 254.85 + 254.1 + 246.8}{5} = \frac{1306.33}{5} = 261.266$.

The mean without the outlier:

$$\frac{261.83 + 254.85 + 254.1 + 246.8}{4} = \frac{1017.58}{4} = 254.395$$

Exercises 1. median 2. Check students' work. 3. Find the median: 5, 7, 8, 8, 8, 10, 12; 8. Find the mode: 8. 4. Find the median: 1, 1, 1, 2, 3, 4, 5, 5, 5; 3. Find the mode: 1, 5. 5. Answers may vary. Sample: 60, 100. 6. The median is the mean of the middle two numbers in the ordered data: 7, 8, 13, 42, 50, 91; $\frac{13 + 42}{2} = \frac{55}{2} = 27.5$. 7. The median is the mean of the middle two numbers in the ordered data: 0, 0, 0, 0, 0, 1, 1, 1, 1, 1; $\frac{0 + 1}{2} = \frac{1}{2} = 0.5$.

8. The median is middle number in the ordered data:

14.1, 16.0, 20.7, 20.8, 24.3; 20.7. **9.** The median is middle number in the ordered data: 450, 450, 475, 500, 500; 475.

10. The median is middle number in the ordered data: 60.2, 60.8, 61.1, 62, 62.2, 63.4, 63.5; 62. **11.** The median is the mean of the middle two numbers in the ordered data: 1,187; 1,190; 1,205; 1,225; 1,239; 1,763;

$\frac{1,205 + 1,225}{2} = \frac{2,430}{2} = 1,215$. **12.** The median is the mean of the middle two numbers in the ordered data: 2, 2, 3, 7, 8, 10; $\frac{3 + 7}{2} = \frac{10}{2} = 5$. **13.** 8 **14.** sad, glad **15.** none **16.** 23 **17.** There is an outlier so the mean does not describe the data well. The mean with the outlier:

$\frac{9 + 9 + 4 + 12 + 11 + 12 + 12}{7} = \frac{69}{7} = 9.85$; The mean without the outlier:

$\frac{9 + 9 + 12 + 11 + 12 + 12}{6} = \frac{65}{6} = 10.83$. The mode does not show all the data. The median best describes the data. **18.** There is no mode so repeating the median will make the mode and median equal. The median is the middle number in the ordered data: 74, 82, 83, 85, 87, 88, 91, 92, 96; 87 **19.** Find the mean:

$\frac{13.5 + 15 + 13.5 + 11 + 13}{5} = \frac{66}{5} = 13.2$. Find the median:

11, 13, 13.5, 13.5, 15; 13.5. Find the mode: 13.5. **20.** Find the mean: $\frac{32 + 28.3 + 26.8 + 31 + 24.4}{5} = \frac{142.5}{5} = 28.5$.

Find the median: 24.4, 26.8, 28.3, 31, 32; 28.3. Find the mode: none.

21. $\frac{x + 51}{2} = 48$

$$\frac{x + 51}{2} \times 2 = 48 \times 2$$

$$x + 51 = 96$$

$$x + 51 - 51 = 96 - 51$$

$$x = 45$$

22. Check students' work. **23.** The mode is the best measure because the types of shoes are not numeric data. **24.** The median is the middle number in the ordered data: 153, 198, 240, 374, 410; 240. **25a.** Find the mean:

$\frac{5,895 + 5,642 + 6,194 + 6,960}{4} = 6,172.75$; 6,172.75 m.

Find the median: 5,642; 5,895; 6,194; 6,960;

$\frac{5,895 + 6,194}{2} = \frac{12,089}{2} = 6,044.5$; 6,044.5 m.

25b. They both increase. The mean becomes

$\frac{6,044.5 \times 4 + 8,850}{5} = 6,708.2$ m. The median becomes

6,194 m. **26.** Answers may vary. Sample: Median is not a good measure because it doesn't account for how high or low the other scores are. **27.** 7 **28.** $2.7 - 1.8 = 0.9$;

0.9 **29.** $6 \times 1.5 + 1 = 9 + 1 = 10$; 10

30. $10 - 2 \times 4 - 1 = 10 - 8 - 1 = 2 - 1 = 1$

31. $200 \div (32 - 12) + 5 = 200 \div 20 + 5 = 10 + 5 = 15$

2-3 Frequency Tables and Line Plots

pages 70–73

Check Skills You'll Need For complete solutions see *Daily Skills Check and Lesson Quiz Transparencies or Presentation Pro CD-ROM*. **1.** The mode is(are) the data

item(s) that appear(s) most often. **2.** Find the mean:

$\frac{6 + 4 + 6 + 7 + 4 + 3 + 8 + 4}{8} = \frac{42}{8} = 5.25$. Find the

median: 3, 4, 4, 4, 6, 6, 7, 8; $\frac{4 + 6}{2} = \frac{10}{2} = 5$. Find the mode:

4. **3.** Find the mean:

$\frac{1.5 + 0 + 3 + 0 + 2 + 8.5 + 1}{7} = \frac{16}{7} \approx 2.29$. Find the

median: 0, 0, 1, 1.5, 2, 3, 8.5; 1.5. Find the mode: 0.

Quick Check 1. mode: L

Initial	Tally	Frequency
A		1
B		1
C		1
D		2
J		1
K		2
L		3
P		1
S		1
T		1
V		1

2. Number of Sales Calls



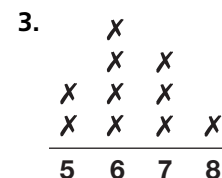
Answers may vary. Sample: Either a low number of sales calls were made each hour (0–3) or a high number (6–9).

3. $36 - 4 = 32$

Exercises 1. Answers may vary. Sample: Both the line plot and frequency table show the data grouped in an easy-to-read way.

2.

Ages	Tally	Frequency
5		2
6		4
7		3
8		1



4. 3; No; the range shows the spread of the data.

5. Answers may vary. Sample: A line plot immediately shows the mode.

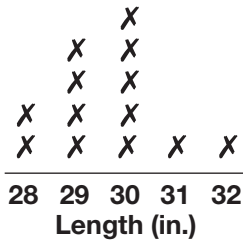
6. mode: 31

Number of Days	Tally	Frequency
28		1
30		4
31		7

7. mode: compact

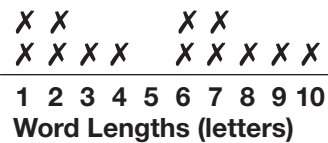
Type of Car	Tally	Frequency
Compact		4
Mid-size		3
SUV		2
Wagon		1
Pick-up		2

8. Baseball Bat Lengths (in.)



Answers may vary.
Sample: Most baseball bats are 29 or 30 inches long.

9. Word Lengths in a Sentence



Answers may vary.
Sample: There are very few words with less than three letters. 10. 68 2 51 5 17; The range of

presidents ages is 17 years 11. 3.5 2 1.8 5 1.7; 1.7 m

12. $22 + 55 = 77$; \$77

$$\begin{array}{r} 22 \\ 2 \overline{)44} \\ \underline{-4} \\ 04 \\ \underline{-4} \\ 0 \end{array}$$

13. $65 - 40 = 25$; 25 mph

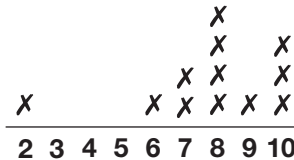
14a.

Letter	Tally	Frequency
a		3
b		1
c		2
d		1
e		1
f		1
g		4
h		2
i		3
l		4
n		4
o		4
p		2
r		3
s		1
t		1
w		4
y		4

14b. The mode is l. The letter l alone makes up about 19% of the letters in the name. 15. the number of organisms in a sample 16. 1; 1 17. Answers may vary. Sample: Data items 3 and 4 did not occur often but will affect the mean.

- 18a.

Scores	Tally	Frequency
2		1
6		1
7		2
8		4
9		1
10		3



18b. 2 is the outlier because all of the other numbers are between 6–10; the line plot because it displays the data in numerical order and the outlier stands out. 19. Check students' work. 20. Looking at the graph you can see that two more students received a C than the number that received a B; the correct choice is D. 21. The median is the middle number in the ordered data: 0, 4, 5, 6, 8, 8, 9, 10, 10, 12, 12, 14, 15, 16; 10; the correct choice is H. 22. $17 + 23 = 40$ 23. $46 + 14 = 60$ 24. $5 + 32 + 15 = 52$

2-4 Bar Graphs and Line Graph

pages 74–77

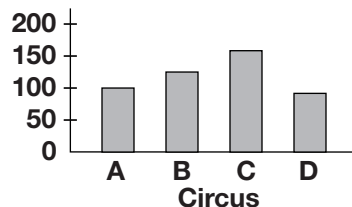
Check Skills You'll Need For complete solutions see *Daily Skills Check and Lesson Quiz Transparencies or Presentation Pro CD-ROM*. 1. The range is the difference between the least and greatest values.



Quick Check 1. $300 + 80 = 380$ mg 2. Less than 75°F ; it is decreasing because it is colder at night. 3. Line graph; it shows change over time.

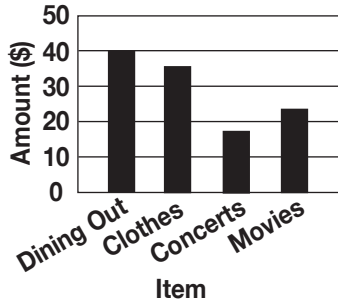
Exercises 1. line 2. bar graph 3. Number of days

4. Length of Circus Tours (in days)

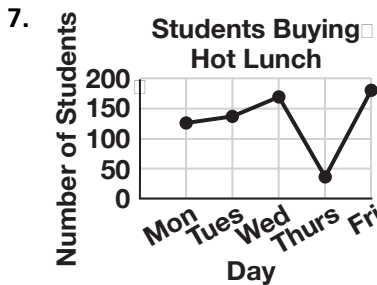
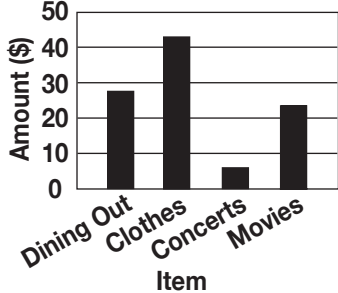


Circus D toured about $\frac{1}{2}$ as many days as Circus C.

5. **Planned Monthly Budget**

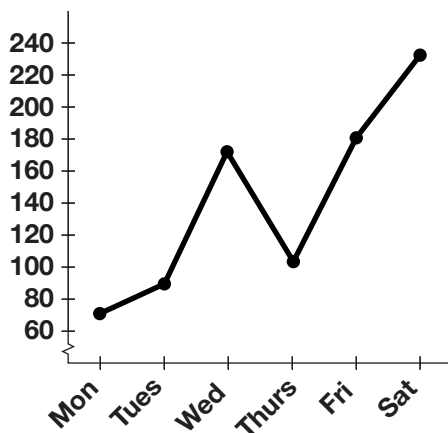


6. **Actual Monthly Budget**



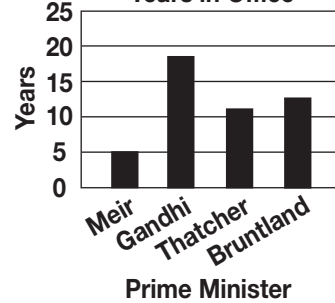
8. Bar graph; it is better for comparing amounts.

9. **Number of Customers**



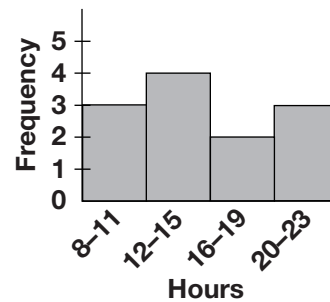
It generally increases during the week. 10. Answers may vary. Sample: You can use the range to help you decide the intervals you need on the axis.

11. **Female Prime Ministers' Years in Office**



12. Check students' work.

13. **Hours of Battery Life**



14. Looking at the graph you can see that the number of flu cases increased over time; the correct choice is A.

15. 2.50, 3.75, 4.50, 4.95, 5.25, 5.95, 6.95, 8.95; $\frac{4.95 + 5.25}{2} = 5.10$; the correct choice is G. 16. $1.45 > 1.4$ 17. $0.75 < 0.752$ 18. $3.20 = 3.2$

ACTIVITY LAB

page 78

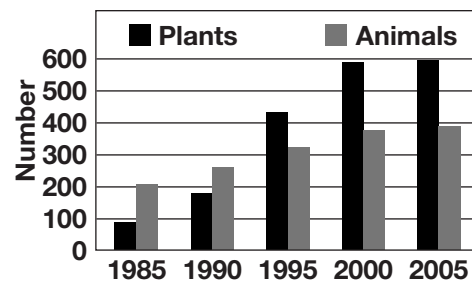
1. Check students' work. 2. Check students' work.

EXTENSION

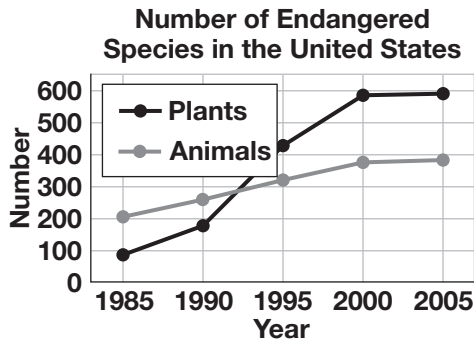
page 79

1. double line graph 2. double bar graph

3. **Number of Endangered Species in the United States**



4.



2-5 Using Spreadsheets to Organize Data pages 80–83

Check Skills You'll Need For complete solutions see *Daily Skills Check and Lesson Quiz Transparencies or Presentation Pro CD-ROM*. 1. usually 2. 159 3. 814

Quick Check 1. 30; the minutes of country music on disc 3 2. = D2 + D3 + D4

Exercises 1. A cell is a box in a spreadsheet where a specific row and column meet. 2. 19; D 3. 15; B 4. = B2 + B3; F 5. 15 + 19 = 34; E 6. C2, C3, C4, C5 7. F2, F3, F4, F5 8. B5, C5, D5, E5, F5 9. E2, E3, E4, E5 10. 100 11. 80 12. 95 13. 90 14. = B4 + C4 + D4 15. $\frac{(B4 + C4 + D4)}{3}$ or $\frac{E4}{3}$ 16. = C2 - B2 = 8 - 3 = 5; D2 = 5 17. C4 - B4; = E4*7; 7 × 3 = 21; \$21 18. Glitter 19. 5 20. Amount collected (dollars) 21. 8 × 3 = 24; \$24 22. = B2*3 23a. Answers may vary. Sample: The “fill down” function will apply that formula to the entire column. 23b. 10 × 3 = 30; 6 × 3 = 18; 12 × 3 = 36; 15 × 3 = 45; 5 × 3 = 15 24. = C2 + C3 + C4 + C5 + C6 + C7; 30 + 18 + 36 + 45 + 15 = 168; 168 25. = $\frac{C8}{6}$ 26. Viewing the graph shows that 18 is the lowest number so it cannot be the median; the correct choice is B. 27. 92 - 80 = 12; the correct choice is G. 28. 1,498 + 898 + 612 < 1,500 + 1,000 + 500 = 3,000; the correct choice is D. 29. The median is the middle number in the ordered data: 3, 3, 4, 4, 5, 7, 7, 7, 8, 8, 11; 7 30. The median is the mean of the two middle number: 0, 0, 0.8, 1, 1.6, 2.8; $\frac{0.8 + 1}{2} = 0.9$

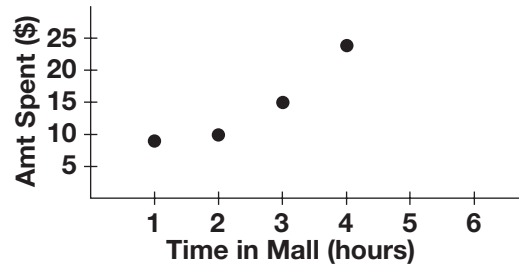
ACTIVITY LAB

page 84

1. Graphs may vary. Sample:

	A	B
1	Time in Mill (hours)	Amount spent (\$)
2	2	10
3	4	24
4	3	15
5	1	8

Allowance Spent at the Mall

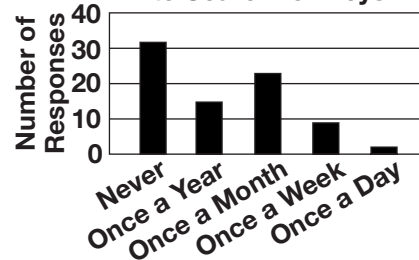


Check student's work.

2. Graphs may vary. Sample:

	A	B
1	Category	Number of Responses
2	Never	31
3	Once A Year	15
4	Once A Month	23
5	Once A Week	9
6	Once A Day	2

How Often People Need to Search for Keys



Check student's work.

CHECKPOINT QUIZ 1

page 85

1. Find the mean:

$$\frac{17 + (18 \times 2) + 19 + 20 + (21 \times 4) + (22 \times 3) + (24 \times 2) + 26}{15} = \frac{17 + 36 + 19 + 20 + 84 + 66 + 48 + 26}{15} = \frac{316}{15} \approx 21.07$$

Find the median: 17, 18, 18, 19, 20, 21, 21, 21, 21, 22, 22, 22, 24, 24, 26; 21. Find the mode: 21. 2. 26 - 17 = 9

3. Yes; 26 is much higher than the majority of the data.

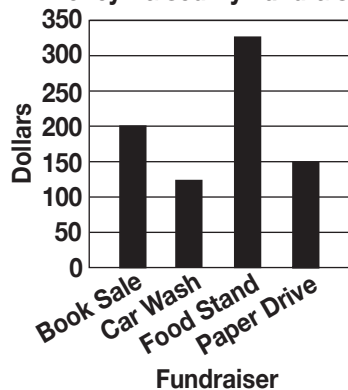
4. Answers may vary. Sample: The mode represents the temperature which occurred the most; 21.

5.

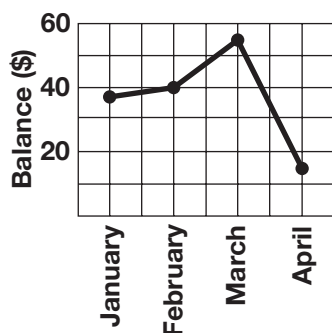
Grams of Fat	Tally	Frequency
0		8
1		8
2		5
3		3

6. = B2 + B3 + B4 + B5. 7. 200 + 125 + 325 + 150 = 800; \$800

8. Money Raised By Fundraisers



9. Account Balance



2-6 Stem-and-Leaf Plots

pages 86–90

Check Skills You'll Need For complete solutions see *Daily Skills Check* and *Lesson Quiz Transparencies* or *Presentation Pro CD-ROM*. 1. The median of a data set is the middle value when the data are arranged in numerical order.

2. 32 3. 15 4. 5.2

Quick Check 1. $58 - 23 = 35$

2.

12	1 3 4 5 5 6 7
13	0 2 3 6 7 8 8
14	0 1 4 5
15	0 5
16	
17	
18	1

Key: 12|3 means 123

More than One Way Answers may vary. Sample given.

Minutes Needed for Tutoring		
Minutes	Tally	Frequency
30		5
45		4
60		8

The order of data is 30, 30, 30, 30, 30, 45, 45, 45, 45, 60, 60, 60, 60, 60, 60, 60. I can use a frequency table because

it will show how many students request each length of time. The time with the most tallies has the greatest frequency. The most requested time is 60 minutes.

Exercises 1. stem-and-leaf 2. 30; 8 or 38 3. 4

4.

3	6 8 8
4	1 1 2 3 4
5	0
6	2
7	5 7 9
8	9

Key: 3 | 6 means 36 s

5. The stem-and-leaf plot organizes the values from least to greatest. 6. 0|8 represents 8 seconds 7. 3 entries have a value of 15 8. 4 customers waited less than 9 seconds

9. Heights of Tomato Plants (inches)

2	6 7 9
3	0 1 3 3 5 6 6
4	0 1

Key: 2|6 means 26 in.

10. Number of Jelly Beans in a Scoop

2	7 8
3	2 4 5 5 8
4	3 5 7 7
5	3 8
6	
7	6

Key: 2|7 means 27 jelly beans

11. Lengths of Eruptions of Mauna Loa

1	2 5 5 6 6
2	0 1 3 4 5
3	9
4	6 8
5	
6	1

Key: 1 | 2 means 12 days

12. State Populations in Millions

3	6
4	1 6
5	0 5 6 7 9
6	2

Key: 3|6 means 3.6 million

13a. Ages of People

```

0 | 9
1 | 1 2 2 2 2 3 3 5 5 6 9
2 | 0 1 3 4
3 | 5
4 | 0
  
```

Key: 2 | 6 means 26 years old

Ages of Eighteen People

```

      X
      X
     XX X
X XXX XX XXX XX      X      X
10  15  20  25  30  35  40
      Years
  
```

13b. Stem-and-leaf plot; explanations may vary. The data with a stem of 1 and a leaf of 3 or more represent the teenagers.

14. Heights (in inches)

```

5 | 9
6 | 1 4 6 7 8
7 | 0 9
8 | 2
  
```

Key: 5 | 9 means 59 inches

Median: 67 in. Mode: none Outliers: 79 in. and 82 in.

15. Check students' work.

16. Group D | Group F

```

    6 4 | 2 5 9
    9 5 3 | 3 4 6 7
  
```

Key:
means ← 4 | 2 | 5 → means
24 25

17. The data items greater than 67 are 68, 68, 69, 72, 74, 76, and there are 6 of them; the correct choice is B. **18.** The favorite activity that occurs the most is sports, so the mode is sports; the correct choice is H.

19. 0.24 represents $\frac{6}{25}$; the correct choice is A.

```

   0.24
25)6.00
  -50
   100
  -100
    0
  
```

20. $13 + 5 \times 12 - 4 = 13 + 60 - 4 = 73 - 4 = 69$

21. $22 + 44 \div 22 - 11 = 221 - 211 = 24 - 11 = 13$

2. Answers may vary. Sample: You can round \$2.416 to \$2.40 and \$1.951 to \$1.90 and subtract to get 0.50, which is $\frac{1}{2}$. Since $\frac{1}{2}$ of 22 is 11, the answer is reasonable. **3.** Answers may vary. Sample: You could find the amount of money it cost to fill the 22-gallon tank in Hawaii and Georgia and then subtract to find the difference. **4a.** In Texas, it costs \$1.935 per gallon of gas. One tank must be filled with 18 gallons and another tank must be filled with 23 gallons. **4b.** Before it can be known how much less it costs to fill an 18-gallon tank than a 23-gallon tank, the cost of filling each tank must be found.

4c.	1.935	1.935	44.505
	$\times 23$	$\times 18$	-34.830
	5805	15480	09.675
	+ 38700	+ 19350	about \$9.68
	44.505	34.830	

\$44.505 to fill a 23-gallon tank \$34.830 to fill an 18-gallon tank

5. 2.056
 -1.778 A gallon of gas cost
 0.278 \$0.278 more in Week 11.

6. Explanations may vary. **7.** 1.935
 Sample: $15.5 \approx 16$; $2.45 \approx 2.5$; -0.200
 $2.5 \times 16 = 40$; $7.85 \approx 8$ 1.735
 $40 + 8 = 48$; 45.83 is 1.735
 reasonable because it is close to the estimate. $\times 18.5$

15.5	28675
$\times 2.45$	138800
775	+ 173500
6,200	32.0975
+ 31,000	32.0975 rounds to 32.10;
37.975	\$32.10
\$ 37.975	
+ 7.850	
45.825	

45.825 rounds up to 45.83;
 \$45.83

8. Find the mean: $2.91 + 2.93 + 2.94 + 2.95 + 2.98 + 2.80 + 2.80 + 2.80 + 2.87 + 2.87 + 2.89 + 2.89 + 2.70 + 2.72 + 2.72 + 2.78 + 2.78 + 2.65 + 2.67 + 2.68 + 2.35 = 58.68$; $\frac{58.68}{21} \approx 2.79$; \$2.79. Find the median: 2.91, 2.93, 2.94, 2.95, 2.98, 2.80, 2.80, 2.80, 2.87, 2.87, 2.89, 2.89, 2.70, 2.72, 2.72, 2.78, 2.78, 2.65, 2.67, 2.68, 2.35; \$2.89. Find the mode: \$2.80. Answers may vary: the mode represents the typical price because that is the price at most gas stations. **9.** $6.1 \times 5 = 30.5$; $8.3 \times 5 = 41.5$; $41.5 - 30.5 = 11$; 11 lbs

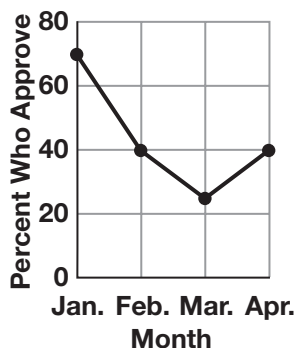
GUIDED PROBLEM SOLVING pages 91–92

1. Answer may vary. Sample: The diagram shows that the difference is needed to find out how much more gas costs.

2-7 Misleading Graphs and Statistics pages 93-96

Check Skills You'll Need For complete solutions see *Daily Skills Check and Lesson Quiz Transparencies or Presentation Pro CD-ROM*. **1.** The mean of a set of data values is the sum of the data divided by the number of data values. **2.** 55.5 **3.** 13.5 **4.** 131

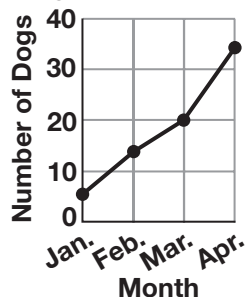
Quick Check 1. Mayor's Performance



2a. It's twice as tall. **2b.** 82 cars were sold in June. 79 cars were sold in May. $82 - 79 = 3$; 3 cars **3.** Median; the mode is the least data value. It occurs only twice, so its value is really too low to give a good idea of what a typical data value is.

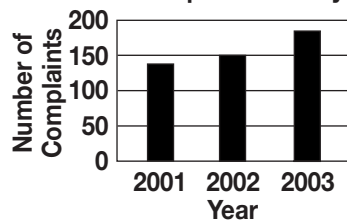
Exercises 1. It looks as if there was a dramatic decrease in sales. **2.** It is about four times the height. **3.** 3 more sales were made in Week 1 than Week 4. **4.** The vertical scale does not begin at 0. So you are looking at just the top of the graph. **5.** The graph is misleading because the intervals on the vertical axis are unequal; it appears there was a greater increase in January than there actually was.

Dogs in Animal Shelter



6. The graph is misleading because by starting the vertical scale at 100, it gives the impression that each year is very different from the others.

Number of Complaints to City Hall



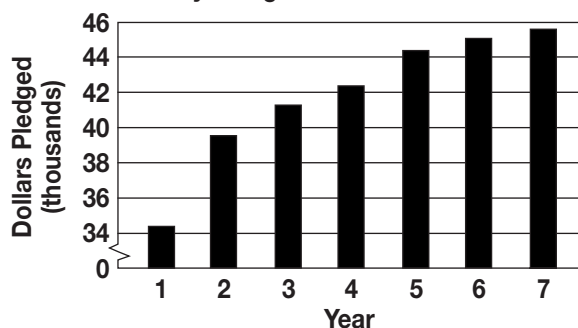
7. The mean is $\frac{100 + 100 + 90 + 70 + 60}{5} = \frac{420}{5} = 84$.

The mode is 100. The median is 90. The mode makes his grade look best. **8.** Answers may vary. Sample: A

salesperson who is less than fair might use the mode since it has the lowest value and might be most attractive to price conscious customers. **9.** Candidate A: graph I, Candidate B: graph II; the candidate would present a graph to make the results look more favorable. **10.** The rises and falls of the values represented on the vertical axis seem more pronounced.

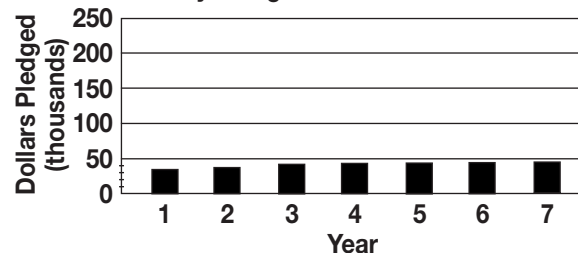
11. Graphs may vary. Sample:

Money Pledged to Public Radio Station



12. Graphs may vary. Sample:

Money Pledged to Public Radio Station



13. Answers may vary. Sample: Mean; the mean of \$41,637.14 is a little less than the median of \$42,209. $\frac{34,096 + 39,021 + 41,132 + 42,209 + 44,172 + 45,071 + 45,759}{7} =$

$\frac{291,460}{7} = 41,637.142$. There is no mode.

14. Use trial and error:

remove 2

$$\frac{7 + 12 + 14 + 17}{4} = \frac{50}{4} = 12.5; \frac{12 + 14}{2} = \frac{26}{2} = 13$$

remove 7

$$\frac{2 + 12 + 14 + 14}{4} = \frac{45}{4} = 11.25; \frac{12 + 14}{2} = \frac{26}{2} = 13$$

remove 12

$$\frac{2 + 7 + 14 + 17}{4} = \frac{40}{4} = 10; \frac{7 + 14}{2} = \frac{21}{2} = 10.5$$

remove 14

$$\frac{2 + 7 + 12 + 17}{4} = \frac{38}{4} = 9.5; \frac{7 + 12}{2} = \frac{19}{2} = 9.5; 14$$

15. 4, 4.5, 4.5, 5.5, 6, 6.5

$(4.5 + 5.5) \div 2 = 10 \div 2 = 5$; the correct choice is C.

16. The initial height is 0 and not 2 cm; the correct choice is F.

17. Test Scores

1	4 4 6 6 6
2	3 5 8
3	3 3 7
4	2 5

Key: 1 | 4 means 14

EXTENSION

page 97

1a–c. Answers may vary. Samples are given. **1a.** No; it is more likely the shoppers will name the store they're currently in. **1b.** Yes; you will survey many different people in different locations. **1c.** No; your friends probably like most of the same stores. **2.** Check students' work.

CHECKPOINT QUIZ 2

page 98

1. Test Scores

6	4 8
7	6
8	1 4 4 5 5 6 9
9	1 2 5 7

Key: 6 | 4 means 64%

2. 4, 4, 5, 6, 9, 10, 10, 11, 11, 13, 15, 15, 15, 15, 18, 20, 20, 20, 21, 22, 25, 40; 15 years. The median life span is 15 years. **3.** 8 of the animals have a life span greater than 15 years.

4. $40 - 4 = 36$ **5.** Answers

may vary. Sample: Median; an outlier affects the mean, and the mode is not the best description because the most requested age is not necessarily the most accurate description. **6.** Answers may vary. Sample: Starting a graph at 60 ft³ on the vertical axis will make the differences in cars seem very large.

TEST-TAKING STRATEGIES

page 99

1. The stem-and-leaf plot shows that the tallest student who is less than 70 in. tall is 67 in. tall; the correct choice is B. **2.** $71 - 57 = 14$; the correct choice is F.

CHAPTER REVIEW

pages 100–101

1. C **2.** A **3.** G **4.** F **5.** E **6.** Find the mean:

$$\frac{34 + 49 + 63 + 43 + 50 + 50 + 26}{7} = \frac{315}{7} = 45. \text{ Find the median: } 26, 34, 43, 49, 50, 50, 63; 49. \text{ Find the mode: } 50.$$

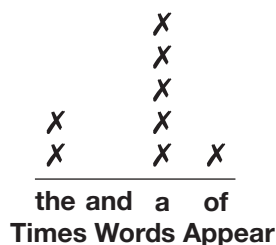
7. Find the mean: $\frac{3 + 7 + 1 + 9 + 9 + 5 + 8}{7} = \frac{42}{7} = 6.$

Find the median: 1, 3, 5, 7, 8, 9, 9; 7. Find the mode: 9.

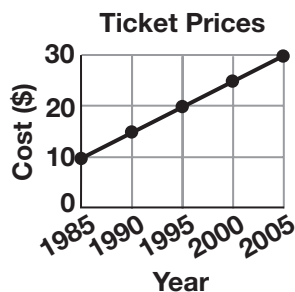
8.

Number of Times Vowels Occur		
Vowels	Tally	Frequency
A		18
E		18
I		10
O		5
U		5
Y		3

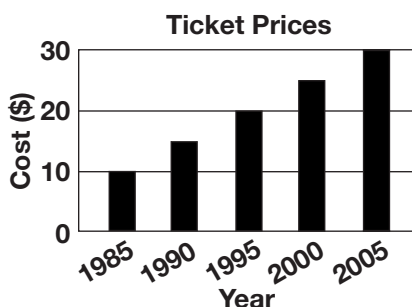
9. Number of Times Listed Words Appear



10.



11.



12. Line graph; it shows changes over time. **13.** B2, B3

14. 75 **15.** = B2 + C2 + D2

16. 3 | 01 41 67 79 88 99

4 | 65 79 79 83

5 | 07 12 43 48

Key: 4 | 65 means 465

17. Find the mean: $\frac{62 + 67 + 72 + 77 + 82}{5} = \frac{360}{5} = 72.$

Find the median: 62, 67, 72, 77, 82; 72. There is no mode.

mean or median, since they are the same **18.** Find the

mean: $\frac{1 + 1.5 + 4.5 + 8 + 4.5 + 12}{6} = \frac{31.5}{6} = 5.25.$ Find the

median: 1, 1.5, 4.5, 4.5, 8, 12; $\frac{4.5 + 4.5}{2} = 4.5$; 4.5. Find the

mode: 4.5. median or mode **19.** mode because the data

is qualitative not quantitative **20.** Find the median: 0, 1,

2, 3, 4, 5, 7, 9, 39; 4; median **21.** Answers may vary.

Sample: Start the vertical axis at zero and used intervals of 10.

CHAPTER TEST

pages 102

1. Find the mean: $\frac{31 + 20 + 31 + 51 + 27}{5} = \frac{160}{5} = 32.$

Find the median: 20, 27, 31, 31, 51; 31. Find the mode: 31.

Find the range: $51 - 20 = 31.$ **2.** Find the median: 1, 1, 1,

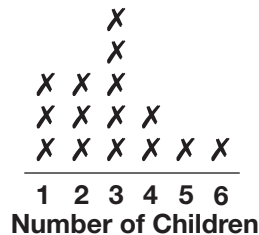
2, 2, 2, 3, 3, 3, 3, 4, 5, 6; $\frac{3 + 3}{2} = \frac{6}{2} = 3.$ Find the mode: 3.

Find the range: $6 - 1 = 5.$

3.

Children in Families		
Number of Children	Tally	Frequency
1		3
2		3
3	 	5
4		2
5		1
6		1

4.



5. The mode is \$5,000, but it is the highest value.

6. $= (B2 + C2 + D2)/3$;
 $= (B3 + C3 + D3)/3$

7. State Fair Pumpkin Weights (lb)

20	3 7
21	0 2 2 8
22	6
23	3
24	7
25	
26	2 9
27	1
28	8

Key: 27|1 means 271

8. Find the mean:

$$\frac{20 + 5 + 45 + 90 + 60 + 45 + 30 + 10 + 30 + 45 + 15 + 25}{12} = \frac{420}{12}$$

= 35. Find the median: 5, 10, 15, 20, 25, 30, 30,

45, 45, 45, 60, 90; $\frac{30 + 30}{2} = \frac{60}{2} = 30$. Find the mode:

45. Find the range: $90 - 5 = 85$. **9.** mean or median

because the values are close **10.** Answers may vary.

Sample: Line plot; it organizes and compares the

responses. **11.** Preschool **12.** 75, 160, 150, 50, 175; 150;

Two values are higher and two values are lower. **13. 4**

14. 12 **15.** $8.1 - 5.0 = 3.1$ **16.** Find the median: 5.0, 5.2,

5.6, 6.1, 6.3, 6.6, 6.7, 7.4, 7.8, 7.9, 8.0, 8.1;

$$\frac{6.6 + 6.7}{2} = \frac{13.3}{2} = 6.56.$$

TEST PREP

page 103

1. Find the mean: $\frac{36 + 32 + 55 + 81}{4} = \frac{204}{4} = 51$; the

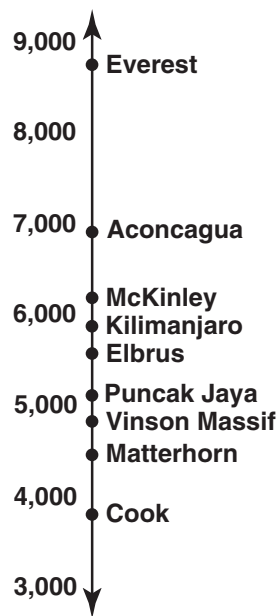
correct choice is C. **2.** Find the median: 32, 36, 55, 81; $\frac{36 + 55}{2} = 45.5$; the correct choice is G. **3.** The sum of the ages of all the delegates is $42 \cdot 55$, or 2,310; the correct choice is B. **4.** The 60-year-old delegate would still be the oldest delegate so the median would remain the same, however, since he is younger, the mean would be lower; the correct choice is F. **5.** Three orbits is a total distance of 75,679 miles, or about 75,000 miles; so one orbit is a total distance of $75,000 \div 3$, or 25,000; the correct choice is C. **6.** An orbit has a total distance of about 25,000 miles and John Glenn traveled 17,544 miles per hour. $25,000 \div 17,544 \approx 1.4$; the correct choice is F. **7.** The total distance to the moon is 240,000 miles. $240,000 \div 17,544 \approx 14$; the correct choice is B. **8.** There are 24×3 or 72 hours in 3 days. The ship traveled at a rate of $240,000 \div 72 \approx 3,333$ mi/h; the correct choice is J.

DK PROBLEM SOLVING APPLICATION

pages 104–105

1a. The heights from highest elevation to lowest elevation are 8,850; 6,960; 6,194; 5,895; 5,642; 4,897; 2,228. So, the mountains in order from highest to lowest elevation are Everest, Aconcagua, McKinley, Kilimanjaro, Elbrus, Vinson Massif, Kosciusko

1b–1c. Answers may vary. Sample:



2. $1,352 + 8,850 = 10,202$ m

3. $2,950 - 400 = 2,550$ m

4. $4,478 + 4,807 = 9,285$

5a. Answers may vary. Accept all reasonable estimates. Sample: $\frac{5,895}{40} \approx 147$, or about 147 m

5b. $8,850 \approx 9,000$; $147 \approx 150$; $\frac{9,000}{150} = 60$, or about 60 times taller **6.** $8,850 - 5,486 = 3,354$; $3,354 \times 24 = 80,736 \text{ m} = 80.736 \text{ km}$

CHECK YOUR READINESS

page 106

1. $3 \times 8 + 5 = 24 + 5 = 29$ 2. $36 + 6 \div 2 = 36 + 3 = 39$
 3. $48 - 6 \times 5 = 48 - 30 = 18$ 4. $(23 - 18) \times 6 = 5 \times 6 = 30$ 5. $36.05 + 6.1 \approx 36 + 6 = 42$; $36.05 + 6.10 = 42.15$; about 42; 42.15 6. $36 - 26.5 \approx 36 - 27 = 9$; $36.0 - 26.5 = 9.5$; about 9; 9.5 7. $0.05 + 5.05 \approx 0 + 5 = 5$; $0.05 + 5.05 = 5.1$; about 5; 5.1 8. $5.2 - 3.04 \approx 5 - 3 = 2$; $5.20 - 3.04 = 2.16$; about 2; 2.16 9. $5.12 - 2.85 \approx 5 - 3 = 2$; $5.12 - 2.85 = 2.27$; about 2; 2.27 10. $9.8 + 4.56 \approx 10 + 5 = 15$; $9.80 + 4.56 = 14.36$; about 15; 14.36 11. $3.79 \times 5 = 18.95$ 12. $6.4 \times 3.04 = 19.456$ 13. $43.7 \times 7.1 = 310.27$

14. $13.2 \div 4 = 3.3$ 15. $85 \div 0.5 = 850 \div 5 = 170$

$$\begin{array}{r} 3.3 \\ 4 \overline{)13.2} \\ \underline{-12} \\ 12 \\ \underline{-12} \\ 0 \end{array}$$

$$\begin{array}{r} 170 \\ 5 \overline{)850} \\ \underline{5} \\ 35 \\ \underline{35} \\ 00 \end{array}$$

16. $1.917 \div 2.7 = 19.17 \div 27 = 0.71$

$$\begin{array}{r} 0.71 \\ 27 \overline{)19.17} \\ \underline{-189} \\ 027 \\ \underline{-27} \\ 0 \end{array}$$

3-1 Describing a Pattern

pages 108–111

Check Skills You'll Need For complete solutions see *Daily Skills Check and Lesson Quiz Transparencies* or *Presentation Pro CD-ROM*. 1. Value 2. 3.1, 3.31, 3.331 3. 0.0105, 0.105, 10.5

Quick Check 1. The number of tiles in the design increases by 3 each time. For the eighth design, it has increased seven times. So the eighth design has $1 + 3 \times 7 = 22$; 22 tiles.

2a. $-15 \quad -15 \quad -15 \quad -15 \quad -15$
 $90, \quad 75, \quad 60, \quad 45, \quad 30, \quad 15$

2b. $\times 3 \quad \times 3 \quad \times 3 \quad \times 3 \quad \times 3$
 $1, \quad 3, \quad 9, \quad 27, \quad 81, \quad 243$

3a. Start with 1.5 and multiply by 3 repeatedly; $40.5 \times 3 = 121.5$; $121.5 \times 3 = 364.5$; $364.5 \times 3 = 1,093.5$; 121.5, 364.5, 1,093.5 3b. Start with 256 and divide by 2

repeatedly; $64 \div 2 = 32$; $32 \div 2 = 16$; $16 \div 2 = 8$; 32, 16, 8

Exercises 1. conjecture 2. Answers may vary. Sample: The coins increase in size from left to right. 3. Start with 53 and subtract 4 repeatedly. 4. Start with 2 and multiply by 5 repeatedly. 5. Each number is 4 more than the one before it. So, the next two terms are $14 + 4 = 18$ and $18 + 4 = 22$. 6. Each number is 11 less than the one before it. So, the next two terms are $66 - 11 = 55$ and $55 - 11 = 44$. 7. Each number is 5 times the one before it. So, the next two terms are $125 \times 5 = 625$ and $625 \times 5 = 3,125$. 8. Each number is 0.4 greater than the one before it. So, the next two terms are $2.2 + 0.4 = 2.6$ and $2.6 + 0.4 = 3.0$. 9. Each number is 4 greater than the one before it. So, $2012 + 4 = 2016$, $2016 + 4 = 2020$, and $2020 + 4 = 2024$.

10. $+4 \quad +4 \quad +4 \quad +4 \quad +4$
 $7, \quad 11, \quad 15, \quad 19, \quad 23, \quad 27$

11. $\div 2 \quad \div 2 \quad \div 2 \quad \div 2 \quad \div 2$
 $512, \quad 256, \quad 128, \quad 64, \quad 32, \quad 16$

12. $-11 \quad -11 \quad -11 \quad -11 \quad -11 \quad -11$
 $100, \quad 89, \quad 78, \quad 67, \quad 56, \quad 45, \quad 34$

The rule is start with 100 and subtract 11 repeatedly; 56, 45, 34.

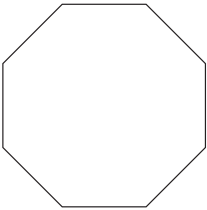
13. $\times 10 \quad \times 10 \quad \times 10 \quad \times 10 \quad \times 10 \quad \times 10$
 $0.12; \quad 1.2; \quad 12; \quad 120; \quad 1,200; \quad 12,000; \quad 120,000$

The rule is start with 0.12 and multiply by 10 repeatedly; 1,200, 12,000, 120,000.

14. $\div 10 \quad \div 10 \quad \div 10 \quad \div 10 \quad \div 10$
 $600,000; \quad 60,000; \quad 6,000; \quad 600; \quad 60; \quad 6$
 The rule is start with 600,000 and divide by 10 repeatedly; 600, 60, 6.

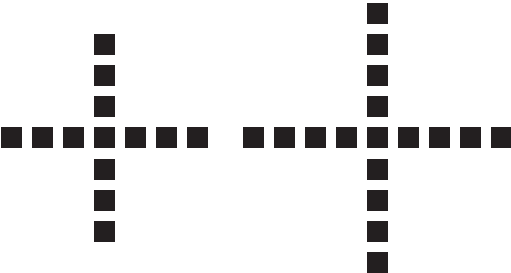
15. $+\$2.85 \quad +\$2.85 \quad +\$2.85 \quad +\$2.85 \quad +\$2.85$
 $\$2.85, \quad \$5.70, \quad \$8.55, \quad \$11.40, \quad \$14.25, \quad \17.10

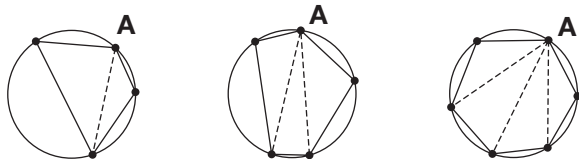
The rule is start with \$2.85 and add \$2.85 repeatedly; \$11.40, \$14.25, \$17.10. 16. Start with 75 and subtract 6.7 repeatedly until the difference is less than 20: 75.0, 68.3, 61.6, 54.9, 48.2, 41.5, 34.8, 28.1, 21.4, 14.7. Since 14.7 is the ninth term after the start day, it will take 9 days before more llama food is purchased. 17. Each term is 12 more

- than the one before it. $36 + 12 = 48$; $48 + 12 = 60$; 48, 60
- 18a.** The six items will cost, respectively, \$5.00, \$4.50, \$4.00, \$3.50, \$3.00 and \$2.50. All six together will cost $\$5.00 + \$4.50 + \$4.00 + \$3.50 + \$3.00 + \$2.50 = \$22.50$.
- 18b.** Each successive item costs \$.50 less. To be free the item must cost \$.50 less, or $10 \times \$.50$. So the eleventh item will be cleaned for free. **19.** Check students' work; answers will vary. Sample: Start with 1682 and add 76 repeatedly until the sum exceeds the current year: 1682; 1758; 1834; 1910; 1986; 2062. Subtract student's birth year from 2062. **20.** Check students' work.
- 21.** 
- 22.** Start with 156. Divide by 2 to get the next term. Subtract 2 to get the next term. Repeat this pattern of dividing and subtracting; $16 \div 2 = 8$; $8 - 2 = 6$; $6 \div 2 = 3$. **23.** Each term is 6 more than the one before it so add 6 to the previous number; the correct choice is C. **24.** $\$24,000 \div \$2,949 \approx \$24 \div \$3 = 8$; about 8 gallons; the correct choice is F. **25.** $17.2 - 4.5 \approx 17 - 5 = 12$; $17.2 - 4.5 = 12.7$; 12.7; about 12 **26.** $2.005 + 2.307 \approx 2 + 2 = 4$; $2.005 + 2.307 = 4.312$; 4.312; about 4 **27.** $8.01 + 1.7 + 1.09 \approx 8 + 2 + 1 = 11$; $8.01 + 1.70 + 1.09 = 10.8$; 10.8; about 11

ACTIVITY LAB

page 112

- 1.** 
- 2.** Each pattern has 4 more squares than the one before it; $9 + 4 = 13$; 13 squares; $13 + 4 = 17$; 17 squares
- 3.**
- | Design Number | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|-------------------|---|---|---|----|----|----|----|
| Number of Squares | 1 | 5 | 9 | 13 | 17 | 21 | 25 |
- 4.** Answers may vary. Sample: Multiply $(10 - 1)$ or 9, by 4, and then add 1.
- 5.** Check students' work.



- 6.**
- | Number of points on circle | 4 | 5 | 6 |
|---|---|---|---|
| Number of segments added to each diagram. | 1 | 2 | 3 |

- 7.**
- | | | |
|----------------------------|---|---|
| Number of points on circle | 7 | 8 |
| Number of segments added | 4 | 5 |


- 8.** Each number in the second row is 3 less than the corresponding number in the first row, or $n - 3$.


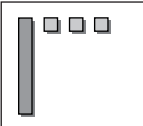

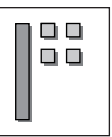

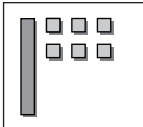
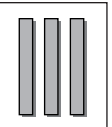
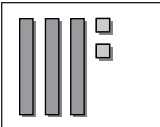
3-2 Variables and Expressions

pages 113–116

Check Skills You'll Need For complete solutions see *Daily Skills Check and Lesson Quiz Transparencies* or *Presentation Pro CD-ROM*. **1.** A mathematical expression is a phrase containing numbers, variables, and operation symbols. **2.** 32 **3.** 19 **4.** 441

Quick Check

- 1.**  **2a.** $3x + 15 = 3(7) + 15 = 21 + 15 = 36$
2b. $5x \div 7 = 5(7) \div 7 = 35 \div 7 = 5$
2c. $56 - 4x = 56 - 4(7) = 56 - 28 = 28$ **3.** $3p = 3(85) = 255$; the amount you will earn from 85 people coming to your booth is \$255.
- Exercises 1.** Answers may vary. Sample: A numerical expression is a mathematical phrase with only numbers and operation symbols. An algebraic expression is a mathematical expression with one or more variables. Example: $8 + 5 \cdot 6$ is a numerical expression. $8 + 5x$ is an algebraic expression. **2.** $50 - x$ will get smaller as x increases. **3.** $x + 12 = 8 + 12 = 20$ **4.** $80 \div x = 80 \div 8 = 10$ **5.** $2x = 2(8) = 16$ **6.** $x - 3 = 8 - 3 = 5$

- 7.**  **8.** 
- 9.**  **10.**  **11.** 
- 12.**  **13.**  **14.** 

- 15.** $24 \div d = 24 \div 3 = 8$ **16.** $p + 8 = 6 + 8 = 14$
17. $3r - 2 = 3(65) - 2 = 195 - 2 = 193$ **18.** $8b - 12 = 8(2.1) - 12 = 16.8 - 12 = 4.8$ **19.** $18 - 3y = 18 - 3(2.5) = 18 - 7.5 = 10.5$

- 20.**
- | Hour | Rental Fee |
|------|------------|
| h | $5 + 2h$ |
| 1 | 7 |
| 2 | 9 |
| 3 | 11 |
- 21.**
- | x | $x + 6$ |
|-----|---------|
| 1 | 7 |
| 4 | 10 |
| 7 | 13 |

22.

x	$7x$
2	14
4	28
6	42

23.

x	$100 - x$
20	80
35	65
50	50

24. $P = 2\ell + 2w = 2(7) + 2(4) = 14 + 8 = 22$; 22 cm

25. $11t - 6v = 11(9) - 6(4) = 99 - 24 = 75$

26. $2ab = 2(35)(3) = 70 \times 3 = 210$

27. $N = 7 \times \ell \times h = 7 \times 22 \times 30 = 154 \times 30 = 4,620$; 4,620 bricks

28a. $10d + 6s = 10(4) + 6(2) = 40 + 12 = 52$; \$52

28b. $10d + 6s = 10(0) + 6(6) = 0 + 36 = 36$; \$36

29. The number of points earned must equal the number of points lost; $12h = 8m$. The number of hits and the number of misses must equal 25; $h + m = 25$. Use trial and error to find $12(10) = 8(15)$; $120 = 120$; $10 + 15 = 25$; 10 hits; 15 misses

30. The number of people seated can be found by using the expression $6b + 4t$, where b is the number of booths and t is the number of tables, $6(8) + 4(0) = 48$. The number of available seats can be found by subtracting the number of people sitting from the total number of seats; subtract the product of 6 and 8 from 200; the correct choice is B.

31. $1 \times 20 = 20$; $20 \times 20 = 400$; $20 \times 400 = 8,000$; multiply by 20; the correct choice is H.

32. $3.4 + 3.7 = 7.1$; 7.1 mi.; the correct choice is D.

33. $2.43 \times 12 = 29.16$

34. $4.05 \times 1.5 = 6.075$

ACTIVITY LAB

page 117

1–4.

Word Phrase	Diagram 1	Diagram 2
1. Height h divided by 6		
2. Answers may vary. Sample: 8 more than q		
3. Answers may vary. Sample: 7 times r		
4. 6.3 smaller than t		

3-3 Writing Algebraic Expressions

pages 118–122

Check Skills You'll Need For complete solutions see *Daily Skills Check and Lesson Quiz Transparencies* or *Presentation Pro CD-ROM*. 1. To evaluate an expression means to replace a variable with a number and simplify it. 2. 10 3. 30 4. 48 5. 11

Quick Check 1. $x + 2$ 2. Let b = Brandon's age. Brandon is 28 years younger than his father, so the father is 28 years older than Brandon; $b + 28$ 3. Adding 4 to each number in the first column results in the numbers in the second column; $n + 4$

More Than One Way $5 + 4m = 5 + 4(10) = 5 + 40 = 45$; the call costs 45 cents. Check students' work.

Exercises 1. Answers may vary. Sample: Your grandfather is 50 years older than you. The expression $y + 50$ relates his age to yours. 2. $8h$ 3. $m + 4$ 4. $y \div 5$ 5. $6 \times z$

6. $m - 4$ 7. $k - 34$ 8. $e + 4$ 9. $50 + d$ 10. $23q$

11. $7 - b$ 12. $b \div 3$ or $\frac{b}{3}$ 13. $13 - d$ 14. $32a$ 15. $19 - n$

16. Let m = money earned. There are 3 brothers so the money gets divided 3 ways; $m \div 3$ or $\frac{m}{3}$. 17. Subtracting each number in the first column by 3 results in the number in the second column; $n - 3$. 18. Multiplying each number in the first column by 7 results in the number in the second column; $7n$. 19. Adding 2 to each number in the first column results in the number in the second column; $n + 2$. 20. Dividing each number in the first column by 6 results in the number in the second column; $n \div 6$. 21. Multiplying each number in the first column by 11 results in the number in the second column; $11n$. 22. Subtracting each number in the first column by 7 results in the number in the second column; $n - 7$. 23. If the width is w , then the length in terms of width is $10w$. The width is 7 feet. $10(7) = 70$; 70 feet

24. The cost for p people is $3p$. With the discount, the cost is $3p - 5$.

25. $m \div n - 5$ 26. $3j + 12$ 27. $h + 2$

28a. Dividing each number in the first column by 400 results in the numbers in the second column; $A \div 400$.

28b. Multiply the cost per gallon by the number of gallons needed for A square feet: $17.95(A \div 400)$.

29. $(20 + 0.75n)t$ 30. Let m equal the number of friends. Since Maria has a total of 20 cookies and will give each friend 2 cookies, multiply m by 2 and subtract it from the total amount of cookies she has: $20 - 2m$; the correct choice is B. 31. The number of dots in the bottom row is equal to figure number in the pattern; the correct choice is F.

32.
$$\begin{array}{r} 4.423 \\ + 1.009 \\ \hline 5.441 \end{array}$$

33.
$$\begin{array}{r} 2.005 \\ + 12.500 \\ \hline 14.505 \end{array}$$

34.
$$\begin{array}{r} 2.449 \\ + 0.700 \\ \hline 3.149 \end{array}$$

ACTIVITY LAB

page 123

1. Adding 6 to each number in the first column results in the number in the second column; $n + 6$. 2. Subtracting each number in the first column by 4 results in the number in the second column; $n - 4$. 3. Adding 3 to each number in the first column results in the number in the second column; $n + 3$.

3-4 Using Number Sense to Solve One-Step Equations

pages 124–127

Check Skills You'll Need For complete solutions see *Daily Skills Check and Lesson Quiz Transparencies* or *Presentation Pro CD-ROM*. 1. Add the whole dollars first and then estimate when adding the cents.

2. about 6; 6.37 3. about 4; 3.7 4. about 2; 1.7

Quick Check 1a. $7 \times 9 = 63$; $63 = 63$; true 1b. $4 + 5 = 9 \neq 45$; false 1c. $70 - 39 = 31 \neq 41$; false 2a. $17 - x = 8$; $17 - 9 = 8$, so $x = 9$. 2b. $w \div 4 = 20$; $80 \div 4 = 20$, so $w = 80$. 2c. $4.7 + c = 5.9$; $4.7 + 1.2 = 5.9$, so $c = 1.2$.

3. $39 \approx 40$ and $82 \approx 80$; since $40 + 40 = 80$; k is about 40. $40 + 39 = 79 \neq 82$, so 40 is too low. $43 + 39 = 82$; 43

Exercises 1. The value(s) of the variable(s) that make(s) the equation true is (are) unknown. **2.** Round 19 to 20 and round 42 to 40. So $n + 20 = 40$. Since you know $20 + 20 = 40$, your starting point is 20. Continue checking numbers close to 20 until you find the value of n which makes the statement true.

$$\begin{aligned} 3. \quad n + 3 &= 3 + 3 + 3 + 3 + 3 + 3 \\ n + 3 &= 18 \\ 15 + 3 &= 18 \\ n &= 15 \end{aligned}$$

4. $x + 3 = 5$, $2 + 3 = 5$; so the missing number equals 2. **5.** $x \times 4 = 12$, $3 \times 4 = 12$; so the missing number equals 3. **6.** $5 + 14 = 19$; $14 + 5 = 19$; $19 = 19$; true **7.** $0 \times 9 = 0$; $0 \neq 9$; false **8.** $2 \times 5 = 10$; $5 + 2 = 7$; $10 \neq 7$; false **9.** $0 + 3 = 3$; $3 = 3$; true **10.** $1 \cdot y = y$; $y = y$; true **11.** $x + 1 \neq x$; false **12.** $3 + 50 = 53 \neq 80$; false **13.** $3 + 4 + 2 = 9$; $3 + 6 = 9$; $9 = 9$; true **14.** $0 \times 5.7 = 0$; $0 \neq 5.7$; false **15.** $x + 5 = 7$; $2 + 5 = 7$; 2 **16.** $4x = 32$; $4 \times 8 = 32$; 8 **17.** $x + 2 = 6.3$, $4.3 + 2 = 6.3$; 4.3 **18.** $g \div 4 = 2$; $8 \div 4 = 2$; 8 **19.** $p - 6 = 25$; $31 - 6 = 25$; 31 **20.** $r + 14 = 23$; $9 + 14 = 23$; 9 **21.** $6d = 612$; $6 \times 102 = 612$; 102 **22.** $k + 9 = 28$; $19 + 9 = 28$; 19 **23.** $792 \approx 800$; $200 \times 4 = 800$; p is about 200. $200 \times 4 = 800$, so 200 is too high. $198 \times 4 = 792$; 198 **24.** $588 \approx 600$; $600 = 3n$; $600 = 3 \times 200$; n is about 200. $3 \times 200 = 600$, so 200 is too high. $588 = 3 \times 196$; 196 **25.** $23 \approx 20$ and $68 \approx 70$; $b - 20 = 70$; $90 - 20 = 70$; b is about 90. $90 - 23 = 67$, so 90 is too low. $91 - 23 = 68$; 91 **26.** $13 \approx 10$ and $71 \approx 70$; $w + 10 = 70$; $60 + 10 = 70$; w is about 60. $60 + 13 = 73$, so 60 is too high. $58 + 13 = 71$; 58 **27.** $20.25 \approx 20$ and $74.95 \approx 75$; $20 + j = 75$; $20 + 55 = 75$; j is about 55. $20.25 + 55 = 75.25$, so 55 is too high. $20.25 + 54.70 = 74.95$; \$54.70 **28.** $18 \cdot 20 = 360$, so $n = 20$; 1 gal of gasoline produces 20 lb of carbon dioxide. **29.** $c + 2.7 = 6$; $3.3 + 2.7 = 6.0$; 3.3 lb **30.** No; $59.4 \approx 60$ and $27.6 \approx 30$; $60 + 30 = 90$, which is not close to 31.8. **31.** Let s equal Sue's age. Amy is 0 years old when she is born. Since Sue is 30 when Amy is born, $30 - 0 = s$ so $s - 30$ represents Amy's age; the correct choice is B.

$$\begin{aligned} 32. \quad 25 - 5s + 1s &= 1 \\ 25 - 4s &= 1 \\ 25 - 25 - 4s &= 1 - 25 \\ -4s &= -24 \\ \frac{-4s}{-4} &= \frac{-24}{-4} \\ s &= 6; 6 \text{ stops; the correct choice is H.} \end{aligned}$$

$$33. \quad 4 \times 3 = 12, 12 \times 3 = 36, 36 \times 3 = 108, 108 \times 3 = 324, 324 \times 3 = 972, 972 \times 3 = 2,916; 324; 972; 2,916$$

VOCABULARY BUILDER

page 128

- 1a.** pet **1b.** wild animal **1c.** pet **1d.** wild animal
2. Answers may vary. Sample: dog, cat, fish, bird, hamster
3. Check students' work. **4a.** algebraic **4b.** numerical
4c. algebraic **4d.** numerical **5.** Check students' work.
6. No; numerical expressions do not contain variables. x is a variable. **7a–c.** Check students' work.

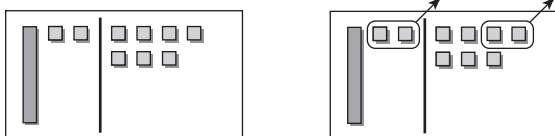
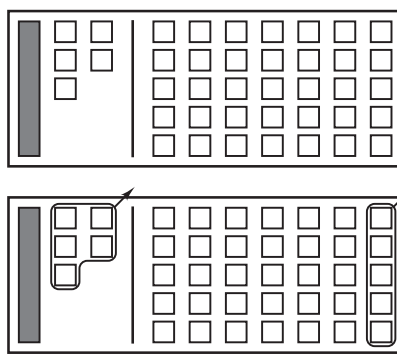
CHECKPOINT QUIZ 1


page 129

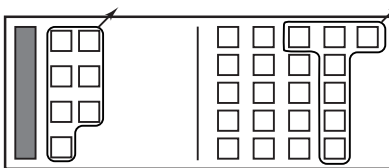
- 1.** Each number is 6 times greater than the one before it. So the next three terms are $216 \times 6 = 1,296$, $1,296 \times 6 = 7,776$, and $7,776 \times 6 = 46,656$. The rule is start with 1 and multiply by 6 repeatedly; 1,296; 7,776; 46,656. **2.** Each number is 15 less than the one before it. So the next three terms are $240 - 15 = 225$, then $225 - 15 = 210$, and $210 - 15 = 195$. The rule is start with 285 and subtract 15 repeatedly; 225, 210, 195. **3.** Each number is $\frac{1}{10}$ of the one before it. So the next three terms are $0.05 \div 10 = 0.005$, then $0.005 \div 10 = 0.0005$, and $0.0005 \div 10 = 0.00005$. The rule is start with 50 and divide by 10 repeatedly; 0.005, 0.0005, 0.00005. **4.** $8x = 8(7) = 56$ **5.** $3 \cdot (x - 4) = 3 \cdot (7 - 4) = 3 \times 3 = 9$ **6.** $x \cdot (x + 3) = 7 \cdot (7 + 3) = 7 \times 10 = 70$ **7.** The expression for d less than 17 is $17 - d$. **8.** The expression for a times e is $a \cdot e$, or ae . **9.** The expression for 14 divided by q is $14 \div q$ or $\frac{14}{q}$.

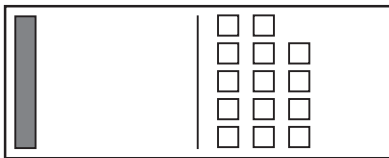
ACTIVITY LAB

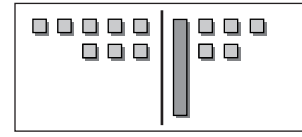
page 129

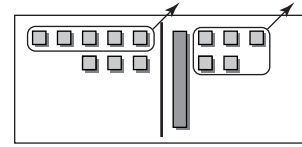
- 1.** 
 $x + 2 = 7$
 $x + 2 - 2 = 7 - 2$
 $x = 5$
- 2.** 
 $5 + c = 35$
 $5 + c - 5 = 35 - 5$
 $c = 30$

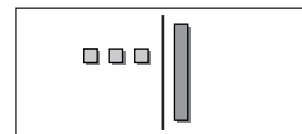
3.  $7 + m = 21$

 $7 + m - 7 = 21 - 7$

 $m = 14$

4.  $8 = n + 5$

 $8 - 5 = n + 5 - 5$

 $3 = n, \text{ or } n = 3$

3-5 Solving Addition Equations

pages 130–133

Check Skills You'll Need For complete solutions see *Daily Skills Check and Lesson Quiz Transparencies* or *Presentation Pro CD-ROM*. **1.** It has one or more variables. **2.** 1 **3.** 70 **4.** 14

Quick Check

1. $w + 4.3 = 9.1$
 $w + 4.3 - 4.3 = 9.1 - 4.3$
 $w = 4.8$

Check the solution:

$w + 4.3 = 9.1$
 $4.8 + 4.3 \geq 9.1$
 $9.1 = 9.1$ ✓

2.

11.6 lb	
w	1.8 lb

 Let w = the cat's weight last year.

$w + 1.8 = 11.6$
 $w + 1.8 - 1.8 = 11.6 - 1.8$
 $w = 9.8$

The cat weighed 9.8 lb.

Check the solution:

$w + 1.8 = 11.6$
 $9.8 + 1.8 \geq 11.6$
 $11.6 = 11.6$ ✓

Exercises 1. The inverse operation of adding 6 is subtracting 6. **2.** Check students' work.

3. $d + 3 = 21$
 $d + 3 - 3 = 21 - 3$
 $d = 18$

4. $k + 5.1 = 7.4$
 $k + 5.1 - 5.1 = 7.4 - 5.1$
 $k = 2.3$

5. $x + 4.3 = 7$
 $2.7 + 4.3 - 4.3 = 7 - 4.3$
 $x = 2.7$

6. $x + 46 = 72$
 $x + 46 - 46 = 72 - 46$
 $x = 26$

7. $d + 5 = 53$
 $d + 5 - 5 = 53 - 5$
 $d = 48$

Check the solution:

$x + 46 = 72$
 $46 + 26 \geq 72$
 $72 = 72$ ✓

Check the solution:

$d + 5 = 53$
 $48 + 5 \geq 53$
 $53 = 53$ ✓

8. $y + 12 = 64$
 $y + 12 - 12 = 64 - 12$
 $y = 52$

9. $n + 17 = 56$
 $n + 17 - 17 = 56 - 17$
 $n = 39$

Check the solution:

$y + 12 = 64$
 $52 + 12 \geq 64$
 $64 = 64$ ✓

Check the solution:

$n + 17 = 56$
 $39 + 17 \geq 56$
 $56 = 56$ ✓

10. $m + 1.3 = 2.8$
 $m + 1.3 - 1.3 = 2.8 - 1.3$
 $m = 1.5$

11. $n + 4.5 = 10.8$
 $n + 4.5 - 4.5 = 10.8 - 4.5$
 $n = 6.3$

Check the solution:

$m + 1.3 = 2.8$
 $1.5 + 1.3 \geq 2.8$
 $2.8 = 2.8$ ✓

Check the solution:

$n + 4.5 = 10.8$
 $6.3 + 4.5 \geq 10.8$
 $10.8 = 10.8$ ✓

12. $14.7 = 5 + f$
 $14.7 - 5 = 5 + f - 5$
 $9.7 = f$

13. $31 + y = 82$
 $31 + y - 31 = 82 - 31$
 $y = 51$

Check the solution:

$14.7 = 5 + f$
 $14.7 \geq 5 + 9.7$
 $14.7 = 14.7$ ✓

Check the solution:

$31 + y = 82$
 $31 + 51 \geq 82$
 $82 = 82$ ✓

14. $28 + g = 72$
 $28 + g - 28 = 72 - 28$
 $g = 44$

15. $15 = k + 8.2$
 $15 - 8.2 = k + 8.2 - 8.2$
 $6.8 = k$

Check the solution:

$28 + g = 72$
 $28 + 44 \geq 72$
 $72 = 72$ ✓

Check the solution:

$15 = k + 8.2$
 $15 = 6.8 + 8.2$
 $15 = 15$ ✓

16. $2.7 + g = 8.2$
 $2.7 + g - 2.7 = 8.2 - 2.7$
 $g = 5.5$

Check the solution:

$2.7 + g = 8.2$
 $2.7 + 5.5 \geq 8.2$
 $8.2 = 8.2$ ✓

17. $2.6 = 1.9 + g$
 $2.6 - 1.9 = 1.9 + g - 1.9$
 $0.7 = g$

Check the solution:

$2.6 = 1.9 + g$
 $2.6 \geq 1.9 + 0.7$
 $2.6 = 2.6$ ✓

18. Let m = number of models before summer.

$$m + 7 = 25$$

$$m + 7 - 7 = 25 - 7$$

$$m = 18$$

You had 18 models before the summer.

19. Let y = year Mozart was born.

$$y + 6 = 1762$$

$$y + 6 - 6 = 1762 - 6$$

$$y = 1756$$

Mozart was born in 1756.

20. Let s = sale price of jeans.

\$29.97	
s	\$4.99

$$s + 4.99 = 29.97$$

$$s + 4.99 - 4.99 = 29.97 - 4.99$$

$$s = 24.98$$

The sale price for the jeans was \$24.98.

21. Let m = music on the player before adding song.

$$2\text{h} \times 60\text{ min} = 120\text{ min}$$

$$m + 4 = 120$$

$$m + 4 - 4 = 120 - 4$$

$$m = 116$$

There were 116 minutes of music on the player before the song was added. **22a.** The sum of the main diagonal is $8 + 5 + 2 = 15$.

- 22b.** Equations may vary. Sample:

$$a + 1 + 8 = 15$$

$$a + 9 = 15$$

$$a + 9 - 9 = 15 - 9$$

$$a = 6$$

$$b + 2 + 4 = 15$$

$$b + 6 = 15$$

$$b + 6 - 6 = 15 - 6$$

$$b = 9$$

$$c + 5 + 7 = 15$$

$$c + 12 = 15$$

$$c + 12 - 12 = 15 - 12$$

$$c = 3$$

23. Let s = number of minutes a sea otter can hold its breath.

15 min	
s	10 min

$$s + 5 = 15$$

$$s + 5 - 5 = 15 - 5$$

$$s = 10$$

A sea otter can hold its breath for 10 minutes.

24. $y + 13.82 = 24$

$$y + 13.82 - 13.82 = 24 - 13.82$$

$$y = 10.18$$

Check the solution:

$$y + 13.82 = 24$$

$$10.18 + 13.82 \stackrel{?}{=} 24$$

$$24 = 24 \quad \checkmark$$

25. $1.5 + x = 9.7$

$$1.5 - 1.5 + x = 9.7 - 1.5$$

$$x = 8.2$$

Check the solution:

$$1.5 + x = 9.7$$

$$1.5 + 8.2 \stackrel{?}{=} 9.7$$

$$9.7 = 9.7 \quad \checkmark$$

26. $0.4 + g = 1.9$

$$0.4 - 0.4 + g = 1.9 - 0.4$$

$$g = 1.5$$

Check the solution:

$$0.4 + g = 1.9$$

$$0.4 + 1.5 \stackrel{?}{=} 1.9$$

$$1.9 = 1.9 \quad \checkmark$$

27. $6.2 = j + 5.91$

$$6.20 - 5.91 = j + 5.91 - 5.91$$

$$0.29 = j$$

Check the solution:

$$6.2 = j + 5.91$$

$$6.2 \stackrel{?}{=} 0.29 + 5.91$$

$$6.2 = 6.2 \quad \checkmark$$

28. $b + 0.87 = 1$

$$b + 0.87 - 0.87 = 1.00 - 0.87$$

$$b = 0.13$$

Check the solution:

$$b + 0.87 = 1$$

$$0.13 + 0.87 \stackrel{?}{=} 1$$

$$1 = 1 \quad \checkmark$$

29. $11.4 = h + 5.9$

$$11.4 - 5.9 = h + 5.9 - 5.9$$

$$5.5 = h$$

Check the solution:

$$11.4 = h + 5.9$$

$$11.4 \stackrel{?}{=} 5.5 + 5.9$$

$$11.4 = 11.4 \quad \checkmark$$

30. Let w = weight of a brick. Then the weight of the stepping stone is $5w$ and the combined weight is $5w + w = 6w$. Since $6w = 30$, $w = 5$. So the brick weighs 5 lb and the stone weighs 25 lb. **31.** Multiplying each number in the first column by 2 and adding 6 results in the number in the second column; $2n + 6$; the correct choice is D. **32.** If the rule, start with 1 and add 3 repeatedly, described the pattern then the first two terms would be 1 and $1 + 3 = 4$. Since the first two terms in the pattern are 1 and 3, this rule does not describe the pattern; the correct choice is J. **33.** $37 + 3 = 40$; $40 + 3 = 43$; $43 + 3 = 46$; $46 + 3 = 49$; 37; 40; 43; 46; 49. **34.** $3.2 \times 5 = 16$; $16 \times 5 = 80$; $80 \times 5 = 400$; $400 \times 5 = 2,000$; 3.2; 16; 80; 400; 2000.

3-6 Solving Subtraction Equations

page 134–136

Check Skills You'll Need For complete solutions see *Daily Skills Check and Lesson Quiz Transparencies* or *Presentation Pro CD-ROM*. **1.** It makes the equation true. **2.** 14 **3.** 11 **4.** 10

Quick Check

1a. $n - 53 = 28$

1b. $x - 43 = 12$

$$n - 53 + 53 = 28 + 53$$

$$x - 43 + 43 = 12 + 43$$

$$n = 81$$

$$x = 55$$

- 2.** Let t = temperature at 7 P.M.

$$t - 9 = 54$$

$$t - 9 + 9 = 54 + 9$$

$$t = 63$$

The temperature was 63°F.

Exercises 1. She subtracted 4 from each side instead of adding 4 to each side.

- 2.** Let j = Javon's age.

$$10 = j - 2$$

$$10 + 2 = j - 2 + 2$$

$$12 = j$$

Javon is 12 years old.

3. $x - 3 = 7$
 $x - 3 + 3 = 7 + 3$
 $x = 10$; C
5. $x - 5 = 6$
 $x - 5 + 5 = 6 + 5$
 $x = 11$; B
7. $q - 2.4 = 1.8$
 $q - 2.4 + 2.4 = 1.8 + 2.4$
 $q = 4.2$
8. $n - 297 = 18$
 $n - 297 + 297 = 18 + 297$
 $n = 315$
9. $d - 68 = 40$
 $d - 68 + 68 = 40 + 68$
 $d = 108$
11. $k - 56 = 107$
 $k - 56 + 56 = 107 + 56$
 $k = 163$
12. $5.8 = n - 0.35$
 $5.8 + 0.35 = n - 0.35 + 0.35$
 $6.15 = n$
13. $0.6 = h - 2.9$
 $0.6 + 2.9 = h - 2.9 + 2.9$
 $3.5 = h$
14. $q - 8.2 = 154$
 $q - 8.2 + 8.2 = 154 + 8.2$
 $q = 162.2$
15. $p - 1.23 = 8.77$
 $p - 1.23 + 1.23 = 8.77 + 1.23$
 $p = 10$
16. $n - 10.5 = 11.7$
 $n - 10.5 + 10.5 = 11.7 + 10.5$
 $n = 22.2$
17. $x - 5.7 = 5.7$
 $x - 5.7 + 5.7 = 5.7 + 5.7$
 $x = 11.4$

18. Let c = the approximate area of Padre Island National Seashore.

$$c - 72,772 = 57,662$$

$$c - 72,772 + 72,772 = 57,662 + 72,772$$

$$c = 130,434$$

Padre Island National Seashore is about 130,434 acres.

19. Let t = temperature when sick.

$$t - 3.7 = 98.6$$

$$t - 3.7 + 3.7 = 98.6 + 3.7$$

$$t = 102.3$$

The sick person had a temperature of 102.3°F.

20. Let m = money before buying the poster

$$m - 18.95 = 7.05$$

$$m - 18.95 + 18.95 = 7.05 + 18.95$$

$$m = 26$$

You had \$26 before buying the posters.

21. Let b = Bob's age. Let s = Sue's age. Let m = Mary's age. If $s = 11$ and $m = s - 2$, then $m = 11 - 2 = 9$.

$$b - 3 = m$$

$$b - 3 = 9$$

$$b - 3 + 3 = 9 + 3$$

$$b = 12$$

Bob is 12 years old.

22. Let m = the amount spent on DVDs.

$$m + 10 = 26$$

$$m + 10 - 10 = 26 - 10$$

$$m = 16$$

Since \$16 was spent on DVDs and each DVD costs \$2 to rent, Jeremy rented $16 \div 2 = 8$ DVDs.

23. Let g = the amount of gas in the tank before it was filled.

$$g + 9.6 = 18.2$$

$$g + 9.6 - 9.6 = 18.2 - 9.6$$

$$g = 8.6$$

There were 8.6 gallons in the tank before it was filled.

$$24. 24 \div 4 - 2 \times 3 = 6 - 6 = 0$$

$$25. 24 \div 3 - 2 \times 4 = 8 - 8 = 0$$

$$26. 24 \div (3 - 2) \times 4 = 24 \div 1 \times 4 = 24 \times 4 = 96$$

$$27. (24 \div 3 - 2) \times 4 = (8 - 2) \times 4 = 6 \times 4 = 24$$

CHECKPOINT QUIZ 2

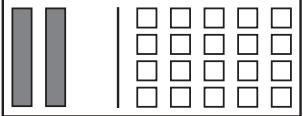
page 137

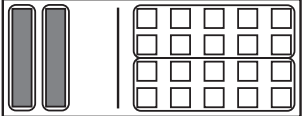
1. $5 + x = 65$
 $5 - 5 + x = 65 - 5$
 $x = 60$
2. $n - 3.2 = 15$
 $n - 3.2 + 3.2 = 15 + 3.2$
 $n = 18.2$
3. $z + 6 = 8.2$
 $z + 6 - 6 = 8.2 - 6$
 $z = 2.2$
4. $k - 4 = 3.6$
 $k - 4 + 4 = 3.6 + 4$
 $k = 7.6$
5. $14 = 3.2 + y$
 $14 - 3.2 = 3.2 - 3.2 + y$
 $10.8 = y$
6. $28 = 1.4 + a$
 $28 - 1.4 = 1.4 - 1.4 + a$
 $26.6 = a$
7. $23 = 16 + y$
 $23 - 16 = 16 - 16 + y$
 $7 = y$
8. $48 = 9.6 + a$
 $48 - 9.6 = 9.6 - 9.6 + a$
 $38.4 = a$
9. Let x = change received.
 $x + 5.73 = 10.00$
 $x + 5.73 - 5.73 = 10.00 - 5.73$
 $x = 4.27$

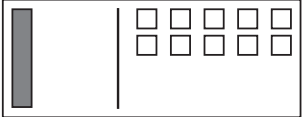
You should receive \$4.27 in change.

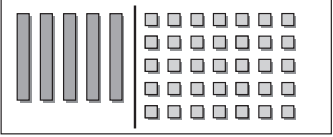
ACTIVITY LAB

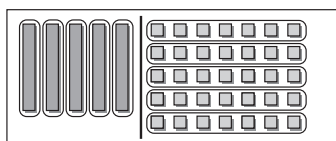
page 137

1.  $2x = 20$

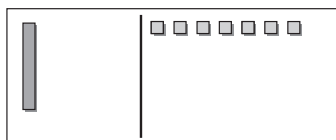
 $2x \div 2 = 20 \div 2$

 $x = 10$

2.  $5c = 35$

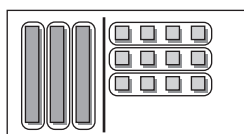
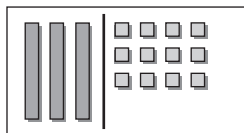


$$5c \div 5 = 35 \div 5$$

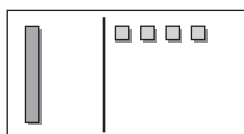


$$c = 7$$

3. $3g = 12$

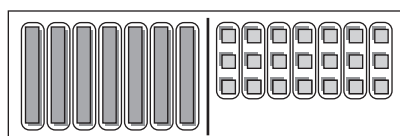
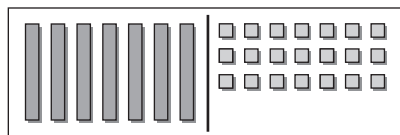


$$3g \div 3 = 12 \div 3$$

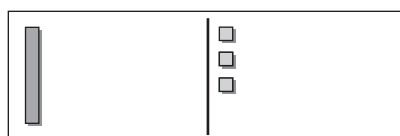


$$g = 4$$

4. $7m = 21$



$$7m \div 7 = 21 \div 7$$



$$m = 3$$

5. Check students' work.

3-7 Solving Multiplication and Division Equations pages 138-141

Check Skills You'll Need For complete solutions see *Daily Skills Check and Lesson Quiz Transparencies* or *Presentation Pro CD-ROM*. 1. Answers may vary. Sample: Equations contain equal signs and expressions do not. 2. 9 3. 2 4. 9 5. 3

Quick Check

1. $0.8p = 32$
 $0.8p \div 0.8 = 32 \div 0.8$
 $p = 40$
 Check your solution:
 $0.8p = 32$
 $0.8 \times 40 \stackrel{?}{=} 32$
 $32 = 32 \checkmark$
2. Let $c =$ number of cards.
 $0.35c = 302.75$
 $0.35c \div 0.35 = 302.75 \div 0.35$
 $c = 865$
 The club sold 865 cards.

3. $w \div 1.5 = 10$
 $w \div 1.5 \times 1.5 = 10 \times 1.5$
 $w = 15$
 Check your solution:
 $w \div 1.5 = 10$
 $15 \div 1.5 \stackrel{?}{=} 10$
 $10 = 10 \checkmark$

Exercises 1. The Multiplication Property of Equality states that you can multiply each side of an equation by the same nonzero number and the equation will be the same. The Division Property states the same is true for division. Multiplication is commutative, but division is not.

2. $4x = 20$; C
 4. $5x = 20$; D
 6. $3x = 12.6$
 $3x \div 3 = 12.6 \div 3$
 $x = 4.2$
 8. $5a = 100$
 $5a \div 5 = 100 \div 5$
 $a = 20$
3. $x \div 4 = 5$; B
 5. $x \div 5 = 4$; A
 7. $v \div 2 = 7$
 $v \div 2 \times 2 = 7 \times 2$
 $v = 14$
 9. $8k = 76$
 $8k \div 8 = 76 \div 8$
 $k = 9.5$

Check your solution:

$$5a = 100$$

$$5 \times 20 \stackrel{?}{=} 100$$

$$100 = 100 \checkmark$$

10. $7n = 11.9$
 $7n \div 7 = 11.9 \div 7$
 $n = 1.7$

Check your solution:

$$7n = 11.9$$

$$7 \times 1.7 \stackrel{?}{=} 11.9$$

$$11.9 = 11.9 \checkmark$$

12. $0.4x = 1$
 $0.4x \div 0.4 = 1 \div 0.4$
 $x = 2.5$

Check your solution:

$$0.4x = 1$$

$$0.4 \times 2.5 \stackrel{?}{=} 1$$

$$1 = 1 \checkmark$$

14. $16j = 80$
 $16j \div 16 = 80 \div 16$
 $j = 5$

Check your solution:

$$16j = 80$$

$$16 \times 5 \stackrel{?}{=} 80$$

$$80 = 80 \checkmark$$

16. $10y = 5$
 $10y \div 10 = 5 \div 10$
 $y = 0.5$

Check your solution:

$$10y = 5$$

$$10 \times 0.5 \stackrel{?}{=} 5$$

$$5 = 5 \checkmark$$

18. $q \div 6 = 4$
 $q \div 6 \times 6 = 4 \times 6$
 $q = 24$

Check your solution:

$$q \div 6 = 4$$

$$24 \div 6 \stackrel{?}{=} 4$$

$$4 = 4 \checkmark$$

Check your solution:

$$8k = 76$$

$$8 \times 9.5 \stackrel{?}{=} 76$$

$$76 = 76 \checkmark$$

11. $25h = 450$
 $25h \div 25 = 450 \div 25$
 $h = 18$

Check your solution:

$$25h = 450$$

$$25 \times 18 \stackrel{?}{=} 450$$

$$450 = 450 \checkmark$$

13. $75 = 15c$
 $75 \div 15 = 15c \div 15$
 $5 = c$

Check your solution:

$$75 = 15$$

$$75 \stackrel{?}{=} 15 \times 5$$

$$75 = 75 \checkmark$$

15. $2.5g = 17.5$
 $2.5g \div 2.5 = 17.5 \div 2.5$
 $g = 7$

Check your solution:

$$2.5g = 17.5$$

$$2.5 \times 7 \stackrel{?}{=} 17.5$$

$$17.5 = 17.5 \checkmark$$

17. Let $c =$ number of cartons needed.
 $12c = 8,616$
 $12c \div 12 = 8,616 \div 12$
 $c = 718$
 718 cartons are needed for the eggs.

19. $a \div 7 = 63$
 $a \div 7 \times 7 = 63 \times 7$
 $a = 441$

Check your solution:

$$a \div 7 = 63$$

$$441 \div 7 \stackrel{?}{=} 63$$

$$63 = 63 \checkmark$$

$$20. \quad n \div 2.5 = 3 \quad 21. \quad y \div 43 = 1,204$$

$$n \div 2.5 \times 2.5 = 3 \times 2.5 \quad y \div 43 \times 43 = 1,204 \times 43$$

$$n = 7.5 \quad y = 51,772$$

Check your solution:

$$n \div 2.5 = 3$$

$$7.5 \div 2.5 \stackrel{?}{=} 3$$

$$3 = 3 \quad \checkmark$$

Check your solution:

$$y \div 43 = 1,204$$

$$51,772 \div 43 \stackrel{?}{=} 1,204$$

$$1,204 = 1,204 \quad \checkmark$$

$$22. \quad 10 = k \div 20$$

$$10 \times 20 = k \div 20 \times 20$$

$$200 = k$$

Check your solution:

$$10 = k \div 20$$

$$10 \stackrel{?}{=} 200 \div 20$$

$$10 = 10 \quad \checkmark$$

$$23. \quad 12 = r \div 9$$

$$12 \times 9 = r \div 9 \times 9$$

$$108 = r$$

Check your solution:

$$12 = r \div 9$$

$$12 \stackrel{?}{=} 108 \div 9$$

$$12 = 12 \quad \checkmark$$

$$24. \quad n \div 4 = 0.6 \quad 25. \quad t \div 0.3 = 1.4$$

$$n \div 4 \times 4 = 0.6 \times 4 \quad t \div 0.3 \times 0.3 = 1.4 \times 0.3$$

$$n = 2.4 \quad t = 0.42$$

Check your solution:

$$n \div 4 = 0.6$$

$$2.4 \div 4 \stackrel{?}{=} 0.6$$

$$0.6 = 0.6 \quad \checkmark$$

Check your solution:

$$t \div 0.3 = 1.4$$

$$0.42 \div 0.3 \stackrel{?}{=} 1.4$$

$$1.4 = 1.4 \quad \checkmark$$

$$26. \quad b \div 11 = 87$$

$$b \div 11 \times 11 = 87 \times 11$$

$$b = 957$$

Check your solution:

$$b \div 11 = 87$$

$$957 \div 11 \stackrel{?}{=} 87$$

$$87 = 87 \quad \checkmark$$

27. There are $6 + 2 + 1 = 9$ people on a team.

Let n = number of teams.

$$9n = 288$$

$$9n \div 9 = 288 \div 9$$

$$n = 32$$

There can be 32 teams.

28. The store rented $6 + 4 + 3 + 6 + 8 = 27$ movies.

Let c = cost to rent one movie.

$$27c = \$80.73$$

$$27c \div 27 = 80.73 \div 27$$

$$c = 2.99$$

The rental charge is \$2.99 per video.

29. Let h = the height of the elephant

$$h \div 5.5 = 1.5$$

$$h \div 5.5 \times 5.5 = 1.5 \times 5.5$$

$$h = 8.25$$

The height of the elephant is about 8.25 feet.

$$30. \quad y \div 1.6 = 0.256$$

$$y \div 1.6 \times 1.6 = 0.256 \times 1.6$$

$$y = 0.4096$$

Check your solution:

$$y \div 1.6 = 0.256$$

$$0.4096 \div 1.6 \stackrel{?}{=} 0.256$$

$$0.256 = 0.256 \quad \checkmark$$

$$31. \quad 13 = 65x \quad 32. \quad 30 = p \div 30$$

$$13 \div 65 = 65x \div 65 \quad 30 \times 30 = p \div 30 \times 30$$

$$0.2 = x \quad 900 = p$$

Check your solution:

$$13 = 65x$$

$$13 \stackrel{?}{=} 65 \times 0.2$$

$$13 = 13 \quad \checkmark$$

Check your solution:

$$30 = p \div 30$$

$$30 \stackrel{?}{=} 900 \div 30$$

$$30 = 30 \quad \checkmark$$

$$33. 5.6k = 19.152 \quad 34. \quad 0.02g = 6$$

$$5.6k \div 5.6 = 19.152 \div 5.6 \quad 0.02g \div 0.02 = 6 \div 0.02$$

$$k = 3.42 \quad g = 300$$

Check your solution:

$$5.6k = 19.152$$

$$5.6 \times 3.42 \stackrel{?}{=} 19.152$$

$$19.152 = 19.152 \quad \checkmark$$

Check your solution:

$$0.02g = 6$$

$$0.02 \times 300 \stackrel{?}{=} 6$$

$$6 = 6 \quad \checkmark$$

$$35. \quad h \div 2.4 = 15$$

$$h \div 2.4 \times 2.4 = 15 \times 2.4$$

$$h = 36$$

Check your solution:

$$h \div 2.4 = 15$$

$$36 \div 2.4 \stackrel{?}{=} 15$$

$$15 = 15 \quad \checkmark$$

36. Let ℓ = length of the *Jahre Viking*.

$$3.5\ell = 5,280$$

$$3.5\ell \div 3.5 = 5,280 \div 3.5$$

$$\ell \approx 1,508.6$$

The *Jahre Viking* is about 1,508.6 feet long.

37. The price of tickets times the number of tickets equals the total cost of the tickets. $\$25t = 100$; the correct choice is B.

38. Let m = money before buying book.

$$m - 15.99 = 32.12$$

$$m - 15.99 + 15.99 = 32.12 + 15.99$$

$$m = 48.11$$

Ashley had \$48.11 before she bought the book; the correct choice is J. 39. Multiplying each number in the first column by 3 results in the number in the second column; $3n$; the correct choice is D. 40. $6.0 > 1.6$; $>$

41. $3.40 = 3.40$; $=$ 42. $8.05 > 5.08$; $>$

GUIDED PROBLEM SOLVING pages 142–143

1. Yes; he had about 1,500 pounds left and he lost about 2,500. Since $1,500 + 2,500 = 4,000$, he used about 4,000 less than 18,100, which is about 14,000. 2. Answers may vary. Sample: The amount accounted for is less than half of 18,100.

3. Let f = the amount of fuel.

$$13,985 + f = 18,100$$

$$13,985 - 13,985 + f = 18,100 - 13,985$$

$$f = 4,115$$

He would have had 4,115 pounds of fuel when he landed.

4. Let y = the number of years between the flights.

$$1,924 + y = 2,005$$

$$1,924 - 1,924 + y = 2,005 - 1,924$$

$$y = 81$$

There were 81 years between the two flights.

5. Let h = the height of the plane.

$$82h = 45,000$$

$$82h \div 82 = 45,000 \div 82$$

$$h \approx 548.8$$

Fosset's altitude was about 548.8 times greater.

6. Let s = the speed of sound.

$$6.7s = 4,520$$

$$6.7s \div 6.7 = 4,520 \div 6.7$$

$$s \approx 674.6$$

The speed of sound is about 674.6 mph.

7. Let d = the distance around the world.

$$d \div 149,129 = 6$$

$$d \div 149,129 \times 149,129 = 6149,129$$

$$d \approx 24,854.8$$

The distance around the world is about 24,854.8 miles.

8. $44,262,000 - 27,546,000 = 16,716,000$; 16,716,000 passengers

3-8 The Distributive Property

pages 144–147

Check Skills You'll Need For complete solutions see *Daily Skills Check and Lesson Quiz Transparencies* or *Presentation Pro CD-ROM*. **1.** Answers may vary.

Sample: The associative property changes the grouping of numbers and the commutative property changes the order of the numbers. **2.** $15 + 8 + 35 = 50 + 8 = 58$

3. $44 + 73 + 56 = 100 + 73 = 173$

4. $81 + 3 + 99 = 180 + 3 = 183$

Quick Check 1. $5 \times (70 - 2) = (5 \times 70) - (5 \times 2) = 350 - 10 = 340$ **2.** $2.80 \times 5 = (3.00 - 0.20) \times 5 = 15.00 - 1.00 = 14.00$; \$14.00

Exercises 1. C **2.** Thomas; answers may vary. Sample: The Distributive Property multiplies the number outside parentheses by each number inside parentheses.

3. $19 \times 12 = 228$

$(19 \times 10) + (19 \times 2) = 190 + 38 = 228$

$(20 \times 12) - (1 \times 12) = 240 - 12 = 228$

$(10 \times 12) + (9 \times 12) = 120 + 108 = 228$

$(10 \times 10) + (9 \times 12) = 100 + 108 = 208$; J

4. $6 \times 52 = 6 \times (50 + 2) = (6 \times 50) + (6 \times 2) =$

$300 + 12 = 312$ **5.** $4 \times 18 = 4 \times (20 - 2) =$

$(4 \times 20) - (4 \times 2) = 80 - 8 = 72$ **6.** $8 \times 28 =$

$8 \times (20 + 8) = (8 \times 20) + (8 \times 8) = 160 + 64 = 224$

7. $5 \times 63 = 5 \times (60 + 3) = (5 \times 60) + (5 \times 3) =$

$300 + 15 = 315$ **8.** $4 \times 34 = 4 \times (30 + 4) =$

$(4 \times 30) + (4 \times 4) = 120 + 16 = 136$ **9.** $6 \times 99 =$

$6 \times (100 - 1) = (6 \times 100) - (6 \times 1) = 600 - 6 =$

594 **10.** $7 \times 83 = 7 \times (80 + 3) = (7 \times 80) + (7 \times 3) =$

$560 + 21 = 581$ **11.** $3 \times 2.9 = 3 \times (3 - 0.1) =$

$(3 \times 3) - (3 \times 0.1) = 9 - 0.3 = 8.7$ **12.** $9 \times 48 =$

$9 \times (50 - 2) = (9 \times 50) - (9 \times 2) = 450 - 18 = 432$

13. $8.7 \times 3 = 3 \times (9 - 0.3) = (3 \times 9) - (3 \times 0.3) =$

$27 - 0.9 = 26.1$ **14.** $52 \times 6 = 6 \times (50 + 2) =$

$(6 \times 50) + (6 \times 2) = 300 + 12 = 312$ **15.** $6 \times 4.50 =$

$6 \times (5 - 0.5) = (6 \times 5) - (6 \times 0.5) = 30 - 3 = 27$; \$27.00

16. You can rewrite 32.5 as $(30 + 2 + 0.5)$;

$40 \times (30 + 2 + 0.5) = (40 \times 30) + (40 \times 2) + (40 \times 0.5) =$
 $1200 + 80 + 20 = 1300$; 1,300 cents or \$13.00

17. $50 \times 5.3 = 50 \times (5 + 0.3) = (50 \times 5) + (50 \times 0.3) =$
 $250 + 15 = 265$; 265 mi **18.** Answers may vary. Sample:

You could add 6.8 and 2, and then multiply the sum by 2.5. You could also multiply 2.5 by 6.8, then 2.5 by 2, and add the products. **19.** $4(7 - y) = (4 \times 7) - (4 \times y)$;

y **20.** $9(a + b) = (9 \times a) + (9 \times b)$; 9; b **21.** $8 \times 2.90 =$

$8 \times (3 - 0.10) = (8 \times 3) - (8 \times 0.10) = 24 - 0.8 = 23.2$;

\$23.20 **22.** $8 \times 27 = 8 \times (20 + 7) = (8 \times 20) + (8 \times 7) =$

$160 + 56 = 216$; 216 trees **23.** The Distributive Property

makes A, B, and D equivalent to each other; the correct choice is C. **24.** $(9 + 8) \times (7 - 6) \times 5 + 4 \times (3 + 2) =$
 $17 \times 1 \times 5 + 4 \times 5 = 17 \times 5 + 20$; $5 \times (20 - 3) + 20 =$
 $(5 \times 20) - (5 \times 3) + 20 = 100 - 15 + 20 = 105$ **25.** $m =$
 $4 \times \$5.00 - \8.75 ; the correct choice is B. **26.** Movie
preference from least to greatest is drama, action,
comedy. Choice G displays this, so the correct choice is
G. **27.** $5 \times 3 = 15 \neq 8$; false **28.** $0 \times 9.8 = 0 \neq 9.8$; false
29. $1 \times 6.7 = 6.7 = 6.7$; true

ACTIVITY LAB

page 148

- 1.** $3.78 \times 14.95 \times 0 = 0$; $388.4 - 300 - 88.4 = 0$; $0 = 0$;
true, Zero Property of Multiplication **2.** $15.4 \times 10 =$
 154 ; $(15 \times 10) + (0.4 \times 10) = 150 + 4 = 154$; $154 = 154$;
true; Distributive Property **3.** $25.7 - (13 - 10) =$
 $25.7 - 3 = 22.7$; $(25.7 - 13) - 10 = 12.7 - 10 = 2.7$;
 $22.7 \neq 2.7$; false, subtraction is not associative.
4. $16 \times (3.8 \div 3.8) = 16 \times 1 = 16$; $2 \times 8 = 16$, $16 = 16$;
true; Multiplicative Identity **5.** False; $2 - 0.5 \neq 19.5$
6. $321 \times 3 = 963$, $(300 \times 3) + (21 \times 3) = 900 + 63 = 963$;
 $963 = 963$; true; Distributive Property **7.** false; Zero
Property of Multiplication; $0 \times a = 0$; $0 \neq a$ **8.** false;
 $0 \div a = 0$; $0 \neq a$ **9.** true; addition and subtraction are
inverse operations. **10.** false; cannot divide by 0
11. true; Commutative Property of Multiplication
12. true; addition and subtraction are inverse operations.
13. true; division and multiplication are inverse
operations. **14.** false; division is not commutative.
15. true; division and multiplication are inverse
operations. **16.** $a \div a = 1$; $b \div b = 1$; $1 = 1$; true
17. You cannot multiply 0 by any number to get 5.

TEST-TAKING STRATEGIES

page 149

Answers may vary. Samples are given.

- 1.** The 2-point response defined the variable, set up an equation, and found the weight of the dog; the 1-point response only showed a method and found the weight of the dog. **2.** Let d = weight of the dog. $121 - d = 104$

$$121 - d + d = 104 + d$$

$$121 = 104 + d$$

$$121 - 104 = 104 - 104 + d$$

$$17 = d$$
; The dog weighs 17 pounds.

CHAPTER REVIEW

pages 150–151

- 1.** term **2.** algebraic expression **3.** solution **4.** variable
5. equation

6.

$$\begin{array}{ccccccccc} & \times 3 & & \times 3 & & \times 3 & & \times 3 & & \times 3 & & \times 3 \\ \text{2,} & \xrightarrow{\quad} & \text{6,} & \xrightarrow{\quad} & \text{18,} & \xrightarrow{\quad} & \text{54,} & \xrightarrow{\quad} & \text{162,} & \xrightarrow{\quad} & \text{486,} & \xrightarrow{\quad} & \text{1,458} \end{array}$$

Start with 2 and multiply by 3 repeatedly.

7.

$$\begin{array}{ccccccccc} & +12 & & +12 & & +12 & & +12 & & +12 & & +12 \\ \text{7,} & \xrightarrow{\quad} & \text{19,} & \xrightarrow{\quad} & \text{31,} & \xrightarrow{\quad} & \text{43,} & \xrightarrow{\quad} & \text{55,} & \xrightarrow{\quad} & \text{67,} & \xrightarrow{\quad} & \text{79} \end{array}$$

Start with 7 and add 12 repeatedly.

8.

$$\begin{array}{ccccccccc} & \times 2 & & \times 2 & & \times 2 & & \times 2 & & \times 2 & & \times 2 \\ \text{7,} & \xrightarrow{\quad} & \text{14,} & \xrightarrow{\quad} & \text{28,} & \xrightarrow{\quad} & \text{56,} & \xrightarrow{\quad} & \text{112,} & \xrightarrow{\quad} & \text{224,} & \xrightarrow{\quad} & \text{448} \end{array}$$

Start with 7 and multiply by 2 repeatedly.

9. $48 \div x = 8 = 48 \div 6 = 8$ 10. $c - 7 = 56 - 7 = 49$
 11. $14b = 14(3) = 42$ 12. $x \div 12$ 13. $2b$ 14. $h + k$
 15. $15 + 25 = 40$; $40 \neq 30$; false 16. $21 \div 3 = 7$; $7 = 7$;
 true 17. $6 \times 4 = 24$; $24 \neq 28$; false 18. $x + 7 = 12$; $5 + 7 =$
 12 ; 5 19. $m + 13 = 21$; $8 + 13 = 21$; 8 20. $4t = 32$;
 $4 \times 8 = 32$; 8

21. $r - 1,078 = 4,562$

$r - 1,078 + 1,078 = 4,562 + 1,078$

$r = 5,640$

22. $m + 8 = 15$

$m + 8 - 8 = 15 - 8$

$m = 7$

24. $d - 2.16 = 3.9$

$d - 2.16 + 2.16 = 3.9 + 2.16$

$d = 6.06$

25. Let e = the amount Elizabeth weighs.

$e + 2.7 = 132.4$

$e + 2.7 - 2.7 = 132.4 - 2.7$

$e = 129.7$

Elizabeth weighs 129.7 lb.

26. $78x = 4,368$

$78x \div 78 = 4,368 \div 78$

$x = 56$

28. $1.2h = 3$

$1.2h \div 1.2 = 3 \div 1.2$

$7.2 \times 1.5 = u \div 1.5 \times 1.5$

$h = 30 \div 12$

$10.8 = u$

$h = 2.5$

30. $v \div 3.2 = 19$

$v \div 3.2 \times 3.2 = 19 \times 3.2$

$v = 60.8$

27. $t \div 4p = 32$

$t \div 4 \times 4 = 32 \times 4$

$t = 128$

29. $7.2 = u \div 1.5$

$7.2 \times 1.5 = u \div 1.5 \times 1.5$

$10.8 = u$

$h = 2.5$

31. $4.5 = 5n$

$4.5 \div 5 = 5n \div 5$

$0.9 = n$

32. Let s = the amount of money Stuart has.

$5s = 83.40$

$5s \div 5 = 83.40 \div 5$

$s = 16.68$

Stuart has \$16.68.

33. $7 \times 28 = 7 \times (20 + 8) = (7 \times 20) + (7 \times 8) =$

$140 + 56 = 196$ 34. $5 \times 3.4 = 5 \times (3 + 0.4) =$

$(5 \times 3) + (5 \times 0.4) = 15 + 2 = 17$ 35. $11 \times 57 =$

$(10 + 1) \times 57 = (10 \times 57) + (1 \times 57) = 570 + 57 = 627$

CHAPTER TEST

page 152

1. The first term is 10; multiply by 2 to get the next term:

$10 \times 2 = 20$; $20 \times 2 = 40$; $40 \times 2 = 80$; $80 \times 2 = 160$;

$160 \times 2 = 320$, so the next six terms are 10, 20, 40, 80, 160,

320. 2. The first term is 50: subtract 4 to get the next term:

$50 - 4 = 46$; $46 - 4 = 42$; $42 - 4 = 38$; $38 - 4 = 34$;

$34 - 4 = 30$, so the next six terms are 50, 46, 42, 38, 34, 30.

3. $+4$ $+4$ $+4$ $+4$ $+4$ $+4$

2, 6, 10, 14, 18, 22, 26

Start with 6 and add 4 repeatedly.

4. $\div 2$ $\div 2$ $\div 2$ $\div 2$ $\div 2$ $\div 2$

64, 32, 16, 8, 4, 2, 1

Start with 64 and divide by 2 repeatedly.

5. -9 -9 -9 -9 -9 -9
 78, 69, 60, 51, 42, 33, 24

Start with 78 and subtract 9 repeatedly.

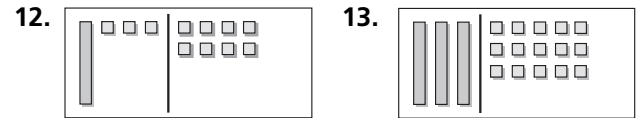
6. $\times 3$ $\times 3$ $\times 3$ $\times 3$ $\times 3$ $\times 3$
 4, 12, 36, 108, 324, 972, 2,916

Start with 4 and multiply by 3 repeatedly.

7. $500 + (x - 8) = 500 + (12 - 8) = 500 + 4 = 504$

8. $2x - 3 = 2(12) - 3 = 24 - 3 = 21$ 9. $8 + x \div 2 =$

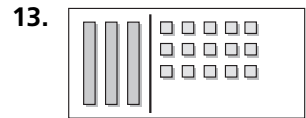
$8 + 12 \div 2 = 8 + 6 = 14$ 10. $2x + 4$ 11. $3x + 2$



$v + 3 = 8$

$v + 3 - 3 = 8 - 3$

$v = 5$



$3g = 15$

$3g \div 3 = 15 \div 3$

$g = 5$

14. $4 + c$ 15. $3d - 8$ 16. $x - 8$

17. Check students' work.

18. $6 + 7 \times 3 = 6 + 21 = 27$; $27 \neq 39$; false

19. $1.5 \times (6 - 4) = 1.5 \times 2 = 3$; $3 = 3$; true

20. $x + 1.5 = 32 = 17 + 1.5 = 18.5$; $18.5 \neq 32$; no

21. $h - 8 = 2$; $28 - 8 = 20$; $20 \neq 2$; no

22. $n - 4 = 8.4$

$n - 4 + 4 = 8.4 + 4$

$n = 12.4$

23. $25 + b = 138$

$25 - 25 + b = 138 - 25$

$b = 113$

24. $k \div 12 = 3$

$k \div 12 \times 12 = 3 \times 12$

$k = 36$

25. $11t = 99$

$11t \div 11 = 99 \div 11$

$t = 9$

26. Let c = number of cards sold.

$0.40c = 302$

$0.4c \div 0.4 = 302 \div 0.4$

$c = 3,020 \div 4$

$c = 755$

The team sold 755 cards.

27. The number of squares in the design increases by 2 each time. For the sixth figure, it has increased five times.

So the sixth design has $3 + (2 \times 5) = 13$; 13 squares.

28. $8 \times 39 = 8 \times (40 - 1) = (8 \times 40) - (8 \times 1) =$

$320 - 8 = 312$ 29. $4 \times 71 = 4 \times (70 + 1) =$

$(4 \times 70) + (4 \times 1) = 280 + 4 = 284$ 30. $6 \times 82 =$

$6 \times (80 + 2) = (6 \times 80) + (6 \times 2) = 480 + 12 = 492$

31. $3 \times 98 = 3 \times (100 - 2) = (3 \times 100) - (3 \times 2) =$

$300 - 6 = 294$

TEST PREP

pages 153

1. Fifty-four hundredths is 0.54; the correct choice is B.

2. 0.48 is to the right of 0.478 on a number line,

$0.48 > 0.478$; the correct choice is H. 3. The

Commutative Property is represented by $5 \times 9 = 9 \times 5$;

the correct choice is C. 4. She increases the number of

laps she jogs every day by 4; since she jogs 19 laps on day

4, she jogs $19 + 4$, or 23 laps on day 5 and $23 + 4$, or 27

laps on day 6; the correct choice is J. 5. b less than 10 is

$10 - b$; this is not the same as $b - 10$; the correct choice

is C. **6.** $3^2 + 2^2 = 9 + 4 = 13$; the correct choice is H.

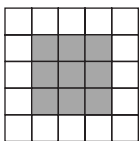
7. Adding 15 to each side would isolate the variable; the correct choice is C. **8.** $2.5c + 2 = 2.5(6) + 2 = 15 + 2 = 17$; the correct choice is G. **9.** A: $13 \times (20 + 2) = 13 \times 22$ by the Order of Operations; B: $13 \times 20 + 13 \times 2 = 13 \times (20 + 2) = 13 \times 22$ by the Distributive Property; C: $(10 + 13) \times (10 + 12) = 23 \times 22$; D: $22 \times (10 + 3) = 22 \times 13 = 13 \times 22$ by the Commutative Property; the correct choice is C. **10.** You have \$4.00 to spend and each apple costs \$0.38; $\$4.00 \div \$0.38 \approx 10.5$; you can buy 10 apples; the correct choice is H.

11. $x \div 0.15 = 1.2$

$$x \div 0.15 \cdot 0.15 = 1.2 \cdot 0.15$$

$$x = 0.18$$

12. You spend \$12.15 on fish that costs \$4.86 per pound, so you spend $\$12.15 \div \4.86 , or 2.5 lbs. **13.** The thickness of 100 sheets of metal is $100 \cdot 0.004$, or 0.4 in.

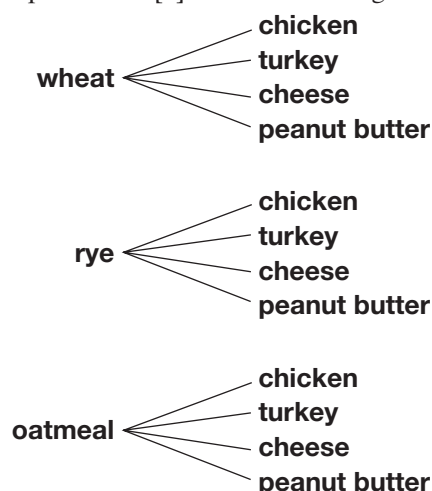
14a-b. [2]  The sixth figure will have 7 small squares on each side. In the center, the shaded part will have 5 small squares on each side. The number of white

squares will be $7^2 - 5^2 = 49 - 25 = 24$ squares.

[1] incorrect figure with correct number of white squares

OR correct figure with incorrect number of white squares

15. [2] Draw a tree diagram



I can make 12 different sandwiches. OR a correct explanation of choices: there are 3 different types of breads and 4 different fillings, so you can make $3 \cdot 4$, or 12 different sandwiches. [1] has correct answer with a correct diagram or explanation OR a correct diagram or explanation without a correct answer

DK PROBLEM SOLVING APPLICATION

pages 154–155

1a. Let y = the number of Mercury years in 1 Earth year.

$$87.97y = 365.24$$

$$87.97y \div 87.97 = 365.24 \div 87.97$$

$$y \approx 4.15$$

An Earth year is about 4 Mercury years. **1b.** Check students' work. **2a–b.** Answers may vary. Samples are given. **2a.** You would celebrate a birthday once every Jupiter year, which equals $4,332.71 \div 365.24 \approx 11.86$, or about 11.86 Earth years. A person lives about 80 years so you would celebrate $80 \div 11.86 \approx 80 \div 12 \approx 7$, or about 7 birthdays. **2b.** One year on Pluto is $90,777.3 \div 365.24 \approx 249$, or about 249 Earth years, so you could not celebrate a birthday after one year on Pluto. **3a.** Answers may vary. Sample: A month on Mars could be defined as the time that it takes one of its moons to orbit the planet. This is roughly the definition of one month on Earth. **3b.** Answers may vary. Sample: No; a Martian month is almost the same as a Martian day.

CHECK YOUR READINESS

page 156

1. four tenths 2. thirty-seven hundredths 3. one and eight tenths 4. two hundred five thousandths 5. twenty and eighty-eight hundredths 6. one hundred fifty thousandths 7. Compare place values of digits and decimals; 4.02, 4.2, 4.21 are ordered from least to greatest. 8. Compare place values of digits and decimals; 0.033, 0.3, 0.33 are ordered from least to greatest. 9. Compare place values of digits and decimals; 6.032, 6.203, 6.302 are ordered from least to greatest. 10. Compare place values of digits and decimals; 9.013, 9.031, 9.103 are ordered from least to greatest.

11. $1.6 \div 2 = 0.8$

$$\begin{array}{r} 0.8 \\ 2 \overline{)1.6} \\ \underline{-1.6} \\ 0 \end{array}$$

12. $3.85 \div 7 = 0.55$

$$\begin{array}{r} 0.55 \\ 7 \overline{)3.85} \\ \underline{3.5} \\ .35 \\ \underline{-.35} \\ 0 \end{array}$$

13. $7.6 \div 0.4 = 76 \div 4 = 19$

$$\begin{array}{r} 19 \\ 4 \overline{)76} \\ \underline{-40} \\ 36 \\ \underline{-36} \\ 0 \end{array}$$

14. $290.4 \div 8 = 36.3$

$$\begin{array}{r} 36.3 \\ 8 \overline{)290.4} \\ \underline{-24} \\ 50 \\ \underline{-48} \\ 24 \\ \underline{-24} \\ 0 \end{array}$$

15. $211.2 \div 1.6 =$

$2,112 \div 16 = 132$

$$\begin{array}{r} 132 \\ 16 \overline{)2112} \\ \underline{-16} \\ 51 \\ \underline{-48} \\ 32 \\ \underline{-32} \\ 0 \end{array}$$

16. $583 \div 11 = 53$

$$\begin{array}{r} 53 \\ 11 \overline{)583} \\ \underline{-55} \\ 33 \\ \underline{-33} \\ 0 \end{array}$$

4-1 Divisibility and Mental Math

pages 158–161

Check Skills You'll Need For complete solutions see *Daily Skills Check and Lesson Quiz Transparencies* or *Presentation Pro CD-ROM*. 1. division 2. 49 3. 41 4. 50

Quick Check 1a. No; 64 divided by 6 has a remainder that is not 0. 1b. Yes; $93 = 31 \times 3$; so, 93 is divisible by 3.

2a. Since 150 ends in 0, it is divisible by 2, by 5, and by 10. Sum of digits: $1 + 5 + 0 = 6$; this is divisible by 3; so 150 is divisible by 3; so, 150 is divisible by 2, 3, 5, and 10.

2b. Since 1,021 does not end in 0, 2, 4, 5, 6, or 8, it is not divisible by 2, 5, or 10. Sum of digits: $1 + 0 + 2 + 1 = 4$; this is not divisible by 3. 2c. 2,112 ends in 2, so it is divisible by 2, not divisible by 5 since it does not end in 0 or 5; not divisible by 10, since it does not end in 0. Sum of digits: $2 + 1 + 1 + 2 = 6$, this is divisible by 3; so, 2,112 is divisible by 2 and 3. 3. Sum of digits: $1 + 2 + 6 = 9$; this is divisible by 9, so 126 is divisible by 9; yes

Exercises 1. If the number is divisible by 2, then the number is even; otherwise, the number is odd. 2. 6 is divisible by 2 and 3. 3. 60 is divisible by 2, 3, 5, and 10; the correct choice is C. 4. 48 is divisible by 2 and 3; the correct choice is B. 5. 81 is divisible by 3 and 9; the correct choice is A. 6. yes, since $48 \div 4 = 12$ 7. no, since $46 \div 4$ will have a nonzero remainder 8. yes, since $63 \div 7 = 9$ 9. no, since $122 \div 6$ will have a nonzero remainder 10. 48,960 ends in 0, so it is divisible by 2, by 5 and by 10. Sum of digits: $4 + 8 + 9 + 6 = 27$; this is divisible by 3, so 48,960 is divisible by 3. 11. 2,385 is not divisible by 2 since it does not end in 0, 2, 4, 6, or 8; is divisible by 5 since it ends in 5; not divisible by 10 since it does not end in 0. Sum of digits: $2 + 3 + 8 + 5 = 18$; this is divisible by 3, so, 2,385 is divisible by 3. 12. 928 ends in 8, so it is divisible by 2; not divisible by 5 since it does not end in 0 or 5; not divisible by 10 since it does not end in 0. Sum of digits: $9 + 2 + 8 = 19$; this is not divisible by 3, so 928 is not divisible by 3. 13. 672 ends in 2, so it is divisible by 2; not divisible by 5 since it does not end in 0 or 5; not divisible by 10 since it does not end in 0. Sum of digits: $6 + 7 + 2 = 15$; this is divisible by 3, so, 672 is divisible by 3. 14. 202,470 is divisible by 2, 5, and 10 since it ends in 0. Sum of digits: $2 + 2 + 4 + 7 = 15$; this is divisible by 3 so, 202,470 is divisible by 3.

15. 53,559 is not divisible by 2 since it does not end in 0, 2, 4, 6, or 8; not divisible by 5 since it does not end in 0 or 5; not divisible by 10 since it does not end in 0. Sum of digits: $5 + 3 + 5 + 5 + 9 = 27$; this is divisible by 3, so, 53,559 is divisible by 3. 16. 57 is not divisible by 2 since it does not end in 0, 2, 4, 6, or 8; not divisible by 5 since it does not end in 0 or 5; not divisible by 10 since it does not end in 0. Sum of digits: $5 + 7 = 12$; this is divisible by 3, so 57 is divisible by 3. 17. 92 ends in 2, so it is divisible by 2; not divisible by 5 since it does not end in 0 or 5; not divisible by 10 since it does not end in 0. Sum of digits: $9 + 2 = 11$; this is not divisible by 3, so 92 is not divisible by 3. 18. 171 is not divisible by 2 since it does not end in 0, 2, 4, 6, or 8; not divisible by 5 since it does not end in 0 or 5; not divisible by 10 since it does not end in 0. Sum of digits: $1 + 7 + 1 = 9$; this is divisible by 3, so 171 is divisible by 3. 19. 962 ends in 2, so it is divisible by 2;

not divisible by 5 since it does not end in 0 or 5; not divisible by 10 since it does not end in 0. Sum of digits: $9 + 6 + 2 = 17$; this is not divisible by 3, so 962 is not divisible by 3. **20.** 1,956 ends in 6, so it is divisible by 2; not divisible by 5 since it does not end in 0 or 5; not divisible by 10 since it does not end in 0. Sum of digits: $1 + 9 + 5 + 6 = 21$; this is divisible by 3, so 1,956 is divisible by 3. **21.** 11,160 is divisible by 2, 5, and 10 since it ends in 0. Sum of digits: $1 + 1 + 1 + 6 = 9$; this is divisible by 3, so, 11,160 is divisible by 3. **22.** Yes, since $1 + 1 + 4 = 6$ and 6 is divisible by 3, everyone will have some spot on one of 38 teams. **23.** No; sum of the digits: $1 + 1 + 8 + 7 = 17$; this is not divisible by 9; so, 1,187 is not divisible by 9. **24.** Yes; sum of the digits: $2 + 1 + 8 + 7 = 18$; this is divisible by 9; so, 2,187 is divisible by 9. **25.** Yes; sum of the digits: $1 + 7 + 5 + 9 + 5 = 27$; this is divisible by 9; so, 17,595 is divisible by 9. **26.** 84 ends in 4, so it is divisible by 2; sum of digits: $8 + 4 = 12$ and 12 is divisible by 3; it is divisible by 6 since it is divisible by both 2 and 3. Using the divisibility rules it is not divisible by 5, 9, or 10. The factors of 84 are 1, 2, 3, 4, 6, 7, 12, 14, 21, 28, 42, and 84. Teams require 2 or more people and equal size teams implies at least 2 teams, so 84 people can be divided into teams (of size 2, 3, 4, 6, 7, 12, 14, 21, 28, 42) ten ways. **27.** $9 + 5 + x + 4 = 18$; $x = 4$ **28.** $x + 7 + 3 + 0 + 2 = 18$; $x = 6$ **29.** $2 + x + 6 + 5 + 5 + 5 = 27$; $x = 4$ **30.** 2; yes, 60 ends in 0; 3; yes; sum of digits, 6, is divisible by 3; 4; yes since $60 = 15 \times 4$; 5; yes, since 60 ends in 0; 6; yes; 60 is divisible by both 2 and 3; 7; no, $60 \div 7$ has a nonzero remainder; 8; no, $60 \div 8$ has a nonzero remainder; 9; no sum of digits, 6, is not divisible by 9; 10; yes; ends in 0; 60 is divisible by 2, 3, 4, 5, 6, and 10. **31.** yes; $5 + 6 + 6 + 1 = 18$; 18 is divisible by 9, so \$5661, or \$56.61, is divisible by 9. **32a.** $x + 6$; 30, 36, 42, 48 **32b.** All are divisible by 2 and 3. **32c.** Any number that is divisible by both 2 and 3 is also divisible by 6. **33.** \$1.00; $17 \div 2$ has a remainder of 1.

$$\begin{array}{r} 8 \\ 2 \overline{)17} \\ \underline{-16} \\ 1 \end{array}$$

34. Start with 1: 123 and 132; start with 2: 213 and 231; start with 3: 321 and 312; 123, 132, 213, 231, 312, 321. Consider only the even numbers: 132 and 312; $132 \div 4 = 33$ and $312 \div 4 = 78$; so, only 132 and 312 are divisible by 4 **35.** $28 \div 2 = 14$; the correct choice is D. **36.** 14.98 rounds to 15, 18.99 rounds to 19, 11.75 rounds to 12, 6.25 rounds to 6, 28.50 rounds to 29; $15 + 19 + 12 + 6 + 29 = 81$; the correct choice is J. **37.** $1 \div 100 = 0.01$; the correct choice is B. **38.** $2(2 - 1)$; $2 \times 1 = 2$; **39.** $1 + (7 \times 5)$; $1 + 35 = 36$ **40.** $6(3 + 2)$; $6 \times 5 = 30$ **41.** $3 \times 3 - 2$; $9 - 2 = 7$

Check Skills You'll Need For complete solutions see *Daily Skills Check and Lesson Quiz Transparencies* or *Presentation Pro CD-ROM*. **1.** expression **2.** 25

3. 0 **4.** 2

Quick Check 1a. 3.94^2 ; 3.94 is the base; 2 is the exponent **1b.** 7^4 ; 7 is the base; 4 is the exponent **1c.** x^3 ; x is the base; 3 is the exponent **2.** $3^3 = 3 \times 3 \times 3 = 27$ **3a.** $2^3 - 6 \div 3 = 8 - 2 = 6$ **3b.** $5 + (2 + 1)^2 = 5 + 3^2 = 5 + 9 = 14$

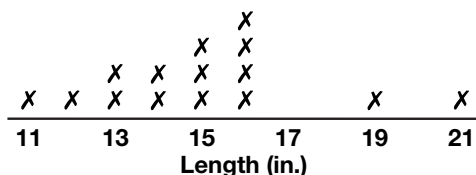
Exercises 1. The exponent tells how many times the base is used as a factor. **2.** No; $5^4 = 5 \times 5 \times 5 \times 5 = 625$; $5 \times 4 = 5 + 5 + 5 + 5 = 20$ **3.** $3 \times 3 = 3^2$ **4.** $2 \times 2 \times 2 = 2^3$ **5.** $9 \times 9 \times 9 = 9^3$ **6.** $4^2 = 4 \times 4 = 16$ **7.** $2^3 = 2 \times 2 \times 2 = 8$ **8.** 1^4 ; 1 is the base; 4 is the exponent **9.** 29^1 ; 29 is the base; 1 is the exponent **10.** 3^4 ; 3 is the base; 4 is the exponent **11.** 25^3 ; 25 is the base; 3 is the exponent **12.** 2.5^3 ; 2.5 is the base; 3 is the exponent **13.** 100^3 ; 100 is the base; 3 is the exponent **14.** r^2 ; r is the base; 2 is the exponent **15.** b^5 ; b is the base; 5 is the exponent **16.** $25n^4$; n is the base; 4 is the exponent **17.** $5^3 = 5 \times 5 \times 5 = 125$ **18.** $5^2 = 5 \times 5 = 25$ **19.** $4^3 = 4 \times 4 \times 4 = 16 \times 4 = 64$ **20.** $2.5^2 = 2.5 \times 2.5 = 6.25$ **21.** $(2 + 3)^2 = 5^2 = 5 \times 5 = 25$ **22.** $(3^2 - 1)^2 = (9 - 1)^2 = 8^2 = 8 \times 8 = 64$ **23.** $(9 - 7)^3 \times 6 = 2^3 \times 6 = 8 \times 6 = 48$ **24.** $(9 + 1)^2 - 1^3 = 10^2 - 1 = 100 - 1 = 99$ **25.** $15^2 - (1 + 13^2) = 225 - (1 + 169) = 225 - 170 = 55$ **26.** $(10 - 8)^4 \times 3.5 = 2^4 \times 3.5 = 16 \times 3.5 = 56$ **27.** $38,000 - 10^4 = 38,000 - 10 \times 10 \times 10 \times 10 = 38,000 - 10,000 = 28,000$ ft **28.** $10,000,000 = 10^7$ **29.** $j^6 = 2^6 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 = 64$ **30.** $(j + g)^3 = (2 + 4)^3 = 6^3 = 6 \times 6 \times 6 = 216$ **31.** $(j + g)^2 + 4 = (2 + 4)^2 + 4 = 6^2 + 4 = 6 \times 6 + 4 = 36 + 4 = 40$

Power	Standard Form	
10^1	10	10,000; 10^5 ; 100,000
10^2	100	32b. The exponent tells the number of 0's in standard form.
10^3	1,000	32c. 10^6 ; 1,000,000; 10^7 ; 10,000,000; 10^8 ; 100,000,000 32d. 10^n
10^4	10,000	represents 1 followed by n zeros
10^5	100,000	
10^6	1,000,000	
10^7	10,000,000	
10^8	100,000,000	

33. After 1 hour there are 2 or 2^1 cells, after 2 hours there are 4 or 2^2 cells. Continuing the pattern after 8 hours there are 2^8 cells. **34.** $2^2 \times 2^3 - 2^3 - 1 = 4 \times 9 - 8 - 1 = 36 - 9 - 1 = 27$; $2^2(3^2 - 2^3) - 1 = 4 \times (9 - 8) - 1 = 4 \times 1 - 1 = 3$; The expressions do not have the same value, because of the order of operations. **35.** $5^2 = 25$, $6^2 = 36$; d is between 5 and 6. **36.** $k = 15 - 3$; the correct choice is C.

37. $2x + x = 30$, $3x = 30$, $x = 10$; Karen eats $2x$ grapes so $2 \times 10 = 20$; the correct choice is H. 38. $1^3 = 1$; $2^3 = 8$; $3^3 = 27$; $n^3 = n^3$, so the correct choice is D.

39. Length of Lake Trout



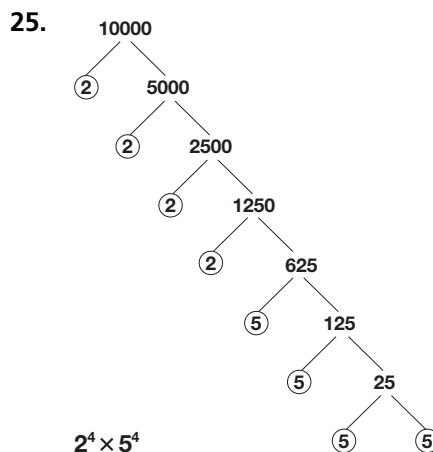
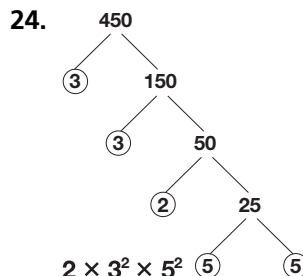
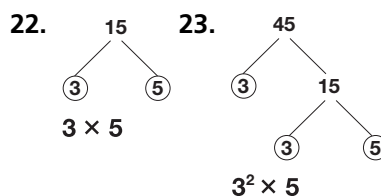
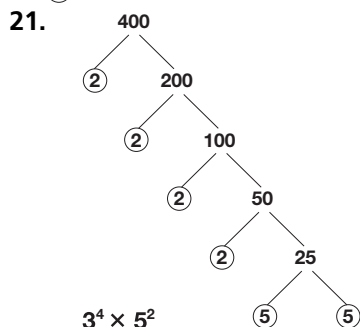
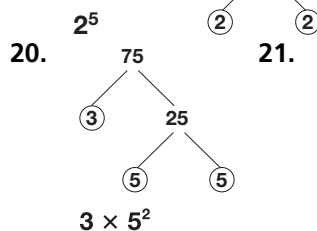
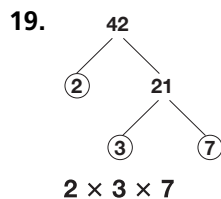
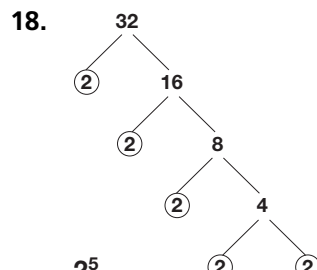
4-3 Prime Numbers and Prime Factorization pages 166–169

Check Skills You'll Need For complete solutions see *Daily Skills Check and Lesson Quiz Transparencies* or *Presentation Pro CD-ROM*. 1. No; 25 is divisible by 5 but not by 10. 2. 2, 3, 5, 9, 10 3. divisible by none of these 4. 2, 5, and 10 5. 2, 5, and 10

Quick Check 1. 1×24 , 2×12 , 3×8 , 4×6

2a. composite; $3 \times 13 = 39$ 2b. Prime; it has only two factors, 1 and 47. 2c. composite; $3 \times 21 = 63$ or $7 \times 9 = 63$ 3. $27 = 9 \times 3 = 3 \times 3 \times 3 = 3^3$

Exercises 1. A prime number has exactly two factors, and a composite number has more than two factors. 2. 11 and 13, or 17 and 19 3. 55 has factors of 1, 5, 11, and 55 so it is composite. 51 has factors of 1, 3, 17, and 51 so it is composite. 82 has factors of 1, 2, 41, 82, so it is composite. 7 has just two factors, 1 and 7, so it is prime. 4. No. Each number has only one prime factorization. 5. factors of 28: 1, 2, 4, 7, 14, 28 6. factors of 21: 1, 3, 7, 21 7. factors of 17: 1, 17 8. factors of 60: 1, 2, 3, 4, 5, 6, 10, 12, 15, 20, 30, 60 9. factors of 48: 1, 2, 3, 4, 6, 8, 12, 16, 24, 48 10. factors of 37: 1, 37 11. factors of 144: 1, 2, 3, 4, 6, 8, 9, 12, 16, 18, 24, 36, 48, 72, 144 12. factors of 450: 1, 2, 3, 5, 6, 9, 10, 15, 18, 25, 30, 45, 50, 75, 90, 150, 225, 450 13. 1 3 36, 2 3 18, 3 3 12, 4 3 9, 6 3 6 14. Prime; the only factors are 1 and 19. 15. Prime; the only factors are 1 and 67. 16. composite; $3 \times 19 = 57$ 17. composite; $7 \times 13 = 91$



26. 1×48 ; 2×24 ; 3×16 ; 4×12 ; 6×8

27. $7 \times 11 \times 13 = 77 \times 13 = 1,001$

28. $2^3 \times 5^2 \times 7 \times 11 = 8 \times 25 \times 77 = 200 \times 77 = 15,400$

29. $81 = 9 \times 9$; 9 rows 30. Since $36 = 1 \times 36$, 2×18 , 3×12 , 4×9 , and 6×6 , there could be 1 row with 36 guards, 2 rows with 18 guards, 3 rows with 12 guards, 4 rows with 9 guards, 6 rows with 6 guards, or any of these possibilities reversed. 31. If $p > 2$ and prime, then p is always odd. So $p + 1$ is even and always composite.

32. 1×116 ; 2×58 ; 4×29 33. 3, 5; 5, 7; 11, 13; 17, 19; 29, 31; 41, 43; 59, 61; 71, 73

34.

$48 = 6 \times 8 = (2 \times 3) \times (2 \times 2 \times 2) = 2^4 \times 3$; the correct choice is D.

35. Pop or Rock = 200 students; Country = 40 students; Jazz = 20; F: Pop or Rock > Jazz, $200 > 20$; True; G: Jazz > Country, $20 > 40$; False; H: Country + Jazz = $40 + 60 = 60$, total number of students = $200 + 40 + 20 = 260$, $\frac{60}{260} = \frac{3}{13} \neq \frac{1}{2}$; False; J: $200 \neq 100$, False. The correct choice is F. 36. factors of 12: 1, 2, 3, 4, 6, 12; factors of 30: 1, 2, 3, 5, 6, 10, 15, 30; 5 is not a factor of 12; the correct choice is C. 37. $(8 + 10) \div 2 = 18 \div 2 = 9$; $14 \div (2 + 5) = 14 \div 7 = 2$; $9 > 2$ 38. $3.5 + 2.5 \times 2 = 3.5 + 5 = 8.5$; $24 \div 4 + 3 = 6 + 3 = 9$; $8.5 < 9$

1. 2; no; 375 ends in 5; 3; yes; sum of digits, 15, is divisible by 3; 5; yes; 375 ends in 5; 9; no; sum of digits, 15, is not divisible by 9; 10; no; 375 ends in 5. **2.** 2; yes; 1,402 ends in 2; 3; no; sum of digits, 7, is not divisible by 3; 5; no; 1,402 ends in 2; 9; no; sum of digits, 7, is not divisible by 9; 10; no; 1,402 ends in 2. **3.** 2; yes; 240 ends in 0; 3; yes; sum of digits, 6, is divisible by 3; 5; yes; 240 ends in 0; 9; no; sum of digits, 6, is not divisible by 9; 10; yes; 240 ends in 0. **4.** $4^3 = 4 \times 4 \times 4 = 16 \times 4 = 64$ **5.** $5 + (2^3 - 3) = 5 + (2 \times 2 \times 2 - 3) = 5 + (8 - 3) = 5 + 5 = 10$ **6.** $5^5 = 5 \times 5 \times 5 \times 5 \times 5 = 25 \times 25 \times 5 = 625 \times 5 = 3,125$ **7.** $(6 + 2)^2 = 8^2 = 8 \times 8 = 64$ **8.** $42 = 6 \times 7 = (2 \times 3) \times 7 = 2 \times 3 \times 7$ **9.** $80 = 10 \times 8 = (2 \times 5) \times (4 \times 2) = (2 \times 5) \times (2 \times 2 \times 2) = 2^4 \times 5$ **10.** $1,000 = 10 \times 100 = (2 \times 5) \times (10 \times 10) = (2 \times 5) \times (2 \times 5 \times 2 \times 5) = 2^3 \times 5^3$ **11.** $1 \times 105, 3 \times 35, 5 \times 21, 7 \times 15$

4-4 Greatest Common Factor

pages 171–174

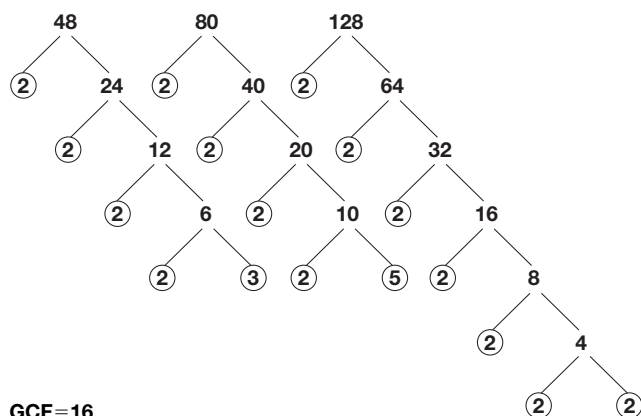
Check Skills You'll Need For complete solutions see *Daily Skills Check and Lesson Quiz Transparencies* or *Presentation Pro CD-ROM*. **1.** Answers may vary. Sample: Multiply two factors together to find the product. **2.** $3^2 \times 5$ **3.** 7×3 **4.** $3^2 \times 11$

Quick Check 1a. Find the factors of 6: 1, 2, 3, 6; find the factors of 21: 1, 3, 7, 21; the GCF of 6 and 21 is 3.

1b. Find the factors of 18: 1, 2, 3, 6, 9, 18; find the factors of 49: 1, 7, 49; the GCF of 18 and 49 is 1. **1c.** Find the factors of 14: 1, 2, 7, 14; find the factors of 28: 1, 2, 4, 7, 14, 28; the GCF of 14 and 28 is 14.

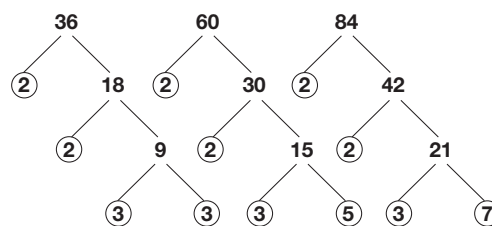
2. $2 \overline{)18 \ 42}$ $2 \times 3 = 6$; The GCF of 18 and 42 is 6, so the length of each ribbon cut should be 6 in.
 $3 \overline{)9 \ 21}$
 3 7

3a.



GCF=16

3b.



GCF=12

Exercises 1. When two numbers have 1 as their only common factor, then the greatest common factor is 1.

2. Answers may vary. Sample: 12 and 8 **3.** Find the factors of 18: 1, 2, 3, 6, 9, 18; find the factors of 3: 1, 3; the GCF is 3, so the correct choice is B. **4.** Find the factors of 8: 1, 2, 4, 8; find the factors of 12: 1, 2, 3, 4, 6, 12; the GCF is 4, so the correct choice is C. **5.** Find the factors of 22: 1, 2, 11, 22; find the factors of 110: 1, 2, 5, 10, 11, 22, 55, 110; the GCF is 22, so the correct choice is A. **6.** Find the factors of 14: 1, 2, 7, 14; Find the factors of 35: 1, 5, 7, 35; the GCF of 14 and 35 is 7. **7.** Find the factors of 24: 1, 2, 3, 4, 6, 8, 12, 24; find the factors of 45: 1, 3, 5, 9, 15, 45; the GCF of 24 and 45 is 3. **8.** Find the factors of 26: 1, 2, 13, 26; find the factors of 34: 1, 2, 17, 34; the GCF of 26 and 34 is 2. **9.** Find the factors of 30: 1, 2, 3, 5, 6, 10, 15, 30; find the factors of 35: 1, 5, 7, 35; the GCF of 30 and 35 is 5. **10.** Find the factors of 48: 1, 2, 3, 4, 6, 8, 12, 16, 24, 48; find the factors of 88: 1, 2, 4, 8, 11, 22, 44, 88; the GCF of 48 and 88 is 8. **11.** Find the factors of 36: 1, 2, 3, 4, 6, 9, 12, 18, 36; find the factors of 63: 1, 3, 7, 9, 21, 63; the GCF of 36 and 63 is 9.

12. $2 \overline{)10 \ 18}$
 5 9

GCF = 2

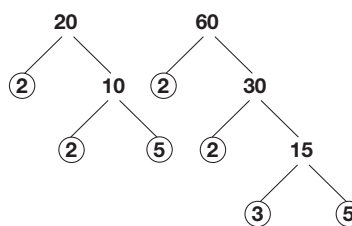
14. $1 \overline{)11 \ 23}$
 11 23

GCF = 1

16. $2 \overline{)12 \ 16 \ 28}$
 $2 \overline{)6 \ 8 \ 14}$
 3 4 7

GCF = 4

18.



$20 = 2 \times 2 \times 5$
 $60 = 2 \times 2 \times 3 \times 5$

13. $2 \overline{)24 \ 60}$
 $2 \overline{)12 \ 30}$
 $3 \overline{)6 \ 15}$
 2 5

GCF = 12

15. $3 \overline{)27 \ 30}$
 9 10

GCF = 3

17. $11 \overline{)33 \ 55 \ 132}$
 3 5 12

GCF = 11

GCF: $2 \times 2 \times 5 = 20$

19. 54 84 GCF: $2 \times 3 = 6$

```

  54      84
  / \    / \
 2 27  2 42
 / \    / \
3  9   2 21
 / \    / \
3  3   3  7

```

$54 = 2 \times 3 \times 3 \times 3$
 $84 = 2 \times 2 \times 3 \times 7$

20. 72 120 GCF: $2 \times 2 \times 2 \times 3 = 24$

```

  72      120
  / \    / \
 2 36  2 60
 / \    / \
 2 18  2 30
 / \    / \
 2  9   2 15
 / \    / \
3  3   3  5

```

$72 = 2 \times 2 \times 2 \times 3 \times 3$
 $120 = 2 \times 2 \times 2 \times 3 \times 5$

21. 64 125 GCF = 1

```

  64      125
  / \    / \
 2 32  5 25
 / \    / \
 2 16  5  5
 / \    / \
 2  8   2  4
 / \    / \
 2  4   2  2

```

$64 = 2 \times 2 \times 2 \times 2 \times 2 \times 2$
 $125 = 5 \times 5 \times 5$

22. 117 130 GCF = 13

```

  117      130
  / \    / \
 3 39  2 65
 / \    / \
 3 13  5 13

```

$117 = 3 \times 3 \times 13$
 $130 = 2 \times 5 \times 13$

23. 45 150 GCF: $3 \times 5 = 15$

```

  45      150
  / \    / \
 3 15  3 50
 / \    / \
 3  5   2 25
          / \
          5  5

```

$45 = 3 \times 3 \times 5$
 $150 = 3 \times 2 \times 5 \times 5$

24. Find the factors of 18: 1, 2, 3, 6, 9, 18; find the factors of 30: 1, 2, 3, 5, 6, 7, 10, 15, 30; find the factors of 42: 1, 2, 3, 6, 7, 14, 21, 42; the GCF is 6 so 6 bouquets can be made. 25. Find the factors of 27: 1, 3, 9, 27; find the factors of 36: 1, 2, 3, 4, 6, 9, 12, 18, 36; find the factors of 81: 1, 9, 81; the GCF is 9 so at most each ticket costs \$9.

26. $50 \overline{) 450}$ 300

```

    9   6
  3 \  /
    3   2

```

GCF = $50 \times 3 = 150$

28. $100 \overline{) 200}$ 300 400 GCF = 100

2 3 4

27. $2 \overline{) 280}$ 420

```

    140 210
  2 \ /
    70 105
  5 \ /
    14  21
  7 \ /
    2   3

```

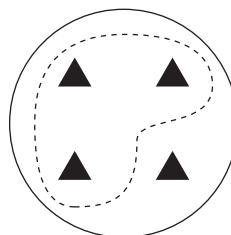
GCF = $2 \times 2 \times 5 \times 7 = 140$

29. Nine is not a common factor of 24 and 36. 30. For Brand A find the factors of 8: 1, 2, 4, 8; for Brand B find the factors 12: 1, 2, 3, 4, 6, 12; for Brand C find the factors of 15: 1, 3, 5, 15; They should purchase Brand B with 12 cards and Brand C with 15 cards because 3 is a common factor of 12 and 15. Three friends cannot equally share 8 cards. They should choose Brand B and Brand C. Alternately, only Brands B and C have 3 as common a factor. They should choose Brand B and Brand C. 31. Find the factors of 14: 1, 2, 7, 14; find the factors of 77: 1, 7, 11, 77; the GCF is 7 so there should be 7 groups which leaves each group with 2 counselors and 11 campers. 32. The number less than 50 with the most factors is 48: 1, 2, 3, 4, 6, 8, 12, 16, 24, 48; any other number that is less than 50 has fewer than 10 factors. Eliminate all prime numbers; Then use trial and error along with the process of elimination. 48 has 1, 2, 3, 4, 6, 8, 12, 16, 24, and 48 as its ten factors. 33. The four two-digit numbers that are less than 50 and end in 6 are 16, 26, 36 and 46; find the factors of 16: 1, 2, 4, 8, 16; find the factors of 26: 1, 2, 13, 26; find the factors of 36: 1, 2, 3, 4, 6, 9, 12, 18, 36; find the factors of 46: 1, 2, 23, 46, so the GCF is 2. 34. Find the factors of 36: 1, 2, 3, 4, 6, 9, 12, 18, 36; find the factors of 54: 1, 2, 3, 6, 9, 18, 27, 54, so the GCF is 18. 35. The correct answer is 4. 36. $3 \times 1.25 + 1.50 = 3.75 + 1.50 = 5.25$; \$5.25

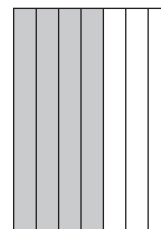
ACTIVITY LAB

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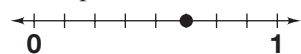
- The model represents $\frac{4}{6}$.
- The model represents $\frac{4}{7}$.
- The model represents $\frac{17}{25}$.
- The model represents $\frac{4}{6}$.
- three triangles out of four triangles



- four strips out of seven strips



7. the point 5 tick marks to the right of 0



8. All parts shaded out of all parts represent 1; $\frac{n}{n}$. No part shaded out of all parts represents 0; $\frac{0}{n}$. 1; 0

4-5 Equivalent fractions

pages 176–177

Check Skills You'll Need For complete solutions see *Daily Skills Check and Lesson Quiz Transparencies or Presentation Pro CD-ROM*. **1.** The GCF is the largest number in the set of common factors. **2.** 5 **3.** 6 **4.** 1

Quick Check 1a–b. Answers may vary. Samples are given. **1a.** $\frac{4 \div 2}{10 \div 2} = \frac{2}{5}$; $\frac{4 \times 2}{10 \times 2} = \frac{8}{20}$, so two equivalent fractions are $\frac{2}{5}$ and $\frac{8}{20}$. **1b.** $\frac{5 \times 2}{8 \times 2} = \frac{10}{16}$; $\frac{5 \times 3}{8 \times 3} = \frac{15}{24}$, so two equivalent fractions are $\frac{10}{16}$ and $\frac{15}{24}$. **2.** The GCF of 24 and 32 is 8; $\frac{24 \div 8}{32 \div 8} = \frac{3}{4}$, so the simplest form of $\frac{24}{32}$ is $\frac{3}{4}$. **3.** $36 + 24 + 18 + 42 = 120$; $\frac{42 \div 6}{120 \div 6} = \frac{7}{20}$, so in simplest form, the fraction of food that is dog food is $\frac{7}{20}$.

Exercises 1. If the GCF of the numerator and the denominator is 1, then the fraction is in simplest form.

2. $\frac{8}{12}$ and $\frac{3}{5}$; no **3.** $\frac{9}{27} = \frac{9 \div 3}{27 \div 3} = \frac{1}{3}$, so the correct choice is A **4.** $\frac{5}{20} = \frac{5 \div 5}{20 \div 5} = \frac{1}{4}$, so the correct choice is C.

5. $\frac{6}{15} = \frac{6 \div 3}{15 \div 3} = \frac{2}{5}$, so the correct choice is B.

6–13. Answers may vary. Samples are given. **6.** $\frac{2}{4} = \frac{2 \times 2}{4 \times 2} = \frac{4}{8}$; $\frac{2 \div 2}{4 \div 2} = \frac{1}{2}$, so two equivalent fractions are $\frac{4}{8}$ and $\frac{1}{2}$. **7.** $\frac{6}{7} = \frac{6 \times 2}{7 \times 2} = \frac{12}{14}$; $\frac{6 \times 4}{7 \times 4} = \frac{24}{28}$, so two equivalent fractions are $\frac{12}{14}$ and $\frac{24}{28}$. **8.** $\frac{12}{18} = \frac{12 \div 6}{18 \div 6} = \frac{2}{3}$; $\frac{12 \div 3}{18 \div 3} = \frac{4}{6}$, so two equivalent fractions are $\frac{2}{3}$ and $\frac{4}{6}$. **9.** $\frac{3}{16} = \frac{3 \times 2}{16 \times 2} = \frac{6}{32}$; $\frac{3 \times 3}{16 \times 3} = \frac{9}{48}$, so two equivalent fractions are $\frac{6}{32}$ and $\frac{9}{48}$.

10. $\frac{3}{10} = \frac{3 \times 2}{10 \times 2} = \frac{6}{20}$; $\frac{3 \times 3}{10 \times 3} = \frac{9}{30}$, so two equivalent fractions are $\frac{6}{20}$ and $\frac{9}{30}$. **11.** $\frac{3}{9} = \frac{3 \div 3}{9 \div 3} = \frac{1}{3}$; $\frac{3 \times 2}{9 \times 2} = \frac{6}{18}$, so two equivalent fractions are $\frac{1}{3}$ and $\frac{6}{18}$. **12.** $\frac{1}{20} = \frac{1 \times 2}{20 \times 2} = \frac{2}{40}$; $\frac{1 \times 3}{20 \times 3} = \frac{3}{60}$, so two equivalent fractions are $\frac{2}{40}$ and $\frac{3}{60}$.

13. $\frac{15}{20} = \frac{15 \div 5}{20 \div 5} = \frac{3}{4}$; $\frac{15 \times 2}{20 \times 2} = \frac{30}{40}$, so two equivalent fractions are $\frac{3}{4}$ and $\frac{30}{40}$. **14.** GCF of 4 and 6: 2 ; $\frac{4}{6} = \frac{4 \div 2}{6 \div 2} = \frac{2}{3}$. **15.** GCF of 10 and 35: 5 ; $\frac{10}{35} = \frac{10 \div 5}{35 \div 5} = \frac{2}{7}$. **16.** GCF of 10 and 20: 10 ; $\frac{10}{20} = \frac{10 \div 10}{20 \div 10} = \frac{1}{2}$. **17.** GCF of 40 and 50: 10 ; $\frac{40}{50} = \frac{40 \div 10}{50 \div 10} = \frac{4}{5}$. **18.** GCF of 15 and 45: 15 ; $\frac{15}{45} = \frac{15 \div 15}{45 \div 15} = \frac{1}{3}$. **19.** GCF of 6 and 8: 2 ; $\frac{6}{8} = \frac{6 \div 2}{8 \div 2} = \frac{3}{4}$.

20. GCF of 12 and 18: 6 ; $\frac{12}{18} = \frac{12 \div 6}{18 \div 6} = \frac{2}{3}$. **21.** GCF of 9 and 21: 3 ; $\frac{9}{21} = \frac{9 \div 3}{21 \div 3} = \frac{3}{7}$. **22.** GCF of 15 and 25: 5 ; $\frac{15}{25} = \frac{15 \div 5}{25 \div 5} = \frac{3}{5}$. **23.** The anniversary cards are all the cards minus the birthday and get well cards. $105 - (50 + 30) = 105 - 80 = 25$; GCF of 25 and 105: 5 ; $\frac{25}{105} = \frac{25 \div 5}{105 \div 5} = \frac{5}{21}$.

24. no; GCF of 3 and 6: 3 ; $\frac{3}{6} = \frac{3 \div 3}{6 \div 3} = \frac{1}{2}$. **25.** yes; GCF of 1 and 7: 1. **26.** no; GCF of 15 and 18: 3 ; $\frac{15}{18} = \frac{15 \div 3}{18 \div 3} = \frac{5}{6}$. **27.** no; GCF of 17 and 51: 17 ; $\frac{17}{51} = \frac{17 \div 17}{51 \div 17} = \frac{1}{3}$. **28.** The first engineer is measuring time in minutes. The second engineer is measuring time in fractions of an hour.

29. GCF of 16 and 32: 16 ; $\frac{16}{32} = \frac{16 \div 16}{32 \div 16} = \frac{1}{2}$. **30.** To write a fraction in simplest form, divide the numerator and the denominator by their GCF. **31a.** $a=1$, $\frac{2}{3} \times \frac{1}{1} = \frac{2}{3}$; $a=2$, $\frac{2 \times 2}{3 \times 2} = \frac{4}{6}$; $a=5$, $\frac{2 \times 5}{3 \times 5} = \frac{10}{15}$; $a=10$, $\frac{2 \times 10}{3 \times 10} = \frac{20}{30}$. **31b.** $\frac{2}{3}$; when you divide the numerator and the denominator by the common factor a , the result is in simplest form.

32. 1 hour equals 60 minutes. GCF of 40 and 60: 20; $\frac{40 \div 20}{60 \div 20} = \frac{2}{3}$, so the correct choice is C. **33.** Find the factors of 84: 1, 2, 3, 4, 6, 7, 12, 14, 21, 28, 42, 84; find the factors of 78: 1, 2, 3, 6, 13, 26, 39, 78; the greatest common factor is 6, so the correct choice is G. **34.** Factors divide whole numbers with a remainder of zero; the correct choice is A. **35.** Find the factors of 48: 1, 2, 3, 4, 6, 8, 12, 16, 24, 48; find the factors of 56: 1, 2, 4, 7, 8, 14, 28, 56. so the greatest common factor is 8. **36.** $15 = 3 \times 5$; $21 = 3 \times 7$; GCF: 3. **37.** Find the factors of 42: 1, 2, 3, 6, 7, 14, 21, 42; find the factors of 72: 1, 2, 3, 4, 6, 8, 9, 12, 18, 24, 36, 72, so the greatest common factor is 6.

38. 50) 300 450

$$\begin{array}{r} 3 \overline{) 69} \\ \underline{23} \\ 46 \\ \underline{45} \\ 10 \\ \underline{9} \\ 10 \end{array}$$

GCF: $50 \times 3 = 150$

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- 1.** $\frac{18}{51}$ Simp = $\frac{6}{17}$ **2.** $\frac{21}{49}$ Simp = $\frac{3}{7}$ **3.** $\frac{102}{387}$ Simp = $\frac{34}{129}$
4. $\frac{35}{56}$ Simp = $\frac{5}{8}$ **5.** $\frac{20}{65}$ Simp = $\frac{4}{13}$ **6.** $\frac{17}{68}$ Simp = $\frac{1}{4}$
7. $\frac{12}{15}$ Simp = $\frac{4}{5}$ **8.** $\frac{28}{32}$ Simp = $\frac{7}{8}$ **9.** $\frac{12}{30}$ Simp = $\frac{2}{5}$
10. $\frac{45}{75}$ Simp = $\frac{3}{5}$ **11.** $\frac{12}{96}$ Simp = $\frac{1}{8}$
12. $\frac{92}{132}$ Simp = $\frac{23}{33}$ **13.** $\frac{39}{117}$ Simp = $\frac{1}{3}$
14. $\frac{126}{324}$ Simp = $\frac{7}{18}$ **15.** $\frac{200}{385}$ Simp = $\frac{40}{77}$

16. Answers may vary. Sample: Use the fraction $\frac{12}{42}$ as a test. If the calculator simplifies $\frac{12}{42}$ to $\frac{2}{7}$ in one step, then it is using the GCF.

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Part	Fraction Name of One Part	Two Numbers for All Parts
4 blue rhombuses	$\frac{1}{3}$	$\frac{4}{3}$ and $1\frac{1}{3}$
8 green triangles	$\frac{1}{6}$	$\frac{8}{6}$ and $1\frac{1}{3}$
7 green triangles	$\frac{1}{6}$	$\frac{7}{6}$ and $1\frac{1}{6}$

2. Yes; yes; an improper fraction can represent the same amount as a mixed number. **3.** Check students' work.

4-6 Mixed Numbers and Improper Fractions pages 182–185

Check Skills You'll Need For complete solutions see *Daily Skills Check and Lesson Quiz Transparencies* or *Presentation Pro CD-ROM*. **1.** A fraction is in simplest form when the only common factor of the numerator and denominator is 1. **2.** $\frac{1}{3}$ **3.** $\frac{2}{3}$ **4.** $\frac{5}{16}$

Quick Check **1.** $3\frac{4}{7} = \frac{(3 \times 7) + 4}{7} = \frac{25}{7}$ **2.** 4 quart = 1 gallon, $2\frac{1}{4} = \frac{(2 \times 4) + 1}{4} = \frac{9}{4}$; There are 9 fourths in $2\frac{1}{4}$, so you need 9 quarts of water. 9 qt

$$\begin{array}{r} 3a. \quad 4 \\ 9 \overline{)40} \\ \underline{-36} \\ 4 \end{array}$$

$9 \overline{)40}$ gives a quotient of 4 and a remainder of 4; $4\frac{4}{9}$

$$\begin{array}{r} 3b. \quad 5 \\ 6 \overline{)32} \\ \underline{-30} \\ 2 \end{array}$$

$6 \overline{)32}$ gives a quotient of 5 and a remainder of 2; $5\frac{2}{6} = 5\frac{1}{3}$

$$\begin{array}{r} 3c. \quad 5 \\ 4 \overline{)23} \\ \underline{-20} \\ 3 \end{array}$$

$4 \overline{)23}$ gives a quotient of 5 and a remainder of 3; $5\frac{3}{4}$

Exercises **1.** $\frac{7}{8}$ is a proper fraction. C **2.** $2\frac{4}{5}$ is a mixed number. A **3.** $\frac{7}{4}$ is an improper fraction. B **4.** $2\frac{2}{3}$; $2\frac{2}{3} = \frac{(2 \times 3) + 2}{3} = \frac{8}{3}$ **5.** $3\frac{1}{4}$; $3\frac{1}{4} = \frac{(3 \times 4) + 1}{4} = \frac{13}{4}$ **6.** $1\frac{4}{5} = \frac{(1 \times 5) + 4}{5} = \frac{9}{5}$ **7.** $3\frac{1}{7} = \frac{(3 \times 7) + 1}{7} = \frac{22}{7}$ **8.** $3\frac{1}{4} = \frac{(3 \times 4) + 1}{4} = \frac{13}{4}$ **9.** $5\frac{1}{2} = \frac{(5 \times 2) + 1}{2} = \frac{11}{2}$ **10.** $1\frac{3}{11} = \frac{(1 \times 11) + 3}{11} = \frac{14}{11}$ **11.** $3\frac{3}{8} = \frac{(3 \times 8) + 3}{8} = \frac{27}{8}$ **12.** $2\frac{1}{16} = \frac{(2 \times 16) + 1}{16} = \frac{33}{16}$ **13.** $21\frac{1}{3} = \frac{(21 \times 3) + 1}{3} = \frac{64}{3}$ **14.** $2\frac{2}{3} = \frac{(2 \times 3) + 2}{3} = \frac{8}{3}$; 8 times **15.** $5 \overline{)17}$ gives a quotient of 3 and a remainder of 2; $3\frac{2}{5}$ **16.** $4 \overline{)10}$ gives a quotient of 2 and a remainder of 2; $2\frac{2}{4} = 2\frac{1}{2}$ **17.** $12 \overline{)27}$ gives a quotient of 2 and a remainder of 3; $2\frac{3}{12} = 2\frac{1}{4}$ **18.** $4 \overline{)9}$ gives a quotient of 2 and a remainder of 1; $2\frac{1}{4}$ **19.** $14 \overline{)21}$ gives a quotient of 1 and a remainder of 7; $1\frac{7}{14} = 1\frac{1}{2}$ **20.** $11 \overline{)18}$ gives a quotient of 1 and a remainder of 7; $1\frac{7}{11}$ **21.** $10 \overline{)21}$ gives a quotient of 2 and a remainder of 1; $2\frac{1}{10}$ **22.** $12 \overline{)16}$ gives a quotient of 1 and a remainder of 4; $1\frac{4}{12} = 1\frac{1}{3}$

23. To find out how many cans you need, multiply: $150 \times 2 = 300$. To find out how many cases you need,

divide 300 by 24:

$$\begin{array}{r} 12 \\ 24 \overline{)300} \\ \underline{-24} \\ 60 \\ \underline{-48} \\ 12 \end{array}$$

$24 \overline{)300}$ gives a quotient of 12 and a remainder of 12; $12\frac{12}{24} = 12\frac{1}{2}$; 13 cases **24.** 33 halves is $\frac{33}{2}$; $2 \overline{)33}$ gives a quotient of 16 and a remainder of 1; $16\frac{1}{2}$ **25.** 7 fifths is $\frac{7}{5}$; $5 \overline{)7}$ gives a quotient of 1 and a remainder of 2; $1\frac{2}{5}$ **26.**

106 fourths is $\frac{106}{4}$; $4 \overline{)106}$ gives a quotient of 26 and a remainder of 2; $26\frac{2}{4} = 26\frac{1}{2}$ **27.** 2 and 3 fifths is $2\frac{3}{5}$, $\frac{(2 \times 5) + 3}{5} = \frac{13}{5}$ **28.** 8 and 7 ninths is $8\frac{7}{9}$, $\frac{(8 \times 9) + 7}{9} =$

$\frac{79}{9}$ **29.** 6 and 2 thirds is $6\frac{2}{3}$, $\frac{(6 \times 3) + 2}{3} = \frac{20}{3}$ **30.** She can serve 6 guests with one melon ($12 \div 2 = 6$); melons needed: $\frac{50}{6}$, which is $8\frac{1}{3}$; She will need 9 melons.

31. To find the number of boxes, divide 250 by 30:

$$\begin{array}{r} 8 \\ 30 \overline{)250} \\ \underline{-240} \\ 10 \end{array}$$

$30 \overline{)250}$ gives a quotient of 8 and a remainder of 10; $8\frac{10}{30} = 8\frac{1}{3}$; 9 boxes. To find the total cost of the boxes, multiply:

$150 \times 9 = 1,350$; \$1,350 **32.** Answers may vary. Sample: $\frac{6}{4} = \frac{12}{8}$; $\frac{7}{4} = \frac{14}{8}$; Choose fractions whose denominator is 8 and whose numerator is a whole $1\frac{13}{16}$ in. number between 12 and 14; that is, $\frac{13}{8}$ or $1\frac{5}{8}$. **33.** $1\frac{5}{8}$ in.; **34.** $\frac{3}{4}$ in.; $1\frac{1}{8}$ in.

35. To find the number of squares that fit in a sheet, divide the area of the sheet by the area of a square. Area of sheet: $8\frac{1}{2} \times 11 = \frac{17}{2} \times \frac{11}{1} = \frac{187}{2}$. Area of square = $\frac{1}{2} \cdot \frac{1}{2} = \frac{1}{4}$. Area of sheet divided by area of square = $\frac{187}{2} \div \frac{1}{4} = \frac{187}{2} \times \frac{4}{1} = \frac{187}{1} \times \frac{2}{1} = 374$; 374 squares.

$$\begin{array}{r} 2 \\ 8 \overline{)20} \\ \underline{-24} \\ 4 \end{array}$$

$8 \overline{)20}$ gives a quotient of 2 and a remainder of 4; $2\frac{4}{8} = 2\frac{1}{2}$; the correct choice is C. **37.** $650 = 10 \times 65 = 2 \times 5 \times 65 = 2 \times 5 \times 5 \times 13 = 2 \times 5^2 \times 13$; the correct choice is H.

38. factors of 60: 1, 2, 3, 4, 5, 6, 10, 12, 15, 20, 30, 60; so 8 is not a factor of 60; the correct choice is C. **39.** $48 \div 6 = 8 = 8$; true **40.** $12.6 \div 2 = 6.3 \neq 6.2$; false **41.** $5.4 \div 3 = 1.8 = 1.8$; true

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1. $\frac{6}{8}$ in. = $\frac{3}{4}$ in. **2.** $\frac{13}{16}$ in. **3.** $\frac{3}{16}$ in. **4.** $\frac{1}{2}$ in. **5.** $\frac{3}{4}$ in. **6.** $\frac{15}{16}$ in. **7.** $\frac{3}{8}$ in. **8.** $\frac{7}{8}$ in. **9.** $\frac{5}{8}$ in.

1. factors of 45: 1, 3, 5, 9, 15, 45; factors of 80: 1, 2, 4, 5, 8, 20, 40, 80; GCF = 5
 2. factors of 24: 1, 2, 3, 4, 6, 8, 12, 24; factors of 72: 1, 2, 3, 4, 6, 8, 9, 12, 18, 24, 36, 72; GCF = 24
 3. factors of 9: 1, 3, 9; factors of 18: 1, 2, 3, 6, 9, 18; factors of 51: 1, 3, 17, 51; GCF = 3
 4. factors of 18: 1, 2, 3, 6, 9, 18; factors of 48: 1, 2, 3, 4, 6, 8, 12, 16, 24, 48; GCF = 6
 5. $3\frac{1}{5} = \frac{(3 \times 5) + 1}{5} = \frac{16}{5}$
 6. $8\overline{)13}$ gives a quotient of 1 and a remainder of 5; $1\frac{5}{8}$
 7. $\frac{(2 \times 3) + 2}{3} = \frac{8}{3}$
 8. In order to have the same amount per bag, you have to find the GCF of all the items. The GCF of 16, 48, and 96 is 8; $16 \div 8 = 2$, $48 \div 8 = 6$, $96 \div 8 = 12$; 2 toys, 6 balloons, 12 bags of peanuts

4-7 Least Common Multiple

pages 188–191

Check Skills You'll Need For complete solutions see *Daily Skills Check and Lesson Quiz Transparencies* or *Presentation Pro CD-ROM*.
 1. A factor tree helps you write a number as a product of prime factors.
 2. $2^4 \times 5$
 3. 2^5
 4. $2^4 \times 13$
 5. $2^2 \times 5^3$

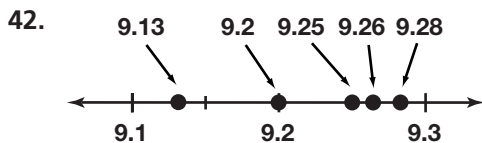
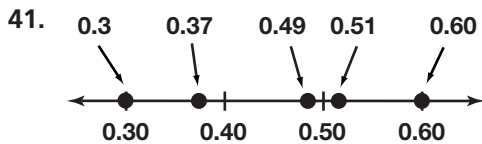
Quick Check 1a. multiples of 10: 10, 20, 30, 40, 50, 60, 70, 80; multiples of 12: 12, 24, 36, 48, 60; LCM of 10 and 12: 60
 1b. multiples of 7: 7, 14, 21, 28, 35, 42, 49, 56, 63, 70; multiples of 10: 10, 20, 30, 40, 50, 60, 70; LCM of 7 and 10: 70
 2. prime factorization of $6 = 2 \times 3$; prime factorization of $8 = 2 \times 2 \times 2$; prime factorization of $12 = 2 \times 2 \times 3$; $2 \times 2 \times 2 \times 3 = 8 \times 3 = 24$; LCM = 24

More Than One Way prime factorization of 6: 2×3 ; prime factorization of 9: 3^2 ; prime factorization of 10: 2×5 ; LCM of 6, 9, and 10: 90; Explanations and choices may vary. Sample: The prime factorization method has the advantage that you need only look at prime numbers and exponents. You need not make a list.

Exercises 1. Answers may vary. Sample: One number has many multiples.
 2–4. Answers may vary. Samples are given.
 2. multiples of 7: 1, 14, 21, 28, 35
 3. multiples of 8: 1, 16, 24, 32, 40
 4. multiples of 11: 1, 22, 33, 44, 55
 5. $16 = 2 \times 2 \times 2 \times 2$; $24 = 2 \times 2 \times 2 \times 3$; $2^4 \times 3 = 48$; 48
 6. multiples of 4: 4, 8, 12, 16, 20, 24, 28, 32, 36; multiples of 9: 9, 18, 27, 36; LCM of 4 and 9: 36
 7. multiples of 5: 5, 10, 15, 20, 25, 30; multiples of 6: 6, 12, 18, 24, 30; LCM of 5 and 6: 30
 8. multiples of 12: 12, 24, 36, 48, 60; multiples of 15: 15, 30, 45, 60; LCM of 12 and 15: 60
 9. multiples of 10: 10, 20, 30, 40, 60, 70, 80; multiples of 16: 16, 32, 48, 64, 80; LCM of 10 and 16: 80
 10. multiples of 14: 14, 28, 42; multiples of 21: 21, 42; LCM of 14 and 21: 42
 11. multiples of 20: 20, 40, 60; multiples of 30: 30, 60; LCM of 20 and 30: 60
 12. multiples of 25: 25, 50, 75, 100, 125, 150; multiples of 75: 75, 150; LCM of 25 and 75: 75
 13. multiples of 8: 8, 16, 24, 32, 40; multiples of 10: 10, 20, 30, 40; LCM of 8 and 10: 40
 14. multiples of 3: 3, 6, 9, 12, 15, 18, 21, 24, 27, 30, 33, 36, 39, 42, 45, 48, 51, 54, 57, 60, 63, 66, 69, 72, 75, 78, 81, 84, 87, 90, 93, 96, 99, 102, 105, 108, 111, 114, 117, 120; multiples of 8: 8, 16, 24, 32, 40, 48, 56, 72, 80, 88, 96,

104, 112, 120; multiples of 12: 12, 24, 36, 48, 60, 72, 84, 96, 108, 120; multiples of 15: 15, 30, 45, 60, 75, 90, 105, 120; LCM of 3, 8, 12 and 15: 120
 15. multiples of 4: 4, 8, 12, 16, 20, 24, 28, 32, 36, 40, 44, 48, 52, 56, 60, 64, 68, 72, 76, 80, 84; multiples of 7: 7, 14, 21, 28, 35, 42, 49, 56, 63, 70, 77, 84; multiples of 12: 12, 24, 36, 48, 60, 72, 84; multiples of 21: 21, 42, 63, 84; LCM of 4, 7, 12, and 21: 84
 16. multiples of 25: 25, 50, 75, 100, 125, 150, 175, 200, 225, 250; multiples of 50: 50, 100, 150, 200, 250; multiples of 125: 125, 250; LCM of 25, 50, and 125: 250
 17. You cannot list multiples because the answer is too large to list every multiple up to it; instead, use prime factorization: $2 = 2$, $3 = 3$, $4 = 4$, $5 = 5$, $7 = 7$, $11 = 11$; $2 \times 3 \times 5 \times 7 \times 11$, $77 \times 30 = 2,310$, LCM = 2,310
 18. $9 = 3^2$; $21 = 3 \times 7$; LCM: $3^2 \times 7$, or 63
 19. $18 = 2 \times 3^2$, $24 = 2^3 \times 3$; LCM: $2^3 \times 3^2$, or 72
 20. $75 = 3 \times 5^2$; $100 = 2^2 \times 5^2$; LCM: $2^2 \times 3 \times 5^2$, or 300
 21. $8 = 2^3$; $14 = 2 \times 7$; LCM: $2^3 \times 7$, or 56
 22. $22 = 2 \times 11$; $55 = 5 \times 11$; LCM: $2 \times 5 \times 11$, or 110
 23. $18 = 2 \times 3^2$; $108 = 2^2 \times 3^3$; LCM: $2^2 \times 3^3$, or 108
 24. $7 = 7$; $12 = 2^2 \times 3$; LCM: or 84
 25. $4 = 2^2$; $7 = 7$; $20 = 2^2 \times 5$; LCM: or 140
 26. $30 = 5 \times 2 \times 3$; $50 = 5 \times 2 \times 5$; $200 = 2^3 \times 5^2$; LCM: or 600
 27. In order to have the same number of each item, you must find the LCM of all the items. $15 = 3 \times 5$, $20 = 2 \times 2 \times 5$, $120 = 3 \times 2 \times 2 \times 2 \times 5$; the LCM is 120. $\frac{120}{15} = 8$; $\frac{120}{20} = 6$; $\frac{120}{120} = 1$; 8 packages of plates, 6 packages of cups, 1 package of napkins
 28. You can use prime factorization to find the LCM because that is the soonest the two ships will leave together again. $12 = 3 \times 2 \times 2$, $16 = 2 \times 2 \times 2 \times 2$, $16 \times 3 = 48$; 48 days
 29. List multiples of 15 and 40 to find the LCM because this is the number of the customer who will be the first to receive both a CD and a DVD; multiples of 15: 15, 30, 45, 60, 75, 90, 106, 120; multiples of 40: 40, 80, 120; LCM of 15 and 40: 120; the 120th customer
 30. $35 = 5 \times 7$ and $45 = 3^2 \times 5$; LCM: $3^2 \times 5 \times 7$, or 315
 31. $6 = 2 \times 3$, $8 = 2^3$, and $16 = 2^4$; LCM: $2^4 \times 3$, or 48
 32. The LCM of $2^2 \times 7$ and 2×7^2 is $2^2 \times 7^2$, or 196
 33a. $8 = 2 \times 2 \times 2$, $10 = 2 \times 5$, $N = 2 \times 2 \times 2 \times 5 \times p$, where p is a whole number. Some factors of N are 2, 4, and 5.
 33b. The smallest value of N is the LCM of 8 and 10, namely, 40.
 34. Using the LCM will allow you to find the next day you will do both activities on the same day. multiples of 3: 3, 6, 9, 12, multiples of 4: 4, 8, 12; 12 days
 35. Since the LCM of 3 and 6 is the second number and the LCM of 5 and 10 is also the second number, the LCM of x and $2x$ is $2x$.
 36. The LCM will be the product of the two numbers. Examples and explanations may vary. Sample: LCM of 6 and 5 = 30 and $6 \times 5 = 30$; the LCM of 6 and 35 = 210 and $6 \times 35 = 210$. Write the prime factorization of each number. The LCM must have all the prime factors of each number. But the numbers will not have any prime factors in common, so you will have to multiply the prime factorizations to get all the factors needed in the LCM.
 37. multiples of $25xy$: $25xy$, $50xy$, $75xy$, $100xy$, $125xy$, $150xy$, $175xy$, $200xy$, multiples of $200xy$: $200xy$; LCM of $25xy$ and $200xy$: $200xy$
 38. $24 = 2 \times 2 \times 2 \times 3$, $28 = 2 \times 2 \times 7$, $24 \times 7 = 168$; the correct choice is C.
 39. You need to find the prime

factorization before you can find the LCM. The correct choice is G. **40.** The original fee is \$30 and he must pay \$2.50 every time he skates, s . So $c = 2.50s + 30$. The correct choice is A.



4-8 Comparing and Ordering Fractions pages 192–195

Check Skills You'll Need For complete solutions see *Daily Skills Check and Lesson Quiz Transparencies* or *Presentation Pro CD-ROM*. **1.** When you write a fraction in simplest form, you are writing an equivalent fraction using division. **2–5.** Answers may vary. Samples are given. **2.** $\frac{1}{3}$ and $\frac{14}{42}$ **3.** $\frac{1}{5}$ and $\frac{2}{10}$ **4.** $\frac{4}{6}$ and $\frac{20}{30}$ **5.** $\frac{1}{6}$ and $\frac{5}{30}$

Quick Check 1. Find two fractions that are equivalent to the fractions given and have a common denominator: The least common multiple of 8 and 9 is 72, so 72 is the LCD. $\frac{6}{8} \times \frac{9}{9} = \frac{54}{72}$, $\frac{7}{9} \times \frac{8}{8} = \frac{56}{72}$, $\frac{54}{72} < \frac{56}{72}$, so $\frac{6}{8} < \frac{7}{9}$. **2.** Yes; $\frac{7}{8} = \frac{28}{32}$ and $\frac{28}{32} > \frac{27}{32}$, so $6\frac{7}{8} > 6\frac{27}{32}$. **3.** First order them by their whole numbers: $\frac{3}{8}$, $\frac{1}{3}$, $1\frac{2}{3}$, $2\frac{5}{6}$, $2\frac{4}{5}$; now compare those with the same whole number part by finding a common denominator for their fractions to find the correct order; $\frac{3}{8} = \frac{9}{24}$ and $\frac{1}{3} = \frac{8}{24}$; for $2\frac{5}{6}$ and $2\frac{4}{5}$, $\frac{5}{6} = \frac{25}{30}$ and $\frac{4}{5} = \frac{24}{30}$, so the order from least to greatest is $1\frac{2}{3}$, $\frac{3}{8}$, $1\frac{1}{3}$, $2\frac{4}{5}$, $2\frac{5}{6}$.

Exercises 1. It is the LCM of the denominators. **2.** Find the least common multiple for 3 and 4; multiples of 3: 3, 6, 9, 12; multiples of 4: 4, 8, 12, so the LCD is 12. **3.** Find the least common multiple for 8 and 2; multiples of 8: 8; multiples of 2: 2, 4, 6, 8, so the LCD is 8. **4.** Find the least common multiple for 5 and 6; multiples of 5: 5, 10, 15, 20, 25, 30; multiples of 6: 6, 12, 18, 24, 30, so the LCD is 30. **5.** $\frac{1}{15} \times \frac{4}{4} = \frac{4}{60}$, $\frac{1}{20} \times \frac{3}{3} = \frac{3}{60}$, $4 > 3$, so $\frac{1}{15} > \frac{1}{20}$. **6.** $\frac{3}{4} \times \frac{1}{1} = \frac{3}{4}$, $\frac{3}{4} \times \frac{2}{2} = \frac{6}{8}$, $3 < 6$, so $\frac{3}{4} < \frac{3}{2}$. **7.** $\frac{2}{45} \times \frac{2}{2} = \frac{2}{90}$, $\frac{1}{30} \times \frac{3}{3} = \frac{1}{10}$, $2 < 3$, so $\frac{2}{45} > \frac{1}{30}$. **8.** $\frac{3}{5} \times \frac{8}{8} = \frac{24}{40}$, $\frac{5}{8} \times \frac{5}{5} = \frac{25}{40}$, $24 < 25$, so $\frac{3}{5} < \frac{5}{8}$. **9.** $\frac{3}{4} \times \frac{5}{5} = \frac{15}{20}$, $\frac{3}{5} \times \frac{4}{4} = \frac{12}{20}$, $15 > 12$, so $\frac{3}{4} > \frac{3}{5}$. **10.** $\frac{1}{2} \times \frac{8}{8} = \frac{8}{16}$, $8 > 7$, so $\frac{1}{2} > \frac{7}{16}$. **11.** $\frac{3}{5} \times \frac{4}{4} = \frac{12}{20}$, $\frac{12}{20} = \frac{12}{20}$, so $\frac{3}{5} = \frac{12}{20}$. **12.** $\frac{5}{7} \times \frac{6}{6} = \frac{30}{42}$, $\frac{5}{6} \times \frac{7}{7} = \frac{35}{42}$, $30 < 35$, so $\frac{5}{7} < \frac{5}{6}$. **13.** $\frac{3}{11} \times \frac{4}{4} = \frac{12}{44}$, $\frac{1}{4} \times \frac{11}{11} = \frac{11}{44}$, $12 > 11$, so $\frac{3}{11} > \frac{1}{4}$. **14.** $\frac{2}{9} \times \frac{10}{10} = \frac{20}{90}$, $\frac{4}{15} \times \frac{6}{6} = \frac{24}{90}$, $20 < 24$, so $\frac{2}{9} < \frac{4}{15}$. **15.** $\frac{15}{16} = \frac{15}{16}$, $\frac{7}{8} \times \frac{2}{2} = \frac{14}{16}$, $15 > 14$, so $\frac{15}{16} > \frac{7}{8}$. **16.** $\frac{9}{24} = \frac{9}{24}$ and $\frac{3}{8} \times \frac{3}{3} = \frac{9}{24}$, $9 = 9$, so $\frac{9}{24} = \frac{3}{8}$. **17.** The whole numbers are the same so compare the fractions: $\frac{1}{8} = \frac{1}{8}$, $\frac{1}{4} \times \frac{2}{2} = \frac{2}{8}$, $1 < 2$,

so $3\frac{1}{8} < 3\frac{1}{4}$. **18.** The whole numbers are the same so compare the fractions: $\frac{2}{3} \times \frac{2}{2} = \frac{4}{60}$, $4 = 4$, so $7\frac{2}{3} = 7\frac{4}{6}$.

19. The whole numbers are the same so compare the fractions: $\frac{3}{5} \times \frac{2}{2} = \frac{6}{10}$, $7 > 6$, so $8\frac{7}{10} > 8\frac{3}{5}$. **20.** The whole numbers are the same so compare the fractions: $\frac{17}{18} \times \frac{8}{8} = \frac{136}{144}$, $\frac{13}{16} \times \frac{9}{9} = \frac{117}{144}$, $136 > 117$, so $2\frac{17}{18} > 2\frac{13}{16}$. **21.** The whole numbers are the same so compare the fractions: $\frac{4}{6} \times \frac{7}{7} = \frac{28}{42}$, $\frac{5}{7} \times \frac{6}{6} = \frac{30}{42}$, $28 < 30$, so $5\frac{4}{6} < 5\frac{5}{7}$. **22.** The whole numbers are the same so compare the fractions: $\frac{1}{4} \times \frac{5}{5} = \frac{5}{20}$, $\frac{1}{5} \times \frac{4}{4} = \frac{4}{20}$, $5 > 4$, so $3\frac{1}{4} > 3\frac{1}{5}$. **23.** The whole numbers are the same so compare the fractions: $\frac{3}{4} = \frac{3 \times 10}{4 \times 10} = \frac{30}{40}$, $\frac{7}{10} = \frac{7 \times 4}{10 \times 4} = \frac{28}{40}$, $30 > 28$, $\frac{3}{4} > \frac{7}{10}$ so Tim ran farther.

24. $\frac{2}{3} \times \frac{4}{4} = \frac{10}{12}$, $\frac{5}{6} \times \frac{2}{2} = \frac{10}{12}$, $\frac{3}{4} \times \frac{3}{3} = \frac{9}{12}$, so the order from least to greatest is $\frac{2}{3}$, $\frac{3}{4}$, $\frac{5}{6}$. **25.** The whole numbers are

equal so compare the fractions: $\frac{2}{3} = \frac{2 \times 5}{3 \times 5} = \frac{10}{15}$, $\frac{2}{5} = \frac{2 \times 3}{5 \times 3} = \frac{6}{15}$, $\frac{7}{15} = \frac{7}{15}$, so the order from least to greatest is $3\frac{2}{5}$, $3\frac{7}{15}$, $3\frac{2}{3}$. **26.** Compare the fractions with the same whole number part: for $2\frac{8}{9}$ and $2\frac{5}{6}$, $\frac{8}{9} = \frac{16}{18}$ and $\frac{5}{6} = \frac{15}{18}$;

for $\frac{1}{8}$ and $\frac{3}{10}$, $\frac{1}{8} = \frac{5}{40}$ and $\frac{3}{10} = \frac{12}{40}$, so the order from least to greatest is $\frac{1}{8}$, $\frac{3}{10}$, $2\frac{5}{6}$, $2\frac{8}{9}$. **27.** Compare the fractions with

the same whole number part: for $\frac{3}{12}$ and $\frac{1}{2}$, $\frac{1}{2} = \frac{6}{12}$, so the order from least to greatest is $\frac{3}{12}$, $\frac{1}{2}$, $2\frac{2}{3}$, $3\frac{1}{4}$. **28.** Compare the fractions with the same whole number part: for $\frac{5}{8}$, $\frac{3}{4}$, and $\frac{1}{2}$, $\frac{3}{4} = \frac{6}{8}$ and $\frac{1}{2} = \frac{4}{8}$, so the order from least to greatest is $\frac{1}{2}$, $\frac{5}{8}$, $\frac{3}{4}$, $1\frac{7}{12}$, $2\frac{2}{3}$. **29.** Compare the fractions with the same

whole number part: for $6\frac{2}{9}$ and $6\frac{2}{3}$, $\frac{2}{3} = \frac{6}{9}$; for $8\frac{1}{5}$ and $8\frac{2}{9}$, $\frac{1}{5} = \frac{9}{45}$ and $\frac{2}{9} = \frac{10}{45}$, so the order from least to greatest is $6\frac{2}{9}$, $6\frac{2}{3}$, $8\frac{1}{5}$, $8\frac{2}{9}$. **30.** Use a common denominator of 8:

$\frac{3}{4} = \frac{3 \times 2}{4 \times 2} = \frac{6}{8}$, $\frac{1}{2} = \frac{1 \times 4}{2 \times 4} = \frac{4}{8}$, $\frac{1}{4} = \frac{1 \times 2}{4 \times 2} = \frac{2}{8}$, so the order from least to greatest is $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{5}{8}$, $\frac{3}{4}$. **31.** $>$; $\frac{3}{7} > \frac{3}{8}$, the

numerators are equal, so the fraction with the lesser denominator is larger. **32.** $<$; $\frac{11}{16} < \frac{11}{12}$, the numerators are equal, so the fraction with the lesser denominator is

larger. **33.** $>$; $\frac{1}{8} > \frac{1}{18}$, the numerators are equal, so the fraction with the lesser denominator is larger. **34.** The

whole numbers are equal so compare the fractions: $\frac{7 \times 5}{16 \times 5} = \frac{35}{80}$, $\frac{9 \times 4}{20 \times 4} = \frac{36}{80}$, so the cherry-flavored drink is a better buy. **35a.** $\frac{1}{4} = \frac{4}{16}$, $\frac{1}{2} = \frac{8}{16}$, and $\frac{1}{8} = \frac{2}{16}$. From greatest to least, they are $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$, and $\frac{1}{16}$.

35b.



The note symbol that is "open" has the greatest value, and for the other symbols, the more flags there are, the

4-9 Fractions and Decimals

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less the value of the note. **36.** $19\text{ ft. }4\frac{1}{4}\text{ in.}$, $19\text{ ft. }2\frac{1}{4}\text{ in.}$, $19\text{ ft. }2\text{ in.}$, $19\text{ ft. }1\frac{1}{2}\text{ in.}$, $18\text{ ft. }8\frac{1}{4}\text{ in.}$ **37.** In fractions with the same numerator, the fraction with the larger denominator is the smaller fraction. **38.** $\frac{2}{3} \times \frac{8}{8} = \frac{16}{24}$, $\frac{x}{8} \times \frac{3}{3} = \frac{3x}{24}$, $\frac{1}{1} = \frac{24}{24}$, $16 < 3x < 24$; $3 \times 6 = 18$, $3 \times 7 = 21$; 6 or 7 **39.** Convert to like fractions: $\frac{3}{4} = \frac{3 \times 2}{4 \times 2} = \frac{6}{8}$; $\frac{7}{8} = \frac{7}{8}$; $\frac{5}{8} = \frac{5}{8}$; $\frac{6}{8} = \frac{6}{8}$; $\frac{12}{16} = \frac{12 \div 2}{16 \div 2} = \frac{6}{8}$; $\frac{13}{16} = \frac{13 \div 2}{16 \div 2} = \frac{6.5}{8}$; $\frac{5}{8} < \frac{6}{8}$, so $\frac{5}{8}$ inch is not between $\frac{3}{4}$ inch and $\frac{7}{8}$ inch. $\frac{6}{8} = \frac{3}{4}$; $\frac{12}{16}$, so neither $\frac{6}{8}$ inch or $\frac{12}{16}$ inch are between $\frac{3}{4}$ inch and $\frac{7}{8}$ inch. $\frac{6}{8} < \frac{6.5}{8} < \frac{7}{8}$, so $\frac{13}{16}$ inch is between $\frac{3}{4}$ inch and $\frac{7}{8}$ inch; the correct choice is D. **40.** Find the least common multiple: multiples of 10 are 10, 20, 30, 40; multiples of 8 are 8, 16, 24, 32, 40, so the correct choice is H. **41.** $108 = 9 \times 12 = 3 \times 3 \times 3 \times 2 \times 2 = 3^3 \times 2^2$, so the correct choice is A. **42.** GCF of 18 and 42: $\frac{18}{42} = \frac{18 \div 6}{42 \div 6} = \frac{3}{7}$ **43.** GCF of 16 and 36: $\frac{16}{36} = \frac{16 \div 4}{36 \div 4} = \frac{4}{9}$ **44.** GCF of 36 and 132: $\frac{36}{132} = \frac{36 \div 12}{132 \div 12} = \frac{3}{11}$ **45.** GCF of 36 and 153: $\frac{36}{153} = \frac{36 \div 9}{153 \div 9} = \frac{4}{17}$

GUIDED PROBLEM SOLVING pages 196–197

1. If a fraction is greater than then its numerator is more than half its denominator. **2.** Using the results of Exercise 1, compare the fractions in each group two at a time. **3.** Compare the fractions with the same whole number part: for $1\frac{1}{2}$ and $1\frac{3}{4}$, $\frac{1}{2} = \frac{2}{4}$; for $3\frac{1}{4}$, $3\frac{1}{2}$, $3\frac{3}{4}$, $\frac{1}{2} = \frac{2}{4}$, so the order from least to greatest is $1\frac{1}{2}$, $1\frac{3}{4}$, $2\frac{1}{4}$, $2\frac{3}{4}$, $3\frac{1}{4}$, $3\frac{1}{2}$, $3\frac{3}{4}$. **4.** First convert to like fractions: $\frac{5}{16} = \frac{5}{16}$; $\frac{3}{8} = \frac{3 \times 2}{8 \times 2} = \frac{6}{16}$; $\frac{1}{2} = \frac{1 \times 8}{2 \times 8} = \frac{8}{16}$; $\frac{5}{8} = \frac{5 \times 2}{8 \times 2} = \frac{10}{16}$; $\frac{11}{16} = \frac{11}{16}$. Arrange in order from least to greatest: $\frac{5}{16}$, $\frac{6}{16}$, $\frac{8}{16}$, $\frac{10}{16}$, $\frac{11}{16}$. Each numerator is 1 greater than the previous. The first missing size is $\frac{6+1}{16} = \frac{7}{16}$ in. The second missing size is $\frac{8+1}{16} = \frac{9}{16}$ in. **5.** Find the least common multiple: multiples of 4 are 4, 8, 12; multiples of 6 are 6, 12, so this will occur in 12 years **6.** Answers may vary. Samples: The width of piece 1 is greater than that of piece 2. The length of piece 1 is less than that of piece 2. **7.** Find the GCF: factors of 120 are 1, 2, 3, 4, 5, 6, 8, 10, 12, 15, 20, 30, 40, 60, 120; factors of 84 are 1, 2, 3, 4, 6, 7, 12, 14, 21, 28, 42, 84; the GCF is 12 so the largest plot size they can divide the field into is 12 ft. \times 12 ft. **8.** Find the least common multiple: multiples of 18 are 18, 36, 54, 72, 90, 108, 126, 144; multiples of 16 are 16, 32, 48, 64, 80, 96, 112, 128, 144; $144 \div 18 = 8$ and $144 \div 16 = 9$ so you must purchase 9 cases of cat food and 8 cases of dog food.

Check Skills You'll Need For complete solutions see *Daily Skills Check and Lesson Quiz Transparencies* or *Presentation Pro CD-ROM*. **1.** You find how many groups of 3 are in 12. **2.** 1.5 **3.** $0.\overline{6}$ **4.** 1.6 **5.** 0.3

Quick Check **1.** $5.08 = 5\frac{8}{100}$; $\frac{8}{100} = \frac{8 \div 4}{100 \div 4} = \frac{2}{25}$; $5\frac{2}{25}$
2. To write 35 out of 40 as a decimal, divide 35 by 40.

$$\begin{array}{r} 0.875 \\ 40 \overline{)35.000} \\ \underline{-320} \\ 300 \\ \underline{-280} \\ 200 \\ \underline{-200} \\ 0 \end{array}$$

Since $0.875 > 0.8$, you scored higher.

3. 1.8 and $3\frac{1}{5}$ are the two extremes so you only have to compare $2\frac{2}{3}$ and 2.7 which have the same whole number part, $0.7 = \frac{7}{10} \times \frac{3}{3} = \frac{21}{30}$, $\frac{2}{3} \times \frac{10}{10} = \frac{20}{30}$, $\frac{21}{30} > \frac{20}{30}$; 1.8, $2\frac{2}{3}$, 2.7, $3\frac{1}{5}$

Exercises **1.** $0.3 = \frac{3}{10}$ **2.** $0.8 = \frac{8}{10}$; $\frac{8}{10} \div \frac{2}{2} = \frac{4}{5}$ **3.** $0.75 = \frac{75}{100} = \frac{75 \div 25}{100 \div 25} = \frac{3}{4}$ **4.** $0.04 = \frac{4}{100} = \frac{4 \div 4}{100 \div 4} = \frac{1}{25}$ **5.** $2\frac{3}{4} = 2 + \frac{3}{4} = 2 + 0.75 = 2.75$ **6.** $\frac{2}{5} = \frac{4}{10} = 0.40$; **B** **7.** $\frac{3}{4} = \frac{75}{100} = 0.75$; **A** **8.** $\frac{3}{8} = \frac{15}{40} = 0.375$; **C** **9.** $\frac{3}{4} = 0.75$, $1\frac{3}{4} = 1.75$;

from least to greatest: 1.6, $1\frac{3}{4}$, 2.3 **10.** from least to greatest: $2\frac{1}{2}$, 3.5, 3.7 **11.** $\frac{3}{8} = 0.375$; from least to greatest:

3.1, $3\frac{3}{8}$, $4\frac{3}{5}$ **12.** $0.15 = \frac{15}{100} = \frac{15 \div 5}{100 \div 5} = \frac{3}{20}$ **13.** $0.17 = \frac{17}{100}$

14. $0.008 = \frac{8}{1,000} = \frac{8 \div 8}{1,000 \div 8} = \frac{1}{125}$ **15.** $5.5 = 5\frac{5}{10} =$

$5\frac{5 \div 5}{10 \div 5} = 5\frac{1}{2}$ **16.** $4.25 = 4\frac{25}{100} = 4\frac{25 \div 25}{100 \div 25} = 4\frac{1}{4}$

17. $3.149 = 3\frac{149}{1,000}$ **18.** $5.075 = 5\frac{75}{1,000} = 5\frac{75 \div 25}{1,000 \div 25} = 5\frac{3}{40}$

19. $8.32 = 8\frac{32}{100} = 8\frac{32 \div 4}{100 \div 4} = 8\frac{8}{25}$

20. To write $\frac{5}{6}$ as a decimal, divide 5 by 6. $0.8\overline{3}$:

$$\begin{array}{r} 0.833 \\ 6 \overline{)5.000} \\ \underline{-48} \\ 20 \\ \underline{-18} \\ 20 \end{array}$$

21. To write $\frac{7}{15}$ as a decimal, divide 7 by 15. $0.4\overline{6}$:

$$\begin{array}{r} 0.466 \\ 15 \overline{)7.000} \\ \underline{-60} \\ 100 \\ \underline{-90} \\ 10 \end{array}$$

22. To write $\frac{11}{8}$ as a decimal, divide 11 by 8. 1.375:

$$\begin{array}{r} 1.375 \\ 8 \overline{)11} \\ \underline{-8} \\ 30 \\ \underline{-24} \\ 60 \\ \underline{-56} \\ 40 \\ \underline{-40} \\ 0 \end{array}$$

23. To write $\frac{10}{9}$ as a decimal, divide 10 by 9. 1.1:

$$\begin{array}{r} 1.1 \\ 9 \overline{)10} \\ \underline{-9} \\ 10 \\ \underline{-9} \\ 1 \end{array}$$

24. $4\frac{7}{10} = 4.7$ 25. $1\frac{1}{10} = 1 + 0.1 = 1.1$

26. To write $\frac{7}{12}$ as a decimal, divide 7 by 12. 2.583:

$$\begin{array}{r} 0.5833 \\ 12 \overline{)7.0000} \\ \underline{-60} \\ 100 \\ \underline{-96} \\ 40 \\ \underline{-36} \\ 40 \end{array}$$

27. To write $\frac{3}{20}$ as a decimal, divide 3 by 20. 5.15:

$$\begin{array}{r} .15 \\ 20 \overline{)3.00} \\ \underline{-20} \\ 100 \\ \underline{-100} \\ 0 \end{array}$$

28. 0.375 and 0.8125 are less than one, $\frac{1}{8} = \frac{1 \times 2}{8 \times 2} = \frac{2}{16} > \frac{1}{16}$; 0.375, 0.8125, $1\frac{1}{16}$, $1\frac{1}{8}$ 29. First enter 184, then the division key and then 599; $184 \div 599 = 0.307$ 30. $4\frac{3}{5} = 4\frac{3 \times 2}{5 \times 2} = 4\frac{6}{10}$; D 31. $4.3 = 4\frac{3}{10}$; A 32. $4.43 = 4\frac{43}{100} \approx 4\frac{4}{10}$; C 33. $4\frac{1}{3} \approx 4.333 > 4.3$; B 34. $\frac{1}{4} = \frac{25}{100} = 0.25$; The scale should show 1.25. 35. Write 0.125 as $\frac{125}{1,000}$. Divide the numerator and denominator by 125 to express the fraction in simplest form as $\frac{1}{8}$. 36. To convert a fraction to a decimal, divide the numerator by the denominator: $\frac{2}{3} = 2 \div 3 = 0.66 \dots = 0.\overline{6}$; $\frac{3}{3} = 3 \div 3 = 1$; $\frac{4}{3} = 4 \div 3 = 1.33 \dots = 1.\overline{3}$; $\frac{5}{3} = 5 \div 3 = 1.66 \dots = 1.\overline{6}$; $\frac{6}{3} = 6 \div 3 = 2$; When the numerator is not divisible by 3, the denominator of 3 results in a repeating decimal.

37. Convert mixed numbers to improper fractions: $6\frac{5}{8} = \frac{53}{8}$; $8\frac{1}{2} = \frac{17}{2}$. Convert fractions to decimals: $\frac{53}{8} = 53 \div 8 = 6.625$; $\frac{17}{2} = 17 \div 2 = 8.50$; \$6.625, \$8.50 38. Four and three fourths pounds is $4\frac{3}{4}$. Since $\frac{3}{4} = 0.75$, $4\frac{3}{4} = 4.75$ lb. $4\frac{3}{4}$ lb; 4.75 lb

$$\begin{array}{r} 0.75 \\ 4 \overline{)3.00} \\ \underline{-28} \\ 20 \\ \underline{-20} \\ 0 \end{array}$$

39. $5\frac{7}{8}$ in., 5.875 in.

$$\begin{array}{r} 0.875 \\ 8 \overline{)7.0} \\ \underline{-64} \\ 60 \\ \underline{-56} \\ 40 \\ \underline{-40} \\ 0 \end{array}$$

40. Try letting the missing digit equal 1. $\frac{16}{125} = 0.128$. This does not equal 0.108. Try letting the missing digit equal 2. $\frac{26}{125} = 0.208$. The blank has a 2 in it. 41. To write a fraction as a decimal, Noah should divide the numerator by the denominator; the correct choice is C.

$$\begin{array}{l} 42. \frac{1}{2} = \frac{1 \times 12}{2 \times 12} = \frac{12}{24} \\ \frac{1}{3} = \frac{1 \times 8}{3 \times 8} = \frac{8}{24} \\ \frac{1}{4} = \frac{1 \times 6}{4 \times 6} = \frac{6}{24} \\ \frac{1}{8} = \frac{1 \times 3}{8 \times 3} = \frac{3}{24} \\ 1 = \frac{24}{24} \end{array}$$

$$24 > 12 > 8 > 6 > 3$$

1 c, $\frac{1}{2}$ c, $\frac{1}{3}$ c, $\frac{1}{4}$ c, $\frac{1}{8}$ c; the correct choice is J.

43. factors of 144: 1, 2, 3, 4, 6, 8, 9, 12, 16, 18, 24, 36, 48, 72, 144; the correct choice is C. 44. $3 \times 42 = 3 \times (40 + 2) =$

$$(3 \times 40) + (3 \times 2) = 120 + 6 = 126$$
 45. $9 \times 68 = 9 \times (60 + 8) = (9 \times 60) + (9 \times 8) = 540 + 72 = 612$

$$46. 7 \times 2.9 = 7 \times (2 + 0.9) = (7 \times 2) + (7 \times 0.9) = 14 + 6.3 = 20.3$$
 47. $4 \times 9.1 = 4 \times (9 + 0.1) = (4 \times 9) + (4 \times 0.1) = 36 + 0.4 = 36.4$

ACTIVITY LAB

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1–7. Check students' work.

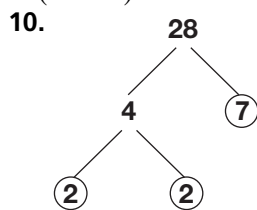
TEST-TAKING STRATEGIES

page 203

1. 5 and 14 are not a pair of factors of 80.

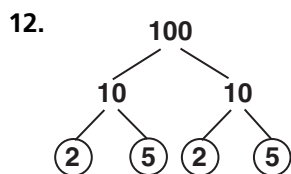
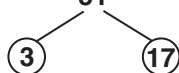
2. 4 and 20, 80 and 10, 5 and 16

1. equivalent fractions 2. mixed number 3. prime factorization 4. 207 is odd so it's not divisible by 2; $2 + 0 + 7 = 9$ so it's divisible by 3 and 9; 207 doesn't end in a zero or five so it's not divisible by 5 or 10; 3 and 9 5. 585 is odd so it's not divisible by 2; $5 + 8 + 5 = 18$ so it's divisible by 3 and 9; 585 ends in a five so it's divisible by 5; 585 does not end in a zero so it's not divisible by 10; 3, 5, and 9 6. 756 is even so it's divisible by 2; $7 + 5 + 6 = 18$ so it's divisible by 3 and 9; 756 doesn't end in a zero or five so it's not divisible by 5 or 10; 2, 3, and 9 7. 3,330 is even so it's divisible by 2, $3 + 3 + 3 + 0 = 9$ so it's divisible by 3 and 9; 3,330 ends in a zero so it's divisible by 5 and 10; 2, 3, 5, 9, and 10 8. $3^2 + 2^3 = 9 + 8 = 17$ 9. $(15 - 1) - 3^2 = 14 - 9 = 5$

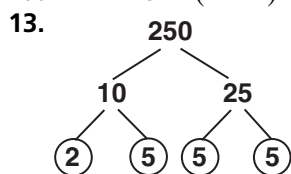


$$28 = 4 \times 7 = (2 \times 2) \times 7 = 2^2 \times 7$$

11. $51 = 3 \times 17$



$$100 = 4 \times 25 = (2 \times 2) \times (5 \times 5) = 2^2 \times 5^2$$



$250 = 10 \times 25 = (2 \times 5) \times (5 \times 5) = 2 \times 5^3$ 14. $18 = 2 \times 3 \times 3 = 2 \times 3^2$; $28 = 2 \times 2 \times 7 = 2^2 \times 7$; GCF = 2 15. $12 = 2 \times 2 \times 3 = 2^2 \times 3$; $62 = 2 \times 31$; GCF = 2 16. $25 = 5 \times 5 = 5^2$; $35 = 7 \times 5$; GCF = 5 17. $16 = 2 \times 2 \times 2 \times 2 = 2^4$; $40 = 2 \times 2 \times 2 \times 5 = 2^3 \times 5$; GCF = 8 18. no; GCF of 5 and 20: $5 = \frac{5}{20} \div \frac{5}{20} = \frac{1}{4}$; answers may vary. Sample: $\frac{1 \times 2}{4 \times 2} = \frac{2}{8}$, $\frac{1 \times 3}{4 \times 3} = \frac{3}{12}$, $\frac{1 \times 4}{4 \times 4} = \frac{4}{16}$ 19. no; GCF of 10 and 15: $5 = \frac{10}{15} \div \frac{5}{15} = \frac{2}{3}$; answers may vary. Sample: $\frac{2 \times 4}{3 \times 4} = \frac{8}{12}$, $\frac{2 \times 10}{3 \times 10} = \frac{20}{30}$, $\frac{2 \times 2}{3 \times 2} = \frac{4}{6}$

20. yes; the GCF of 1 and 3 is 1; answers may vary. Sample: $\frac{1 \times 3}{3 \times 3} = \frac{3}{9}$, $\frac{1 \times 4}{3 \times 4} = \frac{4}{12}$, $\frac{1 \times 5}{3 \times 5} = \frac{5}{15}$ 21. yes; the GCF of 2 and 9 is 1; answers may vary. Sample: $\frac{2 \times 2}{9 \times 2} = \frac{4}{18}$, $\frac{2 \times 3}{9 \times 3} = \frac{6}{27}$, $\frac{2 \times 4}{9 \times 4} = \frac{8}{36}$ 22. $4\frac{2}{3} = \frac{(4 \times 3) + 2}{3} = \frac{14}{3}$ 23. $8\frac{1}{5} = \frac{(8 \times 5) + 1}{5} = \frac{41}{5}$ 24. $3\overline{)13}$ gives a quotient of 4 and remainder of 1; $4\frac{1}{3}$ 25. $6\overline{)58}$ gives a quotient of 9 and

remainder of 4; $9\frac{4}{6}$ or $9\frac{2}{3}$ 26. $12 = 2^2 \times 3$, $22 = 2 \times 11$; LCM = $2^2 \times 3 \times 11$ or 132 27. $10 = 2 \times 5$, $20 = 2^2 \times 5$, $35 = 5 \times 7$; LCM = $2^2 \times 5 \times 7$ or 140 28. $\frac{1}{2} = \frac{6}{12}$; $\frac{1}{4} = \frac{3}{12}$; $\frac{1}{6} = \frac{2}{12}$; $2 < 3$ and $3 < 6$; $\frac{1}{6}$, $\frac{1}{4}$, $\frac{1}{2}$ 29. $\frac{1}{3} = \frac{5}{15}$, $\frac{2}{5} = \frac{6}{15}$; $\frac{4}{15}$; $4 < 5$ and $5 < 6$; $2\frac{1}{3}$, $2\frac{4}{15}$, $2\frac{2}{5}$ 30. $\frac{17}{40} = \frac{38}{80}$, $\frac{7}{20} = \frac{28}{80}$, $\frac{5}{16} = \frac{25}{80}$; $25 < 28$ and $28 < 34$; $\frac{5}{16}$, $\frac{7}{20}$, $\frac{17}{40}$

31. 0.1875

$$\begin{array}{r} 0.1875 \\ 16 \overline{)3.0000} \\ \underline{-16} \\ 140 \\ \underline{-128} \\ 120 \\ \underline{-112} \\ 80 \\ \underline{-80} \\ 0 \end{array}$$

32. $6\frac{5}{24} = 6.208\overline{3}$

$$\begin{array}{r} 0.20833 \\ 24 \overline{)5.00000} \\ \underline{-48} \\ 200 \\ \underline{-192} \\ 80 \\ \underline{-72} \\ 80 \end{array}$$

33. $0.06 = \frac{6}{100} = \frac{6 \div 2}{100 \div 2} = \frac{3}{50}$

34. $4.52 = 4\frac{52}{100} = 4\frac{52 \div 4}{100 \div 4} = 4\frac{13}{25}$

CHAPTER TEST

page 206

1. 70 is even so it's divisible by 2, $7 + 0 = 7$ so it's not divisible by 3 or 9, 70 ends in a zero so it's divisible by 5 and 10; 2, 5, and 10 2. 405 is odd so it's not divisible by 2, $4 + 0 + 5 = 9$ so it's divisible by 3 and 9; 405 ends in a five so it's divisible by 5; 405 does not end in zero so it's not divisible by 10; 3, 5, and 9 3. 628 is even so it's divisible by 2, $6 + 2 + 8 = 16$ so it's not divisible by 3 or 9, 628 doesn't end in a zero or a five so it's not divisible by 5 or 10; 2 4. 837 is odd so it's not divisible by 2, $8 + 3 + 7 = 18$ so it's divisible by 3 and 9, 837 doesn't end in a zero or a five so it's not divisible by 5 or 10; 3 and 9 5. 19 is prime since the only factors of 19 are 1 and 19. 6. 39 is composite since $39 = 3 \times 13$. 7. 51 is composite since $51 = 3 \times 17$. 8. 67 is prime since the only factors of 67 are 1 and 67. 9. $72 = 8 \times 9 = 2 \times 2 \times 2 \times 3 \times 3 = 2^3 \times 3^2$ 10. $80 = 8 \times 10 = 2 \times 2 \times 2 \times 2 \times 5 = 2^4 \times 5$ 11. $120 = 12 \times 10 = 2 \times 2 \times 3 \times 2 \times 5 = 2^3 \times 3 \times 5$ 12. $24 = 2 \times 2 \times 3 \times 2 = 2^3 \times 3$; $36 = 2 \times 2 \times 3 \times 3 = 2^2 \times 3^2$; GCF: 12 13. $20 = 5 \times 2 \times 2 = 5 \times 2^2$, $25 = 5 \times 5 = 5^2$, $30 = 5 \times 2 \times 3$; GCF: 5 14. $7 = 1 \times 7$, $19 = 1 \times 19$; GCF: 1 15. $15 = 5 \times 3$, $35 = 5 \times 7$; GCF: 5 At most there can be 5 groups. 16a. $\frac{7}{8}$ in. 16b. $1\frac{5}{16}$ in. 16c. $1\frac{3}{4}$ in. 17. $10 \times 10 \times 10 \times 10 = 10^4$; base is 10; the exponent is 4 18. $p \times p \times p \times p \times p \times p = p^6$; the base is p ; the exponent is 6 19. $4^3 - 1 = 4 \times 4 \times 4 - 1 = 16 \times 4 - 1 = 64 - 1 = 63$ 20. $2 \times 3^2 = 2 \times 9 = 18$ 21. $150 \div 5^2 = 150 \div 25 = 6$ 22. $36 - (8 - 6)^4 = \frac{4 \times 2}{10 \times 2}$ $36 - 2^4 = 36 - 2 \times 2 \times 2 \times 2 = 36 - 16 = 20$ 23. multiples of 4: 4, 8, 12, 16
multiples of 3: 3, 6, 9, 12, 15
The LCM is 12; 12 days

24a-d. Answers may vary. Samples given. **24a.** $\frac{6}{18} = \frac{6 \div 6}{18 \div 6} = \frac{1}{3}$, $\frac{6}{18} = \frac{6 \div 3}{18 \div 3} = \frac{2}{6}$ **24b.** $\frac{9}{24} = \frac{9 \div 3}{24 \div 3} = \frac{3}{8}$, $\frac{9}{24} = \frac{3 \times 3}{8 \times 3} = \frac{3}{8}$ **24c.** $\frac{18}{20} = \frac{18 \div 2}{20 \div 2} = \frac{9}{10}$, $\frac{9}{10} \times \frac{3}{3} = \frac{27}{30}$ **24d.** $\frac{60}{100} = \frac{60 \div 10}{100 \div 10} = \frac{6}{10}$, $\frac{6}{10} \div \frac{2}{2} = \frac{3}{5}$ **25.** $\frac{34}{51} = \frac{34 \div 17}{51 \div 17} = \frac{2}{3}$ **26.** Answers may vary. Sample: Write the prime factorization of each number. Circle each different factor where it appears the greatest number of times. Multiply the circled factors. Example: $12 = 2 \times 2 \times 3$
 $8 = 2 \times 2 \times 2$

The LCM of 12 and 8 is $2 \times 2 \times 2 \times 3 = 24$.

27. $4 = 2^2$, $8 = 2^3$; LCM = 2^3 or 8 **28.** $6 = 2 \times 3$, $11 = 1 \times 11$; LCM = $2 \times 3 \times 11$ or 66 **29.** $10 = 2 \times 5$, $12 = 2^2 \times 3$, $15 = 3 \times 5$; LCM = $2^2 \times 3 \times 5 = 60$ **30.** $2 > 1$; $1\frac{2}{5} > 1\frac{1}{5}$ **31.** $\frac{15}{4} = \frac{75}{20}$ and $\frac{17}{5} = \frac{68}{20}$; $75 > 68$; $\frac{15}{4} > \frac{17}{5}$ **32.** $\frac{7}{14} = \frac{7 \div 7}{14 \div 7} = \frac{1}{2}$ **33.** $\frac{3}{5} = \frac{33}{55}$ and $\frac{7}{11} = \frac{35}{55}$; $33 < 35$; $\frac{3}{5} < \frac{7}{11}$; $2\frac{3}{3} < 2\frac{7}{11}$ **34.** $\frac{5}{6} = \frac{30}{36}$, $\frac{7}{9} = \frac{28}{36}$, $\frac{3}{4} = \frac{27}{36}$; $27 < 28$ and $28 < 30$; $\frac{35}{36}$, $1\frac{3}{4}$, $1\frac{7}{9}$, $1\frac{5}{6}$ **35.** $\frac{1}{2} = \frac{12}{24}$, $\frac{2}{3} = \frac{16}{24}$, $\frac{3}{8} = \frac{9}{24}$; $9 < 12$ and $12 < 16$; The greatest fraction is $\frac{2}{3}$. Orlando jogged the farthest. **36.** $0.04 = \frac{4}{100} = \frac{4 \div 4}{100 \div 4} = \frac{1}{25}$

37. 0.425

$$\begin{array}{r} 0.425 \\ 40 \overline{)17.000} \\ \underline{-160} \\ 100 \\ \underline{-80} \\ 200 \\ \underline{-200} \\ 0 \end{array}$$

38. $3.875 = 3 + \frac{875}{1000} = 3 + \frac{875 \div 125}{1,000 \div 125} = 3\frac{7}{8}$

39. $0.\overline{8}$

$$\begin{array}{r} 0.8 \\ 9 \overline{)8.0} \\ \underline{-72} \\ 80 \\ \underline{-72} \\ 8 \end{array}$$

40. $2.14 = 2 + \frac{14}{100} = 2 + \frac{14 \div 2}{100 \div 2} = 2\frac{7}{50}$

41. $0.\overline{54}$

$$\begin{array}{r} 0.5454 \\ 11 \overline{)6.0} \\ \underline{-55} \\ 50 \\ \underline{-44} \\ 60 \\ \underline{-55} \\ 50 \\ \underline{-44} \\ 6 \end{array}$$

TEST PREP

page 207

1. The sum of the third column is $2 + 11 + 7 + 14$, or 34; the correct choice is C.

2. Use the first row to solve for a .

$$16 + 3 + 2 + a = 34$$

$$21 + a = 34$$

$$21 - 21 + a = 34 - 21$$

$$a = 13$$

Use the fourth row to solve for f .

$$f + 15 + 14 + 1 = 34$$

$$f + 30 = 34$$

$$f + 30 - 30 = 34 - 30$$

$$f = 4$$

The correct choice is J.

3. $5 + 11 + b + c = 34$

$$16 + b + c = 34$$

$$16 - 16 + b + c = 34 - 16$$

$$b + c = 18; \text{ the correct choice is D.}$$

4. 15 and 14 are next to each other and the only answer choice that works, so the correct choice is J. **5.** $2 + 2 = 4$ and 4 is the only even number choice over 2; the correct choice is D. **6.** 41 and 59 are prime numbers and add to 100; the correct choice is J. **7.** 21 and 9 are not prime numbers; the correct choice is B. **8.** 9 is not a prime number; the correct choice is H.

DK PROBLEM SOLVING APPLICATION

pages 208–209

1a. $\frac{3}{6}$, or $\frac{1}{2}$ **1b.** one half of 100 pounds, or 50 pounds

2a. This table shows the fractions.

lever	Mus. Mul.	Great Lifter	Load Lifter
a	6	4	5
b	10	6	8
fraction	$\frac{6}{10}$, or $\frac{3}{5}$	$\frac{4}{6}$, or $\frac{2}{3}$	$\frac{5}{8}$

lever	Extra Muscle	Effort Less	Lever Greatness
a	10	8	5
b	15	14	9
fraction	$\frac{10}{15}$, or $\frac{2}{3}$	$\frac{8}{14}$, or $\frac{4}{7}$	$\frac{5}{9}$

2b. Lever Greatness, Effort Less, Muscle Multiplier, Load Lifter, Extra Muscle, Great Lifter; Extra Muscle and Great Lifter need the same force. **2c.** $\frac{6}{10} = 0.6$, $\frac{4}{6} = 0.67$, $\frac{5}{8} = 0.63$, $\frac{10}{15} = 0.67$, $\frac{4}{7} = 0.57$, $\frac{5}{9} = 0.56$; 0.57, 0.6, 0.63, 0.67, 0.67 **3a-c.** Check students' work.

4. Answers may vary. Sample: If $a > b$, then the required force is greater than the weight of the load. You could use such a lever to move objects under a microscope.

5. Class 2; explanations may vary. Sample: The fulcrum is at one end, and the effort is at the other end.

CHECK YOUR READINESS

page 210

- Look at the digit to the right of the hundredths place. $7 \geq 5$, so round up. $2.58796 \approx 2.59$.
- Look at the digit to the right of the hundredths place. $6 \geq 5$, so round up. $1.98637 \approx 1.99$.
- Look at the digit to the right of the hundredths place. $9 \geq 5$, so round up. $6.219054 \approx 6.22$.
- Look at the digit to the right of the hundredths place. $4 < 5$, so round down. $7.654321 \approx 7.65$.
- $\frac{5}{10} = \frac{5 \div 5}{10 \div 5} = \frac{1}{2}$
- $\frac{6}{15} = \frac{6 \div 3}{15 \div 3} = \frac{2}{5}$
- $\frac{12}{16} = \frac{12 \div 4}{16 \div 4} = \frac{3}{4}$
- $\frac{87}{9} = 87 \div 9 = 9 \text{ R}6 = 9\frac{6}{9} = 9\frac{2}{3}$
- $\frac{21}{4} = 21 \div 4 = 5 \text{ R}1 = 5\frac{1}{4}$
- $\frac{15}{2} = 15 \div 2 = 7 \text{ R}1 = 7\frac{1}{2}$
- The multiples of 8 are 8, 16, 24, 32, 40, 48, 56, 64, 72, ... The multiples of 18 are 18, 36, 54, 72, ... The least common multiple is 72.
- The multiples of 5 are 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 65, 70, 75, 80, ... The multiples of 16 are 16, 32, 48, 64, 80, ... The least common multiple is 80.
- The multiples of 14 are 14, 28, 42, 56, 70, 84, 98, 112, 126, 140, 154, 168, 182, 196, 210, ... The multiples of 30 are 30, 60, 90, 120, 150, 180, 210, ... The least common multiple is 210.

5-1 Estimating Sums and Differences

page 212-215

Check Skills You'll Need For complete solutions see *Daily Skills Check and Lesson Quiz Transparencies* or *Presentation Pro CD-ROM*. 1. Compatible numbers are numbers that are easy to compute mentally. 2. 60 3. 150 4. 900. 5. 1,230

Quick Check 1. 8 is almost as much as 9, so choose the benchmark 1. 2a. $\frac{5}{6} + \frac{3}{7} \approx 1 + \frac{1}{2} = 1\frac{1}{2}$ 2b. $\frac{12}{13} - \frac{2}{25} \approx 1 - 0 = 1$ 3. $8\frac{1}{2} - 3\frac{3}{4} \approx 9 - 4 = 5$, so the difference in driving time is about 5 hours.

Exercises 1. Benchmarks are whole numbers or fractions that are easy to use, such as $0, \frac{1}{2}$ or 1. Rounding uses place value to find approximate values for numbers. 2. $\frac{3}{8} \approx \frac{1}{2}$; $\frac{7}{15} \approx \frac{1}{2}$; $\frac{11}{57} \approx 0$; $\frac{45}{92} \approx \frac{1}{2}$. Unlike the other fractions, $\frac{11}{57}$ has a numerator that, when compared to the denominator, is close to 0. 3. Compared to the denominator, the numerator is close to 0, so choose the benchmark 0. 4. Compared to the denominator, the numerator is half the denominator, so choose the benchmark $\frac{1}{2}$. 5. The numerator is comparatively close to the denominator, so choose the benchmark 1. 6. Compared to the denominator, the numerator is about half the denominator, so choose the benchmark $\frac{1}{2}$. 7. Compared to the denominator, the numerator is close to 0, so choose the benchmark 0. 8. Compared to the











denominator, the numerator is half the denominator, so choose the benchmark $\frac{1}{2}$. 9. The numerator is comparatively close to the denominator, so choose the benchmark 1. 10. Compared to the denominator, the numerator is about half the denominator, so choose the benchmark $\frac{1}{2}$. 11. Compared to the denominator, the numerator is about half the denominator, so choose the benchmark $\frac{1}{2}$. 12. Compared to the denominator, the numerator is close to 0, so choose the benchmark 0.

- $\frac{5}{13} + \frac{4}{25} \approx \frac{1}{2} + 0 = \frac{1}{2}$
- $\frac{17}{19} - \frac{2}{13} \approx 1 - 0 = 1$
- $\frac{70}{85} + \frac{32}{51} \approx 1 + \frac{1}{2} = 1\frac{1}{2}$
- $\frac{11}{20} - \frac{2}{15} \approx \frac{1}{2} - 0 = \frac{1}{2}$
- $\frac{9}{16} - \frac{18}{37} \approx \frac{1}{2} - \frac{1}{2} = 0$
- $\frac{5}{16} + \frac{7}{15} \approx \frac{1}{2} + \frac{1}{2} = 1$
- $4\frac{2}{9} \approx 4$; $6\frac{13}{27} \approx 6$; $4 + 6 = 10$
- $9\frac{7}{15} \approx 9$; $3\frac{1}{2} \approx 4$; $9 - 4 = 5$
- $22\frac{1}{9} \approx 22$; $16\frac{9}{11} \approx 17$; $22 - 17 = 5$
- $22\frac{8}{14} \approx 23$; $17\frac{3}{7} \approx 17$; $23 - 17 = 6$
- $76\frac{6}{23} \approx 76$; $45\frac{1}{5} \approx 45$; $76 - 45 = 31$
- $84\frac{3}{36} \approx 84$; $41\frac{7}{8} \approx 42$; $84 + 42 = 126$
- $4\frac{5}{6} - 1\frac{1}{12} \approx 5 - 1 = 4$; about 4 ft
- $42\frac{3}{4} \approx 43$; $3\frac{1}{2} \approx 4$; $6\frac{1}{4} \approx 6$; $43 + 4 - 6 = 41$; about 41 lb
- $\frac{11}{16} + \frac{3}{4} + \frac{13}{16} + \frac{15}{16} \approx \frac{1}{2} + 1 + 1 + 1 = 3\frac{1}{2}$; about $3\frac{1}{2}$ in.
- Answers may vary. Sample: Less than the actual sum; since two of the three fractions are slightly greater than their benchmarks, the estimate will be less than the sum.
- Answers may vary. Sample: Whole numbers are easier to add and subtract; yes.
- a. Jocelyn grew $62\frac{1}{4} - 61\frac{7}{8} \approx 62 - 62 = 0$ in. Carlos grew $61\frac{5}{8} - 60\frac{3}{4} \approx 62 - 61 = 1$ in. Amanda grew $60\frac{5}{8} - 59\frac{1}{8} \approx 61 - 59$, or about 2 in.
- b. Amanda $14\frac{9}{10} - (8\frac{1}{7} + 1\frac{8}{9}) \approx 15 - (8 + 2) = 5$; $14\frac{9}{10} - 8\frac{1}{7} + 1\frac{8}{9} \approx 15 - 8 + 2 = 9$; $5 < 9$; < 32. $\frac{3}{4} + \frac{7}{8} \approx 1 + 1 = 2$ in.; the correct choice is B.
- $1.47 \approx 1.5 = 1\frac{1}{2}$; $1\frac{1}{2}$ lb; the correct choice is H.
- $\frac{3}{8} = 3 \div 8 = 0.375$; $0.375 = \frac{3}{8}$; the correct choice is D.
- $47 \div 1,000 = 0.047$
- $4 \div 5 = 0.8$
- $3 \div 500 = 0.006$
- $17 \div 20 = 0.85$
- $1 \div 8 = 0.125$













ACTIVITY LAB

page 216

Activity 1. Check students' work.

-  +  = ; $\frac{7}{16} + \frac{5}{16} = \frac{12}{16}$
-  +  =  ; $\frac{7}{16} + \frac{11}{16} = \frac{18}{16}, \frac{18}{16} = 1\frac{2}{16}, \frac{18}{16} > 1$.
-  -  = ; $\frac{11}{16} - \frac{7}{16} = \frac{4}{16}$

Exercises

-  +  = ; $\frac{1}{16} + \frac{9}{16} = \frac{10}{16}$
-  -  = ; $\frac{6}{8} - \frac{4}{8} = \frac{2}{8}$
-  +  = ; $\frac{3}{8} + \frac{7}{8} = \frac{10}{8}$
-  -  = ; $\frac{15}{16} - \frac{3}{16} = \frac{12}{16}$

5a. When you add or subtract fractions with the same denominators, you add or subtract the numerators and leave the denominators. **5b.** $\frac{2}{5} + \frac{3}{5} + \frac{1}{5} = \frac{2+3+1}{5} = \frac{6}{5}$

5-2 Fractions With Like Denominators

pages 217–220

Check Skills You'll Need For complete solutions see *Daily Skills Check and Lesson Quiz Transparencies or Presentation Pro CD-ROM*. **1.** A fraction is in simplest form when the GCF of the numerator and denominator is 1. **2.** $\frac{1}{4}$ **3.** $\frac{1}{3}$ **4.** $\frac{5}{6}$ **5.** $\frac{3}{7}$

Quick Check **1a.** $\frac{1}{6} + \frac{1}{6} = \frac{1+1}{6} = \frac{2}{6} = \frac{1}{3}$ **1b.** $\frac{10}{21} + \frac{4}{21} =$

$$\frac{10+4}{21} = \frac{14}{21} = \frac{2}{3} \quad \textbf{2a.} \quad \frac{5}{16} + \frac{13}{16} = \frac{5+13}{16} = \frac{18}{16} = 1\frac{1}{8}$$






$$\textbf{2b.} \quad \frac{11}{20} + \frac{17}{20} = \frac{11+17}{20} = \frac{28}{20} = 1\frac{7}{5} = 1\frac{2}{5} \quad \textbf{3.} \quad \frac{11}{12} - \frac{7}{12} = \frac{11-7}{12} = \frac{4}{12} = \frac{1}{3}$$

- Exercises** **1.** $\frac{1}{5} + \frac{2}{5} = \frac{1+2}{5} = \frac{3}{5}$; you do not add the denominators when adding two or more fractions.
2. You can tell an answer is not in simplest form when the numerator and the denominator have a common factor greater than 1. **3.** $\frac{2}{6} + \frac{3}{6} = \frac{2+3}{6} = \frac{5}{6}$ **4.** $\frac{5}{8} - \frac{3}{8} = \frac{5-3}{8} = \frac{2}{8} = \frac{1}{4}$ **5.** $\frac{1}{4} + \frac{1}{4} = \frac{1+1}{4} = \frac{2}{4} = \frac{1}{2}$ **6.** $\frac{2}{5} + \frac{3}{5} = \frac{2+3}{5} = \frac{5}{5} = 1$ **7.** $\frac{2}{9} + \frac{4}{9} = \frac{2+4}{9} = \frac{6}{9} = \frac{2}{3}$ **8.** $\frac{1}{6} + \frac{3}{6} = \frac{1+3}{6} = \frac{4}{6} = \frac{2}{3}$ **9.** $\frac{2}{3} + \frac{2}{3} = \frac{2+2}{3} = \frac{4}{3} = 1\frac{1}{3}$ **10.** $\frac{9}{10} + \frac{7}{10} = \frac{9+7}{10} = \frac{16}{10} = 1\frac{6}{5} = 1\frac{12}{10} = 1\frac{6}{5}$ **11.** $\frac{7}{12} + \frac{6}{12} = \frac{7+6}{12} = \frac{13}{12} = 1\frac{1}{12}$ **12.** $\frac{4}{5} + \frac{3}{5} = \frac{4+3}{5} = \frac{7}{5} = 1\frac{2}{5}$ **13.** $\frac{17}{18} - \frac{5}{18} = \frac{17-5}{18} = \frac{12}{18} = \frac{2}{3}$ **14.** $\frac{15}{20} - \frac{3}{20} = \frac{15-3}{20} = \frac{12}{20} = \frac{3}{5}$ **15.** $\frac{4}{5} - \frac{3}{5} = \frac{4-3}{5} = \frac{1}{5}$ **16.** $\frac{6}{7} - \frac{3}{7} = \frac{6-3}{7} = \frac{3}{7}$ **17.** $\frac{5}{9} - \frac{2}{9} = \frac{5-2}{9} = \frac{3}{9} = \frac{1}{3}$ **18.** $\frac{9}{16} - \frac{3}{16} = \frac{9-3}{16} = \frac{6}{16} = \frac{3}{8}$ **19.** $\frac{8}{12} - \frac{5}{12} = \frac{8-5}{12} = \frac{3}{12} = \frac{1}{4}$ **20.** $\frac{17}{24} - \frac{7}{24} = \frac{17-7}{24} = \frac{10}{24} = \frac{5}{12}$ **21.** $\frac{3}{5} - \frac{1}{5} = \frac{3-1}{5} = \frac{2}{5}$ **22.** $\frac{7}{10} - \frac{6}{10} = \frac{7-6}{10} = \frac{1}{10}$ **23.** First find how much farther your friend runs in ten minutes. $\frac{7}{8} - \frac{5}{8} = \frac{7-5}{8} = \frac{2}{8} = \frac{1}{4}$; $\frac{1}{4}$ mi. Then find how much farther your friend could run in twenty minutes. $\frac{1}{4} + \frac{1}{4} = \frac{1+1}{4} = \frac{2}{4} = \frac{1}{2}$; $\frac{1}{2}$ mi.
24. $\frac{1}{20} + \frac{3}{20} + \frac{5}{20} = \frac{1+3+5}{20} = \frac{9}{20}$ **25.** $\frac{27}{100} + \frac{41}{100} + \frac{3}{100} = \frac{27+41+3}{100} = \frac{71}{100}$ **26.** $\frac{4}{15} + \frac{1}{15} + \frac{7}{15} = \frac{4+1+7}{15} = \frac{12}{15} = \frac{4}{5}$ **27.** $\frac{7}{8} - \frac{3}{8} = \frac{7-3}{8} = \frac{4}{8} = \frac{1}{2}$ **28.** $\frac{11}{20} - \frac{9}{20} = \frac{11-9}{20} = \frac{2}{20} = \frac{1}{10}$ **29.** Answers may vary. Sample: Add the






numerators and keep the denominator. Change the improper fraction $\frac{12}{9}$ to the mixed number $1\frac{3}{9}$. Reduce to $1\frac{1}{3}$. **30a.** $\frac{3}{8} + \frac{7}{8} = \frac{3+7}{8} = \frac{10}{8} = 1\frac{2}{8} = 1\frac{1}{4}$; $1\frac{1}{4}$ in.
30b. $\frac{7}{8} - \frac{3}{8} = \frac{7-3}{8} = \frac{4}{8} = \frac{1}{2}$; $\frac{1}{2}$ in. **31.** You can use the strategy *Work Backward*. $\frac{1}{6} = \frac{2}{12}$, so $7 - \blacksquare = 2$, so $\blacksquare = 5$. **32.** To add fractions with like denominators, add the numerators and keep the same denominator; the correct choice is D. **33.** Mark each measurement on the ruler. The closest measurement is $1\frac{7}{8}$ in.; the correct choice is G. **34.** $\frac{3}{6} - \frac{1}{6} = \frac{3-1}{6} = \frac{2}{6}$; the correct choice is A.
35–38. Answers may vary. Samples are given. **35.** $\frac{3}{8} = \frac{3 \times 2}{8 \times 2} = \frac{6}{16}$; $\frac{3}{8} = \frac{3 \times 3}{8 \times 3} = \frac{9}{24}$ **36.** $\frac{1}{6} = \frac{1 \times 2}{6 \times 2} = \frac{2}{12}$; $\frac{1}{6} = \frac{1 \times 3}{6 \times 3} = \frac{3}{18}$ **37.** $\frac{2}{5} = \frac{2 \times 2}{5 \times 2} = \frac{4}{10}$; $\frac{2}{5} = \frac{2 \times 3}{5 \times 3} = \frac{6}{15}$ **38.** $\frac{7}{10} = \frac{7 \times 2}{10 \times 2} = \frac{14}{20}$; $\frac{7}{10} = \frac{7 \times 3}{10 \times 3} = \frac{21}{30}$

ACTIVITY LAB






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1.  +  =  +  = 




$$\frac{1}{6} + \frac{1}{3} = \frac{1}{6} + \frac{2}{6} = \frac{3}{6} = \frac{1}{2}$$

2.  -  =  -  = 

$$\frac{7}{8} - \frac{1}{2} = \frac{7}{8} - \frac{4}{8} = \frac{3}{8}$$

3.  -  =  -  = 

$$\frac{5}{6} - \frac{1}{2} = \frac{5}{6} - \frac{3}{6} = \frac{2}{6} = \frac{1}{3}$$

4.  +  = 



$$\frac{1}{8} + \frac{3}{8} = \frac{1+3}{8} = \frac{4}{8} = \frac{1}{2}$$

5.  -  = 




$$\frac{3}{6} - \frac{1}{6} = \frac{3-1}{6} = \frac{2}{6} = \frac{1}{3}$$

6.  +  = 

$$\frac{1}{2} + \frac{3}{8} = \frac{4}{8} + \frac{3}{8} = \frac{7}{8}$$

7.  -  = 

$$\frac{5}{6} - \frac{1}{3} = \frac{5}{6} - \frac{2}{6} = \frac{3}{6} = \frac{1}{2}$$

8.  -  = 

$$\frac{1}{2} + \frac{1}{3} = \frac{3}{6} + \frac{2}{6} = \frac{5}{6}$$

9. Answers may vary. Sample: A common denominator means that the pieces are all the same size.

5-3 Fractions With Unlike Denominators page 222–225

Check Skills You'll Need For complete solutions see *Daily Skills Check and Lesson Quiz Transparencies or Presentation Pro CD-ROM*. **1.** Answers may vary.

Sample: Write the prime factorization for each number.
2. 18 **3.** 120 **4.** 150 **5.** 60

Quick Check 1. The LCD is 10. $\frac{3}{5} + \frac{1}{10} = \frac{3 \times 2}{5 \times 2} + \frac{1}{10} = \frac{6}{10} + \frac{1}{10} = \frac{7}{10}$ **2.** The LCD is 6. $\frac{1}{2} + \frac{1}{3} = \frac{1 \times 3}{2 \times 3} + \frac{1 \times 2}{3 \times 2} = \frac{3}{6} + \frac{2}{6} = \frac{5}{6}$; $\frac{5}{6}$ hour **3.** The LCD is 6. $\frac{2}{3} - \frac{1}{2} = \frac{2 \times 2}{3 \times 2} - \frac{1 \times 3}{2 \times 3} = \frac{4}{6} - \frac{3}{6} = \frac{1}{6}$ yd.

Exercises 1. Nine of the ten sections are shaded, so $\frac{2}{5} + \frac{1}{2} = \frac{9}{10}$. **2.** Three of the twelve sections are shaded, so $\frac{2}{3} - \frac{5}{12} = \frac{3}{12} = \frac{1}{4}$. **3.** The LCD is 10. $\frac{1}{10} + \frac{2}{5} = \frac{1}{10} + \frac{4}{10} = \frac{5}{10} = \frac{1}{2}$. **4.** The LCD is 36. $\frac{7}{9} - \frac{1}{4} = \frac{28}{36} - \frac{9}{36} = \frac{19}{36}$. **5.** $\frac{1}{3} + \frac{1}{6} = \frac{1 \times 2}{3 \times 2} + \frac{1}{6} = \frac{2}{6} + \frac{1}{6} = \frac{3}{6} = \frac{1}{2}$. **6.** $\frac{1}{6} + \frac{1}{2} = \frac{1}{6} + \frac{1 \times 3}{2 \times 3} = \frac{1}{6} + \frac{3}{6} = \frac{4}{6} = \frac{2}{3}$. **7.** $\frac{8}{9} + \frac{5}{6} = \frac{8 \times 2}{9 \times 2} + \frac{5 \times 3}{6 \times 3} = \frac{16}{18} + \frac{15}{18} = \frac{31}{18} = 1\frac{13}{18}$. **8.** $\frac{5}{6} + \frac{1}{4} = \frac{5 \times 2}{6 \times 2} + \frac{1 \times 3}{4 \times 3} = \frac{10}{12} + \frac{3}{12} = \frac{13}{12} = 1\frac{1}{12}$. **9.** $\frac{1}{3} + \frac{2}{5} = \frac{1 \times 5}{3 \times 5} + \frac{2 \times 3}{5 \times 3} = \frac{5}{15} + \frac{6}{15} = \frac{11}{15}$. **10.** $\frac{3}{5} + \frac{3}{20} = \frac{3 \times 4}{5 \times 4} + \frac{3}{20} = \frac{12}{20} + \frac{3}{20} = \frac{15}{20} = \frac{3}{4}$. **11.** $\frac{3}{10} + \frac{1}{4} = \frac{3 \times 2}{10 \times 2} + \frac{1 \times 5}{4 \times 5} = \frac{6}{20} + \frac{5}{20} = \frac{11}{20}$. **12.** $\frac{3}{5} + \frac{1}{3} = \frac{3 \times 3}{5 \times 3} + \frac{1 \times 5}{3 \times 5} = \frac{9}{15} + \frac{5}{15} = \frac{14}{15}$. **13.** $\frac{1}{4} + \frac{1}{5} = \frac{1 \times 5}{4 \times 5} + \frac{1 \times 4}{5 \times 4} = \frac{5}{20} + \frac{4}{20} = \frac{9}{20}$ lb. **14.** $\frac{13}{16} - \frac{1}{4} = \frac{13}{16} - \frac{1 \times 4}{4 \times 4} = \frac{13}{16} - \frac{4}{16} = \frac{9}{16}$. **15.** $\frac{17}{20} - \frac{2}{5} = \frac{17}{20} - \frac{2 \times 4}{5 \times 4} = \frac{17}{20} - \frac{8}{20} = \frac{9}{20}$. **16.** $\frac{9}{10} - \frac{3}{5} = \frac{9}{10} - \frac{3 \times 2}{5 \times 2} = \frac{9}{10} - \frac{6}{10} = \frac{3}{10}$. **17.** $\frac{3}{4} - \frac{1}{12} = \frac{3 \times 3}{4 \times 3} - \frac{1}{12} = \frac{9}{12} - \frac{1}{12} = \frac{8}{12} = \frac{2}{3}$. **18.** $\frac{5}{8} - \frac{1}{4} = \frac{5}{8} - \frac{1 \times 2}{4 \times 2} = \frac{5}{8} - \frac{2}{8} = \frac{3}{8}$. **19.** $\frac{4}{5} - \frac{2}{3} = \frac{4 \times 3}{5 \times 3} - \frac{2 \times 5}{3 \times 5} = \frac{12}{15} - \frac{10}{15} = \frac{2}{15}$. **20.** $\frac{7}{10} - \frac{1}{4} = \frac{7 \times 2}{10 \times 2} - \frac{1 \times 5}{4 \times 5} = \frac{14}{20} - \frac{5}{20} = \frac{9}{20}$. **21.** $\frac{5}{6} - \frac{1}{2} = \frac{5}{6} - \frac{1 \times 3}{2 \times 3} = \frac{5}{6} - \frac{3}{6} = \frac{2}{6} = \frac{1}{3}$. **22.** The LCD of 48, 3 and 4 is 48. $\frac{46}{48} - \frac{1}{3} - \frac{1}{4} = \frac{46}{48} - \frac{1 \times 16}{3 \times 16} - \frac{1 \times 12}{4 \times 12} = \frac{46}{48} - \frac{16}{48} - \frac{12}{48} = \frac{18}{48} = \frac{3}{8}$. **23.** $\frac{5}{8} + \frac{9}{12} + \frac{1}{2} = \frac{5 \times 3}{8 \times 3} + \frac{9 \times 2}{12 \times 2} + \frac{1 \times 12}{2 \times 12} = \frac{15}{24} + \frac{18}{24} + \frac{12}{24} = \frac{45}{24} = 1\frac{21}{24} = 1\frac{7}{8}$. **24.** $\frac{11}{30} - \frac{1}{5} - \frac{1}{6} = \frac{11}{30} - \frac{1 \times 6}{5 \times 6} - \frac{1 \times 5}{6 \times 5} = \frac{11}{30} - \frac{6}{30} - \frac{5}{30} = 0$. **25.** $\frac{2}{5} + \frac{1}{2} - \frac{1}{10} = \frac{2 \times 2}{5 \times 2} + \frac{1 \times 5}{2 \times 5} - \frac{1}{10} = \frac{4}{10} + \frac{5}{10} - \frac{1}{10} = \frac{8}{10} = \frac{4}{5}$. **26.** Answers may vary. Sample: The LCD; the numerators and denominators will be smaller, and the answers will be easier to simplify. $\frac{5}{6} + \frac{7}{12} = \frac{5 \times 2}{6 \times 2} + \frac{7}{12} = \frac{10}{12} + \frac{7}{12} = \frac{17}{12} = 1\frac{5}{12}$. **27a.** $\frac{3}{10}$: Compared to the denominator, the numerator is close to half the denominator, so choose the benchmark $\frac{1}{2}$. $\frac{7}{8}$: The numerator is comparatively close to the denominator, so choose the benchmark 1. $\frac{1}{2} + 1 = 1\frac{1}{2}$; $1\frac{1}{2}$ in. **27b.** $\frac{3}{10} + \frac{7}{8} = \frac{3 \times 4}{10 \times 4} + \frac{7 \times 5}{8 \times 5} = \frac{12}{40} + \frac{35}{40} = \frac{47}{40} = 1\frac{7}{40}$; $1\frac{7}{40}$ in. **28.** $\frac{3}{4} - \frac{1}{3} + \frac{1}{2} = \frac{3 \times 3}{4 \times 3} - \frac{1 \times 3}{3 \times 3} + \frac{1 \times 6}{2 \times 6} = \frac{9}{12} - \frac{4}{12} + \frac{6}{12} = \frac{11}{12}$; $\frac{11}{12}$ cup. **29.** $\frac{1}{2} + \frac{1}{3} + \frac{1}{4} = \frac{1 \times 6}{2 \times 6} + \frac{1 \times 4}{3 \times 4} + \frac{1 \times 3}{4 \times 3} = \frac{6}{12} + \frac{4}{12} + \frac{3}{12} = \frac{13}{12} = 1\frac{1}{12}$; the distance

is greater than 1 mile. **30.** $\frac{1}{2} + \frac{1}{4} = \frac{1 \times 2}{2 \times 2} + \frac{1}{4} = \frac{2}{4} + \frac{1}{4} = \frac{3}{4}$; $\frac{1}{2} + \frac{1}{4} + \frac{1}{8} = \frac{1 \times 4}{2 \times 4} + \frac{1 \times 2}{4 \times 2} + \frac{1}{8} = \frac{4}{8} + \frac{2}{8} + \frac{1}{8} = \frac{7}{8}$; $\frac{1}{2} + \frac{1}{4} + \frac{1}{8} + \frac{1}{16} = \frac{1 \times 8}{2 \times 8} + \frac{1 \times 4}{4 \times 4} + \frac{1 \times 2}{8 \times 2} + \frac{1}{16} = \frac{8}{16} + \frac{4}{16} + \frac{2}{16} + \frac{1}{16} = \frac{15}{16}$. Answers may vary. Sample: The sum will never be greater than 1. Each amount added is smaller and smaller, so that the sum approaches 1 but is never greater than 1. **31.** $\frac{2}{3} + \frac{1}{4} = \frac{2 \times 4}{3 \times 4} + \frac{1 \times 3}{4 \times 3} = \frac{8}{12} + \frac{3}{12} = \frac{11}{12}$; $\frac{11}{12}$ cup; the correct choice is C. **32.** $\frac{1}{6} + \frac{2}{6} = \frac{1}{6} + \frac{1}{3}$; the correct choice is F. **33.** Anna has her whole savings (1) minus the amount she spent ($\frac{1}{2} + \frac{1}{3}$). So Anna has $1 - (\frac{1}{2} + \frac{1}{3})$; the correct choice is C. **34.** factors of 16: 1, 2, 4, 8, 16; factors of 64: 1, 2, 4, 8, 16, 32, 64; the GCF of 16 and 64 is 16. **35.** factors of 33: 1, 3, 11, 33; factors of 121: 1, 11, 121; the GCF of 33 and 121 is 11. **36.** factors of 40: 1, 2, 4, 5, 8, 10, 20, 40; factors of 72: 1, 2, 3, 4, 6, 8, 9, 12, 18, 24, 36, 72; the GCF of 40 and 72 is 8. **37.** factors of 60: 1, 2, 3, 5, 6, 10, 12, 20, 30, 60; factors of 210: 1, 2, 3, 5, 6, 7, 10, 14, 15, 21, 30, 35, 42, 70, 105, 210; the GCF of 60 and 210 is 30.

CHECKPOINT QUIZ 1 page 226

1. $\frac{8}{9} + \frac{5}{16} \approx 1 + \frac{1}{2} = 1\frac{1}{2}$ **2.** $\frac{12}{13} - \frac{1}{9} \approx 1 - 0 = 1$ **3.** $\frac{7}{12} + \frac{7}{8} \approx \frac{1}{2} + 1 = 1\frac{1}{2}$ **4.** $\frac{11}{12} - \frac{5}{6} \approx 1 - 1 = 0$ **5.** $\frac{3}{10} + \frac{9}{10} = \frac{12}{10} = 1\frac{2}{10} = 1\frac{1}{5}$ **6.** $\frac{5}{6} - \frac{1}{3} = \frac{5}{6} - \frac{1 \times 2}{3 \times 2} = \frac{5}{6} - \frac{2}{6} = \frac{3}{6} = \frac{1}{2}$ **7.** $\frac{7}{12} + \frac{2}{3} = \frac{7}{12} + \frac{2 \times 4}{3 \times 4} = \frac{7}{12} + \frac{8}{12} = \frac{15}{12} = 1\frac{3}{12} = 1\frac{1}{4}$ **8.** $\frac{9}{10} - \frac{1}{3} = \frac{9 \times 3}{10 \times 3} - \frac{1 \times 10}{3 \times 10} = \frac{27}{30} - \frac{10}{30} = \frac{17}{30}$ **9.** $\frac{1}{7} + \frac{5}{14} = \frac{1 \times 2}{7 \times 2} + \frac{5}{14} = \frac{2}{14} + \frac{5}{14} = \frac{7}{14} = \frac{1}{2}$ **10.** $\frac{17}{20} - \frac{3}{20} = \frac{14}{20} = \frac{7}{10}$ **11.** $\frac{7}{9} - \frac{1}{6} = \frac{7 \times 2}{9 \times 2} - \frac{1 \times 3}{6 \times 3} = \frac{14}{18} - \frac{3}{18} = \frac{11}{18}$ of the class **12.** $\frac{2}{3} + \frac{1}{2} = \frac{2 \times 2}{3 \times 2} + \frac{1 \times 3}{2 \times 3} = \frac{4}{6} + \frac{3}{6} = \frac{7}{6} = 1\frac{1}{6}$; $1\frac{1}{6}$ cup **13.** $\frac{1}{4} + \frac{1}{8} = \frac{1 \times 2}{4 \times 2} + \frac{1}{8} = \frac{2}{8} + \frac{1}{8} = \frac{3}{8}$ gallon

ACTIVITY LAB page 227

1. $1\frac{3}{8} \approx 1$, $2\frac{1}{4} \approx 2$, $1 + 2 = 3$; about 3 in. **2.** about $3\frac{5}{8}$ in.
3. $1\frac{3}{8} + 2\frac{1}{4} = 1\frac{3}{8} + 2\frac{1 \times 2}{4 \times 2} = 1\frac{3}{8} + 2\frac{2}{8} = 3\frac{5}{8}$; $3\frac{5}{8}$ in.
3a. Check students' work. **3b.** Answers may vary. Sample: Measuring the two pieces end to end is the same as adding the lengths together. **4a.** $1\frac{7}{8} \approx 2$, $3\frac{3}{4} \approx 4$, $2 + 4 = 6$; about 6 in. $1\frac{7}{8} + 3\frac{3}{4} = 1\frac{7}{8} + 3\frac{3 \times 2}{4 \times 2} = 1\frac{7}{8} + 3\frac{6}{8} = 4 + 1\frac{5}{8} = 5\frac{5}{8}$; $5\frac{5}{8}$ in.; check students' work. **4b.** $2\frac{1}{4} \approx 2$, $3\frac{3}{4} \approx 4$, $2 + 4 = 6$; about 6 in. $2\frac{1}{4} + 3\frac{3}{4} = 5\frac{4}{4} = 6$; 6 in.; check students' work. **5.** Answers may vary. Sample: No; the fraction parts may add to be a whole number.
6. Estimate the length of each piece of string: $1\frac{3}{8} \approx 1$, $2\frac{1}{4} \approx 2$, $1\frac{7}{8} \approx 2$, $3\frac{1}{8} \approx 3$, $3\frac{3}{4} \approx 4$. Total length 6 to 7 inches: $2\frac{1}{4}$ and $3\frac{3}{4}$, and $3\frac{1}{8}$ and $3\frac{3}{4}$; difference less than 1 inch: $1\frac{3}{8}$ and $2\frac{1}{4}$, $1\frac{3}{8}$ and $1\frac{7}{8}$, $1\frac{7}{8}$ and $2\frac{1}{4}$, $2\frac{1}{4}$ and $3\frac{1}{8}$, and $3\frac{1}{8}$ and $3\frac{3}{4}$

5-4 Adding Mixed Numbers

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Check Skills You'll Need For complete solutions see *Daily Skills Check and Lesson Quiz Transparencies* or *Presentation Pro CD-ROM*. **1.** The numerator is

greater than the denominator. **2.** $1\frac{1}{3}$ **3.** $2\frac{1}{2}$ **4.** $1\frac{3}{4}$ **5.** $2\frac{1}{2}$

Quick Check 1. $2\frac{1}{3} + 3\frac{1}{2} = 2\frac{2}{6} + 3\frac{3}{6} = 5\frac{5}{6}$; $5\frac{5}{6}$ yd

2a. $3\frac{5}{6} + 5\frac{11}{12} = 3\frac{10}{12} + 5\frac{11}{12} = 8 + \frac{21}{12} = 8 + 1\frac{7}{12} = 9\frac{7}{12} = 9\frac{3}{4}$

2b. $7\frac{3}{5} + 13\frac{2}{3} = 7\frac{9}{15} + 13\frac{10}{15} = 20 + \frac{19}{15} = 20 + 1\frac{4}{15} = 21\frac{4}{15}$

3. $1\frac{1}{4} + 2\frac{7}{8} = 1\frac{2}{8} + 2\frac{7}{8} = 3\frac{9}{8} = 3 + 1\frac{1}{8} = 4\frac{1}{8}$; $4\frac{1}{8}$ in.

Exercises 1. Answers may vary. Sample: $1\frac{1}{4} + 3\frac{3}{4} = 4\frac{4}{4} = 5$. **2.** $1 + 2\frac{1}{6} = 3\frac{1}{6}$ **3.** $2\frac{2}{3} + 4 = 6\frac{2}{3}$ **4.** $3\frac{5}{7} + 1\frac{1}{7} = 4\frac{6}{7}$

5. $8\frac{1}{5} + 3\frac{2}{5} = 11\frac{3}{5}$ **6.** $3\frac{1}{9} + 2\frac{2}{3} = 3\frac{1}{9} + 2\frac{4}{9} = 5\frac{5}{9}$ **7.** $9\frac{1}{6} + 2\frac{1}{3} = 9\frac{1}{6} + 2\frac{2}{6} = 11\frac{3}{6} = 11\frac{1}{2}$ **8.** $2\frac{2}{5} + 7\frac{1}{3} = 2\frac{4}{15} + 7\frac{5}{15} = 9\frac{9}{15} = 9\frac{3}{5}$

9. $3\frac{1}{2} + 3\frac{1}{5} = 3\frac{5}{10} + 3\frac{2}{10} = 6\frac{7}{10}$ **10.** $11\frac{1}{3} + 6\frac{7}{9} = 11\frac{3}{9} + 6\frac{7}{9} = 17\frac{10}{9} = 17 + 1\frac{1}{9} = 18\frac{1}{9}$ **11.** $8\frac{5}{6} + 2\frac{1}{3} = 8\frac{5}{6} + 2\frac{2}{6} = 10\frac{7}{6} = 10 + 1\frac{1}{6} = 11\frac{1}{6}$ **12.** $5\frac{2}{3} + 4\frac{1}{2} = 5\frac{4}{6} + 4\frac{3}{6} = 9\frac{7}{6} = 9 + 1\frac{1}{6} = 10\frac{1}{6}$

13. $2\frac{5}{6} + 6\frac{2}{3} = 2\frac{5}{6} + 6\frac{4}{6} = 8\frac{9}{6} = 8 + 1\frac{3}{6} = 9\frac{1}{2}$

14. $2\frac{3}{4} + 1\frac{5}{8} = 2\frac{6}{8} + 1\frac{5}{8} = 3\frac{11}{8} = 3 + 1\frac{3}{8} = 4\frac{3}{8}$ **15.** $4\frac{5}{8} + 1\frac{3}{4} = 4\frac{5}{8} + 1\frac{6}{8} = 5\frac{11}{8} = 5 + 1\frac{3}{8} = 6\frac{3}{8}$ **16.** $3\frac{1}{3} + 2\frac{5}{6} = 3\frac{2}{6} + 2\frac{5}{6} = 5\frac{7}{6} = 5 + 1\frac{1}{6} = 6\frac{1}{6}$ **17.** $1\frac{1}{2} + 3\frac{5}{6} = 1\frac{3}{6} + 3\frac{5}{6} = 4\frac{8}{6} = 4 + 1\frac{2}{6} = 5\frac{1}{3}$ **18.** $12\frac{1}{6} + 8\frac{3}{4} = 12\frac{2}{12} + 8\frac{9}{12} = 20\frac{11}{12}$; $20\frac{11}{12}$ minutes

19. You skate the distance between your house and the park ($1\frac{1}{4}$ miles) twice. $1\frac{1}{4} + 2\frac{3}{10} + 1\frac{1}{4} = 1\frac{10}{40} + 2\frac{12}{40} + 1\frac{10}{40} = 4\frac{32}{40} = 4\frac{4}{5}$; $4\frac{4}{5}$ mi **20.** Find the amount of milk you need: $1\frac{3}{4} + 1\frac{1}{2} = 1\frac{3}{4} + 1\frac{2}{4} = 2\frac{5}{4} = 3\frac{1}{4}$. Compare: $3 < 3\frac{1}{4}$. No, for both recipes, you need a total of $3\frac{1}{4}$ c milk, so $\frac{1}{4}$ c is still needed. **21.** $5\frac{8}{9} \approx 6$, $7\frac{5}{6} \approx 8$, $6 + 8 = 14$; $14 > 13$; $>$

22. $4\frac{5}{13} \approx 4$, $5\frac{4}{9} \approx 5$, $4 + 5 = 9$; $9 < 10\frac{12}{13}$; $<$

23a. $4\frac{11}{12} + 2\frac{3}{4} = 4\frac{11}{12} + 2\frac{9}{12} = 6\frac{20}{12} = 6 + 1\frac{8}{12} = 7\frac{8}{12} = 7\frac{2}{3}$; $7\frac{2}{3}$ ft **23b.** $5\frac{1}{2} + 2\frac{3}{4} = 5\frac{2}{4} + 2\frac{3}{4} = 7\frac{5}{4} = 7 + 1\frac{1}{4} = 8\frac{1}{4}$; $8\frac{1}{4}$ ft

24. Sometimes; check students' work. Sample: whole number: $1\frac{1}{9} + 1\frac{8}{9} = 3$; mixed number: $1\frac{2}{9} + 1\frac{8}{9} = 3\frac{10}{9}$

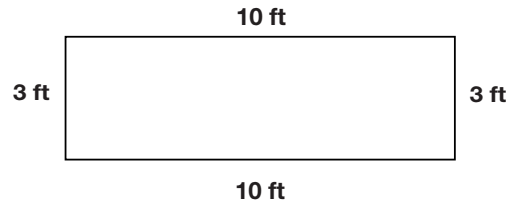
25. $3\frac{1}{4} + 5\frac{1}{2} + 4\frac{1}{4} = 3\frac{1}{4} + 5\frac{2}{4} + 4\frac{1}{4} = 12\frac{4}{4} = 13$; 13 yd

26. Answers may vary. Sample: Add like fractions: $\frac{1}{3} + \frac{2}{3} + \frac{4}{5} + \frac{1}{5} = 1 + 1 = 2$. Add 2 to the sum of the whole numbers: $5 + 3 + 3 + 6 + 2 = 19$.

27. $7\frac{1}{3} + 7\frac{5}{6} - 7\frac{1}{9} = 7\frac{6}{18} + 7\frac{15}{18} - 7\frac{2}{18} = 14\frac{21}{18} - 7\frac{2}{18} = 7\frac{19}{18} = 7 + 1\frac{1}{18} = 8\frac{1}{18}$ **28.** $3\frac{1}{2} + 2\frac{3}{4} + 5 = 3\frac{2}{4} + 2\frac{3}{4} + 5 = 10\frac{5}{4} = 10 + 1\frac{1}{4} = 11\frac{1}{4}$; the correct choice is C. **29.** Write each amount as a fraction. The numerator is the number of slices sold, and the denominator is the total number of slices in each pie. The total number of pies sold is the sum of the fractions. $\frac{5}{8} + \frac{8}{8} + \frac{2}{8} + \frac{3}{8}$; the correct choice is G.

30. Using the strategy *Draw a Picture*, you can see that Emily used twice each dimension ($2 \times \text{length} + 2 \times \text{width}$) to make her fence. Starting with choice A,

$$(2 \times 3) + (2 \times 10) = 6 + 20 = 26.$$



$26 \neq 30$, so she could not have built a 3 ft \times 10 ft pen; the correct choice is A. **31.** Use the Order of

Operations. $2^3 \times 3^2 + 5 = 8 \times 9 + 5 = 72 + 5 = 77$

32. Use the Order of Operations. $5^3 \times 2^2 \div 10^2 =$

$125 \times 4 \div 100 = 500 \div 100 = 5$ **33.** Use the Order of Operations. $6^2 \times 10^3 = 36 \times 1,000 = 36,000$

5-5 Subtracting Mixed Numbers

pages 232–236

Check Skills You'll Need For complete solutions see *Daily Skills Check and Lesson Quiz Transparencies* or *Presentation Pro CD-ROM*. **1.** Answers may vary. Sample: Write multiples of 6 until a multiple is divisible

by 4. 12 is divisible by both 6 and 4. **2.** $\frac{3}{5}$, $\frac{13}{20}$, $\frac{7}{10}$

3. $2\frac{7}{32}$, $2\frac{1}{4}$, $2\frac{5}{16}$, $2\frac{3}{8}$

Quick Check 1. $14\frac{13}{16} - 7\frac{5}{8} = 14\frac{13}{16} - 7\frac{10}{16} = 7\frac{3}{16}$; $7\frac{3}{16}$ in.

2a. $5 - 3\frac{2}{3} = 4\frac{3}{3} - 3\frac{2}{3} = 1\frac{1}{3}$ **2b.** $10 - 4\frac{1}{4} = 9\frac{4}{4} - 4\frac{1}{4} = 5\frac{3}{4}$

3. $3\frac{5}{6} - 1\frac{3}{4} = 3\frac{10}{12} - 1\frac{9}{12} = 2\frac{1}{12}$; $2\frac{1}{12}$ ft

More Than One Way $10\frac{1}{3} - 7\frac{8}{9} = 10\frac{3}{9} - 7\frac{8}{9} = 9\frac{12}{9} - 7\frac{8}{9} = 2\frac{4}{9}$; Answers may vary. Sample: I renamed $10\frac{1}{3}$ as $9\frac{12}{9}$ and

subtracted $7\frac{8}{9}$; the difference is $2\frac{4}{9}$.

Exercises 1. $4\frac{5}{7} = 3 + \frac{7}{7} + \frac{5}{7} = 3\frac{12}{7}$; the correct choice is

C. **2.** $12\frac{3}{4} - 10\frac{1}{4} = 2\frac{2}{4} = 2\frac{1}{2}$ **3.** $3\frac{4}{4} - 2\frac{3}{4} = 1\frac{1}{4}$

4. $9\frac{4}{7} - 2\frac{3}{14} = 9\frac{8}{14} - 2\frac{3}{14} = 7\frac{5}{14}$ **5.** $7\frac{3}{4} - 6\frac{2}{5} =$

$7\frac{15}{20} - 6\frac{8}{20} = 1\frac{7}{20}$ **6.** $2\frac{5}{8} - 1\frac{4}{4} = 2\frac{5}{8} - 1\frac{2}{8} = 1\frac{3}{8}$ **7.** $9\frac{4}{5} - 4\frac{4}{15} =$

$9\frac{12}{15} - 4\frac{4}{15} = 5\frac{8}{15}$ **8.** $21\frac{3}{8} - 11\frac{1}{4} = 21\frac{3}{8} - 11\frac{2}{8} = 10\frac{1}{8}$

9. $15\frac{11}{12} - 11\frac{1}{2} = 15\frac{11}{12} - 11\frac{6}{12} = 4\frac{5}{12}$ **10.** $12\frac{1}{4} - 4\frac{1}{8} =$

$12\frac{2}{8} - 4\frac{1}{8} = 8\frac{1}{8}$ **11.** $3\frac{2}{3} - 1\frac{1}{6} = 3\frac{4}{6} - 1\frac{1}{6} = 2\frac{3}{6} = 2\frac{1}{2}$

12. $19\frac{1}{3} - 7\frac{1}{5} = 19\frac{5}{15} - 7\frac{3}{15} = 12\frac{2}{15}$ **13.** $2\frac{2}{3} - 1\frac{1}{2} =$

$2\frac{4}{6} - 1\frac{3}{6} = 1\frac{1}{6}$; $1\frac{1}{6}$ hour **14.** $8 - 2\frac{3}{4} = 7\frac{4}{4} - 2\frac{3}{4} = 5\frac{1}{4}$

15. $23 - 19\frac{5}{8} = 22\frac{8}{8} - 19\frac{5}{8} = 3\frac{3}{8}$ **16.** $32 - 16\frac{1}{2} =$

$31\frac{2}{2} - 16\frac{1}{2} = 15\frac{1}{2}$ **17.** $10\frac{1}{10} - 3\frac{2}{5} = 10\frac{1}{10} - 3\frac{4}{10} =$

$9\frac{11}{10} - 3\frac{4}{10} = 6\frac{7}{10}$ **18.** $3\frac{3}{8} - 1\frac{3}{4} = 3\frac{3}{8} - 1\frac{6}{8} = 2\frac{1}{8} - 1\frac{6}{8} = 1\frac{5}{8}$

19. $4\frac{5}{12} - 1\frac{3}{4} = 4\frac{5}{12} - 1\frac{9}{12} = 3\frac{17}{12} - 1\frac{9}{12} = 2\frac{8}{12} = 2\frac{2}{3}$

20. $6\frac{1}{5} - 2\frac{2}{3} = 6\frac{3}{15} - 2\frac{10}{15} = 5\frac{18}{15} - 2\frac{10}{15} = 3\frac{8}{15}$ **21.** $11\frac{1}{6} - 5\frac{2}{3} =$

$11\frac{1}{6} - 5\frac{4}{6} = 10\frac{1}{6} - 5\frac{4}{6} = 5\frac{5}{6} = 5\frac{1}{2}$; $5\frac{1}{2}$ miles **22.** $12 - 3\frac{7}{12} =$

$11\frac{12}{12} - 3\frac{7}{12} = 8\frac{5}{12}$; $8\frac{5}{12}$ **23.** $18\frac{1}{2} - 15\frac{3}{4} = 18\frac{2}{4} - 15\frac{3}{4} = 17\frac{6}{4} - 15\frac{3}{4} = 2\frac{3}{4}$; $2\frac{3}{4}$ in.

24. because $\frac{5}{6}$ is greater than $\frac{1}{6}$ **25.** $4\frac{5}{12} - 3\frac{1}{2} = 4\frac{5}{12} - 3\frac{6}{12} =$

$$3\frac{17}{12} - 3\frac{6}{12} = \frac{11}{12}; \frac{11}{12} \text{ ft} \quad \mathbf{26.} \quad 6\frac{2}{5} - 3\frac{1}{2} = \frac{32}{5} - \frac{7}{2} = \frac{64}{10} - \frac{35}{10} = \frac{29}{10},$$

answers may vary. Sample: Rename as improper fractions because the denominators are different.

27. Rename: $23 \text{ ft } 5\frac{1}{4} \text{ in.} = 22 \text{ ft } 17\frac{1}{4} \text{ in.}$ Subtract the feet:

$$22 - 22 = 0. \text{ Subtract the inches: } 17\frac{1}{4} - 11\frac{1}{4} = 6. \text{ The}$$

difference is 0 ft 6 in., or 6 in. **28.** Find pairs of jumps that are close: 1992 and 1996, 1996 and 2004. Find the difference for 1992 and 1996:

$$23 \text{ ft } 5\frac{1}{4} \text{ in.} - 23 \text{ ft } 4\frac{1}{2} \text{ in.} \quad 23 - 23 = 0; 0 \text{ ft; } 5\frac{1}{4} - 4\frac{1}{2} =$$

$$4\frac{5}{4} - 4\frac{2}{4} = \frac{3}{4}, \frac{3}{4} \text{ in. Find the difference for 1996 and 2004:}$$

$$23 \text{ ft } 4\frac{1}{2} \text{ in.} - 23 \text{ ft } 2\frac{1}{2} \text{ in.} \quad 23 - 23 = 0, 0 \text{ ft; } 4\frac{1}{2} - 2\frac{1}{2} = 2,$$

$$2 \text{ in. } \frac{3}{4} \text{ in.} < 2 \text{ in. The two closest jumps were in 1992 and}$$

1996. **29.** The longest jump is 24 ft. $3\frac{1}{2} \text{ in.}$ The shortest jump is 22 ft. $11\frac{1}{4} \text{ in.}$ Rename: $24 \text{ ft } 3\frac{1}{2} \text{ in.} = 23 \text{ ft } 15\frac{1}{2} \text{ in.}$

Subtract the feet: $23 - 22 = 1.$ Subtract the inches:

$$15\frac{1}{2} - 11\frac{1}{4} = 15\frac{2}{4} - 11\frac{1}{4} = 4\frac{1}{4}. \text{ So the difference is}$$

$$1 \text{ ft } 4\frac{1}{4} \text{ in.}$$

$$\mathbf{30.} \quad x + 1\frac{2}{3} = 3\frac{1}{2}$$

$$x + 1\frac{4}{6} = 3\frac{3}{6}$$

$$x + 1\frac{4}{6} - 1\frac{4}{6} = 3\frac{3}{6} - 1\frac{4}{6}$$

$$x = 2\frac{9}{6} - 1\frac{4}{6}$$

$$x = 1\frac{5}{6}$$

$$\mathbf{31.} \quad 2\frac{1}{4} - 1\frac{3}{4} = \frac{5}{4} - \frac{3}{4} = \frac{2}{4} = \frac{1}{2}, \frac{1}{2} \text{ hour; the correct choice}$$

is A. **32.** To add mixed numbers, add the whole number (Step N) and fractions (Step L) separately, then combine the two parts to find the total. Since in this problem the fraction parts add up to a mixed number (Step K), you add again to simplify (Step M). Choice J shows the

$$\text{correct order. } \mathbf{33.} \quad \frac{15}{25} \div \frac{5}{5} = \frac{3}{5} \quad \mathbf{34.} \quad \frac{16}{56} \div \frac{8}{8} = \frac{2}{7}$$

$$\mathbf{35.} \quad \frac{36}{54} \div \frac{18}{18} = \frac{2}{3} \quad \mathbf{36.} \quad \frac{8}{4} \div \frac{4}{4} = \frac{2}{1} = 2$$

ACTIVITY LAB

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$$\mathbf{1.} \quad 3 \boxed{/} 4 \boxed{-} 2 \boxed{/} 5 \boxed{=} 7/20; \frac{7}{20} \quad \mathbf{2.} \quad 8 \boxed{/} 9 \boxed{+} 1 \boxed{/} 12 \boxed{=} 35/36; \frac{35}{36}$$

$$\mathbf{3.} \quad 11 \boxed{/} 12 \boxed{-} 3 \boxed{/} 8 \boxed{=} 13/24; \frac{13}{24}$$

$$\mathbf{4.} \quad 4 \boxed{/} 5 \boxed{+} 1 \boxed{/} 20 \boxed{=} 17/20; \frac{17}{20} \quad \mathbf{5.} \quad 3 \boxed{/} 10 \boxed{-} 2 \boxed{/} 9 \boxed{=} 7/90; \frac{7}{90}$$

$$\mathbf{6.} \quad 22 \boxed{/} 5 \boxed{+} 9 \boxed{/} 100 \boxed{=} 97/100; \frac{97}{100} \quad \mathbf{7.} \quad 9 \boxed{\text{unit}} 3 \boxed{/} 4 \boxed{+} 3 \boxed{\text{unit}} 3 \boxed{/} 4 \boxed{=} 13\text{u } 2/4 \boxed{\text{Simp}} \boxed{=} 13\text{u } 1/2; 13\frac{1}{2}$$

$$\mathbf{8.} \quad 6 \boxed{\text{unit}} 9 \boxed{/} 10 \boxed{+} 2 \boxed{\text{unit}} 1 \boxed{/} 12 \boxed{=} 8\text{u } 59/60; 8\frac{59}{60}$$

$$\mathbf{9.} \quad 18 \boxed{\text{unit}} 5 \boxed{/} 12 \boxed{-} 9 \boxed{\text{unit}} 1 \boxed{/} 2 \boxed{=} 8\text{u } 11/12; 8\frac{11}{12}$$

$$\mathbf{10.} \quad 1 \boxed{\text{unit}} 1 \boxed{/} 10 \boxed{+} 8 \boxed{\text{unit}} 1 \boxed{/} 12 \boxed{=} 9\text{u } 11/60; 9\frac{11}{60}$$

$$\mathbf{11.} \quad 13 \boxed{\text{unit}} 5 \boxed{/} 12 \boxed{-} 5 \boxed{\text{unit}} 1 \boxed{/} 3 \boxed{=} 8\text{u } 1/12; 8\frac{1}{12}$$

$$\mathbf{12.} \quad 14 \boxed{\text{unit}} 3 \boxed{/} 10 \boxed{-} 3 \boxed{\text{unit}} 1 \boxed{/} 2 \boxed{=} 10\text{u } 8/10; \boxed{\text{Simp}} \boxed{=} 10\text{u } 4/5; 10\frac{4}{5}$$

$$\mathbf{13.} \quad \text{Answers may vary. Sample: Enter the improper fraction into the calculator. Press } 2\text{nd} \boxed{\text{A}^{\text{b}}/\text{C}} \boxed{=}$$

$$\mathbf{14.} \quad x - 3\frac{1}{5} = \frac{2}{5}, x - 3\frac{1}{5} + 3\frac{1}{5} = \frac{2}{5} + 3\frac{1}{5}, x = 3\frac{3}{5}; \text{C}$$

$$\mathbf{2.} \quad x + 4\frac{3}{5} = 8, x + 4\frac{3}{5} - 4\frac{3}{5} = 8 - 4\frac{3}{5}, x = 7\frac{5}{5} - 4\frac{3}{5}, x = 3\frac{2}{5}; \text{B}$$

$$\mathbf{3.} \quad x - 2\frac{1}{5} = 1\frac{3}{5}, x - 2\frac{1}{5} + 2\frac{1}{5} = 1\frac{3}{5} + 2\frac{1}{5}, x = 3\frac{4}{5}; \text{D}$$

$$\mathbf{4.} \quad x + 4\frac{4}{5} = 8, x + 4\frac{4}{5} - 4\frac{4}{5} = 8 - 4\frac{4}{5}, x = 7\frac{5}{5} - 4\frac{4}{5}, x = 3\frac{1}{5}; \text{A}$$

$$\mathbf{5.} \quad 11\frac{2}{3} = \frac{1}{2} + j, \frac{35}{3} = \frac{1}{2} + j, \frac{35}{3} - \frac{1}{2} = \frac{1}{2} + j - \frac{1}{2}, \frac{70}{6} - \frac{3}{6} = j, \frac{67}{6} = j, 11\frac{1}{6} = j; 11\frac{1}{6} \text{ ft}$$

$$\mathbf{6.} \quad x + 4\frac{2}{5} = 7\frac{4}{5}, 3 + 4 = 7, \frac{2}{5} + \frac{2}{5} = \frac{4}{5}, x = 3\frac{2}{5}$$

$$\mathbf{7.} \quad a + 6\frac{1}{3} = 20\frac{2}{3}, 14 + 6 = 20, \frac{1}{3} + \frac{1}{3} = \frac{2}{3}, x = 14\frac{1}{3}$$

CHECKPOINT QUIZ 2

page 238

$$\mathbf{1.} \quad 2\frac{1}{2} + 3\frac{1}{8} = 2\frac{4}{8} + 3\frac{1}{8} = 5\frac{5}{8} \quad \mathbf{2.} \quad 9\frac{1}{2} - 4\frac{3}{4} = 9\frac{2}{4} - 4\frac{3}{4} =$$

$$8\frac{6}{4} - 4\frac{3}{4} = 4\frac{3}{4} \quad \mathbf{3.} \quad 6\frac{1}{3} + 8\frac{1}{2} = 6\frac{2}{6} + 8\frac{3}{6} = 14\frac{5}{6} \quad \mathbf{4.} \quad 7\frac{5}{9} - 1\frac{2}{3} =$$

$$7\frac{5}{9} - 1\frac{6}{9} = 6\frac{14}{9} - 1\frac{6}{9} = 5\frac{8}{9} \quad \mathbf{5.} \quad 3\frac{1}{3} + 2\frac{1}{2} = 3\frac{2}{6} + 2\frac{3}{6} = 5\frac{5}{6}$$

$$\mathbf{6.} \quad 2\frac{1}{9} - 1\frac{2}{3} = 2\frac{1}{9} - 1\frac{6}{9} = 1\frac{10}{9} - 1\frac{6}{9} = \frac{4}{9} \quad \mathbf{7.} \quad 4\frac{1}{2} + 5\frac{3}{8} =$$

$$4\frac{4}{8} + 5\frac{3}{8} = 9\frac{7}{8} \quad \mathbf{8.} \quad 5\frac{2}{3} - 1\frac{1}{2} = 5\frac{4}{6} - 1\frac{3}{6} = 4\frac{1}{6} \quad \mathbf{9.} \quad 1\frac{1}{2} + 2\frac{3}{4} =$$

$$1\frac{2}{4} + 2\frac{3}{4} = 3\frac{5}{4} = 4\frac{1}{4}; 4\frac{1}{4} \text{ hours} \quad \mathbf{10.} \quad 2\frac{1}{4} - 1\frac{7}{10} = 2\frac{5}{20} - 1\frac{14}{20} =$$

$$1\frac{25}{20} - 1\frac{14}{20} = \frac{11}{20}; \frac{11}{20} \text{ mile}$$

ACTIVITY LAB

page 239

$$\mathbf{1.} \quad 3\frac{3}{4} + 4\frac{1}{2} = 3\frac{3}{4} + 4\frac{2}{4} = 7\frac{5}{4} = 7 + 1\frac{1}{4} = 8\frac{1}{4}; 8\frac{1}{4} \text{ thousand}$$

$$\text{people or } 8,250 \text{ people} \quad \mathbf{2.} \quad 6\frac{1}{2} + 3 + 1\frac{3}{4} + 3\frac{1}{4} =$$

$$6\frac{2}{4} + 3 + 1\frac{3}{4} + 3\frac{1}{4} = 13\frac{6}{4} = 14\frac{2}{4} = 14\frac{1}{2} \text{ sets of 8 hits}$$

each or 116 hits **3–5.** Check students' work.

5-6 Equations With Fractions

pages 240–243

Check Skills You'll Need For complete solutions see *Daily Skills Check and Lesson Quiz Transparencies* or *Presentation Pro CD-ROM*. **1.** subtraction **2.** 26 **3.** 3.8 **4.** 18.9

$$\mathbf{Quick Check} \quad \mathbf{1a.} \quad x - 1\frac{3}{8} = 1\frac{3}{8}, 2 - 1 = 1, \frac{6}{8} - \frac{3}{8} = \frac{3}{8}, 2\frac{6}{8} =$$

$$2\frac{3}{4} \quad \mathbf{1b.} \quad 14\frac{1}{4} + x = 25\frac{1}{2}, 14 + 11 = 25, \frac{1}{4} + \frac{1}{4} = \frac{1}{2}, 11\frac{1}{4}$$

$$\mathbf{1c.} \quad 5\frac{5}{6} - x = 2\frac{1}{6}, 5 - 3 = 2, 5\frac{5}{6} - \frac{4}{6} = \frac{1}{6}, 3\frac{4}{6} = 3\frac{2}{3}$$

$$\mathbf{2a.} \quad n + \frac{1}{3} = \frac{11}{12}, n + \frac{1}{3} - \frac{1}{3} = \frac{11}{12} - \frac{1}{3}, n = \frac{11}{12} - \frac{4}{12} = \frac{7}{12}$$

$$\mathbf{2b.} \quad \frac{2}{5} + a = \frac{13}{20}, \frac{2}{5} - \frac{2}{5} + a = \frac{13}{20} - \frac{2}{5}, a = \frac{13}{20} - \frac{8}{20} = \frac{5}{20} = \frac{1}{4}$$

$$\mathbf{3.} \quad 2\frac{3}{8} = t + \frac{5}{8}, 2\frac{3}{8} - \frac{5}{8} = t + \frac{5}{8} - \frac{5}{8}, t = 2\frac{3}{8} - \frac{5}{8} = 1\frac{11}{8} - \frac{5}{8} =$$

$$1\frac{6}{8} = 1\frac{3}{4}, 1\frac{3}{4} \text{ in.}$$

$$\mathbf{Exercises} \quad \mathbf{1.} \quad x - 3\frac{1}{5} = \frac{2}{5}, x - 3\frac{1}{5} + 3\frac{1}{5} = \frac{2}{5} + 3\frac{1}{5}, x = 3\frac{3}{5}; \text{C}$$

$$\mathbf{2.} \quad x + 4\frac{3}{5} = 8, x + 4\frac{3}{5} - 4\frac{3}{5} = 8 - 4\frac{3}{5}, x = 7\frac{5}{5} - 4\frac{3}{5}, x = 3\frac{2}{5}; \text{B}$$

$$\mathbf{3.} \quad x - 2\frac{1}{5} = 1\frac{3}{5}, x - 2\frac{1}{5} + 2\frac{1}{5} = 1\frac{3}{5} + 2\frac{1}{5}, x = 3\frac{4}{5}; \text{D}$$

$$\mathbf{4.} \quad x + 4\frac{4}{5} = 8, x + 4\frac{4}{5} - 4\frac{4}{5} = 8 - 4\frac{4}{5}, x = 7\frac{5}{5} - 4\frac{4}{5}, x = 3\frac{1}{5}; \text{A}$$

$$\mathbf{5.} \quad 11\frac{2}{3} = \frac{1}{2} + j, \frac{35}{3} = \frac{1}{2} + j, \frac{35}{3} - \frac{1}{2} = \frac{1}{2} + j - \frac{1}{2}, \frac{70}{6} - \frac{3}{6} = j, \frac{67}{6} = j, 11\frac{1}{6} = j; 11\frac{1}{6} \text{ ft}$$

$$\mathbf{6.} \quad x + 4\frac{2}{5} = 7\frac{4}{5}, 3 + 4 = 7, \frac{2}{5} + \frac{2}{5} = \frac{4}{5}, x = 3\frac{2}{5}$$

$$\mathbf{7.} \quad a + 6\frac{1}{3} = 20\frac{2}{3}, 14 + 6 = 20, \frac{1}{3} + \frac{1}{3} = \frac{2}{3}, x = 14\frac{1}{3}$$

$$\mathbf{8.} \quad c - \frac{3}{10} = 6\frac{9}{10}, 6 - 0 = 6, \frac{12}{10} - \frac{3}{10} = \frac{9}{10}, x = 6\frac{12}{10} = 7\frac{2}{10} = 7\frac{1}{5}$$

$$\mathbf{9.} \quad 7\frac{4}{5} = 2\frac{3}{5} + n, 7 = 2 + 5, \frac{4}{5} = \frac{3}{5} + \frac{1}{5}, n = 5\frac{1}{5}$$

$$\mathbf{10.} \quad 4\frac{3}{8} = k - 7\frac{1}{8}, 4 = 11 - 7, \frac{3}{8} = \frac{4}{8} - \frac{1}{8}, k = 11\frac{4}{8} = 11\frac{1}{2}$$

$$\mathbf{11.} \quad 12\frac{5}{6} = s + 2\frac{5}{6}, 12 = 10 + 2, \frac{5}{6} = 0 + \frac{5}{6}, s = 10$$

$$\mathbf{12.} \quad x = \frac{2}{7} + \frac{5}{6} = \frac{12}{42} + \frac{35}{42} = \frac{47}{42} = 1\frac{5}{42}$$

$$\mathbf{13.} \quad \frac{2}{5} - \frac{1}{9} = x, \frac{18}{45} - \frac{5}{45} = \frac{13}{45}, x = \frac{13}{45}$$

$$\mathbf{14.} \quad x - \frac{5}{6} = \frac{7}{8}, x - \frac{5}{6} + \frac{5}{6} = \frac{7}{8} + \frac{5}{6}, x = \frac{21}{24} + \frac{20}{24} = \frac{41}{24} = 1\frac{17}{24}$$

$$\mathbf{15.} \quad \frac{5}{24} + g = \frac{1}{3}, \frac{5}{24} - \frac{5}{24} + g = \frac{1}{3} - \frac{5}{24}, g = \frac{8}{24} - \frac{5}{24} = \frac{3}{24} = \frac{1}{8}$$

$$\mathbf{16.} \quad \frac{4}{9} = y - \frac{2}{5}, \frac{4}{9} + \frac{2}{5} = y - \frac{2}{5} + \frac{2}{5}, x = \frac{4}{9} + \frac{2}{5} = \frac{20}{45} + \frac{18}{45} = \frac{38}{45}$$

17. $t - \frac{7}{9} = \frac{1}{3}$, $t - \frac{7}{9} + \frac{7}{9} = \frac{1}{3} + \frac{7}{9}$, $t = \frac{3}{9} + \frac{7}{9} = \frac{10}{9} = 1\frac{1}{9}$
 18. $\frac{11}{12} = n + \frac{2}{3}$, $\frac{11}{12} - \frac{2}{3} = n + \frac{2}{3} - \frac{2}{3}$, $n = \frac{11}{12} - \frac{8}{12}$, $n = \frac{3}{12} = \frac{1}{4}$
 19. $\frac{5}{8} = a + \frac{1}{3}$, $\frac{5}{8} - \frac{1}{3} = a + \frac{1}{3} - \frac{1}{3}$, $a = \frac{15}{24} - \frac{8}{24}$, $a = \frac{7}{24}$
 20. $3\frac{1}{5} = x - \frac{12}{25}$, $3\frac{1}{5} + \frac{12}{25} = x - \frac{12}{25} + \frac{12}{25}$, $x = 3\frac{5}{25} + \frac{12}{25}$, $x = 3\frac{17}{25}$
 21. $y - 2\frac{8}{9} = \frac{5}{6}$, $y - 2\frac{8}{9} + 2\frac{8}{9} = \frac{5}{6} + 2\frac{8}{9}$, $y = \frac{15}{18} + 2\frac{16}{18}$, $y = 2\frac{31}{18} = 3\frac{13}{18}$
 22. $k - 4\frac{5}{6} = 2\frac{1}{4}$, $k - 4\frac{5}{6} + 4\frac{5}{6} = 2\frac{1}{4} + 4\frac{5}{6}$, $k = 2\frac{3}{12} + 4\frac{10}{12}$, $k = 6\frac{13}{12} = 7\frac{1}{12}$
 23. $9\frac{7}{8} = b - \frac{3}{4}$, $9\frac{7}{8} + \frac{3}{4} = b - \frac{3}{4} + \frac{3}{4}$, $b = 9\frac{7}{8} + \frac{6}{8}$, $b = 9\frac{13}{8} = 10\frac{5}{8}$
 24. $\frac{3}{8} + x = \frac{8}{8}$, $\frac{3}{8} + x - \frac{3}{8} = \frac{8}{8} - \frac{3}{8}$, $x = \frac{5}{8}$; $\frac{5}{8}$ of the book is left, or 5 chapters are left.
 25. $b + 5\frac{1}{2} + 4\frac{2}{3} = 12$, $b + 5\frac{3}{6} + 4\frac{4}{6} = 11\frac{6}{6}$, $b + 9\frac{7}{6} = 11\frac{6}{6}$, $b + 10\frac{1}{6} - 10\frac{1}{6} = 11\frac{6}{6} - 10\frac{1}{6}$, $b = 1\frac{5}{6}$; $1\frac{5}{6}$ lb left
 26a. $\frac{1}{3} + x = \frac{1}{2}$, $\frac{1}{3} + x - \frac{1}{3} = \frac{1}{2} - \frac{1}{3}$, $x = \frac{3}{6} - \frac{2}{6}$, $x = \frac{1}{6}$
 26b. $\frac{1}{4} + x = \frac{1}{3}$, $\frac{1}{4} + x - \frac{1}{4} = \frac{1}{3} - \frac{1}{4}$, $x = \frac{4}{12} - \frac{3}{12}$, $x = \frac{1}{12}$
 26c. $\frac{1}{5} + x = \frac{1}{4}$, $\frac{1}{5} + x - \frac{1}{5} = \frac{1}{4} - \frac{1}{5}$, $x = \frac{5}{20} - \frac{4}{20}$, $x = \frac{1}{20}$
 26d. $\frac{1}{9} + x = \frac{1}{8}$, $x = \frac{1}{8} - \frac{1}{9}$; $x = \frac{9}{72} - \frac{8}{72} = \frac{1}{72}$; the answer will be $\frac{1}{72}$ because 72 is the LCM of 9 and 8, and because they are opposites, so the numerator will be $9 - 8$.
 27. $10 = 5\frac{2}{3} + 3\frac{1}{2} + x$; $10 = 5\frac{4}{6} + 3\frac{3}{6} + x$; $10 = 8\frac{7}{6} + x$; $10 = 9\frac{1}{6} + x$; $10 - 9\frac{1}{6} = 9\frac{1}{6} + x - 9\frac{1}{6}$, $x = 9\frac{6}{6} - 9\frac{1}{6} = \frac{5}{6}$; $\frac{5}{6}$ yd
 28. $\frac{4}{5} = \frac{1}{2} + b$, $\frac{4}{5} - \frac{1}{2} = \frac{1}{2} + b - \frac{1}{2}$, $b = \frac{8}{10} - \frac{5}{10}$, $b = \frac{3}{10}$; $\frac{3}{10}$ mi
 29. $1\frac{1}{2} + 1\frac{3}{8} + 1\frac{3}{4} + 1\frac{1}{4} = 4 + \frac{1}{2} + \frac{3}{8} + \frac{3}{4} + \frac{1}{4} = 4 + \frac{4}{8} + \frac{3}{8} + \frac{6}{8} + \frac{2}{8} = 5 + \frac{1}{2} + \frac{3}{8} = 5 + \frac{4}{8} + \frac{3}{8} = 5\frac{7}{8}$.

Answers may vary. Sample: Yes; the sum

of the relay times is $5\frac{7}{8}$ min which is less than 6 min.

30. $\frac{1}{3} + \frac{2}{5} = \frac{5}{15} + \frac{6}{15} = \frac{11}{15}$, $\frac{15}{15} - \frac{11}{15} = \frac{4}{15}$; $\frac{4}{15}$ of the class

31. $m - \frac{3}{4} = \frac{37}{50}$, $m - \frac{3}{4} + \frac{3}{4} = \frac{37}{50} + \frac{3}{4}$, $m = \frac{74}{100} + \frac{75}{100}$, $m = \frac{149}{100} = 1\frac{49}{100}$; $n - \frac{4}{5} = \frac{37}{50}$, $n - \frac{4}{5} + \frac{4}{5} = \frac{37}{50} + \frac{4}{5}$, $n = \frac{37}{50} + \frac{40}{50}$, $n = \frac{77}{50} = 1\frac{27}{50}$; n has the greater value.

32. One girl can eat $\frac{1}{2}$ apple in $\frac{1}{3}$ min, so she can eat 1 apple in $\frac{2}{3}$ min. Then three girls can eat 3 apples in $\frac{2}{3}$ min. 2 min is $\frac{6}{3}$ min, $\frac{2}{3} + \frac{2}{3} + \frac{2}{3} = \frac{6}{3}$. Every $\frac{2}{3}$ min, they can eat 3 apples, so $3 + 3 + 3 = 9$; 9 apples
 33. The median is the middle number in a set of ordered data. 76, 91, 92, 98, 98, 92; the correct choice is C.
 34. For every hour she earns \$8, so you multiply the hours by 8, $8h$; the correct choice is G.
 35. First find the LCD of 2, 3, 7, and 10. The LCD is 210. $\frac{1}{2} = \frac{1 \times 105}{2 \times 105} = \frac{105}{210}$, $\frac{2}{3} = \frac{2 \times 70}{3 \times 70} = \frac{140}{210}$, $\frac{4}{7} = \frac{4 \times 30}{7 \times 30} = \frac{120}{210}$, $\frac{3}{10} = \frac{3 \times 21}{10 \times 21} = \frac{63}{210}$, $\frac{63}{210} < \frac{105}{210} < \frac{120}{210} < \frac{140}{210}$, $\frac{3}{10} < \frac{1}{2} < \frac{4}{7} < \frac{2}{3}$
 36. First find the LCD of 2, 3, and 12. The LCD is 36. $\frac{3}{4} = \frac{3 \times 9}{4 \times 9} = \frac{27}{36}$, $\frac{4}{3} = \frac{4 \times 12}{3 \times 12} = \frac{48}{36}$, $\frac{1}{9} = \frac{1 \times 4}{9 \times 4} = \frac{4}{36}$, $\frac{11}{12} = \frac{11 \times 3}{12 \times 3} = \frac{33}{36}$, $\frac{1}{4} < \frac{3}{12} < \frac{11}{12}$, $\frac{4}{36} < \frac{27}{36} < \frac{33}{36}$
 37. $\frac{0}{5} = 0$, so first find the LCD of 7, 9, and 11. $11 \cdot 9 \times 7 = 693$, $\frac{2}{11} = \frac{2 \times 63}{11 \times 63} = \frac{126}{693}$, $\frac{5}{9} = \frac{5 \times 77}{9 \times 77} = \frac{385}{693}$, $\frac{8}{7} = \frac{8 \times 99}{7 \times 99} = \frac{792}{693}$, $\frac{0}{5} < \frac{2}{11} < \frac{5}{9} < \frac{8}{7}$

GUIDED PROBLEM SOLVING pages 244–245

1. Answers may vary. Sample: Yes; you could subtract

$11\frac{1}{4}$ from each side of the equation twice to get the variable alone on one side of the equation. **2.** Answers may vary. Sample: Each board is about 11 inches wide, so together they are about 22 inches wide. Since $36 - 22 = 14$, and $13\frac{1}{2}$ is close to 14, the answer is reasonable.

3. Check students' work. **4.** They each have equal number of feet, so compare inches; $6\frac{1}{2} - 4\frac{1}{5} = 6\frac{5}{10} - 4\frac{2}{10} = 2\frac{3}{10}$ inches **5.** The sum of the thickness of the book covers and the thickness of the book without its covers is $1\frac{5}{16}$ inches. $1\frac{5}{16} = (2 \times \frac{1}{8}) + x$, $1\frac{5}{16} = \frac{2}{8} + x$, $1\frac{5}{16} - \frac{2}{8} = \frac{2}{8} + x - \frac{2}{8}$, $x = 1\frac{5}{16} - \frac{4}{16}$, $x = 1\frac{1}{16}$;

$1\frac{1}{16}$ inches **6.** To find how much wider the envelope is than the paper you would just subtract the width of the envelope by the width of the paper. $9 - 8\frac{1}{2} = \frac{1}{2}$; $\frac{1}{2}$ in.

The envelope is $\frac{1}{2}$ in. wider than the piece of paper.

7. The object and both boxes are all over 2 inches tall, so compare the fractions. The second box is $\frac{1}{4}$ in. which equals $\frac{2}{8}$ in., it is too small. The first box is $\frac{9}{16}$ in.

The object is $\frac{3}{8}$ in., which equals $\frac{6}{16}$ in., so the first box is $\frac{3}{16}$ in. larger. You would use the first box and there would be $\frac{3}{16}$ in. extra space. **8.** $3\frac{3}{8} = (2 \times \frac{3}{8}) + x$, $3\frac{3}{8} = \frac{6}{8} + x$, $3\frac{3}{8} - \frac{6}{8} = \frac{6}{8} + x - \frac{6}{8}$, $x = 2\frac{11}{8} - \frac{6}{8}$, $x = 2\frac{5}{8}$; $2\frac{5}{8}$ in. **9.** First you would compare the width, $6 - 5\frac{3}{4} = \frac{1}{4}$. The difference

in the width is $\frac{1}{4}$ in. Then compare the length, $9\frac{1}{2} - 9\frac{1}{8} = \frac{1}{2} - \frac{1}{8} = \frac{4}{8} - \frac{1}{8} = \frac{3}{8}$. The difference in the length is $\frac{3}{8}$ in., $\frac{1}{4}$ in., $\frac{3}{8}$ in. **10.** Check students' work. $1\frac{1}{2} + 1\frac{1}{2} + d = 10\frac{1}{2}$, $3 + d = 10\frac{1}{2}$, $3 - 3 + d = 10\frac{1}{2} - 3$; $d = 7\frac{1}{2}$

5-7 Measuring Elapsed Time

pages 246–250

Check Skills You'll Need For complete solutions see *Daily Skills Check and Lesson Quiz Transparencies* or *Presentation Pro CD-ROM*. **1.** Answers may vary. Sample: seconds, hours, days, weeks **2.** 482 minutes

3. 123 hours **4.** 26 days

Quick Check 1. $47 + 39 = 86$; 86 min =

60 min + 26 min = 1 h 26 min **2.** $5:25 \approx 5$ hours after 12:00 and $8:52 \approx 9$ hours after 12:00; $9 - 5 = 4$; 4 h

3. First, find the elapsed time between 10:00 A.M. and noon.

$$\begin{array}{r} 12 \text{ h } 00 \text{ min} \\ - 10 \text{ h } 00 \text{ min} \\ \hline 2 \text{ h } 00 \text{ min} \end{array}$$

Then add the ending time to the elapsed time:

$$\begin{array}{r} 2 \text{ h } 00 \text{ min} \\ + 7 \text{ h } 15 \text{ min} \\ \hline 9 \text{ h } 15 \text{ min} \end{array}$$

4. First, find out when next bus arrives. The next bus comes at 5:50 P.M. because the Willson Street bus comes on the 20th and the 50th minute of every hour. Then add the amount of time it takes to arrive at Kagy Blvd.

$$\begin{array}{r} 5 \text{ h } 50 \text{ min} \\ + 25 \text{ min} \\ \hline 5 \text{ h } 75 \text{ min} \end{array}$$

Rewrite as 6 h 15 min. Then add your walking time to the gym. 6 hr 15 min + 5 min = 6 h 20 min; 6:20 P.M.

Exercises 1. elapsed time 2. If both clocks show A.M. times on the same day, they show the least possible amount of time that has passed.

$$\begin{array}{r} 7:10 \rightarrow 6 \text{ h } 70 \text{ min} \rightarrow 6 \text{ h } 70 \text{ min} \\ - 6:30 \rightarrow - 6 \text{ h } 30 \text{ min} \rightarrow - 6 \text{ h } 30 \text{ min} \\ \hline 40 \text{ min have elapsed} \end{array}$$

$$\begin{array}{r} 3. \quad 7:10 \text{ is } 7 \text{ h } 10 \text{ min;} \\ 7 \text{ h } 10 \text{ min} \\ + 0 \text{ h } 45 \text{ min} \\ \hline 7 \text{ h } 55 \text{ min} \end{array}$$



45 minutes after 7:10 is 7:55

4. $205 \div 60 = 3 \text{ R } 25$; 205 min = 3 h 25 min, so the correct choice is D. 5. $45 + 30 + 10 = 85$; 85 min = 60 min + 25 min = 1 h 25 min
6. $43 + 38 = 81$; 81 min = 60 min + 21 min; 1 h 21 min
7. $52 + 25 = 77$; 77 min = 60 min + 17 min; 1 h 17 min
8. $58 + 7 + 56 = 121$; 121 min = 60 min + 60 min + 1 min; 2 h 1 min
9. $28 + 49 + 50 = 127$; 127 min = 60 min + 60 min + 7 min; 2 h 7 min
10. 4:50 \approx 5 hours after 12:00 and 1:38 \approx 2 hours after 12:00; $5 - 2 = 3$; 3h
11. 7:12 \approx 7 hours after 12:00, or 19 h and 11:49 \approx 12:00; $19 - 12 = 7$; 7 h
12. 3:35 \approx 4 hours after 12:00 and 2:25 \approx 2 hours after 12:00; $4 - 2 = 2$; 2 h
13. 10:52 \approx 11 hours after 12:00 and 8:25 \approx 8 hours after 12:00; $11 - 8 = 3$; 3 h

$$\begin{array}{r} 14. \quad 11:11 \rightarrow 10 \text{ h } 71 \text{ min} \\ - 5:25 \rightarrow - 5 \text{ h } 25 \text{ min} \\ \hline 5 \text{ h } 46 \text{ min} \end{array}$$

$$\begin{array}{r} 15. \quad 11:07 \rightarrow 10 \text{ h } 67 \text{ min} \\ - 9:28 \rightarrow - 9 \text{ h } 28 \text{ min} \\ \hline 1 \text{ h } 39 \text{ min} \end{array}$$

16. First, find the elapsed time between 11:25 A.M. and noon:

$$\begin{array}{r} 12 \text{ h } 00 \text{ min} \rightarrow 12 - 1 \text{ h } (60 + 00) \text{ min} \\ - 11 \text{ h } 25 \text{ min} \rightarrow - 11 \text{ h } 25 \text{ min} \\ \hline \end{array}$$

$$\begin{array}{r} \rightarrow 11 \text{ h } 60 \text{ min} \\ \rightarrow - 11 \text{ h } 25 \text{ min} \\ \hline 35 \text{ min} \end{array}$$

Then add the ending time to the elapsed time:

$$\begin{array}{r} 2 \text{ h } 45 \text{ min} \\ - 0 \text{ h } 35 \text{ min} \\ \hline 2 \text{ h } 80 \text{ min} \\ 2 \text{ h } 80 \text{ min} = 3 \text{ h } 20 \text{ min} \end{array}$$

17. First, find the elapsed time between 8:30 PM and noon:

$$\begin{array}{r} 12 \text{ h } 45 \text{ min} \rightarrow (12 - 1) \text{ h } (60 + 100) \text{ min} \\ - 8 \text{ h } 30 \text{ min} \rightarrow - 8 \text{ h } 30 \text{ min} \\ \hline \end{array}$$

$$\begin{array}{r} \rightarrow 11 \text{ h } 60 \text{ min} \\ \rightarrow - 8 \text{ h } 30 \text{ min} \\ \hline 3 \text{ h } 30 \text{ min} \end{array}$$

Then add the ending time to the elapsed time:

$$\begin{array}{r} 7 \text{ h } 39 \text{ min} \\ - 3 \text{ h } 30 \text{ min} \\ \hline 10 \text{ h } 69 \text{ min} \end{array}$$

$$10 \text{ h } 69 \text{ min} = 11 \text{ h } 9 \text{ min}$$

18. Time for Train A: 8:42 – 8:15

$$\begin{array}{r} 8 \text{ h } 42 \text{ min} \\ - 8 \text{ h } 15 \text{ min} \\ \hline 27 \text{ min} \end{array}$$

Time for Train B: 9:19 – 8:42

$$\begin{array}{r} 9 \text{ h } 19 \text{ min} \rightarrow 8 \text{ h } (60 + 19) \text{ min} \rightarrow 8 \text{ h } 79 \text{ min} \\ - 8 \text{ h } 42 \text{ min} \rightarrow - 8 \text{ h } 42 \text{ min} \rightarrow - 8 \text{ h } 42 \text{ min} \\ \hline 37 \text{ min} \end{array}$$

Train A takes less time.

19. 9:04 – 8:35

$$\begin{array}{r} 9 \text{ h } 4 \text{ min} \rightarrow 8 \text{ h } (60 + 4) \text{ min} \rightarrow 8 \text{ h } 64 \text{ min} \\ - 8 \text{ h } 35 \text{ min} \rightarrow - 8 \text{ h } 35 \text{ min} \rightarrow - 8 \text{ h } 35 \text{ min} \\ \hline 29 \text{ min} \end{array}$$

You wait 29 minutes.

20. 9:19 – 8:55

$$\begin{array}{r} 9 \text{ h } 19 \text{ min} \rightarrow 8 \text{ h } (60 + 19) \text{ min} \rightarrow 8 \text{ h } 79 \text{ min} \\ - 8 \text{ h } 55 \text{ min} \rightarrow - 8 \text{ h } 55 \text{ min} \rightarrow - 8 \text{ h } 55 \text{ min} \\ \hline 24 \text{ min} \end{array}$$

Train B takes 24 minutes.

21.

List Item	Start Time	End Time
Mix cake	1:00 p.m.	1:40 p.m.
Bake cake	1:40 p.m.	2:15 p.m.
Shower and dress	1:40 p.m.	2:05 p.m.
Decorate room	2:05 p.m.	3:05 p.m.
Cool cake	2:15 p.m.	3:00 p.m.
Frost cake	3:05 p.m.	3:25 p.m.

Answers may vary. Sample: mix cake, bake cake, cool cake, frost cake; you don't have to be present while certain activities are being done. You can shower and dress while baking the cake and decorate the room while the cake cools. 22. Chicago is one hour ahead of Denver; 1:00 P.M. 23. New York City is two hours ahead of Denver; 2:00 P.M. 24. San Francisco is one hour behind Denver; 11:00 A.M. 25. $x + 3$ 26. Answers may vary. Sample: There is three hours time difference between the East and West coasts. If it is 1:00 A.M. on Tuesday in the Eastern time zone, it is 10:00 P.M. on Monday in the Pacific time zone.

27.

Activity	Start Time	End Time
1st show	10:00 a.m.	10:45 a.m.
Break	10:45 a.m.	11:45 a.m.
2nd show	11:45 a.m.	12:30 p.m.
Break	12:30 p.m.	1:30 p.m.
3rd show	1:30 p.m.	2:15 p.m.

28. 7:15 A.M. to noon on Saturday

$$\begin{array}{r} 12:00 \text{ P.M.} \rightarrow 12 \text{ h } 00 \text{ min} \rightarrow \\ - 7:15 \text{ A.M.} \rightarrow - 7 \text{ h } 15 \text{ min} \rightarrow \end{array}$$

$$\begin{array}{r} (12 - 1) \text{ h } (60 + 0) \text{ min} \rightarrow 11 \text{ h } 60 \text{ min} \\ - \quad \quad \quad 7 \text{ h } \quad \quad 15 \text{ min} \rightarrow - 7 \text{ h } 15 \text{ min} \\ \hline \quad \quad \quad \quad \quad \quad \quad \rightarrow 4 \text{ h } 45 \text{ min} \end{array}$$

noon to midnight on Saturday: 12 h

midnight to noon on Sunday: 12 h

noon to 3:05 p.m. on Sunday: 3 h 5 min

Total all the times up.

$$\begin{array}{r} 4 \text{ h } 45 \text{ min} \\ 12 \text{ h } \quad 0 \text{ min} \\ 12 \text{ h } \quad 0 \text{ min} \\ + 3 \text{ h } \quad 5 \text{ min} \\ \hline 31 \text{ h } 50 \text{ min} \end{array}$$

29. First, find how much time Pablo has between leaving school and eating dinner: $6:00 - 3:15 = 6 \text{ h} - 3 \text{ h } 15 \text{ min} = 5 \text{ h } 60 \text{ min} - 3 \text{ h } 15 \text{ min} = 2 \text{ h } 45 \text{ min}$; then find how long it takes for him to complete the other items on his list: $20 + 10 + 60 + 35 = 125 \text{ min} = 2 \text{ h } 5 \text{ min}$; finally, subtract that time from the amount of time he has between leaving school and eating dinner: $2 \text{ h } 45 \text{ min} - 2 \text{ h } 5 \text{ min} = 40 \text{ min}$; the correct choice is A. **30.** $12.5 - 4.7 = 7.8 \text{ c}$; the correct choice is J. **31.** $23 = d - 16$, $23 + 16 = d - 16 + 16$; $d = 39$ **32.** $15 = w + 9$, $15 - 9 = w + 9 - 9$; $w = 6$ **33.** $9.1 - c = 5.3$; $9.1 - 9.1 - c = 5.3 - 9.1$; $-c = -3.8$; $\frac{-1c}{-1} = \frac{-3.8}{-1}$; $c = 3.8$

TEST-TAKING STRATEGIES

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1. Precipitation is either rainfall or snowfall. The Sahara gets 8 inches of rain per year and the South Pole gets 1 inch of snow per year. Subtract: $8 - 1 = 7$; about 7 in.

2. Deserts cover $\frac{1}{5}$ of Earth's land surface and rainforests cover $\frac{3}{50}$ of Earth's land surface. Add: $\frac{1}{5} + \frac{3}{50} = \frac{10}{50} + \frac{3}{50} = \frac{13}{50}$.

CHAPTER REVIEW

pages 252–253

1. benchmark **2.** elapsed time **3.** $\frac{8}{9} + \frac{3}{7} \approx 1 + \frac{1}{2} = 1\frac{1}{2}$
4. $\frac{5}{8} - \frac{3}{12} \approx \frac{1}{2} - \frac{1}{2} = 0$ **5.** $\frac{4}{5} + \frac{1}{6} \approx 1 + 0 = 1$ **6.** $\frac{23}{35} - \frac{4}{7} \approx \frac{1}{2} - \frac{1}{2} = 0$ **7.** $4\frac{1}{7} + 9\frac{7}{14} \approx 4 + 10 = 14$ **8.** $24\frac{11}{16} - 15\frac{1}{4} \approx 25 - 15 = 10$ **9.** $8\frac{5}{6} + 6\frac{3}{8} \approx 9 + 6 = 15$ **10.** $45\frac{33}{35} - 40\frac{2}{7} \approx 46 - 40 = 6$ **11.** $1\frac{1}{3} + 4\frac{3}{4} \approx 1 + 5 = 6$, so about 6 c
12. $\frac{2}{5} + \frac{5}{5} = \frac{7}{5} = 1\frac{2}{5}$ **13.** $\frac{7}{8} - \frac{3}{8} = \frac{4}{8} = \frac{1}{2}$ **14.** $\frac{3}{20} + \frac{9}{20} = \frac{12}{20} = \frac{3}{5}$ **15.** $\frac{25}{36} - \frac{5}{36} = \frac{20}{36} = \frac{5}{9}$ **16.** $\frac{1}{8} + \frac{3}{4} = \frac{1}{8} + \frac{6}{8} = \frac{7}{8}$ **17.** $\frac{4}{5} - \frac{3}{10} = \frac{8}{10} - \frac{3}{10} = \frac{5}{10} = \frac{1}{2}$ **18.** $\frac{17}{24} - \frac{7}{12} = \frac{17}{24} - \frac{14}{24} = \frac{3}{24} = \frac{1}{8}$
19. $\frac{11}{15} + \frac{1}{2} = \frac{22}{30} + \frac{15}{30} = \frac{37}{30} = 1\frac{7}{30}$ **20.** $\frac{2}{3} + \frac{1}{5} = \frac{10}{15} + \frac{3}{15} = \frac{13}{15}$; $\frac{13}{15} \text{ mi}$ **21.** $3 + 4\frac{1}{8} = 7\frac{1}{8}$ **22.** $9\frac{8}{9} + 7\frac{4}{9} = 16\frac{12}{9} = 17\frac{4}{3} = 17\frac{1}{3}$
23. $35\frac{1}{5} + 28\frac{7}{10} = 35\frac{2}{10} + 28\frac{7}{10} = 63\frac{9}{10}$ **24.** $54\frac{1}{3} + 2\frac{1}{2} + 2\frac{3}{4} = 54\frac{4}{12} + 2\frac{6}{12} + 2\frac{9}{12} = 58\frac{19}{12} = 59\frac{7}{12}$, so about $59\frac{7}{12}$ in.
25. $6 - 2\frac{2}{5} = 5\frac{5}{5} - 2\frac{2}{5} = 3\frac{3}{5}$ **26.** $10\frac{7}{8} - 4\frac{1}{2} = 10\frac{7}{8} - 4\frac{4}{8} = 6\frac{3}{8}$
27. $25\frac{1}{3} - 8\frac{5}{9} = 24\frac{4}{3} - 8\frac{5}{9} = 24\frac{12}{9} - 8\frac{5}{9} = 16\frac{7}{9}$ **28.** $\frac{5}{7} - \frac{2}{7} = p + \frac{2}{7} - \frac{2}{7}$; $p = \frac{3}{7}$ **29.** $\frac{3}{4} = \frac{6}{8}$; $q + \frac{5}{8} = \frac{6}{8}$; $q + \frac{5}{8} - \frac{5}{8} = \frac{6}{8} - \frac{5}{8}$; $q = \frac{1}{8}$ **30.** $\frac{2}{3} = \frac{6}{9}$; $\frac{6}{9} = t - \frac{4}{9}$; $\frac{6}{9} + \frac{4}{9} = t - \frac{4}{9} + \frac{4}{9}$; $t = \frac{10}{9} = 1\frac{1}{9}$
31. $4\frac{2}{3} = x + 1\frac{1}{3}$; $4\frac{2}{3} - 1\frac{1}{3} = x + 1\frac{1}{3} - 1\frac{1}{3}$; $x = 3\frac{1}{3}$

$$\mathbf{32.} \quad k - 2\frac{1}{6} = 8\frac{8}{9}; \frac{1}{6} \times \frac{3}{3} = \frac{3}{18}; \frac{8}{9} \times \frac{2}{2} = \frac{16}{18}; k - 2\frac{3}{18} = 8\frac{16}{18}; k - 2\frac{3}{18} + 2\frac{3}{18} = 8\frac{16}{18} + 2\frac{3}{18}; k = 10\frac{19}{18} = 11\frac{1}{18}$$

$$\mathbf{33.} \quad 13\frac{3}{5} + h = 20; 13\frac{3}{5} - 13\frac{3}{5} + h = 20 - 13\frac{3}{5}; h =$$

$19\frac{5}{5} - 13\frac{3}{5} = 6\frac{2}{5}$ **34.** $11:56 - 8:15 = 11 \text{ h } 56 \text{ min} - 8 \text{ h } 15 \text{ min} = 3 \text{ h } 41 \text{ min}$ **35.** $12:00 - 9:33 = 12 \text{ h} - 9 \text{ h } 33 \text{ min} = 11 \text{ h } 60 \text{ min} - 9 \text{ h } 33 \text{ min} = 2 \text{ h } 27 \text{ min}$; $2 \text{ h } 27 \text{ min} + 6 \text{ h } 21 \text{ min} = 8 \text{ h } 48 \text{ min}$ **36.** Find how many minutes it will take for you to do all the things on your list and to take a 25-minute break: $40 + 55 + 10 + 25 = 130 \text{ min} = 2 \text{ h } 10 \text{ min}$; $6 \text{ h} + 2 \text{ h } 10 \text{ min} = 8 \text{ h } 10 \text{ min} = 8:10 \text{ P.M.}$

CHAPTER TEST

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1. $\frac{18}{35} + \frac{14}{16} \approx \frac{1}{2} + 1 = 1\frac{1}{2}$ **2.** $\frac{7}{50} + \frac{9}{16} \approx 0 + \frac{1}{2} = \frac{1}{2}$
3. $\frac{9}{10} + \frac{2}{26} = 1 + 0 = 1$ **4.** $8\frac{5}{16} - 8\frac{1}{8} = 8\frac{5}{16} - 8\frac{2}{16} = \frac{3}{16} \text{ in.}$
5. $6\frac{5}{6} + 2\frac{1}{9} \approx 7 + 2 = 9$ **6.** $11\frac{6}{7} - 3\frac{9}{7} \approx 12 - 4 = 8$
7. $10\frac{5}{12} - 5\frac{1}{8} \approx 10 - 5 = 5$ **8.** $\frac{3}{8} + \frac{3}{4} \approx \frac{1}{2} + 1 = 1\frac{1}{2}$, so about $1\frac{1}{2} \text{ ft}$ **9.** $\frac{4}{5} + \frac{2}{5} = \frac{6}{5} = 1\frac{1}{5}$ **10.** $\frac{11}{13} - \frac{7}{13} = \frac{4}{13}$ **11.** $\frac{4}{7} + \frac{6}{7} = \frac{10}{7} = 1\frac{3}{7}$ **12.** $1\frac{13}{15} - \frac{2}{3} = 1\frac{13}{15} - \frac{10}{15} = 1\frac{3}{15} = 1\frac{1}{5}$ **13.** $\frac{9}{20} + \frac{4}{5} = \frac{9}{20} + \frac{16}{20} = \frac{25}{20} = \frac{5}{4} = 1\frac{1}{4}$ **14.** $\frac{3}{4} - \frac{3}{8} = \frac{6}{8} - \frac{3}{8} = \frac{3}{8}$
15. $3\frac{3}{4} - 2\frac{8}{10} = 2\frac{7}{4} - 2\frac{8}{10} = 2\frac{35}{20} - 2\frac{16}{20} = \frac{19}{20}$
16. $8\frac{1}{5} + 4\frac{1}{6} = 8\frac{6}{30} + 4\frac{5}{30} = 12\frac{11}{30}$ **17.** $\frac{1}{7} + \frac{2}{7} + \frac{5}{7} = \frac{8}{7} = 1\frac{1}{7}$
18. $\frac{4}{12} + \frac{2}{12} + \frac{5}{12} = \frac{11}{12}$ **19a.** $\frac{7}{8} - \frac{5}{6} = \frac{21}{24} - \frac{20}{24} = \frac{1}{24} \text{ mi}$
19b. $\frac{7}{8} + \frac{5}{6} = \frac{21}{24} + \frac{20}{24} = \frac{41}{24} = 1\frac{17}{24} \text{ mi}$ **20.** Answers may vary. Sample: I'd rewrite $7\frac{4}{5}$ as $7\frac{8}{10}$ and then add $3\frac{1}{10}$ to get $10\frac{9}{10}$. **21.** $\frac{6}{9} = \frac{1}{3} + g = \frac{3}{9} + g$; $\frac{6}{9} - \frac{3}{9} = g + \frac{3}{9} - \frac{3}{9}$; $g = \frac{3}{9} = \frac{1}{3}$ **22.** $y - \frac{4}{5} = \frac{11}{20}$; $y - \frac{16}{20} = \frac{11}{20}$; $y - \frac{16}{20} + \frac{16}{20} = \frac{11}{20} + \frac{16}{20}$; $y = \frac{27}{20} = 1\frac{7}{20}$ **23.** $4\frac{3}{4} + v = 17\frac{1}{8}$; $4\frac{6}{8} + v = 17\frac{1}{8}$; $4\frac{6}{8} - 4\frac{6}{8} + v = 17\frac{1}{8} - 4\frac{6}{8}$; $v = 16\frac{9}{8} - 4\frac{6}{8} = 12\frac{3}{8}$
24. $13\frac{2}{9} = k - 10\frac{7}{9}$; $13\frac{6}{9} = k - 10\frac{7}{9}$; $13\frac{6}{9} + 10\frac{7}{9} = k - 10\frac{7}{9} + 10\frac{7}{9}$; $k = 23\frac{13}{9} = 24\frac{4}{9}$ **25.** $5\frac{1}{2} - \frac{7}{8} = 5\frac{4}{8} - \frac{7}{8} = 4\frac{12}{8} - \frac{7}{8} = 4\frac{5}{8}$; $4\frac{5}{8} \text{ in.}$ **26.** Answers may vary. Sample: white and red **27.** $1\frac{5}{8} - 1\frac{1}{4} = 1\frac{5}{8} - 1\frac{2}{8} = \frac{3}{8}$; $\frac{3}{8} \text{ in.}$

$$\mathbf{28.} \quad 60 \times 5 + 47 = 300 + 47 = 347 \text{ min}$$

29. $23 \times 60 + 8 = 1,380 + 8 = 1,388 \text{ min}$ **30.** First find the elapsed time between 6:33 A.M. and 12:00 noon:

$$\begin{array}{r} 12:00 \text{ P.M.} \rightarrow 12 \text{ h } 00 \text{ min.} \rightarrow \\ - 6:33 \text{ P.M.} \rightarrow - 6 \text{ h } 33 \text{ min.} \rightarrow \end{array}$$

$$\begin{array}{r} (12 - 1) \text{ h } (60 + 100) \text{ min} \rightarrow 11 \text{ h } 60 \text{ min} \\ - \quad \quad \quad 6 \text{ h} \quad \quad 33 \text{ min} \rightarrow - 6 \text{ h } 33 \text{ min} \\ \hline \quad \quad \quad \quad \quad \quad \quad \rightarrow 5 \text{ h } 27 \text{ min} \end{array}$$

Then add the ending time to the elapsed time:

$$\begin{array}{r} 7 \text{ h } 20 \text{ min} \\ + 5 \text{ h } 27 \text{ min} \\ \hline 12 \text{ h } 47 \text{ min} \end{array}$$

TEST PREP

page 255

1. The length of a Venus day is equal to 243.01 Earth days and the length of a Mercury day is 58.65 Earth days.

2. $x + 5.35 = 20$; the correct choice is G. **3.** The thickness of the quarter is $1\frac{3}{4}$ mm and the thickness of the dime is $1\frac{7}{20}$ mm. $1\frac{3}{4} - 1\frac{7}{20} = 1\frac{15}{20} - 1\frac{7}{20} = \frac{8}{20} = \frac{2}{5}$; the correct choice is C. **4.** $8.1 + 3.5 = 3.5 + 8.1$ is an example of the commutative property; the correct choice is J. **5.** Find the factors of 24: 1, 2, 3, 4, 6, 8, 12, 24; find the factors of 36: 1, 2, 3, 4, 6, 9, 12, 18, 36; find the factors of 9: 1, 3, 9; the GCF is 3, so the correct choice is C.

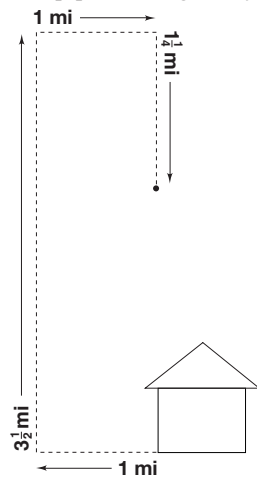
is H. **7.** $\frac{1}{4} = \frac{4}{16} < \frac{5}{16}$; the correct choice is C.

9.

8:13	→	8 h 13 min	→	7 h 73 min
<u>-7:48</u>		<u>-7 h 48 min</u>		<u>-7 h 48 min</u>
				0 h 25 min

$$\begin{aligned} 10. \quad x + \frac{3}{16} &= \frac{3}{4} \\ x + \frac{3}{16} &= \frac{12}{16} \\ x + \frac{3}{16} - \frac{3}{16} &= \frac{12}{16} - \frac{3}{16} \\ x &= \frac{9}{16} \end{aligned}$$

12. [2] Drawings may vary.



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Course 1 Solution Key • Chapter 5, page 58

CHECK YOUR READINESS

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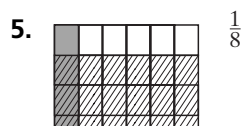
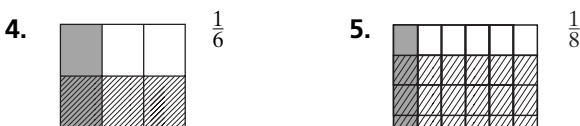
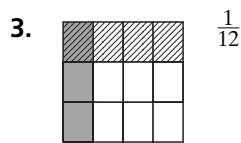
1. $3a = 12$
 $3a \div 3 = 12 \div 3$
 $a = 4$
2. $5x = 25$
 $5x \div 5 = 25 \div 5$
 $x = 5$
3. $p \div 3 = 4$
 $p \div 3 \times 3 = 4 \times 3$
 $p = 12$
4. $14 = x \div 8$
 $14 \times 8 = x \div 8 \times 8$
 $x = 112$
5. $0.1n = 10$
 $0.1n \div 0.1 = 10 \div 0.1$
 $n = 100$
6. $2 = g \div 0.3$
 $2 \times 0.3 = g \div 0.3 \times 0.3$
 $g = 0.6$
7. $12 = 2 \times 2 \times 3$; $24 = 2 \times 2 \times 2 \times 3$; $2 \times 2 \times 3 = 12$; the GCF of 12 and 24 is 12. 8. $28 = 2 \times 2 \times 7$; $35 = 5 \times 7$; the GCF of 28 and 35 is 7. 9. $27 = 3 \times 3 \times 3$; $24 = 2 \times 2 \times 2 \times 3$; the GCF of 27 and 24 is 3. 10. $80 = 2 \times 2 \times 2 \times 2 \times 5$; $100 = 2 \times 2 \times 5 \times 5$; $2 \times 2 \times 5 = 20$; the GCF of 80 and 100 is 20. 11. $36 = 2 \times 2 \times 3 \times 3$; $66 = 2 \times 3 \times 11$; $2 \times 3 = 6$; the GCF of 36 and 66 is 6. 12. $21 = 3 \times 7$; $42 = 2 \times 3 \times 7$; $3 \times 7 = 21$; the GCF of 21 and 42 is 21. 13. $\frac{15}{35} = \frac{15 \div 5}{35 \div 5} = \frac{3}{7}$ 14. $\frac{24}{36} = \frac{24 \div 12}{36 \div 12} = \frac{2}{3}$
15. $\frac{16}{48} = \frac{16 \div 16}{48 \div 16} = \frac{1}{3}$ 16. $\frac{24}{64} = \frac{24 \div 8}{64 \div 8} = \frac{3}{8}$
17. $\frac{18}{72} = \frac{18 \div 18}{72 \div 18} = \frac{1}{4}$ 18. $\frac{21}{49} = \frac{21 \div 7}{49 \div 7} = \frac{3}{7}$

ACTIVITY LAB

page 260

1a. 8 1b. 3 1c. $\frac{3}{8}$ 2. Answers may vary. Sample: Since you are shading $\frac{1}{2}$ of the paper and $\frac{3}{4}$ of the paper, the product of $\frac{1}{2}$ and $\frac{3}{4}$ is represented by the fraction of small rectangles shaded twice. $\frac{1}{2} \times \frac{3}{4} = \frac{3}{8}$.

Exercises 1. $\frac{1}{2} \times \frac{2}{5} = \frac{2}{10} = \frac{1}{5}$



6. Answers may vary. Sample: Multiply the numerators together. Then multiply the denominators together. Then simplify the fraction.

6-1 Multiplying Fractions

pages 261–264

Check Skills You'll Need For complete solutions see *Daily Skills Check* and *Lesson Quiz Transparencies* or *Presentation Pro CD-ROM*. 1. Answers may vary.

Sample: $\frac{2}{5}$ and $\frac{4}{10}$ 2. $\frac{1}{2}$ 3. $\frac{3}{5}$ 4. $\frac{2}{3}$ 5. $\frac{9}{10}$

Quick Check 1a. $\frac{3}{5} \times \frac{1}{4} = \frac{3 \times 1}{5 \times 4} = \frac{3}{20}$ 1b. $\frac{2}{9} \times \frac{5}{7} = \frac{2 \times 5}{9 \times 7} = \frac{10}{63}$

2. $12 \times \frac{5}{6} = \frac{12}{1} \times \frac{5}{6} = \frac{2 \times 5}{1 \times 1} = \frac{10}{1} = 10$; 10 ft

Exercises 1. Greater; you are multiplying by a greater number. 2. $\frac{1}{4} \times \frac{1}{3} = \frac{1 \times 1}{4 \times 3} = \frac{1}{12}$; so the correct choice is D. 3. $\frac{2}{3} \times \frac{2}{5} = \frac{2 \times 2}{3 \times 5} = \frac{4}{15}$; so the correct choice is B.

4. $\frac{1}{2} \times \frac{3}{4} = \frac{3}{8}$; so the correct choice is A. 5. $\frac{6}{7} \times 7 =$

$\frac{6}{7} \times \frac{7}{1} = \frac{6 \times 7}{7 \times 1} = 6$; so the correct choice is C. 6. $\frac{1}{2} \times \frac{3}{8} =$

$\frac{1 \times 3}{2 \times 8} = \frac{3}{16}$ 7. $\frac{5}{11} \times \frac{2}{7} = \frac{5 \times 2}{11 \times 7} = \frac{10}{77}$ 8. $\frac{3}{4} \times \frac{11}{12} = \frac{1}{4} \times \frac{11}{4} =$

$\frac{1 \times 11}{4 \times 4} = \frac{11}{16}$ 9. $\frac{2}{9} \times \frac{4}{8} = \frac{2}{9} \times \frac{1}{2} = \frac{1}{9} \times \frac{1}{1} = \frac{1}{9 \times 1} = \frac{1}{9}$

10. $\frac{4}{9} \cdot \frac{3}{10} = \frac{2}{3} \cdot \frac{1}{5} = \frac{2 \cdot 1}{3 \cdot 5} = \frac{2}{15}$ 11. $\frac{3}{5}$ of $\frac{2}{3} = \frac{3}{5} \times \frac{2}{3} = \frac{1}{5} \times \frac{2}{1} =$

$\frac{1 \times 2}{5 \times 1} = \frac{2}{5}$ 12. $\frac{4}{11} \cdot \frac{5}{8} = \frac{1}{11} \cdot \frac{5}{2} = \frac{1 \cdot 5}{11 \cdot 2} = \frac{5}{22}$

13. $\frac{9}{10}$ of $\frac{2}{5} = \frac{9}{10} \times \frac{2}{5} = \frac{9 \times 2}{10 \times 5} = \frac{9 \times 1}{5 \times 5} = \frac{9}{25}$

14. $\frac{3}{4} \cdot 20 = \frac{3}{4} \cdot \frac{20}{1} = \frac{3 \cdot 5}{1 \cdot 1} = 15$ 15. $\frac{3}{8} \times 5 = \frac{3}{8} \times \frac{5}{1} =$

$\frac{3 \times 5}{8 \times 1} = \frac{15}{8} = 1\frac{7}{8}$ 16. $\frac{11}{14}$ of 28 = $\frac{11}{14} \times \frac{28}{1} = \frac{11}{1} \times \frac{2}{1} =$

$\frac{11 \times 2}{1 \times 1} = 22$ 17. $\frac{5}{12} \cdot 30 = \frac{5}{12} \cdot \frac{30}{1} = \frac{5 \cdot 5}{2 \cdot 1} = \frac{5 \cdot 5}{2 \cdot 1} = \frac{25}{2} =$

$12\frac{1}{2}$ 18. $\frac{7}{9}$ of 21 = $\frac{7}{9} \times \frac{21}{1} = \frac{7 \times 7}{3 \times 1} = \frac{7 \times 7}{3 \times 1} = \frac{49}{3} =$

$16\frac{1}{3}$ 19. $\frac{1}{6} \cdot 6 = \frac{1}{6} \cdot \frac{6}{1} = \frac{1 \cdot 1}{1 \times 1} = \frac{1 \times 1}{1 \times 1} = 1$ 20. $\frac{3}{10} \times 45 =$

$\frac{3}{10} \times \frac{45}{1} = \frac{3}{2} \times \frac{9}{1} = \frac{3 \times 9}{2 \times 1} = \frac{27}{2} = 13\frac{1}{2}$ 21. $\frac{3}{4} \times 3 = \frac{3}{4} \times \frac{3}{1} =$

$\frac{3 \times 3}{4 \times 1} = \frac{9}{4} = 2\frac{1}{4}$ mi 22. Your friend ate $\frac{1}{3} \times \frac{2}{3} = \frac{2}{9}$, or $\frac{2}{9}$ of

the popcorn. You ate $1 - \frac{1}{3} = \frac{3}{3} - \frac{1}{3} = \frac{2}{3}$, or $\frac{2}{3}$ of the

popcorn. Since $\frac{2}{3} > \frac{2}{9}$, you ate more. You ate $\frac{2}{3} - \frac{2}{9} =$

$\frac{6}{9} - \frac{2}{9} = \frac{4}{9}$, or $\frac{4}{9}$ more of the popcorn. 23. When you add

$\frac{3}{8}$ and $\frac{5}{8}$, you add the numerators and keep the same

denominator. When you multiply, you multiply the

numerators and multiply the denominators. 24. $15 \times \frac{2}{3} =$

$\frac{15}{1} \times \frac{2}{3} = \frac{5}{1} \times \frac{2}{1} = \frac{5 \times 2}{1 \times 1} = 10$ 25. $\frac{3}{2} \times \frac{2}{3} = \frac{1}{1} \times \frac{1}{1} = \frac{1 \times 1}{1 \times 1} =$

$\frac{1}{1} = 1$ 26. $\frac{9}{10} \times \frac{2}{3} = \frac{3}{5} \times \frac{1}{1} = \frac{3 \times 1}{5 \times 1} = \frac{3}{5}$ 27. $\frac{2}{3} \times \frac{2}{3} = \frac{2 \times 2}{3 \times 3} =$

$\frac{4}{9}$ 28. His car and rent make up $\frac{3}{8}$ of his total spending

$(\frac{1}{4} + \frac{1}{8} = \frac{2}{8} + \frac{1}{8} = \frac{3}{8})$; $\frac{3}{8} \times 2,712 = \frac{3}{8} \times \frac{2,712}{1} = \frac{3 \times 2,712}{8 \times 1} =$

$\$1,017$ 29. No; answers may vary. Sample: Common

denominators are not necessary because you are finding

part of a fractional amount. 30. $\frac{1}{10} \times 555 = \frac{1 \times 555}{10 \times 1} =$

$\frac{555}{10} = 55\frac{1}{2}$ ft, the length of a side is about $55\frac{1}{2}$ ft.

31. $8\frac{2}{3} \cdot 7\frac{1}{2} = \frac{26}{3} \cdot \frac{15}{2} = \frac{13}{1} \cdot \frac{5}{1} = \frac{13 \cdot 5}{1 \cdot 1} = \frac{65}{1} = 65$

32. Meg already has $\frac{3}{4}$ yard of fencing so she needs $5 - \frac{3}{4}$

more. $5 - \frac{3}{4} = \frac{20}{4} - \frac{3}{4} = \frac{17}{4} = 4\frac{1}{4}$; choice B models $4\frac{1}{4}$, the

correct choice is B. 33. $420 = 42 \times 10 = 2 \times 3 \times 7 \times$

$2 \times 5 = 2^2 \times 3 \times 5 \times 7$, so the correct choice is H.

34. Subtract the time it takes for him to do his

homework and the time he uses for a break from 9:30:
 9 h 30 min – (2 h + 30 min) =

9 h 30 min - 2 h 30 min = 6 h, so the correct choice is C.

35. $\frac{5}{6} + \frac{1}{3} = \frac{5}{6} + \frac{2}{6} = \frac{7}{6} = 1\frac{1}{6}$ 36. $\frac{4}{5} - \frac{1}{2} = \frac{8}{10} - \frac{5}{10} = \frac{3}{10}$

37. $\frac{7}{9} - \frac{3}{5} = \frac{35}{45} - \frac{27}{45} = \frac{8}{45}$ 38. $\frac{3}{10} + \frac{5}{8} = \frac{12}{40} + \frac{25}{40} = \frac{37}{40}$

ACTIVITY LAB

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1. True; 3 was added to 525, and 3 was subtracted from 350. 2. True; 10 was subtracted from 48.1, and 10 was added to -28.2. 3. False; 10 was subtracted from 48.3 and 16. 4. True; 13 was multiplied by 10, and 40 was divided by 10. 5. True; 200 was multiplied by 2, and $\frac{1}{2}$ was divided by 2. 6. True; 20 and 2.4 were both multiplied by 2. 7. 15.3; 2 was added to 4 so you must subtract 2 from 17.3. 8. 31.5; 10 was added to 73 so you must add 10 to 21.5. 9. 1; 27 was divided by 3 so you must multiply $\frac{1}{3}$ by 3. 10. 16; 30 is twice as much as 15, so x must be half of 32. 11. 150; 50 was divided by 2 so you must multiply 75 by 2. 12. 5; 25 was multiplied by 4 so you must divide 20 by 4. 13. Yes; it obeys the Addition Property of Equality. 14. Yes; it obeys the Addition Property of Equality. 15. No, 26 would have to be divided by 2 for the two equations to be equal.

6-2 Multiplying Mixed Numbers

pages 266-270

Check Skills You'll Need For complete solutions see *Daily Skills Check and Lesson Quiz Transparencies* or *Presentation Pro CD-ROM*. 1. A proper fraction has a numerator that is less than the denominator. An improper fraction has a denominator that is less than or equal to the numerator. 2. $\frac{27}{7}$ 3. $\frac{17}{3}$ 4. $\frac{47}{4}$ 5. $\frac{79}{9}$

Quick Check 1a. $5\frac{5}{6} \times 6\frac{4}{9} \approx 6 \times 6 = 36$ **1b.** $7\frac{11}{16} \cdot 7\frac{1}{5} \approx 8 \cdot 7 = 56$ **2a.** $10\frac{1}{4} \times 2\frac{3}{4} = \frac{41}{4} \times \frac{11}{4} = \frac{41 \times 11}{4 \times 4} = \frac{451}{16} = 28\frac{3}{16}$

2b. $7\frac{1}{3} \times 3\frac{3}{4} = \frac{22}{3} \times \frac{15}{4} = \frac{11}{1} \times \frac{5}{2} = \frac{11 \times 5}{1 \times 2} = \frac{55}{2} = 27\frac{1}{2}$

3. $3\frac{1}{2} \times \frac{3}{4} = \frac{7}{2} \times \frac{3}{4} = \frac{7 \times 3}{2 \times 4} = \frac{21}{8} = 2\frac{5}{8}$; 2 $\frac{5}{8}$ mi

More Than One Way Answers may vary. Sample: I wrote both numbers as improper fractions and got $\frac{7}{1} \times \frac{17}{5} = \frac{119}{5} = 23\frac{4}{5}$. I didn't see an easy way to multiply mentally.

Exercises 1. $3 \times 3 = 9$, $\frac{3}{1} \times \frac{1}{2} = \frac{21}{2} = 10\frac{1}{2}$; $9 < 10\frac{1}{2}$, so $3\frac{1}{2}$ is greater than 3. **2.** $1\frac{2}{5} = \frac{(1 \times 5) + 2}{5} = \frac{7}{5}$ **3.** $3\frac{1}{3} = \frac{(3 \times 3) + 1}{3} = \frac{10}{3}$ **4.** $2\frac{2}{3} = \frac{(2 \times 3) + 2}{3} = \frac{8}{3}$ **5.** $\frac{2}{3} \cdot \frac{3}{4} = \frac{1}{1} \cdot \frac{1}{2} = \frac{1 \cdot 1}{1 \cdot 2} = \frac{1}{2}$ **6.** $2\frac{1}{2} \times 1\frac{2}{3} = \frac{(2 \times 2) + 1}{2} \times \frac{(1 \times 3) + 2}{3} = \frac{5}{2} \times \frac{5}{3} = \frac{5 \cdot 5}{2 \cdot 3} = \frac{25}{6} = 4\frac{1}{6}$ **7.** $2\frac{1}{2} \cdot 1\frac{1}{4} = \frac{(2 \cdot 2) + 1}{2} \cdot \frac{(1 \cdot 4) + 1}{4} = \frac{5}{2} \cdot \frac{5}{4} = \frac{5 \cdot 5}{2 \cdot 4} = \frac{25}{8} = 3\frac{1}{8}$ **8.** $3\frac{1}{2} \cdot 1\frac{1}{4} \approx 4 \times 1 = 4$ **9.** $14\frac{2}{3} \cdot 5\frac{1}{3} \approx 15 \times 5 = 75$ **10.** $5\frac{1}{2} \cdot 10\frac{3}{10} \approx 6 \times 10 = 60$ **11.** $7\frac{3}{4} \times 9\frac{1}{2} \approx 8 \times 10 = 80$ **12.** $15\frac{9}{10} \cdot 3\frac{1}{5} \approx 16 \times 3 = 48$ **13.** $2\frac{3}{4} \times 6\frac{1}{8} \approx 3 \times 6 = 18$ **14.** Since Andrew works $4\frac{1}{2}$ hours a day and makes \$6.25 an hour, he earns $6.25 \times 4\frac{1}{2} \approx 6 \times 5 = 30$ for each day of work. He works 5 days per week so he makes about 30×5 ; or \$150 per week. **15.** $7\frac{1}{2} \cdot 8\frac{2}{3} =$

$\frac{15}{2} \cdot \frac{26}{3} = \frac{5}{1} \cdot \frac{13}{1} = \frac{5 \cdot 13}{1 \cdot 1} = 65$ **16.** $5\frac{1}{3} \times 2\frac{1}{4} = \frac{16}{3} \times \frac{9}{4} =$

$\frac{4}{1} \times \frac{3}{1} = \frac{4 \times 3}{1 \times 1} = 12$ **17.** $3\frac{1}{9} \cdot 3\frac{3}{8} = \frac{28}{9} \cdot \frac{27}{8} = \frac{7}{1} \cdot \frac{3}{2} = \frac{7 \cdot 3}{1 \cdot 2} =$

$\frac{21}{2} = 10\frac{1}{2}$ **18.** $2\frac{4}{5} \times 12\frac{1}{2} = \frac{14}{5} \times \frac{25}{2} = \frac{7}{1} \times \frac{5}{1} = \frac{7 \times 5}{1 \times 1} = 35$

19. $1\frac{1}{3} \cdot 10\frac{1}{2} = \frac{4}{3} \cdot \frac{21}{2} = \frac{2}{1} \cdot \frac{7}{1} = \frac{2 \cdot 7}{1 \times 1} = 14$ **20.** $3\frac{1}{5} \cdot 1\frac{7}{8} =$

$\frac{16}{5} \cdot \frac{15}{8} = \frac{2}{1} \cdot \frac{3}{1} = \frac{2 \cdot 3}{1 \cdot 1} = 6$ **21.** $7\frac{1}{2} \times \frac{2}{3} = \frac{15}{2} \times \frac{2}{3} = \frac{5}{1} \times \frac{1}{1} =$

$\frac{5 \times 1}{1 \times 1} = 5$; the dimensions are 5 in. by 5 in. **22.** $6 \times 3\frac{1}{2} =$

$\frac{6}{1} \times \frac{7}{2} = 3 \times 7 = 21$; No, the carpenter needs $6 \times 3\frac{1}{2}$ ft =

21 ft of wood for the slats; two 10-ft boards are only 20 ft.

23. $1\frac{1}{6} \times 20\frac{13}{14} = \frac{7}{6} \times \frac{(20 \times 14) + 13}{14} = \frac{7}{6} \times \frac{293}{14} = \frac{1}{6} \times \frac{293}{2} =$

$\frac{1 \times 293}{6 \times 2} = \frac{293}{12} \approx 24$; the women's record is approximately

24 ft **24.** $9 \times 5\frac{1}{3} = \frac{9}{1} \times \frac{16}{3} = \frac{3}{1} \times \frac{16}{1} = \frac{3 \times 16}{1 \times 1} = 48$

25. $2\frac{5}{8} \cdot 5\frac{1}{3} = \frac{21}{8} \cdot \frac{16}{3} = \frac{7}{1} \cdot \frac{2}{1} = \frac{7 \cdot 2}{1 \cdot 1} = 14$ **26.** $3 \times 5\frac{1}{3} + 2 =$

$\frac{3}{1} \times \frac{16}{3} + 2 = \frac{1}{1} \times \frac{16}{1} + 2 = \frac{1 \times 16}{1 \times 1} + 2 = 16 + 2 = 18$

27. $7\frac{1}{2} \times 5\frac{1}{3} + 5\frac{1}{4} \times 5\frac{1}{3} = \frac{15}{2} \times \frac{16}{3} + \frac{21}{4} \times \frac{16}{3} =$

$\frac{5}{1} \times \frac{8}{1} + \frac{7}{1} \times \frac{4}{1} = \frac{5 \times 8}{1 \times 1} + \frac{7 \times 4}{1 \times 1} = 40 + 28 = 68$

28a. $1\frac{3}{8} \times 1\frac{1}{3} = \frac{11}{8} \times \frac{4}{3} = \frac{11}{2} \times \frac{1}{3} = \frac{11 \times 1}{2 \times 3} = \frac{11}{6} = 1\frac{5}{6}$ times

28b. $3 \times 1\frac{5}{6} = \frac{3}{1} \times \frac{11}{6} = \frac{1}{1} \times \frac{11}{2} = \frac{1 \times 11}{1 \times 2} = \frac{11}{2} = 5\frac{1}{2}$; 5 $\frac{1}{2}$ ft

29. Find the width: $1\frac{3}{4} \times 1\frac{1}{3} = \frac{7}{4} \times \frac{4}{3} = \frac{7}{1} \times \frac{1}{3} = \frac{7 \times 1}{1 \times 3} =$

$\frac{7}{3} = 2\frac{1}{3}$; Find the length: $1\frac{5}{8} \times 1\frac{1}{3} = \frac{13}{8} \times \frac{4}{3} = \frac{13}{2} \times \frac{1}{3} = \frac{13 \times 1}{2 \times 3} =$

$\frac{13}{6} = 2\frac{1}{6}$; The painting will be $2\frac{1}{3}$ ft by $2\frac{1}{6}$ ft. **30.** Find total

days: $3 \times 2 = 6$; find the total hours: $6 \times 4\frac{1}{2} = \frac{6}{1} \times \frac{9}{2} =$

$\frac{3}{1} \times \frac{9}{1} = \frac{3 \times 9}{1 \times 1} = 27$, $7.25 \times 27 = 195.75$; You will earn

\$195.75 in two weeks. **31.** Check students' work.

32. $(2\frac{1}{3}) \cdot (1\frac{1}{2})^2 = \frac{7}{3} \cdot \frac{3}{2} \cdot \frac{3}{2} = \frac{7}{1} \cdot \frac{1}{2} \cdot \frac{3}{2} = \frac{7 \cdot 1 \cdot 3}{1 \cdot 2 \cdot 2} = \frac{21}{4} = 5\frac{1}{4}$

33. First, find the difference between each choice

and zero; A = $\frac{1}{2} - \frac{1}{4} = \frac{2}{4} - \frac{1}{4} = \frac{1}{4} = \frac{4}{16}$; B = $\frac{1}{2} - \frac{5}{16} =$

$\frac{8}{16} - \frac{5}{16} = \frac{3}{16}$; C = $\frac{5}{8} - \frac{1}{2} = \frac{5}{8} - \frac{4}{8} = \frac{1}{8} = \frac{2}{16}$; D = $\frac{3}{4} - \frac{1}{2} =$

$\frac{3}{4} - \frac{2}{4} = \frac{1}{4} = \frac{4}{16}$; then find the smallest difference;

$\frac{2}{16} < \frac{3}{16} < \frac{4}{16}$; the correct choice is C. **34.** To find how

much greater the length is than the width, you need to

find the difference between the numbers; $3\frac{3}{8} - 2\frac{1}{8}$; the

correct choice is F. **35.** Gerry's answer is incorrect

because $9 + 2 = 11$, and 11 is not divisible by 3; the

correct choice is B. **36.** $3\frac{2}{5} + 4\frac{1}{5} = 7\frac{2+1}{5} = 7\frac{3}{5}$

37. $2\frac{1}{6} + 1\frac{5}{6} = 3\frac{6}{6} = 3 + 1 = 4$ **38.** $5\frac{3}{8} + 2\frac{1}{4} = 5\frac{3}{8} + 2\frac{2}{8} = 7\frac{5}{8}$

ACTIVITY LAB

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1a. 6 halves **1b.** $3 \div \frac{1}{2} = 6$

2.

Number of Circles	Fraction	Number of Pieces	Division Problem
3	$\frac{1}{2}$	6	$3 \div \frac{1}{2} = 6$
4	$\frac{1}{2}$	8	$4 \div \frac{1}{2} = 8$
5	$\frac{1}{2}$	10	$5 \div \frac{1}{2} = 10$
6	$\frac{1}{2}$	12	$6 \div \frac{1}{2} = 12$

3a. The number of pieces is twice the number of circles.

3b. The number is doubled. 4. They produce the same result.

5a. $4 \div \frac{1}{3} = 12$

5b. $5 \div \frac{1}{3} = 15$

5c. $4 \div \frac{1}{4} = 16$

6-3 Dividing Fractions pages 272-275

Check Skills You'll Need For complete solutions see *Daily Skills Check and Lesson Quiz Transparencies* or *Presentation Pro CD-ROM*. 1. List the factors of 4 and 15. Choose the largest number that is a factor of both 4 and 15. 2. 6 3. $\frac{1}{5}$ 4. $\frac{1}{7}$ 5. $\frac{4}{11}$

Quick Check 1a. The reciprocal of $\frac{3}{4}$ is $\frac{4}{3}$, or $1\frac{1}{3}$. 1b. $7 = \frac{7}{1}$, so the reciprocal of $\frac{7}{1}$ is $\frac{1}{7}$. 2a. $\frac{9}{16} \div \frac{3}{4} = \frac{9}{16} \times \frac{4}{3} = \frac{3}{4} \times \frac{1}{1} = \frac{3}{4}$ 2b. $\frac{4}{5} \div \frac{1}{3} = \frac{4}{5} \times \frac{3}{1} = \frac{12}{5} = 2\frac{2}{5}$

3. $\frac{5}{6} \div 5 = \frac{5}{6} \times \frac{1}{5} = \frac{1}{6} \times \frac{1}{1} = \frac{1}{6}$ yd

Exercises 1. The product of reciprocals always equals 1. 2. Answers may vary. Sample: The reciprocal of $\frac{11}{9}$ was multiplied by $\frac{2}{3}$ instead of multiplying $\frac{11}{9}$ by the reciprocal of $\frac{2}{3}$. The correct answer is $1\frac{5}{6}$. You need to multiply by the reciprocal of the divisor; $\frac{11}{9} \times \frac{3}{2} = \frac{33}{18} = 1\frac{5}{6}$. 3. Answers may vary. Sample: a fraction $\frac{2}{3}$ has a reciprocal $\frac{3}{2}$.

4. $5 \div \frac{3}{8} = 5 \times \frac{8}{3} = \frac{5}{1} \times \frac{8}{3} = \frac{40}{3} = 13\frac{1}{3}$

5. $\frac{10}{16} \div \frac{5}{16} = \frac{10}{16} \times \frac{16}{5} = \frac{2}{1} \times \frac{1}{1} = 2$ 6. The reciprocal of $\frac{2}{5}$ is $\frac{5}{2}$. 7. The reciprocal of $\frac{1}{7}$ is 7. 8. The reciprocal of 11 is $\frac{1}{11}$.

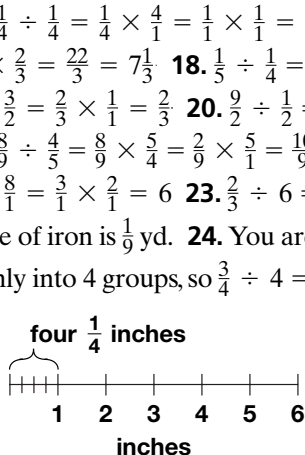
9. The reciprocal of $\frac{5}{3}$ is $\frac{3}{5}$. 10. The reciprocal of $\frac{4}{11}$ is $\frac{11}{4}$.

11. $7 \div \frac{3}{5} = 7 \times \frac{5}{3} = \frac{7}{1} \times \frac{5}{3} = \frac{35}{3} = 11\frac{2}{3}$ 12. $9 \div \frac{4}{9} = 9 \times \frac{9}{4} = \frac{9}{1} \times \frac{9}{4} = \frac{81}{4} = 20\frac{1}{4}$ 13. $6 \div \frac{2}{5} = 6 \times \frac{5}{2} = \frac{6}{1} \times \frac{5}{2} = \frac{3}{1} \times \frac{5}{1} = 15$ 14. $8 \div \frac{3}{7} = 8 \times \frac{7}{3} = \frac{8}{1} \times \frac{7}{3} = \frac{56}{3} = 18\frac{2}{3}$ 15. $\frac{8}{9} \div \frac{1}{3} = \frac{8}{9} \times \frac{3}{1} = \frac{8}{3} \times \frac{1}{1} = \frac{8}{3} = 2\frac{2}{3}$

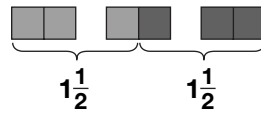
16. $\frac{1}{4} \div \frac{1}{4} = \frac{1}{4} \times \frac{4}{1} = \frac{1}{1} \times \frac{1}{1} = 1$ 17. $\frac{11}{2} \div \frac{3}{4} = \frac{11}{2} \times \frac{4}{3} = \frac{11}{1} \times \frac{2}{3} = \frac{22}{3} = 7\frac{1}{3}$ 18. $\frac{1}{5} \div \frac{1}{4} = \frac{1}{5} \times \frac{4}{1} = \frac{4}{5}$ 19. $\frac{4}{9} \div \frac{2}{3} = \frac{4}{9} \times \frac{3}{2} = \frac{2}{3} \times \frac{1}{1} = \frac{2}{3}$ 20. $\frac{9}{2} \div \frac{1}{2} = \frac{9}{2} \times \frac{2}{1} = \frac{9}{1} \times \frac{1}{1} = 9$

21. $\frac{8}{9} \div \frac{4}{5} = \frac{8}{9} \times \frac{5}{4} = \frac{2}{9} \times \frac{5}{1} = \frac{10}{9} = 1\frac{1}{9}$ 22. $\frac{3}{4} \div \frac{1}{8} = \frac{3}{4} \times \frac{8}{1} = \frac{3}{1} \times \frac{2}{1} = 6$ 23. $\frac{2}{3} \div 6 = \frac{2}{3} \times \frac{1}{6} = \frac{1}{3} \times \frac{1}{3} = \frac{1}{9}$; Each piece of iron is $\frac{1}{9}$ yd. 24. You are dividing $\frac{3}{4}$ tons of stone evenly into 4 groups, so $\frac{3}{4} \div 4 = \frac{3}{4} \times \frac{1}{4} = \frac{3}{16} \times \frac{3}{16} = \frac{3}{16}$ t.

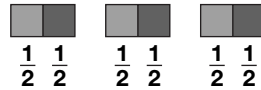
25. $\frac{1}{4} \div \frac{1}{4} = \frac{1}{4} \times \frac{4}{1} = \frac{1}{1} \times \frac{1}{1} = 1$ There are four $\frac{1}{4}$ inches in 1 inch, so there are $6 \times 4, \frac{1}{4}$ inches in 6 inches; 24



26. $3 \div 2 = 1\frac{1}{2}$



$3 \div \frac{1}{2} = 6$



Answers may vary. Sample: When you divide a number by 2, the quotient is less than the dividend. When you divide a number by $\frac{1}{2}$ the quotient is greater than the dividend. For example:

$3 \div 2 = \frac{3}{2} = 1\frac{1}{2}$ and

$3 \div \frac{1}{2} = 6$

27. $a \div b = \frac{1}{2} \div \frac{1}{4} = \frac{1}{2} \times \frac{4}{1} = \frac{1}{1} \times \frac{2}{1} = 2$

28. $b \div c = \frac{1}{4} \div \frac{3}{8} = \frac{1}{4} \times \frac{8}{3} = \frac{1}{1} \times \frac{2}{3} = \frac{2}{3}$

29. $c \div b = \frac{3}{8} \div \frac{1}{4} = \frac{3}{8} \times \frac{4}{1} = \frac{3}{2} \times \frac{1}{1} = \frac{3}{2}$

30. $3 \div \frac{2}{3} = 3 \times \frac{3}{2} = \frac{9}{2} = 4\frac{1}{2}$; you can make about 4 loaves of banana bread with 3 cups of oil.

31. $\frac{1}{10} \div \frac{1}{13} = \frac{1}{10} \times \frac{13}{1} = \frac{13}{10} = 1\frac{3}{10}$; about $1\frac{3}{10}$ times more people live in Argentina as in Peru. 32. $\frac{1}{85} \times \frac{1}{2} = \frac{1}{170}$;

about $\frac{1}{170}$ of the total population of South America lives in Brasilia. 33. $(\frac{2}{7})^2 \div (\frac{1}{7})^2 = \frac{4}{49} \div \frac{1}{49} = \frac{4}{49} \times \frac{49}{1} = 4$; The expression simplified is 4. 34. First, identify the cost of the fabric and the amount of fabric needed for each bear. Second, multiply the number of yards needed for each bear by 3. Last, multiply the cost of the fabric by the total number of yards you need; the correct choice is A.

35. $7.99 \times 2 = 15.98$

The cost of 2 shirts for \$7.99 each is \$15.98

$$\begin{array}{r} 7.99 \\ \times 2 \\ \hline 15.98 \\ + 15.98 \\ \hline 31.96 \end{array}$$

The cost of the 2 shirts for \$7.99 each and a pair of pants for \$19.99 before tax is \$35.97; the correct choice is G.

36. Since 1,250 ends in an even digit, it is divisible by 2. Since the last digit is 0, it is divisible by 5 and 10. 1,250 is divisible by 2, 5, and 10. 37. Since 372 ends in an even digit, it is divisible by 2. Since the sum of the digits is 12, which is divisible by 3, it is divisible by 3. 372 is divisible by 2 and 3. 38. Since 55,600 ends in an even digit, it is divisible by 2. Since it ends in 0 or 5, it is divisible by 5. Since it ends in 0, it is divisible by 10. So, 55,600 is divisible by 2, 5, and 10. 39. Since 445 ends in 0 or 5, it is divisible by 5.

6-4 Dividing Mixed Numbers

pages 276-279

Check Skills You'll Need For complete solutions see *Daily Skills Check and Lesson Quiz Transparencies* or *Presentation Pro CD-ROM*. 1. The product of the fractions is not 1. 2. 28 3. $\frac{7}{24}$ 4. $\frac{1}{6}$ 5. $2\frac{8}{11}$

Quick Check 1a. $7\frac{2}{3} \div 1\frac{3}{7} \approx 7 \div 1 = 7$; about 7

1b. $14\frac{9}{16} \div 3\frac{8}{19} \approx 15 \div 3 = 5$; about 5 2. $3\frac{3}{4} \div 3 =$

$\frac{15}{4} \times \frac{1}{3} = \frac{5}{4} \times \frac{1}{1} = \frac{5}{4} = 1\frac{1}{4}$; Since the baker has $3\frac{3}{4}$ cups of walnuts to make three batches of muffins, $1\frac{1}{4}$ cups of walnuts should go into each batch of muffins.

3a. $7 \div 1\frac{1}{6} = 7 \div \frac{7}{6} = 7 \times \frac{6}{7} = 6$ **3b.** $6\frac{5}{6} \div 3\frac{1}{3} =$

$\frac{41}{6} \div \frac{10}{3} = \frac{41}{6} \times \frac{3}{10} = \frac{41}{2} \times \frac{1}{10} = \frac{41}{20} = 2\frac{1}{20}$

Exercises 1. $8\frac{3}{4} \div 3\frac{1}{3} \approx 9 \div 3 = 3$; about 3 **2.** Answers may vary. Sample: How many $1\frac{1}{4}$ ton loads of stone are needed to make a total of $2\frac{1}{2}$ tons?; $2\frac{1}{2}$ is the total, and $1\frac{1}{4}$ is the amount of each part. **3.** Annie; Jocelyn incorrectly renamed as $4\frac{1}{2}$ as $\frac{8}{2}$ **4.** $50\frac{1}{4} \div 5\frac{3}{16} \approx 50 \div 5 = 10$; about 10 **5.** $48\frac{8}{10} \div 7\frac{3}{7} \approx 49 \div 7 = 7$; about 7 **6.** $99 \div 8\frac{2}{3} \approx 99 \div 9 = 11$; about 11 **7.** $10\frac{1}{2} \div 4\frac{1}{2} \approx 10 \div 5 = 2$; the river rose about 2 inches per hour in the $4\frac{1}{2}$ hours of the storm.

8. $6\frac{1}{2} \div 8 = \frac{13}{2} \div \frac{8}{1} = \frac{13}{2} \times \frac{1}{8} = \frac{13}{16}$; a man that is $6\frac{1}{2}$ feet tall has a head about $\frac{13}{16}$ ft long. **9.** $3\frac{1}{6} \div 2 = \frac{19}{6} \div \frac{2}{1} =$

$\frac{19}{6} \times \frac{1}{2} = \frac{19}{12} = 1\frac{7}{12}$ **10.** $2\frac{1}{2} \div 7 = \frac{5}{2} \div \frac{7}{1} = \frac{5}{2} \times \frac{1}{7} = \frac{5}{14}$

11. $1 \div 4\frac{1}{2} = 1 \div \frac{9}{2} = 1 \times \frac{2}{9} = \frac{2}{9}$ **12.** $3\frac{1}{3} \div 1\frac{1}{2} = \frac{10}{3} \div \frac{3}{2} =$

$\frac{10}{3} \times \frac{2}{3} = \frac{20}{9} = 2\frac{2}{9}$ **13.** $7\frac{1}{3} \div 1\frac{5}{6} = \frac{22}{3} \div \frac{11}{6} = \frac{22}{3} \times \frac{6}{11} =$

$\frac{2}{1} \times \frac{2}{1} = 4$ **14.** $3\frac{1}{4} \div 1\frac{1}{2} = \frac{13}{4} \div \frac{3}{2} = \frac{13}{4} \times \frac{2}{3} = \frac{13}{2} \times \frac{1}{3} =$

$\frac{13}{6} = 2\frac{1}{6}$ **15.** $2\frac{1}{2} \div 1\frac{1}{8} = \frac{5}{2} \div \frac{9}{8} = \frac{5}{2} \times \frac{8}{9} = \frac{5}{1} \times \frac{4}{9} =$

$\frac{20}{9} = 2\frac{2}{9}$ **16.** $10\frac{1}{3} \div 3\frac{1}{3} = \frac{31}{3} \div \frac{10}{3} = \frac{31}{3} \times \frac{3}{10} =$

$\frac{31}{1} \times \frac{1}{10} = \frac{31}{10} = 3\frac{1}{10}$ **17.** $2\frac{1}{10} \div 4\frac{2}{3} = \frac{21}{10} \div \frac{14}{3} = \frac{21}{10} \times \frac{3}{14} =$

$\frac{3}{10} \times \frac{3}{2} = \frac{9}{20}$ **18.** $93 \div 8\frac{1}{2} = \frac{93}{1} \div \frac{17}{2} = \frac{93}{1} \times \frac{2}{17} = \frac{186}{17} =$

$10\frac{16}{17}$; about 11 million mi **19.** $2\frac{3}{5} \div 2\frac{1}{2} = x$; $\frac{13}{5} \div \frac{5}{2} =$

x ; $\frac{13}{5} \times \frac{2}{5} = x$; $\frac{26}{25} = x$; $1\frac{1}{25} = x$ **20.** $2\frac{3}{5} \div x = 1$; any

number divided by itself is 1; the solution is $2\frac{3}{5}$.

21. $x \div \frac{1}{2} = 1\frac{3}{4}$; $\frac{x}{1} \times \frac{2}{1} = \frac{7}{4}$; $\frac{1}{2}(\frac{2x}{1}) = \frac{1}{2}(\frac{7}{4})$; $x = \frac{7}{8}$

22. $24 \div 1\frac{1}{3} \approx 24 \div 1 = 24$; an attic ceiling 24 feet wide insulated with insulation strips $1\frac{1}{3}$ feet wide will need about 24 strips. **23.** $136\frac{1}{2} \div 10\frac{1}{2} = \frac{273}{2} \div \frac{21}{2} = \frac{273}{2} \times \frac{2}{21} = \frac{273}{21} = 13$; the gardener will need 13 bricks. They cost \$.35 each.

0.35

$\times 13$

1 05

+ 3 50

4.55; \$4.55. The border will cost \$4.55.

24. Change $12 \div \frac{1}{5}$ to $12 \times \frac{5}{1}$. Since $\frac{5}{1} = 5$, find 12×5 to get 60. **25.** $37\frac{1}{2} \div 1\frac{1}{4} = \frac{75}{2} \div \frac{5}{4} = \frac{75}{2} \times \frac{4}{5} = \frac{15}{1} \times \frac{2}{1} = 30$; a bookstore that has a shelf that is $37\frac{1}{2}$ inches long can fit 30 books that are $1\frac{1}{4}$ inches thick. **26a.** $(x + x) \div \frac{1}{2} =$

$(1\frac{1}{3} + 1\frac{1}{3}) \div \frac{1}{2} = 2\frac{2}{3} \div \frac{1}{2} = \frac{8}{3} \times \frac{2}{1} = \frac{16}{3} = 5\frac{1}{3}$

26b. $(x + 1) \div 1\frac{1}{2} = (1\frac{1}{3} + 1) \div 1\frac{1}{2} = 2\frac{1}{3} \div 1\frac{1}{2} = \frac{7}{3} \div \frac{3}{2} =$

$\frac{7}{3} \times \frac{2}{3} = \frac{14}{9} = 1\frac{5}{9}$ **27.** $\frac{5}{6} + \frac{1}{3} + \frac{1}{12} = \frac{10}{12} + \frac{4}{12} + \frac{1}{12} =$

$\frac{21}{12} = 1\frac{9}{12} = 1\frac{3}{4}$; $1\frac{3}{4}$ of the pizza was eaten; the correct choice is A. **28.** Divide 380 by 60; the correct choice is G.

29. Find the factors of 12: 1, 2, 3, 4, 6, 12; find the factors of 20: 1, 2, 4, 5, 10, 20; the GCF is 4; the correct choice is C. **30.** $144 = 12 \times 12 = 2 \times 2 \times 3 \times 2 \times 2 \times 3 = 2^4 \times 3^2$ **31.** $98 = 2 \times 49 = 2 \times 7 \times 7 = 2 \times 7^2$ **32.** $276 = 23 \times 12 = 23 \times 2 \times 2 \times 3 = 2^2 \times 3 \times 23$ **33.** $5,000 = 50 \times 100 = 2 \times 5 \times 5 \times 2 \times 2 \times 5 \times 5 = 5^4 \times 2^3$

ACTIVITY LAB

page 280

1. $3\frac{1}{5} \times 1\frac{3}{4} = 5\frac{3}{5}$; $3 + 1 \div 5 = 3.2$; $1 + 3 \div 4 = 1.75$; $5 + 3 \div 5 = 5.6$; $3.2 \times 1.75 = 5.6$ ✓ **2.** $9\frac{3}{10} - 3\frac{2}{5} = 5\frac{9}{10}$; $9 + 3 \div 10 = 9.3$; $3 + 2 \div 5 = 3.4$; $5 + 9 \div 10 = 5.9$; $9.3 - 3.4 = 5.9$ ✓ **3.** $6\frac{1}{2} \div 1\frac{3}{5} = 4\frac{1}{16}$; $6 + 1 \div 2 = 6.5$; $1 + 3 \div 5 = 1.6$; $4 + 1 \div 16 = 4.0625$; $6.5 \div 1.6 = 4.0625$ ✓ **4.** $2\frac{5}{7} + 7\frac{1}{2} = 10\frac{3}{14}$; $2 + 5 \div 7 = 2.714$; $7 + 1 \div 2 = 7.5$; $10 + 3 \div 14 = 10.214$; $2.714 + 7.5 = 10.214$ ✓

CHECKPOINT QUIZ 1

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1. $\frac{5}{12} \times 36 = \frac{5}{12} \times \frac{36}{1} = 15$ **2.** $5\frac{1}{4} \times 4\frac{1}{2} = \frac{21}{4} \times \frac{9}{2} = \frac{189}{8} = 23\frac{5}{8}$ **3.** $24 \div \frac{3}{8} = \frac{24}{1} \times \frac{8}{3} = \frac{8}{1} \times \frac{8}{1} = 64$ **4.** $1\frac{1}{9} \div 6\frac{2}{3} = \frac{10}{9} \div \frac{20}{3} = \frac{10}{9} \times \frac{3}{20} = \frac{1}{3} \times \frac{1}{2} = \frac{1}{6}$ **5.** $\frac{2}{7} \times 5\frac{1}{3} = \frac{2}{7} \times \frac{16}{3} = \frac{32}{21} = 1\frac{11}{21}$ **6.** $2\frac{2}{5} \div 4 = \frac{12}{5} \div \frac{4}{1} = \frac{12}{5} \times \frac{1}{4} = \frac{3}{5} \times \frac{1}{1} = \frac{3}{5}$ **7.** $8\frac{1}{6} \times 2 = \frac{49}{6} \times \frac{2}{1} = \frac{49}{3} = 16\frac{1}{3}$ **8.** $7\frac{4}{9} \div 3\frac{1}{3} = \frac{67}{9} \div \frac{10}{3} = \frac{67}{9} \times \frac{3}{10} = \frac{67}{3} \times \frac{1}{10} = \frac{67}{30} = 2\frac{7}{30}$ **9.** $5\frac{2}{3} \div \frac{1}{6} = \frac{17}{3} \div \frac{1}{6} = \frac{17}{3} \times \frac{6}{1} = \frac{17}{1} \times \frac{2}{1} = 34$ **10.** $\frac{3}{5} \times 7\frac{1}{2} = \frac{3}{5} \times \frac{15}{2} = \frac{9}{2} = 4\frac{1}{2}$ **11.** $3\frac{3}{10} \div 1\frac{1}{2} = \frac{33}{10} \div \frac{3}{2} = \frac{33}{10} \times \frac{2}{3} = \frac{11}{5} \times \frac{1}{1} = \frac{11}{5} = 2\frac{1}{5}$ **12.** $5\frac{1}{6} \times 3 = \frac{31}{6} \times \frac{3}{1} = \frac{31}{2} \times \frac{1}{1} = \frac{31}{2} = 15\frac{1}{2}$ **13.** $4\frac{1}{3} \times 9 = \frac{13}{3} \times \frac{9}{1} = \frac{13}{1} \times \frac{3}{1} = 39$; a tree that is 9 times as tall as a $4\frac{1}{3}$ -foot sapling is 39 ft tall. **14.** $1 \text{ ft} = 12 \text{ in}$; $12 \div \frac{1}{2} = \frac{12}{1} \times \frac{2}{1} = 24$; 24 cookies that are $\frac{1}{2}$ -inch-thick can be sliced from 1 foot of cookie dough. **15.** $72\frac{3}{8} \div 5\frac{5}{8} = \frac{579}{8} \div \frac{45}{8} = \frac{579}{8} \times \frac{8}{45} = \frac{579}{45} \approx 13$; about 13 panels that are $5\frac{5}{8}$ inches wide are needed to cover a wall $72\frac{3}{8}$ inches wide.

6-5 Solving Fraction Equations by Multiplying

pages 282–285

Check Skills You'll Need For complete solutions see *Daily Skills Check and Lesson Quiz Transparencies* or *Presentation Pro CD-ROM*. **1.** Divide each side by 4.

2. $\frac{7}{30}$ **3.** $\frac{3}{11}$ **4.** $\frac{2}{5}$ **5.** $\frac{9}{25}$

Quick Check

1a. $\frac{x}{2} = 15$

$2 \times \frac{x}{2} = 2 \times 15$

$\frac{2}{1} \times \frac{x}{2} = 30$

$x = 30$

2. $\frac{7}{8}x = 42$

$\frac{8}{7} \times \frac{7}{8}x = \frac{8}{7} \times \frac{42}{1}$

$x = 48$

1b. $\frac{n}{6} = 12$

$6 \times \frac{n}{6} = 6 \times 12$

$\frac{6}{1} \times \frac{n}{6} = 6 \times 12$

$n = 72$

Check:

$\frac{7}{8} \times 48 \stackrel{?}{=} 42$

$\frac{7}{8} \times \frac{48}{1} \stackrel{?}{=} 42$

$42 = 42$

3. $\frac{5}{8} \times f = 13$; $\frac{5}{8} \times \frac{8}{5} \times f = \frac{8}{5} \times 13$; $f = \frac{104}{5} = 20\frac{4}{5}$; the group can make 20 flags with 13 yards of material.

Exercises 1. Answers may vary. Sample: Let $b = 8$.

Since $\frac{8}{4} = 2$, b must be greater than 8. **2.** The reciprocal of $\frac{1}{3}$ is $\frac{3}{1}$. **3.** The reciprocal of $\frac{2}{5}$ is $\frac{5}{2}$. **4.** The reciprocal of $\frac{5}{9}$ is $\frac{9}{5}$. **5.** $v = 11 \times 4 = 44$ **6.** $s = 5 \times 35 = 175$

7. $y = \frac{5}{4} \times 8 = \frac{5}{1} \times \frac{2}{1} = 10$

8. $\frac{x}{3} = 12$
 $3 \times \frac{x}{3} = 3 \times 12$
 $\frac{3}{1} \times \frac{x}{3} = 36$
 $x = 36$

Check:

$$\frac{36}{3} \stackrel{?}{=} 12$$

$$12 = 12$$

10. $\frac{j}{12} = 27$
 $\frac{12}{1} \times \frac{j}{12} = \frac{12}{1} \times 27$
 $j = 324$

Check:

$$\frac{324}{12} \stackrel{?}{=} 27$$

$$27 = 27$$

12. $\frac{t}{2} = 75$
 $\frac{2}{1} \times \frac{t}{2} = \frac{2}{1} \times 75$
 $t = 150$

Check:

$$\frac{150}{2} \stackrel{?}{=} 75$$

$$75 = 75$$

14. $\frac{1}{2}m = 6$
 $\frac{2}{1} \times \frac{1}{2}m = \frac{2}{1} \times 6$
 $m = 12$

Check:

$$\frac{1}{2} \times 12 \stackrel{?}{=} 6$$

$$6 = 6$$

16. $\frac{3}{5}n = 9$
 $\frac{5}{3} \times \frac{3}{5}n = \frac{5}{3} \times 9$
 $n = 15$

Check:

$$\frac{3}{5} \times 15 \stackrel{?}{=} 9$$

$$\frac{3}{5} \times \frac{15}{1} \stackrel{?}{=} 9$$

$$9 = 9$$

18. $\frac{3}{20}x = 5$
 $\frac{20}{3} \times \frac{3}{20}x = \frac{20}{3} \times 5$
 $x = 33\frac{1}{3}$

Check:

$$\frac{3}{20} \times 33\frac{1}{3} \stackrel{?}{=} 5$$

$$\frac{3}{20} \times \frac{100}{3} \stackrel{?}{=} 5$$

$$5 = 5$$

9. $\frac{a}{7} = 8$
 $7 \times \frac{a}{7} = 7 \times 8$
 $\frac{7}{1} \times \frac{a}{7} = 56$
 $a = 56$

Check:

$$\frac{56}{7} \stackrel{?}{=} 8$$

$$8 = 8$$

11. $\frac{x}{15} = 3$
 $\frac{15}{1} \times \frac{x}{15} = \frac{15}{1} \times 3$
 $x = 45$

Check:

$$\frac{45}{15} \stackrel{?}{=} 3$$

$$3 = 3$$

13. $\frac{r}{12} = 1.5$
 $\frac{12}{1} \times \frac{r}{12} = \frac{12}{1} \times 1.5$
 $r = 18$

Check:

$$\frac{18}{12} \stackrel{?}{=} 1.5$$

$$1.5 = 1.5$$

15. $\frac{2}{3}r = 10$
 $\frac{3}{2} \times \frac{2}{3}r = \frac{3}{2} \times 10$
 $r = 15$

Check:

$$\frac{2}{3} \times 15 \stackrel{?}{=} 10$$

$$\frac{2}{3} \times \frac{15}{1} \stackrel{?}{=} 10$$

$$10 = 10$$

17. $\frac{7}{8}b = 14$
 $\frac{8}{7} \times \frac{7}{8}b = \frac{8}{7} \times 14$
 $b = 16$

Check:

$$\frac{7}{8} \times 16 \stackrel{?}{=} 14$$

$$\frac{7}{8} \times \frac{16}{1} \stackrel{?}{=} 14$$

$$14 = 14$$

19. $\frac{3}{4}y = 21$
 $\frac{4}{3} \times \frac{3}{4}y = \frac{4}{3} \times 21$
 $y = 28$

Check:

$$\frac{3}{4} \times 28 \stackrel{?}{=} 21$$

$$\frac{3}{4} \times \frac{28}{1} \stackrel{?}{=} 21$$

$$21 = 21$$

20. $\frac{7}{12}b = 14$
 $\frac{12}{7} \times \frac{7}{12}b = \frac{12}{7} \times 14$
 $b = 24$

The value of Gerald's brother's coins is \$24.

21. $\frac{29}{25}e = 1,450$; $e = \frac{25}{29} \times 1,450 = 25 \times 50 = 1,250$; the height of the Empire State Building is about 1,250 feet

22. $\frac{5}{6} \times \frac{9}{1} = \frac{5}{2} \times \frac{3}{1} = \frac{15}{2}$; To make 9 costumes that use $\frac{5}{6}$ yard of ribbon each you will need $7\frac{1}{2}$ yd of ribbon.

23. $2\frac{2}{5}p = 10$
 $\frac{12}{5}p = 10$
 $\frac{5}{12} \times \frac{12}{5}p = \frac{5}{12} \times 10$
 $p = \frac{25}{6}$
 $p = 4\frac{1}{6}$

Check:

$$4\frac{1}{6} \times 2\frac{2}{5} \stackrel{?}{=} 10$$

$$\frac{25}{6} \times \frac{12}{5} \stackrel{?}{=} 10$$

$$10 = 10$$

25. $\frac{2}{7}n = \frac{1}{14}$
 $\frac{7}{2} \times \frac{2}{7}n = \frac{7}{2} \times \frac{1}{14}$
 $n = \frac{1}{4}$

Check:

$$\frac{2}{7} \times \frac{1}{4} \stackrel{?}{=} \frac{1}{14}$$

$$\frac{1}{14} = \frac{1}{14}$$

26. $\frac{5}{6}p = 12.50$; $\frac{6}{5} \times \frac{5}{6}p = \frac{25}{2} \times \frac{6}{5}$; $p = 15$; the pants cost \$15. **27.** $\frac{d}{12} = 14\frac{1}{2}$; $\frac{12}{1} \times \frac{d}{12} = \frac{12}{1} \times \frac{29}{2}$; $d = 174$; the total

distance of the bike race is 174 mi. **28.** $\frac{2}{5}d = 120$;

$\frac{5}{2} \times \frac{2}{5}d = \frac{5}{2} \times \frac{120}{1}$; $d = 300$; Cleveland is about 300 mi from Chicago.

29. $2\frac{5}{8}y = 10\frac{1}{2}$
 $\frac{21}{8}y = \frac{21}{2}$
 $\frac{8}{21} \times \frac{21}{8}y = \frac{8}{21} \times \frac{21}{2}$
 $y = 4$

Check:

$$\frac{21}{8} \times 4 \stackrel{?}{=} \frac{21}{2}$$

$$\frac{21}{2} = \frac{21}{2}$$

30. $10 + 36 + 22 \approx 10 + 40 + 20 = 70$; Suchin has about 70 ft of string; the correct choice is C. **31.** $\frac{1}{4} + \frac{1}{8} =$

$\frac{2}{8} + \frac{1}{8} = \frac{3}{8}$; the strip with 3 of 8 parts shaded; the correct

choice is H. **32.** $1\frac{1}{4} + 4\frac{5}{8} \approx 1 + 5 = 6$; Bridget will need about 6 yd of string; the correct choice is B.

33. $15\frac{6}{9} - 13\frac{5}{12} = 15\frac{24}{36} - 13\frac{15}{36} = 2\frac{9}{36} = 2\frac{1}{4}$

34. $23\frac{2}{3} - 4\frac{1}{2} = 23\frac{4}{6} - 4\frac{3}{6} = 19\frac{1}{6}$

35. $26 - 4\frac{1}{9} = 25\frac{9}{9} - 4\frac{1}{9} = 21\frac{8}{9}$

GUIDED PROBLEM SOLVING pages 286–287

1. Division is the inverse operation for multiplication.

2. Greater than 1; $3\frac{2}{5}$ goes into $4\frac{2}{5}$ more than one time.

3. $4\frac{2}{5}$ is less than twice $3\frac{2}{5}$ so the answer is reasonable.

4a. 6.61

$$\begin{array}{r} -2.80 \\ 6.61 \\ \hline 3.81 \end{array}$$

The price of gasoline in the Netherlands is greater than the price of gasoline in the United States by \$3.81.

4b. $6.61 \div 2.80 = 661 \div 280 = 2.36$

$$\begin{array}{r}
 2.36 \\
 280 \overline{) 661.00} \\
 \underline{-560} \\
 1010 \\
 \underline{-840} \\
 1700 \\
 \underline{-1080} \\
 20
 \end{array}$$

The average price of gas in the Netherlands is about 2.36 times greater. **5.** $6 \div \frac{3}{4} = \frac{6}{1} \times \frac{4}{3} = \frac{2}{1} \times \frac{4}{1} = 8$; to finish a 6-mile race you will need to complete 8 laps. **6.** $12 \times 1\frac{1}{4} = 12 \times \frac{5}{4} = 3 \times \frac{5}{1} = 15$; each stack of 12 pieces of lumber is 15 in. thick. **7.** $6.75 \times 40 - 5.15 \times 40 = 270 - 206 = 64$; by working in Texas instead of New York you will earn \$64 less. **8.** $7.15 \times 8 \times 20 \approx 7 \times 8 \times 20 = 56 \times 20 = 1,120$; you would earn about \$1,120.

6-6 The Customary System

pages 288–291

Check Skills You'll Need For complete solutions see *Daily Skills Check and Lesson Quiz Transparencies* or *Presentation Pro CD-ROM*. **1.** Answers may vary. Sample: Find the least common denominator of 4 and 12 and write equivalent fractions using the LCD to compare. **2.** $\frac{1}{2} > \frac{1}{3}$ **3.** $\frac{5}{6} > \frac{5}{7}$ **4.** $4 > 3\frac{1}{4}$

Quick Check 1–3. Answers may vary. Samples are given. **1a.** Inches; pencils are shorter than a foot. **1b.** Feet or yards; small whales are twice as long as a man. **2.** Pounds; a refrigerator weighs less than a piano. **3a.** Gallons; a tanker truck holds more gasoline than can fit in a small bucket. **3b.** Fluid ounces or cups; a container of yogurt is usually less than a pint.

Exercises 1. Check students' work. **2.** inches **3.** cups **4.** ounces **5–16.** Answers may vary. Samples are given. **5.** Feet; back yards are usually measured in feet. **6.** Miles; any smaller unit would be too small, since the moon is thousands of miles from Earth. **7.** Inches; a license plate is a little longer than a foot-ruler. **8.** Inches; width of a photograph is usually measured in inches. **9.** Pounds; one orange weighs less than a pound, so a bag of oranges would weigh more than a pound. **10.** Ounces; a package of chewing gum weighs about as much as a slice of bread. **11.** Pounds; a bowling ball weighs more than a loaf of bread. **12.** Tons or pounds; a pickup truck is very heavy. Ounces are much too small. **13.** Fluid ounces; a sample size bottle of shampoo holds less than a cup. **14.** Cup; a bowl can usually hold a cup of soup or a bit more. **15.** Gallon; lawnmower tanks usually hold about 1 gallon of gas. **16.** Fluid ounces; a tube of toothpaste usually is measured in fluid ounces. **17.** $660 \times 2 = 1,320$; there are 1,320 ft in two furlongs; $440 \times 3 = 1,320$; there are 1,320 ft in 440 yd; They are equal. **18.** $40 \div 3 \approx 14$; a crocodile is as long as about 14 door widths. **19.** Weight of a pen < 6 oz **20.** Height of a tree < 0.5 mi **21.** Inches are too small to describe walking distances. **22a.** From

shortest to tallest: beaker, flask, cylinder **22b.** Capacities from least to greatest: cylinder, flask, beaker **23.** $480 \times 2 = 960$; two troy ounces of stones weighs 960 grains **24.** Depending on whether people use a lot or a little milk in their cereal, an ounce can be used to measure – it is most precise; the correct choice is A. **25.** The total amount is \$108 and each student pays \$12.00. The equation you can use is $108 \div 12 = s$; the correct choice is F.

26. $\frac{3}{8} + \frac{3}{4} = \frac{3}{8} + \frac{6}{8}$; The model with 3 out of 8 sections shaded plus another one with 6 out of 8 sections shaded; the correct choice is C.

$$\begin{array}{rcl}
 27. \quad 11:29 \text{ A.M.} & \rightarrow & 11 \text{ h } 29 \text{ min} \rightarrow 10 \text{ h } 89 \text{ min} \\
 9:30 \text{ A.M.} & \rightarrow & \underline{- 9 \text{ h } 30 \text{ min}} \rightarrow \underline{- 9 \text{ h } 30 \text{ min}} \\
 & & 1 \text{ h } 59 \text{ min}
 \end{array}$$

$$\begin{array}{rcl}
 28. \quad 2:30 \text{ P.M.} & \rightarrow & 14 \text{ h } 30 \text{ min} \\
 8:15 \text{ A.M.} & \rightarrow & \underline{- 8 \text{ h } 15 \text{ min}} \\
 & & 6 \text{ h } 15 \text{ min}
 \end{array}$$

6-7 Changing Units in the Customary System

pages 292–295

Check Skills You'll Need For complete solutions see *Daily Skills Check and Lesson Quiz Transparencies* or *Presentation Pro CD-ROM*. **1.** An improper fraction has a numerator greater than the denominator. A mixed number is the sum of an integer and a proper fraction.

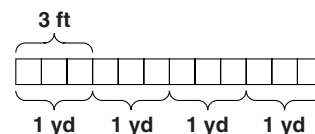
2. $25\frac{1}{2}$ **3.** $\frac{55}{78}$ **4.** $\frac{3}{8}$ **5.** $\frac{20}{27}$

Quick Check 1. $2,000 \times 2 = 4,000$; the number of pounds in 2 tons is 4,000 lb.

2. 5 cups = $(5 \div 4)$ quarts; **3.** $\begin{array}{r} 6 \text{ lb } 8 \text{ oz} \\ 5 \div 4 = 5 \times \frac{1}{4} = \frac{5}{1} \times \frac{1}{4} = \frac{5}{4}, \\ \text{or } 1\frac{1}{4}; 1\frac{1}{4} \text{ qt} \end{array}$

$$\begin{array}{r}
 16 \text{ oz} = 1 \text{ lb, so } 17 \text{ oz} = 1 \text{ lb } 1 \text{ oz;} \\
 7 \text{ lb } 17 \text{ oz} = 7 \text{ lb} + 1 \text{ lb } 1 \text{ oz} = \\
 8 \text{ lb } 1 \text{ oz.}
 \end{array}$$

Exercises 1.



There are 4 yards in 12 feet.

2. To change units from pounds to ounces, you multiply. **3.** To change units from feet to yards, you divide. **4.** To change units from quarts to gallons, you divide. **5.** false; $6 \text{ ft} = 2 \text{ yd}$ **6.** true **7.** false; $2\frac{1}{2} \text{ qt} = 5,000 \text{ lb}$ **8.** $6 \text{ lb} = (6 \times 16) \text{ oz} = 96 \text{ oz}$; 96 **9.** $3 \text{ mi} = (3 \times 5,280) \text{ ft} = 15,840 \text{ ft}$; 15,840 **10.** $68 \text{ qt} = (68 \times 2) \text{ qt} = 136 \text{ pt}$; 136 **11.** $3 \text{ yd} = (3 \times 3) \text{ ft} = 9 \text{ ft}$; 9 **12.** $6 \text{ qt} = (6 \times 2) \text{ pt} = 12 \text{ pt}$; 12 **13.** $40 \text{ in.} = (40 \div 12) \text{ ft} = 3\frac{1}{3} \text{ ft}$; $3\frac{1}{3}$ **14.** $5,500 \text{ lb} = (5,500 \div 2,000) \text{ t} = \frac{55}{20} \text{ t} = 2\frac{11}{20} \text{ t}$; $2\frac{11}{20}$ **15.** $27\frac{1}{4} \text{ c} = (27\frac{1}{4} \div 2) \text{ pt} = \frac{109}{4} \div \frac{2}{1} \text{ pt} = \frac{109}{4} \times \frac{1}{2} \text{ pt} = \frac{109}{8} \text{ pt} = 13\frac{5}{8} \text{ pt}$; $13\frac{5}{8}$ **16.** $2,640 \text{ ft} = (2,640 \div 5,280) \text{ mi} = \frac{1}{2} \text{ mi}$; $\frac{1}{2}$ **17.** $32 \text{ oz} = (32 \div 16) \text{ lb} = 2 \text{ lb}$; 2

$$18. 9 \text{ fl oz} = (9 \div 32) \text{ qt} = 9 \times \frac{1}{32} \text{ qt} = \frac{9}{32} \text{ qt}; \frac{9}{32} \quad 19. 24 \text{ c} = (24 \div 16) \text{ gal} = 24 \times \frac{1}{16} \text{ gal} = \frac{24}{16} \text{ gal} = \frac{3}{2} \text{ gal} = 1\frac{1}{2} \text{ gal}; 1\frac{1}{2} \quad 20. 16 \text{ oz} = 1 \text{ lb}, 12 \text{ oz} = (12 \div 16) \text{ lb} = 12 \times \frac{1}{16} \text{ lb} = \frac{12}{16} \text{ lb} = \frac{3}{4} \text{ lb}$$

$$21. \begin{array}{r} 6 \text{ gal } 3 \text{ qt} \\ + 4 \text{ gal } 1 \text{ qt} \\ \hline 10 \text{ gal } 4 \text{ qt}, 4 \text{ qt} = 1 \text{ gal}, 10 \text{ gal} + 1 \text{ gal} = 11 \text{ gal} \end{array}$$

$$22. \begin{array}{r} 4 \text{ ft } 8 \text{ in.} \rightarrow 3 \text{ ft } 20 \text{ in.} \\ - 1 \text{ ft } 9 \text{ in.} \rightarrow -1 \text{ ft } 9 \text{ in.} \\ \hline 2 \text{ ft } 11 \text{ in.} \end{array}$$

$$23. \begin{array}{r} 8 \text{ qt } 1 \text{ c} \rightarrow 7 \text{ qt } 5 \text{ c} \\ - 6 \text{ qt } 1 \text{ pt} \rightarrow -6 \text{ qt } 2 \text{ c} \\ \hline 1 \text{ qt } 3 \text{ c} \end{array}$$

$$24. \begin{array}{r} 7 \text{ ft } 3 \text{ in.} \rightarrow 6 \text{ ft } 15 \text{ in.} \\ - 5 \text{ ft } 8 \text{ in.} \rightarrow -5 \text{ ft } 8 \text{ in.} \\ \hline 1 \text{ ft } 7 \text{ in.} \end{array}$$

$$25. \begin{array}{r} 5,280 \\ \times 31 \\ \hline 5,280 \\ + 158,400 \\ \hline 163,680 \end{array}$$

163,680 ft > 38,000 ft; the Channel Tunnel is longer.

$$26. 12 \times 50 = 600; 600 \text{ in.} \quad 27. 18 \div 8 = 18 \times \frac{1}{8} = \frac{18}{8} = \frac{9}{4} = 2\frac{1}{4}; 2\frac{1}{4} > 2; 18 \text{ fl oz} > 2 \text{ c} \quad 28. 16 \times 3\frac{1}{2} = 16 \times \frac{7}{2} = 8 \times 7 = 56; 56 = 56; 3\frac{1}{2} \text{ lb} = 56 \text{ oz} \quad 29. 2,000 \times 1\frac{1}{2} = 2,000 \times \frac{3}{2} = 1,000 \times 3 = 3,000; 3,000 < 4,000;$$

$1\frac{1}{2} \text{ t} < 4,000 \text{ lb}$ **30.** Answers may vary. Sample: When following a recipe, you might need to convert pints to cups or cups to pints. **31.** $12 \times 16 = 192$, $60 \times 3 = 180$; Yes. You have 192 cups of punch and you need 180.

32. $34 \times 2 = 68$, $68 \div 36 = 68 \times \frac{1}{36} = \frac{68}{36} = \frac{68 \div 4}{36 \div 4} = \frac{17}{9}$, $\frac{17}{9} \text{ yd}$ **33.** $x = \text{yd}$; $y = \text{ft}$; since 3 ft = 1 yd, to convert 6 feet to yards, you can write $3x = 6$, and $x = 2$. So 6 ft = 2 yd. To convert 9 yards to feet, write $3 \times 9 = 27$; 9 yd = 27 ft. **34.** $80,000 \div 2,000 = 80,000 \times \frac{1}{2,000} = \frac{80,000}{2,000} = 40$; the maximum weight allowed for a truck is 40 t. **35.** The weight of A, B and C minus the weight of A and B will equal the weight of C. $29.5 - 14.5 = 15.0$. If you subtract the weight of C from the weight of B and C you will get the weight of B. $24 - 15 = 9$. If you subtract the weight of B from A and B you will get the weight of A. $14\frac{1}{2} - 9 = 5\frac{1}{2}$; A: $5\frac{1}{2} \text{ lb}$; B: 9 lb; C: 15 lb **36.** $7 \times 3 = 21$, $55 - 21 = 34$; Mrs. Kim spent \$34 while she was out; the correct choice is C. **37.** $100 \times 3 = 300$; a football field is 300 ft long.

$$\begin{array}{r} 17.6 \\ 300 \overline{)5,280.0} \\ \underline{-300} \\ 2280 \\ \underline{-2100} \\ 1800 \\ \underline{-1800} \\ 0 \end{array}$$

17.6 lengths of a football field would equal a mile; the correct choice is G. **38.** $24 = 2 \times 2 \times 2 \times 3$, $32 = 2 \times 2 \times 2 \times 2 \times 2$, $56 = 7 \times 2 \times 2 \times 2$; $2 \times 2 \times 2 = 8$; the greatest common factor between 24, 32, and 56 is 8; the correct choice is B. **39.** $8\frac{4}{7} - 3\frac{5}{14} = 8\frac{8}{14} - 3\frac{5}{14} = 5\frac{3}{14}$ **40.** $4\frac{3}{8} - 1\frac{5}{16} = 4\frac{6}{16} - 1\frac{5}{16} = 3\frac{1}{16}$ **41.** $7\frac{2}{9} - 5\frac{5}{6} = 7\frac{4}{18} - 5\frac{15}{18} = 6 + 1 + \frac{4}{18} - 5\frac{15}{18} = 6 + \frac{4}{18} + \frac{4}{18} - 5\frac{15}{18} = 6\frac{22}{18} - 5\frac{15}{18} = 1\frac{7}{18}$

ACTIVITY LAB

page 296

1–7. Check students' work.

CHECKPOINT QUIZ 2

page 296

$$1. \frac{2}{3}x = 7; \frac{2}{3} \times \frac{3}{2} \times x = 7 \times \frac{3}{2}; x = \frac{21}{2} = 10\frac{1}{2} \quad 2. \frac{1}{3} = \frac{5}{6}h, \frac{6}{5} \times \frac{1}{3} = \frac{6}{5} \times \frac{5}{6} \times h; h = \frac{6}{5} \times \frac{1}{3} = \frac{2}{5} \times \frac{1}{1} = \frac{2}{5} \quad 3. \frac{1}{2}m = 23, \frac{1}{2} \times 2 \times m = 23 \times 2; m = 46 \quad 4. \frac{b}{4} = \frac{2}{5}; \frac{1}{4}b = \frac{2}{5}; \frac{4}{1} \times \frac{1}{4}b = \frac{2}{5} \times \frac{1}{4}, b = \frac{8}{5} \text{ or } 1\frac{3}{5} \quad 5. \text{mile} \quad 6. \text{pound} \quad 7. 25 \div \frac{1}{2} + 1 = 25 \times 2 + 1 = 50 + 1 = 51; 51 \text{ markers}$$

TEST-TAKING STRATEGIES

page 297

1. $36\frac{1}{2} \approx 37$, $15\frac{3}{5} \approx 16$, $37 - 16 = 21$, D is too large and A is too small; $36\frac{1}{2} - 15\frac{3}{5} = \frac{73}{2} - \frac{78}{5} = \frac{365}{10} - \frac{156}{10} = \frac{209}{10} = 20\frac{9}{10}$; the truck weighs $20\frac{9}{10}$ tons; the correct choice is B. **2.** $86 \approx 90$, $53 \approx 50$, $90 - 50 = 40$, $40 \text{ in} \approx 3 \text{ ft}$, J is too large and F is too small; $86 - 53 = 33$, $33 \text{ in} \approx 3 \text{ ft}$; the distance between the person's head and the top of the door is 3 ft; the correct choice is H. **3.** 1 gal = 4 qt, 4 cups = 1 qt, so D is not enough to equal 2 gallons, and A will be too much; $4 \times 4 \times 2 = 16 \times 2 = 32$; 32 cups of juice are equivalent to 2 gallons; the correct choice is B.

CHAPTER REVIEW

pages 298–299

$$1. 3\frac{1}{3} \approx 3, 4\frac{1}{8} \approx 4, 3 \times 4 = 12 \quad 2. 5\frac{2}{3} \approx 6, 1\frac{5}{6} \approx 2, 6 \times 2 = 12 \quad 3. 8\frac{3}{8} \approx 8, 9\frac{11}{15} \approx 10, 8 \times 10 = 80 \quad 4. 7\frac{10}{23} \approx 7, 12\frac{3}{16} \approx 12, 7 \times 12 = 84 \quad 5. \frac{1}{2} \times \frac{3}{5} = \frac{3}{10} \quad 6. \frac{12}{13} \times \frac{1}{18} = \frac{2}{13} \times \frac{1}{3} = \frac{2}{39} \quad 7. \frac{7}{9} \times \frac{18}{35} = \frac{1}{1} \times \frac{2}{5} = \frac{2}{5} \quad 8. \frac{5}{8} \times 24 = \frac{5}{1} \times 3 = 15 \quad 9. 25 \times \frac{7}{10} = 5 \times \frac{7}{2} = \frac{35}{2} = 17\frac{1}{2} \quad 10. 5\frac{1}{6} \times \frac{3}{4} = \frac{31}{6} \times \frac{3}{4} = \frac{31}{2} \times \frac{1}{4} = \frac{31}{8} = 3\frac{7}{8} \quad 11. 3\frac{1}{3} \times 2\frac{2}{25} = \frac{10}{3} \times \frac{52}{25} = \frac{2}{3} \times \frac{52}{5} = \frac{104}{15} = 6\frac{14}{15} \quad 12. 4\frac{5}{11} \times 4\frac{9}{14} = \frac{49}{11} \times \frac{65}{14} = \frac{7}{11} \times \frac{65}{2} = \frac{455}{22} = 20\frac{15}{22} \quad 13. \frac{2}{3} \times \frac{1}{2} = \frac{1}{3} \times \frac{1}{1} = \frac{1}{3}; you need $\frac{1}{3}$ cup of peaches to make $\frac{1}{2}$ of the original recipe. **14.** $8 \div \frac{1}{2} = 8 \times 2 = 16$ **15.** $4 \div \frac{12}{17} = 4 \times \frac{17}{12} = 1 \times \frac{17}{3} = \frac{17}{3} = 5\frac{2}{3}$ **16.** $\frac{3}{11} \div \frac{3}{5} = \frac{3}{11} \times \frac{5}{3} = \frac{1}{11} \times \frac{5}{1} = \frac{5}{11}$ **17.** $\frac{5}{6} \div \frac{15}{16} = \frac{5}{6} \times \frac{16}{15} = \frac{1}{6} \times \frac{16}{3} = \frac{16}{18} = \frac{8}{9}$ **18.** $\frac{4}{7} \div \frac{2}{5} = \frac{4}{7} \times \frac{5}{2} = \frac{2}{7} \times \frac{5}{1} = \frac{10}{7} = 1\frac{3}{7}$ **19.** $\frac{18}{25} \div 9 = \frac{18}{25} \times \frac{1}{9} = \frac{2}{25} \times \frac{1}{1} = \frac{2}{25}$ **20.** $3\frac{3}{4} \div \frac{13}{15} = \frac{15}{4} \div \frac{13}{15} = \frac{15}{4} \times \frac{15}{13} = \frac{225}{52} = 4\frac{17}{52}$$$

21. $4\frac{1}{7} \div \frac{1}{3} = \frac{29}{7} \div \frac{1}{3} = \frac{29}{7} \times \frac{3}{1} = \frac{87}{7} = 12\frac{3}{7}$
 22. $3\frac{1}{3} \div \frac{1}{6} = \frac{10}{3} \div \frac{1}{6} = \frac{10}{3} \times 6 = \frac{10}{1} \times 2 = 20$; you can pick 20 buckets of tomatoes in $3\frac{1}{3}$ hours.
 23. $2\frac{1}{5} \approx 2, 2\frac{1}{3} \approx 2, 2 \div 2 = 1; \frac{11}{5} \div \frac{7}{3} = \frac{11}{5} \times \frac{3}{7} = \frac{33}{35}$
 24. $8\frac{2}{3} \approx 9, 3\frac{2}{11} \approx 3, 9 \div 3 = 3$;
 $\frac{26}{3} \div \frac{35}{11} = \frac{26}{3} \times \frac{11}{35} = \frac{286}{105} = 2\frac{76}{105}$
 25. $12\frac{2}{7} \approx 12, 3\frac{5}{9} \approx 4, 12 \div 4 = 3$;
 $\frac{86}{7} \div \frac{32}{9} = \frac{86}{7} \times \frac{9}{32} = \frac{43}{7} \times \frac{9}{16} = \frac{387}{112} = 3\frac{51}{112}$
 26. $13\frac{1}{2} \approx 14, 7\frac{5}{16} \approx 7, 14 \div 7 = 2; \frac{27}{2} \div \frac{117}{16} = \frac{27}{2} \times \frac{16}{117} = \frac{27}{1} \times \frac{5}{117} = \frac{216}{117} = 1\frac{99}{117}$
 27. $6\frac{1}{2} \div \frac{1}{3} = \frac{13}{2} \times \frac{3}{1} = \frac{39}{2} = 19\frac{1}{2}$; about 19 appointments
 28. $\frac{m}{6} = 16, \frac{m}{6} \times 6 = 16 \times 6; m = 96$
 29. $\frac{2}{5}x = 10, \frac{2}{5} \times \frac{5}{2} \times x = 10 \times \frac{5}{2}; x = 5 \times \frac{5}{1} = 25$
 30. $\frac{3}{8}k = \frac{3}{4}, \frac{3}{8} \times \frac{8}{3} \times k = \frac{3}{4} \times \frac{8}{3}; k = \frac{1}{1} \times \frac{2}{1} = 2$
 31. $\frac{6}{7}y = \frac{9}{14}, \frac{6}{7} \times \frac{7}{6} \times y = \frac{9}{14} \times \frac{7}{6}; y = \frac{3}{2} \times \frac{1}{2} = \frac{3}{4}$
 32. $\frac{5}{6}z = 3\frac{1}{6}, \frac{5}{6} \times \frac{6}{5} \times z = \frac{10}{3} \times \frac{6}{5}; z = \frac{2}{1} \times \frac{2}{1} = 4$
 33. $\frac{4}{5}w = 1\frac{3}{5}, \frac{4}{5} \times \frac{5}{4} \times w = \frac{8}{5} \times \frac{5}{4}; w = \frac{2}{1} \times \frac{1}{1} = 2$
 34. $\frac{2}{3}x = 4\frac{2}{3}, \frac{2}{3} \times \frac{3}{2} \times x = \frac{24}{5} \times \frac{3}{2} = \frac{12}{5} \times \frac{3}{1}; x = \frac{36}{5} = 7\frac{1}{5}$
 35. $5a = 1\frac{3}{10}, 5 \times \frac{1}{5} \times a = \frac{13}{10} \times \frac{1}{5}; a = \frac{13}{50}$ 36. A car is heavy, so use the largest weight; tons. 37. A can of soda is less than a quart; fluid ounces. 38. 880 in. = $880 \times \frac{1}{12} = \frac{880}{12} \times \frac{1}{12} = \frac{220}{3} = 73\frac{1}{3}$ ft; $73\frac{1}{3}$ 39. $2\frac{1}{2}$ gal = $2\frac{1}{2} \times 16 = \frac{5}{2} \times \frac{16}{1} = 40$ c; 40 40. 12,000 lb = $12,000 \div 2,000 = 6$ t; 6 41. 1 yd = 3 ft; 50 yd = (3×50) ft; 50 yd = 150 ft; 150 ft

CHAPTER TEST

page 300

1. $4\frac{2}{3} \approx 5, 1\frac{2}{7} \approx 1, 5 \times 1 = 5$ 2. $5\frac{3}{4} \approx 6, 7\frac{4}{9} \approx 7, 6 \times 7 = 42$
 3. $2\frac{1}{2} \approx 3, \frac{11}{19} \approx 1, 3 \times 1 = 3$ 4. $9\frac{1}{8} \approx 9, 2\frac{5}{6} \approx 3, 9 \times 3 = 27$
 5. $\frac{3}{8}$ of 32 = $\frac{3}{8} \times 32 = \frac{3}{8} \times \frac{32}{1} = 12$ 6. $\frac{5}{6} \times \frac{12}{25} = \frac{1}{1} \times \frac{2}{5} = \frac{2}{5}$
 7. $\frac{7}{9} \times 5\frac{4}{7} = \frac{7}{9} \times \frac{39}{7} = \frac{1}{9} \times \frac{39}{1} = \frac{39}{9} = 4\frac{3}{9} = 4\frac{1}{3}$
 8. $3\frac{1}{3} \times 2\frac{3}{4} = \frac{10}{3} \times \frac{11}{4} = \frac{5}{3} \times \frac{11}{2} = \frac{55}{6} = 9\frac{1}{6}$
 9. $12 \times \frac{3}{4} = 3 \times \frac{3}{1} = 9$; 9 ft 10. $96 \times 1\frac{7}{8} = 96 \times \frac{15}{8} = 12 \times \frac{15}{1} = 180$; 180 lb 11. $15 \div \frac{9}{11} = 15 \times \frac{11}{9} = 5 \times \frac{11}{3} = \frac{55}{3} = 18\frac{1}{3}$ 12. $\frac{2}{5} \div \frac{8}{25} = \frac{2}{5} \times \frac{25}{8} = \frac{1}{1} \times \frac{5}{4} = \frac{5}{4} = 1\frac{1}{4}$
 13. $\frac{5}{7} \div 25 = \frac{5}{7} \times \frac{1}{25} = \frac{1}{7} \times \frac{1}{5} = \frac{1}{35}$ 14. $6\frac{3}{4} \div 4\frac{1}{2} = \frac{27}{4} \div \frac{9}{2} = \frac{27}{4} \times \frac{2}{9} = \frac{3}{2} \times \frac{1}{1} = \frac{3}{2} = 1\frac{1}{2}$ 15. $10\frac{4}{17} \approx 10, 4\frac{5}{9} \approx 5, 10 \div 5 = 2$ 16. $30\frac{2}{7} \approx 30, 15\frac{1}{10} \approx 15, 30 \div 15 = 2$
 17. $1\frac{1}{4}x = 27\frac{1}{2}, \frac{5}{4}x = \frac{55}{2}, \frac{5}{4} \times \frac{4}{5}x = \frac{4}{5} \times \frac{55}{2}; x = 22$; 22 volumes 18. $\frac{1}{3}x = 5, \frac{1}{3} \times 3 \times x = 5 \times 3; x = 15$
 19. $\frac{2}{3}x = \frac{7}{24}, \frac{2}{3} \times \frac{3}{2} \times x = \frac{7}{24} \times \frac{3}{2}; x = \frac{7}{8} \times \frac{1}{2} = \frac{7}{16}$
 20. $\frac{1}{3}x = 3\frac{1}{3}, \frac{1}{3} \times 3 \times x = \frac{22}{7} \times 3; x = \frac{66}{7} = 9\frac{3}{7}$
 21. $\frac{1}{3}x = 8, \frac{1}{3} \times 3 \times x = 8 \times 3; x = 24$ 22. 63,360 in. =

- $63,360 \times \frac{1}{12} \text{ ft} = 5,280 \text{ ft}; 5,280 \text{ ft} = 1 \text{ mi}$ 23. 1 gal = 4 qt; $36\frac{1}{2} \text{ quarts} = (36\frac{1}{2} \div 4) \text{ gal} = \frac{73}{2} \times \frac{1}{4} = \frac{73}{8} = 9\frac{1}{8}; 9\frac{1}{8} \text{ gal}$
 24. $\frac{5}{6}d = 2, \frac{5}{6} \times \frac{6}{5} \times d = 2 \times \frac{6}{5} = \frac{12}{5} = 2\frac{2}{5}; 2\frac{2}{5} \text{ mi}$
 25. $1\frac{1}{3} \times 18 = \frac{4}{3} \times 18 = \frac{4}{1} \times 6 = 24; 24 + 18 = 42$;
 42 people 26. $5\frac{3}{4} \div 3 = \frac{23}{4} \div 3 = \frac{23}{4} \times \frac{1}{3} = \frac{23}{12} = 1\frac{11}{12}; 1\frac{11}{12} \text{ yd}$ 27. $150 \times 16 = 150 \times (10 + 6) = (150 \times 10) + (150 \times 6) = 1500 + 900 = 2,400$; 2,400 oz 28. 4 qt per 1 gal; $\frac{15}{4} = 3\frac{3}{4}$; 15 qt > $3\frac{1}{2}$ gal 29. $\frac{16}{16} = 1$; 16 fl oz = 1 pt
 30. Answers may vary. Sample: Multiply: $5 \times 7 = 35$ and $5 \times \frac{2}{5} = 2$; $35 + 2 = 37$. 31a. An airplane is heavy, so use the largest unit of weight; tons. 31b. A soccer field is measured in yards; yards. 31c. A bathtub holds lots of water, so measure it in the largest unit of capacity; gallons. 31d. A mouthful holds less than a cup; fluid ounces 31e. A mouse weighs less than a pound; ounces. 31f. The length of a baby's foot is usually more than 1 inch, and the length of an adult's foot is usually less than 2 feet. Answers may vary. Sample: inches.

TEST PREP

pages 301

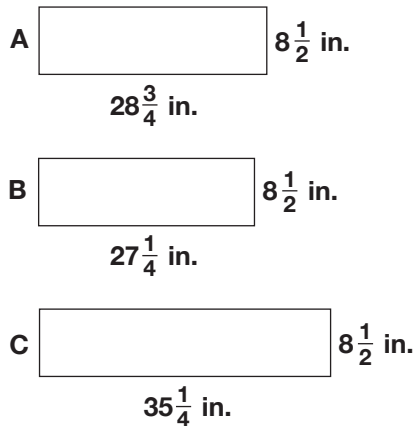
1. You need 1 cup flour, $\frac{1}{2}$ cup salt, and 1 cup water. $1 + \frac{1}{2} + 1 = 2\frac{1}{2}$; the correct choice is C. 2. $\frac{1}{2}$ cup salt is used for 1 batch, so for $\frac{1}{2}$ batch you would use $\frac{1}{2} \cdot \frac{1}{2}$, or $\frac{1}{4}$ cup; the correct choice is F.
 3. $\frac{1}{2} \cdot x = 1$
 $\frac{3}{2}x = 1$
 $\frac{2}{3} \cdot \frac{3}{2}x = \frac{2}{3} \cdot 1$
 $x = \frac{2}{3}$; the correct choice is C.
 4. There are 48 teaspoons in 1 cup. $1\frac{1}{2} \div 48 = \frac{3}{2} \div \frac{48}{1} = \frac{3}{2} \cdot \frac{1}{48} = \frac{1}{2} \cdot \frac{1}{16} = \frac{1}{32}$; the correct choice is F. 5. There were $4 + 2 + 6$, or 12 computer games in the box and Lisa picked 2 of them. $\frac{2}{12} = \frac{1}{6}$; the correct choice is A.
 6. Lenny bought $\frac{6}{12}$, or $\frac{1}{2}$ of the games. $\frac{1}{2}$ of 18 is $\frac{1}{2} \cdot 18$, or \$9; the correct choice is H. 7. Lisa bought $\frac{2}{12}$, or $\frac{1}{6}$ of the games. $\frac{1}{6}$ of 18 is $\frac{1}{6} \cdot 18$, or \$3; the correct choice is A.
 8. Lenny and Carlos picked $\frac{4+6}{12} = \frac{10}{12}$, or $\frac{5}{6}$ of the games; the correct choice is H.

DK PROBLEM SOLVING APPLICATION

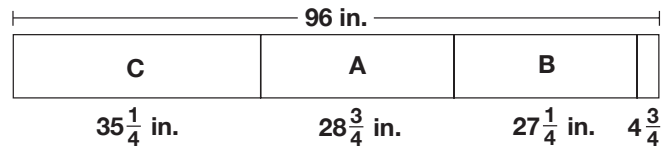
pages 302–303

1. The total space between shelves is the total height minus the 4 shelf widths: $36\frac{3}{4} - 4 \times \frac{3}{4} = 36\frac{3}{4} - 3 = 33\frac{3}{4}$, or $33\frac{3}{4}$ in. So, $3h = 33\frac{3}{4}; h = 33\frac{3}{4} \div 3 = 11\frac{1}{4}$, or $11\frac{1}{4}$ in.
 2. The top and bottom boards are the entire width of the trophy case, which is $28\frac{3}{4}$ in. The shelves are the total width of the case minus 2 side widths: $28\frac{3}{4} - 2 \times \frac{3}{4} =$

$28\frac{3}{4} - \frac{6}{4} = 28\frac{3}{4} - 1\frac{2}{4} = 27\frac{1}{4}$, or $27\frac{1}{4}$ in. The sides are the total height of the case minus 2 shelf widths for the top and bottom shelves:
 $36\frac{3}{4} - 2 \times \frac{3}{4} = 36\frac{3}{4} - 1\frac{2}{4} = 35\frac{1}{4}$, or $35\frac{1}{4}$ in. So,
 $A = 28\frac{3}{4}$ in.,
 $B = 27\frac{1}{4}$ in., and
 $C = 35\frac{1}{4}$ in.



3a. From Exercise 2, you need 2 boards that are $28\frac{3}{4}$ in., or 2 ft $4\frac{3}{4}$ in. long for the top and bottom; you need 2 boards that are $27\frac{1}{4}$ in., or 2 ft $3\frac{1}{4}$ in. long for the inside shelves; and you need 2 boards that are $35\frac{1}{4}$, or 2 ft $11\frac{1}{4}$ in. long for the top and bottom shelves. Since $2\text{ ft } 4\frac{3}{4}\text{ in.} + 2\text{ ft } 3\frac{1}{4}\text{ in.} + 2\text{ ft } 11\frac{1}{4}\text{ in.} = 6\text{ ft } 19\frac{1}{4}\text{ in.}$, or $7\text{ ft } 7\frac{1}{4}\text{ in.}$, one each of the three different needed lengths can be cut from one 8-ft board. Since 2 of each length is needed, the number of 8-ft boards needed is 2.



3b. Since you need two 8-ft boards, the total cost is $8 \times 2 \times 3.25 = 52$, or \$52.00.

CHECK YOUR READINESS

page 304

- $n \div 8 = 6$
 $n \div 8 \times 8 = 6 \times 8$
 $n = 48$
- $\frac{n}{7} = 6$
 $\frac{7}{1} \times \frac{n}{7} = 6 \times \frac{7}{1}$
 $n = 42$
- $3 \times n = 72$
 $3 \times n \div 3 = 72 \div 3$
 $n = 24$
- $6n = 54$
 $6 \times n \div 6 = 54 \div 6$
 $n = 9$
- $\frac{10}{25} = \frac{10 \div 5}{25 \div 5} = \frac{2}{5}$
- $\frac{20}{44} = \frac{20 \div 4}{44 \div 4} = \frac{5}{11}$
- $\frac{34}{51} = \frac{34 \div 17}{51 \div 17} = \frac{2}{3}$
- $\frac{27}{81} = \frac{27 \div 27}{81 \div 27} = \frac{1}{3}$
- $\frac{7}{9} = \frac{28}{36}$, $\frac{3}{4} = \frac{27}{36}$, $28 > 27$; $\frac{7}{9} > \frac{3}{4}$
- $\frac{2}{3} = \frac{10}{15}$, $\frac{3}{5} = \frac{9}{15}$, $10 > 9$; $\frac{2}{3} > \frac{3}{5}$
- $\frac{12}{15} = \frac{36}{45}$, $\frac{12}{9} = \frac{60}{45}$, $36 < 60$;
 $\frac{12}{15} < \frac{12}{9}$
- $\frac{24}{48} = \frac{1}{2}$, $\frac{1}{2} = \frac{1}{2}$, $\frac{24}{48} = \frac{1}{2}$
- $\frac{4}{7} \times \frac{2}{3} = \frac{4 \times 2}{7 \times 3} = \frac{8}{21}$
- $\frac{12}{14} \times \frac{7}{12} = \frac{1}{2} \times \frac{1}{1} = \frac{1}{2}$
- $\frac{1}{2} \times \frac{1}{1} = \frac{1}{2}$
- $\frac{7}{9} \div \frac{1}{5} = \frac{7}{9} \times \frac{5}{1} = \frac{35}{9}$, or $3\frac{8}{9}$
- $\frac{11}{12} \div \frac{2}{9} = \frac{11}{12} \times \frac{9}{2} = \frac{11}{4} \times \frac{3}{2} = \frac{33}{8}$, or $4\frac{1}{8}$

7-1 Ratios

pages 306–309

Check Skills You'll Need For complete solutions see *Daily Skills Check and Lesson Quiz Transparencies or Presentation Pro CD-ROM*. 1. A fraction is in simplest form when the numerator and denominator have only a common factor of 1. 2. $\frac{1}{3}$ 3. $\frac{2}{3}$ 4. $\frac{2}{9}$ 5. $\frac{1}{16}$

Quick Check 1a. pretzels (2) to cereal (4); 2 to 4, $2 : 4$, $\frac{2}{4}$

1b. pretzels (2) to party mix (6); 2 to 6, $2 : 6$, $\frac{2}{6}$

2a–c. Answers may vary. Samples are given **2a.** Divide each term by 5; $\frac{10}{35} = \frac{2}{7}$; multiply each term by 2; $\frac{2}{7} = \frac{4}{14}$; 2 to 7, 4 to 14 **2b.** $12 : 3$ is $\frac{12}{3}$, $\frac{12}{3} = \frac{4}{1}$; 4 : 1; multiply each term by 2; 8 : 2; 4 to 1, 8 to 2 **2c.** 8 to 22 is $\frac{8}{22}$, $\frac{8}{22} = \frac{4}{11}$; 4 to 11; multiply each term by 3; 12 to 33; 4 to 11, 12 to 33

3. 3 cups to 24 quarts is $\frac{3}{24}$, $\frac{3}{24} = \frac{1}{8}$; 1 : 8

Exercises 1. $\frac{9}{5}$ is a comparison of two numbers by division; $1\frac{4}{5}$ is not **2.** $6 : 10 = 6$ to 10 ; $6 : 10 = \frac{6}{10} = \frac{3}{5}$; multiply each term by 2; $6 : 10 = 12 : 20$; answer: $\frac{8}{12}$; 4 to 8 **3.** cups (6) to bowls (5); 6 to 5; D **4.** coasters (4) to blue cups (2); 4 to 2; $\frac{4}{2} \div \frac{2}{2} = 2$ to 1; B **5.** yellow cups (2) to blue bowls (3); 2 to 3; C **6.** bowls (5) to total number of items (15); 5 to 15; $\frac{5}{15} \div \frac{5}{5} = 1$ to 3; A **7.** students (35) to adults (24); 35 to 24; $\frac{35}{24}$ **8.** adults (24) to seniors (11); 24 to 11; $\frac{24}{11}$ **9.** seniors (11) to total (70); 11 to 70; $\frac{11}{70}$ **10–13.** Answers may vary.

Samples are given **10.** 6 to 18 is $\frac{6}{18}$; divide each term by 2 to get $\frac{3}{9}$, or 3 to 9; multiply each term by 3 to get $\frac{18}{54}$ or 18 to 54; 3 to 9, 18 to 54 **11.** $\frac{4}{14}$; divide each term by 2 to

get $\frac{2}{7}$; multiply each term by 4 to get $\frac{16}{56}$, $\frac{2}{7} = \frac{16}{56}$ **12.** 8 : 10 is $\frac{8}{10}$; divide each term by 2 to get $\frac{4}{5}$, or 4 : 5; multiply each term by 2 to get $\frac{16}{20}$, or 16 : 20; 4 : 5, 16 : 20 **13.** $\frac{30}{40}$; divide each term by 10 to get $\frac{3}{4}$; divide each term by 5 to get $\frac{6}{8}$; $\frac{3}{4}$, $\frac{6}{8}$ **14.** $\frac{6}{15} = \frac{6 \div 3}{15 \div 3} = \frac{2}{5}$ **15.** 40 : 30 is $\frac{40}{30}$, $\frac{40}{30} = \frac{40 \div 10}{30 \div 10} = \frac{4}{3}$, or 4 : 3 **16.** 42 to 50 is $\frac{42}{50}$, $\frac{42}{50} = \frac{42 \div 2}{50 \div 2} = \frac{21}{25}$, or 21 to 25 **17.** $\frac{14}{42} = \frac{14 \div 14}{42 \div 14} = \frac{1}{3}$ **18.** 9 to 81 is $\frac{9}{81}$, $\frac{9}{81} = \frac{9 \div 9}{81 \div 9} = \frac{1}{9}$, or 1 to 9 **19.** 75 : 15 is $\frac{75}{15}$, $\frac{75}{15} = \frac{75 \div 15}{15 \div 15} = \frac{5}{1}$, or 5 : 1 **20.** 8 : 36 is $\frac{8}{36}$, $\frac{8}{36} = \frac{8 \div 4}{36 \div 4} = \frac{2}{9}$, or 2 : 9 **21.** 18 to 12 is $\frac{18}{12}$, $\frac{18}{12} = \frac{18 \div 6}{12 \div 6} = \frac{3}{2}$, or 3 to 2 **22.** You know half of the marbles are black, so use this to find out how many total marbles there are: $30 \times 2 = 60$ marbles; subtract the number of black and white marbles from the total number of marbles to find out how many red marbles there are: $60 - 30 - 20 = 10$; 20 : 10 = 2 : 1 **23.** $\frac{6}{9} = \frac{6 \div 3}{9 \div 3} = \frac{2}{3}$; 2 **24.** $\frac{32}{90} = \frac{32 \div 2}{90 \div 2} = \frac{16}{45}$; 16 : 45 **25.** 4 to 6 is $\frac{4}{6}$, $\frac{4}{6} = \frac{4 \times 4}{6 \times 4} = \frac{16}{24}$; 16 : 24 **26.** $\frac{50}{50} = \frac{50 \div 50}{50 \div 50} = \frac{1}{1}$ **27.** 50 : 150 is $\frac{50}{150}$, $\frac{50}{150} = \frac{50 \div 50}{150 \div 50} = \frac{1}{3}$; 1 : 3 **28.** $\frac{72}{24} = \frac{72 \div 24}{24 \div 24} = \frac{3}{1}$; 3 **29.** Find the number of teeth an adult cat has: $42 - 12 = 30$; 30 to 42 is $\frac{30}{42}$, $\frac{30}{42} = \frac{5}{7}$; 5 : 7 **30.** Divide each number by their GCF, 8 **31.** Yes; $\frac{14}{20} = \frac{14 \div 2}{20 \div 2} = \frac{7}{10}$; 14 to 20 is equivalent to $\frac{7}{10}$ **32.** Check students' work **33.** $8x : 16x = \frac{8x}{16x} = \frac{8x \div 8x}{16x \div 8x} = \frac{1}{2} = 1 : 2$ **34.** 128 to 96 is $\frac{128}{96}$, $\frac{128}{96} = \frac{128 \div 32}{96 \div 32} = \frac{4}{3}$; the correct choice is B **35.** Find the multiples of 48: 48, 96, 144, 192, 240. . . ; find the multiples of 60: 60, 120, 180, 240. . . ; the correct choice is H **36.** There are 8 ounces in 1 cup; $\frac{12}{8} = \frac{3}{2} = 1\frac{1}{2}$ cups; the correct choice is C **37.** $\frac{2}{5} \times \frac{3}{7} = \frac{2 \times 3}{5 \times 7} = \frac{6}{35}$ **38.** $\frac{3}{4} \times \frac{5}{8} = \frac{3 \times 5}{4 \times 8} = \frac{15}{32}$ **39.** $\frac{1}{6}$ of $\frac{3}{5} = \frac{1}{6} \times \frac{3}{5} = \frac{1 \times 3}{6 \times 5} = \frac{3}{30} = \frac{1}{10}$ **40.** $\frac{3}{16} \times \frac{16}{21} = \frac{3}{1} \times \frac{1}{21} = \frac{3 \times 1}{1 \times 21} = \frac{3}{21} = \frac{1}{7}$

ACTIVITY LAB

page 310

1. 3 : 5; 3 to 5; $\frac{3}{5}$



2. 7 : 10; 7 to 10; $\frac{7}{10}$



3. 1 : 4; 1 to 4; $\frac{1}{4}$



4. Answers may vary. Sample: Blue jays to goldfinches, 7 : 9; blue jays to all birds, 7 : 16; goldfinches to all birds, 9 : 16 **5.** To find the total number of parts, you would

add the number of parts in the ratio. In Example 1, there are 4 oranges and 2 lemons, so the total number of parts is $4 + 2$, or 6 parts **6**. No; the ratio may be simplified, so the total could be any multiple of 14.

VOCABULARY BUILDER

page 311

1. Check students' work. **2a.** fruit **2b.** vegetable **2c.** vegetable **2d.** fruit **2e.** vegetable **3.** Answers may vary. Sample: A fruit salad contains fruits, such as apples and bananas. A vegetable salad contains vegetables, such as lettuce and carrots **4.** Answers may vary. Sample: A ratio is a comparison of two numbers by division **5a.** $\frac{1}{2} = \frac{1 \times 3}{2 \times 3} = \frac{3}{6}$, $\frac{3}{6} = \frac{3}{6}$; equal **5b.** $\frac{2}{5} = \frac{2 \times 2}{5 \times 2} = \frac{4}{10}$, $\frac{4}{10} = \frac{4}{10}$; equal **5c.** $\frac{5}{6} = \frac{5 \times 2}{6 \times 2} = \frac{10}{12}$, $\frac{10}{12} \neq \frac{1}{12}$; unequal **5d.** $\frac{1}{3} = \frac{1 \times 3}{3 \times 3} = \frac{3}{9}$, $\frac{3}{9} = \frac{3}{9}$; equal **6.** Check students' work.

7-2 Unit Rates

pages 312–315

Check Skills You'll Need For complete solutions see *Daily Skills Check and Lesson Quiz Transparencies* or *Presentation Pro CD-ROM*. **1.** division **2.** 4 **3.** 4 **4.** 5 **5.** 6

Quick Check 1. \$2.37 for 3 pounds is $\frac{\$2.37}{3 \text{ pounds}}$; $\frac{\$2.37 \div 3}{3 \text{ pounds} \div 3} = \frac{\$0.79}{1 \text{ pound}}$, or \$0.79 per pound **2.** Divide \$.68 by 6 to get \$.11 per ounce to the nearest cent and divide \$2.89 by 32 to get \$.09 per ounce to the nearest cent; the 32-ounce container **3a.** $\frac{\$5.25}{1 \text{ hour} \times 5} = \frac{\$26.25}{5 \text{ hours}}$; \$26.25 in 5 hours **3b.** $\frac{25 \text{ words}}{1 \text{ minute} \times 10} = \frac{250 \text{ words}}{10 \text{ minutes}}$; 250 words in 10 minutes.

Exercises 1. $\frac{12 \text{ inches}}{1 \text{ foot}}$ is a unit rate because it has 1 in the denominator. **2.** $\frac{210 \text{ heartbeats}}{3 \text{ minutes}} = 210 \div 3 = 70$; 70 heartbeats per minute **3.** $\frac{\$3.84}{6 \text{ peaches}} = \$3.84 \div 6 = \$.64$; the correct choice is C. **4.** $\frac{\$1.96}{4 \text{ bananas}} = \$1.96 \div 4 = \$.49$; the correct choice is A. **5.** $\frac{\$2.16}{3 \text{ oranges}} = \$2.16 \div 3 = \$.72$; the correct choice is D. **6.** $\frac{\$2.90}{5 \text{ pears}} = \$2.90 \div 5 = \$.58$; the correct choice is B. **7.** $\frac{92 \text{ desks}}{4 \text{ classrooms}} = 92 \div 4 = 23$; 23 desks per classroom **8.** $\frac{\$19.50}{3 \text{ shirts}} = \$19.50 \div 3 = \$6.50$; \$6.50 per shirt **9.** $\frac{45 \text{ miles}}{5 \text{ hours}} = 45 \div 5 = 9$; 9 miles per hour **10.** $\frac{\$29.85}{3 \text{ presents}} = \$29.85 \div 3 = \$9.95$; \$9.95 per present **11.** Divide \$2.39 by 16 to get \$.15 per ounce to the nearest cent and divide \$3.19 by 20 to get \$.16 per ounce to the nearest cent; the 16-oz box for \$2.39 is the better buy. **12.** Divide \$2.07 by 48 to get \$.04 per ounce to the nearest cent and divide \$1.64 by 32 to get \$.05 per ounce to the nearest cent; 48 oz for \$2.07 is the better buy. **13.** Divide \$1.89 by 3 to get \$.63 per pound and divide \$.79 by 1 to get \$.79 per pound; 3 pounds for \$1.89 is the better buy. **14.** $\frac{\$6.75}{1 \text{ book}}$, $\frac{\$6.75 \times 8}{8 \text{ books}}$; \$54 for 8 books **15.** $\frac{3 \text{ feet}}{1 \text{ yard}}$, $\frac{3 \text{ feet} \times 15}{15 \text{ yards}}$; 45 feet in 15 yards **16.** $\frac{45 \text{ students}}{1 \text{ bus}}$; $\frac{45 \text{ students} \times 5}{5 \text{ buses}}$; 225 students in 5 buses **17.** Calculate your unit rate: $\frac{\$44.55}{9 \text{ hours}} = \frac{\$4.45}{1 \text{ hour}}$; calculate your friend's unit rate:

$\frac{\$51}{12 \text{ hours}} = \frac{\$4.95}{1 \text{ hour}}$; $\$4.95 \times 20 + \$4.25 \times 20 = \$99 + \$85 = \$184$ **18.** $\frac{60 \text{ pages}}{2 \text{ hours}} = \frac{30 \text{ pages}}{1 \text{ hour}}$; $\frac{99 \text{ pages}}{3 \text{ hours}} = \frac{33 \text{ pages}}{1 \text{ hour}}$; 99 pages in 3 hours **19.** $\frac{110 \text{ words}}{5 \text{ minutes}} = \frac{22 \text{ words}}{1 \text{ minute}}$; $\frac{208 \text{ words}}{8 \text{ minutes}} = \frac{26 \text{ words}}{1 \text{ minute}}$; 208 words in 8 minutes **20.** $\frac{18 \text{ miles}}{2 \text{ hours}} = \frac{9 \text{ miles}}{1 \text{ hour}}$; $\frac{18 \text{ miles}}{2 \text{ hours}} = \frac{9 \text{ miles}}{1 \text{ hour}}$; 33 miles in 3 hours **21.** $\frac{81 \text{ points}}{9 \text{ games}} = \frac{9 \text{ points}}{1 \text{ game}}$; $\frac{132 \text{ points}}{12 \text{ games}} = \frac{11 \text{ points}}{1 \text{ game}}$; 132 points in 12 games **22a.** $\frac{255 \text{ jumps}}{3 \text{ minutes}} = \frac{85 \text{ jumps}}{1 \text{ minute}}$ **22b.** $\frac{882 \text{ jumps}}{3 \text{ minutes}} = \frac{294 \text{ jumps}}{1 \text{ minute}}$ **22c.** Subtract the unit rates; the world record holder jumped $294 - 85$, or 209 more times per minute. **23.** About 28 miles per gallon; answers may vary. Sample: I rounded 279.9 to 280, and 9.8 to 10, then I divided 280 by 10. **24.** Answers may vary. Sample: A car's speed is given in miles per hour. **25.** Divide 2,750 miles by 5 hours to get 550 miles per hour; $\frac{550 \text{ miles}}{1 \text{ hour}} \times \frac{1 \text{ hour}}{60 \text{ minutes}} \times \frac{1 \text{ minute}}{60 \text{ seconds}} \approx 0.15 \text{ mi/s}$ **26.** $\frac{54}{18} = \frac{3}{1}$; the correct choice is B. **27.** $6 : 3 = 2 : 1$; the correct choice is H. **28.** $4\frac{2}{3} \div 1\frac{3}{4} = \frac{14}{3} \div \frac{7}{4} = \frac{14}{3} \times \frac{4}{7} = \frac{8}{3}$, or $2\frac{2}{3}$. **29.** $6\frac{1}{4} \div 2\frac{1}{2} = \frac{25}{4} \div \frac{5}{2} = \frac{25}{4} \times \frac{2}{5} = \frac{5}{2}$, or $2\frac{1}{2}$ **30.** $2\frac{2}{5} \div 7\frac{1}{5} = \frac{12}{5} \div \frac{36}{5} = \frac{12}{5} \times \frac{5}{36} = \frac{1}{3}$

7-3 Understanding Proportions

pages 316–319

Check Skills You'll Need For complete solutions see *Daily Skills Check and Lesson Quiz Transparencies* or *Presentation Pro CD-ROM*. **1.** You see whether the two fractions are equal or whether one is greater. **2.** $<$ **3.** $=$ **4.** $<$ **5.** $<$

Quick Check 1. No; $\frac{8}{5} = \frac{8 \times 4}{5 \times 4} = \frac{32}{20}$, which does not equal $\frac{36}{20}$. **2.** No; $\frac{1}{12}$ and $\frac{3}{26}$ are not equal. $\frac{1}{12} \neq \frac{3}{26}$; $3 \times 12 \neq 1 \times 26$; $36 \neq 26$

Exercises 1. The cross products are equal **2.** Answers may vary. Sample: If both fractions are reduced to simplest form, they both equal $\frac{1}{4}$ **3.** Answers may vary. Sample: $\frac{2}{5}$, $\frac{4}{10}$, $\frac{6}{15}$, $\frac{24}{60}$ **4.** In a proportion, the cross products of the ratios are equal. This is true for choices A, C, and D. For choice B: $\frac{9}{4} \neq \frac{3}{2}$; $9 \times 2 \neq 4 \times 3$; $18 \neq 12$. The correct answer is choice B. **5.** yes; $\frac{1}{2} = \frac{1 \times 50}{2 \times 50} = \frac{50}{100}$. **6.** no; $\frac{10}{20} = \frac{10 \times 2}{20 \times 2} = \frac{20}{40}$, which does not equal $\frac{30}{40}$ **7.** no; $\frac{4}{12} = \frac{1}{3}$ but $\frac{6}{8} = \frac{3}{4}$ **8.** yes; $42 \div 6 = 7$ and $504 \div 72 = 7$ **9.** yes; $\frac{9}{11} = \frac{9 \times 7}{11 \times 7} = \frac{63}{77}$ **10.** yes; $\frac{72}{27} = \frac{72 \div 9}{27 \div 9} = \frac{8}{3}$ **11.** no; $\frac{4}{9} = \frac{4 \times 3}{9 \times 3} = \frac{12}{27}$, which does not equal $\frac{16}{27}$ **12.** no; $\frac{3}{2} = \frac{3 \times 8}{2 \times 8} = \frac{24}{16}$, which does not equal $\frac{22}{16}$ **13.** yes; $\frac{4}{12} = \frac{1}{3}$ and $\frac{3}{9} = \frac{1}{3}$ **14.** yes; $\frac{32}{80} = \frac{32 \div 8}{80 \div 8} = \frac{4}{10}$ **15.** no; $\frac{5}{7} = \frac{5 \times 10}{7 \times 10} = \frac{50}{70}$, $\frac{8}{10} = \frac{8 \times 7}{10 \times 7} = \frac{56}{70}$, $\frac{50}{70} \neq \frac{56}{70}$ **16.** no; $\frac{6}{2} = \frac{6 \times 5}{2 \times 5} = \frac{30}{10}$, $\frac{8}{5} = \frac{8 \times 2}{5 \times 2} = \frac{16}{10}$, $\frac{30}{10} \neq \frac{16}{10}$ **17.** yes; $\frac{93}{60} = \frac{31}{20}$ and $\frac{62}{40} = \frac{31}{20}$ **18.** yes; $\frac{18}{9} = 2$ and $\frac{6}{3} = 2$ **19.** no; $\frac{3}{5} = \frac{9}{15}$, which does not equal $\frac{10}{15}$ **20.** yes; $\frac{10}{16} = \frac{10 \div 2}{16 \div 2} = \frac{5}{8}$ **21.** no; $\frac{36 \text{ cookies}}{2 \text{ cups}} = \frac{36 \text{ cookies} \times 1.5}{2 \text{ cups} \times 1.5} =$

$\frac{54 \text{ cookies}}{3 \text{ cups}}; \frac{54}{3} \neq \frac{60}{3}$ **22.** Compute the ratio for each homeroom: the proportion for Homeroom A is $\frac{13}{26} = \frac{1}{2}$, the proportion for Homeroom B is $\frac{10}{20} = \frac{1}{2}$, the proportion for Homeroom C is $\frac{12}{22} = \frac{6}{11}$; Homerooms A and B have the same proportion. **23.** $\frac{4}{12} = \frac{x}{18}; 4 \times 18 = x \times 12; 72 = 12x; x = 6$; the correct choice is C. **24.** no; $\frac{3}{1.2} \neq \frac{0.5}{2}; 3 \times 2 \neq 1.2 \times 0.5; 6 \neq 0.6$ **25.** yes; $\frac{20}{8} \neq \frac{3.5}{1.4}; 20 \times 1.4 \neq 8 \times 3.5; 28 \neq 28$ **26.** no; $\frac{8.4}{4.2} \neq \frac{20}{40}; 8.4 \times 40 \neq 4.2 \times 20; 336 \neq 84$ **27.** no; $\frac{6.1}{3.4} \neq \frac{7.4}{4.7}; 6.1 \times 4.7 \neq 3.4 \times 7.4; 28.67 \neq 25.16$ **28.** Answers may vary. Sample: I used cross products because they always give a correct answer. **29.** no; $\frac{4}{6} \neq \frac{6}{8}; 4 \times 8 \neq 6 \times 6; 32 \neq 36$ **30.** $\frac{1}{5} = \frac{x}{10}; 1 \times 10 = 5 \times x, 10 = 5x, x = 2; \frac{1}{5} = \frac{4}{x}, 1 \times x = 4 \times 5, x = 20; \frac{1}{5} = \frac{6}{x}, 1 \times x = 5 \times 6, x = 30; \frac{1}{5} = \frac{x}{35}, 1 \times 35 = 5 \times x, 35 = 5x, x = 7; \frac{1}{5} = \frac{x}{50}, 1 \times 50 = 5 \times x, 50 = 5x, x = 10; 2; 20; 30; 7; 10$ **31.** No; answers may vary. Sample: If two ratios are equivalent, a third ratio must be equivalent to both of them or neither of them. **32.** $\frac{\$7}{2 \text{ hours}} = \frac{\$7 \div 2}{2 \text{ hours} \div 2} = \frac{\$3.50}{1 \text{ hour}}; \$17.50 \div \$3.50 = 5; 5 \text{ hours}$ **33.** Find a ratio of wins to losses equal to $\frac{3}{4}$. In choice A, $\frac{10}{12}$ can be simplified to $\frac{5}{6}; \frac{10 \div 2}{12 \div 2} = \frac{5}{6}; \frac{5}{6} \neq \frac{3}{4}$. In choice B, $\frac{12}{16}$ can be simplified to $\frac{3}{4}; \frac{12 \div 4}{16 \div 4} = \frac{3}{4}$. In choice C, $\frac{9}{16}$ is in simplified form; $\frac{9}{16} \neq \frac{3}{4}$. In choice D, $\frac{40}{30}$ can be simplified to $\frac{4}{3}; \frac{40 \div 10}{30 \div 10} = \frac{4}{3}; \frac{4}{3} \neq \frac{3}{4}$. The correct choice is B. **34.** $200 = 20 \times 10 = 2 \times 2 \times 5 \times 2 \times 5 = 2^3 \times 5^2$; the correct choice is F. **35.** 85 min = 1 h 25 min; 11:45 A.M. = 11 h 45 min; 11 h 45 min + 1 h 25 min = 12 h 70 min = 13 h 10 min; 1:10 P.M.; the correct choice is C. **36.** $7\frac{1}{2} - 6\frac{1}{4} = 7\frac{2}{4} - 6\frac{1}{4} = 1\frac{1}{4}$ **37.** $7\frac{2}{9} - 5\frac{1}{3} = 7\frac{2}{9} - 5\frac{3}{9} = 6\frac{11}{9} - 5\frac{3}{9} = 1\frac{8}{9}$ **38.** $4\frac{1}{4} - 1\frac{1}{2} = 4\frac{1}{4} - 1\frac{2}{4} = 3\frac{5}{4} - 1\frac{2}{4} = 2\frac{3}{4}$ **39.** $9\frac{1}{6} - 4\frac{2}{3} = 9\frac{1}{6} - 4\frac{4}{6} = 8\frac{7}{6} - 4\frac{4}{6} = 4\frac{3}{6}$, or $4\frac{1}{2}$

7-4 Solving Proportions

pages 320–324

Check Skills You'll Need For complete solutions see *Daily Skills Check and Lesson Quiz Transparencies* or *Presentation Pro CD-ROM*. **1.** Answers may vary.

Sample: The ratios do not form a proportion, because their cross products are not equal. **2.** yes **3.** no

Quick Check 1. $\frac{12}{4} = \frac{12 \div 4}{4 \div 4} = \frac{3}{1}; 3 \times 5 = 15$ **2a.** $\frac{6}{8} = \frac{3}{4}$; since $4 \times 5 = 20$, multiply $3 \times 5; 3 \times 5 = 15$ **2b.** $\frac{9}{12} = \frac{3}{4}$; since $9 \div 3 = 3$, divide 12 by 3; $12 \div 3 = 4$ **3.** $\frac{5}{7.85} = \frac{3}{c}; 5 \times c = 3 \times 7.85; 5 \div 5 \times c = 23.55 \div 5; c = 4.71; \4.71

More Than One Way \$30; answers may vary. Sample: I found that the unit rate was \$6 per movie and multiplied it by 5.

Exercises 1. Answers may vary. Sample: You could determine whether their cross products are equal or put each ratio in simplest form and see if they are equivalent.

- 2.** $\frac{1}{5} = \frac{w}{10}$
 $1 \times 10 = 5 \times w$
 $10 = 5w$
 $\frac{10}{5} = \frac{5w}{5}$
 $2 = w$
- 3.** $\frac{3}{d} = \frac{12}{4}$
 $3 \times 4 = d \times 12$
 $12 = 12d$
 $\frac{12}{12} = \frac{12d}{12}$
 $1 = d$
- 4.** $\frac{n}{3} = \frac{6}{6}$
 $n \times 6 = 3 \times 6$
 $6n = 18$
 $\frac{6n}{6} = \frac{18}{6}$
 $n = 3$
- 5.** $\frac{2}{1} = \frac{z}{4}$
 $2 \times z = 1 \times 4$
 $2z = 4$
 $\frac{2z}{2} = \frac{4}{2}$
 $z = 2$
- 6.** $\frac{35}{7} = \frac{35 \div 7}{7 \div 7} = \frac{5}{1}; 21 \times 5 = 105$ **7.** $\frac{12}{4} = \frac{12 \div 4}{4 \div 4} = \frac{3}{1}; 28 \times 3 = 84$ **8.** $\frac{38}{19} = \frac{38 \div 19}{19 \div 19} = \frac{2}{1}; 57 \times 2 = 114$ **9.** $\frac{114}{3} = \frac{114 \div 3}{3 \div 3} = \frac{38}{1}; 190 \div 38 = 5$ **10.** $\frac{55}{11} = \frac{55 \div 11}{11 \div 11} = \frac{5}{1}; 20 \div 5 = 4$ **11.** $\frac{32}{8} = \frac{32 \div 8}{8 \div 8} = \frac{4}{1}; 40 \div 4 = 10$
- 12.** $\frac{\$6.75 \div 3}{3 \div 3} = \frac{\$2.25}{1}; 7 \times \$2.25 = \15.75
- 13.** $\frac{20}{6} = \frac{c}{12}$
 $20 \times 12 = 6 \times c$
 $240 = 6c$
 $\frac{240}{6} = \frac{6c}{6}$
 $40 = c$
- 14.** $\frac{12}{n} = \frac{4}{21}$
 $12 \times 21 = n \times 4$
 $252 = 4n$
 $\frac{252}{4} = \frac{4n}{4}$
 $63 = n$
- 15.** $\frac{6}{22} = \frac{15}{a}$
 $6 \times a = 22 \times 15$
 $6a = 330$
 $\frac{6a}{6} = \frac{330}{6}$
 $a = 55$
- 16.** $\frac{16}{27} = \frac{4}{m}$
 $16 \times m = 27 \times 4$
 $16m = 108$
 $\frac{16m}{16} = \frac{108}{16}$
 $m = 6.75$
- 17.** $\frac{h}{2} = \frac{3}{16}$
 $h \times 16 = 2 \times 3$
 $16h = 6$
 $\frac{16h}{16} = \frac{6}{16}$
 $h = \frac{3}{8} = 0.375$
- 18.** $\frac{75}{12} = \frac{p}{8}$
 $75 \times 8 = 12 \times p$
 $600 = 12p$
 $\frac{600}{12} = \frac{12p}{12}$
 $50 = p$
- 19.** $\frac{27}{84} = \frac{18}{t}$
 $27 \times t = 84 \times 18$
 $27t = 1512$
 $\frac{27t}{27} = \frac{1512}{27}$
 $t = 56$
- 20.** $\frac{k}{17} = \frac{20}{68}$
 $k \times 68 = 17 \times 20$
 $68k = 340$
 $\frac{68k}{68} = \frac{340}{68}$
 $k = 5$

$$21. \quad \frac{38}{x} = \frac{2}{6} \quad 38 \times 6 = x \times 2$$

$$228 = 2x$$

$$\frac{228}{2} = \frac{2x}{2}$$

$$114 = x$$

$$23. \quad \frac{5 \text{ in.}}{7 \text{ in.}} = \frac{14 \text{ in.}}{x \text{ in.}}$$

$$5 \times x = 7 \times 14$$

$$5x = 98$$

$$\frac{5x}{5} = \frac{98}{5}$$

$$x = 19.6 \text{ in.}$$

24. Find the number of hours in a week:

$$\frac{24 \text{ hours}}{\text{day}} \times \frac{7 \text{ days}}{\text{week}} = \frac{168 \text{ hours}}{\text{week}}$$

$$\frac{12 \text{ in.}}{36 \text{ hours}} = \frac{x \text{ in.}}{168 \text{ hours}}$$

$$12 \times 168 = 36 \times x$$

$$2016 = 36x$$

$$\frac{2016}{36} = \frac{36x}{36}$$

$$56 \text{ in.} = x$$

$$25. \quad \frac{4 \text{ in.}}{6 \text{ in.}} = \frac{22 \text{ in.}}{x \text{ in.}}$$

$$4 \times x = 6 \times 22$$

$$4x = 132$$

$$\frac{4x}{4} = \frac{132}{4}$$

$$x = 33 \text{ in.}$$

26. Yes; the cross products will be the same. $\frac{a}{b} = \frac{x}{y}$; $ay = bx$; $\frac{b}{a} = \frac{y}{x}$; $bx = ay$

$$27. \quad \frac{\$1.60}{3} = \frac{d}{12} \quad 28. \quad \frac{3.21}{k} = \frac{6}{8.2}$$

$$1.60 \times 12 = 3 \times d \quad 3.21 \times 8.2 = k \times 6$$

$$19.2 = 3d \quad 26.322 = 6k$$

$$\frac{19.2}{3} = \frac{3d}{3} \quad \frac{26.322}{6} = \frac{6k}{6}$$

$$\$6.40 = d \quad 4.387 = k$$

$$29. \quad \frac{1.5}{3} = \frac{7.5}{h} \quad 30a. \quad \frac{2.5}{9} = \frac{d}{60}$$

$$1.5 \times h = 3 \times 7.5 \quad 2.5 \times 60 = 9 \times d$$

$$1.5h = 22.5 \quad 150 = 9d$$

$$\frac{1.5h}{1.5} = \frac{22.5}{1.5} \quad \frac{150}{9} = \frac{9d}{9}$$

$$h = 15 \quad 16.7 \text{ ft} \approx d$$

$$\text{about 16.7 feet}$$

30b. No; the ratios only need to have the same units in corresponding places; Example: $\frac{\text{ft}}{\text{in.}} = \frac{\text{ft}}{\text{in.}}$

$$31. \quad \frac{221 \text{ students}}{13 \text{ teachers}} = \frac{272 \text{ students}}{x \text{ teachers}}$$

$$\frac{221}{13} = \frac{272}{x}$$

$$221 \times x = 13 \times 272$$

$$221x = 3,536$$

$$\frac{221x}{221} = \frac{3,536}{221}$$

$$x = 16 \text{ teachers}$$

32. $\frac{54 \div 3}{3 \div 3} = \frac{18}{1}$; $8 \times 18 = 144$; 144 mi; answers may vary. Sample: I found the unit rate and multiplied because this method was quick.

33. Set up two proportions:

$$\frac{x}{3} = \frac{8}{12} \quad \frac{8}{12} = \frac{14}{y}$$

$$x \times 12 = 3 \times 8 \quad 8 \times y = 12 \times 14$$

$$12x = 24 \quad 8y = 168$$

$$\frac{12x}{12} = \frac{24}{12} \quad \frac{8y}{8} = \frac{168}{8}$$

$$x = 2 \quad y = 21$$

$$x = 2; y = 21$$

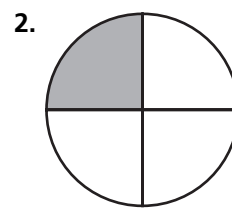
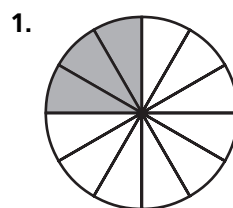
34. If Veronica walks 1 mile every 20 minutes, the ratio of miles walked to minutes is $\frac{1}{20}$. To find how many miles are walked in 1 hour, set up a proportion, using equal units. $\frac{1}{20} = \frac{m}{60}$; the correct choice is A. 35. $216 \div 6 = 36$; $128 \div 4 = 32$; $36 > 32$; the correct choice is F.

36. Let x = amount of money earned; $\frac{25}{3} = \frac{x}{5}$; $3x = 125$; $x = 41.67$; about \$42; the correct choice is B. 37. $4 \div \frac{4}{5} = 4 \times \frac{5}{4} = 5$ 38. $\frac{4}{5} \div 4 = \frac{4}{5} \times \frac{1}{4} = \frac{1}{5}$ 39. $\frac{4}{5} \div \frac{1}{5} = \frac{4}{5} \times 5 = 4$

$$40. \quad \frac{4}{5} \div 5 = \frac{4}{5} \times \frac{1}{5} = \frac{4}{25}$$

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3. 15; answers may vary. Sample: The ratio of winning area to total area of the spinner is $1 : 4$; $\frac{1 \times 15}{4 \times 15} = \frac{15}{60}$.

4. Check students' work.

CHECKPOINT QUIZ 1

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1. 18: 40 is 18 to 40, $\frac{18}{40}$ 2. $\$.19 \times 15 = \2.85 3. If two movie tickets cost \$15, then one movie ticket costs \$7.50. So, five tickets cost $5 \times \$7.50$, or \$37.50. 4. no; $6 \times 18 = 108$ but $2 \times 45 = 90$ 5. no; $4 \times 42 = 168$ but $7 \times 30 = 210$ 6. yes; $8 \times 45 = 360$ and $12 \times 30 = 360$

$$7. \quad \frac{21}{36} = \frac{7}{n} \quad 8. \quad \frac{54}{c} = \frac{9}{13}$$

$$21n = 36 \times 7 \quad 9c = 54 \times 13$$

$$21n = 252 \quad 9c = 702$$

$$\frac{21n}{21} = \frac{252}{21} \quad \frac{9c}{9} = \frac{702}{9}$$

$$n = 12 \quad c = 78$$

$$9. \quad \frac{x}{18} = \frac{6.3}{7} \quad 10. \text{ Let } x = \text{cost of beverages.}$$

$$\frac{6}{2.79} = \frac{16}{x}$$

$$7x = 18 \times 6.3 \quad 6x = 16 \times 2.79$$

$$7x = 113.4 \quad 6x = 47.52$$

$$\frac{7x}{7} = \frac{113.4}{7} \quad x = 7.92, \text{ or } \$7.92$$

$$x = 16.2; \$16.20$$

7-5 Scale Drawings pages 326–329

Check Skills You'll Need For complete solutions see *Daily Skills Check and Lesson Quiz Transparencies* or *Presentation Pro CD-ROM*. 1. Answers may vary.

Sample: You could rewrite the ratios so the numerators or the denominators are equal. 2. 25 3. 2

Quick Check 1. A scale shows the ratio of drawing length to actual length; $\frac{6}{84} = \frac{1}{14}$; 1 inch; 14 inches

2. Let x = actual length in miles. 3. Let x = model length in inches.

$$\frac{1}{20} = \frac{5}{x}$$

$$\frac{1}{10} = \frac{x}{170}$$

$$1x = 20 \times 5$$

$$10x = 1 \times 170$$

$$x = 100 \text{ miles;}$$

$$x = 17 \text{ inches}$$

about 100 miles

Exercises 1. One inch on the map represents an actual distance of 50 miles. 2. Eliminate choices A and C as they are in centimeters. The length of the picture is more than 1 centimeter, so the correct choice is D.

3. Approximate; explanations may vary. Sample: It is very difficult to get exact measurements using a ruler.

4. $\frac{10 \text{ inches}}{40 \text{ inches}} = \frac{1}{4}$; 1 in.: 4 in. 5. $\frac{15 \text{ feet}}{300 \text{ feet}} = \frac{1}{20}$; 1 ft: 20 ft

6. $\frac{3 \text{ inches}}{96 \text{ inches}} = \frac{1}{32}$; 1 in.: 32 in. 7–10. Answers may vary. Samples are given.

7. Let x = actual distance in miles.

$$\frac{1}{31} = \frac{1.5}{x}$$

$$1x = 31 \times 1.5$$

$$x \approx 47 \text{ miles}$$

8. Let x = actual distance in miles.

$$\frac{1}{31} = \frac{2.3}{x}$$

$$1x = 31 \times 2.3$$

$$x \approx 71 \text{ miles}$$

9. Let x = actual distance in miles.

$$\frac{1}{31} = \frac{2.8}{x}$$

$$1x = 31 \times 2.8$$

$$x \approx 87 \text{ miles}$$

10. Let x = actual distance in miles.

$$\frac{1}{31} = \frac{1.5}{x}$$

$$1x = 31 \times 1.5$$

$$x \approx 47 \text{ miles}$$

11. Let s = scale height in inches.

$$\frac{1}{9} = \frac{s}{36}$$

$$9s = 1 \times 36$$

$$9s = 36$$

$$\frac{9s}{9} = \frac{36}{9}$$

$$s = 4 \text{ inches}$$

12. Let s = scale length in inches.

$$\frac{1}{9} = \frac{s}{468}$$

$$9s = 1 \times 468$$

$$9s = 468$$

$$\frac{9s}{9} = \frac{468}{9}$$

$$s = 52 \text{ inches}$$

13. Let s = scale length in inches.

$$\frac{1}{9} = \frac{s}{12}$$

$$9s = 1 \times 12$$

$$9s = 12$$

$$\frac{9s}{9} = \frac{12}{9}$$

$$s = \frac{4}{3}, \text{ or } 1\frac{1}{3} \text{ inches}$$

14. Let s = scale height in inches.

$$\frac{1}{9} = \frac{s}{117}$$

$$9s = 1 \times 117$$

$$9s = 117$$

$$\frac{9s}{9} = \frac{117}{9}$$

$$s = 13 \text{ inches}$$

15. Let s = scale length in inches.

$$\frac{1}{8} = \frac{s}{40}$$

16. Let s = scale length in mm.

$$\frac{30}{6} = \frac{s}{30}$$

$$8s = 1 \times 40$$

$$8s = 40$$

$$\frac{8s}{8} = \frac{40}{8}$$

$$s = 5 \text{ inches}$$

$$6s = 30 \times 30$$

$$6s = 900$$

$$\frac{6s}{6} = \frac{900}{6}$$

$$s = 150 \text{ mm}$$

17. Let s = scale length in cm. 18. Let s = scale length in cm.

$$\frac{1}{100} = \frac{s}{125}$$

$$\frac{1}{100} = \frac{s}{80}$$

$$100s = 1 \times 125$$

$$100s = 1 \times 80$$

$$100s = 125$$

$$100s = 80$$

$$\frac{100s}{100} = \frac{125}{100}$$

$$\frac{100s}{100} = \frac{80}{100}$$

$$s = 1.25 \text{ cm}$$

$$s = 0.8 \text{ cm}$$

19. Let s = scale length in cm. 20. Let s = scale length in cm.

$$\frac{1}{100} = \frac{s}{170}$$

$$\frac{1}{100} = \frac{s}{2,500}$$

$$100s = 1 \times 170$$

$$100s = 1 \times 2,500$$

$$100s = 170$$

$$100s = 2,500$$

$$\frac{100s}{100} = \frac{170}{100}$$

$$\frac{100s}{100} = \frac{2,500}{100}$$

$$s = 1.7 \text{ cm}$$

$$s = 25 \text{ cm}$$

21a. Reduce. The map is 4 cm wide and 3 cm high. For each centimeter on the map, I would draw 0.5 centimeter on my drawing. My drawing would measure 2 cm wide and 1.5 cm high.



22. The ratio $\frac{3 \text{ in.}}{120 \text{ in.}}$, or 1: 40 is used to write and solve each proportion. To find the toy size, divide actual size by 40. To find actual size, multiply by 40.

Part	Toy Size	Actual Size
Car	3 in.	120 in.
Door Handle	0.125 in.	5 in.
Headlight	0.2 in.	8 in.
Front Bumper	0.18 ft	7.2 ft
Rear Window	1.35 in.	4.5 ft

23. Check students' work. 24. $\frac{4}{200} = \frac{4 \div 4}{200 \div 4} = \frac{1}{50}$; the correct choice is D. 25. $\frac{23}{4 \times 8} + \frac{29}{4 \times 8} = \frac{23}{32} + \frac{29}{32}$; the correct choice is F. 26. $\frac{5}{16} \times \frac{32}{1} = \frac{10}{1}$, or 10 27. $\frac{3}{4} \times \frac{10}{1} = \frac{15}{2}$, or $7\frac{1}{2}$ 28. $\frac{9}{10} \times 55 = \frac{99}{2}$, or $49\frac{1}{2}$ 29. $\frac{4}{5} \times \frac{100}{1} = \frac{80}{1}$, or 80

ACTIVITY LAB

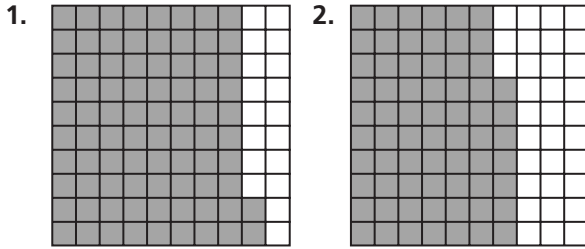
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1–2. Check students' work; 50 squares 3. $\frac{50}{100}$ or $\frac{1}{2}$; 0.50 or 0.5

4.

Fraction	$\frac{5}{100}$	$\frac{75}{100}$	$\frac{37}{100}$	$\frac{100}{100}$
Decimal	0.05	0.75	0.37	1.0
Percent	5%	75%	37%	100%

Exercises



3. two models with one grid completely shaded and the second grid with only 50 squares shaded **4a.** 18 squares, so 18% **4b.** $100\% - 18\% = 82\%$ **4c.** Subtract 18% from 100%.

7-6 Percents, Fractions, and Decimals pages 331–334

Check Skills You'll Need For complete solutions see *Daily Skills Check and Lesson Quiz Transparencies* or *Presentation Pro CD-ROM*. 1. No; $\frac{10}{12}$ in simplest form equals $\frac{5}{6}$ which is larger than $\frac{3}{4}$. 2. $\frac{6}{25}$ 3. $\frac{2}{5}$ 4. $\frac{3}{4}$ 5. $\frac{1}{3}$

Quick Check 1a. $55\% = \frac{55}{100} = \frac{11}{20}$ 1b. $4\% = \frac{4}{100} = \frac{1}{25}$ 2a. $25\% = \frac{25}{100} = 0.25$ 2b. $2\% = \frac{2}{100} = 0.02$ 3a. $0.52 = \frac{52}{100} = 52\%$ 3b. $0.05 = \frac{5}{100} = 5\%$ 3c. $0.5 = \frac{50}{100} = 50\%$ 4. $\frac{1}{20} = \frac{1}{20} \times \frac{5}{5} = \frac{1 \times 5}{20 \times 5} = \frac{5}{100} = 5\%$

Exercises 1. The ratio does not compare a number to 100. 2. $\frac{1}{5} = 1 \div 5 = 0.20 = \frac{20}{100} = 20\%$; $0.02 = \frac{2}{100} = 2\%$; $\frac{20}{50} = 20 \div 50 = 0.40 = \frac{40}{100} = 40\%$; $0.20 = \frac{20}{100} = 20\%$; $\frac{4}{12} = 4 \div 12 = 0.333 \dots = \frac{33}{100} = 33\%$; $0.2 = \frac{20}{100} = 20\%$; $\frac{6}{24} = 6 \div 24 = 0.25 = \frac{25}{100} = 25\%$; $0.4 = \frac{40}{100} = 40\%$; $\frac{20}{100} = 20\%$; $0.05 = \frac{5}{100} = 5\%$; $\frac{1}{5}$, 0.2, 0.20, $\frac{20}{100}$ 3. Answers may vary. Samples: $\frac{5}{6}$ and 0.85. 4. $50\% = \frac{50}{100} = \frac{1}{2}$ 5. $70\% = \frac{70}{100} = \frac{70 \div 10}{100 \div 10} = \frac{7}{10}$ 6. $88\% = \frac{88}{100} = \frac{88 \div 4}{100 \div 4} = \frac{22}{25}$ 7. $5\% = \frac{5}{100} = \frac{5 \div 5}{100 \div 5} = \frac{1}{20}$ 8. $33\% = \frac{33}{100}$ 9. $14\% = \frac{14}{100} = \frac{14 \div 2}{100 \div 2} = \frac{7}{50}$ 10. $15\% = \frac{15}{100} = \frac{15 \div 5}{100 \div 5} = \frac{3}{20}$ 11. $75\% = \frac{75}{100} = \frac{75 \div 25}{100 \div 25} = \frac{3}{4}$ 12. $18\% = \frac{18}{100} = \frac{18 \div 2}{100 \div 2} = \frac{9}{50}$ 13. $2\% = \frac{2}{100} = \frac{2 \div 2}{100 \div 2} = \frac{1}{50}$ 14. $42\% = \frac{42}{100} = \frac{42 \div 2}{100 \div 2} = \frac{21}{50}$ 15. $15\% = \frac{15}{100} = 0.15$ 16. $22\% = \frac{22}{100} = 0.22$ 17. $82\% = \frac{82}{100} = 0.82$ 18. $63\% = \frac{63}{100} = 0.63$ 19. $10\% = \frac{10}{100} = 0.10$, or 0.1 20. $40\% = \frac{40}{100} = 0.40$, or 0.4 21. $3\% = \frac{3}{100} = 0.03$ 22. $7\% = \frac{7}{100} = 0.07$ 23. $12\% = \frac{12}{100} = 0.12$ 24. $100\% = \frac{100}{100} = 1$ 25. $6\% = \frac{6}{100} = 0.06$ 26. $0.17 = \frac{17}{100} = 17\%$ 27. $0.08 = \frac{8}{100} = 8\%$ 28. $0.98 = \frac{98}{100} = 98\%$ 29. $0.22 = \frac{22}{100} = 22\%$ 30. $0.44 = \frac{44}{100} = 44\%$ 31. $\frac{19}{20} = \frac{19 \times 5}{20 \times 5} = \frac{95}{100} = 95\%$ 32. $\frac{27}{50} = \frac{27 \times 2}{50 \times 2} = \frac{54}{100} = 54\%$ 33. $\frac{1}{4} = \frac{1 \times 25}{4 \times 25} = \frac{25}{100} = 25\%$ 34. $\frac{19}{25} = \frac{19 \times 4}{25 \times 4} = \frac{76}{100} = 76\%$ 35. $\frac{7}{25} = \frac{7 \times 4}{25 \times 4} = \frac{28}{100} = 28\%$ 36. $\frac{3}{5} = \frac{3 \times 20}{5 \times 20} = \frac{60}{100} = 60\%$ 37. Find the fraction of

the earth that is not covered by water: $\frac{10}{10} - \frac{7}{10} = \frac{3}{10} = \frac{3 \times 10}{10 \times 10} = \frac{30}{100} = 30\%$ 38. B 39. $60\% = \frac{60}{100} = 0.60$; C 40. $\frac{5}{6} = 5 \div 6 = 0.8333 \dots$; D 41. $18\% = \frac{18}{100} = 0.18$; A 42. $46\% = \frac{46}{100} = 0.46$; $\frac{1}{2} = 1 \div 2 = 0.50$; $5\% = \frac{5}{100} = 0.05$; 5%, 46%, $\frac{1}{2}$, 0.53 43. $\frac{1}{4} = 1 \div 4 = 0.25$; $22\% = \frac{22}{100} = 0.22$; $\frac{1}{5} = 1 \div 5 = 0.20$; $\frac{1}{5}$, 22%, 0.24, $\frac{1}{4}$ 44. $63\% = \frac{63}{100} = 0.63$; $\frac{3}{5} = 3 \div 5 = 0.60$; $\frac{31}{50} = 31 \div 50 = 0.62$; 0.58, $\frac{3}{5}$, $\frac{31}{50}$, 63% 45. $\frac{17}{20} = 17 \div 20 = 0.85$; $95\% = \frac{95}{100} = 0.95$; $\frac{22}{25} = 22 \div 25 = 0.88$; $\frac{17}{20}$, $\frac{22}{25}$, 0.9, 95% 46. 99% is $\frac{99}{100}$, which is also 0.99 47.

Fraction	$\frac{11}{50}$	$\frac{39}{50}$	$\frac{22}{25}$	$\frac{9}{20}$	$\frac{21}{50}$	$\frac{4}{5}$
Decimal	0.22	0.78	0.88	0.45	0.42	0.8
Percent	22%	78%	88%	45%	42%	80%

48. yes; $\frac{32}{45} = 0.71 \approx 0.71 = 71\%$ 49. about three quarters; $\frac{3}{4} = \frac{3 \times 25}{4 \times 25} = \frac{75}{100} = 75\%$ 50. Answers may vary. Sample: Move the decimal point two places to the right. Round to the nearest whole number. Add a percent sign. 51. The prime numbers between 1 and 100 are 2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41, 43, 47, 53, 59, 61, 67, 71, 73, 79, 83, 89, and 97. There are 25 of them; $\frac{25}{100} = 25\%$ 52. $\frac{127}{50} = \frac{127 \times 2}{50 \times 2} = \frac{254}{100} = 2.54$ 53. 51.4 seconds – 48.6 seconds = 2.8 seconds 54. $\frac{\$12}{3 \text{ hours}} = \frac{\$4}{1 \text{ hour}} = \frac{4 \times 4}{1 \times 4} = \frac{16}{4}$, \$16 55. $2\frac{3}{4} \times 5\frac{1}{4} \approx 3 \times 5 = 15$ 56. $6\frac{1}{8} \times 3\frac{3}{8} \approx 6 \times 3 = 18$ 57. $4\frac{5}{8} \times 2\frac{2}{3} \approx 5 \times 3 = 15$ 58. $3\frac{1}{2} \times 5\frac{1}{3} \approx 4 \times 5 = 20$

CHECKPOINT QUIZ 2 page 335

1. $74\% = \frac{74}{100} = 0.74$ and $\frac{74}{100} = \frac{37}{50}$ 2. $6\% = \frac{6}{100} = 0.06$ and $\frac{6}{100} = \frac{3}{50}$ 3. $60\% = \frac{60}{100} = 0.60$ and $\frac{60}{100} = \frac{3}{5}$ 4. $\frac{21}{25} = \frac{21 \times 4}{25 \times 4} = \frac{84}{100} = 84\%$ 5. $\frac{7}{10} = \frac{7 \times 10}{10 \times 10} = \frac{70}{100} = 70\%$ 6. $\frac{1}{20} = \frac{1 \times 5}{20 \times 5} = \frac{5}{100} = 5\%$ 7. $\frac{1 \text{ cm}}{57 \text{ mi}} = \frac{4.7 \text{ cm}}{d \text{ mi}}$; $1 \times d = 4.7 \times 57$; $d = 268$; about 268 mi 8. $\frac{1 \text{ cm}}{57 \text{ mi}} = \frac{10.3 \text{ cm}}{d \text{ mi}}$; $1 \times d = 10.3 \times 57$; $d = 587$; about 587 mi 9. $\frac{1 \text{ cm}}{57 \text{ mi}} = \frac{10 \text{ cm}}{d \text{ mi}}$; $1 \times d = 10 \times 57$; $d = 570$; about 570 mi 10. $\frac{6 \text{ in.}}{18 \text{ ft}} = \frac{1 \text{ in.}}{3 \text{ ft}} = 1 \text{ in.} : 3 \text{ ft}$

7-7 Finding the Percent of a Number pages 336–339

Check Skills You'll Need For complete solutions see *Daily Skills Check and Lesson Quiz Transparencies* or *Presentation Pro CD-ROM*. 1. Answers may vary. Sample: You can set the cross products equal to each other to write and solve an equation. 2. 8 3. 15 4. 78 5. 230

Quick Check

1. $\frac{n}{40} = \frac{20}{100}$
 $100 \times n = 20 \times 40$
 $100n = 800$
 $n = 8; \$8$

2a. 12% of 91 $\rightarrow 0.12 \times 91 = 10.92$ 2b. 18% of 121 $\rightarrow 0.18 \times 121 = 21.78$ 3. 75% of 12 $\rightarrow \frac{3}{4} \times 12 = 9$

Exercises 1. 50% of 10 $\rightarrow \frac{1}{2} \times 10 = 5$ 2. 25% of 40 $\rightarrow \frac{1}{4} \times 40 = 10$ 3. 3% of 100 $\rightarrow \frac{3}{100} \times 100 = 3$ 4. 13% of 100 is $\frac{13}{100} \times 100 = 13$ 5. 6% of 500 is $\frac{6}{100} \times 500 = \frac{6}{1} \times 5 = 30$

6. $\frac{n}{70} = \frac{42}{100}$ 7. $\frac{n}{210} = \frac{8}{100}$
 $100 \times n = 42 \times 70$ $100 \times n = 8 \times 210$
 $100n = 2,940$ $100n = 1,680$

$n = 29.4$ $n = 16.8$

8. $\frac{n}{185} = \frac{70}{100}$ 9. $\frac{n}{600} = \frac{11}{100}$
 $100 \times n = 70 \times 185$ $100 \times n = 11 \times 600$
 $100n = 12,950$ $100n = 6,600$

$n = 129.5$ $n = 66$

10. $\frac{n}{90} = \frac{15}{100}$ 11. $\frac{n}{240} = \frac{65}{100}$
 $100 \times n = 15 \times 90$ $100 \times n = 65 \times 240$
 $100n = 1,350$ $100n = 15,600$

$n = 13.5$ $n = 156$

12. 7% of 50 $\rightarrow 0.07 \times 50 = 3.5$ 13. 18% of 170 $\rightarrow 0.18 \times 170 = 30.6$ 14. 44% of 165 $\rightarrow 0.44 \times 165 = 72.6$

15. 43% of 61 $\rightarrow 0.43 \times 61 = 26.23$ 16. 55% of 91 $\rightarrow 0.55 \times 91 = 50.05$ 17. 30% of 490 $\rightarrow 0.30 \times 490 = 147$

18. 20% of \$80 is $0.20 \times \$80 = \16 19. 20% of 180 $\rightarrow \frac{1}{5} \times 180 = 36$ 20. 80% of 40 $\rightarrow \frac{4}{5} \times 40 = 32$

21. 75% of 480 $\rightarrow \frac{3}{4} \times 480 = 360$ 22. 50% of 180 dancers $\rightarrow \frac{1}{2} \times 180$ dancers = 90 dancers 23. Subtract 22% of \$240

from \$240; subtract 40% of what remains;
 $240 - 0.22 \times 240 = 187.20$; $187.20 - (187.20 \times 0.40) = 112.32$; \$112.32

24. 7% of 200 $\rightarrow 0.07 \times 200 = 14$ boys
25. 3% of 200 $\rightarrow 0.03 \times 200 = 6$ girls 26. 62% of 200 $\rightarrow 0.62 \times 200 = 124$ boys 27. 76% of 200 $\rightarrow 0.76 \times 200 = 152$ girls

28. 30% of 200 is $0.30 \times 200 = 60$ students;
60% of those 60 students is $0.60 \times 60 = 36$ students

29. No; 40% off of \$60 is $0.4 \times 60 = 24$, or \$24.

$\$60 \times \$24 = \$36$. Another 10% off the sales price would be $0.1 \times 36 = 3.6$, or \$3.60. The final price would be $\$36 - \$3.60 = \$32.40$. 50% off the full price would be $0.5 \times 60 = 30$, or \$30, making the final price $\$60 - \$30 = \$30$

30. $\$500 \times 0.01 \times 2 = \$5 \times 2 = \$10$

31. $\$1,000 \times 0.03 \times 4 = \$30 \times 4 = \$120$

32. $\$895 \times 0.05 \times 2 = \$44.75 \times 2 = \$89.50$

33. $\$4,500 \times 0.02 \times 3 = \$90 \times 3 = \$270$ 34a. 46% of 85 $\rightarrow 0.46 \times 85 = 39.1$; about 39 people 34b. Answers may vary. Sample: I used the equation $x = 0.46 \times 85$, since it is easy to multiply a whole number by a decimal. I rounded down because a fraction of a person is not reasonable.

35. Store B has a better rate; $\frac{2}{3} \approx 67\%$ and

$67\% > 60\%$. 36. $7\% = \frac{7}{100} = 0.07$; the correct choice is

A. 37. 50 out of 100 squares; $\frac{50}{100} = 50\%$; the correct

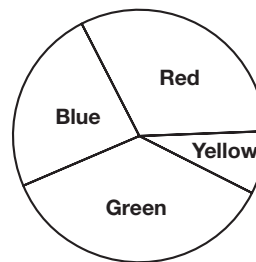
choice is H. 38. $\frac{10}{45} = \frac{10 \div 5}{45 \div 5} = \frac{2}{9}$ 39. $\frac{36}{90} = \frac{36 \div 18}{90 \div 18} = \frac{2}{5}$, or

2 : 5 40. $\frac{18}{21} = \frac{18 \div 3}{21 \div 3} = \frac{6}{7}$, or 6 to 7 41. $\frac{100}{150} = \frac{100 \div 50}{150 \div 50} = \frac{2}{3}$

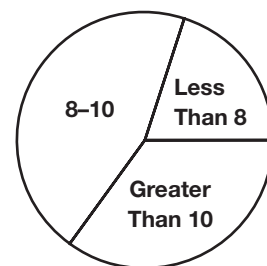
ACTIVITY LAB

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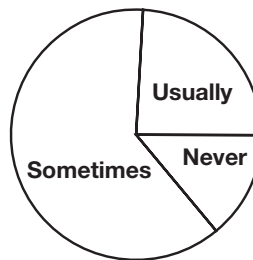
1. Favorite Colors



2. Hours of Sleep Each Night



3. Homework on Saturdays



7-8 Circle Graphs

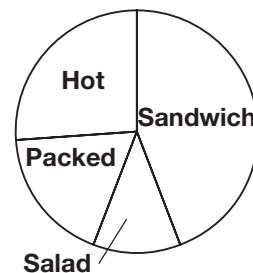
pages 341-344

Check Skills You'll Need For complete solutions see *Daily Skills Check and Lesson Quiz Transparencies* or *Presentation Pro CD-ROM*. 1. Answers may vary.

Sample: You can write a proportion by setting the ratio equal to $\frac{x}{100}$. Solve the proportion and write the solution with a percent sign. 2. 98 3. 104 4. 96

Quick Check 1. They are processed. 2. More are processed; $39\% > 13\%$ 3. $\frac{13}{50} = 26\%$; $\frac{9}{50} = 18\%$; $\frac{6}{50} = 12\%$; $\frac{22}{50} = 44\%$; $26\% \approx \frac{1}{4}$; $18\% \approx \frac{1}{5}$; 12% is slightly more than $\frac{1}{10}$ of the circle; 44% is what is left over;

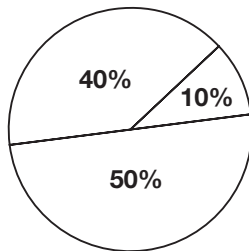
Lunches for 50 Students



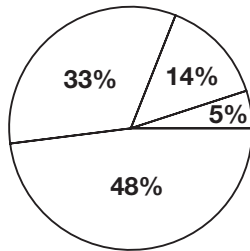
Exercises 1. whole 2. The largest region is for piano; piano 3. $\frac{1}{2} + \frac{1}{3} + \frac{1}{4} = \frac{6}{12} + \frac{4}{12} + \frac{3}{12} = \frac{13}{12}$; the sum of the fractions is not 1. 4. The smallest region is for tennis; tennis 5. The largest region is for basketball; basketball 6. Compare the regions represented by each. The order from smallest to largest is tennis, volleyball, basketball,

baseball, soccer 7. Twice the region for basketball is about the size of the region for baseball; baseball

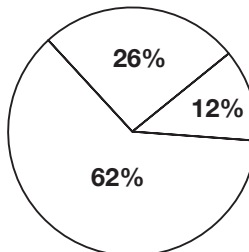
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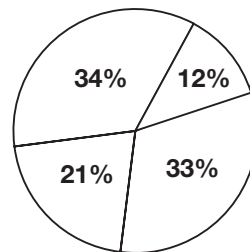
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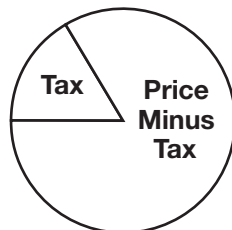
10.



11.

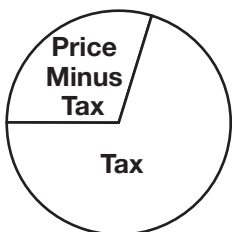


12. What Part of the U.S. Price of Gasoline Is Tax?



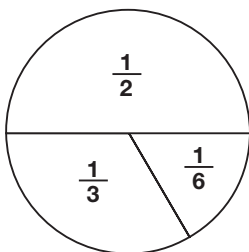
$$\frac{0.39}{2.36} = 16\%$$

What Part of the U.K. Price of Gasoline Is Tax?

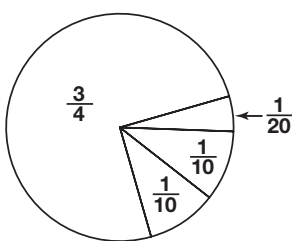


$$\frac{4.27}{6.09} = 70\%$$

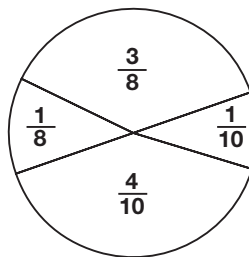
13.



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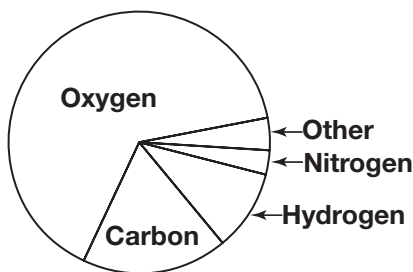


15.



16. 65% is slightly less than $\frac{7}{10}$ of the circle; $18\% \approx \frac{1}{5}$; $10\% = \frac{1}{10}$; 4% is slightly less than $\frac{1}{20}$ of the circle; 3% is what is left over.

Human Body Composition



17. Check students' graphs. 18a. Answers may vary. Sample: The sum is greater than 100%. 18b. bar graph 19. 12% of 700 = $0.12 \times 700 = 84$ quarters; 28% of 700 = $0.28 \times 700 = 196$ nickels; 25% of 700 = $0.25 \times 700 = 175$ pennies; 35% of 700 = $0.35 \times 700 = 245$ dimes; $(0.25 \times 84) + (0.05 \times 196) + (0.01 \times 175) + (0.10 \times 245) = \57.05 20. The region for winter should be slightly smaller than the region for fall and the region for summer should be more than half of the circle. The correct choice is D. 21. Before Camille was paid, she had \$14 less than she has now. $d = 81 - 14$; the correct choice is H. 22. $8x = 8(3\frac{3}{4}) = 8(\frac{15}{4}) = 2(15) = 30$ 23. $\frac{2}{5}x = \frac{2}{5}(3\frac{3}{4}) = \frac{2}{5}(\frac{15}{4}) = \frac{1}{1}(\frac{3}{2}) = 1\frac{1}{2}$ 24. $\frac{4x}{3} = \frac{4}{3}(3\frac{3}{4}) = \frac{4}{3}(\frac{15}{4}) = \frac{1}{3}(\frac{15}{1}) = 5$ 25. $x \cdot 2\frac{1}{2} = (3\frac{3}{4}) \cdot 2\frac{1}{2} = \frac{15}{4} \cdot \frac{5}{2} = \frac{75}{8} = 9\frac{3}{8}$

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1–8. Check students' work.

GUIDED PROBLEM SOLVING

pages 346–347

1. Answers may vary. Samples: $\frac{n}{6} = \frac{425}{100}$, $\frac{6}{n} = \frac{100}{425}$, $\frac{425}{n} = \frac{100}{6}$ 2. There cannot be $\frac{1}{2}$ a person. 3. Answers may vary. Sample: 10% of the people surveyed was found. Then half that number was found since 5% is easier to use than 6%. 4. $0.21 \times 425 \times 0.06 \times 425 = 63.75 \approx 64$ students 5. $100\% - 37\% = 63\%$; $0.63 \times 425 = 267.75$; about 268 people 6. Today; she went farther in less time.

$$\begin{aligned}
 7. \quad \frac{950 \text{ ft}}{80 \text{ sec}} &= \frac{x}{60 \text{ sec}} \\
 950 \times 60 &= 80 \times x \\
 57,000 &= 80x \\
 \frac{57,000}{80} &= \frac{80x}{80} \\
 712.5 \text{ ft} &= x
 \end{aligned}$$

8. The scale is 1 in. = 2,500 ft; $1.6 \times 2,500 = 4,000$ ft

7-9 Estimating With Percents

pages 348–351

Check Skills You'll Need For complete solutions see *Daily Skills Check and Lesson Quiz Transparencies or Presentation Pro CD-ROM*. **1.** Write 98 as $100 - 2$ and multiply by 3; $3(100 - 2)$. **2.** 5,015 **3.** 40.8

Quick Check 1. Round the cost of the hat to \$10. 6% of \$10 = $0.06 \times 10 = 0.6$; total cost about $10 + 0.6 = 10.6$; \$10.60 **2.** The bill is about \$42. $15\% = 10\% + 5\%$. Since 10% of \$42 is \$4.20, 5% is half of \$4.20, or \$2.10. A 15% tip of \$41.63 is about $\$4.20 + \$2.10 = \$6.30$, or about \$6 **3.** The regular price is about \$40. 40% of \$40 is \$16; total cost about $\$40 - \$16 = \$24$

Exercises 1. \$49.99 is about \$50. Since 10% of \$50 is \$5, the total cost is about $\$50 + \5 , or about \$55 **2.** Round up to \$35; if you estimate low, you may not have enough money. **3.** $\$20 \times 0.09$ **4.** $\$500 \times 0.30$ **5.** $\$40 \times 0.05$

6. $\$110 \times 0.25$ **7.** 7% of \$28 is \$1.96; total cost about $\$28 + \$1.96 = \$29.96$ **8.** 7% of \$130 is \$9.10; total cost about $\$130 + \$9.10 = \$139.10$ **9.** 7% of \$15 is \$1.05; total cost about $\$15 + \$1.05 = \$16.05$ **10.** 7% of \$20 is \$1.40; total cost about $\$20.00 + \$1.40 = \$21.40$

11. 15% of \$41.90 is about 10% of \$42 plus 5% of \$42; $\$4.20 + \$2.10 = \$6.30$ **12.** 15% of \$8.60 is about 10% of \$9 plus 5% of \$9; $\$0.90 + \$0.45 = \$1.35$ **13.** 15% of \$79.10 is about 10% of \$80 plus 5% of \$80; $\$8.00 + \$4.00 = \$12.00$ **14.** 15% of \$40.60 is about 10% of \$40 plus 5% of \$40; $\$4.00 + \$2.00 = \$6.00$ **15.** 40% off \$42; $60\% \times \$40 = 0.6 \times \$40 = \$24.00$ **16.** 50% off \$789; $50\% \times \$800 = 0.5 \times \$800 = \$400.00$ **17.** 70% off \$16.99; $30\% \times \$17 = 0.3 \times \$17 = \$5.10$ **18.** 90% off \$68; $10\% \times \$70 = 0.1 \times \$70 = \$7.00$ **19.** 25% of \$28 is \$7; discount cost about $\$28 - \$7 = \$21$; 6% of \$21 is about \$1.26; total cost about $\$21 + \$1.26 = \$22.26$ **20a.** 20% of 14.20 = $0.20 \times 14 = \$2.80$ **20b.** 10% of 24.75 = $0.10 \times 25 = \$2.50$ **20c.** 15% of 19.70 = $0.15 \times 20 = \$3.00$ **20d.** 15% of \$19.70 **21.** I could round to \$4.50 and multiply by 4; I could round to \$4.50 and multiply by 3. **22.** 90% of 49 = $0.90 \times 50 = 45$, overestimate because I rounded 49 up to 50. **23.** 12% of 302 = $0.12 \times 300 = 36$, underestimate because I rounded 302 down to 300. **24.** 1.2% of 490 = $0.012 \times 500 = 6$, overestimate because I rounded 490 up to 500.

25. Let x = the regular price of the snowboard.
60% of $x = 0.60x$

0.60x equals the discount price, which is subtracted from the original price to get the sales price.

$$\text{Thus } x - 0.60x = 12.74$$

$$0.4x = 12.74$$

$$\frac{0.4x}{0.4} = \frac{12.74}{0.4}$$

$$x = \$31.85$$

26. Florida: 6% of \$.80 is about \$.05, total cost about $\$.80 + \$.05 = \$.85$; Georgia: 4% of \$.80 is about \$.03, total cost about $\$.80 + \$.03 = \$.83$; Massachusetts: 5% of \$.80 is about \$.04, total cost about $\$.80 + \$.04 = \$.84$; Tennessee: 7% of \$.80 is about \$.06, total cost about $\$.80 + \$.06 = \$.86$ **27.** Florida: 6% of \$65.00 is \$3.90, total cost about $\$65.00 + \$3.90 = \$68.90$; Georgia: 4% of \$65.00 is \$2.60, total cost about $\$65.00 + \$2.60 = \$67.60$; Massachusetts: 5% of \$65.00 is about \$3.25, total cost about $\$65.00 + \$3.25 = \$68.25$; Tennessee: 7% of \$65.00 is about \$4.55, total cost about $\$65.00 + \$4.55 = \$69.55$

28. Note: Some students may notice that the estimated total cost of the journal in Georgia and Massachusetts using \$5.00 as an estimate is less than the actual cost of the journal itself, so they may use an estimated journal cost of \$5.30 with these results: Florida: 6% of \$5.30 is about \$.32, total cost about $\$5.30 + \$.32 = \$5.62$; Georgia: 4% of \$5.30 is about \$.21, total cost about $\$5.30 + \$.21 = \$5.51$; Massachusetts: 5% of \$5.30 is about \$.27, total cost about $\$5.30 + \$.27 = \$5.57$; Tennessee: 7% of \$5.30 is \$.37, total cost about $\$5.30 + \$.37 = \$5.67$

29. Multiply the child's height by 2; 2×2 feet + 2×9 inches = 4 feet 18 inches, which is 5 feet 6 inches

30. $11 \times \$24 \approx 10 \times 25 = \250 ; the correct choice is B.

31. In the chart, as age increases, the ratio of men to women decreases: $\frac{92}{100} > \frac{84}{100} > \frac{46}{100}$. The correct answer is choice G. **32.** $100 - 80 = 20$; $20\% = \frac{20}{100} = \frac{1}{5}$; the correct choice is A. **33.** 1 h 15 min is 60 min plus 15 min, or 75 min **34.** 2 h 10 min is 2×60 min plus 10 min, or 130 min

35. 5 h 45 min is 5×60 min plus 45 min, or 345 min

36. 6 h 20 min is 6×60 min plus 20 min, or 380 min

EXTENSION

page 352

$$1. 0.2\% = \frac{0.2}{100} = 0.002 \quad 2. 0.75\% = \frac{0.75}{100} = 0.0075$$

$$3. 110\% = \frac{110}{100} = 1.1 \quad 4. 250\% = \frac{250}{100} = 2.5 \quad 5. 400\% \text{ of } 5 = \frac{400}{100} \times 5 = 4 \times 5 = 20$$

$$6. 150\% \text{ of } 18 = \frac{150}{100} \times 18 = 1.5 \times 18 = 27$$

$$7. 0.5\% \text{ of } 300 = 0.005 \times 300 = 1.5$$

$$8. 0.25\% \text{ of } 12 = 0.0025 \times 12 = 0.03$$

TEST-TAKING STRATEGIES

page 353

1. Choices B and D add a number to the total bill, which would be more than the amount charged for additional minutes, so eliminate those choices. Choice C subtracts the amount charged for only 1 additional minute from the total bill, so choice C is not the answer. By eliminating incorrect answers, we get the correct answer, choice A. **2.** Since $450 > 4 \times 100$ but $450 < 5 \times 100$, the copies cost more than $4 \times \$4.00$ but less than $5 \times \$4.00$. The correct choice is G. **3.** $0.88 \times 40 = 35.2$, $\frac{88}{100} \times 40 = 35.2$, and 35.2 makes sense as the solution to the proportion in C. Since choices A, B, and C give identical

solutions, the method that cannot be used is choice D.

CHAPTER REVIEW

pages 354–355

1. proportion (B) 2. ratio (D) 3. rate (C) 4. percent (A) 5. 15 bolts to 23 nails, 15 to 23, 15 : 23, or $\frac{15}{23}$ 6. 15 bolts to 8 tacks, 15 to 8, 15 : 8, or $\frac{15}{8}$ 7. 23 nails to 8 tacks, 23 to 8, 23 : 8, or $\frac{23}{8}$ 8. 15 bolts to total (46), 15 to 46, 15 : 46, or $\frac{15}{46}$ 9. $\frac{8}{32} = \frac{8 \div 8}{32 \div 8} = \frac{1}{4}$, or 1 to 4 10. $\frac{18}{30} = \frac{18 \div 6}{30 \div 6} = \frac{3}{5}$ 11. $\frac{24}{8} = \frac{24 \div 8}{8 \div 8} = \frac{3}{1} = 3$ ft : 1 yd 12. $\frac{45}{54} = \frac{45 \div 9}{54 \div 9} = \frac{5}{6}$, 5 boys : 6 girls 13. $\frac{1 \text{ miles}}{8 \text{ minutes}} = \frac{1 \text{ miles} \times 5}{8 \text{ minutes} \times 5} = \frac{5 \text{ miles}}{40 \text{ minutes}}$; 40 min 14. $\frac{\$400}{32 \text{ hours}} = \frac{\$400 \div 32}{32 \text{ hours} \div 32} = \frac{\$12.50}{1 \text{ hour}} = \12.50 15. \$3.09 for 32 ounces is about \$0.10 per ounce; \$1.40 for 24 ounces is about \$0.06 per ounce; a 24-oz loaf is the better buy. 16. no; $2 \times 3 = 6$ but $5 \times 1 = 5$ 17. yes; $6 \times 56 = 336$ and $16 \times 21 = 336$ 18. yes; $15 \times 3 = 45$ and $9 \times 5 = 45$ 19. no; $3 \times 16 = 48$ but $8 \times 9 = 72$

20. Let x = number of yellow marbles.

$$\begin{aligned}\frac{3}{8} &= \frac{x}{944} \\ 8 \times x &= 3 \times 944 \\ 8x &= 2,832 \\ \frac{8x}{8} &= \frac{2,832}{8} \\ x &= 354 \text{ yellow marbles}\end{aligned}$$

21. Let s = scale length in feet.

$$\begin{aligned}\frac{1}{10} &= \frac{s}{990} \\ 10 \times s &= 1 \times 990 \\ 10s &= 990 \\ \frac{10s}{10} &= \frac{990}{10} \\ s &= 99 \text{ feet}\end{aligned}$$

22. Let s = scale length in inches.

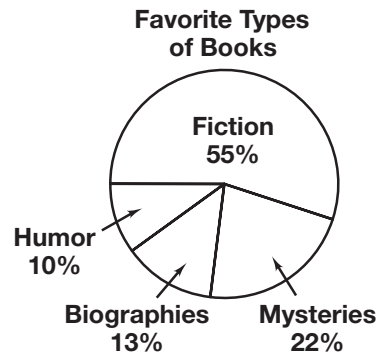
$$\begin{aligned}\frac{3}{20} &= \frac{s}{990} \\ 20 \times s &= 3 \times 990 \\ 20s &= 2,970 \\ \frac{20s}{20} &= \frac{2,970}{20} \\ s &= 148.5 \text{ inches}\end{aligned}$$

23. Let s = scale length in inches.

$$\begin{aligned}\frac{2}{15} &= \frac{s}{990} \\ 15 \times s &= 2 \times 990 \\ 15s &= 1,980 \\ \frac{15s}{15} &= \frac{1,980}{15} \\ s &= 132 \text{ inches}\end{aligned}$$

24. $30\% = \frac{30}{100} = \frac{3}{10}$, $\frac{30}{100} = 0.30$, or 0.3 25. $25\% = \frac{25}{100} = \frac{1}{4}$, $\frac{25}{100} = 0.25$ 26. $56\% = \frac{56}{100} = \frac{14}{25}$, $\frac{56}{100} = 0.56$ 27. $12\% = \frac{12}{100} = \frac{3}{25}$, $\frac{12}{100} = 0.12$ 28. 30% of 200 is 0.3 of 200; $0.3 \times 200 = 60$; 60 students 29. 3 out of 5 is $\frac{3}{5}$; $\frac{3}{5} = \frac{3 \times 20}{5 \times 20} = \frac{60}{100}$; 60%

30.



31. 20% of 48 is about 20% of 50, or 10 32. 6% of \$19.99 is about 0.06 of \$20, or \$1.20 33. 15% of \$38.56 is about 0.15 of \$40, or \$6.00

CHAPTER TEST

page 356

1. 3 nickels to 5 quarters: 3 to 5, 3 : 5, $\frac{3}{5}$ 2. 11 dimes to 3 nickels: 11 to 3, 11 : 3, $\frac{11}{3}$ 3. 11 dimes to 19 coins: 11 to 19, 11 : 19, $\frac{11}{19}$ 4. 5 quarters to 11 dimes: 5 to 11, 5 : 11, $\frac{5}{11}$ 5. 4 shaded squares to 6 un-shaded squares: $\frac{4}{6} = \frac{2}{3}$; 2 : 3 6–8. Answers may vary. Samples are given. 6. Multiply by 2 \rightarrow 6 to 4; Multiply by 3 \rightarrow 9 to 6; Multiply by 4 \rightarrow 12 to 8 7. $\frac{3}{18} \div \frac{3}{3} = \frac{1}{6}$; $\frac{1}{6} = \frac{1 \times 2}{6 \times 2} = \frac{2}{12}$; $\frac{1}{6} = \frac{1 \times 4}{6 \times 4} = \frac{4}{24}$ 8. Divide by 2 \rightarrow 3 : 4; Multiply by $\frac{3}{2} \rightarrow$ 9 : 12; Multiply by 5 \rightarrow 30 : 40 9. $\frac{28 \text{ miles}}{1 \text{ gallon}} = \frac{28 \text{ miles} \times 8}{1 \text{ gallon} \times 8} = \frac{224 \text{ miles}}{8 \text{ gallons}}$; 224 miles 10. $\frac{\$0.96}{6 \text{ ounces}} = \frac{\$0.16}{1 \text{ ounce}}$; $\frac{\$1.12}{8 \text{ ounces}} = \frac{\$0.14}{1 \text{ ounce}}$; the 8-ounce size 11. yes; $5 \times 9 = 45$ and $3 \times 15 = 45$ 12. no; $3 \times 5 = 15$ but $4 \times 4 = 16$ 13. no; $8 \times 8 = 64$ but $12 \times 12 = 144$ 14. $\frac{4}{5} = \frac{x}{25}$ 15. $\frac{6}{4} = \frac{9}{m}$
 $5 \times x = 4 \times 25$ $6 \times m = 4 \times 9$
 $5x = 100$ $6m = 36$
 $\frac{100}{5} = \frac{5x}{5}$ $\frac{6m}{6} = \frac{36}{6}$
 $20 = x$ $m = 6$ 16. $\frac{a}{25} = \frac{3}{10}$
 $10 \times a = 25 \times 3$
 $10a = 75$
 $\frac{10a}{10} = \frac{75}{10}$
 $a = 7.5$ 17. Let a = the cost of 8 pounds of apples.
 $\frac{6}{4} = \frac{8}{a}$
 $6 \times a = 8 \times 4$
 $6a = 32$
 $\frac{6a}{6} = \frac{32}{6}$
 $a \approx \$5.33$ 18 No; 15 is not a multiple of 6. 19. Let a = actual distance. 20. Let a = actual distance.
 $\frac{1}{30} = \frac{3}{a}$ $\frac{1}{30} = \frac{6}{a}$
 $1 \times a = 3 \times 30$ $1 \times a = 6 \times 30$
 $a = 90 \text{ miles}$ $a = 180 \text{ miles}$

21. Let a = actual distance.

$$\frac{1}{30} = \frac{0.5}{a}$$

$$1 \times a = 30 \times 0.5$$

$$a = 15 \text{ miles}$$

22. scale: ratio of model length to actual length: 1.5 ft to 9 ft, or $\frac{1.5}{9}$; $\frac{1.5}{9} = \frac{1.5 \times 10}{9 \times 10} = \frac{15}{90} = \frac{1}{6}$ 23. $25\% = \frac{25}{100} = 0.25$; $\frac{25}{100} = \frac{25 \div 25}{100 \div 25} = \frac{1}{4}$ 24. $6\% = \frac{6}{100} = 0.06$; $\frac{6}{100} = \frac{6 \div 2}{100 \div 2} = \frac{3}{50}$ 25. $98\% = \frac{98}{100} = 0.98$; $\frac{98}{100} = \frac{98 \div 2}{100 \div 2} = \frac{49}{50}$ 26. In 0.48, move the decimal point two places to the right and add the percent symbol to get 48%. 27. In 0.02, move the decimal point two places to the right and add the percent symbol to get 2%. 28. $\frac{1}{10} = \frac{1 \times 10}{10 \times 10} = \frac{10}{100} = 10\%$ 29. $\frac{3}{15} = \frac{3 \div 3}{15 \div 3} = \frac{1}{5} = \frac{1 \times 20}{5 \times 20} = \frac{20}{100} = 20\%$ 30. $5 \div 6 = 0.8\overline{3}$; 83% 31. $0.9 = 0.999$; 100% 32. 5% of 200 is $\frac{1}{20} \times 200 = 10$ 33. 80% of 8 is $0.8 \times 8 = 6.4$ 34. 2% of 50 is $\frac{1}{50} \times 50 = 1$ 35. 86% of 50 is $0.86 \times 50 = 43$; 43 people 36a. the largest portion of the graph is yellow; bus. 36b. the smallest portion of the graph is purple; bicycle 37. \$32.04 is about \$32; 10% of \$32 is \$3.20 and 5% of \$32 is \$1.60; $\$3.20 + \$1.60 = \$4.80$ 38. \$48.76 is about \$50; 10% of \$50 is \$5.00 and 5% of \$50 is \$2.50; $\$5.00 + \$2.50 = \$7.50$ 39. \$12.83 is about \$13; 10% of \$13 is \$1.30 and 5% of \$13 is \$.65; $\$1.30 + \$.65 = \$1.95$ 40. \$12.98 is about \$13; 7% of \$13 is $0.07 \times \$13 = \0.91 ; $\$13 + \$0.91 = \$13.91$

TEST PREP

page 357

- $\frac{2}{9} \cdot \frac{5}{7} = \frac{2 \cdot 5}{9 \cdot 7} = \frac{10}{63}$; the correct choice is A.
- $1\frac{3}{4} \div \frac{1}{2} = \frac{7}{4} \div \frac{1}{2} = \frac{7}{4} \cdot 2$; you should multiply $\frac{7}{4}$ and 2, so the correct choice is J. 3. You bought 12 bags and each bag contains c ounces so the total number of ounces is $12 \cdot c$; the correct choice is D.
- F: $\frac{8}{10} = \frac{8 \cdot 4}{10 \cdot 4} = \frac{32}{40}$;
G: $\frac{1}{3} = \frac{1 \cdot 12}{3 \cdot 12} = \frac{12}{36}$;
H: $\frac{24}{42} = \frac{24 \div 6}{42 \div 6} = \frac{4}{7} = \frac{4 \cdot 7}{7 \cdot 7} = \frac{28}{49}$;
J: $\frac{13}{14} = \frac{13 \cdot 14}{14 \cdot 14} = \frac{182}{196} \neq \frac{169}{196}$; the correct choice is J.
- There are 30 shaded squares and 100 squares total so there are $100 - 30$, or 70 squares that are not shaded. $\frac{70}{100} = 0.7$; the correct choice is D. 6. F: 1,350 is divisible by 2, 5, and 10 because the last digit is 0; 1,350 is divisible by 3 and 9 because the sum of the digits, $1 + 3 + 5 + 0 = 9$, which is divisible by 3 and 9; the correct choice is F.

7. The appropriate unit for measuring the length of a driveway is feet; the correct choice is B.

$$8. \quad x - \frac{1}{10} = \frac{1}{2}$$

$$x - \frac{1}{10} + \frac{1}{10} = \frac{1}{2} + \frac{1}{10}$$

$$x = \frac{5}{10} + \frac{1}{10}$$

$$x = \frac{6}{10} = \frac{3}{5}$$

9. $\frac{2}{5} = 0.4 = 40\%$, so 40% of the vehicles were minivans; the correct choice is D. 10. She spends 8 minutes with each customer and she deals with 7 customers so she deals with customers for $8 \cdot 7$, or 56 minutes.

$$11. \quad \frac{k}{9} = \frac{2}{5}$$

$$5k = 2 \cdot 9$$

$$\frac{5k}{5} = \frac{2 \cdot 9}{5}$$

$$k = \frac{18}{5}$$

$$12. \quad 7\frac{5}{6} \cdot 2\frac{1}{2} = \frac{47}{6} \cdot \frac{5}{2} = \frac{47 \cdot 5}{6 \cdot 2} = \frac{235}{12} = 19.58$$

13. $[2] \frac{3}{4}$ of 68 = $\frac{3}{4} \cdot 68$, or 51 days have gone by, so the number of days left are $68 - 51$, or 17 days. [1] correct answer, no reason 14. [4] $\$19.68 \approx 20$; find 10% of 20; $20 \times 0.1 = 2$; half of 10% of 20 is 5% of 20; $2 \div 2 = 1$; the sales tax is about \$1.00. Two times 10% of 20 is 20% of 20; $2 \times 2 = 4$; the tip is about \$4.00. $20 + 1 + 4 = 25$; the total cost is about \$25.00. [3] minor error, correct reasoning; [2] correct answer, but computational error; [1] correct answer with no reason 15. [4] To find the number of calls she receives in a 5-day work week, divide the number of minutes she works by the frequency she receives phone calls. To find the number of minutes she works in a 5-day work week, multiply 5 days \times 7 hours \times 60 min = 2,100 minutes. $2,100 \div 12 = 175$; she received about 175 calls in a 5-day work week. [3] appropriate methods, one error; [2] appropriate methods, more than one computational error; [1] correct answer, no steps

DK PROBLEM SOLVING APPLICATION

pages 358–359

- 1a. Answers may vary. Sample: height, 22.2 cm; leg, 5.7 cm; foot, 2.2 cm; neck, 15.1 cm 1b. Answers may vary. Sample: photo height, 2.8 cm; my height, 145.6 cm; scale 1 : 52 1c. Answers may vary. Sample: 1,154.4 cm, 296.2 cm, 114.4 cm, 785.2 cm 2a. Check students' work. 2b. Answers may vary. 2c–d. Check students' work. 3. Check students' work.

CHECK YOUR READINESS

page 360

- Since $9 + 9 = 18$, $a = 9$. 2. Since $9 \div 3 = 3$, $y = 9$.
- Since $11 \times 4 = 44$, $k = 4$. 4. Since $10 - 5 = 5$, $c = 10$.
- $0.23 + x = 1.5$
 $0.23 + x - 0.23 = 1.5 - 0.23$
 $x = 1.27$
- $p + 120.5 = 180$
 $p + 120.5 - 120.5 = 180 - 120.5$
 $p = 59.5$
- $62.9 + b = 90$
 $62.9 + b - 62.9 = 90 - 62.9$
 $b = 27.1$
- $d - 13 = 4.5$
 $d - 13 + 13 = 4.5 + 13$
 $d = 17.5$
- $g - 22 = 11.3$
 $g - 22 + 22 = 11.3 + 22$
 $g = 33.3$
- $c - 0.45 = 11.62$
 $c - 0.45 + 0.45 = 11.62 + 0.45$
 $c = 12.07$
- yes; $\frac{3}{4} = \frac{3 \times 6}{4 \times 6} = \frac{18}{24}$ 12. no; $\frac{11}{12} = \frac{11 \times 12}{12 \times 12} = \frac{132}{144}$, which does not equal $\frac{121}{144}$ 13. no; $\frac{16}{20} = \frac{16 \times 5}{20 \times 5} = \frac{80}{100}$, which does not equal $\frac{64}{100}$ 14. yes; $\frac{12}{15} = \frac{12 \times 2}{15 \times 2} = \frac{24}{30}$ 15. no; $\frac{5}{8} = \frac{5 \times 3}{8 \times 3} = \frac{15}{24}$, which does not equal $\frac{15}{20}$ 16. yes; $\frac{4}{9} = \frac{4 \times 4}{9 \times 4} = \frac{16}{36}$

8-1 Points, Lines, Segments, and Rays

pages 362–365

Check Skills You'll Need For complete solutions see *Daily Skills Check and Lesson Quiz Transparencies* or *Presentation Pro CD ROM*. 1. Answers may vary. Sample: Numbers are ordered from smallest to largest as you move from left to right on a number line. 2. 1.03, 1.06, 1.3, 1.6 3. 0.2, 0.4, 0.6, 0.9 4. 1.04, 1.3, 1.4, 1.5

Quick Check 1a. Answers may vary. Samples are given. \overleftrightarrow{VP} , \overleftrightarrow{MV} 1b. Use endpoints to name segments: \overline{VM} , \overline{VP} , \overline{MP} 2a–b. Answers may vary. Samples are given. 2a. NE 4th St. and NE 2nd St. 2b. N. Miami Ave. and NE 2nd St.

Exercises 1. A log can represent a finite length in 1-dimensional space, so a log can represent a segment. The correct choice is C. 2. The figure is a segment with endpoints E and F ; \overline{EF} ; the correct choice is B. 3. The figure is a line that contains points E and F ; \overleftrightarrow{EF} ; the correct choice is A. 4. The figure is a ray with endpoint F ; \overrightarrow{FE} ; the correct choice is D. 5. The figure is a ray with endpoint E ; \overrightarrow{EF} ; the correct choice is C. 6. The figure is a segment with endpoints F and G ; \overline{FG} 7. The figure is a

ray with endpoint K ; \overrightarrow{KJ} 8. The figure is a segment with endpoints H and J ; \overline{HJ} 9. The figure is a ray with endpoint Q ; \overrightarrow{QP} 10. The figure is a line that contains points X and Y ; \overleftrightarrow{XY} 11. The figure is a segment with endpoints D and W ; \overline{DW} 12–15. Answers may vary. Samples are given. 12. A line parallel to \overleftrightarrow{PQ} is \overleftrightarrow{SR} 13. Two skew lines are \overleftrightarrow{RV} and \overleftrightarrow{PQ} 14. A line parallel to \overleftrightarrow{SW} and \overleftrightarrow{RV} is \overleftrightarrow{QU} 15. Two intersecting lines are \overleftrightarrow{SR} and \overleftrightarrow{RQ} 16. \overleftrightarrow{AB} is parallel to \overleftrightarrow{DC} . \overleftrightarrow{AB} is skew to \overleftrightarrow{GH} . \overleftrightarrow{AB} intersects \overleftrightarrow{BC} . 17. A ray always has one endpoint. 18. Skew lines never intersect. 19. The arrows in the symbol for a line indicate that the line continues infinitely in both directions. The lack of arrows in the symbol for a line segment indicates that a segment has two endpoints. 20. The segments intersecting \overleftrightarrow{GH} are \overline{GC} , \overline{GE} , \overline{DH} , and \overline{HF} 21. Answers may vary. Sample: a line parallel to \overleftrightarrow{AB} is \overleftrightarrow{GH} 22. The intersection of \overleftrightarrow{EF} and \overleftrightarrow{AE} is E . 23. Answers may vary. Sample: a segment skew to \overleftrightarrow{AC} is \overline{DH} 24a. all the points on line segment \overline{AB} 24b. Point C should be between points A and B . 25. Check students' work. 26. $2\frac{3}{4} + 2\frac{3}{4} = 4\frac{6}{4} = 5\frac{2}{4} = 5\frac{1}{2}$; the correct choice is C. 27. 1 lb = 16 ounces so 8 ounces of cheese is $\frac{1}{2}$ lb; $24 \times \frac{1}{2} = 12$ lb, so the correct choice is H. 28. $40 \div 125 = 0.32$; 32%; the correct choice is C. 29. Put the data in order: 4, 5, 6, 7, 8, 9, 10; the median is 7. 30. Put the data in order: 475, 500, 520, 550, 600; the median is 520.

ACTIVITY LAB

page 366

1a. between wedge A and B 1b. smaller than wedge A 1c. same as wedge A and B combined 2. Answers may vary. Samples are given. 20° ; 10° ; 45° 3. about 150°

8-2 Angles

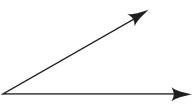
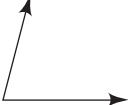
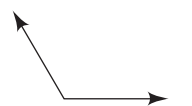
pages 367–371

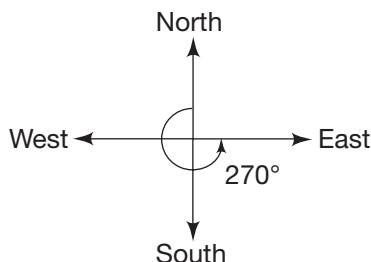
Check Skills You'll Need For complete solutions see *Daily Skills Check and Lesson Quiz Transparencies* or *Presentation Pro CD ROM*. 1. A line continues in opposite directions without end. A ray has one endpoint and continues in one direction without end. 2. Answers may vary. Samples are given. \overleftrightarrow{AC} , \overline{BE} , \overline{DB} 3. Answers may vary. Sample: \overleftrightarrow{EB} , \overline{BD}

Quick Check 1. 125° 2. about 60° ; acute 3a. acute 3b. right 3c. right

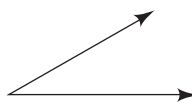
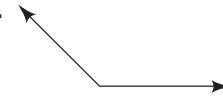


More Than One Way 70° ; check students' work.

Exercises 1. A right angle measures 90° ; an obtuse angle measures between 90° and 180° . 2. No; the measure of an angle is not related to the length of the sides that form the angle. 3–5. Check students' sketches. Samples are given.

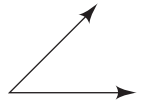
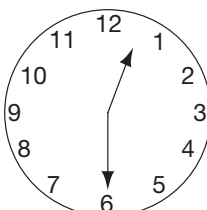
3.  30° 4.  60°
5.  120°
6. 120°
 7. 60° 8. 90° 9. acute 10. right 11. acute
 12. right 13. obtuse 14. right 15. acute
 16. east



17–20. Check students' work.

17.  30° 18.  135°
19.  90° 20.  75°

21. 20° 22. 70° 23. 160° 24. 120° 25. acute 26. Check students' work. 27. Fold the piece of paper lengthwise. Without unfolding, fold it crosswise.

28.  45° 29.  165°

30. An obtuse angle is larger than 90° and less than 180°, so the correct choice is C. 31. The bus starts with 25 people and at every stop 5 get off and 1 gets on. You want to find how many stops it takes for only 1 person to remain on the bus.

Let s = the number of stops.

$$25 - 5s + 1s = 1$$

$$25 - 4s = 1$$

$$25 - 4s + 4s = 1 + 4s$$

$$25 = 1 + 4s$$

$$25 = 1 - 1 + 4s$$

$$25 - 1 = 1 - 1 + 4s$$

$$24 = 4s$$

$$\frac{24}{4} = \frac{4s}{4}$$

$$6 = s$$

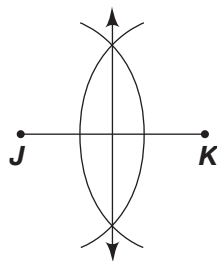
The correct choice is H. 32. Yards or meters; explanations may vary.

EXTENSION

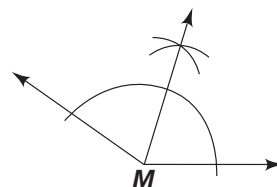
pages 372–373

1–2. Check students' work.

1.



2.



3. Four right angles are formed at the intersection of a segment and its perpendicular bisector. The bisector of a 90° angle divides it into two 45° angles.

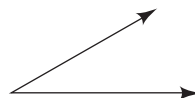
8-3 Special Pairs of Angles

pages 374–377

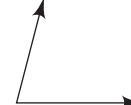
Check Skills You'll Need For complete solutions see *Daily Skills Check and Lesson Quiz Transparencies* or *Presentation Pro CD ROM*. 1. Check students' work.

2–5. Check students' work.

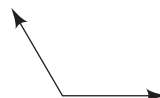
2.



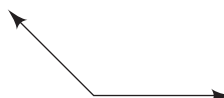
3.



4.



5.



Quick Check

$$\begin{aligned} 1. \quad x + 53^\circ &= 90^\circ \\ x + 53^\circ - 53^\circ &= 90^\circ - 53^\circ \\ x &= 37^\circ \end{aligned}$$

$$\begin{aligned} 2. \quad x + 145^\circ &= 180^\circ \\ x + 145^\circ - 145^\circ &= 180^\circ - 145^\circ \\ x &= 35^\circ \end{aligned}$$

3. $\angle 5$ is supplementary to $\angle 6$, so $180 - 142 = 38$; $\angle 5$ and $\angle 7$ are vertical angles, so $\angle 5 = \angle 7 = 142^\circ$

Exercises 1. Complementary angles have a sum of 90°; supplementary angles add to 180°. 2. Draw a straight line and a ray with its endpoint on the line. The two angles created are supplementary. 3. Angles with equal measures are congruent angles, $47^\circ = 47^\circ$; the correct choice is C. 4. If the sum of the measures of two angles is 90°, the angles are complementary angles, $9^\circ + 81^\circ = 90^\circ$; the correct choice is A. 5. If the sum of the measure of two angles is 180°, the angles are supplementary angles, $89^\circ + 91^\circ = 180^\circ$; the correct choice is B.

6. Let c = the measure of the complement.

$$\begin{aligned} c + 12^\circ &= 90^\circ \\ c + 12^\circ - 12^\circ &= 90^\circ - 12^\circ \\ c &= 78^\circ \end{aligned}$$

7. Let c = the measure of the complement.

$$\begin{aligned} c + 45^\circ &= 90^\circ \\ c + 45^\circ - 45^\circ &= 90^\circ - 45^\circ \\ c &= 45^\circ \end{aligned}$$

8. Let c = the measure of the complement.

$$\begin{aligned} c + 33^\circ &= 90^\circ \\ c + 33^\circ - 33^\circ &= 90^\circ - 33^\circ \\ c &= 57^\circ \end{aligned}$$

9. Let c = the measure of the complement.

$$\begin{aligned} c + 68^\circ &= 90^\circ \\ c + 68^\circ - 68^\circ &= 90^\circ - 68^\circ \\ c &= 22^\circ \end{aligned}$$

10. Let c = the measure of the complement.

$$\begin{aligned} c + 4^\circ &= 90^\circ \\ c + 4^\circ - 4^\circ &= 90^\circ - 4^\circ \\ c &= 86^\circ \end{aligned}$$

11. Let s = the measure of the supplement.

$$\begin{aligned} s + 90^\circ &= 180^\circ \\ s + 90^\circ - 90^\circ &= 180^\circ - 90^\circ \\ s &= 90^\circ \end{aligned}$$

12. Let s = the measure of the supplement.

$$\begin{aligned} s + 176^\circ &= 180^\circ \\ s + 176^\circ - 176^\circ &= 180^\circ - 176^\circ \\ s &= 4^\circ \end{aligned}$$

13. Let s = the measure of the supplement.

$$\begin{aligned} s + 110^\circ &= 180^\circ \\ s + 110^\circ - 110^\circ &= 180^\circ - 110^\circ \\ s &= 70^\circ \end{aligned}$$

14. Let s = the measure of the supplement.

$$\begin{aligned} s + 144^\circ &= 180^\circ \\ s + 144^\circ - 144^\circ &= 180^\circ - 144^\circ \\ s &= 36^\circ \end{aligned}$$

15. $x + 118^\circ = 180^\circ$

$$\begin{aligned} x + 118^\circ - 118^\circ &= 180^\circ - 118^\circ \\ x &= 62^\circ \end{aligned}$$

16. $x + 26^\circ = 90^\circ$

$$\begin{aligned} x + 26^\circ - 26^\circ &= 90^\circ - 26^\circ \\ x &= 64^\circ \end{aligned}$$

17. $x + 120^\circ = 180^\circ$

$$\begin{aligned} x + 120^\circ - 120^\circ &= 180^\circ - 120^\circ \\ x &= 60^\circ \end{aligned}$$

18. angles 1 and 2 are vertical angles which means that they have equal measures, so $m\angle 1 = m\angle 2 = 40^\circ$; angles 1 and 3 are supplementary, which means they have to add up to 180° ; $40^\circ + m\angle 3 = 180^\circ$, so $m\angle 3 = 140^\circ$; angles 3 and 4 are vertical angles which means they have equal measures so, $m\angle 3 = m\angle 4 = 140^\circ$. 19. Angles 2 and 4 are vertical angles and so are angles 1 and 3. Vertical angles have equal measures, so, $m\angle 2 = m\angle 4 = 46^\circ$; $m\angle 3 = m\angle 1$. Angle 3 and angle 1 are supplements of angle 2 and angle 4 so $180^\circ - 46^\circ = 134^\circ = m\angle 1 = m\angle 3$

20. Two acute angles are sometimes complimentary.

21. Two obtuse angles are never supplementary.

22.

$$\begin{aligned} x + 30^\circ + 90^\circ &= 180^\circ \text{ (supplementary angles)} \\ x + 120^\circ &= 180^\circ \\ x + 120^\circ - 120^\circ &= 180^\circ - 120^\circ \\ x &= 60^\circ \end{aligned}$$

23. $x + 90^\circ = 110^\circ$ (vertical angles)

$$\begin{aligned} x + 90^\circ - 90^\circ &= 110^\circ - 90^\circ \\ x &= 20^\circ \end{aligned}$$

24. An acute angle is less than 90° , so solve $x + 5^\circ = 90^\circ$.

$$\begin{aligned} x + 5^\circ &= 90^\circ \\ x + 5^\circ - 5^\circ &= 90^\circ - 5^\circ \\ x &= 85^\circ \end{aligned}$$

An obtuse angle is more than 90° and less than 180° , so solve $y + 85^\circ = 180^\circ$.

$$\begin{aligned} y + 85^\circ &= 180^\circ \\ y + 85^\circ - 85^\circ &= 180^\circ - 85^\circ \\ y &= 95^\circ \end{aligned}$$

85° ; 95°

25. An obtuse angle does not have a complement because it is greater than 90° . 26. A circle has 360° . Two angles of the circle are supplementary to each other so solve, $180^\circ - 65^\circ = 115^\circ$. Subtract these two angles from 360° and you will find your remaining angle, $360^\circ - 115^\circ - 65^\circ = 180^\circ$. 115°; 180° 27. Measure the angle of $\angle QTR$ using the protractor. The correct choice is C. 28. Set up a proportion, $\frac{65}{1} = \frac{w}{30}$; the correct choice is F. 29. 5% of 100 = $0.05 \times 100 = 5$ 30. 30% of 50 = $0.30 \times 50 = 15$ 31. 75% of 42 = $0.75 \times 42 = 31.5$

ACTIVITY LAB

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1. The two lines drawn have no points in common so they are parallel. 2–3. Check students' work. 4. interior angles with the same measure: $\angle 3$ and $\angle 6$, and $\angle 4$ and $\angle 5$; exterior angles with the same measure: $\angle 1$ and $\angle 8$, and $\angle 2$ and $\angle 7$ 5. $\angle 5$, $\angle 4$; answers may vary. Sample: $\angle 3$ and $\angle 4$, $\angle 5$ and $\angle 6$ 6–7. Check students' work.

CHECKPOINT QUIZ 1

page 379

1–10. Answers may vary. Samples are given.

1. \overleftrightarrow{LM} , and \overleftrightarrow{KN} , 2. \overleftrightarrow{JP} and \overleftrightarrow{NK} 3. $\angle PJM$ 4. $\angle PJK$

5. $\angle PJN$ 6. $\angle LJM$ 7. $\angle KJL$ and $\angle MJN$ 8. $\angle KJL$

9. $\angle PJK$ and $\angle KJL$ 10. $\angle LJN$ and $\angle NJM$

ACTIVITY LAB

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1–4. Check students' work. 5. The sum of the measures of the angles of a triangle is 180° . 6. No. Since one obtuse angle is larger than 90° , two obtuse angles together are larger than 180° .

8-4 Classifying Triangles

pages 380–383

Check Skills You'll Need For complete solutions see *Daily Skills Check and Lesson Quiz Transparencies* or *Presentation Pro CD ROM*. 1. No; an obtuse angle itself is already larger than 90° . 2. acute 3. obtuse

4. right 5. straight

Quick Check 1. right triangle

$$\begin{aligned} 2. \quad x + 58^\circ + 72^\circ &= 180^\circ \\ x + 130^\circ &= 180^\circ \\ x + 130^\circ - 130^\circ &= 180^\circ - 130^\circ \\ x &= 50^\circ \end{aligned}$$

3. isosceles triangle; two sides are congruent

Exercises 1. The triangle has no congruent sides and one angle is 90° , so it is a scalene right triangle. 2. The triangle has two congruent sides and one angle of greater than 90° , so it is an obtuse isosceles triangle. 3. The triangle has no congruent sides and all angles are less than 90° , so it is a scalene acute triangle. 4. The triangle has no congruent sides and one angle is 90° , so it is a scalene right triangle. 5. One of the angles in this triangle is 90° , so it is a right triangle. 6. All of the angles in this triangle are less than 90° , so it is an acute triangle. 7. One of the angles in this triangle is over 90° , so it is an obtuse triangle.

$$\begin{aligned} 8. \quad x + 115^\circ + 40^\circ &= 180^\circ \\ x + 155^\circ &= 180^\circ \\ x + 155^\circ - 155^\circ &= 180^\circ - 155^\circ \\ x &= 25^\circ \end{aligned}$$

$$\begin{aligned} 9. \quad x + 50^\circ + 65^\circ &= 180^\circ \\ x + 115^\circ &= 180^\circ \\ x + 115^\circ - 115^\circ &= 180^\circ - 115^\circ \\ x &= 65^\circ \end{aligned}$$

$$\begin{aligned} 10. \quad x + 90^\circ + 40^\circ &= 180^\circ \\ x + 130^\circ &= 180^\circ \\ x + 130^\circ - 130^\circ &= 180^\circ - 130^\circ \\ x &= 50^\circ \end{aligned}$$

11. The triangle has no congruent sides, so it is a scalene triangle. 12. The triangle has two congruent sides, so it is an isosceles triangle. 13. The triangle has two congruent sides, so it is a scalene triangle. 14. The triangle has two congruent sides, so it is an isosceles triangle. 15. The triangle has no congruent sides, so it is a scalene triangle. 16. All the sides of the triangle are congruent, so it is an equilateral triangle. 17. The measure of the largest angle is less than 90° and all three sides are congruent, so it is an acute equilateral triangle.

18. Solve for the angle not known to find what kind of triangle the angles make.

$$\begin{aligned} x + 15^\circ + 60^\circ &= 180^\circ \\ x + 75^\circ &= 180^\circ \\ x + 75^\circ - 75^\circ &= 180^\circ - 75^\circ \\ x &= 105^\circ \end{aligned}$$

One obtuse angle in a triangle classifies it as obtuse.

19. Solve for the angle not known to find what kind of triangle the angles make.

$$\begin{aligned} x + 14^\circ + 76^\circ &= 180^\circ \\ x + 90^\circ &= 180^\circ \\ x + 90^\circ - 90^\circ &= 180^\circ - 90^\circ \\ x &= 90^\circ \end{aligned}$$

One right angle in the triangle classifies it as right.

20. Solve for the angle not known to find what kind of triangle the angles make.

$$\begin{aligned} x + 60^\circ + 61^\circ &= 180^\circ \\ x + 121^\circ &= 180^\circ \\ x + 121^\circ - 121^\circ &= 180^\circ - 121^\circ \\ x &= 59^\circ \end{aligned}$$

Three acute angles in a triangle classifies it as acute.

21. The two triangles have a right angle in each of them so they are right triangles. right; right 22. The orange triangle has no congruent sides. The green triangle has at least two congruent sides. scalene; isosceles 23. If you know two angles, you can subtract them from 180° to find the third. This allows you to classify the triangle.

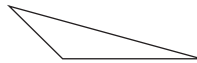
24. Answers may vary. Sample: acute, isosceles

25. A triangle has 180° and in an equilateral triangle all the angles are congruent. $3x = 180^\circ$ or $x + x + x = 180^\circ$

$$3x = 180^\circ$$

$x = 60^\circ$

26. Answers may vary. Sample:



27. Let x represent one of the 2 congruent sides of the isosceles triangle. The third side is calculated by subtracting the sum of the two congruent sides from 180° . $180^\circ - 2x$.

$$\begin{aligned} 28. \quad x + 37^\circ + 52^\circ &= 180^\circ \\ x + 89^\circ &= 180^\circ \\ x + 89^\circ - 89^\circ &= 180^\circ - 89^\circ \\ x &= 91^\circ \end{aligned}$$

29. Start with 10 and keep multiplying by 2; 160 30. Set up a ratio of non-swimmers to swimmers: $\frac{24}{20}, \frac{24}{20} = \frac{12}{10} =$

$$1\frac{2}{10} = 1\frac{1}{5} = 1.2 \quad 31. 25\% \text{ of } 200 = 0.25 \times 200 = 50$$

people 32. Find the amount of people who like ice cream and cake. $40\% \text{ of } 200 = 0.4 \times 200 = 80$ people; $20\% \text{ of } 200 = 0.2 \times 200 = 40$ people; Then find the difference of the two to see how many more people like prefer ice cream than cake. $80 - 40 = 40$ people

VOCABULARY BUILDER

page 384

1–3. Check students' work. 4. 9 cm 5. All angles are right angles, and all opposite sides are parallel and congruent. 6. Check students' work. 7a–c. Check students' work.

ACTIVITY LAB

page 385

1–2. Check students' work. 3. 360° 4. Yes; check students' work. 5. Check students' work. 6. Two triangles were formed. The sum of the angles of $PQRS$ and the sum of the angles of the triangles are the same; the two triangles have $2 \times 180^\circ$ or 360° . This is the same as the sum of the four angles in a quadrilateral. 7. The sum of the angles in a four-sided figure is 360° .

Exercises

$$1. \quad m\angle W = 360^\circ - (89^\circ + 112^\circ + 78^\circ) = 360^\circ - 279^\circ = 81^\circ$$

$$\begin{aligned} 2. \quad x + 90^\circ + 120^\circ + 70^\circ &= 360^\circ \\ x + 280^\circ &= 360^\circ \\ x + 280^\circ - 280^\circ &= 360^\circ - 280^\circ \\ x &= 80^\circ \end{aligned}$$

3. $x = 90^\circ$; all angles of a rectangle are 90° .

8-5 Exploring and Classifying Polygons

pages 386–390

Check Skills You'll Need For complete solutions see *Daily Skills Check and Lesson Quiz Transparencies* or *Presentation Pro CD ROM*.

1. No; skew lines are not in the same plane. 2. Answers may vary. Sample: \overline{CB} and \overline{GH}

Quick Check 1a. quadrilateral 1b. hexagon

1c. octagon 2a. irregular 2b. irregular

3. Parallelogram, rectangle; rectangle; answers may vary. Sample: A rectangle has four right angles and two pairs of parallel lines. 4. The yard forms a quadrilateral. All angles add up to 360° so $m\angle a = 360^\circ - (90^\circ + 90^\circ + 124^\circ) = 360^\circ - 304^\circ = 56^\circ$.

Exercises 1. A rectangle is a square when all four sides are congruent. 2. A five sided polygon is a pentagon. 3. A polygon is a closed figure with 3 or more sides. A figure that is not closed or has fewer than 3 sides is not a polygon. 4. It has 5 sides, so it is a pentagon. 5. It has 10 sides, so it is a decagon. 6. It has 4 sides, so it is a quadrilateral. 7. It has sides that are not all congruent, so it is irregular. 8. It sides and angles that are all congruent, so it is regular. 9. It has angles that are not all congruent, so it is irregular. 10. All four sides are congruent, so it is a rhombus. Both pairs of opposite sides are parallel, so it is a parallelogram; rhombus, parallelogram 11. It has 2 pairs of parallel sides, so it is a parallelogram. It is a parallelogram with 4 right angles, so it is a rectangle; rectangle, parallelogram 12. It has exactly one pair of parallel sides, so it is a trapezoid.

$$\begin{aligned} 13. d + 166^\circ + 90^\circ + 90^\circ &= 360^\circ \\ d + 346^\circ &= 360^\circ \\ d + 346^\circ - 346^\circ &= 360^\circ - 346^\circ \\ d &= 14^\circ \end{aligned}$$

14. 90° ; all angles of a square are 90° .

$$\begin{aligned} 15. n + 40^\circ + 110^\circ + 139^\circ &= 360^\circ \\ n + 289^\circ &= 360^\circ \\ n + 289^\circ - 289^\circ &= 360^\circ - 289^\circ = 71^\circ \end{aligned}$$

16. quadrilateral;



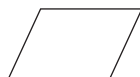
17. trapezoid;



18. rectangle;



19. rhombus;



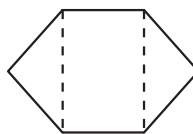
20. parallelogram;



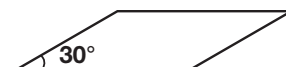
21. quadrilateral with only one right angle;



22. Hexagon; drawings may vary. Sample:



23.



24. Some quadrilaterals are squares. 25. All rhombuses are quadrilaterals. 26. No trapezoids are parallelograms. 27. All squares are rectangles. 28. A quadrilateral has 4 sides and 2 diagonals; a pentagon has 5 sides and 5 diagonals; and a hexagon has 6 sides and 9 diagonals. You can use this information to find a pattern and predict the number of diagonals in an octagon. 2, $2 + 3 = 5$, $5 + 4 = 9$. Each term is increasing by one or more than the previous term was increased. Continuing this pattern gives the number of sides in an octagon: $9 + 5 = 14$, and the number of sides in an octagon: $14 + 6 = 20$. 29. $360^\circ - (120^\circ + 95^\circ + 90^\circ) = 360^\circ - 305^\circ = 55^\circ$, so the correct choice is C. 30. Multiples of 15: 15, 30, 45, 60, 75, 90; 5 is not a multiple of 15, so the correct choice is F. 31. There are 36 shaded squares out of 100; $\frac{36}{100} \times 100\% = 36\%$ 32. There are 20 squares shaded out of 100; $\frac{20}{100} \times 100\% = 20\%$

CHECKPOINT QUIZ 2

page 391

1. One of the angles of the triangle is greater than 90° , so this is an obtuse triangle. 2. One of the angles of the triangle is 90° , so this is a right triangle. 3. All of the angles are less than 90° , so this is an acute triangle. 4. The triangle has two congruent sides, so this is an isosceles triangle. 5. The triangle has no congruent sides, so this is a scalene triangle. 6. The triangle has three congruent sides, so this is an equilateral triangle. 7. The perimeter of a triangle is the sum of all three sides. Since all the sides are equal on the equilateral triangle, the measure of one side is $\frac{12 \text{ cm}}{3} = 4 \text{ cm}$ 8. It has 5 sides, so it is a pentagon. 9. It has 8 sides, so it is an octagon. 10. It has 4 sides, so it is a quadrilateral. 11. It has exactly one pair of parallel sides, so it is a trapezoid. The most descriptive name is the best name; trapezoid 12. It has 2 pairs of parallel sides, so it is a parallelogram. All four sides are congruent, so it is a rhombus. The most descriptive name is the best name; rhombus 13. It has 2 pairs of parallel sides, so it is a parallelogram. It is a parallelogram with 4 right angles, so it is a rectangle. The most descriptive name is the best name; rectangle

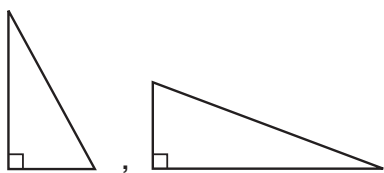
8-6 Congruent and Similar Figures

pages 392–395

Check Skills You'll Need For complete solutions see *Daily Skills Check and Lesson Quiz Transparencies* or *Presentation Pro CD ROM*. 1. They have the same measure. 2. isosceles 3. scalene

Quick Check 1a. The sides are not the same length, so the shapes are different; no **1b.** Though one figure is upside down, the two figures have the same size and shape; yes **2.** Both triangles contain angles measuring 83° and 70° , so those angles are congruent. For both triangles, the missing angle is $180^\circ - (83^\circ + 70^\circ) = 27^\circ$, so all three angles of this triangle are congruent to angles in triangle DEF . Since $\frac{17}{20} = \frac{34}{40}$, corresponding sides of the triangles are proportional, so the triangles are similar. **3.** The triangles are similar so you can find the length of the other side of triangle CDE . $\frac{AB}{BC} = \frac{CD}{DE}$, $\frac{4}{5} = \frac{12}{DE}$, $4\overline{DE} = 60$, $4\overline{DE} \div 4 = 60 \div 4$, $\overline{DE} = 15$

Exercises 1. Congruent and similar figures have congruent angles. **2.** No; the acute angles are not always the same, and the side lengths are not always proportional.



3. The triangle is the same size and shape as figure A. The correct choice is A. **4.** The triangle is the same size and

shape as figure C. The correct choice is C. **5.** The triangle is the same size and shape as figure B. The correct choice is B. **6.** They are the same size and shape; yes. **7.** They are not the same size and shape; no. **8.** Rectangles are similar if the sides are proportional. $\frac{6}{3} \neq \frac{5}{2}$; no **9.** Rectangles are similar if the sides are proportional. $\frac{6}{3} = \frac{4}{3}$; no **10.** Rectangles are similar if the sides are proportional. $\frac{6}{3} = \frac{3}{1.5}$; yes **11.** Rectangles are similar if the sides are proportional. $\frac{6}{3} = \frac{4}{2}$; yes **12.** $\frac{8}{16} = \frac{1}{x}$, $8x = 16$, $8x \div 8 = 16 \div 8$, $x = 2$

$$\begin{aligned} 13. \quad x + 27^\circ + 90^\circ &= 180^\circ \\ x + 117^\circ &= 180^\circ \\ x + 117^\circ - 117^\circ &= 180^\circ - 117^\circ \\ x &= 63^\circ \end{aligned}$$

$$14. \quad \frac{8}{16} = \frac{x}{8}, 16x = 64, 16x \div 16 = 64 \div 16, x = 4$$

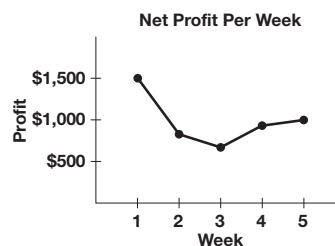
15. Similar figures are the same shape. Congruent figures are the same shape and size. Therefore, two rectangles that have the same shape are similar, but if the rectangles are not the same size, they are not congruent. To replace the broken window, you need a new window that is the same size and shape as the old window or else it will not fit; the new window must be congruent to the original window. **16.** The corresponding sides should be proportional and the corresponding angle measures should be equal: A and E; H and J. **17a.** If the triangles are similar then the corresponding angles are congruent. $\angle MNO$ and $\angle PQR$, $\angle MON$ and $\angle PRQ$, $\angle OMN$ and $\angle RPQ$ **17b.** If the triangles are similar then the corresponding sides are proportional. $3 : 4 : 5 = 12 : 16 : 20$

18. Yes; their angles are always congruent and their sides are always proportional.

$$\begin{aligned} 19. \quad x + 14^\circ + 17^\circ &= 180^\circ \\ x + 31^\circ &= 180^\circ \\ x + 31 - 31^\circ &= 180^\circ - 31^\circ \\ x &= 149^\circ \end{aligned}$$

20. $\frac{8}{6} = \frac{x}{6}$; **8** **21.** The four congruent triangles are the four small equilateral triangles inside the big equilateral triangle because they have the same size and shape. Since all equilateral triangles are similar to each other, there are $4 + 1$, or 5 similar triangles. So, there are 4 congruent triangles and 5 similar triangles; 4, 5. **22.** An angle is obtuse if it is larger than 90° and smaller than 180° , so the correct choice is B. **23.** Multiply the number of classes by the number of students per class. $18 \times 25 = 450$; the correct choice is J.

24.



GUIDED PROBLEM SOLVING pages 396–397

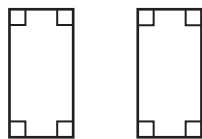
1. The scale gives a ratio of the distance in the picture to the actual distance. **2.** Since 0.3 is a little bigger than 0.25, it makes sense that 60 ft, which is a little bigger than 50 ft, is the answer. **3a.** Set up a proportion that relates $\frac{\text{inches}}{\text{feet}}, \frac{0.25}{50} = \frac{x}{400}, \frac{0.25}{50} = \frac{x}{400}, 50x = (0.25) \cdot 400, 50x = 100, 50x \div 50 = 100 \div 50 = 2; 2 \text{ in.}$ **3b.** 400 ft is 8 times 50 ft and 2 in. is 8 times 0.25 in., so it is a reasonable answer. **4.** The sides of the rectangles have to be proportional to make the rectangles similar. Convert $8\frac{3}{4}$ to a decimal: $8\frac{3}{4} = \frac{35}{4} = 8.75$. Set up a proportion: $\frac{1.1}{8.75} \neq \frac{1.5}{11}$; no, the ratios of the sides do not form a proportion, so the photo is not similar to the book. **5.** Check students' sketch. $\frac{1}{4} = \frac{b}{3}, 4b = 3, b = \frac{3}{4}; 3^2 + 4^2 = c^2, 9 + 16 = 25 = c^2, c = 5; \frac{1}{4} = \frac{c}{5}, 4c = 5, c = \frac{5}{4} = 1\frac{1}{4}; 3 : 4 : 5; 0.75 : 1 : 1.25$ **6.** Check students' sketch. The ratios of the sides are equal. **7.** Convert all fractional measurements to decimals: $5\frac{1}{2} = \frac{11}{2} = 5.5; 3\frac{1}{4} = \frac{13}{4} = 3.25; \frac{3}{4} = 0.75$. Set up proportions of $\frac{\text{scale inches}}{\text{scale feet}} = \frac{\text{actual inches}}{\text{actual feet}}$ to find the actual dimensions of the box. $\frac{0.75}{2} = \frac{2}{x}, 0.75x = 4, x = 5\frac{1}{3}$, or $5\frac{1}{3}; \frac{0.75}{2} = \frac{5.5}{x}, 0.75x = 11; x \approx 14.67$, or $14\frac{2}{3}; \frac{0.75}{2} = \frac{3.25}{x}, 0.75x = 6.5; x \approx 8.67$, or $8\frac{2}{3}$; the dimensions of the actual box are $5\frac{1}{3} \text{ ft}, 14\frac{2}{3} \text{ ft}, 8\frac{2}{3} \text{ ft}.$

8-7 Line Symmetry pages 398–401

Check Skills You'll Need For complete solutions see *Daily Skills Check and Lesson Quiz Transparencies* or *Presentation Pro CD ROM*.

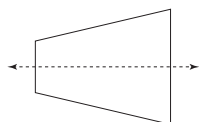
1. Answers may vary. Sample:

2. yes 3. yes

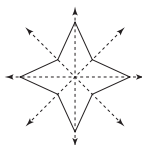


Quick Check 1. No; if you fold the figure along the line, the two parts do not match.

2a. 1;



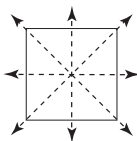
2b. 4;



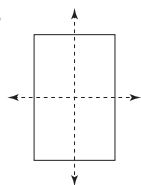
Exercises 1. Yes; if you fold the figure along the line, the two parts match. 2. 4 lines of symmetry;

3. Check students' work. 4. The line of symmetry is a line that divides a figure so each half is a mirror image of the other. No; the top is not a mirror image of the bottom.

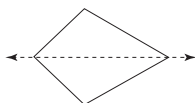
5. The line of symmetry is a line that divides a figure so each half is a mirror image of the other. No; the two sides do not match. 6. The line of symmetry is a line that divides a figure so each half is a mirror image of the other. Yes; the two sides match.



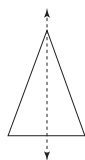
7. 2;



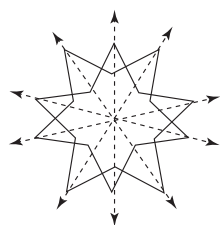
8. 1;



9. 1;

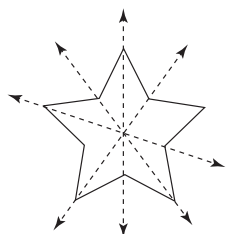


10. As shown in the picture, there are 5 lines of symmetry.



11. You cannot fold it so the two parts match; no. 12. You can fold it on a vertical line through the center so that the two parts match; yes. 13. You can fold it on any line of spokes that passes through the hub of the wheel so that the resulting two parts match; yes.

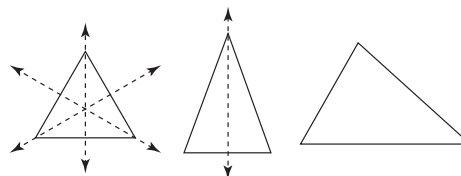
14. As shown in the picture, there are 5 lines of symmetry.



15. There is a line of symmetry through each petal that passes through the center of the flower. Since it has 3 petals, the number of lines of symmetry is 3.

16. Infinitely many; every diameter is a line of symmetry.

17.



Lines of symmetry in equilateral triangles go from each vertex to the center of the opposite side. The line of symmetry in an isosceles triangle extends from the center of the non-congruent side to the opposite vertex. Scalene triangles have no line of symmetry.

18. The blue flag with the white star is a rectangle, which has 2 lines of symmetry and the star has 5, but only one of the

rectangle's symmetry lines is a symmetry line for the star: 1. The blue flag with the red and white stripes is a rectangle, which has 2 lines of symmetry, and the stripes have 2 lines of symmetry, which both match those of the rectangle. The shape at the center of the last flag has no lines of symmetry. 19. Check students' work. 20. The total of the angles of a triangle equals 180° . $90^\circ + 30^\circ + 60^\circ = 180^\circ$; so the correct choice is B.

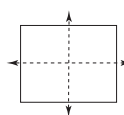
21. The area for the percent of computer and television should be almost of equal size, but significantly bigger than both radio and phone. The area for telephone and radio should almost be equal in area as well. Graph F depicts this the best. The correct choice is F. 22. Answers may vary. Sample: A, C, and D 23. Answers may vary.

Sample: \overrightarrow{AC} , \overrightarrow{BC} , \overrightarrow{AD}

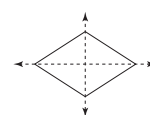
8-8 Transformations pages 402–405

Check Skills You'll Need For complete solutions see *Daily Skills Check and Lesson Quiz Transparencies* or *Presentation Pro CD ROM*. 1. See if the two sides match when the paper is folded.

2.

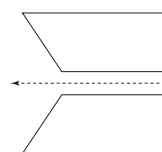


3.



Quick Check 1. The first shape is larger than the second shape.

2.

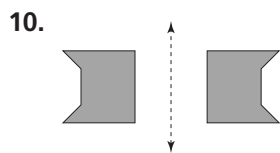
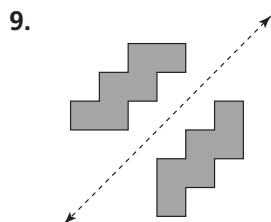
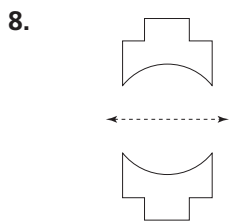


3a. The figure is a mirror image, or reflection, of the original figure; no.

3b. The figure is rotated 180° ; yes.

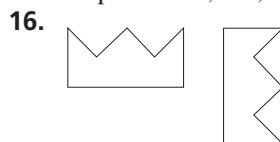
3c. The figure is a reflection over a horizontal line; no.

Exercises 1. A rotation is a transformation that turns a figure about a point; the correct choice is C. 2. A reflection is a transformation that flips the figure over the line of reflection; the correct choice is A. 3. A translation is a transformation that moves every point of a figure the same distance and in the same direction; the correct choice is B. 4. Rotating a figure 180° counter clockwise is the same as rotating it 180° clockwise; 180° . 5. The figure has been rotated; no. 6. The figure is translated to the right and up; yes. 7. The figure is translated to the right and down; yes.

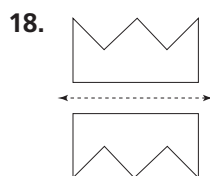
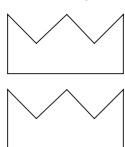


11. The figure is a reflection; no.
12. The figure is a reflection; no.
13. The figure is rotated clockwise 90° ; yes
14. The figure has been rotated 180° ;

yes. 15. The figure forms a square, which can be rotated in multiples of 90° ; 90° , 180° , 270° .



17. Answers may vary. Sample:

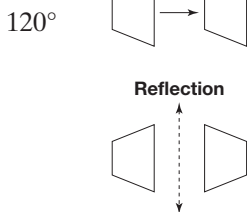
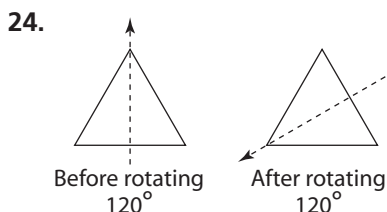


19. Answers may vary. Sample: directly left, directly right and up, and directly to the right
20. The blades turn about the center; rotation.

21. reflection or 180° rotation

22. Translations and reflections are alike because the figures stay the same size and shape. They are different because in a translation the object's orientation does not change, while in a reflection its orientation is reversed.

23. Check students' work.



25. Let x represent the number of adults.

$$\frac{1}{3} = \frac{x}{42};$$

$$42 = 3x;$$

$$42 \div 3 = 3x \div 3;$$

$$14 = x$$

The correct choice is B.

26. The mode is the data item that appears most often in a set of numbers: 90; the correct choice is J.

27. $x + \frac{47}{9} = \frac{43}{3}$
 $x + \frac{47}{9} - \frac{47}{9} = \frac{43}{3} - \frac{47}{9}$
 $x = \frac{43 \times 3}{3 \times 3} - \frac{47}{9}$
 $x = \frac{129}{9} - \frac{47}{9}$
 $x = \frac{82}{9} = 9\frac{1}{9}$

28. $27\frac{1}{2} = x + 5\frac{3}{4}$
 $\frac{55}{2} = x + \frac{23}{4}$
 $\frac{55}{2} - \frac{23}{4} = x + \frac{23}{4} - \frac{23}{4}$
 $x = \frac{110}{4} - \frac{23}{4}$
 $x = \frac{87}{4} = 21\frac{3}{4}$
 $x = \frac{55 \times 2}{2 \times 2} - \frac{23}{4}$
 $x = \frac{110}{4} - \frac{23}{4}$
 $x = \frac{87}{4} = 21\frac{3}{4}$

29. $25 - 17\frac{2}{3} = x$
 $\frac{25}{1} - \frac{53}{3} = x$
 $\frac{25 \times 3}{1 \times 3} - \frac{53}{3} = x$
 $\frac{75}{3} - \frac{53}{3} = x$
 $x = \frac{22}{3} = 7\frac{1}{3}$

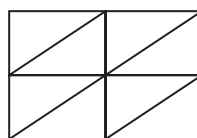
30. $x + 6\frac{2}{3} = 18$
 $x + \frac{20}{3} = \frac{18}{1}$
 $x + \frac{20}{3} - \frac{20}{3} = \frac{18}{1} - \frac{20}{3}$
 $x = \frac{18 \times 3}{1 \times 3} - \frac{20}{3}$
 $x = \frac{54}{3} - \frac{20}{3}$
 $x = \frac{34}{3} = 11\frac{1}{3}$

ACTIVITY LAB

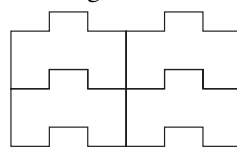
page 406

1–4. Check student's work. Samples are given.

1. Yes;

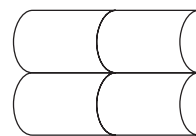


2. Yes;



3. The outside arc will not fit in the inside arc; no.

4. Yes;



TEST-TAKING STRATEGIES

page 407

1. Use the side lengths to set up a proportion; $\frac{4}{8} = \frac{S}{16}$; the correct choice is C.

2. $\angle WMR + \angle MRW + \angle MWR = 180^\circ$

$$\angle WMR + 20^\circ + 130^\circ = 180^\circ$$

$$\angle WMR + 150^\circ = 180^\circ$$

$$\angle WMR + 150^\circ - 150^\circ = 180^\circ - 150^\circ$$

$$\angle WMR = 30^\circ; \text{ the correct choice is G.}$$

CHAPTER REVIEW

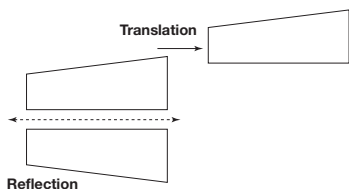
pages 408–409

1. The measure of an obtuse angle is between 90° and 180° . 2. An equilateral triangle has three congruent sides. 3. Lines that intersect to form right angles are perpendicular. 4. A rectangle always has four right angles. 5. A line extends in two opposite directions without end. 6. Answers may vary. Sample: \overleftrightarrow{EF} and \overleftrightarrow{AB}

7. Answers may vary. Sample: \overrightarrow{BC} and \overrightarrow{BA}

8–11. Answers may vary. Samples are given. 8. Vertical angles are formed by two intersecting lines. They share the same vertex, but not any of the same sides. Answers may vary. Sample: $\angle DEG$ and $\angle BEF$ 9. An obtuse angle is more than 90° and less than 180° ; $\angle FEG$ 10. All vertical angles are congruent, and all right angles are congruent. Answers may vary. Sample: $\angle ABE$ and $\angle EBC$ 11. An acute angle measures less than 90° but greater than 0° . Answers may vary. Sample: $\angle DEG$ 12. The quadrilateral is a parallelogram with four right angles, so it is a rectangle. 13. The figure has 6 sides, so it is a hexagon. 14. The figure has 5 sides, so it is a pentagon. 15. The figures are the same shape, but not the same size, so they are similar. 16. The figures are the same shape and size, so they are congruent.

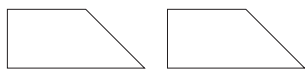
17. Answers may vary. Sample:



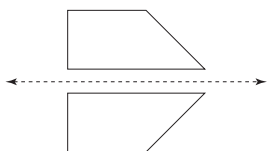
CHAPTER TEST

page 410

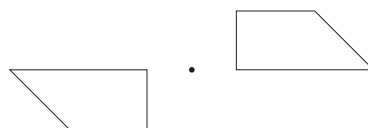
1. 2. The angle measures 90° , so it is right. 3. The angle measures between 0° and 90° , so it is acute. 4. The angle measures between 90° and 180° , so it is obtuse. 5. The angle measures between 90° and 180° , so it is obtuse.
6. Let c = the measure of the complement.
 $c + 72^\circ = 90^\circ$
 $c + 72^\circ - 72^\circ = 90^\circ - 72^\circ$
 $c = 18^\circ$
- Let s = the measure of the supplement.
 $s + 72^\circ = 180^\circ$
 $s + 72^\circ - 72^\circ = 180^\circ - 72^\circ$
 $s = 108^\circ$
7. Let c = the measure of the complement.
 $c + 42^\circ = 90^\circ$
 $c + 42^\circ - 42^\circ = 90^\circ - 42^\circ$
 $c = 48^\circ$
- Let s = the measure of the supplement.
 $s + 42^\circ = 180^\circ$
 $s + 42^\circ - 42^\circ = 180^\circ - 42^\circ$
 $s = 138^\circ$
8. The triangle has one obtuse angle, so it is an obtuse triangle; obtuse. 9. The triangle has one right angle, so it is a right triangle; right. 10. All three sides are congruent, so the triangle is equilateral. 11. None of the sides are congruent, so the triangle is scalene. 12a–d. Check students' work. 13. The figure has 5 sides so it is a pentagon. 14. The quadrilateral is a parallelogram with four right angles, so it is a rectangle. 15. The figure has 8 sides, so it is an octagon. 16. The quadrilateral has two pairs of parallel lines, so it is a parallelogram. 17. Congruent and similar figures both have the same shape. Congruent figures are also the same size. 18. The trapezoid has one vertical line of symmetry; 1. 19. The lines of symmetry of the rhombus contain its two diagonals; 2. 20–22. Answers may vary. Samples given.
20. Slide the figure without turning or flipping it;



21. Draw a line of the reflection and flip the figure over it;



22. Pick a point on or near the shape and then rotate it 180° on that point;



TEST PREP

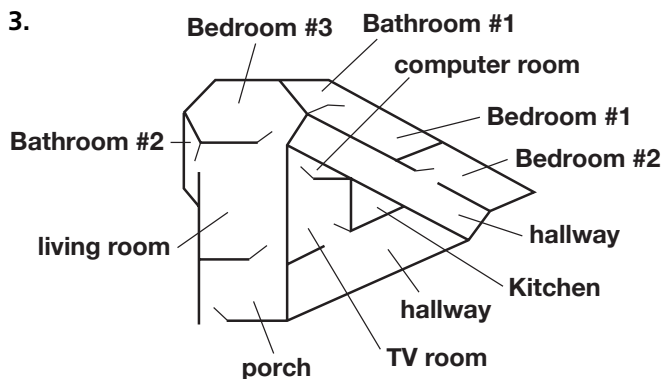
page 411

1. According to the graph, Jen purchased lunch more often than she brought it from home. The graph also shows that Jen purchases hot lunches about as often as cold lunches and Jen purchased hot lunch more often than she brought lunch from home. The graph does not show that Jen brought lunch from home more often than she purchased cold lunch. The correct choice is C.
2. $2,250 \div 90 = 25$; the balloonist should start descending 25 minutes before the scheduled landing time at 3:30 P.M.
 $3\text{h } 30\text{ min}$
 $- 25\text{ min}$
 $3\text{ h } 5\text{ min} \rightarrow 3:05\text{ P.M.}$
- The correct choice is G.
3. All four sides of a rhombus are equal, so for figure $MNOP$ to be a rhombus, \overline{MP} and \overline{PO} must also have length 8; the correct choice is D.
4. F: $0.2 > 0.02 < 0.22$; G: $0.15 < 0.51 < 1.05$; the correct choice is G.
5. $\frac{1}{6} = \frac{x}{100}$
 $6x = 100$
 $\frac{6x}{6} = \frac{100}{6}$
 $x \approx 17$; 17%; the correct choice is A.
6. F: $\frac{3}{7} = \frac{33}{77}$, $\frac{5}{7} = \frac{55}{77}$, $\frac{7}{11} = \frac{49}{77}$, $\frac{33}{77} < \frac{55}{77} > \frac{49}{77}$, so $\frac{3}{7} < \frac{5}{7} > \frac{7}{11}$.
G: $\frac{1}{4} = \frac{5}{20}$, $\frac{1}{2} = \frac{10}{20}$, $\frac{2}{5} = \frac{8}{20}$, $\frac{5}{20} < \frac{10}{20} > \frac{8}{20}$, so $\frac{1}{4} < \frac{1}{2} > \frac{2}{5}$. H: $\frac{1}{3} = \frac{5}{15}$, $\frac{2}{3} = \frac{10}{15}$, $\frac{4}{5} = \frac{12}{15}$, $\frac{5}{15} < \frac{12}{15} < \frac{10}{15}$, so $\frac{1}{3} < \frac{2}{3} < \frac{4}{5}$; the correct choice is H.
7. $3.12 \times \blacksquare = 0.0312$
 $31.2 \times \blacksquare \div 31.2 = 0.0312 \div 31.2$
 $\frac{0.0312}{31.2} = 0.001$
8. $3 + 4 \times 2^3 = 3 + 4 \times 8 = 3 + 32 = 35$
9. Supplementary angles add up to 180° ; $180 - 32 = 148$
10. The greatest angle in a right triangle measures 90 degrees. 11. [2] Find the mean:
 $\frac{81 + 70 + 95 + 73 + 74 + 91 + 86 + 74}{8} = \frac{644}{8} = 80.5$. Find the median: 70, 73, 74, 74, 81, 86, 91, 95; $\frac{74 + 81}{2} = \frac{155}{2} = 77.5$. Find the mode: 74. Find the range: $95 - 70 = 25$. The mean is the greatest in this set of data. [1] the answer OR correct values for 3 of the 4 terms OR a correct explanation 12a–b. [2] $\frac{6}{12} = \frac{x}{5}$; $12x = 30$; $\frac{12x}{12} = \frac{30}{12}$; $x = 2.5$, or \$2.50 for 5 bagels. If 5 bagels cost \$2.50, the unit price of one bagel is $\frac{2.50}{5}$, or \$0.50. [1] Correct answer with one minor error. 13. [4] They are not similar. $\frac{8}{6} \neq \frac{5}{3}$; $24 \neq 30$; [3] correct answer without using a proportion; [2] correct answer with incorrect work OR correct work with no answer or an incorrect answer; [1] correct answer with no work OR some correct work

DK PROBLEM SOLVING APPLICATION**pages 412–413**

1a. The quadrilateral has exactly two parallel lines, so it is a trapezoid. **1b.** Clockwise from the top, the kitchen has 6 sides, so it is a hexagon; the bedroom has 4 sides with exactly 2 parallel lines, so it is a trapezoid; the computer and games room has 2 pairs of parallel lines, so it is a parallelogram; the bathroom has 3 sides, so it is a triangle; the family room has 5 sides, so it is a pentagon.

2. Answers may vary. Sample: bedrooms, bathrooms, kitchen, TV room, computer room, porch, living room

3.

4. Check students' work. **5.** Rooms with angles less than or greater than 90° make it difficult to create wide spaces; the rectangular shape is very efficient.

CHECK YOUR READINESS

page 414

1. pounds 2. miles 3. $16 \text{ oz} = 1 \text{ lb}$; $9 \times 16 = 144$
 4. $12 \text{ in.} = 1 \text{ ft}$; $46 \div 12 = 3 \frac{5}{6}$ 5. $2 \text{ c} = 1 \text{ pt}$; $7 \frac{1}{4} \div 2 = 3 \frac{5}{8}$
 6. $>$; $1 \text{ yd} = 3 \text{ ft}$; $4 \times 3 = 12 \text{ ft}$ 7. $<$; $1 \text{ gal} = 4 \text{ qt}$; $2 \frac{1}{2} \times 4 = 10 \text{ qt}$ 8. $>$; $1 \text{ c} = 8 \text{ fl oz}$; $5 \text{ c} \times 8 = 40 \text{ fl oz}$
 9. rhombus 10. isosceles triangle 11. trapezoid

9-1 Metric Units of Length, Mass, and Capacity

pages 416–419

Check Skills You'll Need For complete solutions see *Daily Skills Check and Lesson Quiz Transparencies* or *Presentation Pro CD-ROM*. 1. Answers may vary.

Sample: ft, lb, fl oz 2. Feet (yards would also be appropriate). 3. Pints (cups or fluid ounces would also be appropriate).

Quick Check 1. meters 2a. kilograms 2b. kilograms 2c. milligrams 3a. liters 3b. kiloliters 3c. milliliters

- Exercises** 1a. mass 1b. length 1c. capacity
 2–4. Answers may vary. Samples are given. 2. paper, staples 3. pencil, finger 4. body weight, fruit 5. true
 6. true 7. false; $1 \text{ L} = 1,000 \text{ mL}$ 8. false; $1 \text{ cm} = 10 \text{ mm}$
 9. meters 10. millimeters 11. centimeters
 12. millimeters 13. centimeters 14. kilometers
 15. grams 16. milligrams 17. kilograms 18. milligrams
 19. grams 20. milligrams 21. liters 22. milliliters
 23. kiloliters 24. liters 25. kiloliters 26. milliliters
 27. no; $650 \text{ mL} \times 2 = 1,300 \text{ mL}$, $1 \text{ L} = 1,000 \text{ mL}$;
 $1,000 \text{ mL} < 1,300 \text{ mL}$ 28. 0.001 29. 0.001 30. 100
 31. Answers may vary. Sample: Use a piece of string whose length matches the width of the door. Count how many times you can lay that string end-to-end from one end of the wall to the other end. 32. Yes; giraffes are very tall. 33. No; a ladybug would be measured in grams or milligrams. 34. No; a sidewalk would be measured in meters. 35. Less; $8 \times 12 = 96$, so $96 \text{ cm} < 1 \text{ m}$. 36. Mass; fruit is usually priced according to weight, which is proportional to mass. 37. Answers may vary. Sample: Mass is a measure of the amount of matter in an object; capacity is a measure of the amount of liquid an object holds. A plastic bottle might have a mass of 10 g, but a capacity of 1 L. 38a. $1 \text{ L} = 10 \text{ dL}$; $15 \text{ L} = 15 \times 10 \text{ dL} = 150 \text{ dL}$ 38b. $1 \text{ dL} = 0.1 \text{ L}$; $273 \text{ dL} = 273 \times 0.1 \text{ L} = 27.3 \text{ L}$
 39. A truck weighs about 1 ton. $1 \text{ ton} \approx 1,000 \text{ kilograms}$, so the correct choice is D 40. All angles in a trapezoid add up to 360° . $360^\circ - (120^\circ + 60^\circ + 30^\circ) = 360^\circ - 210^\circ = 150^\circ$; so the correct choice is J. 41. $90^\circ - 44^\circ = 46^\circ$; $180^\circ - 44^\circ = 136^\circ$ 42. $90^\circ - 16^\circ = 74^\circ$; $180^\circ - 16^\circ = 164^\circ$
 43. $90^\circ - 81^\circ = 9^\circ$; $180^\circ - 81^\circ = 99^\circ$ 44. $90^\circ - 62.5^\circ = 27.5^\circ$; $180^\circ - 62.5^\circ = 117.5^\circ$

ACTIVITY LAB

page 420

1. 21 mL 2. 37 mm; 3.7 cm 3. 12 mm; 1.2 cm 4. 79 mm; 7.9 cm 5. 4 cm with additional decimal places as needed; 40 mm with additional units and decimal places as needed

9-2 Converting Units in the Metric System

pages 421–424

Check Skills You'll Need For complete solutions see *Daily Skills Check and Lesson Quiz Transparencies* or *Presentation Pro CD-ROM*. 1. multiplication 2. 144 3. 16 4. 2

Quick Check 1a. larger unit to smaller one: multiply; $15 \times 10 = 150$; 150 mm 1b. larger unit to smaller one: multiply; $837 \times 1,000 = 837,000$; 837,000 m 2. smaller unit to larger one: divide; $60,000 \div 1,000 = 60$; 60 km 3a. smaller unit to larger one: divide; $15 \div 1,000 = 0.015$ 3b. smaller unit to larger one: divide; $386 \div 1,000 = 0.386$ 3c. smaller unit to larger one: divide; $8.2 \div 100 = 0.082$

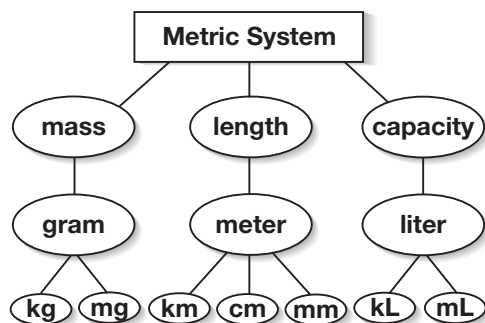
Exercises 1. 5 m; $5 \text{ m} = 5 \text{ mm} \times 1,000 = 5,000 \text{ mm}$
 2. divide, a meter is smaller than a kilometer 3. divide, a liter is smaller than a kiloliter 4. multiply, a centigram is larger than a milligram 5. divide, a centimeter is smaller than a meter 6. larger unit to smaller one: multiply; $1.3 \times 1,000 = 1,300 \text{ m}$ 7. larger unit to smaller one: multiply; $6,000 \times 100 = 600,000 \text{ cm}$ 8. larger unit to smaller one: multiply; $59 \times 10 = 590 \text{ mm}$ 9. larger unit to smaller one: multiply; $200 \times 100,000 = 20,000,000 \text{ cm}$
 10. smaller unit to larger one: divide; $206 \div 100 = 2.06 \text{ m}$
 11. smaller unit to larger one: divide; $142 \div 100,000 = 0.00142 \text{ km}$ 12. smaller unit to larger one: divide; $7.5 \div 10 = 0.75 \text{ cm}$ 13. smaller unit to larger one: divide; $6,900 \div 1,000 = 6.9 \text{ km}$ 14. smaller unit to larger one: divide; $240 \div 100 = 2.4 \text{ m}$ 15. smaller unit to larger one: divide; $3,070 \div 1,000 = 3.07 \text{ m}$ 16. smaller unit to larger one: divide; $586 \div 100 = 5.86 \text{ g}$ 17. larger unit to smaller one: multiply; $0.61 \times 1,000 = 610 \text{ m}$ 18. larger unit to smaller one: multiply; $0.04 \times 100 = 4 \text{ cm}$
 19. larger unit to smaller one: multiply; $4,500 \times 1,000 = 4,500,000 \text{ mg}$ 20. larger unit to smaller one: multiply; $6.4 \times 1,000 = 6,400 \text{ L}$ 21. smaller unit to larger one: divide; $150 \div 100 = 1.5 \text{ L}$ 22. smaller unit to larger one: divide; $120 \div 1,000 = 0.12 \text{ g}$ 23. larger unit to smaller one: multiply; $3,000 \times 1,000 = 3,000,000 \text{ mL}$ 24. larger unit to smaller one: multiply; $0.8 \times 100 = 80 \text{ cm}$, $80 \times 2 + 2.5 = 160 + 2.5 = 162.5$; 162.5 cm 25. smaller unit to larger one: divide; $299,792,458 \div 1,000 = 299,792.458$; about 299,792.458 km (or about 300,000 km)
 26. larger unit to smaller one: multiply; $8 \times 1,000 = 8,000 \text{ L}$ 27. smaller unit to larger one: divide;

7,000 ÷ 1,000 = 7 g **28.** larger unit to smaller one: multiply; $0.24 \times 1,000 = 240$ m **29.** smaller unit to larger one: divide; $34,000 \div 100 = 340$ m **30.** smaller unit to larger one: divide; $0.07 \div 100 = 0.0007$ L **31.** larger unit to smaller one: multiply; $52 \times 1,000 = 52,000$ g **32.** smaller unit to larger one: divide; $8.6 \text{ mm} \div 1,000 = 0.0086$ m **33.** smaller unit to larger one: divide; $41.5 \div 100 = 0.415$ g **34.** larger unit to smaller one: multiply; $n \times 1,000 = 1,000n$ grams; $1 \times 1,000 = 1,000$, $3 \times 1,000 = 3,000$, $5 \times 1,000 = 5,000$; $1,000n$ **35.** larger unit to smaller one: multiply; $0.524 \times 1,000 = 524$ m; $524 \text{ m} - 5 \text{ m} = 519$ m **36.** smaller unit to larger one: divide; $1,002.3 \div 1,000 = 1.0023$ L, smaller unit to larger one: divide; $100.1 \div 100 = 1.001$ L, larger unit to smaller one: multiply; $0.000997 \times 1,000 = 0.997$ L; 100.1 cL is the closest to 1 L. **37.** Answers may vary. Sample: If you are converting to a smaller unit, then you multiply. If you are converting to a larger unit, then you divide. **38.** smaller unit to larger one: divide; $800 \text{ mg} \div 1,000 = 0.8$ g per 2 cups skim milk so 0.4 g per 1 cup skim milk. $8.5 \text{ g} - 0.4 \text{ g} = 8.1$ g; A cup of whole milk has 8.1 g more fat per cup. **39.** smaller unit to larger one: divide; $3,000,000 \text{ m} \div 1,000 = 3,000$ km; the correct choice is B. **40.** A baseball bat is larger than your arm so you should measure it in centimeters; the correct choice is G. **41.** right isosceles triangle. **42.** acute equilateral triangle **43.** obtuse scalene triangle

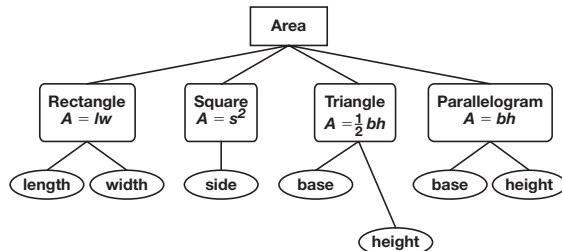
VOCABULARY BUILDER

page 425

1.



2.



9-3 Perimeters and Areas of Rectangles

pages 426–430

Check Skills You'll Need For complete solutions see *Daily Skills Check and Lesson Quiz Transparencies* or *Presentation Pro CD-ROM*. **1.** base: 3; exponent: 2

2. 16 **3.** 36 **4.** 29.16 **5.** 2.56

Quick Check 1. perimeter: $2(8 + 5)$, or 26 ft; area: 8×5 , or 40 ft² **2.** area: 7×7 , or 49 in.²

More Than One Way

$4(90) - 4(60) = 120$; 120 ft; Check students' work.

Exercises 1. Perimeter is the distance around a figure. Area is the two-dimensional space the figure takes up.

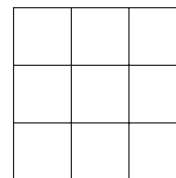
2. perimeter: $2(4 + 4) = 2(8)$, or 16; 16 in.; area: $4 \times 4 = 16$; 16 in.² **3.** perimeter: $2(4 + 9) = 2(13)$, or 26; 26 ft; area: $4 \times 9 = 36$; 36 ft² **4.** perimeter: $2(16 + 8) = 2(24)$, or 48; 48 m; area: $16 \times 8 = 128$; 128 m² **5.** perimeter: $2(12 + 7) = 2(19)$, or 38; 38 in.; area: $12 \times 7 = 84$; 84 in.²

6. perimeter: $2(8 + 5) = 2(13)$, or 26; 26 ft; area: $8 \times 5 = 40$; 40 ft² **7.** perimeter: $2(13 + 9.5) = 2(22.5)$, or 45; 45 in.; area: $13 \times 9.5 = 123.5$; 123.5 in.² **8.** perimeter: $2(1.5 + 0.25) = 2(1.75)$, or 3.5; 3.5 m; area: $1.5 \times 0.25 = 0.375$; 0.375 m² **9.** perimeter: $2(4.4 + 3) = 2(7.4)$, or 14.8; 14.8 m; area: $4.4 \times 3 = 13.2$; 13.2 m²

10. perimeter: $2(8.7 + 5.6) = 2(14.3)$, or 28.6; 28.6 ft; area: $8.7 \times 5.6 = 48.72$; 48.72 ft² **11.** perimeter: $2(\frac{4}{5} + \frac{3}{4}) = 2(\frac{31}{20})$, or $\frac{31}{10}$; $\frac{31}{10}$ in.; area: $\frac{4}{5} \times \frac{3}{4} = \frac{3}{5}$; $\frac{3}{5}$ in.² **12.** perimeter: $2(4\frac{1}{6} + 2\frac{1}{3}) = 2(6\frac{1}{2})$, or 13; 13 in.; area: $4\frac{1}{6} \times 2\frac{1}{3} = 9\frac{13}{18}$; $9\frac{13}{18}$ in.² **13.** perimeter: $2(30 + 18) = 2(48)$, or 96; 96 in.; area: $30 \times 18 = 540$; 540 in.² **14.** $8^2 = 64$; 64 ft² **15.** $5^2 = 25$; 25 m² **16.** $1.4^2 = 1.96$; 1.96 in.² **17.** Subtract the area of the garden from the area of the backyard:

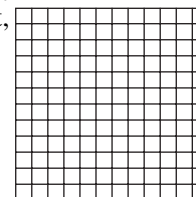
$(131 \times 52) - (13 \times 9) = 6,812 - 117 = 6,695$; 6,695 ft² **18.** $0.31 \times 0.37 = 0.1147$; 0.1147 in.²

19. There are 3 ft \times 3 ft, or 9 ft², in 1 yd². **20.** length: 30; width: 19; perimeter: $2(30 + 19) = 2(49)$, or 98; 98 mm; area: $30 \times 19 = 570$; 570 mm² **21.** length: 14; width: 21; perimeter: $2(21 + 14) = 2(35)$, or 70; 70 mm; area: $21 \times 14 = 294$; 294 mm² **22.** length: 25; width: 17; perimeter: $2(25 + 17) = 2(42)$, or 84; 84 mm; area: $25 \times 17 = 425$; 425 mm² **23.** Subtract the area of the window from the area of the wall: $(12 \times 8) - (3 \times 4) = 96 - 12 = 84$; 84 ft² **24.** The area increases from 13.5 in.² to 54 in.², which is 4 times the area of the original rectangle. The area quadruples because you are doubling both dimensions. **25a.** Check students' drawings. The length of each rectangle will be a whole number between 11 and 6 inclusive. The width will then be between 1 and 6 inclusive. **25b.** Answers may vary. Sample: **25c.** The greatest area comes from the rectangle whose sides are equal in length; it is a square. **26.** Answers may vary. Sample: Knowing the area alone is not enough information to find the perimeter. For example, if the area is 24 square units, you cannot tell whether the dimensions are 4 by 6 or 3 by 8.



L	W	P	A
11	1	24	11
10	2	24	20
9	3	24	27
8	4	24	32
7	5	24	35
6	6	24	36

27. There are 12 in. in 1 ft, or 36 in. in 1 yd. So 1 yd² equals 1 yd \times 1 yd = 36 in. \times 36 in. = 1,296 in.²;



28. $P = \ell \times w$ is not a formula for perimeter; the correct choice is A. 29. 80,000 mL = 80 L; a 0.5-kiloliter drum could hold 500 L so it can hold 80 L. The correct choice is F. 30. $\frac{25}{10} = 2.5$; 2.5 cm

ACTIVITY LAB

page 431

1–5. Check students' work. 6. 364 ft²; explanations may vary. Sample: A parallelogram can be cut into a triangle and trapezoid; both pieces form a rectangle, so $A = bh = 28 \times 13 = 364$. 7–9. Check students' work. 10. 117 cm²; explanations may vary. Sample: Two identical triangles form a parallelogram, so $\frac{1}{2}bh$ equals the area of a triangle.

9-4 Areas of Parallelograms and Triangles

pages 432–435

Check Skills You'll Need For complete solutions see *Daily Skills Check and Lesson Quiz Transparencies or Presentation Pro CD-ROM*. 1. square 2. $P = 20$ in.; $A = 24$ in.² 3. $P = 34$ m; $A = 60$ m²

Quick Check 1. $14 \times 5 = 70$; 70 m² 2. $\frac{1}{2} \times 30 \times 17.3 = 15 \times 17.3 = 259.5$; 259.5 m²

3. $(\frac{1}{2} \times 4 \times 2) + (\frac{1}{2} \times 4 \times 2) + (2 \times 4) = 4 + 4 + 8 = 16$; 16 m²

Exercises 1. The height of a triangle is the length of the perpendicular segment from a vertex to the base opposite that vertex. 2. The area would double.

3. The triangle's area is half of the rectangle's area.

4. $8 \times 3 = 24$; 24 ft² 5. $4 \times 4 = 16$; 16 m² 6. $6 \times 12 = 72$;

72 in.² 7. $\frac{1}{2} \times 7 \times 9 = 31.5$; 31.5 m² 8. $\frac{1}{2} \times 16 \times 5 =$

$8 \times 5 = 40$; 40 cm² 9. $\frac{1}{2} \times 18 \times 11 = 99$; 99 yd²

10. $\frac{1}{2} \times 5 \times 10 = 25$; 25 cm²

11. $(\frac{1}{2} \times 2 \times 3) + (2 \times 3) + (1 \times 1) = 10$; 10 ft²

12. $(\frac{1}{2} \times 7 \times 14) + (9 \times 14) + (\frac{1}{2} \times 7 \times 10) +$
 $(\frac{1}{2} \times 7 \times 10) = 49 + 126 + 35 + 35$, or 245; 245 m²

13. $(\frac{1}{2} \times 7 \times 3) + (\frac{1}{2} \times 3 \times 3) = 10.5 + 4.5$, or 15; 15 cm²

14. $6 \times 4.2 = 25.2$; 25.2 in.² 15. $(\frac{1}{2} \times 7 \times 15) + (7 \times 15) =$
 $52.5 + 105 = 157.5$; 157.5 in.²

16. $(3 \times 2) + (\frac{1}{2} \times 3 \times 2) + (2.4 \times 3.6) = 6 + 3 + 8.64$, or
 17.64; 17.64 m² 17. $21 \times 10.5 = 220.5$; 220.5 ft² 18. The

area of the first parallelogram is one half the area of the second parallelogram. The ratio is 1 to 2. 19. Let h

represent the height. Then $5h = 66$. Divide by 5 to get

13.2; 13.2 in. 20. Answers may vary. Sample: Divide the

perimeter by 3 to get the base b . Then use $A = \frac{1}{2}bh$.

21. $A = b \times h$

$$4 = \frac{8}{12} \times h$$

$$4 \times \frac{12}{8} = \frac{8}{12} \times \frac{12}{8} \times h$$

$$1 \times \frac{12}{2} = h$$

$$6 = h; 6 \text{ ft}$$

22. $\frac{1}{2} \times 4 \times 5 = 10$; the correct choice is D. 23. $\frac{3}{5} = \frac{x}{100}$,
 $3 \times 100 = 5 \times x$, $300 = 5 \times x$, $\frac{300}{5} = \frac{5 \times x}{5}$, $60 = x$; the
 correct choice is H.

24. 6 h 0 min – 4 h 15 min = 5 h 60 min – 4 h 15 min =
 1 h 45 min; the correct choice is B.

25. 50% of 492 is $0.5 \times 492 = 246$ 26. 35% of 84 is
 $0.35 \times 84 = 29.4$ 27. 15% of 120 is $0.15 \times 120 = 18$

CHECKPOINT QUIZ 1

page 436

1. centimeter 2. kilogram 3. smaller unit to larger one:
 divide; $62 \div 1,000 = 0.062$ L 4. larger unit to smaller
 one: multiply; $4.3 \times 1,000 = 4,300$ g 5. smaller unit to
 larger one: divide; $178 \div 100 = 1.78$ m 6. smaller unit to
 larger one: divide; $0.31 \div 100 = 0.0031$ g 7. larger unit
 to smaller one: multiply; $0.5 \times 1,000 = 500$ L 8. smaller
 unit to larger one: divide; $83 \div 1,000 = 0.083$ g

9. perimeter: $2(8.5 + 8.5) = 2 \times 17 = 34$; 34 cm; area:
 $8.5 \times 8.5 = 72.25$; 72.25 cm² 10. perimeter: $2(9 + 4) =$
 $2 \times 13 = 26$; 26 mi; area: $9 \times 4 = 36$; 36 mi²

11. $22 \times 8.8 = (20 \times 8.8) + (2 \times 8.8) = 176 + 17.6 =$
 193.6 ; 193.6 ft² 12. $\frac{1}{2} \times 15.7 \times 9 =$

$\frac{1}{2} \times (15 \times 9) + \frac{1}{2} \times (0.7 \times 9) = 67.5 + 3.15 = 70.65$;

70.65 cm² 13. $(6 \times 3) + (2 \times 4) + (\frac{1}{2} \times 3 \times 3) = 18 + 8$
 $+ 4.5 = 30.5$; 30.5 in.²

ACTIVITY LAB

page 437

1–4. Check students' work. 5. The numbers are all a
 little greater than 3. 6. The distance around the circle is
 about 3 times the distance across the circle. 7. 3.1x

8a. $3.1 \times 12 \approx 3 \times 12 = 36$; 36 cm 8b. The length of the
 diameter is equal to the length of 1 side of the square:

$12 + 12 + 12 + 12 = 48$; 48 cm 8c. $48 - 36 = 12$; 12 cm

9-5 Circles and Circumference

pages 438–441

Check Skills You'll Need For complete solutions see
Daily Skills Check and Lesson Quiz Transparencies or
Presentation Pro CD-ROM. 1. product 2. 6.28 3. 25.12
 4. 219.8 5. 62.8

Quick Check 1. \overline{AC} , \overline{BD} 2. $\frac{1}{2}$ of 8; 4 cm 3. $C = 2\pi r =$
 $2 \times \pi \times 11 = 22\pi$ 4. $\pi(5.8) \approx 18$; 18 cm

Exercises 1. Yes; a chord that does not pass through the
 center is not a diameter. 2. Check students' work.

3. \overline{QR} , \overline{QS} , and \overline{QT} 4. \overline{RT} 5. \overline{RT} , \overline{ST}

6. point Q 7. $2 \times 35 = 70$; 70 mi 8. $\frac{1}{2}$ of 6.8; 3.4 yd

9. $2 \times 18 = 36$; 36 ft 10. $\frac{1}{2}$ of 0.25; 0.125 km 11. $C =$

$2\pi r = 2 \times \pi \times 4 = 8\pi$ 12. $2 \times \pi(9) = 18\pi \approx 56.52$;

56.52 cm 13. $\pi(5) \approx 15.7$; 15.7 in. 14. $\pi(23) \approx 72.22$;

72.22 ft 15. $\pi(28) \approx 87.92$; 87.92 mi 16. $2\pi(7) \approx 43.96$;

43.96 ft 17. $\pi(10) \approx 31.4$; 31.4 m 18. $C = 2\pi r$, so $r = \frac{C}{2\pi} =$

$\frac{20.5}{2\pi} \approx 3.26$; 3.26 cm 19. $\frac{192}{2\pi} \approx 30.6$; 30.6 ft 20. $\frac{1.273}{2\pi} \approx$

202.7; 202.7 m 21. $\frac{3.75}{2\pi} \approx 0.60$; 0.60 in. 22. $\frac{12.4}{2\pi} \approx 1.97$;

1.97 mi **23.** $3(30) - 3(24) = 3(30 - 24) = 3(6)$, or 18; 18 in. **24.** Answers may vary. Sample: The pebble makes a mark along the circumference during every rotation. So the circumference is 69 inches. **25.** $\pi \times 2 \approx 6.3$; about 6.3 ft **26.** The diameter is two times as long as the radius, so the correct choice is B. **27.** A straight angle has a measure of 180° , so the correct choice is J. **28.** From least to greatest, the list is 20, 42, 45, 48, 50, and 50; median: $\frac{45 + 48}{2}$, or 46.5 **29.** From least to greatest, the list is 6.6, 7.5, 7.5, 7.8, and 8.0; median: 7.5

GUIDED PROBLEM SOLVING pages 442–443

1. one gallon covers 240 ft^2 ; $720 \div 240 = 3$; 3 gal
2. $20 \times 12 = 240$; $240 \text{ ft}^2/\text{gal}$ **3.** 4 gallons; divide 960 by 240. **4.** 8 ft by 9 ft; you know that you have 34 ft of fence to enclose a rectangular garden and you want to know which dimensions provide the greatest area. Find two different whole numbers for which $2(\ell) + 2(w) = 34$, such as 9 and 8. The area of a rectangle is $b \times h$, so the area would be 9×8 , or 72 ft^2 . For any other dimensions, such as 10 and 7 or 11 and 6, the area would be 70 and 66 respectively, which are less than 72. **5.** Find the total area of the kitchen by adding the areas of the two rectangles: $(5 \times 6) + (12.5 \times 10) = 30 + 125 = 155 \text{ ft}^2$; $\$3.75 \times 155 = \581.25 **6.** The new figure is 24 in. by 30 in. because the area is nine times greater; each side will be three times greater. **7.** $87.7 \div 63 \approx 1.4$; about 1.4 times

9-6 Area of a Circle pages 444–447

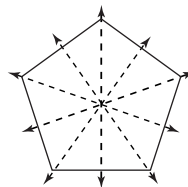
Check Skills You'll Need For complete solutions see *Daily Skills Check and Lesson Quiz Transparencies* or *Presentation Pro CD-ROM*. **1.** $2^2 \times 3^2$ **2.** 144 **3.** 16 **4.** 100 **5.** 18

Quick Check **1a.** $\pi \times 12^2 \approx 452.16$; about 452.16 km^2
1b. $\pi \times 3^2 \approx 28.26$; about 28.26 in.^2 **1c.** radius: 4 yd;
 $\pi \times 4^2 \approx 50.24$; about 50.24 yd^2 **2.** radius: 7; $\frac{22}{7} \times 7^2 = 154$; 154 in.^2

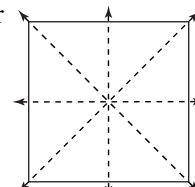
Exercises **1.** $\frac{22}{7} \times 14^2 = \frac{22}{7} \times 196 = 616$; 616 cm^2
2a. $3.14 \times 2^2 = 3.14 \times 4 = 12.56$; 12.56 in.^2 **2b.** $3.14 \times 4^2 = 3.14 \times 16 = 50.24$; 50.24 in.^2 **2c.** $3.14 \times 8^2 = 3.14 \times 64 = 200.96$; 200.96 in.^2 **2d.** $\frac{50.24}{12.56} = \frac{200.96}{50.24} = 4$; It quadruples.
3. $3 \times 2^2 = 12$; 12 in.^2 **4.** radius: 3; $3 \times 3^2 = 27$; 27 mm^2
5. $3 \times 20^2 = 1,200$; $1,200 \text{ cm}^2$ **6.** radius: 8; $3 \times 8^2 = 192$; 192 ft^2 **7.** $\pi \times 8^2 \approx 200.96 \text{ mm}^2$ **8.** radius: 13;
 $\pi \times 13^2 \approx 530.66 \text{ km}^2$ **9.** $\pi \times 37^2 \approx 4,298.66 \text{ ft}^2$
10. radius: 16; $\pi \times 16^2 \approx 803.84 \text{ in.}^2$ **11.** $\pi \times 11^2 \approx 379.94 \text{ yd}^2$ **12.** radius: 6; $\pi \times 6^2 \approx 113.04 \text{ cm}^2$ **13.** $\frac{22}{7} \times (2\frac{1}{3})^2 = \frac{22}{7} \times \frac{49}{9} = \frac{154}{9}$, or $17\frac{1}{9}$; $17\frac{1}{9} \text{ mm}^2$ **14.** $\frac{22}{7} \times (4\frac{1}{2})^2 = \frac{22}{7} \times \frac{81}{4} = \frac{891}{14}$, or $63\frac{9}{14}$; $63\frac{9}{14} \text{ in.}^2$ **15.** radius: 10.5; $\frac{22}{7} \times (10\frac{1}{2})^2 = \frac{22}{7} \times \frac{441}{4} = \frac{693}{2}$, or $346\frac{1}{2}$; $346\frac{1}{2} \text{ mi}^2$ **16.** radius: 7; $\frac{22}{7} \times 7^2 \approx 154$; about 154 ft^2 **17.** radius: 1.8; $3.14 \times (1.8)^2 \approx 10.17$; 10.17 m^2 **18.** $3.14 \times 1.1^2 \approx 3.8$; 3.8 mi^2 **19.** radius: 1.2; $3.14 \times 1.2^2 \approx 4.5$; 4.5 cm^2 **20.** $3.14 \times 0.5^2 \approx 0.8$; 0.8 m^2

21. radius: 6.85; $3.14 \times 6.85^2 \approx 147.3$; 147.3 ft^2
22. $3.14 \times 10^2 = 314$, $18 \times 18 = 324$; No, the area of the circular pan is about 314 in.^2 , and the area of the square pan is 324 in.^2 **23.** $8 \times 2^2 + \frac{1}{2}\pi \times 2^2 = 32 + 2\pi = 38.28$; 38.28 ft^2 **24.** $3.14 \times 45^2 = 6,358.5$; about $6,358.5 \text{ mi}^2$
25. area of square: $12 \times 12 = 144$; area of circle: $3.14 \times 6^2 = 113.04$, difference: $144 - 113.04 = 30.96$; 30.96 cm^2
26. difference of areas:
 $3.14 \times 5^2 - 3.14 \times 2^2 \approx 78.5 - 12.56$, or 65.94 ; 65.94 m^2
27. sum of areas:
 $10 \times 6 + 0.5 \times 3.14 \times 3^2 \approx 60 + 14.13$, or 74.13 ; 74.13 m^2
28. $\pi d = 31.4$, $d = \frac{31.4}{3.14} = 10$; $10 \div 2 = 5$; $3.14 \times 5^2 = 78.5$; 78.5 square units **29.** When the diameter is tripled, the area becomes 9 times greater.
30. The area of a circle can be calculated with the formula πr^2 , so the correct choice is A. **31.** The circumference of a circle can be calculated with the formula $2\pi r$, and to find the radius it would be $\frac{C}{2\pi}$, $\frac{18.84}{3.14} \approx \frac{18}{3} = 6$; $6 \div 2 = 3$; the correct choice is F.

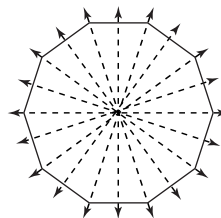
32. five



33. four



34. ten



ACTIVITY LAB

page 448

1. Top



Front



Right



2. Top



Front



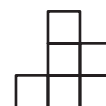
Right



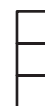
3. Top



Front

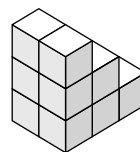


Right

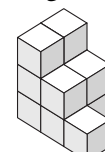


4–5. Answers may vary. Samples are given.

4.



5.



9-7 Three-Dimensional Figures and Spatial Reasoning pages 449–452

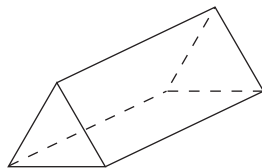
Check Skills You'll Need For complete solutions see *Daily Skills Check and Lesson Quiz Transparencies* or *Presentation Pro CD-ROM*. **1.** A rectangle that is not a square is a 4-sided polygon with 4 right angles and with the length different from the width. **2.** hexagon **3.** triangle

Quick Check 1a. pentagonal prism **1b.** rectangular prism **1c.** triangular prism **2.** rectangular prism

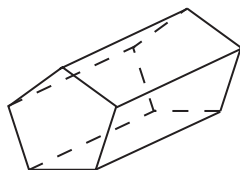
Exercises 1. Answers may vary. Sample: They are both three-dimensional shapes. A prism has two parallel and congruent bases, but a pyramid has only one base.

2. Answers may vary. Sample: One face of the figure is a square. The other four faces are triangles that have a common vertex. **3.** cone **4.** sphere **5.** cylinder

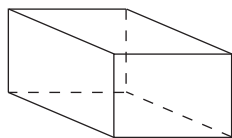
6. triangular prism **7.** hexagonal prism **8.** rectangular prism **9.** pentagonal prism **10.** cube **11.** octagonal prism **12.** sphere **13.** pyramid **14.** rectangular prism **15.** cone **16.** triangular pyramid; 4 faces, 4 vertices, 6 edges **17.** trapezoidal prism; 6 faces, 8 vertices, 12 edges **18.** parallelograms **19.** Answers may vary. Sample:



20. Answers may vary. Sample:



21. Answers may vary. Sample:



22. $82^\circ - 70^\circ = 12^\circ$, so the correct choice is C.

23. 1 gallon = 128 ounces; The correct choice is J.

24. $100\% - 30\% = 70\%$; $\$20 \times 0.7 = \14

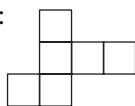
9-8 Surface Area of Prisms pages 453–456

Check Skills You'll Need For complete solutions see *Daily Skills Check and Lesson Quiz Transparencies* or *Presentation Pro CD-ROM*. **1.** The area of a piece of paper is the two-dimensional space a rectangle of the same dimensions as the paper encloses.

2. 21 m^2 **3.** 60 m^2

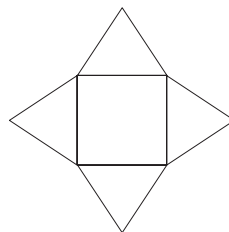
Quick Check 1. Answers may vary. Sample:

2. front and back: $2(30 \times 12) = 720$; top and bottom: $2(30 \times 12) = 720$; left and right: $2(12 \times 12) = 288$; $720 + 720 + 288 = 1,728$; $1,728 \text{ m}^2$

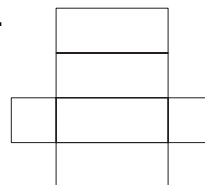


Exercises 1. A net lets you see a 3-dimensional object in 2 dimensions. **2.** $2(3 \times 1) + 2(3 \times 1) + 2(1 \times 1) = 6 + 6 + 2$, or 14; 14 cm^2 **3.** $6(2 \times 2) = 24$; 24 cm^2

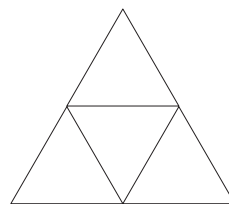
4.



5.



6.



7. $2(3 \times 3) + 2(3 \times 5) + 2(3 \times 5) = 2(9) + 2(15) + 2(15) = 18 + 30 + 30$, or 78; 78 cm^2

8. $(15 \times 10) + (17 \times 10) + (8 \times 10) + 2(\frac{1}{2} \times 8 \times 15) = 150 + 170 + 80 + 120$, or 520; 520 m^2

9. all six faces congruent; $6(6^2) = 216$; 216 ft^2

10. $2(9 \times 8) + 2(12 \times 9) + 2(8 \times 12) = 144 + 216 + 192$, or 552; 552 m^2 **11.** $2(7 \times 20) + 2(15 \times 20) + 2(7 \times 15) = 280 + 600 + 210 = 1,090$; $1,090 \text{ in.}^2$ **12.** $(7.1 \times 13) + (7.1 \times 10.9) + (7.1 \times 7.1) + 2(\frac{1}{2} \times 7.1 \times 10.9) = 92.3 + 77.39 + 50.41 + 77.39$, or 297.49; 297.49 in.^2

13. bases: $2(95 \times 95) = 18,050$; ends $2(95 \times 7) = 1,330$; sides: $2(95 \times 7) = 1,330$; total surface area = $18,050 + 1,330 + 1,330$, or $20,710 \text{ m}^2$ **14.** $2(7 \times 3) + 2(27 \times 7) + 2(27 \times 3) = 42 + 378 + 162 = 582$; 582 cm^2

15. The surface area of the prism with doubled dimensions is four times the surface area of the original prism. **16.** surface area of bases = $2(15 \times 9)$, or 270, surface area of sides = $2(15 \times 4)$, or 120, surface area of ends = $2(9 \times 4)$, or 72; total surface area = $270 + 120 + 72$, or 462 in.^2 ; A 40 in. by 10 in. piece has an area of 400 in.^2 , which will not cover the box; the correct choice is C. **17.** Let s represent the length of an edge. Then $6s^2 = 54$ and $s^2 = 9$. So $s = 3$; 3 in.

18. $2(3 \times 2.2) + 2(2.2 \times 11) + 2(3 \times 11) = 13.2 + 48.4 + 66$, or 127.6; 127.6 m^2

19. $2(6.3 \times 5) + 2(5 \times 8) + 2(6.3 \times 8) = 63 + 80 + 100.8$, or 243.8; 243.8 in.^2

20. $2(s \times s) + 2(s \times s) + 2(s \times s) = 6s^2$

21. Original dimensions: $a \times b \times c$; original surface area: $2(a \times b) + 2(b \times c) + 2(a \times c) = 2ab + 2bc + 2ac$; doubled dimensions: $2a \times 2b \times 2c$; doubled surface area: $2(2a \times 2b) + 2(2b \times 2c) + 2(2a \times 2c) = 8ab + 8bc + 8ac$; tripled dimensions: $3a \times 3b \times 3c$; tripled surface area: $2(3a \times 3b) + 2(3b \times 3c) + 2(3a \times 3c) = 18ab + 18bc + 18ac$; quadrupled dimensions: $4a \times 4b \times 4c$; quadrupled surface area: $2(4a \times 4b) + 2(4b \times 4c) + 2(4a \times 4c) = 32ab + 32bc + 32ac$; $\frac{\text{new dimension}}{\text{original dimension}} = \frac{8}{2} = 4$, when it's

doubled it's 4 times larger; $\frac{18}{2} = 9$, when it's tripled it's 9 times larger; $\frac{32}{2} = 16$ when it's quadrupled it's 16 times

larger; 4 times larger; 9 times larger; 16 times larger

22. $4 + 3 + 12 - 10 + 6$; the correct choice is B.

23. radius: 5; $5^2\pi = 25\pi$; the correct choice is H. **24.** An obtuse angle is one that is greater than 90° and less than 180° , so the correct choice is C. **25.** The graph only represents percents and there is no total number of singers, so the correct choice is G. **26.** Choose a unit larger than liters; kiloliters **27.** Choose a very small unit; milliliters **28.** Choose a unit appropriate to a light weight object; grams **29.** Choose a unit larger than grams; kilograms

ACTIVITY LAB

page 457

1.

Length	Width	Height	Total Cubes
2	4	3	24
4	3	4	48
4	5	3	60

2. Check students' work. **3.** length of 5 cubes **4.** $V = \text{area of the base} \times \text{height}$ **5.** $V = B \times h = (l \times w) \times h = (10 \times 5) \times 4 = 50 \times 4 = 200 \text{ cm}^3$ **6–7.** Answers may vary. Sample:

Width	Length	Height	S.A.
1	1	24	98
2	6	2	56
2	3	4	52
3	8	1	70
3	4	2	52
4	1	6	68
4	2	3	52
6	1	4	68
6	2	2	56
8	3	1	70
12	1	2	76

The dimensions can differ, which results in different surface areas.

9-9 Volumes of Rectangular Prisms

pages 458–460

Check Skills You'll Need For complete solutions see *Daily Skills Check and Lesson Quiz Transparencies* or *Presentation Pro CD-ROM*. **1.** base **2.** 110.5 **3.** 2.7

Quick Check 1. $2 \times 3 \times 6 = 36$; 36 units³

2. $8 \times 7 \times 10 = 560$; 560 m³

Exercises 1. Volume is the measure of an object's capacity. Area is the measure of the number of square units a figure contains. **2.** The volume would be 8 times greater. **3.** $6 \times 4 \times 11 = 264$; 264 m³ **4.** $3 \times 2 \times 9 = 54$; 54 ft **5.** $4 \times 8 \times 6 = 192$; 192 cubic units **6.** $1 \times 2 \times 6 = 12$; 12 cubic units **7.** $2 \times 4 \times 5 = 40$; 40 cubic units **8.** $7 \times 6 \times 5 = 210$; 210 ft³ **9.** $30 \times 9 \times 22 = 5,940$; 5,940 m³ **10.** $4 \times 3 \times 4 = 48$; 48 cm³ **11.** $5.4 \times 13 = 70.2$; 70.2 ft³ **12.** The second prism's volume is twice the first prism's volume. Height is doubled and area remains the same, so volume must be doubled. **13.** Answers may

vary. Sample: 5 feet by 4 feet by 4 feet **14.** $20 \times 8 \times 7 = 1,120$; $108 \times 8 = 864$; $1,120 - 864 = 256$; the trailer with a length of 20 ft, width of 8 ft, and height of 7 ft; 256 ft³ **15.** $24 \times 16 \times 2.5 = 960$; 960 m³; 960,000 L \div 2 L = 480,000; 480,000 bottles **16.** 50 cm = 0.5 m; $2 \times 0.5 \times 1 \text{ m} = 1 \text{ m}^3$, so the correct choice is A.

17. In order to find the area of a parallelogram you need a base length and the height, so the correct choice is H.

18. side length: $12 \div 4 = 3$; $3^2 = 9$; 9 m²

19. side length: $24 \div 4 = 6$; $6^2 = 36$; 36 ft² **20.** side length: $34 \div 4 = 8.5$; $8.5^2 = 72.25$; 72.25 cm² **21.** side length: $25 \div 4 = 6.25$; $6.25^2 = 39.0625$; 39.0625 in.²

CHECKPOINT QUIZ 2

page 461

1. $66 = 2\pi r$;

$$r = \frac{66}{2\pi}$$

$$\pi\left(\frac{66}{2\pi}\right)^2 \approx 346.8 \text{ ft}^2$$

2. triangular pyramid **3.** cone **4.** pentagonal pyramid

5. hexagonal prism

6. $2 \times 2 \times 5 + 2 \times 3 \times 5 + 2 \times 3 \times 2 = 20 + 30 + 12$, or 62; 62 cm² **7.** $5 \times 3 \times 2 = 30$; 30 cm³

ACTIVITY LAB

page 461

1–3. Check students' work. **4.** Add the areas of the circles and the rectangle to find the surface area of a cylinder.

5. surface area: $2 \times \pi \times 1.75^2 + 2 \times \pi \times 1.75 \times 8.5 = 6.125\pi + 29.75\pi = 35.875\pi \approx 112.7 \text{ in.}$

9-10 Surface Areas and Volumes of Cylinders

pages 462–466

Check Skills You'll Need For complete solutions see *Daily Skills Check and Lesson Quiz Transparencies* or *Presentation Pro CD-ROM*. **1.** The radius of a circle is the distance from the center to the edge of the circle.

2. 200.96 m² **3.** 12.56 yd²

Quick Check 1. $2(2.7^2\pi) + 2 \times 2.7 \times \pi \times 3 = 14.58\pi + 16.2\pi = 30.78\pi \approx 96.6$; 96.6 in.² **2.** $V = \pi r^2 h = \pi 4^2 \times 9 = 144\pi \approx 452.38$; 452 in.³

Exercises 1. $2\pi r^2$ represents the area of the two circular bases and $C \times h$ represents the area of the rectangle; their sum represents the total surface area. **2.** Doubling the height doubles the volume because the area of the base circle stays the same. **3.** $2(4^2\pi) + 25 \times 4 = 32\pi + 100 \approx 200.48$; 200.48 in.²

4. $2(4.5^2\pi) + 28.26 \times 5.5 = 40.5\pi + 155.43 = 282.6$; 282.6 mm² **5.** $2 \times 4 \times 10 \times \pi + 2(4^2\pi) = 80\pi + 32\pi = 112\pi \approx 351.68$; 351.7 cm² **6.** $2 \times 6 \times 5 \times \pi + 2(6^2\pi) = 60\pi + 72\pi = 132\pi \approx 414.48$; 414.5 m² **7.** radius: 8; $16 \times 24 \times \pi + 2(8^2\pi) = 384\pi + 128\pi = 512\pi \approx 1,607.68$; 1,607.7 ft² **8.** $5^2\pi \times 3 = 75\pi \approx 235.5$; 235.5 in.³ **9.** radius: 5; $5^2\pi \times 9 = 225\pi \approx 706.5$; 706.5 m³ **10.** radius: 7; $7^2\pi \times 12 = 588\pi \approx 1,846.32$; 1,846.3 yd³ **11.** $3^2\pi \times 19 = 171\pi \approx 536.94$; 536.9 ft³ **12.** $22^2\pi \times 7 = 3,388\pi \approx 10,638.32$; 10,638.3 m³ **13.** $3^2\pi \times 200 =$

$1800\pi = 5,652$; $5,652 \text{ mm}^3$ **14.** radius: $2.875 \div 2 = 2.875 \times 0.5 = 1.4375$; $2.875 \times \pi \times 8.3 + (1.4375)^2 \times \pi = 23.8625\pi + 2.0664\pi = 25.9289\pi = 81.416$; 81.42 in.^2 ; $(1.4375)^2 \times \pi \times 8.3 = 17.15\pi = 53.854$; 53.85 in.^3 .
15. radius: 1.6 ; $3.2 \times \pi \times 5.5 + 2(1.6^2)\pi = 17.6\pi + 5.12\pi = 22.72\pi = 71.34$; 71.3 cm^2 ; $(1.6)^2 \times \pi \times 5.5 = 14.08\pi = 44.21$; 44.2 cm^3 **16.** radius: 1.5 ; $3 \times \pi \times 20 = 60\pi = 188.4$; 188.4 in.^2 ; $(1.5)^2 \times \pi \times 20 = 45\pi = 141.3$; 141.3 in.^3 .
17. $\pi \times (8.1)^2 \times 4 = 262.44\pi = 824.0616$; 824.06 cm^3 .
18. $\pi \times (2.4)^2 \times 5.4 = 31.104\pi = 97.666$; 97.67 in.^3 .
19. $\pi \times 9^2 \times 23.5 = 1,903.5\pi = 5,976.99$; $5,976.99 \text{ m}^3$
20. $\pi \times (8.2)^2 \times 3.2 = 215.168\pi = 675.627$; 675.63 ft^3
21. $V = \frac{1}{3} \times l \times w \times h = \frac{1}{3} \times 230 \times 230 \times 146 = 2,574,466.667$; $2,574,466.7 \text{ m}^3$ **22.** $V = B \times h = \pi r^2 \times h$;
 $h = \frac{V}{\pi r^2} = \frac{85}{\pi \times 2.6^2} \approx 4.0024$; 4 ft **23.** $2 \times 3 \times n = 6n$;
the correct choice is D. **24.** To find the circumference of a circle use the formula $2\pi r$, so the correct choice is J.
25. A folder is a little larger than a piece of notebook paper so you should use inches to measure it. The correct choice is A. **26.** $2 \times \pi \times 10 = 20\pi = 62.8$; 62.8 ft

TEST-TAKING STRATEGIES

page 467

1. The correct choice is D. 2. The correct choice is F.

CHAPTER REVIEW

pages 468–469

1. faces **2.** pyramid or cone **3.** radius **4.** larger unit to smaller one: multiply; $0.3 \times 1,000 = 300$ **5.** smaller unit to larger one: divide; $150 \div 100 = 1.5$ **6.** smaller unit to larger one: divide; $5,700 \div 1,000 = 5.7$ **7.** perimeter: $2 \times 8 + 2 \times 7 = 16 + 14 = 30$; 30 ft; area: $8 \times 6 = 48$; 48 ft² **8.** perimeter: $15.2 + 24.7 + 29 = 68.9$; 68.9 m; area: $\frac{1}{2} \times 24.7 \times 15.2 = 187.72$; 187.72 m² **9.** perimeter: $2 \times 12 + 2 \times 20 = 24 + 40 = 64$; 64 in.; area: $12 \times 20 = 240$; 240 in.² **10.** \overline{XV} , \overline{YW} , and \overline{VW} **11.** \overline{XV} **12.** \overline{OV} , \overline{OX} , and \overline{OY} **13.** $2 \times 5 \times 3.14 = 31.4$; 31.4 in. **14.** $5^2 \times 3.14 = 78.5$; 79 in.² **15.** triangular prism **16.** rectangular pyramid **17.** cylinder **18.** surface area: $(2 \times 2 \times 2) + (2 \times 4 \times 2) + (2 \times 4 \times 2) = 8 + 16 + 16$, or 40; 40 in.²; volume: $4 \times 2 \times 2 = 16$ in.³ **19.** surface area: $(2 \times 3 \times 4) + (2 \times 4 \times 7) + (2 \times 3 \times 7) = 24 + 56 + 42$, or 122; 122 m²; volume: $3 \times 4 \times 7 = 84$ m³ **20.** surface area: $2(6^2\pi) + 12 \times \pi \times 13 = 72\pi + 156\pi = 228\pi \approx 715.92$; 715.92 ft²; volume: $6^2\pi \times 13 = 468\pi \approx 1,469.52$; 1,469.52 ft³

CHAPTER TEST

page 470

1. a few yards long; meters **2.** a small amount to drink; milliliters **3.** a couple of feet long; centimeters **4.** A boat can hold many people; kilograms **5.** a few gallons; liters **6.** smaller unit to larger one: divide; $672 \div 10 = 67.2$ cm **7.** smaller unit to larger one: divide; $25,040 \div 1,000 = 25.04$ L **8.** larger unit to smaller one: multiply; $35.1 \times 1,000 = 35,100$ g **9.** smaller unit to larger one: divide; $125 \div 1,000 = 0.125$ kL **10.** larger unit to smaller one: multiply; $42.9 \times 100 = 4,290$ cm **11.** $21 \times 9 = 189$; 189 mm² **12.** $\frac{1}{2} \times 6 \times 4 = 12$; 12 yd²

13. $6 \times 7 + \frac{1}{2} \times 4 \times 7 = 42 + 14 = 56$; 56 m^2
14. $6 \times 9 + \frac{1}{2} \times 6 \times 6 + 9 \times 5 = 54 + 18 + 45 = 117$;
 117 in.^2 **15.** $\frac{1}{2} \times 8 \times 4 = 16$; 16 ft^2 **16.** A pie plate with a
radius of 5 inches, since the diameter of the plate is
 2×5 , or 10 inches **17.** circumference:
 $2 \times 15 \times 3.14 = 94.2$; 94.2 ft ; area: $15^2 \times 3.14 = 706.5$;
 706.5 ft^2 **18.** radius: 9; circumference:
 $18 \times 3.14 = 56.52$; 56.5 km ; area: $9^2 \times 3.14 = 254.34$;
 254.3 km^2 **19.** width: $20 \div 5 = 4$; perimeter:
 $2 \times 5 + 2 \times 4 = 18$; 18 cm **20.** $2^2\pi \times 8 = 100.5$; 100.5 cm^3
21. $2(12^2\pi) + 2 \times 12 \times \pi \times 14 =$
 $288\pi + 1,055.54\pi$, or $1,959.36$; $1,959.36 \text{ m}^2$
22. $2(\frac{1}{2} \times 5 \times 12) + (2 \times 5) + (2 \times 13) + (2 \times 12) =$
 $60 + 10 + 26 + 24$, or 120 ; 120 in.^2 **23.** $8 \times 7 \times 6 = 336$;
 336 yd^3 **24.** radius: 11; volume: $11^2\pi \times 17 \approx 6,458.98$;
 $6,458.98 \text{ cm}^3$ **25.** Let h represent height: $72h = 504$; $h = 7$;
 7 cm **26.** radius: 18; volume: $18^2\pi \times 36 \approx 36,624.96$;
 $36,624.96 \text{ in.}^3$

TEST PREP

page 471

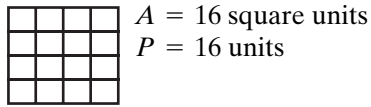
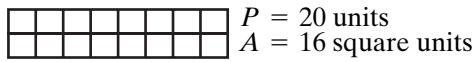
1. The radius is the length of the minute hand, which is about 12 feet. The equation for the circumference of a circle is $2\pi r$, so $2(12)\pi = 24\pi$; the correct choice is D. **2.** If the minute hand were twice as long, it would measure $2(12)$, or 24 feet. The circumference would then measure $2(24)\pi$, or 48π . Therefore, the minute hand would travel twice as far; the correct choice is H. **3.** The area of a circle is expressed πr^2 . The diameter of the clock is 22 feet, and since the radius is half the diameter, $r = 22 \div 2 = 11$, or 11 feet. Therefore $A = \pi(11)^2 = 11 \cdot 11 \cdot \pi$; the correct choice is B. **4.** The diameter of the clock is 22 feet, and since the radius is half the diameter, $r = 22 \div 2 = 11$, or 11 feet. Therefore $A = 11 \cdot 11 \cdot \pi = 121\pi$. If the radius were twice as long, or 22 feet, the area would be $22 \cdot 22 \cdot \pi = 484\pi$. $484 \div 121 = 4$, so the area of the face would be four times greater; the correct choice is H. **5.** If Al's house is 30 miles south and 40 miles east of Mount Monadnock, point R, should represent Al's house. Therefore point Q is not Al's house; the correct choice is A. **6.** The total distance is $40 + 30 = 70$ miles. If he goes 56 miles per hour for 70 miles, then $70 \div 56 = 1.25$ h. The correct choice is G. **7.** The trip from Al's house to Mount Monadnock is 40 miles west and then another 30 miles north. $40 + 30 = 70$; the correct choice is D. **8.** The total distance from Al's house to Mount Monadnock is $40 + 30 = 70$ miles. A round trip will be twice as many miles, so $70 \cdot 2 = 140$. If the odometer reads 12,350 miles as Al leaves home, after a round trip it will read $12,350 + 140 = 12,490$ miles; the correct choice is G.

DK PROBLEM SOLVING APPLICATION

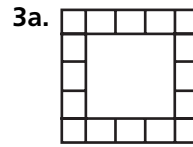
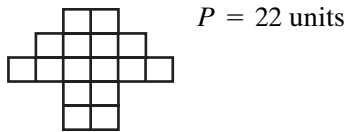
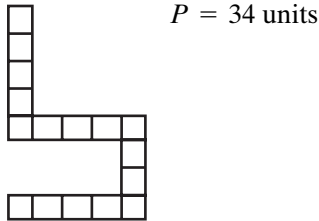
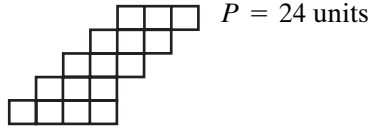
pages 472–473

1.

$A = 16$ square units
 $P = 34$ units



2. Answers may vary. Samples are given.



3b. outside perimeter = 20 units; inside perimeter = 12 units; total perimeter = 32 units **3c.** The architect may want an open courtyard or garden in the center, or the architect may want every room to have a window-view. **4.** the 1×16 rectangle; the 4×4 rectangle **5a.** Building A: volume: $3 \times 2 \times 4 = 24$; 24 units³; exposed surface area: $2 \times 3 \times 4 + 2 \times 2 \times 4 + 2 \times 3 = 24 + 16 + 6$, or 46; 46 units²; Building B: volume: $2 \times 2 \times 6 = 24$; 24 units³; exposed surface area: $2 \times 2 \times 6 + 2 \times 2 \times 2 + 2 \times 6 = 24 + 8 + 12$, or 44; 44 units²; Building C: volume: $1 \times 3 \times 8 = 24$; 24 units³; exposed surface area: $8 \times 1 \times 2 + 8 \times 3 \times 2 + 3 \times 1 = 16 + 48 + 3$, or 67; 67 units² **5b.** Building C gives the most space for windows because it has the greatest exposed surface area. Building B has the least space for windows because it has the least exposed surface area.

CHECK YOUR READINESS

page 474

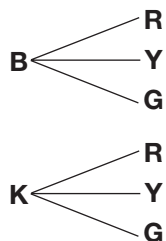
1. $1 - 0.32 = 1.00 - 0.32 = 0.68$ 2. $1 - 0.08 = 1.00 - 0.08 = 0.92$ 3. $1 - 0.6 = 1.0 - 0.6 = 0.4$
 4. $1 - 0.234 = 1.00 - 0.234 = 0.766$ 5. $\frac{2}{5} + \frac{1}{5} = \frac{2+1}{5} = \frac{3}{5}$
 6. $\frac{3}{6} + \frac{1}{6} = \frac{3+1}{6} = \frac{4}{6} = \frac{2}{3}$ 7. $\frac{2}{8} + \frac{5}{8} = \frac{2+5}{8} = \frac{7}{8}$
 8. $\frac{3}{10} + \frac{3}{10} = \frac{3+3}{10} = \frac{6}{10} = \frac{3}{5}$ 9. $\frac{1}{2} \times \frac{5}{6} = \frac{1 \times 5}{2 \times 6} = \frac{5}{12}$
 10. $\frac{3}{4} \times \frac{8}{9} = \frac{1}{4} \times \frac{8}{3} = \frac{1}{1} \times \frac{2}{3} = \frac{2}{3}$ 11. $\frac{7}{10} \times \frac{5}{14} = \frac{1}{2} \times \frac{5}{2} = \frac{5}{4}$
 $\frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$ 12. $\frac{2}{3} \times \frac{8}{9} = \frac{2 \times 8}{3 \times 9} = \frac{16}{27}$ 13. $\frac{2}{8} = 2 \div 8 = 0.25 = 0.25 \times 100\% = 25\%$; $0.25, 25\%$ 14. $\frac{3}{9} = 3 \div 9 = 0.3 \approx 0.33 \times 100\% = 33\%$; $0.3 \approx 33\%$ 15. $\frac{4}{5} = 4 \div 5 = 0.8 = 0.8 \times 100\% = 80\%$; $0.8, 80\%$ 16. $\frac{7}{10} = 7 \div 10 = 0.7 = 0.7 \times 100\% = 70\%$; $0.7, 70\%$

10-1 Tree Diagrams and the Counting Principle pages 476–480

Check Skills You'll Need For complete solutions see *Daily Skills Check and Lesson Quiz Transparencies* or *Presentation Pro CD-ROM*. 1. Associative 2. 5.2
 3. 1,800 4. 1,200

Quick Check 1. 9 outcomes; model 1, color 1; model 1, color 2; model 1, color 3; model 2, color 1; model 2, color 2; model 2, color 3; model 3, color 1; model 3, color 2; model 3, color 3

2. Pants Shirts



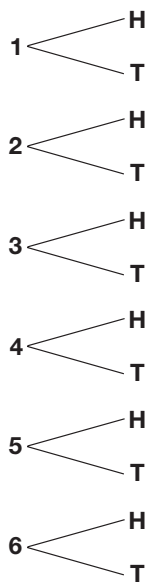
6 outcomes

3. There are now 6 different flavors of ice cream, 4 different toppings, and 2 different cones. The number of different desserts is now $6 \times 4 \times 2$, or 48 different desserts.

More Than One Way Answers may vary. Sample: 16; I used the counting principle: $4 \times 2 \times 2 = 16$ possible outcomes; this method takes less space, or I can calculate mentally.

Exercises 1. sample space

2. Spin Flip

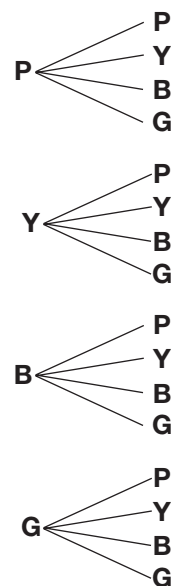


12 outcomes

3. Answers may vary. Sample: You can use the counting principle to multiply 5×6 and find 30 different ways.

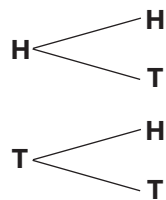
4. 6 outcomes; color 1, size 1; color 1, size 2; color 2, size 1; color 2, size 2; color 3, size 1; color 3, size 2 5. 9 outcomes; car, color 1; car, color 2; car, color 3; plane, color 1; plane, color 2; plane, color 3; boat, color 1; boat, color 2; boat, color 3

6. Spin 1 Spin 2



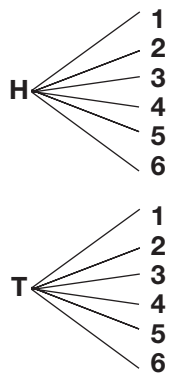
16 outcomes

7. Flip 1 Flip 2



4 outcomes

8. Flip Roll



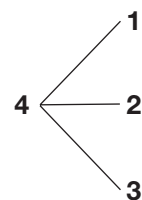
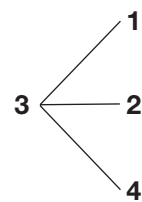
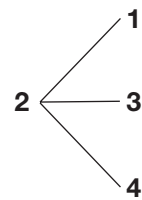
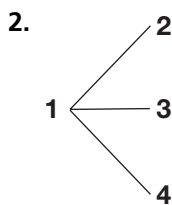
12 outcomes

9. $2 \times 2 \times 2 = 8$; 8 outcomes 10. $8 \times 3 \times 5 = 120$; 120 types of tickets 11. you can make, $2 \times 5 \times 3 = 30$, your friend can make $4 \times 4 \times 2 = 32$; your friend 12a. 1 space, Free Turn; 1 space, Lose a Turn; 1 space, No Change; 2 spaces, Free Turn; 2 spaces, Lose a Turn; 2 spaces, No Change; 3 spaces, Free Turn; 3 spaces, Lose a Turn; 3 spaces, No Change; 4 spaces, Free Turn; 4 spaces, Lose a Turn; 4 spaces, No Change 12b. The only 2 outcomes that would not allow you to win are 1 space, Lose a Turn or 1 space, No Change. Eliminating these two choices leaves 10 outcomes. 13. $30 \div 5 = 6$; 6 colors 14. 27 outcomes; answers may vary. Sample: I used the counting principle and multiplied $3 \times 3 \times 3$, because this method was faster. 15. The first digit can be 2, 4, 6, or 8, which is 4 choices. The last three digits can be 0, 2, 4, 6, or 8, which is 5 choices. $4 \times 5 \times 5 \times 5 = 4 \times 125 = 500$; 500 four-digit numbers 16. The correct choice is B. 17. tons

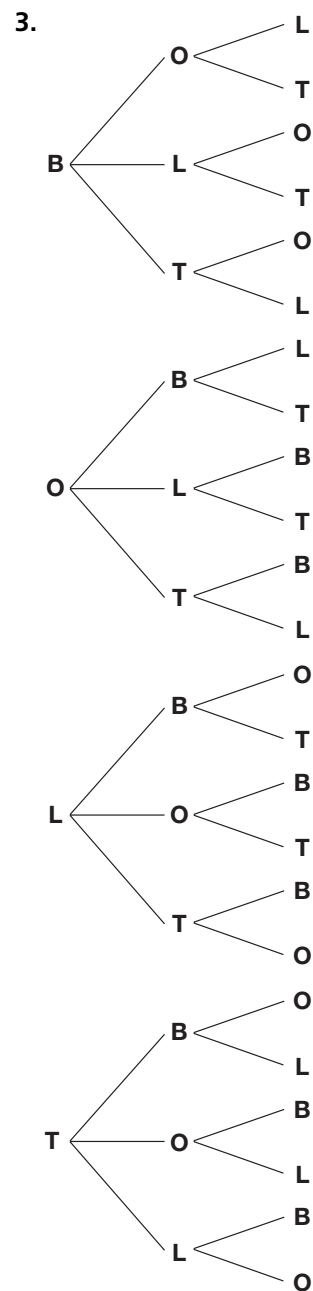
EXTENSION

page 481

1. WORD, WODR, WROD, WRDO, WDOR, WDRO, OWRD, OWDR, ORWD, ORDW, ODWR, ODRW, RWOD, RWDO, ROWD, RODW, RDWO, RDOW, DWOR, DWRO, DOWR, DORW, DRWO, DROW; 24 permutations



12 permutations



24 permutations

4. carrots, peppers, tomatoes, peas; carrots, peppers, peas, tomatoes; carrots, tomatoes, peppers, peas; carrots, tomatoes, peas, peppers; carrots, peas, peppers, tomatoes; carrots, peas, tomatoes, peppers; peppers, carrots, tomatoes, peas; peppers, carrots, peas, tomatoes; peppers, tomatoes, peas; peppers, tomatoes, peas, carrots; peppers, peas, carrots, tomatoes; peppers, peas, tomatoes, carrots; tomatoes, carrots, peppers, peas; tomatoes, carrots, peas, peppers; tomatoes, peppers, carrots, peas; tomatoes, peppers, peas, carrots; tomatoes, peas, carrots, peppers; tomatoes, peas, peppers, carrots; peas, carrots, peppers, tomatoes; peas, carrots, tomatoes, peppers; peas, tomatoes, peppers; peas, tomatoes, peppers, carrots; peas, tomatoes, peppers, tomatoes; peas, peppers, carrots, tomatoes; peas, peppers, tomatoes, carrots; tomatoes, carrots

Check Skills You'll Need For complete solutions see *Daily Skills Check and Lesson Quiz Transparencies* or *Presentation Pro CD-ROM*. **1.** A percent is a ratio that compares a number to 100. **2.** 32% **3.** 36% **4.** 40% **5.** 2%

Quick Check 1. A number cube has just one 4 and just one 6, so there are 2 favorable outcomes. There are 6 possible outcomes, so $P(4 \text{ or } 6) =$

$$\frac{\text{number of favorable outcomes}}{\text{number of outcomes}} = \frac{2}{6} = \frac{1}{3}. \quad \mathbf{2.}$$
 There are 5

numbers on a number cube that are not 6, so there are 5 favorable outcomes. There are 6 possible outcomes, so

$$P(\text{not } 6) = \frac{\text{number of favorable outcomes}}{\text{number of outcomes}} = \frac{5}{6}. \quad \mathbf{3.}$$
 There are 6

favorable outcomes and 10 possible outcomes, so

$$P(\text{pecan}) = \frac{6}{10} = \frac{3}{5} = 0.6.$$

Exercises 1. The sum of the probability of an event and the probability of its complement always equals 1.

2. No; $P(3)$ and $P(4)$ are both $\frac{1}{6}$. **3.** Check students' work.

4. $\frac{1}{6}$; the correct choice is A. **5.** $\frac{2}{6} = \frac{1}{3}$; the correct choice is B.

6. $\frac{5}{6}$; the correct choice is C. **7.** There are 4 favorable outcomes and $4 + 3 + 2 + 1$, or 10, possible outcomes;

$P(\text{red}) = \frac{4}{10} = \frac{2}{5}$. **8.** There are 3 favorable outcomes and $4 + 3 + 2 + 1$, or 10, possible outcomes;

$P(\text{yellow}) = \frac{3}{10}$. **9.** There are 2 favorable outcomes and $4 + 3 + 2 + 1$, or 10, possible outcomes;

$P(\text{black}) = \frac{2}{10} = \frac{1}{5}$. **10.** There is 1 favorable outcome and $4 + 3 + 2 + 1$, or 10, possible outcomes;

$P(\text{green}) = \frac{1}{10}$. **11.** There are 8 favorable outcomes and 12 possible outcomes;

$P(\text{spots}) = \frac{8}{12} = \frac{2}{3}$. There are $12 - 8$, or 4, favorable outcomes and 12 possible outcomes;

$P(\text{no spots}) = \frac{4}{12} = \frac{1}{3}$. **12.** There are 7 favorable outcomes and 21 possible outcomes;

$P(\text{yellow}) = \frac{7}{21} = \frac{1}{3}$. There are $21 - 7$, or 14, favorable outcomes and 21 possible outcomes;

$P(\text{not yellow}) = \frac{14}{21} = \frac{2}{3}$. **13.** There is 1 favorable outcome and 5 possible outcomes, so

$$P(\text{yellow}) = \frac{1}{5} = 1 \div 5 = 0.2. \quad \mathbf{14.}$$
 The favorable outcomes are 4, 5, and 6. There are 3 favorable outcomes and 6 possible outcomes, so

$$P(\text{number greater than } 3) = \frac{3}{6} = \frac{1}{2} = 1 \div 2 = 0.5. \quad \mathbf{15.}$$
 The favorable outcomes are A and E. There are 2 favorable outcomes and 6 possible outcomes, so

$$P(\text{vowel}) = \frac{2}{6} = \frac{1}{3} = 1 \div 3 = 0.\bar{3}. \quad \mathbf{16.}$$
 There is 1 favorable outcome and 6 possible outcomes, so

$$P(\text{your name}) = \frac{1}{6} = 1 \div 6 = 0.1\bar{6}. \quad \mathbf{17.}$$
 package of 25 party favors

$\frac{8}{25} = \frac{32}{100}$, package of 20 party favors $\frac{6}{20} = \frac{30}{100}$; a package of 25 party favors **18.** There are $1 + 4 + 2 + 1$, or 8, possible outcomes and $2 + 1$, or 3, favorable outcomes;

$P(\text{left-handed pitcher}) = \frac{3}{8}$. **19.** The multiples of 3 on a number cube are 3 and 6. There are 2

favorable outcomes and 6 possible outcomes, so

$P(\text{multiple of } 3) = \frac{2}{6} = \frac{1}{3}$. **20.** The only multiple of 4 on a number cube is 4. There are 5 favorable outcomes and 6 possible outcomes, so $P(\text{not a multiple of } 4) = \frac{5}{6}$.

21. The numbers on a number cube that are not factors of 8 are 3, 5, and 6. There are 3 favorable outcomes and 6 possible outcomes, so $P(\text{not a factor of } 8) = \frac{3}{6} = \frac{1}{2}$.

22. The prime numbers on a number cube are 2, 3, and 5. There are 3 favorable outcomes and 6 possible outcomes, so $P(\text{prime}) = \frac{3}{6} = \frac{1}{2}$.

23. The area taken up by purple, yellow and green is a little more than half the circle. Answers may vary. Sample: $55\% = \frac{55}{100} = 0.55$

24. The area taken up by purple, yellow and red is a little less than the whole circle. Answers may vary. Sample: $95\% = \frac{95}{100} = 0.95$

25. Yellow is about $\frac{1}{3}$ of the entire circle, so the other colors take up about $\frac{2}{3}$ of the circle. Answers may vary. Sample: $65\% = \frac{65}{100} = 0.65$

26. No; "losing" means not winning and not tying, and "not winning" could be either losing or tying. **27.** $20 \div 4 = 5$; There are 15 favorable outcomes and 20 possible outcomes, so

$$P(\text{not green}) = \frac{15}{20} = \frac{3}{4}. \quad \mathbf{28.}$$
 $\frac{1}{3x} = 6$, total equals $3 \times 6 = 18$, $\frac{1}{2x} = 9$, there are 9 red marbles, $6 + 9 = 15$, $18 - 15 = 3$; 3 marbles

29. The favorable outcomes are 5, 10, 15 and 20 and there are 20 possible outcomes. So $P(\text{multiple of } 5) = \frac{4}{20} = \frac{1}{5} = 0.2$

30. $(7 \times 9) - (2 \times 3) = 63 - 6 = 57$; 57 **31.** $\frac{1}{8} = \frac{2}{16}$; 16 children **32.** $49 \div 5 = 9\frac{4}{5}$

33. $17 \div 3 = 5\frac{2}{3}$ **34.** $49 \div 6 = 8\frac{1}{6}$ **35.** $51 \div 4 = 12\frac{3}{4}$

CHECKPOINT QUIZ 1

page 487

1. shirt 1, jeans 1; shirt 1, jeans 2; shirt 2, jeans 1; shirt 2, jeans 2; shirt 3, jeans 1; shirt 3, jeans 2

2. Roll Toss **3.** There are 8 flavors of frozen yogurt and 6 kinds of toppings so the number of desserts is 8×6 or 48 desserts.

4. On a number cube, the numbers less than 3 are 1 and 2. There are 2 favorable outcomes and 6 possible outcomes, so

$P(\text{less than } 3) = \frac{2}{6} = \frac{1}{3}$.

5. On a number cube, the numbers don't include 8. There are 0 favorable outcomes and 6 possible outcomes, so

$P(8) = \frac{0}{6} = 0$.

6. There are two favorable outcomes (5 and 6) and 6 possible outcomes so

$P(5 \text{ and } 6) = \frac{2}{6} = \frac{1}{3}$.

7. There are 3 favorable outcomes (T, H, H; H, T, H; H, H, T) and 8 possible outcomes, so the probability is $\frac{3}{8}$.

8. There are 3 favorable outcomes (T, H, H; H, T, H; H, H, T) and 8 possible outcomes, so the probability is $\frac{3}{8}$.

9. There is 1 favorable outcome (T, T, T) and 8 possible outcomes, so the probability is $\frac{1}{8}$.

10. There are 2 favorable outcomes (T, T, T; H, H, H) and

8 possible outcomes, so the probability is $\frac{2}{8}$ or $\frac{1}{4}$.

11. There are 7 favorable outcomes (T, H, H; H, T, H; H, H, T; T, T, H; T, H, T; H, T, T; T, T, T) and 8 possible outcomes, so the probability is $\frac{7}{8}$.

12. There is 1 favorable outcome (H, H, H) and 8 possible outcomes, so the probability is $\frac{1}{8}$. **13.** There are 4 styles of braids, 5 ribbon colors, and 3 different barrettes, so the number of hairdos is $4 \times 5 \times 3$ or 60 hairdos.

10-3 Experimental Probability

pages 488–491

Check Skills You'll Need For complete solutions see *Daily Skills Check and Lesson Quiz Transparencies* or *Presentation Pro CD-ROM*. **1.** You can write a ratio as a fraction, as a phrase using “to,” or as an expression using a colon. **2.** $\frac{3}{5}$ **3.** $\frac{3}{5}$ **4.** $\frac{4}{15}$ **5.** $\frac{13}{20}$

Quick Check 1. $P(\text{Jennie wins}) = \frac{\text{number of times Jennie wins}}{\text{total number of games}} = \frac{20 - 9}{20} = \frac{11}{20}$ **2.** Find $P(1, 3, \text{ or } 6): \frac{16 + 12 + 3}{60} = \frac{31}{60}$. Find $P(2, 4, \text{ or } 5): \frac{17 + 8 + 4}{60} = \frac{29}{60}$. Since $\frac{31}{60} \approx \frac{29}{60}$, the game seems fair; yes.

Exercises 1. Experimental probability is found by conducting an experiment. **2.** $P(\text{tails}) = \frac{\text{number of times tails comes up}}{\text{total number of tosses}} = \frac{8}{20}$ or $\frac{2}{5}$ **3.** There are 20 favorable outcomes and $20 + 13 + 8 + 9$, or 50, possible outcomes; $P(\text{grape}) = \frac{20}{50}$ or $\frac{2}{5}$. **4.** There are $20 + 13 + 8$, or 41, favorable outcomes and $20 + 13 + 8 + 9$, or 50, possible outcomes; $P(\text{not lemon}) = \frac{41}{50}$. **5.** There are 8 favorable outcomes and $20 + 13 + 8 + 9$, or 50, favorable outcomes; $P(\text{lime}) = \frac{8}{50}$ or $\frac{4}{25}$. **6.** $P(\text{Carla wins}) = \frac{\text{number of wins}}{\text{total number of games}} = \frac{63}{294} = \frac{3}{14}$ **7.** $P(\text{Luis wins}) = \frac{\text{number of wins}}{\text{total number of games}} = \frac{14}{30} = \frac{7}{15}$ **8.** $P(\text{Kate wins}) = \frac{\text{number of wins}}{\text{total number of games}} = \frac{17}{17} = 1$ **9.** $P(\text{Sara wins}) = \frac{\text{number of wins}}{\text{total number of games}} = \frac{0}{15} = 0$ **10.** $P(\text{Troy wins}) = \frac{\text{number of wins}}{\text{total number of games}} = \frac{47}{80}$ **11.** Find $P(2, 4, \text{ or } 6): \frac{12 + 14 + 1}{80} = \frac{27}{80}$. No, the experimental probability of rolling an even number is $\frac{27}{80}$, which is not close enough to $\frac{1}{2}$. **12.** Find $P(1, 2, \text{ or } 3): \frac{9 + 12 + 19}{80} = \frac{40}{80} = \frac{1}{2}$. Yes, the experimental probability of rolling a 1, 2, or 3 is $\frac{1}{2}$. **13.** Find $P(5 \text{ or } 6): \frac{25 + 1}{80} = \frac{26}{80} = \frac{13}{40}$. No, the experimental probability of rolling a 5 or 6 is $\frac{13}{40}$, which is not close enough to $\frac{1}{2}$. **14.** $P(\text{getting a hit}) = \frac{\text{number of hits}}{\text{number of times at bat}} = \frac{6}{16} = \frac{3}{8} = 3 \div 8 = 0.375$; $40 \times \frac{3}{8} = 5 \times 3 = 15$; 15 hits

15. If he makes 4 out of 12 free throws, then he misses $12 - 4$ out of 12 free throws, or 8 out of 12 free throws: $P(\text{missing a free throw}) = \frac{8}{12} = \frac{2}{3}$. **16.** Spin it several times to see if it lands on each section about the same number of times. **17–22.** Check students' work.

23. $P(\text{you first}) = \frac{\text{number of times you make it down first}}{\text{total number of times down the mountain}} =$

$\frac{13}{20}$; your friend is first $20 - 13$, or 7, times out of 20, so $P(\text{your friend first}) = \frac{\text{number of times your friend makes it down first}}{\text{total number of times down the mountain}} =$

$\frac{7}{20}$. **24a.** $\frac{\text{number of times 3 occurred}}{\text{total rolls}} = \frac{1}{12}$ **24b.** $P(3)$ is the theoretical probability of getting a 3. Experimental probability tells how many times 3 was actually rolled.

25. The probability of hitting the triangle is $\frac{30}{50} = \frac{3}{5}$. This is approximately equal to the portion of the dartboard taken up by the triangle, $\frac{3}{5} \times 40 = 3 \times 8 = 24$; 24 in.²

26. $P(3) = \frac{\text{number of times 3 occurs}}{\text{total number of rolls}} = \frac{8}{40} = 0.20$; the correct choice is C.

27. $\frac{1}{8} = \frac{x}{12}$

$$8x = 12$$

$$\frac{8x}{8} = \frac{12}{8}$$

$$x = 1\frac{4}{8} = 1\frac{1}{2}$$

The correct choice is J.

28. The triangles are not the same size, so they are not congruent; they are similar. **29.** The triangles are the same size and shape, so they are congruent. **30.** The triangles are not the same size, so they are not congruent; they are similar.

ACTIVITY LAB

page 492

1. BB, BG, GB, GG; $\frac{1}{4}$; 25% **2–5.** Check students' work.

VOCABULARY BUILDER

page 493

1–3. Check students' work. **4.** $75\% = \frac{3}{4}$ **5.** $75 \times \frac{3}{4} = \frac{225}{4} = 56\frac{1}{4}$; about 56 students **6.** $81 \times \frac{3}{4} = \frac{243}{4} = 60\frac{3}{4}$;

about 60 students shouldn't the answer be 61

7a–c. Check students' work.

10-4 Making Predictions From Data

page 494–497

Check Skills You'll Need For complete solutions see *Daily Skills Check and Lesson Quiz Transparencies* or *Presentation Pro CD-ROM*. **1.** A proportion must be an equality. **2.** 6 **3.** 2 **4.** 3

Quick Check 1. 30% of 20 = $0.3 \times 20 = 6$; 6 times

2. $\frac{54}{1,000} = \frac{r}{20,000}$; $1,000r = 54 \times 20,000$; $r = \frac{54 \times 20,000}{1,000} = 54 \times 20 = 1,080$; 1,080 toy robots

Exercises 1. A sample is part of a population.

2. Answers may vary. Sample: You can save much time and money. **3.** 50% of 80 = $0.5 \times 80 = 40$; the correct choice is B. **4.** $\frac{x}{600} = \frac{38}{40}$; $40x = 38 \times 600$; $x = \frac{38 \times 600}{40} =$

$11,400 \div 20 = 570$; 570 people **5.** 40% of 5 = $0.4 \times 5 = 2$ **6.** 40% of 10 = $0.4 \times 10 = 4$ **7.** 40% of 15 = $0.4 \times 15 = 6$ **8.** 40% of 30 = $0.4 \times 30 = 12$ **9.** 40% of 85 = $0.4 \times 85 = 34$ **10.** 40% of 120 = $0.4 \times 120 = 48$

11. $\frac{\text{sample who prefer Mural A}}{\text{students in sample}} \rightarrow \frac{22}{120} = \frac{s}{18,000} \rightarrow$

$\frac{\text{students who prefer Mural A}}{\text{total students}}; 120s = 22 \times 18,000$;

$$s = \frac{22 \times 18,000}{120} = 22 \times 150 = 3,300; 3,300 \text{ students}$$

$$12. \frac{\text{defects in sample}}{\text{number in sample}} \rightarrow \frac{6}{500} = \frac{s}{24,000} \rightarrow \frac{\text{number of defects}}{\text{total number of items}}.$$

$$500s = 6 \times 24,000; s = \frac{6 \times 24,000}{500} = 6 \times 48 = 288;$$

288 shirts

$$13. \frac{\text{defects in sample}}{\text{number in sample}} \rightarrow \frac{3}{160} = \frac{s}{24,000} \rightarrow \frac{\text{number of defects}}{\text{total number of items}}.$$

$$160s = 3 \times 24,000; s = \frac{3 \times 24,000}{160} = 3 \times 150 = 450;$$

450 pairs of socks

$$14. \frac{\text{defects in sample}}{\text{number in sample}} \rightarrow \frac{2}{250} = \frac{b}{24,000} \rightarrow \frac{\text{number of defects}}{\text{total number of items}}.$$

$$250b = 2 \times 24,000; b = \frac{2 \times 24,000}{250} = 2 \times 96 = 192;$$

192 belts

$$15. \frac{\text{defects in sample}}{\text{number in sample}} \rightarrow \frac{3}{10} = \frac{p}{24,000} \rightarrow \frac{\text{number of defects}}{\text{total number of items}}.$$

$$10p = 3 \times 24,000; p = \frac{3 \times 24,000}{10} = 72,000 \div 10 = 7,200;$$

$$7,200 \text{ pairs of pants } 16. \text{ camping: } \frac{f}{15,600} = \frac{84}{200}, 200f =$$

$$15,600 \times 84, f = \frac{15,600 \times 84}{200} = 6,552; 6,552 \text{ families;}$$

$$\text{hiking: } \frac{f}{15,600} = \frac{72}{200}, 200f = 15,600 \times 72, f = \frac{15,600 \times 72}{200} =$$

$$5,616; 5,616 \text{ families; fishing: } \frac{f}{15,600} = \frac{44}{200}, 200f =$$

$$15,600 \times 44, f = \frac{15,600 \times 44}{200} = 3,432; 3,432 \text{ families}$$

17. 60 pieces; experimental probability is more accurate with more trials. 18. $\frac{s}{1,000} = \frac{14}{70}; 70s = 14 \times 1,000; s =$

$$\frac{14 \times 1,000}{70} = \frac{14 \times 100}{7} = 2 \times 100 = 200; 200 \text{ students}$$

$$19. 100 - 7 = 93, \frac{g}{5,000} = \frac{93}{100}, 100g = 5,000 \times 93; g =$$

$$\frac{5,000 \times 93}{100}; g = 50 \times 93 = 4,650; 4,650 \text{ gadgets}$$

$$20. \frac{\text{area of yellow}}{\text{total area}} \rightarrow \frac{6}{1 + 3 + 6 + 10} = \frac{6}{20} = \frac{3}{10}$$

$$21. \frac{\text{area of orange and yellow}}{\text{total area}} \rightarrow \frac{10 + 6}{1 + 3 + 6 + 10} = \frac{16}{20} = \frac{4}{5}$$

$$22. \frac{\text{area of sections that are not black}}{\text{total area}} \rightarrow \frac{3 + 6 + 10}{1 + 3 + 6 + 10} = \frac{19}{20}$$

$$23. \frac{1}{2} = 0.5$$

$$0.5(80 + x) = 16 + x$$

$$40 + 0.5x = 16 + x$$

$$24 = 0.5$$

$$x = 48$$

48 red marbles

24. $\frac{25}{75} = \frac{1}{3}$; the correct choice is A. 25. The correct choice is F. 26. $3(3 - 2) = 3 \times 1 = 3$ 27. $7 \times 3 \div 2 = 21 \div 2 = 10.5$ 28. $1 + 4 \times 1.5 = 1 + 6 = 7$

ACTIVITY LAB

page 498

1a. = RANDBETWEEN(1,3) 1b. For 30 cells, one possible formula is = COUNTIF(A1:E6,1) 1c. $\frac{1}{3} \times 30 = 10$; about 10 ones 1d. Check students' work.

2a–b. Check students' work.

CHECKPOINT QUIZ 2

page 499

$$1. P(2) = \frac{\text{number of times 2 is rolled}}{\text{total number of rolls}} = \frac{4}{20} \text{ or } \frac{1}{5} \quad 2. P(4) =$$

$$\frac{\text{number of times 4 is rolled}}{\text{total number of rolls}} = \frac{3}{20} \quad 3. P(\text{even number}) =$$

$$\frac{\text{number of times an even number is rolled}}{\text{total number of rolls}} = \frac{4 + 3 + 5}{20} = \frac{12}{20} \text{ or } \frac{3}{5}$$

$$4. P(\text{odd number}) = \frac{\text{number of times an odd number is rolled}}{\text{total number of rolls}} =$$

$$\frac{20 - 12}{20} = \frac{8}{20} \text{ or } \frac{2}{5} \quad 5. P(\text{left}) = \frac{8}{20} = \frac{2}{5} \quad 6. \frac{40}{50} = \frac{m}{35,000};$$

$$50m = 40 \times 35,000; m = \frac{40 \times 35,000}{50} = 40 \times 700 =$$

$$28,000; 28,000 \text{ men } 7. \frac{45}{60} = \frac{c}{420}; 60c = 45 \times 420; c =$$

$$\frac{45 \times 420}{60} = 18,900 \div 60 = 315; 315 \text{ customers } 8. \frac{3}{80} =$$

$$\frac{h}{20,000}; 80h = 3 \times 20,000; h = \frac{3 \times 20,000}{80} = 60,000 \div 80 =$$

$$750; 750 \text{ hats}$$

10-5 Independent Events

pages 500–503

Check Skills You'll Need For complete solutions see *Daily Skills Check and Lesson Quiz Transparencies* or *Presentation Pro CD-ROM*. 1. no 2. $\frac{9}{16}$ 3. $\frac{2}{21}$ 4. $\frac{2}{9}$ 5. $\frac{1}{4}$

Quick Check 1. Not independent; after selecting the first card, there is one card fewer from which to choose. The first selection affects the second selection. 2. The probability of drawing a yellow cube is $\frac{2}{3+2}$, or $\frac{2}{5}$, so the probability of drawing 2 yellow cubes after returning the first cube is $\frac{2}{5} \times \frac{2}{5} = \frac{4}{25}$. 3. The four events are independent, so the probability is $\frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} = \frac{1}{16}$.

Exercises 1. are 2. $\frac{1}{6} \times \frac{1}{2} = \frac{1}{12}$ 3. Check students' work.

4. Not independent; the first pick affects the second, because the number of dimes will be 1 fewer.

5. Independent; none of the rolls has an effect on another. 6. Not independent; once the teacher selects a student, there is one student fewer from which to choose. 7. Since the marble is replaced, the events are independent, so $P(\text{red, then red}) = \frac{3}{3+5+2} \times \frac{3}{3+5+2} = \frac{3}{10} \times \frac{3}{10} = \frac{9}{100}$. 8. Since the marble is replaced, the events are independent, so $P(\text{green, then green}) =$

$\frac{2}{3+5+2} \times \frac{2}{3+5+2} = \frac{2}{10} \times \frac{2}{10} = \frac{4}{100} = \frac{1}{25}$. 9. Since the marble is replaced, the events are independent, so $P(\text{blue, then blue}) = \frac{5}{3+5+2} \times \frac{5}{3+5+2} = \frac{5}{10} \times \frac{5}{10} = \frac{25}{100} = \frac{1}{4}$. 10. Since the marble is replaced, the events are independent, so $P(\text{red, then blue}) = \frac{3}{3+5+2} \times \frac{5}{3+5+2} =$

$\frac{3}{10} \times \frac{5}{10} = \frac{15}{100} = \frac{3}{20}$. 11. Since the marble is replaced, the events are independent, so $P(\text{blue, then red}) =$

$\frac{5}{3+5+2} \times \frac{3}{3+5+2} = \frac{5}{10} \times \frac{3}{10} = \frac{15}{100} = \frac{3}{20}$. 12. Since the marble is replaced, the events are independent, so

$P(\text{red, then green}) = \frac{3}{3+5+2} \times \frac{2}{3+5+2} = \frac{3}{10} \times \frac{2}{10} = \frac{6}{100} = \frac{3}{50}$. 13. The events are independent, so

$P(\text{even, then even, then odd}) = \frac{3}{6} \times \frac{3}{6} \times \frac{3}{6} = \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} = \frac{1}{8}$.

14. The events are independent, so $P(3, \text{ then } 4, \text{ then } 5) =$

$\frac{1}{6} \times \frac{1}{6} \times \frac{1}{6} = \frac{1}{216}$. 15. The numbers on a number cube that are less than 5 are 1, 2, 3, and 4, so there are 4 such numbers. The events are independent, so $P(\text{less than 5, then less than 5, then less than 5}) = \frac{4}{6} \times \frac{4}{6} \times \frac{4}{6} = \frac{64}{216} = \frac{8}{27}$.

16. Since the bills are replaced, the events are independent, so $P(\text{\$5 bill, then \$5 bill, then \$5 bill}) =$

$\frac{4}{6} \times \frac{4}{6} \times \frac{4}{6} = \frac{64}{216} = \frac{8}{27}$. 17. The chef has 1 favorable

outcome for each, out of 4 possible main courses and 3 possible desserts, so $P(\text{favorite main course, then favorite dessert}) = \frac{1}{4} \times \frac{1}{3} = \frac{1}{12}$. **18.** $P(H, \text{ then } U) = P(H) \times P(U) = \frac{1}{12} \times \frac{1}{12} = \frac{1}{144}$ **19.** $P(Y, \text{ then } S) = P(Y) \times P(S) = \frac{1}{12} \times \frac{3}{12} = \frac{1}{48}$ **20.** $P(A, \text{ then vowel}) = P(A) \times P(\text{vowel from SUCCESS}) = \frac{1}{12} \times \frac{3}{12} = \frac{1}{48}$ **21.** The events are independent, so $P(\text{girl, then boy}) = \frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$ **22.** There are 3 bells and one favorable outcome each of the three days, so the probability is $\frac{1}{3} \times \frac{1}{3} \times \frac{1}{3} = \frac{1}{27}$. **23.** Yes; the first spin has no effect on the second spin. **24.** Since the events are independent, $P(\text{yellow, then yellow}) = \frac{2}{5} \times \frac{2}{5} = \frac{4}{25}$. **25.** After 1 ripe apple is removed, 2 ripe apples and 2 rotten apples remain, so $P(\text{rotten after 1 ripe apple is eaten}) = \frac{2}{4}$, or $\frac{1}{2}$. **26.** $\frac{23}{24}$; the correct choice is C **27.** 65° ; the correct choice is F **28.** $V = \ell \times w \times h = 4 \times 3 \times 4 = 48$; 48 cm^3 **29.** $V = \ell \times w \times h = 8 \times 3 \times 2 = 48$; 48 cm^3

EXTENSION

page 504

1. $\frac{1}{20} \times \frac{1}{19} = \frac{1}{380}$ **2.** $\frac{1}{20} \times \frac{10}{19} = \frac{1}{2} \times \frac{1}{19} = \frac{1}{38}$ **3.** $\frac{10}{20} \times \frac{1}{19} = \frac{1}{2} \times \frac{1}{19} = \frac{1}{38}$ **4.** $\frac{4}{3+4+2} \times \frac{3}{3+3+2} = \frac{4}{9} \times \frac{3}{8} = \frac{1}{3} \times \frac{1}{2} = \frac{1}{6}$ **5.** $\frac{4}{3+4+2} \times \frac{2}{3+3+1} = \frac{4}{9} \times \frac{2}{8} = \frac{1}{9} \times \frac{2}{2} = \frac{1}{9}$ **6.** $\frac{3}{3+4+2} \times \frac{2}{2+4+2} = \frac{3}{9} \times \frac{2}{8} = \frac{1}{3} \times \frac{1}{4} = \frac{1}{12}$ **7.** $\frac{2}{3+4+2} \times \frac{1}{3+4+1} = \frac{2}{9} \times \frac{1}{8} = \frac{2}{72} = \frac{1}{36}$ **8.** Dependent; after selecting one marble, there is one fewer from which to choose. The first draw affects the second.

GUIDED PROBLEM SOLVING pages 505–506

1–2. Answers may vary. Samples are given. **1.** Order does not matter. Selecting ABC for the three seats is the same as selecting BAC. **2.** Yes; each person has the same chance to be selected. **3a.** the number of people who always wear their seat belt **3b.** the percent of people who always wear a seat belt and the number of people who answered the survey **3c.** Estimate; the survey is only given to a sample of the population, so the answer is not exact. **3.** $1012 \times 85\% = 1012 \times 0.85 = 860.2$; about 860 people **4.** $40 \times 80 = 3,200$; radius: 10; $\pi r^2 = 100 \times 3.14 = 314$; $314 \approx 320$; $320 \div 3,200 = 1 \div 10$ **5.** $6 \times 6 = 36$, $\frac{1}{2} \times 6 \times 5 = 3 \times 5 = 15$; $\frac{15}{36}$ or $\frac{5}{12}$ **6.** There are 3 possibilities but only one can be correct; $\frac{1}{3}$ **7.** $\frac{6}{6+8+4} \times \frac{5}{5+8+4} = \frac{6}{18} \times \frac{5}{17} = \frac{1}{3} \times \frac{5}{17} = \frac{5}{51}$

TEST-TAKING STRATEGIES

page 507

1. Two people played 11 games and two people played 15 games, so the correct choice is B. **2.** The most people played 12 games, so the correct choice is G.

CHAPTER REVIEW

pages 508–509

1. When tossing a coin, one possible event is “coin shows

heads.” The correct choice is C. **2.** Equally likely outcomes have the same chance of occurring. The correct choice is B. **3.** The counting principle can be used to find the number of outcomes in a compound event. The correct choice is A. **4.** To make predictions about a population, you can use a sample that represents that population. The correct choice is D. **5.** There are 4 ways to choose the first color, 3 ways to choose the second color, 2 ways to choose the third color, and 1 way to choose the last color. So the number of ways to order the colors is $4 \times 3 \times 2 \times 1 = 4 \times 6$, or 24 ways. **6.** There is 1 favorable outcome and 6 possible outcomes, so $P(5) = \frac{1}{6}$. **7.** The even numbers on a number cube are 2, 4, and 6. There are 3 favorable outcomes and 6 possible outcomes, so $P(\text{even}) = \frac{3}{6}$, or $\frac{1}{2}$. **8.** There are 2 favorable outcomes and 6 possible outcomes, so $P(4 \text{ or } 6) = \frac{2}{6}$, or $\frac{1}{3}$. **9.** If Noel wins 20 out of 30 games, then Kayla wins $30 - 20$, or 10 times, out of 30 games; $P(\text{Kayla wins}) = \frac{\text{number of desired outcomes}}{\text{number of trials}} = \frac{10}{30} = \frac{1}{3}$. Noel wins 20 out of 30 games, so $P(\text{Noel wins}) = \frac{\text{number of desired outcomes}}{\text{number of trials}} = \frac{20}{30} = \frac{2}{3}$. Noel: $\frac{2}{3}$; Kayla: $\frac{1}{3}$ **10.** $\frac{15}{60} = \frac{1}{4}$ **11.** $\frac{20}{60} = \frac{1}{3}$ **12.** $\frac{15 + 20}{60} = \frac{35}{60} = \frac{7}{12}$ **13.** $\frac{22}{300} = \frac{c}{30,000}$; $300c = 22 \times 30,000$; $c = \frac{22 \times 30,000}{300} = 22 \times 100 = 2,200$; 2,200 defective computers **14.** Check students’ work. **15.** Independent; the first roll does not affect the fourth roll. **16.** Not independent; after drawing the first cube, there is one cube fewer in the bag. **17.** The number of favorable outcomes is 3 and the number of possible outcomes is $2 + 4 + 3$, or 9, so $P(\text{green, then green}) = P(\text{green}) \times P(\text{green}) = \frac{3}{9} \times \frac{3}{9} = \frac{9}{81} = \frac{1}{9}$. **18.** The number of favorable outcomes for green is 3 and for red is 2, and the number of possible outcomes is $2 + 4 + 3$, or 9, so $P(\text{green, then red}) = P(\text{green}) \times P(\text{red}) = \frac{3}{9} \times \frac{2}{9} = \frac{6}{81} = \frac{2}{27}$. **19.** The number of favorable outcomes for red is 2 and for blue is 4, and the number of possible outcomes is $2 + 4 + 3$, or 9, so $P(\text{red, then blue}) = P(\text{red}) \times P(\text{blue}) = \frac{2}{9} \times \frac{4}{9} = \frac{8}{81}$.

CHAPTER TEST

page 510

1.

2. $P(\text{yellow, then red, then yellow}) = \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} = \frac{1}{8}$ **3.** $10\% = 10 \text{ per } 100 = 10 \div 100 = 0.1 = \frac{1}{10}$; $\frac{1}{10}$, 0.1 **4a.** The even numbers are 2, 4, 6, 8, 10, and 12. There are 6 even numbers and 12 possible outcomes, so $P(\text{even}) = \frac{6}{12}$, or $\frac{1}{2}$. **4b.** The prime numbers are 2, 3, 5, 7, and 11.

There are 5 prime numbers and 12 possible outcomes, so $P(\text{prime}) = \frac{5}{12}$. **4c.** There are 2 favorable outcomes and 12 possible outcomes, so $P(7 \text{ or } 8) = \frac{2}{12}$, or $\frac{1}{6}$. **4d.** The

number 13 does not appear on the figure. There are 0 favorable outcomes and 12 possible outcomes, so $P(13) = \frac{0}{12}$, or 0. **5a.** $P(\text{Pam wins}) = \frac{\text{number of games Pam wins}}{\text{total number of games}} = \frac{10}{18}$, or $\frac{5}{9}$. **5b.** $P(\text{Tony wins}) = \frac{\text{number of games Tony wins}}{\text{total number of games}} = \frac{8}{18}$, or $\frac{4}{9}$. **5c.** Answers may vary. Sample: No; Pam and Tony would have to win the same number of times.

6. $\frac{18}{32} = \frac{c}{132}$; $32c = 18 \times 132$; $\frac{32c}{32} = \frac{18 \times 132}{32} = \frac{18 \times 33}{8} = \frac{9 \times 33}{4} = \frac{297}{4} \approx 74$; about 74 cows **7.** Suppose there are 12 chips. $P(\text{blue}) = \frac{5}{12}$. Since there are 5 blue chips and $12 - 5$, or 7 green chips, $P(\text{green}) = \frac{7}{12}$. **8.** There are 4 blue and 3 green cubes, and the total number of cubes is $4 + 4 + 3$, or 11 cubes. So, $P(\text{blue, then green}) = P(\text{blue}) \times P(\text{green}) = \frac{4}{11} \times \frac{3}{11} = \frac{12}{121}$. **9.** There are 4 red cubes, and the total number of cubes is $4 + 4 + 3$, or 11 cubes. So $P(\text{red, then red}) = P(\text{red}) \times P(\text{red}) = \frac{4}{11} \times \frac{4}{11} = \frac{16}{121}$. **10.** There are 3 green cubes, and the total number of cubes is $4 + 4 + 3$, or 11 cubes. So $P(\text{green, then green}) = P(\text{green}) \times P(\text{green}) = \frac{3}{11} \times \frac{3}{11} = \frac{9}{121}$. **11.** There are 4 red and 4 blue cubes, and the total number of cubes is $4 + 4 + 3$, or 11 cubes. So $P(\text{red, then blue}) = P(\text{red}) \times P(\text{blue}) = \frac{4}{11} \times \frac{4}{11} = \frac{16}{121}$. **12a.** Independent; one roll does not affect the other. **12b.** Not independent; after you remove the first marble, there is one marble fewer in the bag. **13.** $P(2, \text{ then } 5) = P(2) \times P(5) = \frac{1}{6} \times \frac{1}{6} = \frac{1}{36}$. **14.** There are 2 favorable outcomes for B and 1 favorable outcome for R , and 11 possible outcomes. $P(B, \text{ then } R) = P(B) \times P(R) = \frac{2}{11} \times \frac{1}{11} = \frac{2}{121}$. **15.** There are 2 favorable outcomes for I and 4 vowels, and 11 possible outcomes. $P(I, \text{ then vowel}) = P(I) \times P(\text{vowel}) = \frac{2}{11} \times \frac{4}{11} = \frac{8}{121}$

TEST PREP

page 511

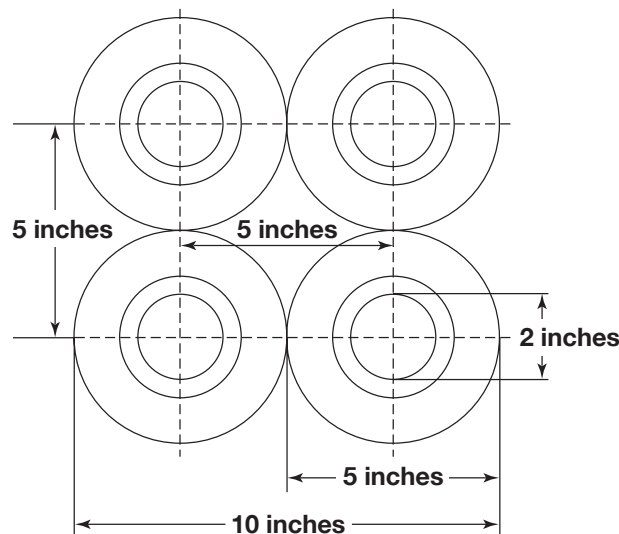
1. Since online sales were 24% for computer hardware, then 24% of this website's 200 orders should be for computer hardware. $200 \cdot 0.24 = 48$; the correct choice is D. **2.** Since 13% of sales were for clothing and footwear, the probability would be expressed as $\frac{13}{100}$; the correct choice is H. **3.** The total percentage for the items listed is $24\% + 13\% + 4\% + 3\% = 44\%$; $100\% - 44\% = 56\%$. The correct choice is A. **4.** Since 4 out of 20 orders are for clothing and footwear, the probability is expressed $\frac{4}{20}$, or $\frac{1}{5}$; the correct choice is H. **5.** In 2000, in-line skating participation rose to 30%, so the probability would be expressed as 0.30; the correct choice is C. **6.** The fact that snowboarding participation rose by 8% is given, but it does not provide the percentage that it began at in 1993, so the probability cannot be found; the correct choice is J. **7.** In 1993, 58% of youths participated in basketball. 58% of 300 is

$0.58 \cdot 300$, or 174; the correct choice is A. **8.** Baseball: $23\% - 12\% = 11\%$; Basketball: $58\% - 46\% = 12\%$. Both in-line skating and snowboarding experienced increased participation, not decreases. Therefore, basketball had the greatest decrease; the correct choice is G.

DK PROBLEM SOLVING APPLICATION

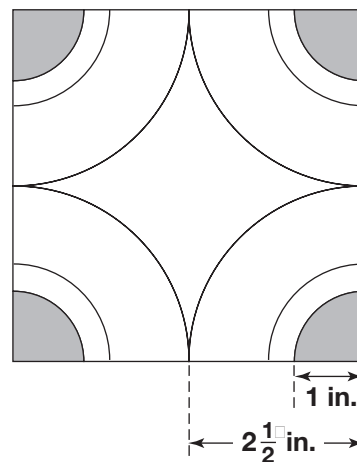
pages 512–513

1. Diagrams may vary. Sample:



2. $A = s \times s = 5 \times 5 = 25$; 25 in.²

3a. Diagrams may vary. Sample:



3b. A quarter of a circle fills each corner of the square. Four quarters would meet at each corner, so they would form circles. **3c.** Since the four quarter circles are equivalent to one circle, the area is $\pi r^2 \approx 3.14 \times 1 \times 1 = 3.14$, or about 3.14 in.². **4a.** $P(\text{winning}) = \frac{\text{area of circle}}{\text{area of square}} \approx \frac{3.14}{25} = \frac{314}{2500} = 0.1256$, or about 12.56%. **4b.** $100 \times 0.1256 = 12.56$, or about 13 times. **4c.** 50 people pay \$50 to play once each. Expected wins $\approx 0.1256(50) \approx 6$; $6(1.75) = 10.50$; $50 - 10.50 = 39.50$; they can expect to raise \$39.50.

CHECK YOUR READINESS

page 514

1. $a + 13 = 92$
 $a + 13 - 13 = 92 - 13$
 $a = 79$
2. $b + 12 = 43$
 $b + 12 - 12 = 43 - 12$
 $b = 31$
3. $c - 31 = 8$
 $c - 31 + 31 = 8 + 31$
 $c = 39$
4. $d - 23 = 23$
 $d - 23 + 23 = 23 + 23$
 $d = 46$
5. $7g = 4.2$
 $7g \div 7 = 4.2 \div 7$
 $g = 0.6$
6. $h \div 6 = 11$
 $h \div 6 \times 6 = 11 \times 6$
 $h = 66$
7. $8j = 328$
 $8j \div 8 = 328 \div 8$
 $j = 41$
8. $k \div 9 = 8$
 $k \div 9 \times 9 = 8 \times 9$
 $k = 72$
9. $16m = 240$
 $16m \div 16 = 240 \div 16$
 $m = 15$
10. $n \div 14 = 18$
 $n \div 14 \times 14 = 18 \times 14$
 $n = 252$
11. $<$ 12. $>$ 13. $=$ 14. $\frac{1}{8} = \frac{3}{24}, \frac{1}{3} = \frac{8}{24}, \frac{1}{12} = \frac{2}{24}, \frac{1}{12} = \frac{1}{12}, \frac{1}{8} = \frac{1}{8}$
15. $\frac{4}{9} = \frac{16}{36}, \frac{5}{6} = \frac{30}{36}, \frac{7}{12} = \frac{21}{36}, \frac{4}{9} = \frac{21}{45}, \frac{7}{12} = \frac{5}{6}, \frac{1}{4} = \frac{7}{28}, \frac{6}{7} = \frac{24}{28}, \frac{1}{2} = \frac{14}{28}, \frac{1}{4} = \frac{1}{4}, \frac{1}{2} = \frac{1}{2}, \frac{6}{7} = \frac{6}{7}$

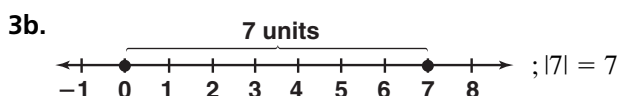
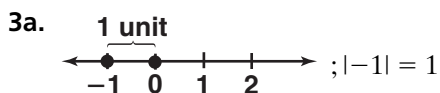
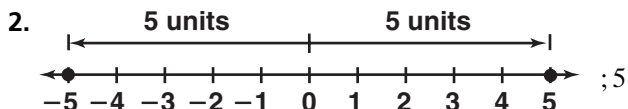
11-1 Exploring Integers

pages 516-519

Check Skills You'll Need For complete solutions see *Daily Skills Check and Lesson Quiz Transparencies* or *Presentation Pro CD-ROM*. 1. The Identity Property of Addition states that the sum of any number and 0 is that number. The Identity Property of Multiplication states that the product of any number and 1 is that number.

2. 9 3. 10 4. 0

Quick Check 1. $0 - 8 = -8$



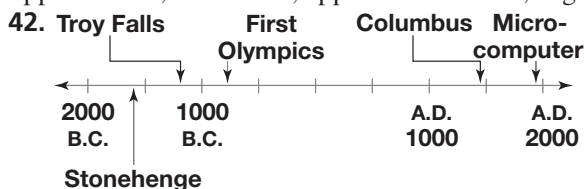
Exercises 1. Answers may vary. Sample: Some integers are $-1, 0, 1, 2$, and 3 ; $-5.7, 0.3, 2.92$, and 10.5 are not integers. 2. Answers may vary. Sample: Temperature, golf score 3. *M* 4. *Q* 5. *P* 6. *N* 7. Earnings are positive income; 100. 8. A gain is positive; 800. 9. Below zero indicates negative degrees; -12 . 10. Above zero

indicates positive degrees; 4. 11. A debt is money you owe, which is paid out of money you have; -25 . 12. A loss is negative; -5 . 13. The integer is negative, so its opposite is positive; 10. 14. The integer is negative, so its opposite is positive; 21. 15. The integer is positive, so its opposite is negative; -14 . 16. The integer 0 is neither negative nor positive, so it has no opposite; 0. 17. The integer is positive, so its opposite is negative; -13 . 18. The integer is negative, so its opposite is positive; 8. 19. The integer is positive, so its opposite is negative; -150 . 20. The integer is negative, so its opposite is positive; 1. 21. 38 is 38 units from 0, so its absolute value is 38. 22. 2 is 2 units from 0, so its absolute value is 2. 23. -9 is 9 units from 0, so its absolute value is 9. 24. -97 is 97 units from 0, so its absolute value is 97. 25. -4 is 4 units from 0, so its absolute value is 4. 26. 17 is 17 units from 0, so its absolute value is 17. 27. -65 is 65 units from 0, so its absolute value is 65. 28. 0 is 0 units from 0, so its absolute value is 0. 29. $72 - 55 = 17$



9th floor

31. Since $|-25| > |-17|$, 25 ft is farther from the surface than 17 ft. The person who dives farther below the surface is Janet. 32. Answers may vary. Sample: No; the absolute value of a number gives its distance from 0 on a number line, and distances are never negative. 33. -6 34. 2 35. 5 36. -3 37. The two integers that are 3 units from 0 are -3 and 3 . 38. The two integers that are 22 units from 0 are -22 and 22 . 39. The two integers that are 101 units from 0 are -101 and 101 . 40. The two integers that are 2,004 units from 0 are $-2,004$ and $2,004$. 41. The absolute value of integer n equals the opposite of n , $|n| = -n$, the opposite of n is $-n$; negative



43. Answers may vary. Sample: Place 3 marks between 200 and 300 to divide the segment into 4 equal-sized segments. The mark closest to 200 is the mark for 225. 44. Below the surface of the ocean indicates a negative number, so the integer -50 represents the starting depth; the correct choice is A. 45. There are $4 + 3 + 5 = 12$ possible outcomes; total number of not red marbles is $3 + 5 = 8$; $P(\text{not red}) = \frac{8}{12} = \frac{2}{3}$; the correct choice is J. 46. The longest bar represents the height of Angel Falls. So, Angel Falls has the greatest height. 47. The shortest

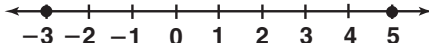
bar represents the height of Dudhsagar Falls. So, Dudhsagar Falls has the least height. **48.** The bars for Piemans Falls and for Yosemite Falls both stop at about 2,400 ft; Piemans Falls and Yosemite Falls.

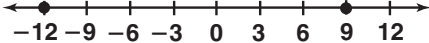
11-2 Comparing and Ordering Integers pages 520–522

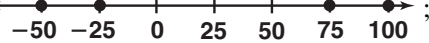
Check Skills You'll Need For complete solutions see *Daily Skills Check and Lesson Quiz Transparencies* or *Presentation Pro CD-ROM*. **1.** less than; greater than

2. < 3 ; $= 4$; $>$

Quick Check

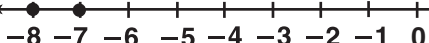
1a.  ; $5 > -3$; $>$

1b.  ; $-12 < 9$; $<$

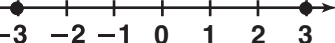
2.  ;
-50, -25, 75, 100

Exercises 1. Since $-5 < -3$, the correct choice is C.

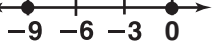
2. The order on the number line from left to right (from least to greatest) is -6, -2, 0, 4. **3.** Answers may vary. Sample: On a number line, numbers increase from left to right. Since negative numbers are less than 0, they are on the left. Positive numbers are greater than 0 and on the right, so $a < b$.

4. 

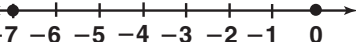
Since -7 is to the right of -8 on the number line, $-7 > -8$; $>$.

5. 


Since -3 is to the left of 3 on the number line, $-3 < 3$; $<$.

6. 

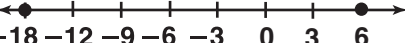
Since 0 is to the right of -9 on the number line, $0 > -9$; $>$.

7. 

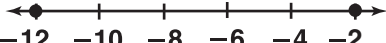
Since -7 is to the left of 0 on the number line, $-7 < 0$; $<$.

8. 

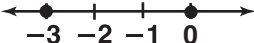
Since -5 is to the left of 0 on the number line, $-5 < 0$; $<$.

9. 

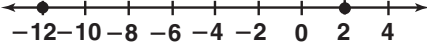
Since 6 is to the right of -18 on the number line, $6 > -18$; $>$.

10. 

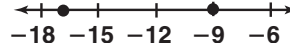
Since -12 is to the left of -2 on the number line, $-12 < -2$; $<$.

11. 

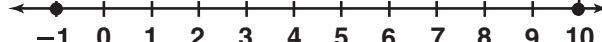
Since 0 is to the right of -3 on the number line, $0 > -3$; $>$.

12. 

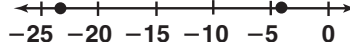
Since 2 is to the right of -12 on the number line, $2 > -12$; $>$.

13. 

Since -9 is to the right of -17 on the number line, $-9 > -17$; $>$.

14. 

Since -1 is to the left of 10 on the number line, $-1 < 10$; $<$.

15. 

Since -23 is to the left of -4 on the number line, $-23 < -4$; $<$.

16. The order on the number line from left to right (from least to greatest) is -15, -12, -9, -4.

17. The order on the number line from left to right (from least to greatest) is -5, -2, 0, 2, 5.

18. The order on the number line from left to right (from least to greatest) is -60, -50, -30, 30, 40.

19. The order on the number line from left to right (from least to greatest) is -33, -28, -16, -13.

20. The order from left to right (from least to greatest) that the integers would be on a number line is -3, -1, +2, +4. **21.** The order from left to right (from least to greatest) that the integers would be on a number line is -62, -54, -34, -22, 85, 86, 90, 96 so the order is -62°F,

-54°F, -34°F, -22°F, 85°F, 86°F, 90°F, 96°F. **22.** -1 is only one unit away from zero on the number line. The rest of the negative numbers are more than one unit away; -1. **23.** -4, -3, -2, -1, 0, 1, 2, 3, 4; there are 9 integers between -5 and 5. **24.** The order from left to right that the integers would be on a number line is -31,

-25, 37, 45, so the order of the temperatures from least to greatest is -31°C, -25°C, 37°C, 45°C. **25a.** If $x > y$; then x is to the right of y on the number line. Then $-x$ and $-y$ must be in the opposite order on the number line, so that $-x$ is to the left of $-y$ and $-x < -y$; examples: $10 > 5$, $-10 < -5$; $7 > 3$, $-7 < -3$. If $x > y$, then the opposite of x is less than the opposite of y ; $<$.

25b. If $x < y$; then x is to the left of y on the number line. Then $-x$ and $-y$ must be in the opposite order on the number line, so that $-x$ is to the right of $-y$ and $-x > -y$; examples: $4 < 5$, $-4 > -5$; $-3 < -1$, $3 > 1$.

If $x < y$, then the opposite of x is greater than the opposite of y ; $>$. **26.** The order on the number line from left to right is -4, -3.5, $-2\frac{3}{4}$, -2, -1.3, $-\frac{1}{2}$, 0, $\frac{1}{4}$, $2\frac{1}{2}$, 3.

27. Since -387 is to the left of 253 on the number line, $-387 < 253$. So the highest moon temperature is 253. The correct choice is C. **28.** $\frac{ft}{3} = yd$; $\frac{3}{3} = 1$; $\frac{6}{3} = 2$; $\frac{n}{3}$; the correct choice is J.

29. $A = b \times h$
 $= 5 \times 3$

$= 15$, or 15 yd²

30. $A = b \times h$
 $= 9 \times 6$

$= 54$, or 54 km²

31. $A = b \times h$

$= 6.5 \times 4$

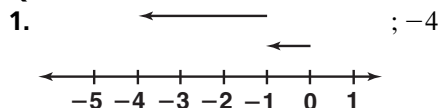
$= 26$, or 26 m²

1. $13 + (-8)$; 13 positive chips plus 8 negative chips; remove the pairs of positive and negative chips, leaving 5 positive chips: 5
 2. $-4 + 3$; 4 negative chips plus 3 positive chips; remove the pairs of positive and negative chips, leaving 1 negative chip: -1
 3. $-7 + (-2)$; 7 negative chips plus 2 negative chips, leaving 9 negative chips: -9
 4. $8 + (-11)$; 8 positive chips plus 11 negative chips; remove pairs of positive and negative chips, leaving 3 negative chips: -3
 5. Answers may vary. Samples given.
 5a. To add two positive integers, add their absolute values. The result is the desired sum.
 5b. To add two negative integers, add their absolute values. The opposite of the result is the desired sum.
 5c. To add two integers with different signs, find the difference of the absolute values. Use the sign of the number with the greater value.

11-3 Adding Integers pages 524–527

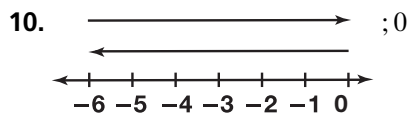
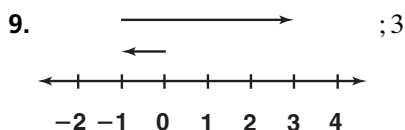
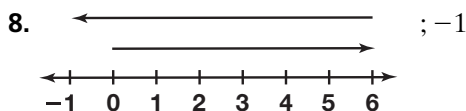
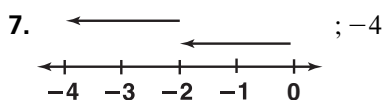
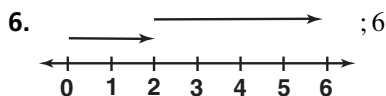
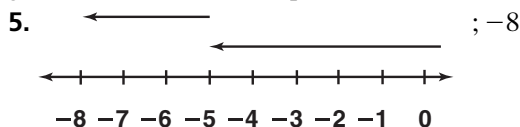
Check Skills You'll Need For complete solutions see *Daily Skills Check and Lesson Quiz Transparencies* or *Presentation Pro CD-ROM*. 1. -6, 6 2. 15 3. 12 4. 8 5. 8

Quick Check



2. $|-4| = 4$; $|1| = 1$; $4 - 1 = 3$; $-4 + 1 = -3$
 3. $-9 + (-12) = -21$ 4. $|-11| = 11$; $|4| = 4$; $11 - 4 = 7$; $-11 + 4 = -7$

Exercises 1. always 2. never 3. sometimes 4. Answers may vary. Sample: If the sign of the integer with the greater absolute value is positive, the sum will be positive.



11. $|-8| = 8$; $|6| = 6$; $8 - 6 = 2$; \$2
 12. $-2 + (-7) = -9$
 13. $|-6| = 6$; $|3| = 3$; $6 - 3 = 3$; $-6 + 3 = -3$ 14. $|-9| = 9$; $|9| = 9$; $9 - 9 = 0$; $-9 + 9 = 0$ 15. $-31 + (-16) = -47$
 16. $-12 + (-9) = -21$ 17. $13 + 29 = 42$ 18. $91 + 28 = 119$ 19. $-47 + (-41) = -88$ 20. $-51 + (-9) = -60$ 21. $|23| = 23$; $|-15| = 15$; $23 - 15 = 8$; $23 + (-15) = 8$ 22. $|-8| = 8$; $|72| = 72$; $72 - 8 = 64$; $-8 + 72 = 64$
 23. $|18| = 18$; $|-39| = 39$; $39 - 18 = 21$; $18 + (-39) = -21$ 24. $-64 + 19$; $|-64| = 64$; $|19| = 19$; $64 - 19 = 45$; $-64 + 19 = -45$ 25. $-4 + 49$; $|-4| = 4$; $|49| = 49$; $49 - 4 = 45$; $-4 + 49 = 45$; 45°F 26. $8 + (-1) + (-6) + 5 = 13 + (-7) = 6$ 27. $-2 + 6 + (-3) + (-4) = 6 + (-9) = -3$ 28. Answers may vary. Sample: Adding a negative number is the same as subtracting the absolute value of that negative number. 29. Answers may vary. Samples are given. 29a. You deposit \$30 and withdraw \$40. What is your balance? 29b. The balance in your account is \$89. If you withdraw \$45, what is the new balance? 29c. You deposit \$60 and write a check for \$60. What is your balance? 30. $15 + 5 + (-3) + (-4) = 13$; 2 floors below the mail center 31. $-86 + 16 + (-58) = -144 + 16 = -128$ 32. If 0 is in the center square, the other two squares in the row, column, or diagonal are opposites. Placement of numbers may vary. Sample:

3	-4	1
-2	0	2
-1	4	-3

33. $\frac{1}{2} = 0.5$; $\frac{1}{4} = 0.25$; $\frac{2}{5} = 0.4$; $\frac{4}{7} \approx 0.57$; $\frac{1}{2} < \frac{4}{7}$; the correct choice is C. 34. $5 \text{ km} \times 1,000 = 5,000 \text{ m}$; the correct choice is J. 35. $9 = 3 \times 3$, $12 = 2 \times 2 \times 3$, $18 = 3 \times 3 \times 2$, LCM = $2 \times 2 \times 3 \times 3 = 36$; the correct choice is B. 36. One endpoint of a radius is on the circle and the other is on the circle's center: \overline{JC} , \overline{JD} , \overline{JE} , \overline{JF} , \overline{JG} , \overline{JH} . 37. A diameter passes through the center of a circle and has endpoints on the circle: \overline{CF} , \overline{DG} , \overline{EH} . 38. The endpoints of a chord are on the circle: \overline{CD} , \overline{DE} , \overline{EF} , \overline{FG} , \overline{GH} , \overline{HC} , \overline{CF} , \overline{DG} , \overline{EH} . 39. The center of a circle is the intersection of any two diameters: J.

CHECKPOINT QUIZ 1

1. -13 is 13 units from 0 on the number line, so its absolute value is 13. 2. 64 is 64 units from 0 on the number line, so its absolute value is 64. 3. $-8 + 5 = -3$ 4. $-10 + (-2) = -12$ 5. Writing a check is spending money that you have, so your balance decreases: -32. 6. The order on the number line from left to right (from least to greatest) is -17, -15, -14, 16, 18. 7. $-7 + 19$; $|-7| = 7$; $|19| = 19$; $19 - 7 = 12$; $-7 + 19 = 12$; 12°F

1. $5 - 8$; 5 positive chips = 5 positive chips plus 3 positive chips with 3 negative chips = 8 positive chips and 3 negative chips; remove 8 positive chips, leaving 3 negative chips: -3 . 2. $-3 - 7$; 3 negative chips = 3 negative chips plus 7 negative chips with 7 positive chips = 10 negative chips and 7 positive chips; remove 7 positive chips: -10 . 3. $5 - (-9)$; 5 positive chips = 5 positive chips plus 9 positive chips with 9 negative chips = 14 positive chips and 9 negative chips; remove 9 negative chips: 14. 4. $-8 - (-13)$; 8 negative chips = 8 negative chips plus 5 negative chips with 5 positive chips = 13 negative chips and 5 positive chips; remove 13 negative chips: 5.

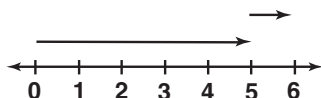
11-4 Subtracting Integers

pages 530–533

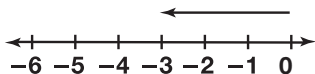
Check Skills You'll Need For complete solutions see *Daily Skills Check and Lesson Quiz Transparencies* or *Presentation Pro CD-ROM*. 1. -6 2. 10 3. -5 4. -11 5. 14

Quick Check

1a. $5 - (-1) = 6$



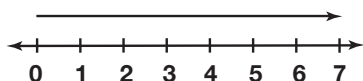
1b. $-3 - 3 = -6$



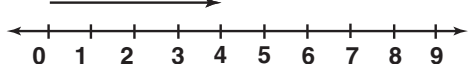
2. $-6 - (-2) = -6 + 2 = -4$ 3. $-1,250 - (-1,872) = -1,250 + 1,872 = 622$; 622 ft; closer

Exercises 1. $-3 - (-2)$ 2. Answers may vary. Sample: When you subtract 7 from 2, you get -5 , whereas $7 - 2$ gives you $+5$. 3. $-10 - 3 = -10 + (-3)$ 4. $2 - (-8) = 2 + 8$ 5. $-1 - (-3) = -1 + 3$

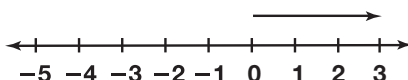
6. 3



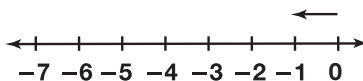
7. 9



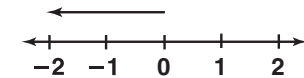
8. -5



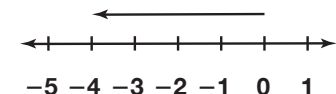
9. -7



10. 1

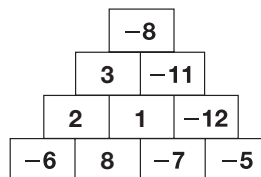


11. -3



12. $-1 - (-1) = -1 + 1 = 0$ 13. $2 - 7 = 2 + (-7) = -5$ 14. $-4 - 3 = -4 + (-3) = -7$ 15. $-9 - 7 = -9 + (-7) = -16$ 16. $81 - 106 = 81 + (-106) = -25$ 17. $12 - (-17) = 12 + 17 = 29$ 18. $43 - (-21) = 43 + 21 = 64$ 19. $-24 - (-12) = -24 + 12 = -12$ 20. $-25 - (-57) = -25 + 57 = 32$ 21. $-1,965 - (-2,327) = -1,965 + 2,327 = 362$; 362 ft 22. $801 - (-279) = 801 + 279 = 1,080$; 1,080°F 23. $5,600 - 6,850 = -1,250$; $-1,250$ ft 24. $17 - 18 - (-81) = 17 + (-18) + 81 = 80$ 25. $-18 - 13 - 12 = -18 + (-13) + (-12) = -43$ 26. $23 - (-18) - (-54) = 23 + 18 + 54 = 95$ 27. $16 - 28 - (-38) = 16 + (-28) + 38 = 26$ 28. Cairo: $1:30 \text{ P.M.} + 2:00 = 3:30 \text{ P.M.}$; Honolulu: $1:30 \text{ P.M.} + (-10:00) = (1:30 + 12:00) \text{ A.M.} + (-10:00) = 13:30 \text{ A.M.} + (-10:00) = 3:30 \text{ A.M.}$; Los Angeles: $1:30 \text{ P.M.} + (-8:00) = (1:30 + 12:00) \text{ A.M.} + (-8:00) = 13:30 \text{ A.M.} + (-8:00) = 5:30 \text{ A.M.}$; Paris: $1:30 \text{ P.M.} + 1:00 = 2:30 \text{ P.M.}$; Sydney: $1:30 \text{ P.M.} + 10:00 = 11:30 \text{ P.M.}$; Tokyo: $1:30 \text{ P.M.} + 9:00 = 10:30 \text{ P.M.}$; Washington, D.C.: $1:30 \text{ P.M.} + (-5:00) = (1:30 + 12:00) \text{ A.M.} + (-5:00) = 13:30 + (-5:00) = 8:30 \text{ A.M.}$ 29. Answers may vary. Sample: $3 - 7 = -4$, $7 - 3 = 4$, $-4 \neq 4$

30.



31. -6 ; the correct choice is B. 32. List the multiples of 12 and the multiples of 20. Then find the least common multiple of 12 and 20. Finally, divide the least common multiple by 12. The correct choice is H. 33–36. Answers may vary. Samples are given. 33. \overrightarrow{AB} , \overrightarrow{DC} , \overrightarrow{DE} 34. \overrightarrow{AB} , \overrightarrow{AD} , \overrightarrow{DC} 35. A, D, E 36. \overrightarrow{AB} , \overrightarrow{AD} , \overrightarrow{CE}

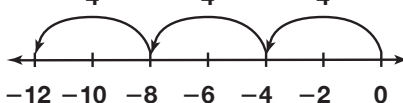
11-5 Multiplying Integers

pages 534–537

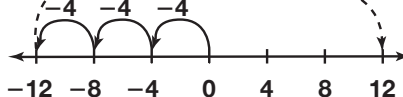
Check Skills You'll Need For complete solutions see *Daily Skills Check and Lesson Quiz Transparencies* or *Presentation Pro CD-ROM*. 1. negative 2. -8 3. 64 4. -28 5. -90

Quick Check

1a. -12



1b. 12



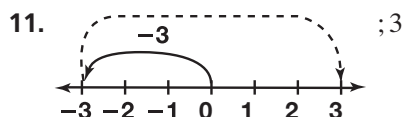
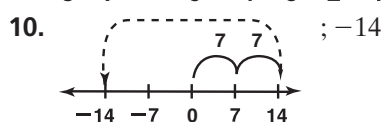
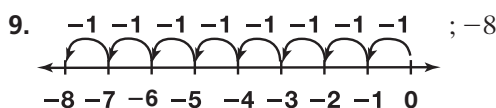
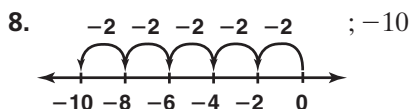
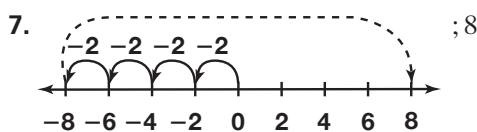
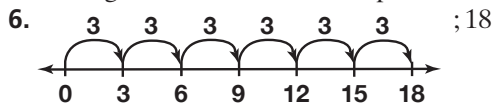
2a. The signs are the same, so the product is positive: $-9 \times (-3) = 27$. 2b. The signs are different, so the product is negative: $5 \times (-3) = -15$. 3. $-5 \times 4 = -20$

Exercises 1. Start at 0. Make 5 groups of -2 on the number line.

2. Multiplication of Integers

positive	×	positive	=	positive
negative	×	negative	=	positive
positive	×	negative	=	negative
negative	×	positive	=	negative

3. The signs are different so the product will be negative.
4. The signs are the same so the product will be positive.
5. The signs are different so the product will be negative.



- 12.** The signs are different, so the product is negative: $-7 \times 5 = -35$. **13.** The signs are different, so the product is negative: $11 \times (-2) = -22$. **14.** The signs are the same, so the product is positive: $7 \times 12 = 84$. **15.** The signs are the same, so the product is positive: $-6 \times (-9) = 54$. **16.** The signs are different, so the product is negative: $-4 \times 9 = -36$. **17.** The signs are different, so the product is negative: $15 \times (-3) = -45$. **18.** The signs are the same, so the product is positive: $-25 \times (-5) = 125$. **19.** The signs are different, so the product is negative: $-16 \times 4 = -64$. **20.** The signs are the same, so the product is positive: $-1 \times (-124) = 124$. **21.** $4 \times (-10) = -40$. **22.** $4 \times (-3) = -12$; -12° . **23.** Player A: $9 \times 25 + 21 \times (-15) = 225 + (-315) = -90$; Player B: $5 \times 25 + 8 \times (-15) = 125 + (-120) = 5$; Player B wins. **24.** $-3 \times (-4) \times (-5) = -3 \times 20 = -60$. **25.** $12 \times (-12) \times (-1) = 12 \times 12 = 144$. **26.** $-6 \times 2 \times (-2) \times 8 = -12 \times (-16) = 192$. **27.** $7 \times 3 \times (-3) \times 2 = 21 \times (-6) = -126$. **28.** when at least 1 integer is zero; when both integers are 0 or when the two integers are opposites. **29.** $4 \times (-235) = -940$. **30a.** Determine the sign of 3 negative integers: (negative integer) \times (negative integer) \times (negative integer) = [(negative integer) \times (negative integer)] \times (negative integer) = [positive integer] \times (negative integer) = (negative integer). **30b.** Determine the sign

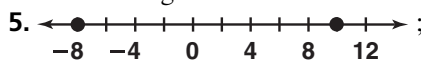
of 4 negative integers: $(\text{negative integer}) \times (\text{negative integer}) \times (\text{negative integer}) \times (\text{negative integer}) = [(\text{negative integer}) \times (\text{negative integer})] \times [(\text{negative integer}) \times (\text{negative integer})] = [\text{positive integer}] \times [\text{positive integer}] = (\text{positive integer})$ **30c.** Determine the sign of 5 negative integers: $(\text{negative integer}) \times (\text{negative integer}) \times (\text{negative integer}) \times (\text{negative integer}) \times (\text{negative integer}) = [(\text{negative integer}) \times (\text{negative integer})] \times [(\text{negative integer}) \times (\text{negative integer})] \times (\text{negative integer}) = [\text{positive integer}] \times [\text{positive integer}] \times (\text{negative integer}) = [\text{positive integer}] \times (\text{negative integer}) = (\text{negative integer})$ **30d.** Negative; an odd number of negative factors results in a negative product. **31.** $1 - 2 + 3 - 4 + 5 - 6 = -3$; try, check, and revise: The result should be $8 \times (-3)$, or -24 ; $1 - 2 + 3 - 4 \times 5 - 6 = -24$ **32.** The graph shows that Rhonda ran the first half of the race in over 2 hours; the correct choice is C. **33.** The possible outcomes: Reed could choose 2 red, 2 yellow, or one of each. The correct choice is H.

$$\begin{aligned} \mathbf{34. S.A.} &= 2(5 \times 3) + 2(5 \times 4) + 2(3 \times 4) \\ &= 30 + 40 + 24 \\ &= 94 \text{ m}^2 \end{aligned}$$

$$\begin{aligned} \text{35. S.A.} &= 2(9 \times 6) + 2(9 \times 7) + 2(6 \times 7) \\ &= 108 + 126 + 84 \\ &= 318 \text{ m}^2 \end{aligned}$$

GUIDED PROBLEM SOLVING *pages 538–539*

- 1–3.** Answers may vary. Samples are given.
1. Change in time is equivalent to final time minus initial time. **2.** 60 s was subtracted from the total seconds and changed to 1 min, which was added to the total minutes.
3. No; you cannot have a negative total time. **4.** Bachelor's degree from high school diploma: $\$51,206 - \$27,915 = \$23,291$; Advanced degree from bachelor's degree $\$74,602 - \$51,206 = \$23,396$; Answers may vary.
 Sample: There is a larger increase in pay from a bachelor's degree to an advanced degree.



$-8 + t = 10; t = 18$ strokes **6.** $208 + 8 = 216$

- 7.** $900,000 \div 8 = 112,500$; \$112,500 per stroke **8.** To represent 10:36 P.M. as a positive number, express the time in terms of hours past noon: $12:00 + 10:36 = 22:36$. To represent 10:36 P.M. as a negative number, express the time in terms of hours before midnight, using the positive number for subtraction: $22:36 - 24:00 = -1:24$.

11-6 Dividing Integers *pages 540–542*

Check Skills You'll Need For complete solutions see *Daily Skills Check and Lesson Quiz Transparencies* or *Presentation Pro CD-ROM*. 1. positive 2. 16 3. 1,024 4. 196 5. 2,025

Quick Check 1a. The signs are different, so the quotient is negative: $-24 \div 6 = -4$. **1b.** The signs are the same, so the quotient is positive: $-36 \div (-2) = 18$.

1c. The signs are different, so the quotient is negative:

$48 \div (-12) = -4$. **2.** Let v = the average decrease in stock value. $-20 \div 5 = v$; $-4 = v$; $-\$4/\text{day}$

Exercises 1. Zarita; the quotient of 2 negative numbers is always positive. **2.** Explanations may vary. Sample: It will be less than zero because the quotient of a negative number and a positive number is always negative. **3.** $-6 \div 3 = -2^\circ$ per hour **4.** The signs are the same so the quotient will be positive. **5.** The signs are different so the quotient will be negative. **6.** The signs are different so the quotient will be negative. **7.** The signs are the same, so the quotient is positive: $-64 \div (-8) = 8$. **8.** The signs are the same, so the quotient is positive: $-25 \div (-5) = 5$. **9.** The signs are the same, so the quotient is positive: $-12 \div (-2) = 6$. **10.** The signs are different, so the quotient is negative: $-15 \div 3 = -5$. **11.** The signs are different, so the quotient is negative: $72 \div (-1) = -72$. **12.** The signs are different, so the quotient is negative: $-28 \div 4 = -7$. **13.** The signs are different, so the quotient is negative: $100 \div (-20) = -5$. **14.** The signs are different, so the quotient is negative: $-84 \div 7 = -12$. **15.** $72 \div 4 = 18$ stairs/min. **16.** $-21 \div 7 = -3/\text{day}$. **17.** $-160 \div 20 = -8$ ft/sec.

18.

-14,580			
-108		135	
12	-9	-15	
-4	-3	3	-5

19. $-30 \div 5 = -6$; $-\$6/\text{day}$.

20. Negative; the sum of five negative numbers is negative. The sum divided by 5 will also be negative.

21. $500 \div 4 = 125$; $600 \div 5 = 120$; Yes, fresh water evaporates at 125 mL/day. Salt water evaporates at 120 mL/day. **22.** No; $10 \div 20 = \frac{1}{2}$, but $20 \div 10 = 2$; $2 \neq \frac{1}{2}$.

23. Let y = the number of years Stacia grows her hair; $6 \times y = 18$; $6 \times y \div 6$; $y = 18 \div 6$; $y = 3$; $3 \times 12 = 36$; the correct choice is D. **24.** 60° ; the correct choice is G.

25. Find the complement: $90 - 50 = 40$; 40° . Find the supplement: $180 - 50 = 130$; 130° . **26.** Find the complement: $90 - 19 = 71$; 71° . Find the supplement: $180 - 19 = 161$; 161° . **27.** Find the complement: $90 - 67 = 23$; 23° . Find the supplement: $180 - 67 = 113$; 113° .

28. Find the complement: $90 - 81 = 9$; 9° . Find the supplement: $180 - 81 = 99$; 99° .

11-7 Solving Equations With Integers pages 543-545

Check Skills You'll Need For complete solutions see *Daily Skills Check and Lesson Quiz Transparencies or Presentation Pro CD-ROM*. **1.** addition and subtraction, multiplication and division **2.** 17 **3.** 25 **4.** 14 **5.** 64

Quick Check

1a. $c - 15 = -5$

$$c - 15 + 15 = -5 + 15$$

$$c = 10$$

1b. $k \div (-7) = -4$

$$k \div -7 \times (-7) = -4 \times (-7)$$

$$k = 28$$

1c. $-6z = 36$

$$-6z \div (-6) = 36 \div (-6)$$

$$z = -6$$

2. $10m = -200$

$$10m \div 10 = -200 \div 10$$

$$m = -20; \$20$$

Exercises 1. Check students' work. **2.** Same; the first and only step is to undo the multiplication by dividing both sides by the appropriate factor in order to isolate x .

3. $100 \div 25 = 4$; 4 min

4. $-3x = -6$

$$-3x \div (-3) = -6 \div (-3)$$

$$x = 2; \text{the correct choice is E.}$$

5. $x - 6 = -7$

$$x - 6 + 6 = -7 + 6$$

$$x = -1; \text{the correct choice is B.}$$

6. $-5x = -5$

$$-5x \div (-5) = -5 \div (-5)$$

$$x = 1; \text{the correct choice is D.}$$

7. $x \div 2 = 0$

$$x \div 2 \times 2 = 0 \times 2$$

$$x = 0; \text{the correct choice is C.}$$

8. $x + 3 = 1$

$$x + 3 - 3 = 1 - 3$$

$$x = -2; \text{the correct choice is A.}$$

9. $t + 12 = 9$

$$t + 12 - 12 = 9 - 12$$

$$t = -3$$

10. $v - 6 = -4$

$$v - 6 + 6 = -4 + 6$$

$$v = 2$$

11. $-3 + c = -8$

$$-3 + c + 3 = -8 + 3$$

$$c = -5$$

12. $w - 18 = -13$

$$w - 18 + 18 = -13 + 18$$

$$w = 5$$

13. $x - (-6) = 18$

$$x - (-6) - 6 = 18 - 6$$

$$x = 12$$

14. $x + 20 = -20$

$$x + 20 - 20 = -20 - 20$$

$$x = -40$$

15. $-6y = 42$

$$\frac{-6y}{-6} = \frac{42}{-6}$$

$$y = -7$$

16. $-4y = -64$

$$\frac{-4y}{-4} = \frac{-64}{-4}$$

$$y = 16$$

17. $7h = -84$

$$\frac{7h}{7} = \frac{-84}{7}$$

$$h = -12$$

$$18. \quad c \div (-8) = 3$$

$$c \div (-8) \times (-8) = 3 \times (-8)$$

$$c = -24$$

$$19. \quad z \div (-7) = -1$$

$$z \div (-7) \times (-7) = -1 \times (-7)$$

$$z = 7$$

$$20. \quad p \div 2 = -2$$

$$p \div 2 \times 2 = -2 \times 2$$

$$p = -4$$

$$21. \quad b - 4 = -3, b - 4 + 4 = -3 + 4 = 1; \$1$$

$$22. \quad \text{Let } p = \text{points lost.}$$

$$250 + p = -300$$

$$250 + p - 250 = -300 - 250$$

$$p = -550$$

$$23. \quad x \div 4 = -20$$

$$x \div 4 \times 4 = -20 \times 4$$

$$x = -80; \$80$$

24. Answers may vary. Sample: To solve both equations, -4 is added to -6.

$$25. \quad -4h = -20$$

$$\frac{-4h}{-4} = \frac{-20}{-4}$$

$$h = 5; 5 \text{ hours}$$

$$26. \quad 2x - 10 = -8$$

$$2x - 10 + 10 = -8 + 10$$

$$2x = 2$$

$$\frac{2x}{2} = \frac{2}{2}$$

$$x = 1$$

Check: $2(1) - 10 = 2 - 10 = -8$

27. $473.7 + 473.7 = 947.4$; 947.4 mi 28. There are 3 appetizers, 4 main courses, and 2 desserts so the number of choices is $3 \times 4 \times 2$, or 24.

$$29. \quad d - 25 = 39$$

$$d - 25 + 25 = 39 + 25$$

$$d = 64$$

$$30. \quad n - 13 = 74$$

$$n - 13 + 13 = 74 + 13$$

$$n = 87$$

ACTIVITY LAB

page 546

1-6. Answers may vary. Samples are given. 1a. False; the left side would be positive. 1b. True; adding an integer to an integer results in another integer. 1c. True; the left side would be negative. 2a. False; 11 is not a factor of 100. 2b. False; both given numbers are positive, so the unknown must be positive. 2c. True; $100 \div 10 = 10$, so dividing 100 by a larger number should result in a number smaller than 10. 3a. True; the given positive number must be multiplied by a negative number to result in a negative number. 3b. False; the left side would be much smaller than -16. 3c. False; the left side would be positive. 4a. False; the left side would be greater than 3. 4b. True; adding an integer to an integer results in another integer. 4c. True; the integer on the right is smaller than the integer being added on the left. 5a. False; the left side would be closer to 10 than to $49\frac{1}{2}$.

5b. True; subtracting a positive number from 100 could result in $49\frac{1}{2}$. 5c. True; the left side would result in a number close to 50, and $49\frac{1}{2}$ is close to 50. 6. True: $x < 0$ and $x \approx -40$; false: $x > 0$ and x is an integer.

ACTIVITY LAB

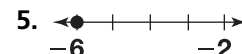
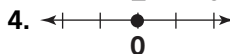
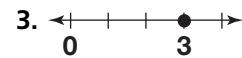
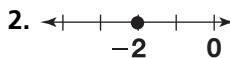
page 547

1-9. Check students' work. 10. The point (4, 8) is 4 units right and 8 units above the origin. 11. The point is on the y-axis. 12. Check students' work.

11-8 Graphing in the Coordinate Plane

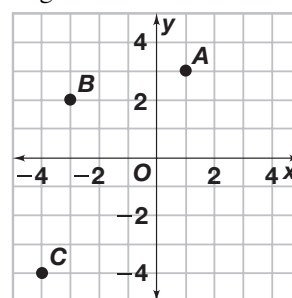
pages 548-551

Check Skills You'll Need For complete solutions see *Daily Skills Check and Lesson Quiz Transparencies* or *Presentation Pro CD-ROM*. 1. 0



Quick Check 1a. Point B is 3 units left and 2 units up from the origin: B(-3, 2). 1b. Point D is 2 units left and 3 units down from the origin: D(-2, -3). 1c. Point E is 2 units right and 2 units down from the origin: E(2, -2).

2a-c.

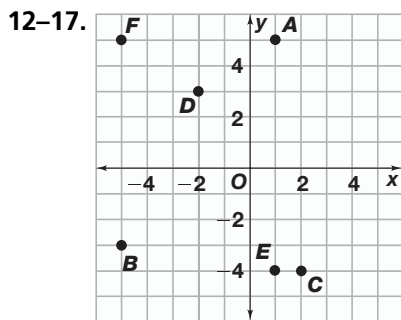


3a. Two blocks south and 5 blocks east of the library is City Hall. 3b. From the origin, City Hall is 3 units right and 1 unit down: (3, -1).

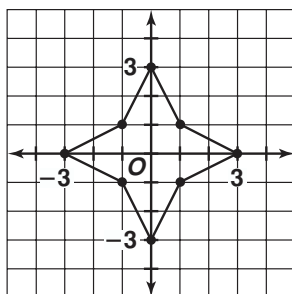
Exercises 1. Answers may vary. Sample: The first coordinate tells how far to move left or right. The second coordinate tells how far to move up or down.

2. Answers may vary. Sample: (0, 0), (1, 0), (1, 1), (0, 1)

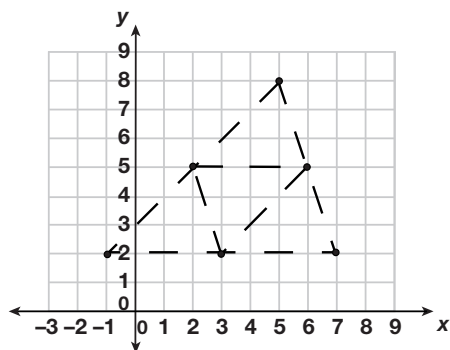
3. A: (+, -), B: (-, +), C: (+, -), D: (+, -), (-5, 6); the correct choice is B. 4. Point B is 3 units left and 1 unit up from the origin: (-3, 1). 5. Point D is 1 unit left and 1 unit up from the origin: (-1, 1). 6. Point K is 3 units right and 2 units up from the origin: (3, 2). 7. Point Q is 0 units right or left and 3 units up from the origin: (0, 3). 8. The point that is 1 unit right and 2 units up from the origin is A. 9. The point that is 2 units left and 2 units down from the origin is P. 10. The point that is 3 units right and 3 units down from the origin is J. 11. The point that is 0 units right or left and 3 units down from the origin is C.



18. 2 units up and 4 units right of the library is the grocery store. 19. The park is 2 units right and 1 unit down from the origin: (2, -1). 20. The school is 0 units right or left and 4 units up from the origin: (0, 4). 21. $(-2, 8) + (6, -10) = (4, -2)$; IV 22. Their x -coordinate is 0. 23. $(-, -)$; III 24. $(+, +)$; I 25. x -coordinate is 0; y -axis 26. $(-, +)$; II 27. y -coordinate is 0; x -axis 28. $(+, -)$; IV 29. y -coordinate is 0; x -axis 30. x -coordinate is 0; y -axis 31. $(-3, 0)$



32. (0, 2), (1, 2), (1, 4), (0, 4), (2, 6), (2, 5), (4, 5), (4, 6), (6, 4), (5, 4), (5, 2), (6, 2), (4, 0), (4, 1), (2, 1), (2, 0) 33a. Africa 33b. Europe 34. y -coordinate is 0; x -axis 35.



$(-1, 2), (7, 2), (5, 8)$

36. (3, 2); the correct choice is C. 37. $8 + 8 + 2 + 2 = 10 + 10 = 20$; the correct choice is J.

$$\begin{aligned} 38. C &= 2\pi r & A &= \pi r^2 \\ &= 2\pi(6) & &= \pi \times (6)^2 \\ &= 12\pi & &= 36\pi \\ &\approx 38 & &\approx 113 \end{aligned}$$

The circumference is about 38 mm; the area is about 113 mm².

CHECKPOINT QUIZ 2

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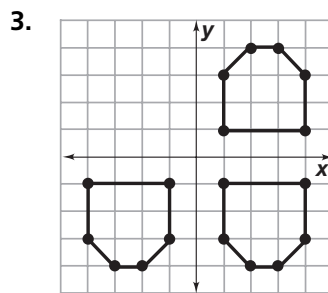
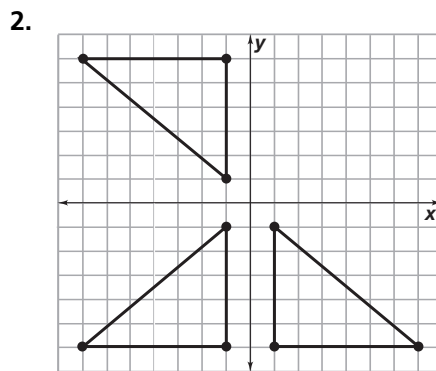
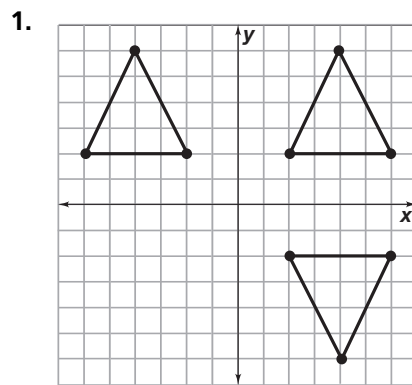
1. $-4 - (-2) = -4 + 2 = -2$ 2. $-10 - 2 = -10 + (-2) = -12$ 3. $12 \times (-3) = -36$ 4. $-8 \times 2 = -16$ 5. $14 \div (-2) = -7$ 6. $-21 \div (-3) = 7$

7. $x + 5 = -8$
 $x + 5 - 5 = -8 - 5$
 $x = -13$ 8. $r - 10 = -2$
 $r - 10 + 10 = -2 + 10$
 $r = 8$ 9. $3d = -12$
 $3d \div 3 = -12 \div 3$
 $d = -4$ 10. $t - 15 = -2$
 $t - 15 + 15 = -2 + 15$
 $t = 13; 13^\circ\text{F}$

11. $(-2, 8) + (4, -12) = (-2 + 4, 8 - 12) = (2, -4)$ 12. Point A is 1.5 units right and 1.5 units up from the origin: (1.5, 1.5). 13. Point B is 2 units left and 1.5 units down from the origin: $(-2, -1.5)$. 14. Point C is 3.5 units left and 2 units up from the origin: $(-3.5, 2)$. 15. Point D is 0.5 units right and 0 units up or down from the origin: (0.5, 0).

EXTENSION

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11-9 Applications of Integers

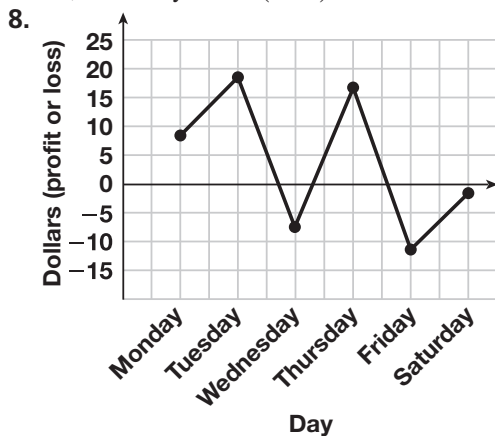
pages 554–557

Check Skills You'll Need For complete solutions see *Daily Skills Check and Lesson Quiz Transparencies* or *Presentation Pro CD-ROM*. 1. Answers may vary. Sample: If the signs of both integers are the same, add their absolute values and use the same sign. If the

integers' signs are different, subtract their absolute values and use the sign of the integer with the greater absolute value. **2.** 38 **3.** 9 **4.** -13 **5.** -29

Quick Check 1. $11,917 + (-14,803) = -2,886$; $-\$2,886$; $11,775 + (-10,954) = 821$; $\$821$ **2.** The company shows a profit in each month with a positive value in the Profit/Loss column; March, April, June, July, August, November, and December.

Exercises 1a. negative **1b.** positive **1c.** negative **1d.** positive **2.** expenses = income, income + (-expenses) = 0; $\$0$ **3.** $4,257 + (-6,513) = -\$2,256$ **4.** $3,840 + (-2,856) = \$984$ **5.** $4,109 + (-3,915) = \$194$ **6.** $3,725 + (-4,921) = -\$1,196$ **7.** Monday: $94 + (-85) = \$9$; Tuesday: $78 + (-60) = \$18$; Wednesday: $13 + (-22) = -\$9$; Thursday: $90 + (-73) = \$17$; Friday: $37 + (-49) = -\$12$; Saturday: $15 + (-16) = -\$1$



9. By using the graph or the table, the profit was greatest on Tuesday. **10.** By using the graph or the table, the loss was greatest on Friday.

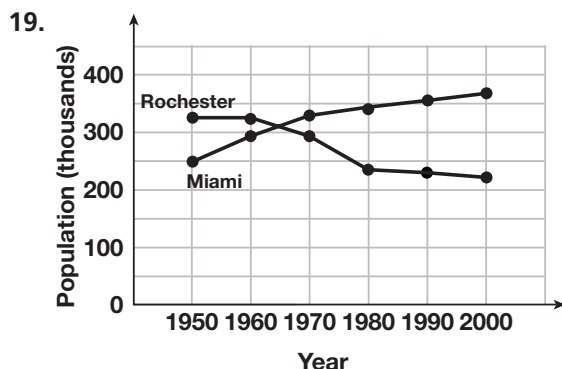
11. $-20 - 1b + 2b = 100$

$$-20 + 20 + 1b = 100 + 20$$

$$b = 120; 120 \text{ bottles}$$

12. $125 - 20 - 15 - 8 - 12 - 35 = \35 **13.** A company has made a profit if its total expenses are less than its total income. **14.** $52 + 145 = \$197$; $197 + (-48) = \$149$; $149 + (-25) = \$124$; $124 + (-135) = -\$11$; $-11 + 215 = \$204$; $\$197, \$149, \$124, -\$11, \$204, -\11 **15.** The vertical axis shows that the number of CDs sold the fifth week was 30. **16.** $33 - 10 = 23$ **17.** The horizontal line that crosses the line twice is for 15 CDs: Weeks 1 and 3.

18. The line rises from week to week, except for between Week 1 and Week 2: Week 2.



20. The line for Miami rises from decade to decade, so the city with the positive trend in population is Miami. The line for Rochester decreases or stays the same, so the city with the negative trend in population is Rochester. **21.** In 1950, Miami's population was 249 thousand and Rochester's was 322 thousand. So, the city with the larger population was Rochester. **22.** Answers may vary. Sample: Miami: about 368,000 because from 1970 to 2000 the population in Miami rose up to 27,000, which is a growth of 9,000 people per 10 years. Thus, at this rate in twenty years, Miami's population would be $362,000 + 2(9,000) = 368,000$; Rochester: about 200,000 because the graph shows that from 1980 the population of Rochester has been dropping approximately 10,000 people per 10 years. At this rate the population of Rochester, NY in 2020 would be $220,000 - 2(10,000) = 200,000$. **23.** The point that is $2\frac{1}{2}$ units right and 3 units up from the origin is D; the correct choice is D. **24.** $40 + 65 + 55 + 20 = 180$, $85 + 75 + 30 + 70 = 260$, $80 + 120 + 90 + 90 = 380$, $115 + 75 + 45 + 125 = 360$; the correct choice is J. **25.** Since $90^\circ < 123^\circ < 180^\circ$, the angle is obtuse. **26.** Since $0^\circ < 54^\circ < 90^\circ$, the angle is acute. **27.** Since the angle measures exactly 90° , the angle is right. **28.** Since $90^\circ < 173^\circ < 180^\circ$, the angle is obtuse. **29.** Since the angle measures exactly 180° , the angle is straight.

11-10 Graphing Functions

pages 558-562

Check Skills You'll Need For complete solutions see *Daily Skills Check and Lesson Quiz Transparencies* or *Presentation Pro CD-ROM*. **1.** An expression does not have an equal sign. **2.** 11 **3.** 6 **4.** 12 **5.** 18

Quick Check

1a. $16 \div 4 = 4$;

$$-24 \div 4 = -6;$$

$$36 \div 4 = 9$$

Input	Output
16	4
-24	-6
36	9

1b. $-6 - 8 = -14$;

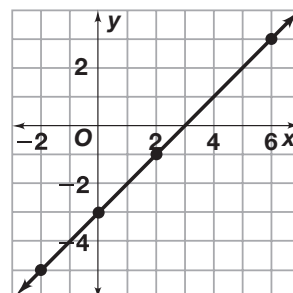
$$-1 - 8 = -9$$
 ;

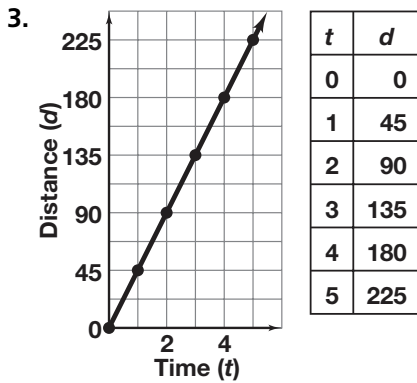
$$4 - 8 = -4$$

Input	Output
-6	-14
-1	-9
4	-4

2.

x	-2	0	2	6
y	-5	-3	-1	3



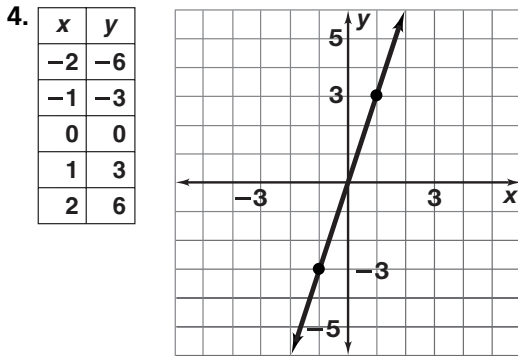


More Than One Way

$$\begin{aligned}
 y &= 30 + 4x \\
 &= 30 + 4(15) \\
 &= \$90
 \end{aligned}$$

I substituted 15 for x in the equation and solved for y ;
I chose this method because it was easier than making a table or graph.

Exercises 1. x 2. Substitute the value 4 into the equation for x . 3. multiply

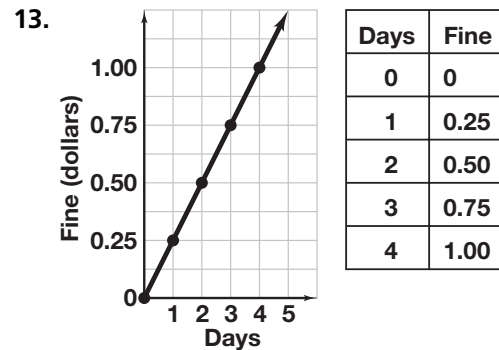
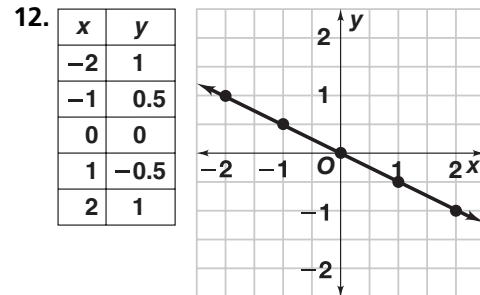
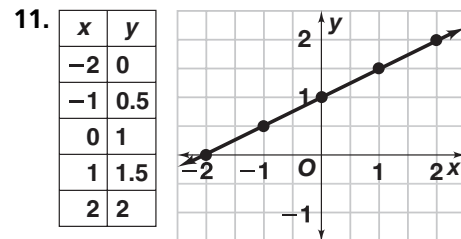
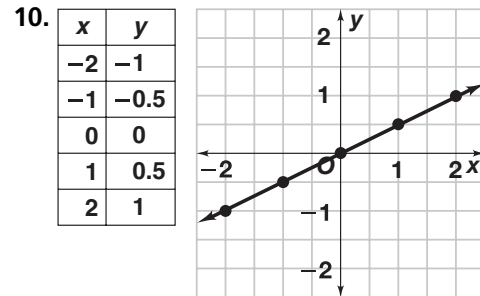
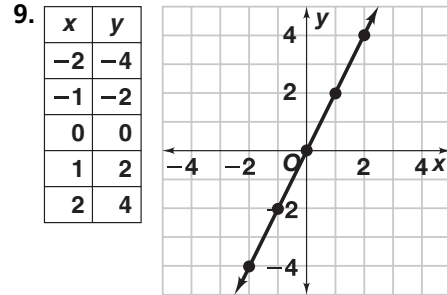
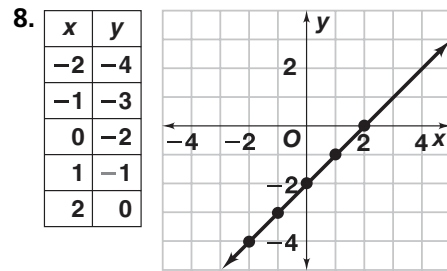
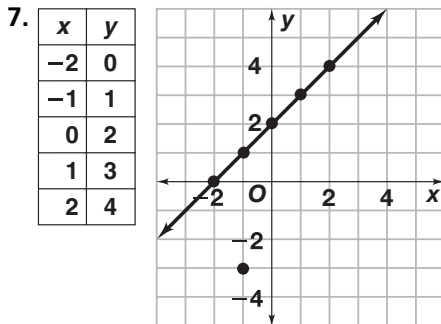


5. $-5 + 4 = -1$;
 $8 + 4 = 12$;
 $31 + 4 = 35$

Input	Output
-5	-1
8	12
31	35

6. $-2 - 4 = -6$;
 $5 - 4 = 1$;
 $14 - 4 = 10$

Input	Output
-2	-6
5	1
14	10

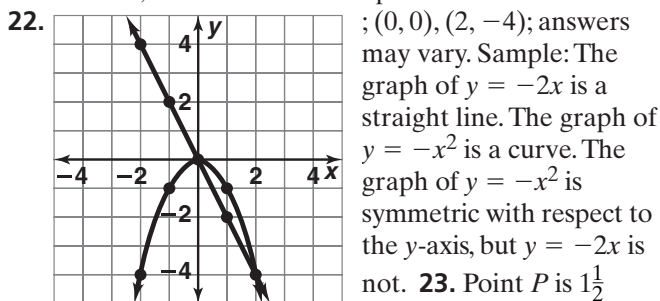


14. $p = 9t - 2$, $9(7) - 2 = 63 - 2 = 61$; \$61 15. $3t + 5$; $3 \times 2 + 5 = 6 + 5 = 11$, $3 \times 3 + 5 = 9 + 5 = 14$, $3 \times 4 + 5 = 12 + 5 = 17$, $3 \times 5 + 5 = 15 + 5 = 20$; \$11, \$14, \$17, \$20; answers may vary. Sample: I evaluated $3t + 5$ for each number of tees because it is easier than making a table or graph. 16. $6 + 2 = 8$, $7 + 2 = 9$; 8, 9; Output = Input + 2. 17. $25 \div 5 = 5$, $30 \div 5 = 6$; 5, 6; Output = Input \div 5.

18a. $p = 0.75c - 600$ $p = 0.75c - 600$
 $p = 0.75(400) - 600$ $p = 0.75(500) - 600$
 $p = 300 - 600$ $p = 375 - 600$
 $p = -300$; -\$300 $p = -225$; -\$225

18b. $p = 0.75c - 600$
 $0 = 0.75c - 600$
 $0 + 600 = 0.75c - 600 + 600$
 $600 = 0.75c$
 $\frac{600}{0.75} = \frac{0.75c}{0.75}$
 $800 \text{ cookies} = c$

19. Linear; the graph is a line. 20. Not linear; the graph is not a line, because it curves. 21. Not linear; the graph is not a line, because it is in two parts.



units right and 2 units up from the origin: $(1\frac{1}{2}, 2)$; the correct choice is A. 24. $240 \div 4 = 60$; $60 \times 7 = 420$; the correct choice is H. 25. 5 hours of driving + $3(\frac{1}{2})$ hour stops = $5 + 1\frac{1}{2} = 6\frac{1}{2}$ hours of traveling; 3:30 P.M. - $6\frac{1}{2}$ hours = (12:00 + 3:30) A.M. - 6:30 = 15:30 A.M. - 6:30 = 9:00 A.M.

TEST-TAKING STRATEGIES

page 563

1. Let p = the number of points Stephanie scored in the second half; $p = 25 - 17$; the correct choice is B. 2. Let s = the number of slices of bread you need; $s = 18 \times 3$; the correct choice is H. 3. Let h = the average number of hours Russell volunteers; $h = 36 \div 15$; the correct choice is D.

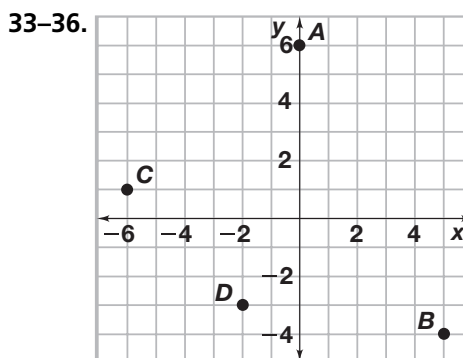
CHAPTER REVIEW

pages 564–565

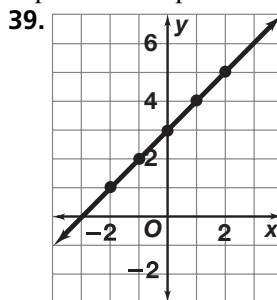
1. A function assigns one output value to each input value. 2. The numbers -4 , -2 , -1 , 0 , and 3 are integers. 3. Quadrants are the regions of the coordinate plane. 4. -3 and 3 are opposites. 5. -14 6. $|-5| = 5$; $|4| = 4$; $|-5| > |4|$; $>$ 7. $-8 < 12$; $<$ 8. $|-9| = 9$; $4 < 9$; $<$ 9. $-12 > -14$; $>$ 10. The order from left to right on the number line is -2 , -1 , 1 , 2 , so the order from least to

greatest is -2 , -1 , 1 , 2 . 11. The order from left to right on the number line is -6 , -4 , 0 , 5 , so the order from least to greatest is -6 , -4 , 0 , 5 . 12. The order from left to right on the number line is -7 , -3 , 5 , 9 , so the order from least to greatest is -7 , -3 , 5 , 9 . 13. $3 + 8 = 11$ 14. $5 + (-9) = -4$ 15. $-4 + 2 = -2$ 16. $-7 + (-6) = -13$ 17. $11 - 3 = 11 + (-3) = 8$ 18. $2 - (-6) = 2 + 6 = 8$ 19. $-7 - 4 = -7 + (-4) = -11$ 20. $-10 - (-2) = -10 + 2 = -8$ 21. $4 \times 9 = 36$ 22. $7 \times (-3) = -21$ 23. $-5 \times 2 = -10$ 24. $-6 \times (-8) = 48$ 25. $16 \div 4 = 4$ 26. $25 \div (-5) = -5$ 27. $-49 \div (-7) = 7$ 28. $-32 \div 8 = -4$

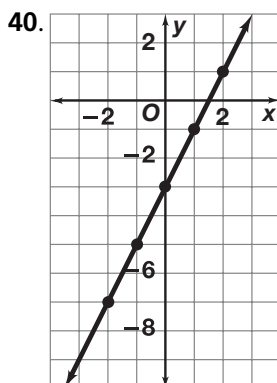
29. $x + 3 = -12$ 30. $x - 3 = -12$
 $x + 3 - 3 = -12 - 3$ $x - 3 + 3 = -12 + 3$
 $x = -15$ $x = -9$
31. $-3x = 12$ 32. $\frac{x}{3} = -12$
 $-3x \div (-3) = 12 \div (-3)$ $\frac{x}{3} \times 3 = -12 \times 3$
 $x = -4$ $x = -36$



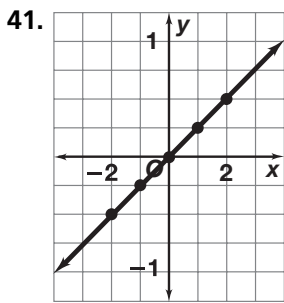
37. $-985 + 10,241 + (-209) + 17,239 = 26,286$; \$26,286 38. The sum of the integers is positive, so they experienced a profit.



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



x	y
-2	-7
-1	-5
0	-3
1	-1
2	1

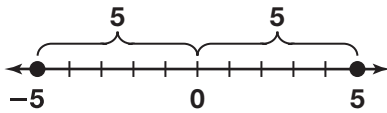


x	y
-2	-0.5
-1	-0.25
0	0
1	0.25
2	0.5

CHAPTER TEST

page 566

1. Below zero means it is less than 0, so the integer is negative: -7 . **2a.** To write the opposite, change the sign: -89 . **2b.** To write the opposite, change the sign: 100. **3.** A positive integer is always greater than a negative integer: $18 > -24$; $>$. **4.** -15 is to the left of -9 on the number line, so $-15 < -9$; $<$. **5.** A positive integer is always greater than a negative integer: $27 > -27$; $>$. **6.** The order from left to right on the number line is $-13, -1, 0, 3, 5$, so the order from least to greatest is $-13, -1, 0, 3, 5$. **7.** Answers may vary. Sample: The absolute value of a number is its distance from 0 on a number line. -5 is 5 units from 0 on a number line, so its absolute value is 5. 5 is 5 units from 0 on a number line, so its absolute value is also 5.



8. $9 + (-4) = 5$ **9.** $-13 + 6 = -7$ **10.** $-7 + (-5) = -12$ **11.** $-2 - 8 = -2 + (-8) = -10$ **12.** $-3 - (-3) = -3 + 3 = 0$ **13.** $3 - 9 = 3 + (-9) = -6$ **14.** $5 \times (-4) = -20$ **15.** $-3 \times (-6) = 18$ **16.** $-2 \times 7 = -14$ **17.** $9 \div (-3) = -3$ **18.** $-5 \div (-5) = 1$ **19.** $-12 \div 4 = -3$

20. $d + 6 = -3$
 $d + 6 - 6 = -3 - 6$
 $d = -9$

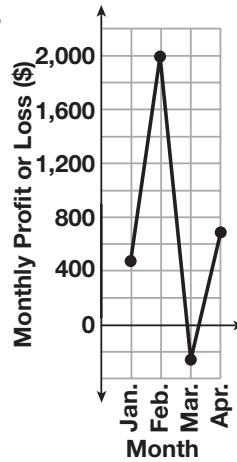
21. $18 - 22 = 18 + (-22) = -4$; -4°F **22.** $50 + (-2) + (-3) + (-2) + (-1) = 42$; 42 points **23a.** The point that is 0 units left or right and 4 units up from the origin is C . **23b.** The point that is 3 units left and 3 units up from the origin is N . **23c.** The point that is 4 units left and 3 units down from the origin is H . **24a.** Point A is 2 units right and 3 units up from the origin: $(2, 3)$.

24b. Point B is 3 units left and 2 units down from the origin: $(-3, -2)$. **24c.** Point F is 1 unit right and 3 units down from the origin: $(1, -3)$. **24d.** Point J is 0 units right or left and 4 units down from the origin: $(0, -4)$.

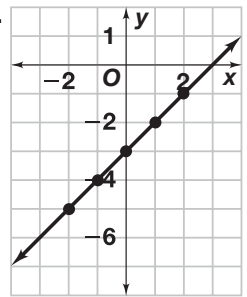
25a-c.

26a. Jan.: $\$1,314 + (-\$828) = \$486$;
 Feb.: $\$2,120 + (-\$120) = \$2,000$;
 Mar.: $\$1,019 + (-\$1,285) = -\$266$;
 Apr.: $\$1,438 + (-\$765) = \$673$

26b.



27.



28. $210 - 50 = 160$; $160 \div 4 = 40$; $40 \times 1.5 = 60$;
 $60 + 210 = 270$; 270 ft

TEST PREP

page 567

1. If $a = 7$ and $b = 24$, then $b - a - 8 = 24 - 7 - 8 = 9$; the correct choice is C . **2.** Since $1 \text{ pt} = 2 \text{ cups}$, $1\frac{1}{2} \text{ pt} = 2 \text{ cups} + \frac{1}{2}(2) \text{ cups} = 3 \text{ cups}$; the correct choice is G . **3.** The ratio of plums to pears is $\frac{8}{12}$, or $\frac{2}{3}$; the correct choice is A . **4.** Find the median: 9, 9, 9, 11, 13, 13, 14, 17, 19; the median is 13; the correct choice is J . **5.** For 12 cups of lemonade at $\$0.50$ each, you make $12 \cdot \$0.50$, or $\$6.00$. Since you gained $\$6.00$ and spent $\$7.00$, $\$6.00 - \$7.00 = -\$1.00$; the correct choice is A . **6.** The area of a circle is πr^2 . The radius is half the diameter, so $r = \frac{9}{2} = 4.5$. $4.5 \cdot 4.5 \cdot \pi = 20.25\pi = 63.585 \approx 64$, or 64 in.^2 ; the correct choice is H . **7.** $-8 + 9 \div 3 = -8 + 3 = -5$; the correct choice is D . **8.** F : A square is always a rectangle; true. G : Some rectangles are rhombuses; true. H : All quadrilaterals are parallelograms; false. The correct choice is H .

9. A: $\frac{3}{4} + 2\frac{1}{2} \stackrel{?}{=} 3\frac{1}{4}$
 $\frac{3}{4} + \frac{5}{2} \stackrel{?}{=} 3\frac{1}{4}$
 $\frac{3}{4} + \frac{10}{4} \stackrel{?}{=} 3\frac{1}{4}$
 $\frac{13}{4} \stackrel{?}{=} 3\frac{1}{4}$
 $3\frac{1}{4} = 3\frac{1}{4}$

B: $3\frac{4}{5} - \frac{6}{8} \stackrel{?}{=} 3\frac{1}{20}$
 $\frac{19}{5} - \frac{6}{8} \stackrel{?}{=} 3\frac{1}{20}$
 $\frac{152}{40} - \frac{30}{40} \stackrel{?}{=} 3\frac{1}{20}$
 $\frac{122}{40} \stackrel{?}{=} 3\frac{1}{20}$
 $3\frac{2}{40} \stackrel{?}{=} 3\frac{1}{20}$
 $3\frac{1}{20} = 3\frac{1}{20}$

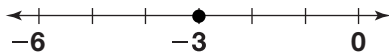
C: $1\frac{7}{8} + 1\frac{5}{6} \stackrel{?}{=} 3\frac{17}{24}$
 $\frac{15}{8} + \frac{11}{6} \stackrel{?}{=} 3\frac{17}{24}$
 $\frac{45}{24} + \frac{44}{24} \stackrel{?}{=} 3\frac{17}{24}$
 $\frac{99}{24} \stackrel{?}{=} 3\frac{17}{24}$
 $3\frac{17}{24} = 3\frac{17}{24}$

D: $5\frac{2}{5} - 2\frac{1}{3} \stackrel{?}{=} 3\frac{1}{10}$
 $\frac{27}{5} - \frac{7}{3} \stackrel{?}{=} 3\frac{1}{10}$
 $\frac{81}{15} - \frac{35}{15} \stackrel{?}{=} 3\frac{1}{10}$
 $\frac{46}{15} \stackrel{?}{=} 3\frac{1}{10}$
 $3\frac{1}{15} \neq 3\frac{1}{10}$

The correct choice is D .

10. $V = \ell \cdot w \cdot h = 10 \cdot 7 \cdot 8 = 560$, or 560 m^3 ; the correct choice is J . **11.** A : none of the angles measure more than 90° . B : 123° is an obtuse angle; the correct choice is B . **12.** 1 meter = 0.001 km, so 120 m expressed in km is $120 \cdot 0.001 = 0.12$ **13.** $32.75 - 23.52 = 9.23$ **14.** [2] Check students' work; $2.5 \cdot 10 = 25$, or 25 feet. [1] correct length without sketch OR with incorrect sketch.

15. [2] -3 ;



[1] incorrect integer OR incorrect number line

16a–b. [4] $A = b \cdot h = 9 \cdot 7 = 63$, or 63 in.^2 ; $b \cdot h = 9 \cdot 7 = 63$; double the base: $b \cdot 2 = 9 \cdot 2 = 18 \text{ in.}$; double the height: $h \cdot 2 = 7 \cdot 2 = 14 \text{ in.}$; $18 \cdot 14 = 252 \text{ in.}^2$; The area is not doubled because both the base and the height were doubled. If only one measurement had doubled, the area would have doubled also. Instead, the area in part (a) is one quarter the area in part (b) because $63 \cdot 4 = 252$. [3] appropriate methods, computational error; [2] did not double the base and height accordingly OR no explanation given; [1] correct areas given without work shown

DK PROBLEM SOLVING APPLICATION

pages 568–569

1. The elevations are 14,495 ft for Mt. Whitney; -282 ft for Death Valley; 0 ft for the Pacific Ocean; 6,145 ft for Colorado Springs; 96 ft for Houston;

633 ft for Detroit; 16 ft for Long Island; -8 ft for New Orleans; 0 ft for the Atlantic Ocean; and 8 ft for Key West. The highest elevation is 14,495 ft for Mt. Whitney. The lowest elevation is -282 ft for Death Valley. **2a.** The elevation of Vostok Station is 11,220 ft. The elevation of Death Valley is -282 ft. The difference is $11,220 - (-282) = 11,220 + 282 = 11,502$; 11,502 ft. **2b.** The elevation of New Orleans is -8 ft. The elevation of Death Valley is -282 ft. The difference is $-8 - (-282) = -8 + 282 = 274$; 274 ft. **3.** The elevation for Colorado Springs is 6,145 ft, and the elevation 5,512 ft lower is $6,145 - 5,512$, or 633 ft for Detroit. The correct choice is B. **4.** The elevation for New Orleans is -8 ft, and the elevation that is 16 ft higher is $-8 + 16$, or 8 ft for Key West. The correct choice is C. **5.** Answers may vary. Sample: Denver, Colorado; Boston, Massachusetts is on the coast and therefore is at about sea level; Memphis, Tennessee is on the Mississippi River and should be fairly low in elevation. Denver, Colorado is located near Colorado Springs, which has an elevation of over 6,000 ft.

CHECK YOUR READINESS

page 70

- $c + 9 = 34$; $c + 9 - 9 = 34 - 9$; $c = 25$; 25
- $a + 5 = -8$; $a + 5 - 5 = -8 - 5$; $a = -13$; -13
- $y - 15 = 28$; $y - 15 + 15 = 28 + 15$; $y = 43$; 43
- $b - 21 = -11$; $b - 21 + 21 = -11 + 21$; $b = 10$; 10
- $9x = 117$; $9x \div 9 = 117 \div 9$; $x = 13$; 13
- $5r = 35$; $5r \div 5 = 35 \div 5$; $r = 7$; 7
- $14z = 266$; $14z \div 14 = 266 \div 14$; $z = 19$; 19
- $m \div 4 = 16$; $m \div 4 \times 4 = 16 \times 4$; $m = 64$; 64
- $s \div 9 = 7$; $s \div 9 \times 9 = 7 \times 9$; $s = 63$; 63
- $y \div 25 = 5$; $y \div 25 \times 25 = 5 \times 25$; $y = 125$; 125
- base 4 and exponent 3; $4 \times 4 \times 4 = 4^3$; 4; 3
- base 2 and exponent 2; $2 \times 2 = 2^2$; 2; 2
- base 1 and exponent 4; $1 \times 1 \times 1 \times 1 = 1^4$; 1; 4
- $4 < 8$; $-2 < -1$; $-100 > -101$; $>$

12-1 Solving Two-Step Equations

pages 572–576

Check Skills You'll Need For complete solutions see *Daily Skills Check* and *Lesson Quiz Transparencies* or *Presentation Pro CD-ROM*. 1. = 2. 20 3. 48 4. 21

5. 192

Quick Check

- 1a. $5x + 3 = 18$ 1b. $3x - 4 = 23$
 $5x + 3 - 3 = 18 - 3$ $3x - 4 + 4 = 23 + 4$
 $5x = 15$ $3x = 27$
 $\frac{5x}{5} = \frac{15}{5}$ $\frac{3x}{3} = \frac{27}{3}$
 $x = 3$ $x = 9$

Check:

$$\begin{aligned} 5x + 3 &= 18 \\ 5(3) + 3 &\stackrel{?}{=} 18 \\ 15 + 3 &= 18 \end{aligned}$$

Check:

$$\begin{aligned} 3x - 4 &= 23 \\ 3(9) - 4 &\stackrel{?}{=} 23 \\ 27 - 4 &= 23 \end{aligned}$$

2. $\frac{m}{2} - 9 = 12$
 $\frac{m}{2} - 9 + 9 = 12 + 9$
 $\frac{m}{2} = 21$
 $2 \cdot \frac{m}{2} = 21 \cdot 2$
 $m = 42$

The total bill was \$42.

More Than One Way

34; Answers may vary. Sample: First I subtracted 75 from both sides of the equation. Then I divided both sides by 5. I chose this method because I would only have to divide $5p$ and 170 by 5.

Exercises 1. two-step 2. one-step 3. two-step

4. $3a - 1 = 11$
 $3a - 1 + 1 = 11 + 1$
 $3a = 12$
 $\frac{3a}{3} = \frac{12}{3}$
 $a = 4$
5. $2b + 4 = 12$
 $2b + 4 - 4 = 12 - 4$
 $2b = 8$
 $\frac{2b}{2} = \frac{8}{2}$
 $b = 4$
6. $2y + 5 = 9$
 $2y + 5 - 5 = 9 - 5$
 $2y = 4$
 $\frac{2y}{2} = \frac{4}{2}$
 $y = 2$
7. $2p + 13 = 3$
 $2p + 13 - 13 = 3 - 13$
 $2p = -10$
 $\frac{2p}{2} = \frac{-10}{2}$
 $p = -5$

Check:

$$\begin{aligned} 2y + 5 &= 9 \\ 2(2) + 5 &\stackrel{?}{=} 9 \\ 4 + 5 &= 9 \end{aligned}$$

Check:

$$\begin{aligned} 2p + 13 &= 3 \\ 2(-5) + 13 &\stackrel{?}{=} 3 \\ -10 + 13 &= 3 \end{aligned}$$

8. $5x + 7 = 22$
 $5x + 7 - 7 = 22 - 7$
 $5x = 15$
 $\frac{5x}{5} = \frac{15}{5}$
 $x = 3$

Check:

$$\begin{aligned} 5x + 7 &= 22 \\ 5(3) + 7 &\stackrel{?}{=} 22 \\ 15 + 7 &= 22 \end{aligned}$$

9. $\frac{a}{2} + 4 = 8$
 $\frac{a}{2} + 4 - 4 = 8 - 4$
 $\frac{a}{2} = 4$
 $2 \cdot \frac{a}{2} = 2 \cdot 4$
 $a = 8$

Check:

$$\begin{aligned} \frac{a}{2} + 4 &= 8 \\ \frac{(8)}{2} + 4 &\stackrel{?}{=} 8 \\ 4 + 4 &= 8 \end{aligned}$$

10. $\frac{x}{3} + 2 = 5$
 $\frac{x}{3} + 2 - 2 = 5 - 2$
 $\frac{x}{3} = 3$
 $3 \cdot \frac{x}{3} = 3 \cdot 3$
 $x = 9$

Check:

$$\begin{aligned} \frac{x}{3} + 2 &= 5 \\ \frac{(9)}{3} + 2 &\stackrel{?}{=} 5 \\ 3 + 2 &= 5 \end{aligned}$$

11. $\frac{n}{6} - 1 = 3$
 $\frac{n}{6} - 1 + 1 = 3 + 1$
 $\frac{n}{6} = 4$
 $6 \cdot \frac{n}{6} = 6 \cdot 4$
 $n = 24$

Check:

$$\begin{aligned} \frac{n}{6} - 1 &= 3 \\ \frac{(24)}{6} - 1 &\stackrel{?}{=} 3 \\ 4 - 1 &= 3 \end{aligned}$$

12. $2y - 3 = -11$
 $2y - 3 + 3 = -11 + 3$
 $2y = -8$
 $\frac{2y}{2} = \frac{-8}{2}$
 $y = -4$

Check:

$$\begin{aligned} 2y - 3 &= -11 \\ 2(-4) - 3 &\stackrel{?}{=} -11 \\ -8 - 3 &= -11 \end{aligned}$$

13. $-6 = 4b - 10$
 $-6 + 10 = 4b - 10 + 10$
 $4 = 4b$
 $\frac{4b}{4} = \frac{4}{4}$
 $b = 1$

Check:

$$\begin{aligned} -6 &= 4b - 10 \\ -6 &\stackrel{?}{=} 4(1) - 10 \\ -6 &= 4 - 10 \end{aligned}$$

$$14. 1 + \frac{g}{2} = -5$$

$$1 + \frac{g}{2} - 1 = -5 - 1$$

$$\frac{g}{2} = -6$$

$$2 \cdot \frac{g}{2} = 2 \cdot (-6)$$

$$g = -12$$

Check:

$$1 + \frac{g}{2} = -5$$

$$1 + \frac{(-12)}{2} \stackrel{?}{=} -5$$

$$1 + (-6) = -5$$

$$16. 2p + 34 = 46$$

$$2p + 34 - 34 = 46 - 34$$

$$2p = 12$$

$$\frac{2p}{2} = \frac{12}{2}$$

$$p = 6$$

You order 6 pens.

$$18. 26w + 182 = 260$$

$$26w + 182 - 182 = 260 - 182$$

$$26w = 78$$

$$\frac{26w}{26} = \frac{78}{26}$$

$$w = 3$$

You will save \$260 in 3 weeks.

$$19. 2y + 1 = 11$$

$$2y + 1 - 1 = 11 - 1$$

$$2y = 10$$

$$\frac{2y}{2} = \frac{10}{2}$$

$$y = 5$$

$$21. 4d - 12 = 8$$

$$4d - 12 + 12 = 8 + 12$$

$$4d = 20$$

$$\frac{4d}{4} = \frac{20}{4}$$

$$d = 5$$

$$23. \frac{w}{2} - 6 = 4$$

$$\frac{w}{2} - 6 + 6 = 4 + 6$$

$$\frac{w}{2} = 10$$

$$2 \cdot \frac{w}{2} = 10 \cdot 2$$

$$w = 20$$

25. After subtracting 4 from each side, the student should have multiplied each side by 5 instead of dividing by 5.

26. Answers may vary. Sample: To solve $16e - 32 = 176$, first add 32 to each side and then divide each side by 16.

To solve $16e = 176$, simply divide each side by 16. 27. The correct choice is A because 410 equals the total of 250 and 0.08s.

$$0.08s + 250 = 410$$

$$0.08s + 250 - 250 = 410 - 250$$

$$0.08s = 160$$

$$\frac{0.08s}{0.08} = \frac{160}{0.08}$$

$$s = 2,000$$

She sold \$2,000.

$$15. 3s + 24 = 90$$

$$3s + 24 - 24 = 90 - 24$$

$$3s = 66$$

$$3s \div 3 = 66 \div 3$$

$$s = 22$$

A shirt costs \$22.

$$17. 35 + 15c = 200$$

$$35 + 15c - 35 = 200 - 35$$

$$15c = 165$$

$$\frac{15c}{15} = \frac{165}{15}$$

$$c = 11$$

He supports 11 other charities.

$$20. 5c + 15 = 30$$

$$5c + 15 - 15 = 30 - 15$$

$$5c = 15$$

$$\frac{5c}{5} = \frac{15}{5}$$

$$c = 3$$

$$22. 3n - 1 = 17$$

$$3n - 1 + 1 = 17 + 1$$

$$3n = 18$$

$$\frac{3n}{3} = \frac{18}{3}$$

$$n = 6$$

$$24. \frac{a}{5} + 7 = 12$$

$$\frac{a}{5} + 7 - 7 = 12 - 7$$

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

$$5 \cdot \frac{a}{5} = 5 \cdot 5$$

$$a = 25$$

28. The correct choice is A because 495 equals the total of 75 and 12m.

$$12m + 75 = 495$$

$$12m + 75 - 75 = 495 - 75$$

$$12m = 420$$

$$\frac{12m}{12} = \frac{420}{12}$$

$$m = 35$$

The monthly fee is \$35.

29. Rule: Multiply by 2 and then add 3; $2(8) + 3 = 19$;

$2(15) + 3 = 33$ 30. Rule: Divide by 3 and then subtract

8; $(30) \div 3 - 8 = 2$; $(63) \div 3 - 8 = 13$

$$31. \frac{a}{2} + \frac{2}{3} = 5\frac{1}{3}$$

$$\frac{a}{2} + \frac{2}{3} - \frac{2}{3} = 5\frac{1}{3} - \frac{2}{3}$$

$$\frac{a}{2} = 4\frac{2}{3}$$

$$2 \cdot \frac{a}{2} = 4\frac{2}{3} \cdot 2$$

$$a = \frac{14}{3} \cdot 2 = \frac{28}{3} = 9\frac{1}{3}$$

32. $90 + 32 = 122$, $180 - 122 = 58$; the correct choice is A.

33. Cameron's father needs to know the size of tiles to know how many feet he can cover with one box. The correct choice is F.

34–37: The diameter is twice the size of the radius. Multiply the radius by 2 to find the diameter; divide the diameter by 2 to find the radius.

34. $2 \times (12) = 24$; 24 in. 35. $\frac{1}{2} \div 2 = \frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$; $\frac{1}{4}$ in.

36. $0.36 \div 2 = 0.18$; 0.18 m 37. $4.7 \times 2 = 9.4$; 9.4 cm

ACTIVITY LAB

page 577

1. $MD + MS + FL = 10$, $MD - 4 = MS$, $\frac{1}{3}MD = FL$;

$$MD + (MD - 4) + \frac{1}{3}MD = 10,$$

$$\frac{7}{3}MD = 14,$$

$$\frac{7}{3}MD \times \frac{3}{7} = 14 \times \frac{3}{7},$$

$$MD = 6$$

Maryland: 6; Mississippi: 2; Florida: 2

2. $IN = 6$, $TN + 2 = KY$, $12 = IN + KY + TN$

$$12 = KY + TN + 6$$

$$6 = KY + TN$$

$$6 = TN + 2 + TN$$

$$4 = 2TN$$

$$2 = TN$$

$$IN = 6, TN = 2, KY = TN + 2 = 2 + 2 = 4$$

Indiana: 6; Kentucky: 4; Tennessee: 2

3. $18 = OH + TN + TX$, $\frac{1}{2} \times 18 = OH$, $2(TX) = TN$

$$OH = 9$$

$$18 = 9 + TN + TX$$

$$9 = TN + TX$$

$$TN = 9 - TX$$

$$2(9 - TX) = TN$$

$$18 - 2(TX) = TN$$

$$18 = 3TX$$

$$TX = 6, TN = \frac{6}{3}, TN = 2;$$

Ohio: 9; Texas: 3; Tennessee: 6

4. $ME + LA + ID = 15$, $LA = ME + 1$, $ID =$

$$ME - 1;$$

$$ME + (ME + 1) + (ME - 1) = 15,$$

$$3ME = 15, ME = 5;$$

Maine: 5; Louisiana: 6; Idaho: 4

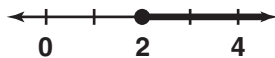
5. Check students' work. 6. Check students' work.
7. Answers may vary. Sample: I divided 18 by 2 to get 9 Ohio quarters. Then I found that there were 6 Tennessee quarters and 3 Texas quarters by using clue 3.

12-2 Inequalities

pages 578–581

Check Skills You'll Need For complete solutions see *Daily Skills Check* and *Lesson Quiz Transparencies* or *Presentation Pro CD-ROM*. 1. A number line shows integers from least to greatest. A number to the left of another number on a number line is less than the other number. 2. $>$ 3. $>$ 4. $<$ 5. $<$

Quick Check 1. “or less” indicates \leq ; Let a represent the altitude from which most skydivers jump; $a \leq 14,500$ 2. “at least” indicates \geq ; Let t represent the number of hours you spend studying; $t \geq 2$

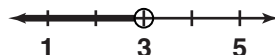


3. 12in. = 1ft, 48in. \div 12in. = 4ft, 3 ft 11 in. $<$ 4 ft; no

Exercises 1. solutions 2. No, 3 is a solution to $x \leq 3$ but not to $x < 3$. 3. open circle indicates -1 is not a solution and the arrow to the left indicates $<$; $x < -1$ 4. “no more than” indicates \leq ; Let s represent the number of students who participated; $s \leq 45$ 5. “more than” indicates $>$; Let ℓ represent the number of ladybugs; $\ell > 15$ 6. “maximum height” indicates \leq ; Let h represent the height; $h \leq 12$ 7. “or fewer” indicates \leq ; Let p represent the number of people who can ride at once; $p \leq 4$



8. “less than” indicates $<$; Let k represent the number of days; $k < 3$



9. “at least” indicates \geq ; Let d represent the number of dollars; $d \geq \$20$



10. Paul, Andrea, and Tim weigh less than 50 pounds; They may ride. 11. Cara and Molly are 13 years of age or older. They may buy the DVD. 12. Let e represent energy use; $e > 50$; dryer



13. true since $-2 \leq 2$ 14. false since $|-5| = 5$ and 5 is not less than 5 15. true since $-4^2 = -16$ and $(-4)^2 = 16$ 16. Everyone but Mark is eligible since Mark is the only one weighing more than 120 pounds; Aaron, Steve, and James 17. Answers may vary. Sample: Use an open circle to exclude -20 and shade to the left of the open circle to show numbers less than -20 . 18a. The speed s is less than 45; $s < 45$ 18b. The speed s is more than 65; $s > 65$

19. Place an open circle at 4. Shade to the left and shade to the right of 4.



20. If $|x| < 2$, then $x < 2$ or $x > -2$. Graph the inequality, $-2 < x < 2$. Shade all points on the number line whose distance from 0 is less than 2. Place an open circle at 2 and -2 . Shade in between.



21. Looking at the graph, $(7, 2)$ is not listed; the correct choice is A. 22. $30 \times 5 \times 10 =$ total number of minutes she will practice; the correct choice is H. 23. $90^\circ < 107^\circ < 180^\circ$; the correct choice is C. 24. $84 + 24 = 108$, $\frac{84}{108} = \frac{7}{9}$

12-3 Solving One-Step Inequalities

pages 582–584

Check Skills You'll Need For complete solutions see *Daily Skills Check* and *Lesson Quiz Transparencies* or *Presentation Pro CD-ROM*. 1. If you subtract the same value from each side of an equation, the two sides remain equal. 2. -9 3. 15

Quick Check

1. $u - 6 \leq 3$ 2. $z + 15 > 24$
 $u - 6 + 6 \leq 3 + 6$ $z + 15 - 15 > 24 - 15$
 $u \leq 9$ $z > 9$

3. Let p = the number of additional people the restaurant can serve.

$$\begin{aligned} p + 97 &\leq 115 \\ p + 97 - 97 &\leq 115 - 97 \\ p &\leq 18 \end{aligned}$$

The restaurant can serve at most 18 more people.

Exercises 1. addition 2. subtraction 3. subtraction

4. If $y + 2 \geq 10$, then $y \geq 8$. If $y + 2 > 10$, then $y > 8$. Only 8 solves the first inequality but not the second.

5. $c - 2 \leq 8$ 6. $x - 2 \geq 5$
 $c - 2 + 2 \leq 8 + 2$ $x - 2 + 2 \geq 5 + 2$
 $c \leq 10$ $x \geq 7$
7. $z - 5 < 0$ 8. $k - 21 > 1$
 $z - 5 + 5 < 0 + 5$ $k - 21 + 21 > 1 + 21$
 $z < 5$ $k > 22$
9. $j - 2 > -9$ 10. $n - 96 < -58$
 $j - 2 + 2 > -9 + 2$ $n - 96 + 96 < -58 + 96$
 $j > -7$ $n < 38$
11. $s - 4 \leq 8$ 12. $r + 5 \geq 7$
 $s - 4 + 4 \leq 8 + 4$ $r + 5 - 5 \geq 7 - 5$
 $s \leq 12$ $r \geq 2$
13. $y + 12 \leq 11$ 14. $w + 2 > -7$
 $y + 12 - 12 \leq 11 - 12$ $w + 2 - 2 > -7 - 2$
 $y \leq -1$ $w > -9$
15. $14 + d \leq 24$ 16. $13 + f > 7$
 $14 + d - 14 \leq 24 - 14$ $13 + f - 13 > 7 - 13$
 $d \leq 10$ $f > -6$
17. $5 + g \leq 62$
 $5 + g - 5 \leq 62 - 5$
 $g \leq 57$

18. Let m = the money that you have left to spend.

$$m + 7.99 \leq 15$$

$$m + 7.99 - 7.99 \leq 15 - 7.99$$

$$m \leq 7.01$$

You can still spend \$7.01.

19. Let d = the amount that needs to be deposited.

$$d + 143 \geq 250$$

$$d + 143 - 143 \geq 250 - 143$$

$$d \geq 107$$

You must deposit at least \$107.

20. Answers may vary. Sample: No algebraic expression can be greater than itself.

21. Let a = altitude.

$$a + 2,500 < 32,000$$

$$a + 2,500 - 2,500 < 32,000 - 2,500$$

$$a < 29,500 \text{ ft}$$

The maximum original altitude of the plane is below 29,500 ft.

22. Let t = the cost of a T-shirt.

$$2t + 13 < 30$$

$$2t + 13 - 13 < 30 - 13$$

$$2t < 17$$

$$\frac{2t}{2} < \frac{17}{2}$$

$$t < 8.5$$

You can spend at most \$8.49 for each T-shirt.

23. $x + 7 \leq 9$ $x + 7 > 4$

$$x + 7 - 7 \leq 9 - 7 \quad x + 7 - 7 > 4 - 7$$

$$x \leq 2$$

$$x > -3$$

$-3 < x \leq 2$; so the integer solutions are $-2, -1, 0, 1$, and 2 .

24. "feet below sea level" means a negative, -282 ; the correct choice is B. 25. \overline{DF} is the diameter, and the diameter is twice the radius; the correct choice is G.

26. pentagonal pyramid 27. rectangular prism

28. hexagonal prism

ACTIVITY LAB

page 585

1. $m + 120 \geq 300$
 $m + 120 - 120 \geq 300 - 120$
 $m \geq \$180$

$$m + 120 \leq 600$$

$$m + 120 - 120 \leq 600 - 120$$

$$m \leq \$480$$

2. $25w \geq 150$ $25w \leq 250$
 $25w \div 25 \geq 150 \div 25$ $25w \div 25 \leq 250 \div 25$
 $w \geq 6$ $w \leq 10$

CHECKPOINT QUIZ 1

page 585

1. $4t + 5 = 37$ $2. \frac{r}{2} - 8 = -4$
 $4t + 5 - 5 = 37 - 5$ $\frac{r}{2} - 8 + 8 = -4 + 8$
 $4t = 32$ $\frac{r}{2} = 4$
 $\frac{4t}{4} = \frac{32}{4}$ $2 \cdot \frac{r}{2} = 2 \cdot 4$
 $t = 8$ $r = 8$

3. $5m - 8 = 57$

$$5m - 8 + 8 = 57 + 8$$

$$5m = 65$$

$$\frac{5m}{5} = \frac{65}{5}$$

$$m = 13$$

4. $p + 8 < 3$

$$p + 8 - 8 < 3 - 8$$

$$p < -5$$

5. $n - 5 \geq -17$

$$n - 5 + 5 \geq -17 + 5$$

$$n \geq -12$$

6. $d + 2 \leq 6$

$$d + 2 - 2 \leq 6 - 2$$

$$d \leq 4$$



ACTIVITY LAB

page 586

- 1a. Check students' work. The squares are 2 by 2, 3 by 3, and 4 by 4.

Area of Square (units ²)	Length of Side (units)
1	1
4	2
9	3
16	4

Area of Square (units ²)	Length of Side (units)
25	5
36	6
49	7

- 2a. Answers may vary. Sample: The numbers in both columns increase from top to bottom. Each number in the left column is the square of the corresponding number in the right column. The length is the square root of the area.

- 2b. 3a. Answers many vary. Sample: about 1.5 units; I knew the length had to be more than 1 but less than 2. 3b. Try, Check, and Revise shows that 1.41 units is the length to the nearest hundredth. 4a. Try, Check, and Revise shows that 2.83

units is the length to the nearest hundredth. 4b. The length in 3b is about half that in 4a. 5. Check students' work. 6. Check students' work.

12-4 Exploring Square Roots and

Rational Numbers pages 587-590

Check Skills You'll Need For complete solutions see *Daily Skills Check and Lesson Quiz Transparencies* or *Presentation Pro CD-ROM*. 1. multiplication 2. 4⁵

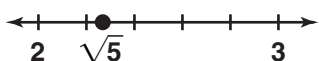
3. 999³ 4. 3.6²

Quick Check 1. Since $10^2 = 100$, $\sqrt{100} = 10$.

2. calculator: 3.16228; square root to the nearest tenth: 3.2 3. No; the decimal does not terminate or repeat so it is not rational.

Exercises 1. Yes. $\sqrt{4} = 2$; 2 is an integer, and integers are rational numbers. 2. $3 \times 3 = 9$, $4 \times 4 = 16$, $8 \times 4 = 32$, $6 \times 6 = 36$; C 3. calculator: 2.64575; square root to

the nearest tenth: 2.6 **4.** $\sqrt{4} = 2$ and $\sqrt{9} = 3$; since 5 is closer to 4 than to 9, $\sqrt{5}$ is closer to 2 than 3.



$\sqrt{5}$ is closer to 2 on the number line. **5.** Since $1^2 = 1$, $\sqrt{1} = 1$. **6.** Since $5^2 = 25$, $\sqrt{25} = 5$. **7.** Since $9^2 = 81$, $\sqrt{81} = 9$. **8.** Since $3^2 = 9$, $\sqrt{9} = 3$. **9.** Since $4^2 = 16$, $\sqrt{16} = 4$. **10.** Since $6^2 = 36$, $\sqrt{36} = 6$. **11.** Since $10^2 = 100$, $\sqrt{100} = 10$. **12.** Since $12^2 = 144$, $\sqrt{144} = 12$. **13.** calculator: 4.58258; square root to the nearest tenth: 4.6 **14.** calculator: 5.74456; square root to the nearest tenth: 5.7 **15.** calculator: 7.14143; square root to the nearest tenth: 7.1 **16.** calculator: 8.66025; square root to the nearest tenth: 8.7 **17.** calculator: 6.32456; square root to the nearest tenth: 6.3; 6.3 ft **18.** repeating decimal; rational **19.** fraction; rational **20.** Since $1^2 = 1$, $\sqrt{1}$ is rational **21.** $-2\frac{1}{2}$ is a quotient of integers, $-\frac{5}{2}$; rational **22.** fraction; rational **23.** Since 18 is not a perfect square, $\sqrt{18}$ is not rational. **24.** terminating decimal; rational. **25.** $3\frac{1}{3}$ is a quotient of integers, $\frac{10}{3}$; rational **26.** Since $7^2 = 49$, $\sqrt{49}$ is rational. **27.** counting number; rational **28.** nonrepeating, nonterminating decimal; not rational **29.** Since 32 is not a perfect square, $\sqrt{32}$ is not rational. **30.** The patio is square so each length is the same size. Therefore, you can take the square root of the area to find a length of one side. Since $13^2 = 169$, $\sqrt{169} = 13$; $13 \times 4 = 52$; 52 ft **31.** The nearest perfect squares for 6 are 4 and 9; $\sqrt{4} = 2$ and $\sqrt{9} = 3$; since 6 is closer to 4 than to 9, $\sqrt{6}$ is closer to 2 than 3; $\sqrt{6} \approx 2$ **32.** The nearest perfect squares for 7 are 4 and 9; $\sqrt{4} = 2$ and $\sqrt{9} = 3$; since 7 is closer to 9 than to 4, $\sqrt{7}$ is closer to 3 than 2; $\sqrt{7} \approx 3$ **33.** The nearest perfect squares for 11 are 9 and 16; $\sqrt{9} = 3$ and $\sqrt{16} = 4$; since 11 is closer to 9 than to 16, $\sqrt{11}$ is closer to 3 than 4; $\sqrt{11} \approx 3$ **34.** The nearest perfect squares for 26 are 25 and 36; $\sqrt{25} = 5$ and $\sqrt{36} = 6$; since 26 is closer to 25, $\sqrt{26}$ is closer to 5 than 6; $\sqrt{26} \approx 5$ **35.** Yes; no; explanations may vary. Sample: Since $\sqrt{1} = 1$, $\sqrt{2}$ must be greater than 1. Since $\sqrt{4} = 2$, $\sqrt{2}$ must be less than 2. **36.** The expressions are all equal. **37.** Use *Try*, *Check*, and *Revise* to find that $230^2 = 52,900$; 230 m on a side **38a.** $(\sqrt{2})^2 = 2$ **38b.** $(\sqrt{3})^2 = 3$ **38c.** $(\sqrt{16})^2 = 16$ **38d.** You get the original number. **39.** 5 and 6; explanations may vary. Sample: $25 < 29 < 36$, and since $\sqrt{25} = 5$ and $\sqrt{36} = 6$, $\sqrt{29}$ lies between 5 and 6. **40.** 36 and 64 are perfect squares because $6^2 = 36$ and $8^2 = 64$; $36 + 64 = 100$; 36 and 64 **41.** Point *S* is 2 units right on the *x* axis and $\frac{2}{3}$ units up on the *y* axis, so the correct choice is C. **42.** Withdrawing money is usually associated with a negative integer, so the correct choice

is J. **43.** $\frac{4}{72} = \frac{1}{18}$; the correct choice is A. **44.** $3.14 \times 2^2 \approx 12.56$; 12.6 in.² **45.** radius: 2; $3.14 \times (2)^2 \approx 12.56$; 12.6 ft² **46.** $3.14 \times 6^2 \approx 113.04$; 113.0 m² **47.** radius: 7.5; $3.14 \times (7.5)^2 \approx 176.625$; about 176.6 km²

12-5 Introducing the Pythagorean Theorem pages 591–594

Check Skills You'll Need For complete solutions see *Daily Skills Check and Lesson Quiz Transparencies* or *Presentation Pro CD-ROM*. **1.** Answers may vary. Sample: 36; 25; 16 **2.** 3 **3.** 8 **4.** 5 **5.** 6 **6.** 11 **7.** 25

Quick Check

1. $12^2 + 16^2 = c^2$	2. $a^2 + 10^2 = 11^2$
$144 + 256 = c^2$	$a^2 + 100 = 121$
$400 = c^2$	$a^2 = 21$
$\sqrt{400} = \sqrt{c^2}$	$\sqrt{a^2} = \sqrt{21}$
$20 = c$	$a \approx 4.58$

20 in.

4.6 ft

Exercises 1. The hypotenuse is the longest side and opposite the right angle.

2. $a^2 + b^2 = c^2$	3. yes; $5^2 + 12^2 = 13^2$	4. No; the hypotenuse is always the longest side of a right triangle.
$21^2 + 20^2 = c^2$	5. $18^2 + 24^2 = c^2$	6. $7^2 + 24^2 = c^2$
$441 + 400 = c^2$	$324 + 576 = c^2$	$49 + 576 = c^2$
$\sqrt{841} = c$	$900 = c^2$	$625 = c^2$
$29 = c$	$\sqrt{900} = \sqrt{c^2}$	$\sqrt{625} = \sqrt{c^2}$
7. $4^2 + 3^2 = c^2$	$30 = c$	$25 = c$
$16 + 9 = c^2$	8. $10^2 + 24^2 = c^2$	$100 + 576 = c^2$
$25 = c^2$	$676 = c^2$	$676 = c^2$
$\sqrt{25} = \sqrt{c^2}$	$\sqrt{676} = \sqrt{c^2}$	$26 = c$
$5 = c$	9. $6^2 + 8^2 = c^2$	10. $12^2 + 20^2 = c^2$
9. $36 + 64 = c^2$	$100 = c^2$	$144 + 400 = c^2$
$\sqrt{100} = \sqrt{c^2}$	$10 = c$	$544 = c^2$
11. $a^2 + 20^2 = 25^2$	$a^2 + 400 = 625$	$\sqrt{544} = \sqrt{c^2}$
$a^2 + 400 = 625$	$a^2 = 225$	$23.3 \approx c$
$a^2 + 400 - 400 = 625 - 400$	$\sqrt{a^2} = \sqrt{225}$	
$a^2 = 225$	$a = 15$	
$\sqrt{a^2} = \sqrt{225}$	12. $8^2 + b^2 = 17^2$	
$a = 15$	$64 + b^2 = 289$	
	$64 + b^2 - 64 = 289 - 64$	
	$b^2 = 225$	
	$\sqrt{b^2} = \sqrt{225}$	
	$b = 15$	

$$\begin{aligned}
 13. \quad a^2 + 7^2 &= 9^2 \\
 a^2 + 49 &= 81 \\
 a^2 + 49 - 49 &= 81 - 49 \\
 a^2 &= 32 \\
 \sqrt{a^2} &= \sqrt{32} \\
 a &\approx 5.7
 \end{aligned}$$

$$\begin{aligned}
 14. \quad 2^2 + b^2 &= 5^2 \\
 4 + b^2 &= 25 \\
 4 + b^2 - 4 &= 25 - 4 \\
 b^2 &= 21 \\
 \sqrt{b^2} &= \sqrt{21} \\
 b &\approx 4.6
 \end{aligned}$$

$$\begin{aligned}
 15. \quad 6^2 + b^2 &= 10^2 \\
 36 + b^2 &= 100 \\
 36 + b^2 - 36 &= 100 - 36 \\
 b^2 &= 64 \\
 \sqrt{b^2} &= \sqrt{64} \\
 b &= 8
 \end{aligned}$$

The point where the ladder touches the building is 8 ft high.

16. The length of the hypotenuse is unknown.

$$\begin{aligned}
 9^2 + 40^2 &= c^2 \\
 81 + 1,600 &= c^2 \\
 1,681 &= c^2 \\
 \sqrt{1,681} &= \sqrt{c^2} \\
 41 &= c
 \end{aligned}$$

The wire will be 41 ft long.

17. The length c of the hypotenuse is unknown.

$$\begin{aligned}
 24^2 + 10^2 &= c^2 \\
 576 + 100 &= c^2 \\
 676 &= c^2 \\
 \sqrt{676} &= \sqrt{c^2} \\
 26 &= c
 \end{aligned}$$

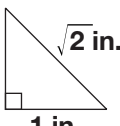
The diagonal should be 26 in. long.

18. Let a represent the width of the screen.

$$\begin{aligned}
 a^2 + 15^2 &= 27^2 \\
 a^2 + 225 &= 729 \\
 a^2 + 225 - 225 &= 729 - 225 \\
 a^2 &= 504 \\
 \sqrt{a^2} &= \sqrt{504} \\
 a &\approx 22.4
 \end{aligned}$$

The screen is about 22 in. wide.

19. The legs have length r and s . The hypotenuse has length t ; $r^2 + s^2 = t^2$

20.  $\sqrt{2} = \sqrt{(1^2 + 1^2)}$; Draw a right triangle whose legs are each 1 unit long.

21. $10 - 5 = 5$; $11 - 5 = 6$; $12 - 5 = 7$; $n - 5$; the correct choice is B.

22. Let c = cans of food.

$$\begin{aligned}
 \frac{2}{7} &= \frac{c}{30} \\
 2 \cdot 30 &= 7c \\
 60 &= 7c \\
 \frac{60}{7} &= \frac{7c}{7} \\
 9 &\approx c
 \end{aligned}$$

The correct choice is H.

23. distance from 0: 0; $|0| = 0$ 24. distance from 0: 3; $|-3| = 3$ 25. distance from 0: 85; $|85| = 85$ 26. distance from 0: 84; $|-84| = 84$

GUIDED PROBLEM SOLVING pages 595–596

1. The angles have the same measure. 2. The proportion $\frac{4}{3} = \frac{y}{12}$ can be used to find y in feet.

$$\begin{aligned}
 3. \quad \frac{4}{3} &= \frac{y}{12} & 4a. \quad 14^2 + 5^2 &= c^2 \\
 4 \cdot 12 &= 3y & 196 + 25 &= c^2 \\
 48 &= 3y & 221 &= c^2 \\
 \frac{48}{3} &= \frac{3y}{3} & \sqrt{221} &= \sqrt{c^2} \\
 16 \text{ ft} &= y & 14.9 &\approx c \\
 4^2 + 16^2 &= x^2 & 14.9 \text{ ft} & \\
 16 + 256 &= x^2 & & \\
 272 &= x^2 & & \\
 \sqrt{272} &= \sqrt{x^2} & & \\
 16.5 \text{ ft} &\approx x & &
 \end{aligned}$$

4b. $5^2 + 14^2 = x^2$ 5a. $10^\circ\text{C} \div 6.5^\circ\text{C} \approx 1.5$; about 1.5 km

5b. $15^\circ\text{C} \div 6.5^\circ\text{C} \approx 2.3$; about 2.3 km 6. $\$15.00 - \$0.25 = \$14.75$; $\$14.75 \div \$0.12 \approx 122.9$; 123 seems to be the solution but $123 \times \$0.12 + \$0.25 = \$15.01$ and you cannot spend over $\$15.00$, so the solution is 122; 122 minutes 7. 3 o'clock to 6 o'clock is 90° , every 90° section is split into 3 equal parts, so 7 o'clock is 30° , 7 to the remaining angle is $\frac{15}{60}$ or $\frac{1}{4}$ of one of the 30° sections; $90^\circ + 30^\circ + (\frac{1}{4} \times 30^\circ) = 120^\circ + 7.5^\circ = 127.5^\circ$

TEST-TAKING STRATEGIES page 597

1. $27 \approx 30$; $30 \times 30 = 900$; the correct choice is D.
2. $s = 116 \div 4$; the correct choice is F.

CHAPTER REVIEW pages 598–599

1. rational number (E) 2. perfect square (D)
3. inequality (B) 4. square root (F) 5. hypotenuse (A)
6. $3h + 6 = 15$ 7. $2j - 4 = -2$
 $3h + 6 - 6 = 15 - 6$ $2j - 4 + 4 = -2 + 4$
 $3h = 9$ $2j = 2$
 $\frac{3h}{3} = \frac{9}{3}$ $\frac{2j}{2} = \frac{2}{2}$
 $h = 3$ $j = 1$
8. $\frac{f}{5} + 4 = 29$
 $\frac{f}{5} + 4 - 4 = 29 - 4$
 $\frac{f}{5} = 25$
 $5 \cdot \frac{f}{5} = 5 \cdot 25$
 $f = 125$

9. no since $4 > -4$ 10. yes since $-4 \leq -4$ 11. no since $-2 > -4$ 12. yes since $-6 \leq -4$ 13. Place an open circle at -4 . Then shade to the right of -4 .



14. Place an open circle at 8. Shade to the left of 8.



15. Place a closed circle at -5 . Then shade to the right of -5 .



16. Place a closed circle at 3. Shade to the left of 3.



17. $q + 6 < 9$

$$q + 6 - 6 < 9 - 6$$

$$q < 3$$

19. $v - 4 > 12$

$$v - 4 + 4 > 12 + 4$$

$$v > 16$$

18. $t - 7 < -2$

$$t - 7 + 7 < -2 + 7$$

$$t < 5$$

20. $y + 9 \geq -11$

$$y + 9 - 9 \geq -11 - 9$$

$$y \geq -20$$

21. Since $9^2 = 81$, $\sqrt{81} = 9$. 22. calculator: 4.898979; square root to the nearest tenth: 4.9 23. calculator:

5.4772255; square root to the nearest tenth: 5.5 24. Since

$12^2 = 144$, $\sqrt{144} = 12$. 25. Since $2^2 = 4$ and $3^2 = 9$, $\sqrt{6}$ is

between 2 and 3. 26. Since $3^2 = 9$ and $4^2 = 16$, $\sqrt{12}$ is

between 3 and 4. 27. Since $4^2 = 16$ and $5^2 = 25$, $\sqrt{21}$ is

between 4 and 5. 28. Since $5^2 = 25$ and $6^2 = 36$, $\sqrt{31}$ is

between 5 and 6. 29. repeating decimal; rational 30. 18

is not a perfect square; not rational 31. terminating

decimal; rational 32. Since $8^2 = 64$, $\sqrt{64} = 8$; rational

33. $6^2 + 8^2 = c^2$

$$36 + 64 = c^2$$

$$100 = c^2$$

$$\sqrt{100} = \sqrt{c^2}$$

$$10 = c$$

34. $15^2 + b^2 = 17^2$

$$225 + b^2 = 289$$

$$225 + b^2 - 225 = 289 - 225$$

$$b^2 = 64$$

$$\sqrt{b^2} = \sqrt{64}$$

$$b = 8$$

36. $a^2 + 6^2 = 8^2$

$$a^2 + 36 = 64$$

$$a^2 = 28$$

$$\sqrt{a^2} = \sqrt{28}$$

$$a \approx 5.3$$

35. $1^2 + 2^2 = c^2$

$$1 + 4 = c^2$$

$$5 = c^2$$

$$\sqrt{5} = \sqrt{c^2}$$

$$2.2 \approx c$$

37. $86^2 + 100^2 = c^2$

$$7,396 + 10,000 = c^2$$

$$17,396 = c^2$$

$$\sqrt{17,396} = \sqrt{c^2}$$

$$132 \approx c$$

132 in.

CHAPTER TEST

page 600

1. $4u + 7 = 35$

$$4u + 7 - 7 = 35 - 7$$

$$4u = 28$$

$$\frac{4u}{4} = \frac{28}{4}$$

$$u = 7$$

2. $6r - 4 = 20$

$$6r - 4 + 4 = 20 + 4$$

$$6r = 24$$

$$\frac{6r}{6} = \frac{24}{6}$$

$$r = 4$$

check:

$$4u + 7 = 35$$

$$4(7) + 7 = 35$$

$$28 + 7 = 35$$

check:

$$6r - 4 = 20$$

$$6(4) - 4 = 20$$

$$24 - 4 = 20$$

3. $\frac{f}{3} + 5 = 20$

$$\frac{f}{3} + 5 - 5 = 20 - 5$$

$$\frac{f}{3} = 15$$

$$3 \cdot \frac{f}{3} = 3 \cdot 15$$

$$f = 45$$

4. $\frac{n}{8} - 2 = -1$

$$\frac{n}{8} - 2 + 2 = -1 + 2$$

$$\frac{n}{8} = 1$$

$$\frac{8 \cdot n}{8} = 8 \cdot 1$$

$$n = 8$$

check:

$$\frac{f}{3} + 5 = 20$$

$$\frac{45}{3} + 5 = 20$$

$$15 + 5 = 20$$

check:

$$\frac{n}{8} - 2 = -1$$

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

$$1 - 2 = -1$$

5. Let p = the cost of one pencil.

$$5p + 0.45 = 1.20$$

$$5p + 0.45 - 0.45 = 1.20 - 0.45$$

$$5p = 0.75$$

$$\frac{5p}{5} = \frac{0.75}{5}$$

$$p = 0.15$$

Each pencil costs \$.15

6a. "fewer than" indicates $<$; Let h = the number of

hamsters; $h < 6$ 6b. "or more" indicates \geq ; Let p = the

number of people; $p \geq 50$ 7. The closed circle indicates

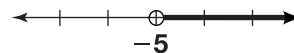
that -6 is a solution and the arrow to the left indicates

\leq or $<$; $x \leq -6$ 8a. no, since 8 is greater than -8 8b.

no, since -7 is greater than -8 8c. yes, since -8 equals

-8 8d. yes, since -10 is less than -8 9. Place an open

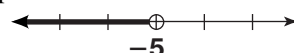
circle at -5 . Then shade to the right of -5 .



10. Place a closed circle at 4. Then shade to the left of 4.



11. Place an open circle at 5. Then shade to the left of 5.



12. Place a closed circle at -12 . Then shade to the right of -12 .



13. Yes; answers may vary. Sample: The inequality includes the equal sign, so -9 is a solution.

14. $j + 4 \geq 9$

$$j + 4 - 4 \geq 9 - 4$$

$$j \geq 5$$

15. $k - 6 < 2$

$$k - 6 + 6 < 2 + 6$$

$$k < 8$$

16. $s - 6 < 42$

$$s - 6 + 6 < 42 + 6$$

$$s < 48$$

17. $f + 2 \geq -1$

$$f + 2 - 2 \geq -1 - 2$$

$$f \geq -3$$

18. Let m = the amount to be deposited.

$$m + 59 \geq 200$$

$$m + 59 - 59 \geq 200 - 59$$

$$m \geq \$141$$

19. Let p = the points she needs.

$$p + 240 \geq 270$$

$$p + 240 - 240 \geq 270 - 240$$

$$p \geq 30 \text{ points}$$

20. Since $5^2 = 25$, $\sqrt{25} = 5$. 21. Since $7^2 = 49$, $\sqrt{49} = 7$.

22. calculator: 7.745967; square root to the nearest tenth:

7.7 23. Since $2^2 = 4$ and $3^2 = 9$, $\sqrt{5}$ is between 2 and 3.

24. Since $3^2 = 9$ and $4^2 = 16$, $\sqrt{14}$ is between 3 and 4.

25. Since $9^2 = 81$ and $10^2 = 100$, $\sqrt{97}$ is between 9 and 10.

26. 14 is not a perfect square; not rational

27. repeating decimal; rational 28. fraction; rational

$$29. 12^2 + 9^2 = c^2$$

$$144 + 81 = c^2$$

$$225 = c^2$$

$$\sqrt{225} = \sqrt{c^2}$$

$$15 = c$$

$$30. 24^2 + b^2 = 51^2$$

$$576 + b^2 = 2,601$$

$$576 + b^2 - 576 = 2,601 - 576$$

$$b^2 = 2,025$$

$$\sqrt{b^2} = \sqrt{2,025}$$

$$b = 45$$

31. The open circle indicates that -5 is not a solution and the arrow to the right indicates \geq or $>$; The inequality is $y > -5$; the correct choice is C.

TEST PREP

pages 601–603

1. According to the Order of Operations, multiplication and division are performed before addition and subtraction from left to right, so the first step would be to multiply 4.1 and 16; the correct choice is B. 2. Each of the four servers should receive $\frac{\$87.44}{4}$, or \$21.86 in tips; the correct choice is H. 3. The difference between the first and second terms is 4. The difference between the second and third terms is 6. The difference between the third and fourth terms is 8. The difference between terms increases by two for each term, so the fifth term will be $20 + 10$, or 30 and the sixth term will be $30 + 12$, or 42; the correct choice is C.

$$4. 0.2x = 46$$

$$\frac{0.2x}{0.2} = \frac{46}{0.2}$$

$$x = 230; \text{ the correct choice is J}$$

$$5. 0.317 \div 0.08 = 317 \div 80$$

$$\begin{array}{r} 3.9625 \\ 80 \overline{)317} \end{array}$$

$$\begin{array}{r} -240 \\ \hline 770 \end{array}$$

$$\begin{array}{r} -720 \\ \hline 500 \end{array}$$

$$\begin{array}{r} -480 \\ \hline 200 \end{array}$$

$$\begin{array}{r} -160 \\ \hline 400 \end{array}$$

$$\begin{array}{r} -400 \\ \hline 0 \end{array}$$

$$0$$

$$6. 4 + 6 \times (-3) - (-10) \div (-2) = 4 + (-18) - 5 = -14 - 5 = -19; \text{ the correct choice is F.}$$

$$7. c + 3\frac{2}{5} = 7\frac{4}{5}$$

$$c + \frac{11}{5} = \frac{39}{5}$$

$$c + \frac{55}{15} = \frac{117}{15}$$

$$c + \frac{55}{15} - \frac{55}{15} = \frac{117}{15} - \frac{55}{15}$$

$$c = \frac{62}{15} = 4\frac{2}{15}; \text{ the correct choice is C.}$$

$$8. 7\frac{5}{6} \approx 8 \text{ and } 5\frac{3}{4} \approx 6, 8 \times 6 = 48; \text{ the correct choice is J.}$$

$$9. 4\frac{2}{5} = \frac{22}{5}, \text{ so the reciprocal is } \frac{5}{22}; \text{ the correct choice is A.}$$

10. The x -coordinate for point P is -3 and the y -coordinate is 2, so the correct choice is J. 11. 8% of \$29.99 is

$$0.08 \cdot 29.99 = 2.40; \text{ the correct choice is A.}$$

12. $0.048 \times 100\% = 4.8\%$; the correct choice is H. 13. A bar graph is the most appropriate choice to display your height each year since birth because it compares data at certain intervals; the correct choice is C.

14. The value of D3 is the mean of A3, B3, and C3, which equals $\frac{79 + 82 + 82}{3}$, or 81; the correct choice is F. 15. In order to find the LCM, find the prime factorization of each number and find the greatest number of each factor and multiply these together. The prime factorization of 20 is $2 \times 2 \times 5$. The prime factorization of 35 is 5×7 . The prime factorization of 100 is $2 \times 2 \times 5 \times 5$. The LCM is $2 \times 2 \times 5 \times 5 \times 7$, or 700; the correct choice is D.

16. An equation for the purchase is $t + 7b = 18.55$, where t represents the tape and b represents the boxes, so

$$2.10 + 7b = 18.55.$$

$$2.10 + 7b - 2.10 = 18.55 - 2.10$$

$$7b = 16.45$$

$$\frac{7b}{7} = \frac{16.45}{7}$$

$$b = 2.35; \text{ the correct choice is G.}$$

$$17. \frac{2m}{21} = \frac{8}{35}$$

$$2m \cdot 35 = 21 \cdot 8$$

$$70m = 168$$

$$\frac{70m}{70} = \frac{168}{70}$$

$$m = 2\frac{28}{70} = 2\frac{2}{5}; \text{ the correct choice is B.}$$

18. Choice G is a 90° rotation of the face; the correct choice is G.

19. $\frac{3}{8} = 3 \div 8$

0.375 The correct choice is B.

$$\begin{array}{r} 0.375 \\ 8 \overline{)3.0} \\ \underline{-24} \\ 60 \\ \underline{-56} \\ 40 \\ \underline{-40} \\ 0 \end{array}$$

20. $-9 + w < 12$

$-9 + w + 9 < 12 + 9$

$w < 21$; the correct choice is H.

21. 4.3 written out in words is four and three tenths; the correct choice is D. 22. $\angle UNS$ and $\angle PNV$ are not vertical angles and therefore not congruent; the correct choice is H. 23. A: $\frac{1}{2} = 0.5$, $\frac{3}{4} = 0.75$, $\frac{2}{3} \approx 0.67$, $\frac{4}{5} = 0.8$, $\frac{9}{10} = 0.9$; B: $\frac{1}{2} = 0.5$, $\frac{2}{3} \approx 0.67$, $\frac{3}{4} = 0.75$, $\frac{4}{5} = 0.8$, $\frac{9}{10} = 0.9$; $\frac{2}{3}$ is not greater than $\frac{3}{4}$; the correct choice is B. 24. The total number of possible outcomes is 2 and the number of favorable outcomes is 1. So $P(\text{red marble}) = \frac{1}{2}$.

25. Set up a proportion in order to predict how many CDs are scratched in the shipment.

$$\begin{aligned} \frac{9}{125} &= \frac{x}{5,000} \\ 125x &= 5,000 \cdot 9 \\ 125x &= 45,000 \\ \frac{125x}{125} &= \frac{45,000}{125} \\ x &= 360 \end{aligned}$$

26. S.A. = $2(4 \times 3) + 2(3 \times 6) + 2(4 \times 6) = 2(12) + 2(18) + 2(24) = 24 + 36 + 48 = 108$

27. 55% of 20 is $0.55 \times 20 = 11$; $20 - 11 = 9$

28. $4j - 8 = 12$

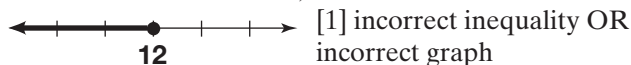
$$\begin{aligned} 4j - 8 + 8 &= 12 + 8 \\ 4j &= 20 \\ \frac{4j}{4} &= \frac{20}{4} \\ j &= 5 \end{aligned}$$

29. $5.6 \times 10^3 = 5.6 \times 1,000 = 5,600$ 30. $(16 - 8) \times 2 + (10 \div 100) = 8 \times 2 + 0.1 = 16 + 0.1 = 16.1$

31. For $j = 11$, $j \div 10 + 8.3 = 11 \div 10 + 8.3 = 1.1 + 8.3 = 9.4$

32. $3 \times 8 - 4 + 5 = 24 - 4 + 5 = 20 + 5 = 25$

33a-b. [2] No more than 12 students volunteered means that 12 or less volunteered; $s \leq 12$



[1] incorrect inequality OR incorrect graph

34a-b. [2] $\sqrt{19} \approx 4.358898944\dots$; $\sqrt{19}$ is not a

rational number because 19 is not a perfect square; [1] correct response with incorrect explanation 35. [2] $RS \cong WU$; $RT \cong WV$; $ST \cong UV$; $\angle SRT \cong \angle UWV$; $\angle RTS \cong \angle WVU$; $\angle RST \cong \angle WUV$ [1] one incorrect congruence 36. [2] $x = 0.43 \times 87$; $0.43 \times 87 = 37.41$; [1] appropriate method, but with one computational error OR correct answer with no work shown

37. [2] $7 \text{ h } 45 \text{ min}$

$$\begin{array}{r} 7 \text{ h } 45 \text{ min} \\ - 3 \text{ h } 15 \text{ min} \\ \hline 4 \text{ h } 30 \text{ min} \end{array} - 15 \text{ min} = 4 \text{ h } 15 \text{ min}$$

[1] appropriate method but with one computational error OR correct answer with no work shown

38. [2] $\frac{b}{2} + 5 = 4$

$$\frac{b}{2} + 5 - 5 = 4 - 5$$

$$\frac{b}{2} = -1$$

$$2 \cdot \frac{b}{2} = 2 \cdot (-1)$$

$$b = -2$$

[1] appropriate method but with one computational error OR correct answer with no work shown

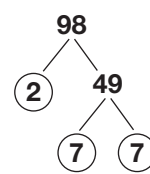
39. [2] $n + 9 \geq 17$

$$n + 9 - 9 \geq 17 - 9$$

$$n \geq 6$$

[1] appropriate method but with one computational error OR correct answer with no work shown

40. [2]



; $2 \times 7 \times 7$;

[1] correct prime factorization but no factor tree shown

41. [2] 130 mi; by an appropriate method such as cross multiplication:

$$\begin{aligned} \frac{5}{325} &= \frac{2}{x} \\ 5x &= 2 \times 325 \\ 5x &= 650 \\ x &= 130 \end{aligned}$$

[1] incorrect method OR incorrect solution

42a-c. [4] $t + 7 > 20$

$$t + 7 > 20$$

$$t + 7 - 7 > 20 - 7$$

$$t > 13$$



[3] appropriate methods, one computational error; [2] incorrect solution, correct graph; [1] correct inequality OR solution OR graph, without work shown

43a-b. [4] $A = b \times h = 5 \times 7 = 35$; 35 in.^2 ; The area of each square cut from the rectangle is 1×1 , or 1 in.^2 . The total area being cut is $1 + 1 + 1 + 1$, or 4 in.^2 . Subtract this from the total area: $35 - 4$, or 31 in.^2 .

[3] correct methods, one computational error; [2] incorrect rectangular area OR area of 2nd figure; [1] one correct solution with no explanation 44a-b. [4] 96 in.^2 by an appropriate method such as: $(3 \times 22) + (6 \times 5) = 66 + 30 = 96$; $3 \times 6 \times 5 = 90$; 90 in.^3 ; [3] appropriate methods, one computational error; [2] surface area correct OR volume correct; [1] correct surface area OR volume, without work shown

45a-b. [4] 15% of \$18.64 is $0.15 \times 18.64 = 2.796 \approx 2.80$; \$2.80; $\$18.64 + \$2.80 = \$21.44$; [3] correct methods, one computational error; [2] 2 out of 3 correct OR correct tax, tip and total no work shown; [1] correct tax OR tip OR total, no work shown

46a–b. [4]	Color	Size	Fabric	The number of possible outcomes is 12 and the number of favorable outcomes is 6, so $P(\text{wool sock}) = \frac{6}{12}$, or $\frac{1}{2}$. [3] correct tree diagram but incorrect part (b); [2] incorrect diagram, but correct probability according to tree;
	G	S	C	
			W	
		M	C	
			W	
		L	C	
			W	
	W	S	C	
			W	
		M	C	
			W	
		L	C	
			W	

[1] correct probability with no tree diagram

DK PROBLEM SOLVING APPLICATION

pages 604–605

1. cost difference: $\$15.80 - \$1.80 = \$14.00$
- 2a. incandescent light bulb: $10 \times 100 = 1,000$ watts; fluorescent light bulb: $32 \times 10 = 320$ watts
- 2b. incandescent light bulb: $1,000 \div 1,000 = 1$ kilowatt-hour; fluorescent light bulb: $320 \div 1,000 = 0.32$ kilowatt-hours
- 2c. incandescent light bulb: $\$.15 \times 1 \text{ kilowatt-hour} = \$.15$; fluorescent light bulb: $\$.15 \times 0.32 \text{ kilowatt-hours} \approx \$.05$
- 3a. incandescent light bulb life: 1,000 hours; $365 \times 10 = 3,650$ hours/year; $3,650 \div 1,000 \text{ hours} = 3.65$. You will use about 4 light bulbs. fluorescent light bulb life: 10,000 hours; $365 \times 10 = 3,650$ hours/year; $3,650 < 10,000$ hours. You will need only one light bulb.
- 3b. incandescent light bulb: $4 \times \$1.80 = \7.20 ; fluorescent light bulb: $1 \times \$15.80 = \15.80
- 3c. incandescent light bulb: $\$.15 \times 365 = \54.75 ; fluorescent light bulb: $\$.05 \times 365 = \18.25
- 3d. incandescent light bulb $\$7.20 + \$54.75 = \$61.95$; fluorescent light bulb: $\$15.80 + \$18.25 = \$34.05$
4. Check students' work.



Chapter 1

pages 612–613

1. eight hundred fifty-four 2. ten thousand fifty-nine
3. seven thousand, three hundred two 4. one million, two hundred five thousand, eight hundred seven
5. twenty-six hundredths 6. three thousand four hundred eighty-one ten-thousandths 7. seventy-two and fifty-three thousandths 8. six hundred ninety-one and four tenths 9–12. Answers may vary. Samples are given.
9. $5.31 \times 2.01 \approx 5 \times 2 = 10$ 10. $15.348 - 7.92 \approx 15 - 8 = 7$ 11. $22.961 \div 3.6 \approx 24 \div 4 = 6$
12. $728.6 + 36.09 \approx 730 + 40 = 770$
13. $65 \geq 10 + 65$ 14. $8 \times 0 \geq 8$
 $65 \neq 75$; false $0 \neq 8$; false
15. $1 \times 9.8 \geq 9.8$ 16. $4 + 5 + 7 \geq 4 + 11$
 $9.8 = 9.8$; true $16 \neq 15$; false
17. $2 + 6 \times 3 + 1 = 2 + 18 + 1 = 21$
18. $(14 + 44) \div 2 = 58 \div 2 = 29$ 19. $3 + 64 \div 4 - 10 = 3 + 16 - 10 = 9$ 20. $144 + 56 \div 4 = 144 + 14 = 158$
21. 216 22. 0.222 23. 0.2, 0.4, 0.7 24. 0.002, 0.02, 0.2, 0.202 25. 6.025, 6.05, 6.2, 6.25 26–29. Estimates may vary. Samples are given.
26. $1.14 + 9.3 \approx 1 + 9 = 10$; $1.14 + 9.3 = 10.44$ 27. $3.541 + 1.333 \approx 4 + 1 = 5$; $3.541 + 1.333 = 4.874$ 28. $5.45 - 2.8 \approx 5 - 3 = 2$; $5.45 - 2.8 = 2.65$ 29. $4.11 - 2.621 \approx 4 - 3 = 1$; $4.11 - 2.621 = 1.489$ 30. $1.8 \times 4.302 = 7.7436$
31. $0.29(0.43) = 0.1247$ 32. $7.4(930) = 6,882$
33. $0.617 \cdot 0.09 = 0.05553$ 34. $8 \div 9 = 0.\overline{8}$
35. $23 \div 25 = 0.92$ 36. $348 \div 60 = 5.8$ 37. $11 \div 16 = 0.6875$ 38. 295,734,134; 1,080,264,588; 1,306,313,812
39. $\$546 \div 180 \approx \3 40. $29 + 13 + 2 + 12 = 56$
41. The cost for students is $12 + 4 = \$16$ each and the cost for teachers is also \$16 each. Thus, the total cost for 28 students and 3 teachers is $28(16) + 3(16) = 448 + 48$, or \$496. 42. $256 \cdot \frac{1}{100} = \frac{256}{100} = 2.56$ 43. 0.23, 0.35, 0.74, 0.8, 1.5 44. $\$222.98 - \$174.99 = \$47.99$ 45. $40 \cdot 25 \cdot 0.05 = \50 46. $\$10 \div \$2.359 = 4.24$; 4.24 gallons

Chapter 2

pages 614–615

1. The mean is $35 + 39 + 27 + 28 = 129$; $129 \div 4 = 32.25$ 2. The mean is $253 + 277 + 249 + 279 + 265 = 1,323$; $1,323 \div 5 = 264.6$ 3. The mean is $7.5 + 3.8 + 12.4 + 11.7 + 12.4 = 47.8$; $47.8 \div 5 = 9.56$ 4. Arrange the data in order: 10, 22, 22, 22, 23, 25, 26, 28; The median is $\frac{22 + 23}{2} = 22.5$. The mode is 22. 5. Arrange the data in order: 11.1, 11.3, 12.0, 13.0, 13.3, 14.2; The median is $\frac{12.0 + 13.0}{2} = 12.5$. There is no mode. 6. Arrange the data in order: 29, 29, 36, 42, 45, 57, 58, 63; The median is $\frac{42 + 45}{2} = 43.5$. The mode is 29.

7.

Books Read	Tally	Frequency
1		3
2		3
3		2
4		4

			X
X	X		X
X	X	X	X
X	X	X	X
1	2	3	4

8.

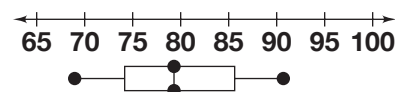
wpm	Tally	Frequency
35		4
40		3
45		0
50		0
55		2
60		0
65		2
70		1

X								
X	X							
X	X			X		X		
X	X			X		X	X	
35	40	45	50	55	60	65	70	

9. hours of reading per year per person; type of reading
10. about 100 hours 11a. 39 11b. The United States received 39 silver medals during the 2004 Summer Olympics. 12. $= B2 + C2 + D2$

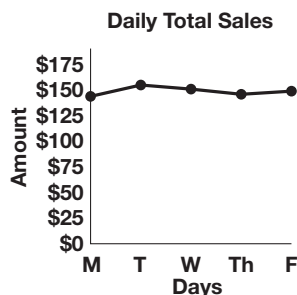
13. 6 | 9
7 | 2 4 7 8
8 | 5 6 9
9 | 1

Key: 7|2 means 72.



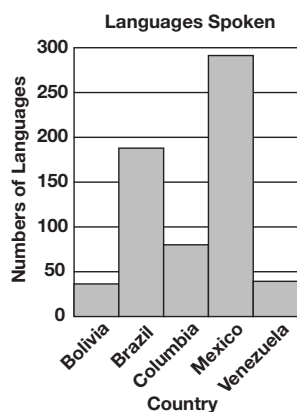
14. The vertical scale does not start at 0 and the intervals on the vertical scale are not equal.

15.



16. The mean weight is $36 + 25 + 28 + 39 + 30 = 158$; $158 \div 5 = 31.6$; 31.6 lbs. 17. The median is 86°F . There is no mode. 18. $24 - 15 = 9$

19.

20. $= F4 \div 4$

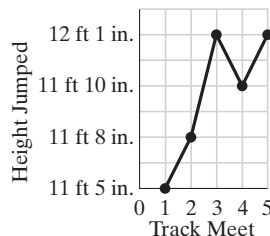
21.

Animal Speeds (mph)

2	5
3	0 2 5
4	0 3

Key: 2 | 5 means 25 mph

22. Answers may vary. Sample: The graph is misleading because the vertical scale uses unequal intervals.

**Chapter 3**

pages 616–617

1. $1 \cdot 4 = 4$; $4 \cdot 4 = 16$; $16 \cdot 4 = 64$; $64 \cdot 4 = 256$; $256 \cdot 4 = 1,024$; $1,024 \cdot 4 = 4,096$; the first term is 1. Multiply each term by 4. 2. $2 \cdot 3 = 6$; $6 \cdot 3 = 18$; $18 \cdot 3 = 54$; $54 \cdot 3 = 162$; $162 \cdot 3 = 486$; $486 \cdot 3 = 1,458$; the first term is 2. Multiply each term by 3. 3. $7 + 4 = 11$; $11 + 4 = 15$; $15 + 4 = 19$; $19 + 4 = 23$; $23 + 4 = 27$; $27 + 4 = 31$; the first term is 7. Add 4 to each term. 4. $80 - 6 = 74$; $74 - 6 = 68$; $68 - 6 = 62$; $62 - 6 = 56$; $56 - 6 = 50$; $50 - 6 = 44$; the first term is 80. Subtract 6 from each term. 5. $n - 7 = 9 - 7 = 2$ 6. $3n - 5 = 3(9) - 5 = 27 - 5 = 22$ 7. $22 - 2n = 22 - 2(9) = 4$ 8. $4n \div 6 = 4(9) \div 6 = 36 \div 6 = 6$ 9. $b - 1$ 10. $2p$ 11. $b + 4$ 12. $n \div 2$ 13. Since $2 + 6 = 8$, $x = 2$ 14. Since $5 \times 8 = 40$, $x = 8$ 15. Since $36 - 0 = 36$, $x = 0$ 16. Since $6.3 + 2 = 8.3$, $x = 6.3$ 17. Since $19 + 1 = 20$, $y = 19$ 18. Since $34 - 10 = 24$, $t = 34$ 19. Since $9 \div 3 = 3$, $a = 9$ 20. Since $10 \cdot 17.8 = 178$, $b = 17.8$ 21. $b + 4 = 7.7$
 $b + 4 - 4 = 7.7 - 4$
 $b = 3.7$

22.

$$c + 3.5 = 7.5$$

$$c + 3.5 - 3.5 = 7.5 - 3.5$$

$$c = 4$$

23.

$$n - 1.7 = 8$$

$$n - 1.7 + 1.7 = 8 + 1.7$$

$$n = 9.7$$

24.

$$8.4 = s - 0.2$$

$$8.4 + 0.2 = s - 0.2 + 0.2$$

$$8.6 = s$$

25.

$$15t = 600$$

$$\frac{15t}{15} = \frac{600}{15}$$

$$t = 40$$

26. $62 = 2b$

$$\frac{62}{2} = \frac{2b}{2}$$

$$31 = b$$

27.

$$x \div 5 = 2.5$$

$$5(x \div 5) = 5(2.5)$$

$$x = 12.5$$

28.

$$a \div 0.05 = 140$$

$$0.05(a \div 0.05) = 0.05(140)$$

$$a = 7$$

29.

$$7 \times 78 = 7 \times 70 + 7 \times 8 = 490 + 56 = 546$$

30.

$$3 \times 19 = 3 \times 10 + 3 \times 9 = 30 + 27 = 57$$

31.

$$6 \times 66 = 6 \times 60 + 6 \times 6 = 360 + 36 = 396$$

32.

$$4 \times 47 = 4 \times 40 + 4 \times 7 = 160 + 28 = 188$$

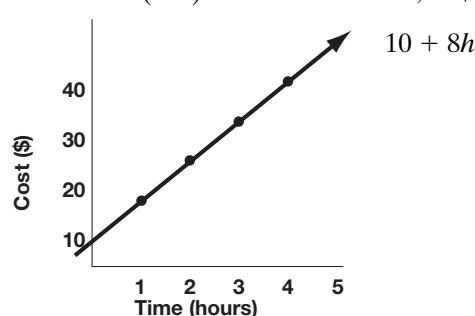
33.

The Red Train is departing every hour so the remaining departure times for the Red Train are 4:51 P.M. and 5:51 P.M. The Blue Train departs every 45 minutes so the remaining departure times for the Blue Trains are 3:17 P.M., 4:02 P.M., 4:47 P.M., and 5:32 P.M.

34.

$$3x + 45 = 3(350) + 45 = 1050 + 45, \text{ or } \$1,095$$

35.



36.

Since $5 \times 15 = 75$, $n = 15$ 37. Let m = the height of the male giraffe; $m - 14.1 = 3.2$;

38.

$$m - 14.1 + 14.1 = 3.2 + 14.1$$

$$m = 17.3 \text{ ft}$$

39.

$$15 + s = 26$$

$$15 - 15 + s = 26 - 15$$

$$s = 11$$

40.

$$11 \text{ students}$$

$$2a = 64,000,000 \text{ sq. mi.}$$

$$a = 64,000,000 \text{ sq. mi.} \div 2$$

$$a = 32,000,000 \text{ sq. mi.}$$

$$\text{Divide the total area into the sum of the two rooms: } 17.5 \times 20 + 17.5 \times 15 = 17.5(15 + 20)$$

Chapter 4

pages 618–619

1.

2: yes; 324 ends in 4; 3: yes; sum of digits, 9, is divisible by 3; 5: no; 324 does not end in 0 or 5; 9: yes; sum of digits, 9, is divisible by 9; 10: no; does not end in 0; 324 is divisible by 2, 3, and 9. 2. 2: no; 2,685 does not end in 0, 2, 4, 6, or 8; 3: yes; sum of digits, 21, is divisible by 3; 5: yes; 2,685 ends in 5; 9: no; sum of digits, 21, is not divisible by 9; 10: no; does not end in 0; 2,685 is divisible by 3 and 5. 3. 2: yes; 540 ends in 0; 3: yes; sum of digits, 9, is divisible by 3; 5: yes; 540 ends in 0; 9: yes; sum of digits,

9, is divisible by 9; 10: yes; ends in 0; 540 is divisible by 2, 3, 5, 9, and 10. **4.** 2: yes; 114 ends in 4; 3: yes; sum of digits, 6, is divisible by 3; 5: no; 114 does not end in 5 or 0; 9: no; sum of digits, 6, is not divisible by 9; 10: no; does not end in 0; 540 is divisible by 2 and 3. **5.** 2: no; 31 does not end in 0, 2, 4, 6, or 8; 3: no; sum of digits, 4, is not divisible by 3; 5: no; 31 does not end in 5 or 0; 9: no; sum of digits, 4, is not divisible by 9; 10: no; does not end in 0; 31 is not divisible by 2, 3, 5, 9, or 10. **6.** 2: no; 981 does not end in 0, 2, 4, 6, or 8; 3: yes; sum of digits, 18, is divisible by 3; 5: no; 981 does not end in 0 or 5; 9: yes; sum of digits, 18, is divisible by 9; 10: no; 981 does not end in 0; 981 is divisible by 3 and 9. **7.** $7 + 5^2 = 7 + 5 \times 5 = 7 + 25 = 32$. **8.** $(6 - 2)^3 \times 3 = 4^3 \times 3 = 4 \times 4 \times 4 \times 3 = 16 \times 12 = 192$. **9.** $8^3 = 8 \times 8 \times 8 = 64 \times 8 = 512$.

10. $9^2 + 2^2 = 9 \times 9 + 2 \times 2 = 81 + 4 = 85$

11. composite **12.** composite **13.** prime **14.** composite

15. prime **16.** prime **17.** $30 = 10 \cdot 3$; GCF of 10 and 30 is 10 **18.** $15 = 3 \cdot 5$; $18 = 3 \cdot 3 \cdot 2$; GCF of 15 and 18 is 3

19. $25 = 5 \cdot 5$; $35 = 5 \cdot 7$; GCF of 25 and 35 is 5

20. $28 = 4 \cdot 7$; $36 = 4 \cdot 9$; GCF of 28 and 36 is 4

21. $45 = 9 \cdot 5$; $72 = 9 \cdot 8$; GCF of 45 and 72 is 9

22. $8 = 4 \cdot 2$; $12 = 4 \cdot 3$; $20 = 4 \cdot 5$; GCF of 8 and 12 and 20 is 4

23. $\frac{6}{60} = \frac{1}{10}$ **24.** $\frac{3}{5} = \frac{3}{5}$ **25.** $\frac{27}{36} = \frac{3}{4}$ **26.** $\frac{40}{50} = \frac{4}{5}$

27. $\frac{3}{4} = \frac{3}{4}$ **28.** $\frac{42}{70} = \frac{3}{5}$ **29.** $1\frac{7}{8} = \frac{15}{8}$ **30.** $2\frac{3}{5} = \frac{13}{5}$

31. $11\frac{1}{9} = \frac{100}{9}$ **32.** $\frac{25}{7} = 3\frac{4}{7}$ **33.** $\frac{39}{12} = 3\frac{3}{12} = 3\frac{1}{4}$

34. $\frac{12}{5} = 2\frac{2}{5}$ **35.** LCM of 4 and 8 is 8 **36.** LCM of 6 and 14 is 42

37. LCM of 15 and 25 is 75 **38.** LCM of 20 and 36 is 180

39. LCM of 3 and 4 and 12 is 12 **40.** LCM of 8 and 10 and 15 is 120

41. $\frac{4}{9}, \frac{4}{5}$ **42.** $\frac{5}{16}, \frac{6}{16}, \frac{7}{16}$ **43.** $\frac{7}{12}, \frac{2}{3}, \frac{5}{6}$

44. $\frac{4}{6}, \frac{3}{4}, \frac{7}{9}$ **45.** $2\frac{1}{8}, 2\frac{1}{2}, 2\frac{3}{4}$ **46.** $\frac{9}{20}, \frac{3}{5}, \frac{5}{8}$ **47.** $1.25 = 1\frac{1}{4}$

48. $0.02 = \frac{1}{50}$ **49.** $0.32 = \frac{8}{25}$ **50.** $3.45 = 3\frac{9}{20}$ **51.** $0.175 = \frac{7}{40}$

52. $2.48 = 2\frac{24}{25}$ **53.** $\frac{2}{3} = 0.\overline{6}$ **54.** $\frac{2}{5} = 0.4$ **55.** $\frac{1}{4} = 0.25$

56. $7\frac{5}{12} = 7.41\overline{6}$ **57.** $4\frac{2}{3} = 4.\overline{6}$ **58.** $\frac{13}{8} = 1.625$

59. No, 18.21 divided by 4 is 4.5525 and it is not possible to split a penny.

60. Every time the piece of paper is folded it doubles the number of rectangles; 2^6

61. The factors of 126 are 1, 2, 3, 6, 21, 42, 63, and 126 so the

photographer can make rows of these numbers.

62. The factors of 84 are 1, 2, 3, 4, 6, 7, 12, 14, 21, 28, 42, and 84.

The factors of 78 are 1, 2, 3, 6, 13, 26, 39, and 78. The

GCF of 84 and 78 is 6 so this is the greatest number of

teams that can be made. **63.** $32\frac{5}{8}$ in. $= 32\frac{10}{16}$ in.

64. $\frac{2 \times 50}{12} = \frac{100}{12} = 8\frac{4}{12} = 8\frac{1}{3}$ **65.** The multiples of 6 are 6,

12, 18, 24, 30, 36, 42, 48, 54, 60, ... The multiples of 10 are

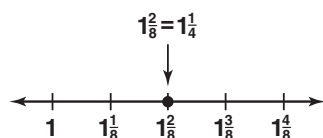
10, 20, 30, 40, 50, 60, ... The multiples of 12 are 12, 24, 36,

48, 60, ... The LCM of 6, 10 and 12 is 60 so you will have

to buy 10 packs of folders, 6 packs of stickers and 5

packs of pens.

66. $1\frac{2}{8} = 1\frac{1}{4}$



67. $\frac{3}{16} = \frac{6}{32}$; $\frac{1}{4} = \frac{8}{32}$; $1\frac{3}{16} = 1\frac{6}{32}$; $1\frac{1}{4} = 1\frac{8}{32}$; I used a common denominator of 32 to compare.

Chapter 5

pages 620–621

1. $\frac{2}{3} + \frac{1}{8} \approx \frac{1}{2} + 0 = \frac{1}{2}$ **2.** $\frac{3}{5} + \frac{4}{7} \approx \frac{1}{2} + \frac{1}{2} = 1$

3. $\frac{5}{6} - \frac{3}{8} \approx 1 - \frac{1}{2} = \frac{1}{2}$ **4.** $\frac{3}{8} - \frac{5}{12} \approx \frac{1}{2} - \frac{1}{2} = 0$

5. $12\frac{3}{4} - 7\frac{4}{9} \approx 13 - 7 = 6$ **6.** $5\frac{7}{9} + 9\frac{3}{5} \approx 6 + 10 = 16$

7. $2\frac{1}{3} - 1\frac{6}{7} \approx 2 - 2 = 0$ **8.** $6\frac{3}{10} + 4\frac{5}{8} \approx 6 + 5 = 11$

9. $\frac{5}{8} + \frac{1}{8} = \frac{6}{8} = \frac{3}{4}$ **10.** $\frac{4}{5} - \frac{2}{5} = \frac{2}{5}$ **11.** $\frac{11}{12} + \frac{5}{12} = \frac{16}{12} =$

$1\frac{4}{12} = 1\frac{1}{3}$ **12.** $\frac{7}{8} - \frac{3}{8} = \frac{4}{8} = \frac{1}{2}$ **13.** $\frac{5}{6} + \frac{2}{3} = \frac{5}{6} + \frac{4}{6} = \frac{9}{6} = 1\frac{1}{2}$

14. $\frac{7}{8} - \frac{3}{4} = \frac{7}{8} - \frac{6}{8} = \frac{1}{8}$ **15.** $\frac{3}{5} + \frac{5}{8} = \frac{24}{40} + \frac{25}{40} = \frac{49}{40} = 1\frac{9}{40}$

16. $\frac{3}{8} - \frac{1}{12} = \frac{9}{24} - \frac{2}{24} = \frac{7}{24}$ **17.** $6\frac{2}{3} + 1\frac{1}{2} = 6\frac{4}{6} + 1\frac{3}{6} =$

$7\frac{7}{6} = 8\frac{1}{6}$ **18.** $5\frac{7}{8} + 1\frac{3}{4} = 5\frac{7}{8} + 1\frac{6}{8} = 6\frac{13}{8} = 7\frac{5}{8}$

19. $8\frac{1}{4} + 3\frac{1}{3} = 8\frac{3}{12} + 3\frac{4}{12} = 11\frac{7}{12}$ **20.** $7\frac{3}{10} + 3\frac{1}{4} =$

$7\frac{6}{20} + 3\frac{5}{20} = 10\frac{11}{20}$ **21.** $7\frac{3}{8} - 1\frac{2}{3} = 7\frac{9}{24} - 1\frac{16}{24} =$

$6\frac{33}{24} - 1\frac{16}{24} = 5\frac{17}{24}$ **22.** $11\frac{1}{6} - 2\frac{3}{4} = 11\frac{2}{12} - 2\frac{9}{12} =$

$10\frac{14}{12} - 2\frac{9}{12} = 8\frac{5}{12}$ **23.** $7\frac{5}{6} - 2\frac{1}{10} = 7\frac{25}{30} - 2\frac{3}{30} = 5\frac{22}{30} =$

$5\frac{11}{15}$ **24.** $6\frac{1}{3} - 2\frac{1}{4} = 6\frac{4}{12} - 2\frac{3}{12} = 4\frac{1}{12}$

25. $x + 6\frac{4}{9} = 8\frac{1}{9}$ **26.** $y + 2\frac{3}{8} = 8\frac{1}{8}$

$x + 6\frac{4}{9} - 6\frac{4}{9} = 8\frac{1}{9} - 6\frac{4}{9}$ $y + 2\frac{3}{8} - 2\frac{3}{8} = 8\frac{1}{8} - 2\frac{3}{8}$

$x = 7\frac{10}{9} - 6\frac{4}{9}$ $y = 8\frac{8}{40} - 2\frac{15}{40}$

$x = 1\frac{6}{9}$ $y = 7\frac{48}{40} - 2\frac{15}{40}$

$x = 1\frac{2}{3}$ $y = 5\frac{33}{40}$

27. $a + 9 = 12\frac{7}{9}$ **28.** $4\frac{5}{7} = b - 3\frac{1}{2}$

$a + 9 - 9 = 12\frac{7}{9} - 9$ $4\frac{5}{7} + 3\frac{1}{2} = b - 3\frac{1}{2} + 3\frac{1}{2}$

$a = 3\frac{7}{9}$ $4\frac{10}{14} + 3\frac{7}{14} = b$

$7\frac{17}{14} = b$

$8\frac{3}{14} = b$

29. $c - 11\frac{2}{3} = 15$ **30.** $n + 4\frac{1}{2} = 5$

$c - 11\frac{2}{3} + 11\frac{2}{3} = 15 + 11\frac{2}{3}$ $n + 4\frac{1}{2} - 4\frac{1}{2} = 5 - 4\frac{1}{2}$

$c - 11\frac{2}{3} + 11\frac{2}{3} = 15 + 11\frac{2}{3}$ $n = \frac{1}{2}$

$c = 26\frac{2}{3}$

31. $m - 5\frac{3}{4} = 10\frac{1}{2}$ **32.** $p - 8\frac{1}{3} = 9\frac{1}{4}$

$m - 5\frac{3}{4} + 5\frac{3}{4} = 10\frac{1}{2} + 5\frac{3}{4}$ $p - 8\frac{1}{3} + 8\frac{1}{3} = 9\frac{1}{4} + 8\frac{1}{3}$

$m = 10\frac{2}{4} + 5\frac{3}{4}$ $p = 9\frac{3}{12} + 8\frac{4}{12}$

$m = 15\frac{5}{4}$ $p = 17\frac{7}{12}$

$m = 16\frac{1}{4}$

33. $5 \text{ h } 15 \text{ min} - 3 \text{ h } 45 \text{ min} = 4 \text{ h } 75 \text{ min} - 3 \text{ h } 45 \text{ min} =$

$1 \text{ h } 30 \text{ min}$ **34.** $11 \text{ h } 55 \text{ min} - 8 \text{ h } 10 \text{ min} = 3 \text{ h } 45 \text{ min}$

35. $6 \text{ h } 23 \text{ min} + 12 \text{ h} = 18 \text{ h } 23 \text{ min}$; $18 \text{ h } 23 \text{ min} - 11 \text{ h}$

$45 \text{ min} = 17 \text{ h } 83 \text{ min} - 11 \text{ h } 45 \text{ min} = 6 \text{ h } 38 \text{ min}$

36. $4 \text{ h } 10 \text{ min} + 12 \text{ h} = 16 \text{ h } 10 \text{ min}$; $16 \text{ h } 10 \text{ min} - 4 \text{ h } 5$

$\text{min} = 12 \text{ h } 5 \text{ min}$ **37.** $5 \text{ h } 2 \text{ min} - 3 \text{ h } 25 \text{ min} =$

$4 \text{ h } 62 \text{ min} - 3 \text{ h } 25 \text{ min} = 1 \text{ h } 37 \text{ min}$

38. $11 \text{ h } 55 \text{ min} + 12 \text{ h} = 23 \text{ h } 55 \text{ min}$;

$23 \text{ h } 55 \text{ min} - 8 \text{ h } 10 \text{ min} = 15 \text{ h } 45 \text{ min}$

39. Convert into mixed fractions; $1\frac{5}{8} = \frac{13}{8}$; $\frac{3}{4} = \frac{3 \times 2}{4 \times 2} =$

$\frac{6}{8}$; Round the prices $\$8.25 \approx \8 ; $\$7.95 \approx \8 . Each costs about the same amount so add together and find cost; $\frac{13}{8} + \frac{6}{8} = \frac{19}{8}$, $\frac{19}{8} \times 8 = 19$. The fabric will cost about \$19.00. **40.** $\frac{1}{8} + \frac{3}{8} = \frac{4}{8} = \frac{1}{2}$, or $\frac{1}{2}$ mi
41. $\frac{1}{6} + \frac{1}{3} = \frac{1}{6} + \frac{2}{6} = \frac{3}{6} = \frac{1}{2}$, or $\frac{1}{2}$ oz
42. $1\frac{3}{4} + 2\frac{1}{2} = 1\frac{3}{4} + 2\frac{2}{4} = 3\frac{5}{4} = 4\frac{1}{4}$, or $4\frac{1}{4}$ lb
43. $7\frac{7}{8} - 5\frac{15}{16} = 7\frac{14}{16} - 5\frac{15}{16} = 6\frac{30}{16} = 5\frac{15}{8} = 1\frac{15}{8}$, $1\frac{15}{8}$ in.
44. $18\frac{1}{2} - 1\frac{1}{8} = 18\frac{4}{8} - 1\frac{1}{8} = 17\frac{3}{8}$, or $17\frac{3}{8}$ ft
45. $2\frac{3}{4} - \frac{1}{2} = 2\frac{3}{4} - \frac{2}{4} = 2\frac{1}{4}$, or $2\frac{1}{4}$ ft **46.** You have to leave home at 12:15 P.M. to reach the reunion at 1:00 P.M. You will be at the reunion 3 hours, or until 4:00 P.M. You will arrive home at 4:45. Find the time elapsed between 12:15 P.M. and 4:45 P.M.: 4 h 45 min + 12 h = 16 h 45 min; 16 h 45 min - 12 h 15 min = 4 h 30 min, or $4\frac{1}{2}$ hours.

Chapter 6

pages 622–623

- 1.** $\frac{1}{2} \times \frac{2}{3} = \frac{2}{6} = \frac{1}{3}$ **2.** $\frac{1}{3} \times \frac{1}{5} = \frac{1}{15}$ **3.** $\frac{7}{8} \times \frac{3}{4} = \frac{21}{32}$ **4.** $\frac{7}{6} \times 42 = \frac{7}{1} \times 7 = 49$ **5.** $7\frac{1}{2} \times 2\frac{2}{3} = \frac{15}{2} \times \frac{8}{3} = \frac{5}{1} \times \frac{4}{1} = 20$
6. $6\frac{2}{3} \times 7\frac{1}{5} = \frac{20}{3} \times \frac{36}{5} = 4 \times \frac{12}{1} = 48$ **7.** $5\frac{5}{8} \times 2\frac{1}{3} = \frac{45}{8} \times \frac{7}{3} = \frac{15}{8} \times \frac{7}{1} = \frac{105}{8} = 13\frac{1}{8}$ **8.** $12\frac{1}{4} \times 6\frac{2}{7} = \frac{49}{4} \times \frac{44}{7} = \frac{7}{1} \times \frac{11}{1} = 77$ **9.** $2 \div \frac{4}{5} = 2 \times \frac{5}{4} = 1 \times \frac{5}{2} = 2\frac{1}{2}$
10. $\frac{2}{3} \div \frac{2}{5} = \frac{2}{3} \times \frac{5}{2} = \frac{1}{1} \times \frac{5}{3} = \frac{5}{3} = 1\frac{2}{3}$ **11.** $\frac{1}{4} \div \frac{1}{5} = \frac{1}{4} \times \frac{5}{1} = \frac{5}{4} = 1\frac{1}{4}$ **12.** $\frac{4}{11} \div 8 = \frac{4}{11} \times \frac{1}{8} = \frac{1}{11} \times \frac{1}{2} = \frac{1}{22}$
13. $12 \div 3\frac{1}{5} \approx 12 \div 3 = 4$ **14.** $7\frac{3}{7} \div 1\frac{2}{5} \approx 7 \div 1 = 7$
15. $41\frac{8}{10} \div 6\frac{1}{3} \approx 42 \div 6 = 7$ **16.** $36\frac{2}{7} \div 4\frac{3}{9} \approx 36 \div 4 = 9$
17. $2\frac{1}{4} \div \frac{2}{3} = \frac{9}{4} \div \frac{2}{3} = \frac{9}{4} \times \frac{3}{2} = \frac{27}{8} = 3\frac{3}{8}$ **18.** $4\frac{1}{2} \div 3\frac{1}{3} = \frac{9}{2} \div \frac{10}{3} = \frac{9}{2} \times \frac{3}{10} = \frac{27}{20} = 1\frac{7}{20}$ **19.** $2\frac{2}{5} \div \frac{2}{25} = \frac{12}{5} \div \frac{2}{25} = \frac{12}{5} \times \frac{25}{2} = \frac{6}{1} \times \frac{5}{1} = 30$ **20.** $5\frac{2}{3} \div 1\frac{1}{2} = \frac{17}{3} \div \frac{3}{2} = \frac{17}{3} \times \frac{2}{3} = \frac{34}{9} = 3\frac{7}{9}$
21. $\frac{x}{4} = 8$ **22.** $\frac{a}{3} = 9$
(4) $\cdot \frac{x}{4} = (4) \cdot 8$ **(3)** $\cdot \frac{a}{3} = (3) \cdot 9$
 $x = 32$ $a = 27$
23. $\frac{c}{7} = 24$ **24.** $\frac{m}{2} = 14$
(7) $\cdot \frac{c}{7} = (7) \cdot 24$ **(2)** $\cdot \frac{m}{2} = (2) \cdot 14$
 $c = 168$ $m = 28$
25. $\frac{r}{4} = 3.5$ **26.** $\frac{t}{12} = 3$
(4) $\cdot \frac{r}{4} = (4) \cdot 3.5$ **(12)** $\cdot \frac{t}{12} = (12) \cdot 3$
 $r = 14$ $t = 36$
27. $\frac{1}{3y} = 15$ **28.** $\frac{3}{4}w = 12$
(3) $\cdot \frac{1}{3y} = (3) \cdot 15$ **$\frac{4}{3} \cdot \frac{3}{4}w = \frac{4}{3} \cdot 12$**
 $y = 45$ $w = 16$
29. gallons **30.** tons **31.** inches **32.** pounds **33.** feet
34. quarts **35.** 4 ft $\div 3 = 1\frac{1}{3}$ yd **36.** 48 oz $\div 16 = 3$ lb
37. 32 qt $\div 4 = 8$ gal **38.** 8,000 lb $\div 2,000 = 4$ ton
39. 10 lb $\times 16 = 160$ oz **40.** 60 in. $\div 12 = 5$ ft
41. 64 cups $\div 2 = 32$ pt **42.** 9 mi $\times 5,280 = 47,520$ ft
43. $\frac{4}{5}$ of the full price for a shirt is $\frac{1}{5}$ off; $\frac{1}{5} \cdot 21.00 = 4.20$.

$\frac{3}{4}$ off the full price for a pair of jeans is $\frac{1}{4}$ off; $\frac{1}{4} \cdot 40.00 = 10.00$. $\frac{9}{10}$ of the full price for a pairs of shoes is $\frac{1}{10}$ off; $\frac{1}{10} \cdot 27.00 = 2.70$. $\$4.20 + 10.00 + \$2.70 = \$16.90$
44. Two 10-foot boards is 20 feet of wood. $6 \cdot 3\frac{1}{2}$ ft = 21 ft; No, she is short by 1 foot so she would need two $10\frac{1}{2}$ ft boards. **45.** $8 \div \frac{1}{8} = 8 \cdot 8 = 64$; 64 pieces **46.** $71 \frac{5}{8} \div 7\frac{1}{2} = 9\frac{11}{20}$; $9\frac{11}{20}$ points per hour **47.** $8 \div 3\frac{1}{3} \cdot 5 = 8 \div \frac{(3 \times 3) + 1}{3} \cdot 5 = 8 \div \frac{10}{3} \cdot 5 = 8 \times \frac{3}{10} \cdot 5 = \frac{24}{10} \cdot 5 = \frac{120}{10} = 12$; 12 miles **48.** $16 \cdot 4\frac{1}{2}$ oz = 72 oz
49. $200 \div 1\frac{1}{6} = 171$; 171 bows **50.** There are 2,000 lb in 1 ton. $1,000 \text{ lb} \div 2,000 = \frac{1}{2}$ ton **51.** There are 5,280 ft in 1 mile. $22,831 \text{ ft} \div 5,280 \approx 4.3$; about 4.3 miles

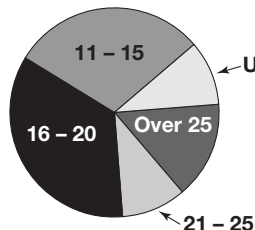
Chapter 7

pages 624–625

1–5. Answers may vary. Samples are given.

- 1.** $\frac{1}{2}, \frac{4}{8}$ **2.** $\frac{1}{3}, 1 : 3, \frac{5}{15}$ **3.** $1 : 4, \frac{13}{52}, \frac{1}{4}$ **4.** 1 to 11, $1 : 11, \frac{1}{11}$
5. 18 : 72, 1 to 4, $1 : 4$ **6.** $\$2.99 \div 12 \approx \0.25 ; $\$3.59 \div 16 \approx \0.22 ; 16 ounces for \$3.59 **7.** $\$1.95 \div 8 \approx \0.24 ; $\$2.99 \div 15 \approx \0.20 ; 8 ounces for \$1.95 **8.** $\frac{6}{30} = \frac{1}{5}$; yes
9. $\frac{9}{12} \neq \frac{12}{9}$; no **10.** $\frac{13}{3} = \frac{26}{6}$; yes **11.** $\frac{5}{225} \neq \frac{2}{95}$; no
12. $\frac{64}{130} \neq \frac{5}{10}$; no
13. $\frac{a}{50} = \frac{3}{75}$ **14.** $\frac{18}{b} = \frac{3}{10}$
 $75a = 150$ $3b = 180$
 $a = 2$ $b = 60$
15. $\frac{51}{17} = \frac{c}{3}$ **16.** $\frac{2}{16} = \frac{d}{24}$
 $17c = 153$ $16d = 48$
 $c = 9$ $d = 3$
17. $\frac{3}{45} = \frac{g}{8}$
 $3g = 180$
 $g = 60$
18. $3.5 \cdot 100 = 350$ km **19.** $1.3 \cdot 100 = 130$ km
20. $0.7 \cdot 100 = 70$ km **21.** $5 \cdot 100 = 500$ km
22. $42\% = 0.42 = \frac{42}{100} = \frac{21}{50}$ **23.** $96\% = 0.96 = \frac{96}{100} = \frac{24}{25}$ **24.** $80\% = 0.8 = \frac{8}{10} = \frac{4}{5}$ **25.** $1\% = 0.01 = \frac{1}{100}$
26. $87\% = 0.87 = \frac{87}{100}$ **27.** $88\% = 0.88 = \frac{88}{100} = \frac{22}{25}$
28. 20% of 80 = $0.2 \cdot 80 = 16$ **29.** 15% of 22.5 = $0.15 \cdot 22.5 = 3.375$ **30.** 50% of 86 = $0.5 \cdot 86 = 43$
31. 90% of 100 = $0.9 \cdot 100 = 90$ **32.** rent **33.** 25%
34. 15% of 34.90 $\approx 15\%$ of 35 = \$5.25
35. 15% of 9.54 $\approx 15\%$ of 10 = \$1.50
36. 15% of 17.50 $\approx 15\%$ of 18 = \$2.70
37. 15% of 24.80 $\approx 15\%$ of 25 = \$3.75
38. $21 - 7 = 14$; $\frac{14}{7} = \frac{2}{1}$; 2 to 1 **39.** $\$22.00 \div 4 = \5.50
40. $\$22.50 \div 10 = \2.25 ; $\$21.00 \div 6 = \3.50 ; No, Cable TV costs more per movie. **41.** $198 \div 22 = 9$; $9 \times 3 = 27$
42. $76 \times 12 = 912$
 $\frac{1.5}{57} = \frac{x}{912}$
 $57x = 1,368$
 $x = 24$ in.; 2 feet
43. $\frac{29}{40} = 0.725 \times 100\% = 72.5\%$
44. 80% of 200 = $0.8 \times 200 = 160$

45. Ages of Video Arcade Customers



Under 11

21-25

46. Answers may vary.
Sample: \$89.99 \approx 90;
 $100\% - 20\% = 80\%$;
 80% of 90 =
 $0.8 \times 90 = 72$; 7% of
 $72 = 0.07 \times 72 = 5.04$;
 $72 + 5 = \$77$

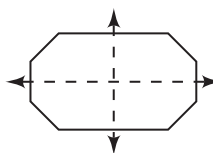
Chapter 8

pages 626-627

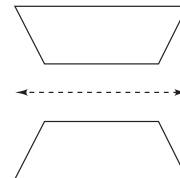
1. Answers may vary. Sample: G, H, D
2. Answers may vary. Sample: $\overrightarrow{HA}, \overrightarrow{HB}, \overrightarrow{HC}, \overrightarrow{HD}, \overrightarrow{HE}, \overrightarrow{HF}$
3. \overrightarrow{FB} and \overrightarrow{AE}
4. straight
5. obtuse
6. right
7. acute
8. obtuse
9. Let c = the complement
 $28^\circ + c = 90^\circ$
 $28^\circ + c - 28^\circ = 90^\circ - 28^\circ$
 $c = 62^\circ$
Let s = the supplement
 $28^\circ + s = 180^\circ$
 $28^\circ + s - 28^\circ = 180^\circ - 28^\circ$
 $s = 152^\circ$
10. Let c = the complement
 $13.5^\circ + c = 90^\circ$
 $13.5^\circ + c - 13.5^\circ = 90^\circ - 13.5^\circ$
 $c = 76.5^\circ$
Let s = the supplement
 $13.5^\circ + s = 180^\circ$
 $13.5^\circ + s - 13.5^\circ = 180^\circ - 13.5^\circ$
 $s = 166.5^\circ$
11. Let c = the complement
 $56.3^\circ + c = 90^\circ$
 $56.3^\circ + c - 56.3^\circ = 90^\circ - 56.3^\circ$
 $c = 33.7^\circ$
Let s = the supplement
 $56.3^\circ + s = 180^\circ$
 $56.3^\circ + s - 56.3^\circ = 180^\circ - 56.3^\circ$
 $s = 123.7^\circ$
12. Let c = the complement
 $79^\circ + c = 90^\circ$
 $79^\circ + c - 79^\circ = 90^\circ - 79^\circ$
 $c = 11^\circ$
Let s = the supplement
 $79^\circ + s = 180^\circ$
 $79^\circ + s - 79^\circ = 180^\circ - 79^\circ$
 $s = 101^\circ$
13. Let c = the complement
 $85^\circ + c = 90^\circ$
 $85^\circ + c - 85^\circ = 90^\circ - 85^\circ$
 $c = 5^\circ$
Let s = the supplement
 $85^\circ + s = 180^\circ$
 $85^\circ + s - 85^\circ = 180^\circ - 85^\circ$
 $s = 95^\circ$
14. isosceles
15. equilateral
16. scalene
17. true
18. false
19. true
20. $\frac{10}{7.5} = \frac{6}{4.5}$; similar

21. $\frac{4}{2} = \frac{5}{2.5}$; similar **22.** $\frac{8}{6} \neq \frac{13}{10}$; not similar

23.



24.



25. A one-sided arrow represents a ray and a double-sided arrow represents a line. **26.** acute

27. angle $RST = 37^\circ$

Let c = the complement

$$37^\circ + c = 90^\circ$$

$$37^\circ + c - 37^\circ = 90^\circ - 37^\circ$$

$$c = 53^\circ$$

Let s = the supplement

$$37^\circ + s = 180^\circ$$

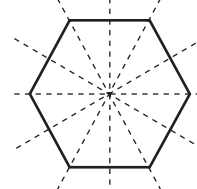
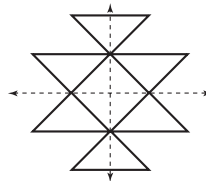
$$37^\circ + s - 37^\circ = 180^\circ - 37^\circ$$

$$s = 143^\circ$$

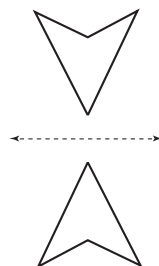
28. equilateral **29.** rectangle, parallelogram, rhombus, quadrilateral **30.** quadrilateral **31.** $\overline{QR}, \overline{MN}, \overline{RS}, \overline{NO}, \overline{SQ}, \overline{OM}; \angle Q, \angle M; \angle R, \angle N; \angle S, \angle O$

32. 2;

33. 6;



34.



Chapter 9

pages 628-629

1. mL
2. kg
3. cm
4. $35 \text{ mm} \div 10 = 3.5 \text{ cm}$
5. $10.8 \text{ km} \cdot 1,000 = 10,800 \text{ m}$
6. $2,400 \text{ mL} \div 1,000 = 2.4 \text{ L}$
7. $1,008 \text{ g} \div 1,000 = 1.008 \text{ kg}$
8. about 16 cm^2
9. about 18 cm^2
10. about 16 cm^2
11. $A = bh = 9.5 \cdot 5.5 = 52.25 \text{ ft}^2$
12. $A = \frac{1}{2}bh = \frac{1}{2} \cdot 6 \cdot 4 = 12 \text{ m}^2$
13. $A = bh = 18 \cdot 8 = 144 \text{ cm}^2$
14. $C = \pi d = 26\pi \approx 82 \text{ yd}$; $A = \pi r^2 = \pi \cdot 13^2 \approx 531 \text{ yd}^2$
15. $C = \pi d = 10.6\pi \approx 33 \text{ ft}$; $A = \pi r^2 = \pi \cdot 5.3^2 \approx 88 \text{ ft}^2$
16. $C = \pi d = 60\pi \approx 188 \text{ in.}$; $A = \pi r^2 = \pi \cdot 30^2 = 900\pi \approx 2,826 \text{ in.}^2$
17. $C = \pi d = 22\pi \approx 69 \text{ mi}$; $A = \pi r^2 = \pi \cdot 11^2 = 121\pi \approx 380 \text{ mi}^2$
18. $C = \pi d = 8.5\pi \approx 27 \text{ m}$; $A = \pi r^2 = \pi \cdot 4.25^2 \approx 57 \text{ m}^2$
19. square pyramid
20. pentagonal prism
21. rectangular prism
22. S.A. = $10 \cdot 5 \cdot 2 + 10 \cdot 8 \cdot 2 + 5 \cdot 8 \cdot 2 = 100 + 160 + 80 = 340 \text{ ft}^2$; $V = 10 \cdot 5 \cdot 8 = 400 \text{ ft}^3$
23. S.A. = $12 \cdot 16 \cdot 4 + 12 \cdot 12 \cdot 2 = 768 + 288 = 1,056 \text{ m}^2$;

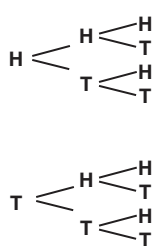
$V = 12 \cdot 16 \cdot 12 = 2,304 \text{ m}^3$ **24.** Count the number of ceiling tiles along a length of a wall. Multiply by $\frac{1}{2}$ meter.
25. $0.807 \text{ km} \times 1,000 = 807 \text{ m}$ **26.** $3 \times 6 = 18$; 18 sq. ft
27. $A = bh$; $96 = 12h$; $\frac{96}{12} = \frac{12h}{12}$; $h = 8$; 8 in. **28.** $C = \pi d$;
 $C = 3 \times 16 = 48$; $C = 3 \times 21 = 63$; $63 - 48 = 15$; 15 in.
29. $A = \pi r^2 = 2 \times 55^2 = 3 \times 3,025 = 9,075$; 9,075 sq. mi
30. triangular prism; faces, 5; vertices, 6; edges, 9
31. S.A. $= 2(b \times h) + 2(w \times h) + 2(b \times w) =$
 $2bh + 2wh + 2bw$; S.A. $=$
 $2(3b \times 3h) + 2(3w \times 3h) + 2(3b \times 3w) =$
 $18bh + 18wh + 18bw$; $18 \div 2 = 9$; 9 times larger
32. $8 \times 6 \times 4 = 8 \times 24 = 192$; 192 sq. ft
33. $V = B \times h = \pi r^2 \times h = 3 \times 18^2 \times 34 = 324 \times 102 =$
 $33,048$; 33,048 sq. in.

Chapter 10

pages 630–631

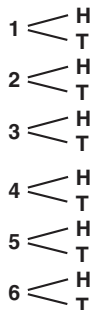
1. 8 outcomes

coin flip 1 coin flip 2 coin flip 3



2. 12 outcomes

Number Cube Coin



3. $\frac{4}{14} = \frac{2}{7}$ **4.** $\frac{3}{14}$ **5.** $\frac{7}{14} = \frac{1}{2}$ **6.** $\frac{10}{14} = \frac{5}{7}$ **7.** $\frac{168}{196} = \frac{6}{7}$ **8.** 100%
9. $0.8 \cdot 4 = 3.2$; 3 **10.** $0.8 \cdot 10 = 8$ **11.** $0.8 \cdot 30 = 24$
12. $0.8 \cdot 55 = 44$ **13.** $0.8 \cdot 125 = 100$ **14.** $0.8 \cdot 520 = 416$

15. $\frac{x}{2,037} = \frac{325}{500}$
 $500x = 2,037 \cdot 325$

$$500x = 662,025$$

$$\frac{500x}{500} = \frac{662,025}{500}$$

$$x = 1,324; 1,324 \text{ students}$$

16. $\frac{6}{10} \cdot \frac{2}{10} = \frac{12}{100} = \frac{3}{25}$ **17.** $\frac{6}{10} \cdot \frac{6}{10} = \frac{36}{100} = \frac{9}{25}$ **18.** $\frac{8}{10} \cdot \frac{8}{10} =$
 $\frac{64}{100} = \frac{16}{25}$ **19.** $9 \cdot 6 = 54$ **20.** There is one favorable

outcome and 4 possible outcomes; $\frac{1}{4}$ **21.** There are 5 favorable outcomes and 25 possible outcomes; $\frac{5}{25} = \frac{1}{5}$; 0.2; 20% **22.** There are 36 favorable outcomes and 48 possible outcomes; $\frac{36}{48} = \frac{3}{4}$ **23.** No; the odds for player A and player B are very different, player A has a $\frac{3}{10}$ chance to win and player B has a $\frac{7}{10}$ chance to win. **24.** For player A, there are 9 favorable outcomes and 20 possible outcomes; $\frac{9}{20}$. For player B, there are 11 favorable outcomes and 20 possible outcomes; $\frac{11}{20}$.

25. $\frac{x}{10,000} = \frac{280}{510}$
 $510x = 2,800,000$
 $\frac{510x}{510} = \frac{2,800,000}{510}$
 $x = 5,490 \text{ votes}$

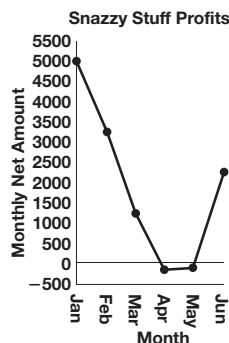
26. Each event is independent. The first toss has no effect on the second toss.

Chapter 11

pages 632–632

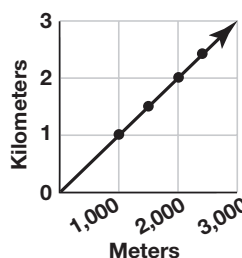
1. 1,000 **2.** -125 **3.** -17 **4.** 11 **5.** -2, -1, 0, 3
6. -8, -5, 2, 4 **7.** -8, -6, 7, 8 **8.** -8, -1, 0, 1
9. $-14 + 28 = 14$ **10.** $-72 + (-53) = -125$
11. $-3 - 1 = -4$ **12.** $-27 - (-27) = 0$ **13.** $-8 \times 5 =$
 -40 **14.** $-4 \times (-9) = 36$ **15.** $93 \div (-3) = -31$
16. $-5 \div (-2) = 2.5$
17. $-4 + c = -8$
 $-4 + c - (-4) = -8 - (-4)$
 $c = -4$
18. $x - (-6) = 15$
 $x - (-6) + (-6) = 15 + (-6)$
 $x = 9$
19. $-4y = -68$ **20.** $p \div 3 = -4$
 $\frac{-4y}{-4} = \frac{-68}{-4}$ $p \div 3 \times 3 = -4 \times 3$
 $y = 17$ $p = -12$

21. (2, 3) **22.** (3, -3) **23.** (-3, -1) **24.** (-3, 3)
25. G **26.** I **27.** H **28.** J **29.** $9,002 - 4,000 = \$5,002$
30. $7,596 - 6,333 = \$1,263$ **31.** $7,941 - 8,027 = -\$86$
32.



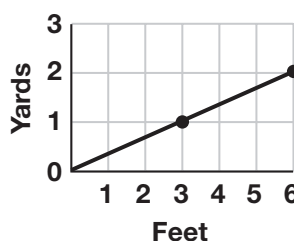
33. $\text{km} = \frac{\text{m}}{1000}$;

m	1,000	1,500	2,000	2,500
km	1	1.5	2	2.5



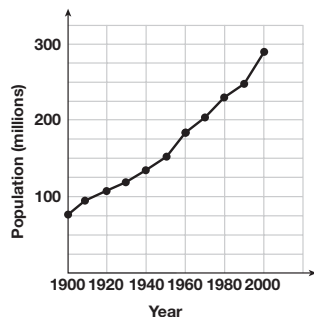
34. $\text{yd} = \frac{\text{ft}}{3}$;

Ft	3	6	9	12
Yd	1	2	3	4

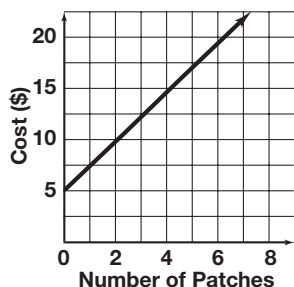


35. $6 + 5 = 11$, or 11 feet

36. $10^\circ + 2^\circ - 13^\circ = 12^\circ - 13^\circ = -1^\circ\text{F}$ 37. $6 - 11 = -5$ yards 38. $23^\circ - (-125^\circ) = 148^\circ\text{F}$ 39. $-4(30) = -120$ in. 40. $-15 \text{ lbs} \div 5 \text{ months} = -3 \text{ lbs/month}$ 41. $y = 25t - 100$; $y = 0$ when $t = 4$ 42. $(-8, -3)$ 43. about 315 million;



44.



Chapter 12

pages 634–635

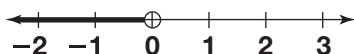
1. $2a + 8 = 26$ 2. $3c + 2.5 = 29.5$
 $2a + 8 - 8 = 26 - 8$ $3c + 2.5 - 2.5 = 29.5 - 2.5$
 $2a = 18$ $3c = 27$
 $\frac{2a}{2} = \frac{18}{2}$ $\frac{3c}{3} = \frac{27}{3}$
 $a = 9$ $c = 9$

3. $5b - 13 = 17$ 4. $7.5d - 7 = 53$
 $5b - 13 + 13 = 17 + 13$ $7.5d - 7 + 7 = 53 + 7$
 $5b = 30$ $7.5d = 60$
 $\frac{5b}{5} = \frac{30}{5}$ $\frac{7.5d}{7.5} = \frac{60}{7.5}$
 $b = 6$ $d = 8$

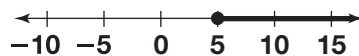
5. $4e - 1 = -93$ 6. $\frac{f}{8} + 6 = 8$
 $4e - 1 + 1 = -93 + 1$ $\frac{f}{8} + 6 - 6 = 8 - 6$
 $4e = -92$ $\frac{f}{8} = 2$
 $\frac{4e}{4} = \frac{-92}{4}$ $(8)\frac{f}{8} = (8)2$
 $e = -23$ $f = 16$

7. $2 + 8g = 34$ 8. $-4 + \frac{h}{4} = 4$
 $2 + 8g - 2 = 34 - 2$ $-4 + \frac{h}{4} + 4 = 4 + 4$
 $8g = 32$ $\frac{h}{4} = 8$
 $\frac{8g}{8} = \frac{32}{8}$ $(4)\frac{h}{4} = (4)8$
 $g = 4$ $h = 32$

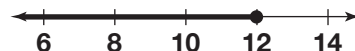
9. $x > -2$ 10. $x \leq 6$ 11. $x \geq 1$
 12. $d < 0$



13. $c \geq 5$



14. $p \leq 12$



15. $m + 8 < 14$ 16. $n - 16 \geq 3$
 $m + 8 - 8 < 14 - 8$ $n - 16 + 16 \geq 3 + 16$
 $m < 6$ $n \geq 19$

17. $p + 9 \leq -5$ 18. $q - 8 > 7$
 $p + 9 - 9 \leq -5 - 9$ $q - 8 + 8 > 7 + 8$
 $p \leq -14$ $q > 15$

19. $\sqrt{49} = 7$ 20. $\sqrt{81} = 9$ 21. $\sqrt{169} = 13$ 22. $\sqrt{484} = 22$

23. $a^2 + b^2 = c^2$
 $16^2 + 30^2 = c^2$
 $256 + 900 = c^2$
 $1,156 = c^2$

$c = 34$
 24. $a^2 + b^2 = c^2$
 $21^2 + b^2 = 35^2$
 $441 + b^2 = 1225$
 $441 + b^2 - 441 = 1225 - 441$
 $b^2 = 784$
 $b = 28$

25. $a^2 + b^2 = c^2$
 $a^2 + 9^2 = 15^2$
 $a^2 + 81 = 225$
 $a^2 + 81 - 81 = 225 - 81$
 $a^2 = 144$
 $a = 12$

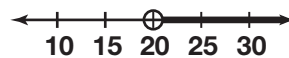
26. $4c - 5 = 31$
 $4c - 5 + 5 = 31 + 5$
 $4c = 36$
 $\frac{4c}{4} = \frac{36}{4}$
 $c = 9$

The cost of one game is \$9.

27. $20b + 180 = 1500$
 $20b + 180 - 180 = 1500 - 180$
 $20b = 1320$
 $\frac{20b}{20} = \frac{1320}{20}$
 $b = 66$

You can load 66 boxes on the elevator.

28. $x \geq 20$



29. $x \leq 36$



- 30.** Let s = the number of subscriptions she must sell every day.

$$30 + 2x \geq 65$$

$$30 + 2x - 30 \geq 65 - 30$$

$$2x \geq 35$$

$$\frac{2x}{2} \leq \frac{35}{2}$$

$$x \geq 17.5$$

She must sell at least 18 magazine subscriptions.

- 31.** $\sqrt{225} = 15$; 15 ft

32. $a^2 + b^2 = c^2$

$$84^2 + 100^2 = c^2$$

$$7056 + 10,000 = c^2$$

$$17,056 = c^2$$

$$\sqrt{17,056} = \sqrt{c^2}$$

$$c = 130.6$$

The length of the diagonals should be 130.6 inches.



Place Value of Whole Numbers

page 636

1. ten millions 2. ten thousands 3. hundred millions
4. tens 5. hundred billions 6. hundred thousands
7. 3 ten millions 8. 4 ten thousands 9. 6 hundred millions
10. 8 tens 11. 9 hundred billions 12. 0 hundred thousands
13. 6 hundreds 14. 6 ten thousands
15. 6 ten millions 16. 6 ten thousands 17. 6 tens
18. 6 ones 19. 6 hundred thousands 20. 6 hundreds
21. 6 ten billions 22. 6 hundreds 23. 6 thousands
24. 6 millions 25. 6 hundred thousands 26. 6 thousands
27. 6 tens 28. 6 hundred thousands

Rounding Whole Numbers

page 637

1. 65 is halfway between 60 and 70. 65 rounded to the nearest ten is 70. 2. 832 is closer to 830 than 840. 832 rounded to the nearest ten is 830. 3. 4,437 is closer to 4,440 than 4,430. 4,437 rounded to the nearest ten is 4,440. 4. 21,024 is closer to 21,020 than 21,030. 21,024 rounded to the nearest ten is 21,020. 5. 3,545 is halfway between 3,540 and 3,550. 3,545 rounded to the nearest ten is 3,550. 6. 889 is closer to 900 than 800. 889 rounded to the nearest hundred is 900. 7. 344 is closer to 300 than 400. 344 rounded to the nearest hundred is 300. 8. 2,861 is closer to 2,900 than 2,800. 2,861 rounded to the nearest hundred is 2,900. 9. 1,138 is closer to 1,100 than 1,200. 1,138 rounded to the nearest hundred is 1,100. 10. 50,549 is closer to 50,500 than 50,600. 50,549 rounded to the nearest hundred is 50,500. 11. 6,411 is closer to 6,400 than 6,500. 6,411 rounded to the nearest hundred is 6,400. 12. 88,894 is closer to 88,900 than 88,800. 88,894 rounded to the nearest hundred is 88,900. 13. 13,735 is closer to 13,700 than 13,800. 13,735 rounded to the nearest hundred is 13,700. 14. 17,459 is closer to 17,500 than 17,400. 17,459 rounded to the nearest hundred is 17,500. 15. 6,059 is closer to 6,100 than 6,000. 6,059 rounded to the nearest hundred is 6,100. 16. 2,400 is closer to 2,000 than 3,000. 2,400 rounded to the nearest thousand is 2,000. 17. 16,218 is closer to 16,000 than 17,000. 16,218 rounded to the nearest thousand is 16,000. 18. 7,430 is closer to 7,000 than 8,000. 7,430 rounded to the nearest thousand is 7,000. 19. 89,375 is closer to 89,000 than 90,000. 89,375 rounded to the nearest thousand is 89,000. 20. 9,821 is closer to 10,000 than 9,000. 9,821 rounded to the nearest thousand is 10,000. 21. 15,631 is closer to 16,000 than 15,000. 15,631 rounded to the nearest thousand is 16,000. 22. 76,900 is closer to 77,000 than 76,000. 76,900 rounded to the nearest thousand is 77,000. 23. 163,875 is closer to 164,000 than 163,000. 163,875 rounded to the nearest thousand is 164,000. 24. 38,295 is closer to 38,000 than

39,000. 38,295 rounded to the nearest thousand is 38,000. 25. 102,359 is closer to 102,000 than 103,000. 102,359 rounded to the nearest thousand is 102,000. 26. Check students' work. 27. Answer may vary. Sample: 16,218 is closer to 20,000 than 10,000. 16,218 rounded to the nearest ten thousand is 20,000. 28. Answers may vary. Sample: Yes; 31 is closer to 0 than it is to 100.

Adding Whole Numbers

page 638

1. $\begin{array}{r} 45 \\ +31 \\ \hline 76 \end{array}$	2. $\begin{array}{r} 56 \\ +80 \\ \hline 136 \end{array}$	3. $\begin{array}{r} 25 \\ +16 \\ \hline 41 \end{array}$
4. $\begin{array}{r} 43 \\ +29 \\ \hline 72 \end{array}$	5. $\begin{array}{r} 66 \\ +78 \\ \hline 144 \end{array}$	6. $\begin{array}{r} 87 \\ +35 \\ \hline 122 \end{array}$
7. $\begin{array}{r} 81 \\ +312 \\ \hline 393 \end{array}$	8. $\begin{array}{r} 406 \\ +123 \\ \hline 529 \end{array}$	9. $\begin{array}{r} 207 \\ +72 \\ \hline 279 \end{array}$
10. $\begin{array}{r} 480 \\ +365 \\ \hline 845 \end{array}$	11. $\begin{array}{r} 217 \\ +347 \\ \hline 564 \end{array}$	12. $\begin{array}{r} 675 \\ +329 \\ \hline 1,004 \end{array}$
13. $\begin{array}{r} 2,051 \\ +843 \\ \hline 2,894 \end{array}$	14. $\begin{array}{r} 786 \\ +4,109 \\ \hline 4,895 \end{array}$	15. $\begin{array}{r} 5,227 \\ +1,527 \\ \hline 6,754 \end{array}$
16. $\begin{array}{r} 3,104 \\ +2,698 \\ \hline 5,802 \end{array}$	17. $\begin{array}{r} 5,337 \\ +1,812 \\ \hline 7,149 \end{array}$	18. $\begin{array}{r} 4,282 \\ +7,518 \\ \hline 11,800 \end{array}$
19. $\begin{array}{r} 78 \\ +56 \\ \hline 134 \end{array}$	20. $\begin{array}{r} 35 \\ +96 \\ \hline 131 \end{array}$	21. $\begin{array}{r} 105 \\ +71 \\ \hline 176 \end{array}$
22. $\begin{array}{r} 29 \\ +342 \\ \hline 371 \end{array}$	23. $\begin{array}{r} 654 \\ +103 \\ \hline 757 \end{array}$	24. $\begin{array}{r} 286 \\ +42 \\ \hline 328 \end{array}$
25. $\begin{array}{r} 55 \\ +77 \\ \hline 132 \end{array}$	26. $\begin{array}{r} 242 \\ +83 \\ \hline 325 \end{array}$	27. $\begin{array}{r} 32 \\ +68 \\ \hline 100 \end{array}$
28. $\begin{array}{r} 108 \\ +13 \\ \hline 121 \end{array}$	29. $\begin{array}{r} 589 \\ +318 \\ \hline 907 \end{array}$	30. $\begin{array}{r} 642 \\ +975 \\ \hline 1,617 \end{array}$
31. $\begin{array}{r} 2,308 \\ +451 \\ \hline 2,759 \end{array}$	32. $\begin{array}{r} 976 \\ +4,035 \\ \hline 5,011 \end{array}$	33. $\begin{array}{r} 8,228 \\ +1,024 \\ \hline 9,252 \end{array}$
34. $\begin{array}{r} 5,417 \\ +2,391 \\ \hline 7,808 \end{array}$	35. $\begin{array}{r} 6,470 \\ +9,828 \\ \hline 16,298 \end{array}$	36. $\begin{array}{r} 7,121 \\ +5,359 \\ \hline 12,480 \end{array}$

Subtracting Whole Numbers

page 639

- | | | |
|--|--|--|
| 1. $\begin{array}{r} 81 \\ -37 \\ \hline 44 \end{array}$ | 2. $\begin{array}{r} 59 \\ -23 \\ \hline 36 \end{array}$ | 3. $\begin{array}{r} 41 \\ -19 \\ \hline 22 \end{array}$ |
| 4. $\begin{array}{r} 83 \\ -25 \\ \hline 58 \end{array}$ | 5. $\begin{array}{r} 99 \\ -78 \\ \hline 21 \end{array}$ | 6. $\begin{array}{r} 87 \\ -31 \\ \hline 56 \end{array}$ |
| 7. $\begin{array}{r} 707 \\ -361 \\ \hline 346 \end{array}$ | 8. $\begin{array}{r} 680 \\ -47 \\ \hline 633 \end{array}$ | 9. $\begin{array}{r} 240 \\ -63 \\ \hline 177 \end{array}$ |
| 10. $\begin{array}{r} 881 \\ -391 \\ \hline 490 \end{array}$ | 11. $\begin{array}{r} 517 \\ -287 \\ \hline 230 \end{array}$ | 12. $\begin{array}{r} 973 \\ -529 \\ \hline 444 \end{array}$ |
| 13. $\begin{array}{r} 7,411 \\ -583 \\ \hline 6,828 \end{array}$ | 14. $\begin{array}{r} 3,789 \\ -809 \\ \hline 2,980 \end{array}$ | 15. $\begin{array}{r} 6,508 \\ -2,147 \\ \hline 4,361 \end{array}$ |
| 16. $\begin{array}{r} 8,000 \\ -5,274 \\ \hline 2,726 \end{array}$ | 17. $\begin{array}{r} 3,003 \\ -1,998 \\ \hline 1,005 \end{array}$ | 18. $\begin{array}{r} 8,828 \\ -4,118 \\ \hline 4,710 \end{array}$ |
| 19. $\begin{array}{r} 78 \\ -19 \\ \hline 59 \end{array}$ | 20. $\begin{array}{r} 231 \\ -99 \\ \hline 132 \end{array}$ | 21. $\begin{array}{r} 901 \\ -65 \\ \hline 836 \end{array}$ |
| 22. $\begin{array}{r} 629 \\ -382 \\ \hline 247 \end{array}$ | 23. $\begin{array}{r} 918 \\ -133 \\ \hline 785 \end{array}$ | 24. $\begin{array}{r} 800 \\ -435 \\ \hline 365 \end{array}$ |
| 25. $\begin{array}{r} 403 \\ -122 \\ \hline 281 \end{array}$ | 26. $\begin{array}{r} 973 \\ -228 \\ \hline 745 \end{array}$ | 27. $\begin{array}{r} 721 \\ -119 \\ \hline 602 \end{array}$ |
| 28. $\begin{array}{r} 522 \\ -146 \\ \hline 376 \end{array}$ | 29. $\begin{array}{r} 642 \\ -223 \\ \hline 419 \end{array}$ | 30. $\begin{array}{r} 427 \\ -193 \\ \hline 234 \end{array}$ |
| 31. $\begin{array}{r} 444 \\ -345 \\ \hline 99 \end{array}$ | 32. $\begin{array}{r} 988 \\ -489 \\ \hline 499 \end{array}$ | 33. $\begin{array}{r} 601 \\ -425 \\ \hline 176 \end{array}$ |

Multiplying Whole Numbers

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- | | | |
|---|---|---|
| 1. $\begin{array}{r} 81 \\ \times 3 \\ \hline 243 \end{array}$ | 2. $\begin{array}{r} 47 \\ \times 2 \\ \hline 94 \end{array}$ | 3. $\begin{array}{r} 58 \\ \times 6 \\ \hline 348 \end{array}$ |
| 4. $\begin{array}{r} 678 \\ \times 5 \\ \hline 3,390 \end{array}$ | 5. $\begin{array}{r} 412 \\ \times 7 \\ \hline 2,884 \end{array}$ | 6. $\begin{array}{r} 326 \\ \times 4 \\ \hline 1,304 \end{array}$ |
| 7. $\begin{array}{r} 45 \\ \times 7 \\ \hline 315 \end{array}$ | 8. $\begin{array}{r} 62 \\ \times 3 \\ \hline 186 \end{array}$ | 9. $\begin{array}{r} 213 \\ \times 4 \\ \hline 852 \end{array}$ |

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|---|---|---|
| 10. $\begin{array}{r} 177 \\ \times 8 \\ \hline 1,416 \end{array}$ | 11. $\begin{array}{r} 673 \\ \times 9 \\ \hline 6,057 \end{array}$ | 12. $\begin{array}{r} 25 \\ \times 46 \\ \hline 150 \\ +1,000 \\ \hline 1,150 \end{array}$ |
| 13. $\begin{array}{r} 62 \\ \times 88 \\ \hline 496 \\ +4,960 \\ \hline 5,456 \end{array}$ | 14. $\begin{array}{r} 808 \\ \times 60 \\ \hline 0 \\ +48,480 \\ \hline 48,480 \end{array}$ | 15. $\begin{array}{r} 409 \\ \times 70 \\ \hline 0 \\ +28,630 \\ \hline 28,630 \end{array}$ |
| 16. $\begin{array}{r} 915 \\ \times 27 \\ \hline 6,405 \\ +18,300 \\ \hline 24,705 \end{array}$ | 17. $\begin{array}{r} 312 \\ \times 53 \\ \hline 936 \\ +15,600 \\ \hline 16,536 \end{array}$ | 18. $\begin{array}{r} 415 \\ \times 76 \\ \hline 2,490 \\ +29,050 \\ \hline 31,540 \end{array}$ |
| 19. $\begin{array}{r} 500 \\ \times 80 \\ \hline 0 \\ +40,000 \\ \hline 40,000 \end{array}$ | 20. $\begin{array}{r} 320 \\ \times 47 \\ \hline 2,240 \\ +12,800 \\ \hline 15,040 \end{array}$ | 21. $\begin{array}{r} 562 \\ \times 18 \\ \hline 4,496 \\ +5,620 \\ \hline 10,116 \end{array}$ |
| 22. $\begin{array}{r} 946 \\ \times 37 \\ \hline 6,622 \\ +28,380 \\ \hline 35,002 \end{array}$ | 23. $\begin{array}{r} 103 \\ \times 76 \\ \hline 618 \\ +7,210 \\ \hline 7,828 \end{array}$ | 24. $\begin{array}{r} 558 \\ \times 32 \\ \hline 1,116 \\ +16,740 \\ \hline 17,856 \end{array}$ |
| 25. $\begin{array}{r} 371 \\ \times 84 \\ \hline 1,484 \\ +29,680 \\ \hline 31,164 \end{array}$ | 26. $\begin{array}{r} 505 \\ \times 40 \\ \hline 0 \\ +20,200 \\ \hline 20,200 \end{array}$ | 27. $\begin{array}{r} 620 \\ \times 19 \\ \hline 5,580 \\ +6,200 \\ \hline 11,780 \end{array}$ |

Multiplying and Dividing Whole Numbers by 10, 100, and 1,000

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1. $85 \times 10 = 850$ 2. $85 \times 100 = 8,500$ 3. $85 \times 1,000 = 85,000$ 4. $420 \times 1,000 = 420,000$ 5. $420 \times 100 = 42,000$
6. $420 \times 10 = 4,200$ 7. $603 \times 100 = 60,300$ 8. $97 \times 10 = 970$ 9. $31 \times 100 = 3,100$ 10. $10 \times 17 = 170$
11. $100 \times 56 = 5,600$ 12. $1,000 \times 4 = 4,000$
13. $13 \times 10 = 130$ 14. $68 \times 100 = 6,800$
15. $19 \times 1,000 = 19,000$ 16. $3,200 \div 10 = 320$
17. $3,200 \div 100 = 32$ 18. $32,000 \div 1,000 = 32$
19. $8,000 \div 100 = 80$ 20. $8,000 \div 10 = 800$
21. $170 \div 10 = 17$ 22. $45,000 \div 1,000 = 45$
23. $9,300 \div 10 = 930$ 24. $90 \div 10 = 9$
25. $6,100 \div 100 = 61$ 26. $7,900 \div 100 = 79$
27. $2,400 \div 10 = 240$ 28. $240 \div 10 = 24$
29. $78,000 \div 1,000 = 78$ 30. $9,900 \div 10 = 990$
31. $76 \times 100 = 7,600$ 32. $52 \times 1,000 = 52,000$
33. $370 \div 10 = 37$ 34. $505 \times 10 = 5,050$
35. $6,200 \div 100 = 62$ 36. $340 \div 10 = 34$
37. $14,000 \div 1,000 = 14$ 38. $253 \times 100 = 25,300$
39. $3,700 \div 10 = 370$ 40. $418 \times 10 = 4,180$

$\begin{array}{r} 73 \text{ R2} \\ 1. 9 \overline{)659} \\ \underline{63} \\ 29 \\ \underline{27} \\ 2 \end{array}$	$\begin{array}{r} 41 \text{ R7} \\ 2. 9 \overline{)376} \\ \underline{36} \\ 16 \\ \underline{9} \\ 7 \end{array}$	$\begin{array}{r} 93 \text{ R1} \\ 3. 3 \overline{)280} \\ \underline{27} \\ 10 \\ \underline{9} \\ 1 \end{array}$
$\begin{array}{r} 67 \text{ R5} \\ 4. 8 \overline{)541} \\ \underline{48} \\ 61 \\ \underline{56} \\ 5 \end{array}$	$\begin{array}{r} 29 \\ 5. 8 \overline{)232} \\ \underline{16} \\ 72 \\ \underline{72} \\ 0 \end{array}$	$\begin{array}{r} 211 \text{ R3} \\ 6. 5 \overline{)1058} \\ \underline{10} \\ 5 \\ \underline{5} \\ 08 \\ \underline{05} \\ 3 \end{array}$
$\begin{array}{r} 1197 \\ 7. 3 \overline{)3591} \\ \underline{3} \\ 5 \\ \underline{3} \\ 29 \\ \underline{27} \\ 21 \\ \underline{21} \\ 0 \end{array}$	$\begin{array}{r} 72 \text{ R4} \\ 8. 7 \overline{)5072} \\ \underline{49} \\ 17 \\ \underline{14} \\ 32 \\ \underline{28} \\ 4 \end{array}$	$\begin{array}{r} 429 \text{ R2} \\ 9. 4 \overline{)1718} \\ \underline{16} \\ 11 \\ \underline{08} \\ 38 \\ \underline{36} \\ 2 \end{array}$
$\begin{array}{r} 627 \text{ R5} \\ 10. 6 \overline{)3767} \\ \underline{36} \\ 16 \\ \underline{12} \\ 47 \\ \underline{42} \\ 5 \end{array}$	$\begin{array}{r} 227 \text{ R13} \\ 11. 17 \overline{)3872} \\ \underline{34} \\ 47 \\ \underline{34} \\ 132 \\ \underline{119} \\ 13 \end{array}$	$\begin{array}{r} 72 \text{ R5} \\ 12. 19 \overline{)1373} \\ \underline{133} \\ 43 \\ \underline{38} \\ 5 \end{array}$
$\begin{array}{r} 68 \text{ R17} \\ 13. 27 \overline{)1853} \\ \underline{162} \\ 233 \\ \underline{216} \\ 17 \end{array}$	$\begin{array}{r} 71 \text{ R6} \\ 14. 59 \overline{)4195} \\ \underline{413} \\ 65 \\ \underline{59} \\ 6 \end{array}$	$\begin{array}{r} 98 \text{ R20} \\ 15. 41 \overline{)4038} \\ \underline{369} \\ 348 \\ \underline{328} \\ 20 \end{array}$
$\begin{array}{r} 84 \text{ R8} \\ 16. 31 \overline{)2612} \\ \underline{246} \\ 132 \\ \underline{124} \\ 8 \end{array}$	$\begin{array}{r} 47 \text{ R11} \\ 17. 34 \overline{)1609} \\ \underline{136} \\ 249 \\ \underline{238} \\ 11 \end{array}$	$\begin{array}{r} 48 \text{ R17} \\ 18. 40 \overline{)1937} \\ \underline{160} \\ 337 \\ \underline{320} \\ 17 \end{array}$
$\begin{array}{r} 25 \\ 19. 54 \overline{)1350} \\ \underline{108} \\ 270 \\ \underline{270} \\ 0 \end{array}$	$\begin{array}{r} 57 \\ 20. 32 \overline{)1824} \\ \underline{160} \\ 224 \\ \underline{224} \\ 0 \end{array}$	<p>21. Check students' work.</p>

$\begin{array}{r} 30 \text{ R2} \\ 1. 7 \overline{)212} \\ \underline{21} \\ 02 \\ \underline{0} \\ 2 \end{array}$	$\begin{array}{r} 40 \text{ R7} \\ 2. 9 \overline{)367} \\ \underline{36} \\ 07 \\ \underline{0} \\ 7 \end{array}$	$\begin{array}{r} 90 \text{ R1} \\ 3. 3 \overline{)271} \\ \underline{27} \\ 01 \\ \underline{0} \\ 1 \end{array}$
$\begin{array}{r} 60 \text{ R5} \\ 4. 8 \overline{)48} \\ \underline{48} \\ 05 \\ \underline{0} \\ 5 \end{array}$	$\begin{array}{r} 80 \text{ R3} \\ 5. 6 \overline{)483} \\ \underline{48} \\ 03 \\ \underline{0} \\ 3 \end{array}$	$\begin{array}{r} 40 \text{ R11} \\ 6. 34 \overline{)1350} \\ \underline{136} \\ 11 \\ \underline{0} \\ 11 \end{array}$
$\begin{array}{r} 70 \text{ R5} \\ 7. 19 \overline{)1335} \\ \underline{133} \\ 05 \\ \underline{0} \\ 5 \end{array}$	$\begin{array}{r} 30 \text{ R21} \\ 8. 62 \overline{)1881} \\ \underline{186} \\ 21 \\ \underline{0} \\ 21 \end{array}$	$\begin{array}{r} 20 \text{ R14} \\ 9. 54 \overline{)1094} \\ \underline{108} \\ 14 \\ \underline{0} \\ 14 \end{array}$
$\begin{array}{r} 90 \text{ R20} \\ 10. 41 \overline{)3710} \\ \underline{369} \\ 20 \\ \underline{0} \\ 20 \end{array}$	$\begin{array}{r} 70 \text{ R2} \\ 11. 4 \overline{)282} \\ \underline{28} \\ 02 \\ \underline{0} \\ 2 \end{array}$	$\begin{array}{r} 20 \text{ R3} \\ 12. 7 \overline{)143} \\ \underline{14} \\ 03 \\ \underline{0} \\ 3 \end{array}$
$\begin{array}{r} 60 \text{ R1} \\ 13. 3 \overline{)181} \\ \underline{18} \\ 01 \\ \underline{0} \\ 1 \end{array}$	$\begin{array}{r} 50 \\ 14. 8 \overline{)400} \\ \underline{40} \\ 00 \\ \underline{0} \\ 0 \end{array}$	$\begin{array}{r} 40 \text{ R5} \\ 15. 9 \overline{)365} \\ \underline{36} \\ 05 \\ \underline{0} \\ 5 \end{array}$
$\begin{array}{r} 201 \text{ R3} \\ 16. 5 \overline{)1008} \\ \underline{10} \\ 00 \\ \underline{0} \\ 08 \\ \underline{5} \\ 3 \end{array}$	$\begin{array}{r} 503 \\ 17. 6 \overline{)3018} \\ \underline{30} \\ 01 \\ \underline{0} \\ 18 \\ \underline{18} \\ 0 \end{array}$	$\begin{array}{r} 705 \text{ R4} \\ 18. 7 \overline{)4939} \\ \underline{49} \\ 03 \\ \underline{0} \\ 39 \\ \underline{35} \\ 4 \end{array}$
$\begin{array}{r} 420 \text{ R2} \\ 19. 4 \overline{)1682} \\ \underline{16} \\ 08 \\ \underline{8} \\ 02 \\ \underline{0} \\ 2 \end{array}$	$\begin{array}{r} 607 \text{ R5} \\ 20. 6 \overline{)3647} \\ \underline{36} \\ 04 \\ \underline{0} \\ 47 \\ \underline{42} \\ 5 \end{array}$	$\begin{array}{r} 80 \text{ R8} \\ 21. 31 \overline{)2488} \\ \underline{248} \\ 08 \\ \underline{0} \\ 8 \end{array}$
$\begin{array}{r} 50 \text{ R22} \\ 22. 67 \overline{)3372} \\ \underline{335} \\ 22 \\ \underline{0} \\ 22 \end{array}$	$\begin{array}{r} 40 \text{ R17} \\ 23. 48 \overline{)1937} \\ \underline{192} \\ 17 \\ \underline{0} \\ 17 \end{array}$	$\begin{array}{r} 70 \text{ R35} \\ 24. 59 \overline{)4165} \\ \underline{413} \\ 35 \\ \underline{0} \\ 35 \end{array}$

$$\begin{array}{r} 20 \text{ R}46 \\ 25. 82 \overline{)1686} \\ \underline{164} \\ 46 \\ \underline{0} \\ 46 \end{array}$$

Reading Thermometer Scales

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1. 36.8°C 2. 37.5°C 3. 38.4°C 4. 94.6°F 5. 96.6°F
6. 106.2°F 7. *G* 8. *I* 9. *F* 10. *Y* 11. *W* 12. *X*

Roman Numerals

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1. XI = 11 2. DIII = 503 3. XCV = 95 4. CMX = 910
5. XXIX = 29 6. DLIX = 559 7. MLVI = 1,056 8. LX = 60
9. CDIV = 404 10. DCV = 605 11. 15 = XV
12. 35 = XXXV 13. 1,632 = MDCXXXII 14. 222 = CCXXII
15. 159 = CLIX 16. 67 = LXVII 17. 92 = XCII
18. 403 = CDIII 19. 1,990 = MCMXC 20. 64 = LXIV

Estimating Lengths Using Nonstandard Units

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- 1–10. Check students' work.

Writing Equivalent Times

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1. 4 wk 3 days = $4(7 \text{ d}) + 3 \text{ d} = 28 \text{ d} + 3 \text{ d} = 31 \text{ days}$
2. 1 h 30 min = $60 \text{ min} + 30 \text{ min} = 90 \text{ min}$
3. 2 min 59 s = $2(60 \text{ s}) + 59 \text{ s} = 120 \text{ s} + 59 \text{ s} = 179 \text{ s}$
4. 8 h 2 min = $8(60 \text{ min}) + 2 \text{ min} = 480 \text{ min} + 2 \text{ min} = 482 \text{ min}$ 5. 5 min 36 s = $5(60 \text{ s}) + 36 \text{ s} = 300 \text{ s} + 36 \text{ s} = 336 \text{ s}$ 6. 3 wk 5 days = $3(7 \text{ d}) + 5 \text{ d} = 21 \text{ d} + 5 \text{ d} = 26 \text{ days}$ 7. 2 days 17 h = $2(24 \text{ h}) + 17 \text{ h} = 48 \text{ h} + 17 \text{ h} = 65 \text{ hours}$ 8. 2 h 15 min = $2(60 \text{ min}) + 15 \text{ min} = 120 \text{ min} + 15 \text{ min} = 135 \text{ min}$ 9. 1 yr 2 wk = $1(52 \text{ wk}) + 2 \text{ wk} = 52 \text{ wk} + 2 \text{ wk} = 54 \text{ wk}$
10. 12 min 4 s = $12(60 \text{ s}) + 4 \text{ s} = 720 \text{ s} + 4 \text{ s} = 724 \text{ s}$
11. 2 wk 1 day = $2(7 \text{ d}) + 1 \text{ d} = 14 \text{ d} + 1 \text{ d} = 15 \text{ days}$
12. 4 days 14 h = $4(24 \text{ h}) + 14 \text{ h} = 96 \text{ h} + 14 \text{ h} = 110 \text{ h}$
13. 3 yr 14 wk = $3(52 \text{ wk}) + 14 \text{ wk} = 156 \text{ wk} + 14 \text{ wk} = 170 \text{ wk}$ 14. 23 min 32 s = $23(60 \text{ s}) + 32 \text{ s} = 1380 \text{ s} + 32 \text{ s} = 1,412 \text{ s}$ 15. 3 h 47 min = $3(60 \text{ min}) + 47 \text{ min} = 180 \text{ min} + 47 \text{ min} = 227 \text{ min}$ 16. 7 min 46 s = $7(60 \text{ s}) + 46 \text{ s} = 420 \text{ s} + 46 \text{ s} = 466 \text{ s}$ 17. 5 wk 3 days = $5(7 \text{ d}) + 3 \text{ d} = 35 \text{ d} + 3 \text{ d} = 38 \text{ days}$ 18. 1 yr 8 wk = $52 \text{ wk} + 8 \text{ wk} = 60 \text{ wk}$ 19. 12 h 12 min = $12(60 \text{ min}) + 12 \text{ min} = 720 \text{ min} + 12 \text{ min} = 732 \text{ min}$ 20. 3 days 4 h = $3(24 \text{ h}) + 4 \text{ h} = 72 \text{ h} + 4 \text{ h} = 76 \text{ h}$ 21. 9 min 9 s = $9(60 \text{ s}) + 9 \text{ s} = 540 \text{ s} + 9 \text{ s} = 549 \text{ s}$ 22. 5 yr 40 wk = $5(52 \text{ wk}) + 40 \text{ wk} = 260 \text{ wk} + 40 \text{ wk} = 300 \text{ wk}$
23. 4 h 52 min = $4(60 \text{ min}) + 52 \text{ min} = 240 \text{ min} + 52 \text{ min} = 292 \text{ min}$ 24. 7 wk 1 day = $7(7 \text{ d}) + 1 \text{ d} = 49 \text{ d} + 1 \text{ d} = 50 \text{ days}$

