Extra Practice

Lesson 1-1 *(pages 6–9)*

Write an algebraic expression for each verbal expression.

1. the sum of b and 21
2. the product of x and 7
3. a number t increased by 6
4. the sum of 4 and 6 times a number z
5. -10 increased by 4 times a number a
6. the sum of 8 and -2 times n
7. one-half the cube of a number x
8. four-fifths the square of m

Evaluate each expression.

9. 2^4
10. 10^2
11. 7^3
12. 20^3
13. 3^6
14. 4^5

Write a verbal expression for each algebraic expression.

15. $2n$
16. 10^7
17. m^5
18. xy
19. $5n^2 - 6$
20. $9a^3 + 1$
21. $x^3 \cdot y^2$
22. $c^4 \cdot d^6$
23. $3e + 2e^2$

Lesson 1-2 *(pages 11–15)*

Evaluate each expression.

1. $3 + 8 \div 2 - 5$
2. $4 + 7 \cdot 2 + 8$
3. $5(9 + 3) - 3 \cdot 4$
4. $9 - 3^2$
5. $(8 - 1) \cdot 3$
6. $4(5 - 3)^2$
7. $3(12 + 3) - 5 \cdot 9$
8. $5^3 + 6^3 - 5^2$
9. $16 \div 2 \cdot 5 \cdot 3 \div 6$
10. $7(5^3 + 3^2)$
11. $\frac{9 \cdot 4 + 2 \cdot 6}{6 \cdot 4}$
12. $25 - \frac{1}{3}(18 + 9)$

Evaluate each expression if $a = 2$, $b = 5$, $x = 4$, and $n = 10$.

13. $8a + b$
14. $48 + ab$
15. $a(6 - 3n)$
16. $bx + an$
17. $x^2 - 4n$
18. $3b + 16a - 9n$
19. $n^2 + 3(a + 4)$
20. $(2x)^2 + an - 5b$
21. $[a + 8(b - 2)]^2 \div 4$

Lesson 1-3 *(pages 16–20)*

Find the solution of each equation if the replacement sets are $x = \{0, 2, 4, 6, 8\}$ and $y = \{1, 3, 5, 7, 9\}$.

1. $x - 4 = 4$
2. $25 - y = 18$
3. $3x + 1 = 25$
4. $5y - 4 = 11$
5. $14 = \frac{96}{x} + 2$
6. $0 = \frac{y}{3} - 3$

Solve each equation.

7. $x = \frac{27 + 9}{2}$
8. $\frac{18 - 7}{13 - 2} = y$
9. $n = \frac{6(5) + 3}{2(4) + 3}$
10. $\frac{5(4) - 6}{2^2 + 3} = z$
11. $\frac{7^2 + 9(2 + 1)}{2(10) - 1} = t$
12. $a = \frac{3^3 + 5^2}{2(3 - 1)}$

Find the solution set for each inequality if the replacement sets are $x = \{4, 5, 6, 7, 8\}$ and $y = \{10, 12, 14, 16\}$.

13. $x + 2 > 7$
14. $x - 1 < 8$
15. $2x \leq 15$
16. $3y \geq 36$
17. $\frac{x}{3} < 2$
18. $\frac{5y}{4} \geq 20$

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Lesson 1-4

(pages 21–25)

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

1. $4 \cdot 3 = 4 \cdot n$
2. $\frac{5}{4} = n + 0$
3. $15 = 15 \cdot n$
4. $\frac{2}{3}n = 1$
5. $2.7 + 1.3 = n + 2.7$
6. $n\left(6^2 \cdot \frac{1}{36}\right) = 4$
7. $8n = 0$
8. $n = \frac{1}{9} \cdot 9$
9. $5 + 7 = 5 + n$
10. $(13 - 4)(2) = 9n$

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

11. $\frac{2}{3}[15 \div (12 - 2)]$
12. $\frac{7}{4}\left[4 \cdot \left(\frac{1}{8} \cdot 8\right)\right]$
13. $[(18 \div 3) \cdot 0] \cdot 10$

Lesson 1-5

(pages 26–31)

Rewrite each expression using the Distributive Property. Then simplify.

1. $5(2 + 9)$
2. $8(10 + 20)$
3. $20(8 - 3)$
4. $3(5 + w)$
5. $(h - 8)7$
6. $6(y + 4)$
7. $9(3n + 5)$
8. $32\left(x - \frac{1}{8}\right)$
9. $c(7 - d)$

Use the Distributive Property to find each product.

10. $6 \cdot 55$
11. $15(108)$
12. $1689 \cdot 5$
13. 7×314
14. $36\left(5\frac{1}{4}\right)$
15. $\left(4\frac{1}{18}\right) \cdot 18$

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

16. $13a + 5a$
17. $21x - 10x$
18. $8(3x + 7)$
19. $4m - 4n$
20. $3(5am - 4)$
21. $15x^2 + 7x^2$
22. $9y^2 + 13y^2 + 3$
23. $11a^2 - 11a^2 + 12a^2$
24. $6a + 7a + 12b + 8b$

Lesson 1-6

(pages 32–36)

Evaluate each expression.

1. $23 + 8 + 37 + 12$
2. $19 + 46 + 81 + 54$
3. $10.25 + 2.5 + 3.75$
4. $22.5 + 17.6 + 44.5$
5. $2\frac{1}{3} + 6 + 3\frac{2}{3} + 4$
6. $5\frac{6}{7} + 15 + 4\frac{1}{7} + 25$
7. $6 \cdot 8 \cdot 5 \cdot 3$
8. $18 \cdot 5 \cdot 2 \cdot 5$
9. $0.25 \cdot 7 \cdot 8$
10. $90 \cdot 12 \cdot 0.5$
11. $5\frac{1}{3} \cdot 4 \cdot 6$
12. $4\frac{5}{6} \cdot 10 \cdot 12$

Simplify each expression.

13. $5a + 6b + 7a$
14. $8x + 4y + 9x$
15. $3a + 5b + 2c + 8b$
16. $\frac{2}{3}x^2 + 5x + x^2$
17. $(4p - 7q) + (5q - 8p)$
18. $8q + 5r - 7q - 6r$
19. $4(2x + y) + 5x$
20. $9r^5 + 2r^2 + r^5$
21. $12b^3 + 12 + 12b^3$
22. $7 + 3(uv - 6) + u$
23. $3(x + 2y) + 4(3x + y)$
24. $6.2(a + b) + 2.6(a + b) + 3a$
25. $3 + 8(st + 3w) + 3st$
26. $5.4(s - 3t) + 3.6(s - 4)$
27. $3[4 + 5(2x + 3y)]$

Lesson 1-7

(pages 37–42)

Identify the hypothesis and conclusion of each statement.

1. If an animal is a dog, then it barks.
2. If a figure is a pentagon, then it has five sides.
3. If $3x - 1 = 8$, then $x = 3$.
4. If 0.5 is the reciprocal of 2, then $0.5 \cdot 2 = 1$.

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

5. A square has four congruent sides.
6. $6a + 10 = 34$ when $a = 4$.
7. The video store is open every night.
8. The band does not have practice on Thursday.

Find a counterexample for each statement.

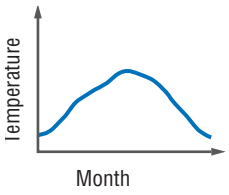
9. If the season is spring, then it does not snow.
10. If you live in Portland, then you live in Oregon.
11. If $2y + 4 = 10$, then $y < 3$.
12. If $a^2 > 0$, then $a > 0$.

Lesson 1-8

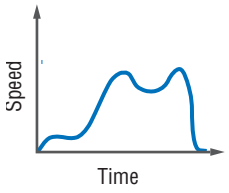
(pages 43–48)

Describe what is happening in each graph.

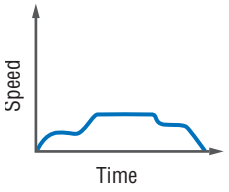
1. The graph shows the average monthly high temperatures for a city over a one-year period.



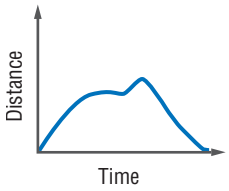
2. The graph shows the speed of a roller coaster car during a two-minute ride.



3. The graph shows the speed of a jogger over time.



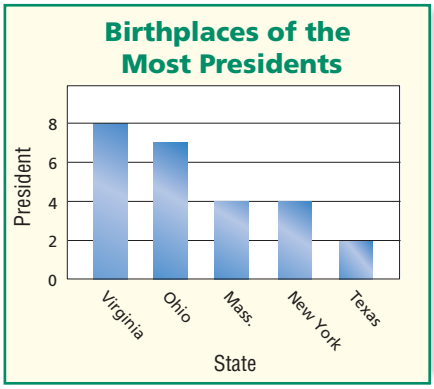
4. The graph shows the distance from camp traveled by a hiker over time.



Lesson 1-9

(pages 50–55)

For Exercises 1–4, use the graph, which shows the five states that were the birthplace of the most U.S. presidents.



1. How many times more presidents were born in Virginia than Texas?
2. Did any states have the same number of presidents? If so, which states?
3. Would it be appropriate to display this data in a circle graph? Explain.
4. By the year 2001, there had been forty-three different presidents. What percent of U.S. presidents at that time had been born in Ohio?

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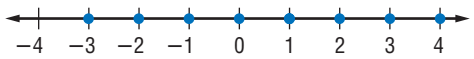
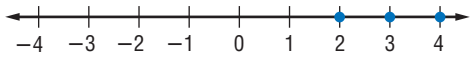
Lesson 2-1

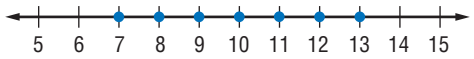
(pages 68–72)

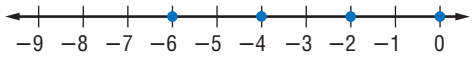
Name the coordinates of the points graphed on each number line.

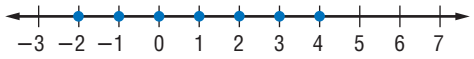
1. 

2. 

3. 

4. 

5. 

6. 

Graph each set of numbers.

7. $\{-2, -4, -6\}$
8. $\{\ldots, -3, -2, -1, 0\}$
9. {integers greater than -1}
10. {integers less than -5 and greater than -10}

Find each absolute value.

11. $|22|$
12. $|-2.5|$
13. $\left|\frac{2}{3}\right|$
14. $\left|-\frac{7}{8}\right|$

Lesson 2-2

(pages 73–78)

Find each sum.

1. $3 + 16$
2. $-27 + 19$
3. $8 + (-13)$
4. $-14 + (-9)$
5. $-25 + 47$
6. $97 + (-79)$
7. $-4.8 + 3.2$
8. $-1.7 + (-3.4)$
9. $-0.009 + 0.06$
10. $-\frac{11}{9} + \left(-\frac{7}{9}\right)$
11. $-\frac{3}{5} + \frac{5}{6}$
12. $\frac{3}{8} + \left(-\frac{7}{12}\right)$

Find each difference.

13. $27 - 14$
14. $8 - 17$
15. $12 - (-15)$
16. $-35 - (-12)$
17. $-2 - (-1.3)$
18. $1.9 - (-7)$
19. $-4.5 - 8.6$
20. $89.3 - (-14.2)$
21. $-18 - (-1.3)$
22. $\frac{5}{11} - \frac{6}{11}$
23. $\frac{2}{7} - \frac{3}{14}$
24. $-\frac{7}{15} - \left(-\frac{5}{12}\right)$

Lesson 2-3

(pages 79–83)

Find each product.

1. $5(12)$
2. $(-6)(11)$
3. $(-7)(-5)$
4. $(-6)(4)(-3)$
5. $\left(-\frac{7}{8}\right)\left(-\frac{1}{3}\right)$
6. $(5)\left(-\frac{2}{5}\right)$
7. $\left(-4\frac{1}{2}\right)\left(2\frac{1}{3}\right)$
8. $\left(-1\frac{2}{7}\right)\left(-3\frac{5}{9}\right)$
9. $(-5.34)(3.2)$
10. $(-6.8)(-5.415)$
11. $(4.2)(-5.1)(3.6)$
12. $(-3.9)(1.6)(8.4)$

Simplify each expression.

13. $5(-3a) - 6a$
14. $-8(-x) - 3x$
15. $2(6y - 2y)$
16. $(c + 7c)(-3)$
17. $-3n(4b) + 2a(3b)$
18. $-7(2m - 3n)$

Lesson 2-4 *(pages 84–87)*

Find each quotient.

1. $-49 \div (-7)$
2. $52 \div (-4)$
3. $-66 \div (0.5)$
4. $25.8 \div (-2)$
5. $-55.25 \div (-0.25)$
6. $-82.1 \div (16.42)$
7. $-\frac{2}{5} \div 5$
8. $\frac{7}{8} \div (-4)$
9. $-4 \div \left(-\frac{7}{10}\right)$
10. $\frac{3}{2} \div \left(-\frac{1}{2}\right)$
11. $-\frac{8}{5} \div \left(-\frac{5}{8}\right)$
12. $-\frac{13}{15} \div \frac{3}{25}$

Simplify each expression.

13. $\frac{32a}{4}$
14. $\frac{12x}{-2}$
15. $\frac{5n + 15}{-5}$
16. $\frac{-2b - 10}{-2}$
17. $\frac{65x - 15y}{5}$
18. $\frac{2a - 10b}{-2}$
19. $\frac{-27c + (-99b)}{9}$
20. $\frac{-3n + (-3m)}{-3}$

Lesson 2-5 *(pages 88–94)*

Use each set of data to make a line plot.

1. 134, 147, 137, 138, 156, 140, 134, 145, 139, 152, 139, 155, 144, 135, 144
2. 19, 12, 11, 11, 7, 7, 8, 13, 12, 12, 9, 9, 8, 15, 11, 4, 12, 7, 7, 6
3. 66, 74, 72, 78, 68, 75, 80, 69, 62, 65, 63, 78, 71, 78, 76, 75, 80, 69, 62, 71, 76, 79, 70, 64, 62, 74, 74, 75, 70
4. 131, 133, 146, 141, 131, 138, 154, 156, 158, 160, 152, 150, 154, 160

Use each set of data to make a stem-and-leaf plot.

5. 22 17 35 19 45 23 35 18 22 47 39 23 17 44 35 19 18 40 10
6. 1.2 1.3 5.6 4.1 1.1 2.0 1.9 3.0 4.5 2.1 4.1 1.2 1.8 1.0 3.2 2.2 2.5
7. 123 134 111 105 108 121 133 135 109 101 130 101 139 129 137 104

Lesson 2-6 *(pages 96–101)*

Find the probability of each event.

1. A coin will land tails up.
2. You eat this month.
3. A baby will be a girl.
4. You will see a blue elephant.
5. This is an algebra book.
6. Today is Wednesday.

A computer randomly picks a letter in the word *success*. Find each probability.

7. the letter e
8. P(not c)
9. the letter s
10. the letter b
11. P(vowel)
12. the letters u or c

One die is rolled. Find the odds of each outcome.

13. a 4
14. a number greater than 3
15. a multiple of 3
16. a number less than 5
17. an odd number
18. not a 6

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Lesson 2-7

(pages 103–109)

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

1. $\sqrt{121}$
2. $-\sqrt{36}$
3. $\sqrt{2.89}$
4. $-\sqrt{125}$
5. $\sqrt{\frac{81}{100}}$
6. $-\sqrt{\frac{36}{196}}$
7. $\pm\sqrt{9.61}$
8. $\pm\sqrt{\frac{7}{8}}$

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

9. $-\sqrt{149}$
10. $\frac{5}{6}$
11. $\sqrt{\frac{8}{2}}$
12. $-\frac{66}{55}$
13. $\sqrt{225}$
14. $-\sqrt{\frac{3}{4}}$
15. $\frac{-1}{7}$
16. $\sqrt{0.0016}$

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

17. $6.\overline{16}$ ● 6
18. 3.88 ● $\sqrt{15}$
19. $-\sqrt{529}$ ● -20
20. $-\sqrt{0.25}$ ● $-0.\overline{5}$
21. $\frac{1}{3}$ ● $\frac{\sqrt{3}}{3}$
22. $\frac{1}{\sqrt{3}}$ ● $\frac{\sqrt{3}}{3}$
23. $-\sqrt{\frac{1}{4}}$ ● $-\frac{1}{4}$
24. $-\frac{1}{6}$ ● $-\frac{1}{\sqrt{6}}$

Lesson 3-1

(pages 120–126)

Translate each sentence into an equation or formula.

1. A number z times 2 minus 6 is the same as m divided by 3.
2. The cube of a decreased by the square of b is equal to c.
3. Twenty-nine decreased by the product of x and y is the same as z.
4. The perimeter P of an isosceles triangle is the sum of twice the length of leg a and the length of the base b.
5. Thirty increased by the quotient of s and t is equal to v.
6. The area A of a rhombus is half the product of lengths of the diagonals a and b.

Translate each equation into a verbal sentence.

7. $0.5x + 3 = -10$
8. $\frac{n}{-6} = 2n + 1$
9. $18 - 5h = 13h$
10. $n^2 = 16$
11. $2x^2 + 3 = 21$
12. $\frac{m}{n} + 4 = 12$

Lesson 3-2

(pages 128–134)

Solve each equation. Then check your solution.

1. $-2 + g = 7$
2. $9 + s = -5$
3. $-4 + y = -9$
4. $m + 6 = 2$
5. $t + (-4) = 10$
6. $v - 7 = -4$
7. $a - (-6) = -5$
8. $-2 - x = -8$
9. $d + (-44) = -61$
10. $e - (-26) = 41$
11. $p - 47 = 22$
12. $-63 - f = -82$
13. $c + 5.4 = -11.33$
14. $-6.11 + b = 14.321$
15. $-5 = y - 22.7$
16. $-5 - q = 1.19$
17. $n + (-4.361) = 59.78$
18. $t - (-46.1) = -3.673$
19. $\frac{7}{10} - a = \frac{1}{2}$
20. $f - \left(-\frac{1}{8}\right) = \frac{3}{10}$
21. $-4\frac{5}{12} = t - \left(-10\frac{1}{36}\right)$
22. $x + \frac{3}{8} = \frac{1}{4}$
23. $1\frac{7}{16} + s = \frac{9}{8}$
24. $17\frac{8}{9} = d + \left(-2\frac{5}{6}\right)$

Extra Practice

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Lesson 3-3

(pages 135–140)

Solve each equation. Then check your solution.

1. $7p = 35$
2. $-3x = -24$
3. $2y = -3$
4. $62y = -2356$
5. $\frac{a}{-6} = -2$
6. $\frac{c}{-59} = -7$
7. $\frac{f}{14} = -63$
8. $84 = \frac{x}{97}$
9. $\frac{w}{5} = 3$
10. $\frac{q}{9} = -3$
11. $\frac{2}{5}x = \frac{4}{7}$
12. $\frac{z}{6} = -\frac{5}{12}$
13. $-\frac{5}{9}r = 7\frac{1}{2}$
14. $2\frac{1}{6}j = 5\frac{1}{5}$
15. $3 = 1\frac{7}{11}q$
16. $-1\frac{3}{4}p = -\frac{5}{8}$
17. $57k = 0.1824$
18. $0.0022b = 0.1958$
19. $5j = -32.15$
20. $\frac{w}{-2} = -2.48$
21. $\frac{z}{2.8} = -6.2$
22. $\frac{x}{-0.063} = 0.015$
23. $15\frac{3}{8} = -5p$
24. $-18\frac{1}{4} = 2.5x$

Lesson 3-4

(pages 142–148)

Solve each equation. Then check your solution.

1. $2x - 5 = 3$
2. $4t + 5 = 37$
3. $7a + 6 = -36$
4. $47 = -8g + 7$
5. $-3c - 9 = -24$
6. $5k - 7 = -52$
7. $5s + 4s = -72$
8. $3x - 7 = 2$
9. $8 + 3x = 5$
10. $-3y + 7.569 = 24.069$
11. $7 - 9.1f = 137.585$
12. $6.5 = 2.4m - 4.9$
13. $\frac{e}{5} + 6 = -2$
14. $\frac{d}{4} - 8 = -5$
15. $-\frac{4}{13}y - 7 = 6$
16. $\frac{p + 3}{10} = 4$
17. $\frac{h - 7}{6} = 1$
18. $\frac{5f + 1}{8} = -3$
19. $\frac{4n - 8}{-2} = 12$
20. $\frac{-3t - 4}{2} = 8$
21. $4.8a - 3 + 1.2a = 9$

Lesson 3-5

(pages 149–154)

Solve each equation. Then check your solution.

1. $5x + 1 = 3x - 3$
2. $6 - 8n = 5n + 19$
3. $-3z + 5 = 2z + 5$
4. $\frac{2}{3}h + 5 = -4 - \frac{1}{3}h$
5. $\frac{1}{2}a - 4 = 3 - \frac{1}{4}a$
6. $6(y - 5) = 18 - 2y$
7. $-28 + p = 7(p - 10)$
8. $\frac{1}{3}(b - 9) = b + 9$
9. $-4x + 6 = 0.5(x + 30)$
10. $4(2y - 1) = -8(0.5 - y)$
11. $1.9s + 6 = 3.1 - s$
12. $2.85y - 7 = 12.85y - 2$
13. $2.9m + 1.7 = 3.5 + 2.3m$
14. $3(x + 1) - 5 = 3x - 2$
15. $\frac{x}{2} - \frac{1}{3} = \frac{x}{3} - \frac{1}{2}$
16. $\frac{6v - 9}{3} = v$
17. $\frac{3t + 1}{4} = \frac{3}{4}t - 5$
18. $0.4(x - 12) = 1.2(x - 4)$
19. $3y - \frac{4}{5} = \frac{1}{3}y$
20. $\frac{3}{4}x - 4 = 7 + \frac{1}{2}x$
21. $-0.2(1 - x) = 2(4 + 0.1x)$

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Lesson 3-6

(pages 155–159)

Solve each proportion.

1. $\frac{4}{5} = \frac{x}{20}$
2. $\frac{b}{63} = \frac{3}{7}$
3. $\frac{y}{5} = \frac{3}{4}$
4. $\frac{7}{4} = \frac{3}{a}$
5. $\frac{t-5}{4} = \frac{3}{2}$
6. $\frac{x}{9} = \frac{0.24}{3}$
7. $\frac{n}{3} = \frac{n+4}{7}$
8. $\frac{12q}{-7} = \frac{30}{14}$
9. $\frac{1}{y-3} = \frac{3}{y-5}$
10. $\frac{x}{8.71} = \frac{4}{17.42}$
11. $\frac{a-3}{8} = \frac{3}{4}$
12. $\frac{6p-2}{7} = \frac{5p+7}{8}$
13. $\frac{2}{9} = \frac{k+3}{2}$
14. $\frac{5m-3}{4} = \frac{5m+3}{6}$
15. $\frac{w-5}{4} = \frac{w+3}{3}$
16. $\frac{96.8}{t} = \frac{12.1}{7}$
17. $\frac{r-1}{r+1} = \frac{3}{5}$
18. $\frac{4n+5}{5} = \frac{2n+7}{7}$

Lesson 3-7

(pages 160–164)

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

1. original: \$100
   new: \$67
2. original: 62 acres
   new: 98 acres
3. original: 322 people
   new: 289 people
4. original: 78 pennies
   new: 36 pennies
5. original: \$212
   new: \$230
6. original: 35 mph
   new: 65 mph

Find the final price of each item.

7. television: \$299
   discount: 20%
8. book: \$15.95
   sales tax: 7%
9. software: \$36.90
   sales tax: 6.25%
10. boots: \$49.99
    discount: 15%
    sales tax: 3.5%
11. jacket: \$65
    discount: 30%
    sales tax: 4%
12. backpack: \$28.95
    discount: 10%
    sales tax: 5%

Lesson 3-8

(pages 166–170)

Solve each equation or formula for x.

1. $x + r = q$
2. $ax + 4 = 7$
3. $2bx - b = -5$
4. $\frac{x-c}{c+a} = a$
5. $\frac{x+y}{c} = d$
6. $\frac{ax+1}{2} = b$
7. $d(x-3) = 5$
8. $nx - a = bx + d$
9. $3x - r = r(-3 + x)$
10. $y = \frac{5}{9}(x - 32)$
11. $A = \frac{1}{2}h(x + y)$
12. $A = 2\pi r^2 + 2\pi rx$

Lesson 3-9

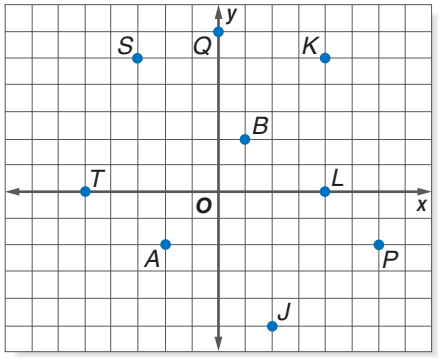
(pages 171–177)

1. **ADVERTISING** An advertisement for grape drink claims that the drink contains 10% grape juice. How much pure grape juice would have to be added to 5 quarts of the drink to obtain a mixture containing 40% grape juice?
2. **GRADES** In Ms. Pham's social studies class, a test is worth four times as much as homework. If a student has an average of 85% on tests and 95% on homework, what is the student's average?
3. **ENTERTAINMENT** At the Golden Oldies Theater, tickets for adults cost $5.50 and tickets for children cost $3.50. How many of each kind of ticket were purchased if 21 tickets were bought for $83.50?
4. **FOOD** Wes is mixing peanuts and chocolate pieces. Peanuts sell for $4.50 a pound and the chocolate sells for $6.50 a pound. How many pounds of chocolate mixes with 5 pounds of peanuts to obtain a mixture that sells for $5.25 a pound?
5. **TRAVEL** Missoula and Bozeman are 210 miles apart. Sheila leaves Missoula for Bozeman and averages 55 miles per hour. At the same time, Casey leaves Bozeman and averages 65 miles per hour as he drives to Missoula. When will they meet? How far will they be from Bozeman?

Lesson 4-1

(pages 192–196)

Write the ordered pair for each point shown at the right. Name the quadrant in which the point is located.



1. B
2. T
3. P
4. Q
5. A
6. K
7. J
8. L
9. S

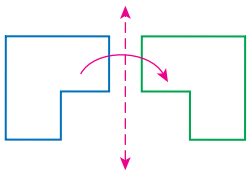
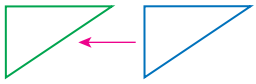
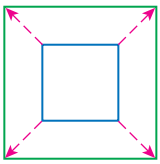
Plot each point on a coordinate plane.

10. $A(2, -3)$
11. $B(3, 6)$
12. $C(-4, 0)$
13. $D(-4, 3)$
14. $E(-5, -5)$
15. $F(-1, 1)$
16. $G(0, -2)$
17. $H(2, 3)$
18. $J(0, 3)$

Lesson 4-2

(pages 197–203)

Determine whether each transformation is a *reflection*, *translation*, *dilation*, or *rotation*.

1. 
2. 
3. 

For Exercises 4–9, complete parts a and b.

a. Find the coordinates of the vertices of each figure after the given transformation is performed.

b. Graph the preimage and its image.

4. quadrilateral $ABCD$ with $A(2, 2)$, $B(-3, 5)$, $C(-4, 0)$, and $D(2, -2)$ translated 1 unit up and 2 units right
5. square $SQUA$ with $S(1, 1)$, $Q(4, 1)$, $U(4, 4)$, and $A(1, 4)$ reflected over the y-axis
6. $\triangle RED$ with $R(2, 1)$, $E(-3, -1)$, and $D(2, -4)$ dilated by a scale factor of 2
7. pentagon $BLACK$ with $B(-3, -5)$, $L(4, -5)$, $A(4, 1)$, $C(0, 4)$, and $K(-4, 1)$ reflected over the x-axis
8. $\triangle ANG$ with $A(2, 1)$, $N(4, 1)$, and $G(3, 4)$ rotated 90° counterclockwise about the origin
9. parallelogram $GRAM$ with $G(-3, -2)$, $R(4, -2)$, $A(6, 4)$, and $M(-1, 4)$ translated 2 units down and 1 unit left

CONTENTS

Lesson 4-3

(pages 205–211)

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

1. $\{(5, 2), (0, 0), (-9, -1)\}$
2. $\{(-4, 2), (-2, 0), (0, 2), (2, 4)\}$
3. $\{(7, 5), (-2, -3), (4, 0), (5, -7), (-9, 2)\}$
4. $\{(3.1, -1), (-4.7, 3.9), (2.4, -3.6), (-9, 12.12)\}$

Express the relation shown in each table, mapping, or graph as a set of ordered pairs. Then write the inverse of the relation.

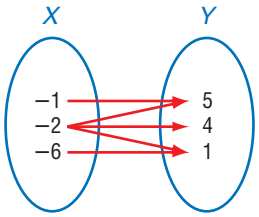
5.

x	y
1	3
2	4
3	5
4	6
5	7

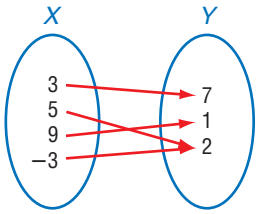
6.

x	y
−4	1
−2	3
0	1
2	3
4	1

7.



8.



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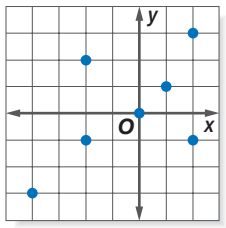
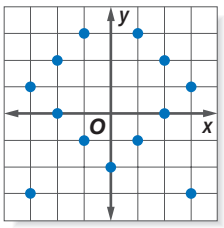


10.



Lesson 4-4

(pages 212–217)

Find the solution set for each equation, given the replacement set.

1. $y = 3x - 1$; $\{(0, -1), (4, 2), (2, 4), (2, 5)\}$
2. $3y = x + 7$; $\{(1, 8), (0, 7), (2, 3), (5, 4)\}$
3. $4x = 8 - 2y$; $\{(2, 0), (0, 4), (0, 2), (-4, 12)\}$
4. $3x = 10 - 4y$; $\{(3, 0.25), (-10, 5), (2, 1), (5, 5)\}$

Solve each equation if the domain is $\{-2, -1, 0, 1, 2\}$.

5. $x + y = 3$
6. $y = x$
7. $y = 5x + 1$
8. $4x + 3y = 13$
9. $5y = 8 - 4x$
10. $2x + y = 4$
11. $y = 4 + x$
12. $2x + 3y = 10$
13. $2y = 3x + 1$

Solve each equation for the given domain. Graph the solution set.

14. $x = y + 1$ for $x = \{-2, -1, 0, 1, 2\}$
15. $y = x + 1$ for $x = \{-3, -1, 0, 1, 3\}$
16. $x + 4y = 2$ for $x = \{-8, -4, 0, 4, 8\}$
17. $y - 3 = x$ for $x = \{-5, -1, 3, 7, 9\}$
18. $x + y = -2$ for $x = \{-4, -3, 0, 1, 3\}$
19. $2x - 3y = -5$ for $x = \{-5, -3, 0, 5, 6\}$
20. $3y = \frac{2}{3}x - 4$ for $x = \{-6, -3, 0, 1, 3\}$
21. $-2y = 8 - \frac{3}{2}x$ for $x = \{-4, 0, 4, 6, 8\}$

Lesson 4-5

(pages 218–223)

Determine whether each equation is a linear equation. If so, write the equation in standard form.

1. $3x = 2y$
2. $2x - 3 = y^2$
3. $4x = 2y + 8$
4. $5x - 7y = 2x - 7$
5. $2x + 5x = 7y + 2$
6. $\frac{1}{x} + \frac{5}{y} = -4$

Graph each equation.

7. $3x + y = 4$
8. $y = 3x + 1$
9. $3x - 2y = 12$
10. $2x - y = 6$
11. $2x - 3y = 8$
12. $y = -2$
13. $y = 5x - 7$
14. $x = 4$
15. $x + \frac{1}{3}y = 2$
16. $5x - 2y = 8$
17. $4.5x + 2.5y = 9$
18. $\frac{1}{2}x + 3y = 12$

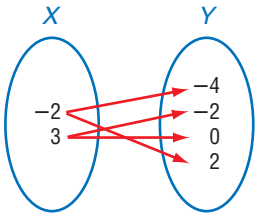
Lesson 4-6 *(pages 226–231)*

Determine whether each relation is a function.

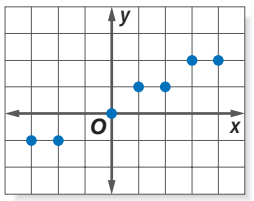
1.

x	y
1	3
2	5
1	−7
2	9

2.



3.



4. {(−2, 4), (1, 3), (5, 2), (1, 4)}
5. {(5, 4), (−6, 5), (4, 5), (0, 4)}
6. {(3, 1), (5, 1), (7, 1)}
7. {(3, −2), (4, 7), (−2, 7), (4, 5)}
8. $y = 2$
9. $x^2 + y = 11$

If $f(x) = 2x + 5$ and $g(x) = 3x^2 - 1$, find each value.

10. $f(-4)$
11. $g(2)$
12. $f(3) - 5$
13. $g(-2) + 4$
14. $f(b^2)$
15. $g(a + 1)$
16. $f(0) + g(3)$
17. $f(n) + g(n)$

Lesson 4-7 *(pages 233–238)*

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

1. −2, −1, 0, 1, …
2. 3, 5, 8, 12, …
3. 2, 4, 8, 16, …
4. −21, −16, −11, −6, …
5. 0, 0.25, 0.5, 0.75, …
6. $\frac{1}{3}, \frac{1}{9}, \frac{1}{27}, \frac{1}{81}, \ldots$

Find the next three terms of each arithmetic sequence.

7. 3, 13, 23, 33, …
8. −4, −6, −8, −10, …
9. −2, −1.4, −0.8, −0.2, …
10. 5, 13, 21, 29, …
11. $\frac{3}{4}, \frac{7}{8}, 1, \frac{9}{8}, \ldots$
12. $-\frac{1}{3}, -\frac{5}{6}, -\frac{4}{3}, -\frac{11}{6}, \ldots$

Find the nth term of each arithmetic sequence described.

13. $a_1 = 3, d = 6, n = 12$
14. $a_1 = -2, d = 4, n = 8$
15. $a_1 = -1, d = -3, n = 10$
16. $a_1 = 2.2, d = 1.4, n = 5$
17. −2, −7, −12, … for $n = 12$
18. $2\frac{1}{2}, 2\frac{1}{8}, 1\frac{3}{4}, 1\frac{3}{8}, \ldots$ for $n = 10$

Write an equation for the nth term of the arithmetic sequence. Then graph the first five terms in the sequence.

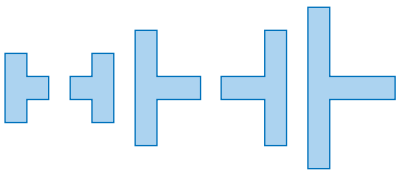
19. −3, 1, 5, 9, …
20. 25, 40, 55, 70, …
21. −9, −3, 3, 9, …
22. −3.5, −2, −0.5, 1, …

Lesson 4-8 *(pages 240–245)*

Find the next two items for each pattern.

1.

2.

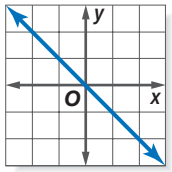


Find the next three terms in each sequence.

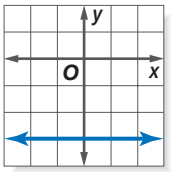
3. 12, 23, 34, 45, …
4. 39, 33, 27, 21, …
5. 6.0, 7.2, 8.4, 9.6, …
6. 86, 81.5, 77, 72.5, …
7. 4, 8, 16, 32, …
8. 3125, 625, 125, 25, …
9. 15, 16, 18, 21, 25, 30, …
10. $w - 2, w - 4, w - 6, w - 8, \ldots$
11. 13, 10, 11, 8, 9, 6, …

Write an equation in function notation for each relation.

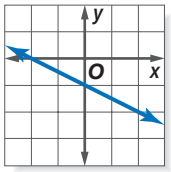
12.



13.



14.



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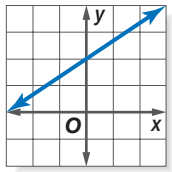
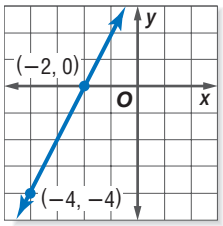


CONTENTS

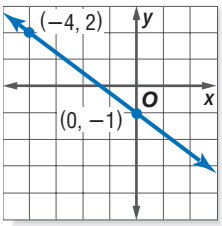
Lesson 5-1 *(pages 256–262)*

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

1.



2.



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

4. $(-2, -8), (1, 4)$

5. $(3, 4), (4, 6)$

6. $(-5, 4), (-1, 11)$

7. $(18, -4), (6, -10)$

8. $(-4, -6), (-4, -8)$

9. $(0, 0), (-1, 3)$

10. $(-8, 1), (2, 1)$

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

11. $(-1, r), (1, -4), m = -5$

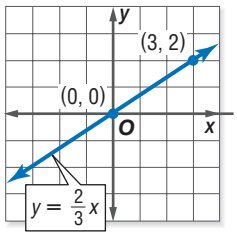
12. $(r, -2), (-7, -1), m = -\frac{1}{4}$

13. $(-3, 2), (7, r), m = \frac{2}{3}$

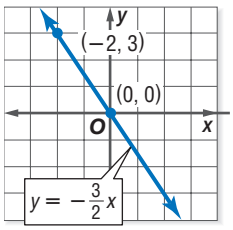
Lesson 5-2 *(pages 264–270)*

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

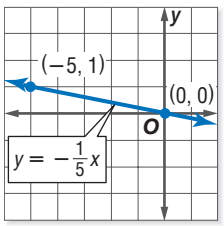
1.



2.



3.



Graph each equation.

4. $y = 5x$

5. $y = -6x$

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

Write a direct variation equation that relates x and y. Assume that y varies directly as x. Then solve.

7. If $y = 45$ when $x = 9$, find y when $x = 7$.

8. If $y = -7$ when $x = -1$, find x when $y = -84$.

9. If $y = 450$ when $x = -6$, find y when $x = 10$.

10. If $y = 6$ when $x = 48$, find y when $x = 20$.

Lesson 5-3 *(pages 272–277)*

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

1. slope: 5, y-intercept: -15

2. slope: -6, y-intercept: 3

3. slope: 0.3, y-intercept: -2.6

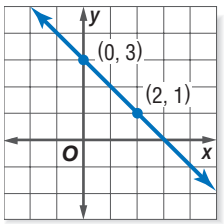
4. slope: $-\frac{4}{3}$, y-intercept: $\frac{5}{3}$

5. slope: $-\frac{2}{5}$, y-intercept: 2

6. slope: $\frac{7}{4}$, y-intercept: -2

Write an equation of the line shown in each graph.

7.



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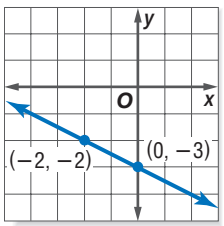
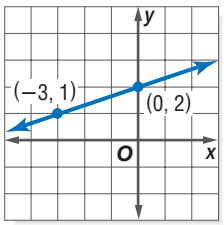


9.



Graph each equation.

10. $y = 5x - 1$

11. $y = -2x + 3$

12. $3x - y = 6$

Lesson 5-4 *(pages 280–285)*

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

1. $(0, 0)$; $m = -2$
2. $(-3, 2)$; $m = 4$
3. $(0, 5)$; $m = -1$
4. $(-2, 3)$; $m = -\frac{1}{4}$
5. $(1, -5)$; $m = \frac{2}{3}$
6. $\left(\frac{1}{2}, \frac{1}{4}\right)$; $m = 8$

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

7. $(-1, 7)$, $(8, -2)$
8. $(4, 0)$, $(0, 5)$
9. $(8, -1)$, $(7, -1)$
10. $(1, 0)$, $(0, 1)$
11. $(5, 7)$, $(-1, 3)$
12. $(-3, -5)$, $(3, -15)$
13. $(-2, 3)$, $(1, 3)$
14. $(0, 0)$, $(-4, 3)$
15. $\left(-\frac{1}{2}, \frac{1}{2}\right)$, $\left(\frac{1}{4}, \frac{3}{4}\right)$

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

16. x-intercept: 2, y-intercept: 1
17. x-intercept: 1, y-intercept: -4
18. x-intercept: 5, y-intercept: 5
19. x-intercept: -1, y-intercept: 3
20. x-intercept: -4, y-intercept: -1
21. x-intercept: 3, y-intercept: -3

Lesson 5-5 *(pages 286–291)*

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

1. $(5, -2)$, $m = 3$
2. $(5, 4)$, $m = -5$
3. $(0, 6)$, $m = -2$
4. $(-3, 1)$, $m = 0$
5. $(-1, 0)$, $m = \frac{2}{3}$
6. $(-2, -4)$, $m = \frac{3}{4}$

Write each equation in standard form.

7. $y + 3 = 2(x - 4)$
8. $y + 3 = -\frac{1}{2}(x + 6)$
9. $y - 4 = -\frac{2}{3}(x - 5)$
10. $y + 2 = \frac{4}{3}(x - 6)$
11. $y - 1 = 1.5(x + 3)$
12. $y + 6 = -3.8(x - 2)$

Write each equation in slope-intercept form.

13. $y - 1 = -2(x + 5)$
14. $y + 3 = 4(x - 1)$
15. $y - 6 = -4(x - 2)$
16. $y + 1 = \frac{4}{5}(x + 5)$
17. $y - 2 = -\frac{3}{4}(x - 2)$
18. $y + \frac{1}{4} = \frac{2}{3}\left(x + \frac{1}{2}\right)$

Lesson 5-6 *(pages 292–297)*

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

1. $(1, 6)$, $y = 4x - 2$
2. $(4, 6)$, $y = 2x - 7$
3. $(-3, 0)$, $y = \frac{2}{3}x + 1$
4. $(5, -2)$, $y = -3x - 7$
5. $(0, 4)$, $3x + 8y = 4$
6. $(2, 3)$, $x - 5y = 7$

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

7. $(0, -1)$, $y = -\frac{3}{5}x + 4$
8. $(-2, 3)$, $6x + y = 4$
9. $(0, 0)$, $y = \frac{3}{4}x - 1$
10. $(4, 0)$, $4x - 3y = 2$
11. $(6, 7)$, $3x - 5y = 1$
12. $(5, -1)$, $8x + 4y = 15$

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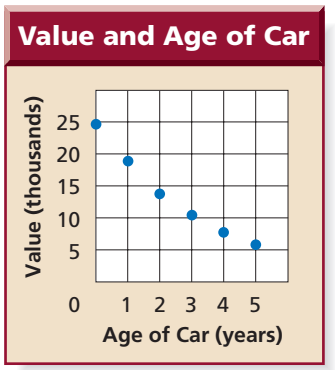
Lesson 5-7

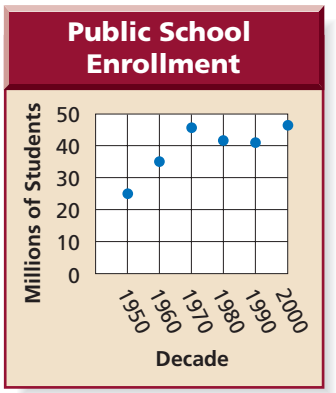
(pages 298–305)

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

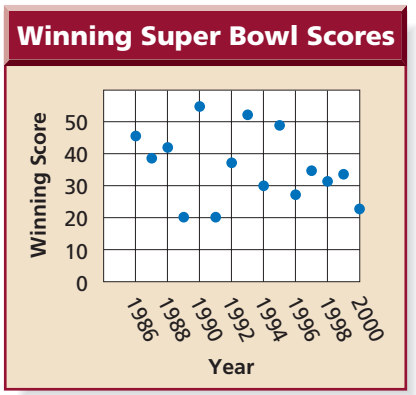
1.



2.



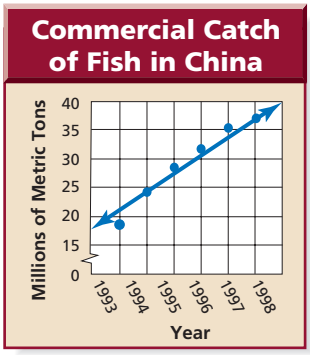
3.



Source: *ESPN Almanac*

For Exercises 4–6, use the scatter plot that shows the year and the amount of fish caught in China in millions of metric tons.

4. Describe the relationship that exists in the data.
5. Use the points (1994, 24) and (1998, 38) to write the slope-intercept form of an equation for the line of fit shown in the scatter plot.
6. Predict the amount of fish that will be caught in China in 2005.



Source: *The World Almanac*

Lesson 6-1

(pages 318–323)

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

1. $c + 9 \leq 3$
2. $d - (-3) < 13$
3. $z - 4 > 20$
4. $h - (-7) > -2$
5. $-11 > d - 4$
6. $2x > x - 3$
7. $2x - 3 \geq x$
8. $16 + w < -20$
9. $14p > 5 + 13p$
10. $-7 < 16 - z$
11. $1.1v - 1 > 2.1v - 3$
12. $\frac{1}{2}t + \frac{1}{4} \geq \frac{3}{2}t - \frac{2}{3}$
13. $9x < 8x - 2$
14. $-2 + 9n \leq 10n$
15. $a - 2.3 \geq -7.8$
16. $5z - 6 > 4z$

Define a variable, write an inequality, and solve each problem.

17. The sum of a number and negative six is greater than 9.
18. Negative five times a number is less than the sum of negative six times the number and 12.

Lesson 6-2

(pages 325–331)

Solve each inequality. Then check your solution.

1. $7b \geq -49$
2. $-5j < -60$
3. $\frac{w}{3} > -12$
4. $\frac{p}{5} < 8$
5. $-8f < 48$
6. $-0.25t \geq -10$
7. $\frac{g}{-8} < 4$
8. $-4.3x < -2.58$
9. $4c \geq -6$
10. $6 \leq 0.8n$
11. $\frac{2}{3}m \geq -22$
12. $-25 > -0.05a$
13. $-15a < -28$
14. $-\frac{7}{9}x < 42$
15. $0.375y \leq 32$
16. $-7y \geq 91$

Define a variable, write an inequality, and solve each problem.

17. Negative one times a number is greater than -7.
18. Three fifths of a number is at least negative 10.
19. Seventy-five percent of a number is at most 100.

Lesson 6-3

(pages 332–337)

Solve each inequality. Then check your solution.

1. $3y - 4 > -37$
2. $7s - 12 < 13$
3. $-5e + 9 > 24$
4. $-6v - 3 \geq -33$
5. $-2k + 12 < 30$
6. $-2x + 1 < 16 - x$
7. $15t - 4 > 11t - 16$
8. $13 - y \leq 29 + 2y$
9. $5q + 7 \leq 3(q + 1)$
10. $2(w + 4) \geq 7(w - 1)$
11. $-4t - 5 > 2t + 13$
12. $\frac{2t + 5}{3} < -9$
13. $\frac{z}{4} + 7 \geq -5$
14. $13r - 11 > 7r + 37$
15. $8c - (c - 5) > c + 17$
16. $-5(k + 4) \geq 3(k - 4)$
17. $9m + 7 < 2(4m - 1)$
18. $3(3y + 1) < 13y - 8$
19. $5x \leq 10(3x + 4)$
20. $3\left(a + \frac{2}{3}\right) \geq a - 1$

Lesson 6-4

(pages 339–344)

Solve each compound inequality. Then graph the solution set.

1. $2 + x < -5$ or $2 + x > 5$
2. $-4 + t > -5$ or $-4 + t < 7$
3. $3 \leq 2g + 7$ and $2g + 7 \leq 15$
4. $2v - 2 \leq 3v$ and $4v - 1 \geq 3v$
5. $3b - 4 \leq 7b + 12$ and $8b - 7 \leq 25$
6. $-9 < 2z + 7 < 10$
7. $5m - 8 \geq 10 - m$ or $5m + 11 < -9$
8. $12c - 4 \leq 5c + 10$ or $-4c - 1 \leq c + 24$
9. $2h - 2 \leq 3h \leq 4h - 1$
10. $3p + 6 < 8 - p$ and $5p + 8 \geq p + 6$
11. $2r + 8 > 16 - 2r$ and $7r + 21 < r - 9$
12. $-4j + 3 < j + 22$ and $j - 3 < 2j - 15$
13. $2(q - 4) \leq 3(q + 2)$ or $q - 8 \leq 4 - q$
14. $\frac{1}{2}w + 5 \geq w + 2 \geq \frac{1}{2}w + 9$
15. $n - (6 - n) > 10$ or $-3n - 1 > 20$
16. $-(2x + 5) \leq x + 5 \leq 2x - 9$

Lesson 6-5

(pages 345–351)

Solve each open sentence. Then graph the solution set.

1. $|y - 9| < 19$
2. $|g + 6| > 8$
3. $|t - 5| \leq 3$
4. $|a + 5| \geq 0$
5. $|14 - 2z| = 16$
6. $|a - 5| = -3$
7. $|2m - 5| > 13$
8. $|14 - w| \geq 20$
9. $|13 - 5y| = 8$
10. $|3p + 5| \leq 23$
11. $|6b - 12| \leq 36$
12. $|25 - 3x| < 5$
13. $|7 + 8x| > 39$
14. $|4c + 5| \geq 25$
15. $|4 - 5s| > 46$
16. $|4 - (1 - x)| \geq 10$
17. $\left|\frac{2n - 1}{3}\right| = 10$
18. $\left|\frac{7 - 2b}{2}\right| \leq 3$
19. $|-2 + (x - 3)| \leq 7$
20. $|-3 - (2b - 6)| \geq 10$

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Lesson 6-6

(pages 352–357)

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

1. $x + y \geq 0$, $\{(0, 0), (1, -3), (2, 2), (3, -3)\}$
2. $2x + y \leq 8$, $\{(0, 0), (-1, -1), (3, -2), (8, 0)\}$
3. $y > x$, $\{(0, 0), (2, 0), (-3, 4), (2, -1)\}$
4. $3x - 2y < 1$, $\{(0, 0), (3, 2), (-4, -5), (0, 6)\}$

Graph each inequality.

5. $y \leq -2$
6. $x < 4$
7. $x + y < -2$
8. $x + y \geq -4$
9. $y > 4x - 1$
10. $3x + y > 1$
11. $3y - 2x \leq 2$
12. $x < y$
13. $3x + y \leq 4$
14. $5x - y < 5$
15. $-2x + 6y \geq 12$
16. $-x + 3y \leq 9$
17. $y > -3x + 7$
18. $3x + 8y \leq 4$
19. $5x - 2y \geq 6$

Lesson 7-1

(pages 369–374)

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

1. $y = 3x$
   $4x + 2y = 30$
2. $x = -2y$
   $x + y = 1$
3. $y = x + 4$
   $3x + 2y = 18$
4. $x + y = 6$
   $x - y = 2$
5. $x + y = 6$
   $3x + 3y = 3$
6. $y = -3x$
   $4x + y = 2$
7. $2x + y = 8$
   $x - y = 4$
8. $\frac{1}{5}x - y = \frac{12}{5}$
   $3x - 5y = 6$
9. $x + 2y = 0$
   $y + 3 = -x$
10. $x + 2y = -9$
    $x - y = 6$
11. $x + \frac{1}{2}y = 3$
    $y = 3x - 4$
12. $\frac{2}{3}x + \frac{1}{2}y = 2$
    $4x + 3y = 12$
13. $y = x - 4$
    $x + \frac{1}{2}y = \frac{5}{2}$
14. $2x + y = 3$
    $4x + 2y = 6$
15. $12x - y = -21$
    $\frac{1}{2}x + \frac{2}{3}y = -3$

Lesson 7-2

(pages 376–381)

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

1. $y = x$
   $5x = 12y$
2. $y = 7 - x$
   $2x - y = 8$
3. $x = 5 - y$
   $3y = 3x + 1$
4. $3x + y = 6$
   $y + 2 = x$
5. $x - 3y = 3$
   $2x + 9y = 11$
6. $3x = -18 + 2y$
   $x + 3y = 4$
7. $x + 2y = 10$
   $-x + y = 2$
8. $2x = 3 - y$
   $2y = 12 - x$
9. $6y - x = -36$
   $y = -3x$
10. $\frac{3}{4}x + \frac{1}{3}y = 1$
    $x - y = 10$
11. $x + 6y = 1$
    $3x - 10y = 31$
12. $3x - 2y = 12$
    $\frac{3}{2}x - y = 3$
13. $2x + 3y = 5$
    $4x - 9y = 9$
14. $x = 4 - 8y$
    $3x + 24y = 12$
15. $3x - 2y = -3$
    $25x + 10y = 215$

Lesson 7-3

(pages 382–386)

Use elimination to solve each system of equations.

1. $x + y = 7$
   $x - y = 9$
2. $2x - y = 32$
   $2x + y = 60$
3. $-y + x = 6$
   $y + x = 5$
4. $s + 2t = 6$
   $3s - 2t = 2$
5. $x = y - 7$
   $2x - 5y = -2$
6. $3x + 5y = -16$
   $3x - 2y = -2$
7. $x - y = 3$
   $x + y = 3$
8. $x + y = 8$
   $2x - y = 6$
9. $2s - 3t = -4$
   $s = 7 - 3t$
10. $-6x + 16y = -8$
    $6x - 42 = 16y$
11. $3x + 0.2y = 7$
    $3x = 0.4y + 4$
12. $9x + 2y = 26$
    $1.5x - 2y = 13$
13. $x = y$
    $x + y = 7$
14. $4x - \frac{1}{3}y = 8$
    $5x + \frac{1}{3}y = 6$
15. $2x - y = 3$
    $\frac{2}{3}x - y = -1$

Lesson 7-4

(pages 387–392)

Use elimination to solve each system of equations.

1. $-3x + 2y = 10$
   $-2x - y = -5$
2. $2x + 5y = 13$
   $4x - 3y = -13$
3. $5x + 3y = 4$
   $-4x + 5y = -18$
4. $\frac{1}{3}x - y = -1$
   $\frac{1}{5}x - \frac{2}{5}y = -1$
5. $3x - 5y = 8$
   $4x - 7y = 10$
6. $x - 0.5y = 1$
   $0.4x + y = -2$
7. $x + 8y = 3$
   $4x - 2y = 7$
8. $4x - y = 4$
   $x + 2y = 3$
9. $3y - 8x = 9$
   $y - x = 2$
10. $x + 4y = 30$
    $2x - y = -6$
11. $3x - 2y = 0$
    $4x + 4y = 5$
12. $9x - 3y = 5$
    $x + y = 1$
13. $2x - 7y = 9$
    $-3x + 4y = 6$
14. $2x - 6y = -16$
    $5x + 7y = -18$
15. $6x - 3y = -9$
    $-8x + 2y = 4$

Lesson 7-5

(pages 394–398)

Solve each system of inequalities by graphing.

1. $x > 3$
   $y < 6$
2. $y > 2$
   $y > -x + 2$
3. $x \leq 2$
   $y + 3 \geq 5$
4. $x + y \leq -1$
   $2x + y \leq 2$
5. $y \geq 2x + 2$
   $y \geq -x - 1$
6. $y \leq x + 3$
   $y \geq x + 2$
7. $x + 3y \geq 4$
   $2x - y < 5$
8. $y - x > 1$
   $y + 2x \leq 10$
9. $5x - 2y > 15$
   $2x - 3y < 6$
10. $4x + 3y > 4$
    $2x - y < 0$
11. $4x + 5y \geq 20$
    $y \geq x + 1$
12. $-4x + 10y \leq 5$
    $-2x + 5y < -1$
13. $y - x \geq 0$
    $y \leq 3$
    $x \geq 0$
14. $y > 2x$
    $x > -3$
    $y < 4$
15. $y \leq x$
    $x + y < 4$
    $y \geq -3$

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Lesson 8-1

(pages 410–415)

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

1. $n^2 - 3$
2. 53
3. $9a^2b^3$
4. $15 - x^2y$

Simplify.

5. $a^5(a)(a^7)$
6. $(r^3t^4)(r^4t^4)$
7. $(x^3y^4)(xy^3)$
8. $(bc^3)(b^4c^3)$
9. $(-3mn^2)(5m^3n^2)$
10. $[(3^3)^2]^2$
11. $(3s^3t^2)(-4s^3t^2)$
12. $x^3(x^4y^3)$
13. $(1.1g^2h^4)^3$
14. $-\frac{3}{4}a(a^2b^3c^4)$
15. $\left(\frac{1}{2}w^3\right)^2(w^4)^2$
16. $[(-2^3)^3]^2$
17. $\left(\frac{2}{3}y^3\right)(3y^2)^3$
18. $(10s^3t)(-2s^2t^2)^3$
19. $(-0.2u^3w^4)^3$

Lesson 8-2

(pages 417–423)

Simplify. Assume that no denominator is equal to zero.

1. $\frac{6^{10}}{6^7}$
2. $\frac{b^6c^5}{b^3c^2}$
3. $\frac{(-a)^4b^8}{a^4b^7}$
4. $\frac{(-x)^3y^3}{x^3y^6}$
5. $\frac{12ab^5}{4a^4b^3}$
6. $\frac{24x^5}{-8x^2}$
7. $\frac{-9h^2k^4}{18h^5j^3k^4}$
8. $\left(\frac{2a^2b^4}{3a^3b}\right)^2$
9. $\frac{9a^2b^7c^3}{2a^5b^4c^5}$
10. $\frac{-15xy^{-5}z^7}{-10x^{-4}y^6z^{-4}}$
11. 3^{-4}
12. $\left(\frac{5}{6}\right)^{-2}$
13. $a^5b^0a^{-7}$
14. $\frac{(-u^{-3}v^3)^2}{(u^3v)^{-3}}$
15. $\left(\frac{a^3}{b^2}\right)^{-3}$
16. $\left(\frac{2x}{y^{-3}}\right)^{-2}$
17. $\frac{(-r)s^5}{r^{-3}s^{-4}}$
18. $\frac{28a^{-4}b^0}{14a^3b^{-1}}$
19. $\frac{(j^2k^3m)^4}{(jk^4)^{-1}}$
20. $\left(\frac{-2x^4y}{4y^2}\right)^0$
21. $\left(\frac{-18x^0a^{-3}}{-6x^{-2}a^{-3}}\right)$
22. $\left(\frac{2a^3b^{-2}}{2^{-1}a^{-5}b^3}\right)^{-1}$
23. $\left(\frac{5n^{-1}m^2}{2nm^{-2}}\right)^0$
24. $\frac{(3ab^2c)^{-3}}{(2a^2bc^2)^2}$

Lesson 8-3

(pages 425–430)

Express each number in standard notation.

1. 2.6×10^5
2. 4×10^{-3}
3. 6.72×10^3
4. 4.93×10^{-4}
5. 1.654×10^{-6}
6. 7.348×10^7

Express each number in scientific notation.

7. 6500
8. 953.56
9. 0.697
10. 843.5
11. $568{,}000$
12. 0.0000269
13. 0.121212
14. 543×10^4
15. 739.9×10^{-5}
16. 6480×10^{-2}
17. 0.366×10^{-7}
18. 167×10^3

Evaluate. Express each result in scientific and standard notation.

19. $(2 \times 10^5)(3 \times 10^{-8})$
20. $\frac{4.8 \times 10^3}{1.6 \times 10^1}$
21. $(4 \times 10^2)(1.5 \times 10^6)$
22. $\frac{8.1 \times 10^2}{2.7 \times 10^{-3}}$
23. $\frac{7.8 \times 10^{-5}}{1.3 \times 10^{-7}}$
24. $(2.2 \times 10^{-2})(3.2 \times 10^5)$
25. $(3.1 \times 10^4)(4.2 \times 10^{-5})$
26. $(78 \times 10^6)(0.01 \times 10^5)$
27. $\frac{2.31 \times 10^{-2}}{3.3 \times 10^{-3}}$

Lesson 8-4 *(pages 432–436)*

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

1. $5x^2y + 3xy - 7$
2. 0
3. $\frac{5}{k} - k^2y$
4. $3a^2x - 5a$

Find the degree of each polynomial.

5. $a + 5c$
6. $14abcd - 6d^3$
7. $\frac{a^3}{4}$
8. 10
9. $-4h^5$
10. $\frac{x^2}{3} - \frac{x}{2} + \frac{1}{5}$
11. -6
12. $a^2b^3 - a^3b^2$

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

13. $2x^2 - 3x + 4x^3 - x^5$
14. $x^3 - x^2 + x - 1$
15. $2a + 3ax^2 - 4ax$
16. $-5bx^3 - 2bx + 4x^2 - b^3$
17. $x^8 + 2x^2 - x^6 + 1$
18. $cdx^2 - c^2d^2x + d^3$

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

19. $5x^2 - 3x^3 + 7 + 2x$
20. $-6x + x^5 + 4x^3 - 20$
21. $5b + b^3x^2 + \frac{2}{3}bx$
22. $21p^2x + 3px^3 + p^4$
23. $3ax^2 - 6a^2x^3 + 7a^3 - 8x$
24. $\frac{1}{3}s^2x^3 + 4x^4 - \frac{2}{5}s^4x^2 + \frac{1}{4}x$

Lesson 8-5 *(pages 439–443)*

Find each sum or difference.

1. $(3a^2 + 5) + (4a^2 - 1)$
2. $(5x - 3) + (-2x + 1)$
3. $(6z + 2) - (9z + 3)$
4. $(-4n + 7) - (-7n - 8)$
5. $(-7t^2 + 4ts - 6s^2) + (-5t^2 - 12ts + 3s^2)$
6. $(6a^2 - 7ab - 4b^2) - (2a^2 + 5ab + 6b^2)$
7. $(4a^2 - 10b^2 + 7c^2) + (-5a^2 + 2c^2 + 2b)$
8. $(z^2 + 6z - 8) - (4z^2 - 7z - 5)$
9. $(4d + 3e - 8f) - (-3d + 10e - 5f + 6)$
10. $(7g + 8h - 9) + (-g - 3h - 6k)$
11. $(9x^2 - 11xy - 3y^2) - (x^2 - 16xy + 12y^2)$
12. $(-3m + 9mn - 5n) + (14m - 5mn - 2n)$
13. $(4x^2 - 8y^2 - 3z^2) - (7x^2 - 14z^2 - 12)$
14. $(17z^4 - 5z^2 + 3z) - (4z^4 + 2z^3 + 3z)$
15. $(6 - 7y + 3y^2) + (3 - 5y - 2y^2) + (-12 - 8y + y^2)$
16. $(-7c^2 - 2c - 5) + (9c - 6) + (16c^2 + 3) + (-9c^2 - 7c + 7)$

Lesson 8-6 *(pages 444–449)*

Find each product.

1. $-3(8x + 5)$
2. $3b(5b + 8)$
3. $1.1a(2a + 7)$
4. $\frac{1}{2}x(8x - 6)$
5. $7xy(5x^2 - y^2)$
6. $5y(y^2 - 3y + 6)$
7. $-ab(3b^2 + 4ab - 6a^2)$
8. $4m^2(9m^2n + mn - 5n^2)$
9. $4st^2(-4s^2t^3 + 7s^5 - 3st^3)$
10. $-\frac{1}{3}x(9x^2 + x - 5)$
11. $-2mn(8m^2 - 3mn + n^2)$
12. $-\frac{3}{4}ab^2\left(\frac{1}{3}b^2 - \frac{4}{9}b + 1\right)$

Simplify.

13. $-3a(2a - 12) + 5a$
14. $6(12b^2 - 2b) + 7(-2 - 3b)$
15. $x(x - 6) + x(x - 2) + 2x$
16. $11(n - 3) + 2(n^2 + 22n)$
17. $-2x(x + 3) + 3(x + 3)$
18. $4m(n - 1) - 5n(n + 1)$
19. $-7xy + x(7y - 3)$
20. $5(-c + 3a) - c(2c + 1)$
21. $-9n(1 - n) + 4(n^2 + n)$

Solve each equation.

22. $-6(11 - 2x) = 7(-2 - 2x)$
23. $11(n - 3) + 5 = 2n + 44$
24. $a(a - 6) + 2a = 3 + a(a - 2)$
25. $q(2q + 3) + 20 = 2q(q - 3)$
26. $w(w + 12) = w(w + 14) + 12$
27. $x(x - 3) + 4x - 3 = 8x + x(3 + x)$
28. $-3(x + 5) + x(x - 1) = x(x + 2) - 3$
29. $n(n - 5) + n(n + 2) = 2n(n - 1) + 1.5$

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Lesson 8-7 *(pages 452–457)*

Find each product.

1. $(d + 2)(d + 5)$
2. $(z + 7)(z - 4)$
3. $(m - 8)(m - 5)$
4. $(a + 2)(a - 19)$
5. $(c + 15)(c - 3)$
6. $(x + y)(x - 2y)$
7. $(2x - 5)(x + 6)$
8. $(7a - 4)(2a - 5)$
9. $(4x + y)(2x - 3y)$
10. $(7v + 3)(v + 4)$
11. $(7s - 8)(3s - 2)$
12. $(4g + 3h)(2g - 5h)$
13. $(4a + 3)(2a - 1)$
14. $(7y - 1)(2y - 3)$
15. $(2x + 3y)(4x + 2y)$
16. $(12r - 4s)(5r + 8s)$
17. $(-a + 1)(-3a - 2)$
18. $(2n - 4)(-3n - 2)$
19. $(x - 2)(x^2 + 2x + 4)$
20. $(3x + 5)(2x^2 - 5x + 11)$
21. $(4s + 5)(3s^2 + 8s - 9)$
22. $(3a + 5)(-8a^2 + 2a + 3)$
23. $(a - b)(a^2 + ab + b^2)$
24. $(c + d)(c^2 - cd + d^2)$
25. $(5x - 2)(-5x^2 + 2x + 7)$
26. $(-n + 2)(-2n^2 + n - 1)$
27. $(x^2 - 7x + 4)(2x^2 - 3x - 6)$
28. $(x^2 + x + 1)(x^2 - x - 1)$
29. $(a^2 + 2a + 5)(a^2 - 3a - 7)$
30. $(5x^4 - 2x^2 + 1)(x^2 - 5x + 3)$

Lesson 8-8 *(pages 458–463)*

Find each product.

1. $(t + 7)^2$
2. $(w - 12)(w + 12)$
3. $(q - 4h)^2$
4. $(10x + 11y)(10x - 11y)$
5. $(4e + 3)^2$
6. $(2b - 4d)(2b + 4d)$
7. $(a + 2b)^2$
8. $(3x + y)^2$
9. $(6m + 2n)^2$
10. $(3m - 7d)^2$
11. $(5b - 6)(5b + 6)$
12. $(1 + x)^2$
13. $(5x - 9y)^2$
14. $(8a - 2b)(8a + 2b)$
15. $\left(\frac{1}{4}x + 4\right)^2$
16. $(c - 3d)^2$
17. $(5a - 12b)^2$
18. $\left(\frac{1}{2}x + y\right)^2$
19. $(n^2 + 1)^2$
20. $(k^2 - 3j)^2$
21. $(a^2 - 5)(a^2 + 5)$
22. $(2x^3 - 7)(2x^3 + 7)$
23. $(3x^3 - 9y)(3x^3 + 9y)$
24. $(7a^2 - b)(7a^2 + b)$
25. $\left(\frac{1}{2}x - 10\right)\left(\frac{1}{2}x + 10\right)$
26. $\left(\frac{1}{3}n - m\right)\left(\frac{1}{3}n + m\right)$
27. $(a - 1)(a - 1)(a - 1)$
28. $(x + 2)(x - 2)(2x + 5)$
29. $(4x - 1)(4x + 1)(x - 4)$
30. $(x - 5)(x + 5)(x + 4)(x - 4)$
31. $(a + 1)(a + 1)(a - 1)(a - 1)$
32. $(n - 1)(n + 1)(n - 1)$
33. $(2c + 3)(2c + 3)(2c - 3)(2c - 3)$
34. $(4d + 5e)(4d + 5e)(4d - 5e)(4d - 5e)$

Lesson 9-1 *(pages 474–479)*

Find the factors of each number. Then classify each number as *prime* or *composite*.

1. 23
2. 21
3. 81
4. 24
5. 18
6. 22

Find the prime factorization of each integer.

7. 42
8. 267
9. -72
10. 164
11. -57
12. -60

Factor each monomial completely.

13. $240mn$
14. $-64a^3b$
15. $-26xy^2$
16. $-231xy^2z$
17. $44rs^2t^3$
18. $-756m^2n^2$

Find the GCF of each set of monomials.

19. 16, 60
20. 15, 50
21. 45, 80
22. 29, 58
23. 55, 305
24. 126, 252
25. 128, 245
26. $7y^2$, $14y^2$
27. $4xy$, $-6x$
28. $35t^2$, $7t$
29. $16pq^2$, $12p^2q$, $4pq$
30. 5, 15, 10
31. $12mn$, $10mn$, $15mn$
32. $14xy$, $12y$, $20x$
33. $26jk^4$, $16jk^3$, $8j^2$

Lesson 9-2

(pages 481–486)

Factor each polynomial.

1. $10a^2 + 40a$
2. $15wx - 35wx^2$
3. $27a^2b + 9b^3$
4. $11x + 44x^2y$
5. $16y^2 + 8y$
6. $14mn^2 + 2mn$
7. $25a^2b^2 + 30ab^3$
8. $2m^3n^2 - 16mn^2 + 8mn$
9. $2ax + 6xc + ba + 3bc$
10. $6mx - 4m + 3rx - 2r$
11. $3ax - 6bx + 8b - 4a$
12. $a^2 - 2ab + a - 2b$
13. $8ac - 2ad + 4bc - bd$
14. $2e^2g + 2fg + 4e^2h + 4fh$
15. $x^2 - xy - xy + y^2$

Solve each equation. Check your solutions.

16. $a(a - 9) = 0$
17. $d(d + 11) = 0$
18. $z(z - 2.5) = 0$
19. $(2y + 6)(y - 1) = 0$
20. $(4n - 7)(3n + 2)$
21. $(a - 1)(a + 1) = 0$
22. $10x^2 - 20x = 0$
23. $8b^2 - 12b = 0$
24. $14d^2 + 49d = 0$
25. $15a^2 = 60a$
26. $33x^2 = -22x$
27. $32x^2 = 16x$

Lesson 9-3

(pages 489–494)

Factor each trinomial.

1. $x^2 - 9x + 14$
2. $a^2 - 9a - 36$
3. $x^2 + 2x - 15$
4. $n^2 - 8n + 15$
5. $b^2 + 22b + 21$
6. $c^2 + 2c - 3$
7. $x^2 - 5x - 24$
8. $n^2 - 8n + 7$
9. $m^2 - 10m - 39$
10. $z^2 + 15z + 36$
11. $s^2 - 13st - 30t^2$
12. $y^2 + 2y - 35$
13. $r^2 + 3r - 40$
14. $x^2 + 5x - 6$
15. $x^2 - 4xy - 5y^2$
16. $r^2 + 16r + 63$
17. $v^2 + 24v - 52$
18. $k^2 - 27kj - 90j^2$

Solve each equation. Check your solutions.

19. $a^2 + 3a - 4 = 0$
20. $x^2 - 8x - 20 = 0$
21. $b^2 + 11b + 24 = 0$
22. $y^2 + y - 42 = 0$
23. $k^2 + 2k - 24 = 0$
24. $r^2 - 13r - 48 = 0$
25. $n^2 - 9n = -18$
26. $2z + z^2 = 35$
27. $-20x + 19 = -x^2$
28. $10 + a^2 = -7a$
29. $z^2 - 57 = 16z$
30. $x^2 = -14x - 33$
31. $22x - x^2 = 96$
32. $-144 = q^2 - 26q$
33. $x^2 + 84 = 20x$

Lesson 9-4

(pages 495–500)

Factor each trinomial, if possible. If the trinomial cannot be factored using integers, write *prime*.

1. $4a^2 + 4a - 63$
2. $3x^2 - 7x - 6$
3. $4r^2 - 25r + 6$
4. $2z^2 - 11z + 15$
5. $3a^2 - 2a - 21$
6. $4y^2 + 11y + 6$
7. $6n^2 + 7n - 3$
8. $5x^2 - 17x + 14$
9. $2n^2 - 11n + 13$
10. $8m^2 - 10m - 3$
11. $6y^2 + 2y - 2$
12. $2r^2 + 3r - 14$
13. $5a^2 - 3a + 15$
14. $18v^2 + 24v + 12$
15. $4k^2 + 2k - 12$
16. $10x^2 - 20xy + 10y^2$
17. $12c^2 - 11cd - 5d^2$
18. $30n^2 - mn - m^2$

Solve each equation. Check your solutions.

19. $8t^2 + 32t + 24 = 0$
20. $6y^2 + 72y + 192 = 0$
21. $5x^2 + 3x - 2 = 0$
22. $9x^2 + 18x - 27 = 0$
23. $4x^2 - 4x - 4 = 4$
24. $12n^2 - 16n - 3 = 0$
25. $12x^2 - x - 35 = 0$
26. $18x^2 + 36x - 14 = 0$
27. $15a^2 + a - 2 = 0$
28. $14b^2 + 7b - 42 = 0$
29. $13r^2 + 21r - 10 = 0$
30. $35y^2 - 60y - 20 = 0$
31. $16x^2 - 4x - 6 = 0$
32. $28d^2 + 5d - 3 = 0$
33. $30x^2 - 9x - 3 = 0$

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Lesson 9-5 *(pages 501–506)*

Factor each polynomial, if possible. If the polynomial cannot be factored, write *prime*.

1. $x^2 - 9$
2. $a^2 - 64$
3. $4x^2 - 9y^2$
4. $1 - 9z^2$
5. $16a^2 - 9b^2$
6. $8x^2 - 12y^2$
7. $a^2 - 4b^2$
8. $x^2 - y^2$
9. $75r^2 - 48$
10. $x^2 - 36y^2$
11. $3a^2 - 16$
12. $12t^2 - 75$
13. $9x^2 - 100y^2$
14. $49 - a^2b^2$
15. $5a^2 - 48$
16. $169 - 16t^2$
17. $8r^2 - 4$
18. $-45m^2 + 5$

Solve each equation by factoring. Check your solutions.

19. $4x^2 = 16$
20. $2x^2 = 50$
21. $9n^2 - 4 = 0$
22. $a^2 - \frac{25}{36} = 0$
23. $\frac{16}{9} - b^2 = 0$
24. $18 - \frac{1}{2}x^2 = 0$
25. $20 - 5g^2 = 0$
26. $16 - \frac{1}{4}p^2 = 0$
27. $\frac{1}{4}c^2 - \frac{4}{9} = 0$
28. $3z^2 - 48 = 0$
29. $72 - 2z^2 = 0$
30. $25a^2 = 1$
31. $2q^3 - 2q = 0$
32. $3r^3 = 48r$
33. $100d - 4d^3 = 0$

Lesson 9-6 *(pages 508–514)*

Determine whether each trinomial is a perfect square trinomial. If so, factor it.

1. $x^2 + 12x + 36$
2. $n^2 - 13n + 36$
3. $a^2 + 4a + 4$
4. $x^2 - 10x - 100$
5. $2n^2 + 17n + 21$
6. $4a^2 - 20a + 25$

Factor each polynomial, if possible. If the polynomial cannot be factored, write *prime*.

7. $3x^2 - 75$
8. $n^2 - 8n + 16$
9. $4p^2 + 12pr + 9r^2$
10. $6a^2 + 72$
11. $s^2 + 30s + 225$
12. $24x^2 + 24x + 9$
13. $1 - 10z + 25z^2$
14. $28 - 63b^2$
15. $4c^2 + 2c - 7$

Solve each equation. Check your solutions.

16. $x^2 + 22x + 121 = 0$
17. $343d^2 = 7$
18. $(a - 7)^2 = 5$
19. $c^2 + 10c + 36 = 11$
20. $16s^2 + 81 = 72s$
21. $9p^2 - 42p + 20 = -29$

Lesson 10-1 *(pages 524–530)*

Use a table of values to graph each function.

1. $y = x^2 + 6x + 8$
2. $y = -x^2 + 3x$
3. $y = -x^2$
4. $y = x^2 + x + 3$
5. $y = x^2 + 1$
6. $y = 3x^2 + 6x + 16$

Write the equation of the axis of symmetry, and find the coordinates of the vertex of the graph of each equation. Identify the vertex as a maximum or minimum. Then graph the equation.

7. $y = -x^2 + 2x - 3$
8. $y = 3x^2 + 24x + 80$
9. $y = x^2 - 4x - 4$
10. $y = 5x^2 - 20x + 37$
11. $y = 3x^2 + 6x + 3$
12. $y = 2x^2 + 12x$
13. $y = x^2 - 6x + 5$
14. $y = x^2 + 6x + 9$
15. $y = -x^2 + 16x - 15$
16. $y = 4x^2 - 1$
17. $y = -2x^2 - 2x + 4$
18. $y = 6x^2 - 12x - 4$
19. $y = -x^2 - 1$
20. $y = -x^2 + x + 1$
21. $y = -5x^2 - 3x + 2$
22. $y = -x^2 + x + 20$
23. $y = 2x^2 + 5x - 2$
24. $y = -3x^2 - 18x - 15$

Lesson 10-2 *(pages 533–538)*

Solve each equation by graphing.

1. $a^2 - 25 = 0$
2. $n^2 - 8n = 0$
3. $d^2 + 36 = 0$
4. $b^2 - 18b + 81 = 0$
5. $x^2 + 3x + 27 = 0$
6. $-y^2 - 3y + 10 = 0$

Solve each equation by graphing. If integral roots cannot be found, estimate the roots by stating the consecutive integers between which the roots lie.

7. $x^2 + 2x - 3 = 0$
8. $-x^2 + 6x - 5 = 0$
9. $-a^2 - 2a + 3 = 0$
10. $2r^2 - 8r + 5 = 0$
11. $-3x^2 + 6x - 9 = 0$
12. $c^2 + c = 0$
13. $3t^2 + 2 = 0$
14. $-b^2 + 5b + 2 = 0$
15. $3x^2 + 7x = 1$
16. $x^2 + 5x - 24 = 0$
17. $8 - n^2 = 0$
18. $x^2 - 7x = 18$
19. $a^2 + 12a + 36 = 0$
20. $64 - x^2 = 0$
21. $-4x^2 + 2x = -1$
22. $5z^2 + 8z = 1$
23. $p = 27 - p^2$
24. $6w = -15 - 3w^2$

Lesson 10-3 *(pages 539–544)*

Solve each equation. Round to the nearest tenth, if necessary.

1. $x^2 - 4x + 4 = 9$
2. $t^2 - 6t + 9 = 16$
3. $b^2 + 10b + 25 = 11$
4. $a^2 - 22a + 121 = 3$
5. $x^2 + 2x + 1 = 81$
6. $t^2 - 36t + 324 = 85$

Find the value of c that makes each trinomial a perfect square.

7. $a^2 + 20a + c$
8. $x^2 + 10x + c$
9. $t^2 + 12t + c$
10. $y^2 - 9y + c$
11. $p^2 - 14p + c$
12. $b^2 + 13b + c$

Solve each equation by completing the square. Round to the nearest tenth, if necessary.

13. $a^2 - 8a - 84 = 0$
14. $c^2 + 6 = -5c$
15. $p^2 - 8p + 5 = 0$
16. $2y^2 + 7y - 4 = 0$
17. $t^2 + 3t = 40$
18. $x^2 + 8x - 9 = 0$
19. $y^2 + 5y - 84 = 0$
20. $t^2 + 12t + 32 = 0$
21. $2x - 3x^2 = -8$
22. $2y^2 - y - 9 = 0$
23. $2z^2 - 5z - 4 = 0$
24. $8t^2 - 12t - 1 = 0$

Lesson 10-4 *(pages 546–552)*

Solve each equation by using the Quadratic Formula. Round to the nearest tenth, if necessary.

1. $x^2 - 8x - 4 = 0$
2. $x^2 + 7x - 8 = 0$
3. $x^2 - 5x + 6 = 0$
4. $y^2 - 7y - 8 = 0$
5. $m^2 - 2m = 35$
6. $4n^2 - 20n = 0$
7. $m^2 + 4m + 2 = 0$
8. $2t^2 - t - 15 = 0$
9. $5t^2 = 125$
10. $t^2 + 16 = 0$
11. $-4x^2 + 8x = -3$
12. $3k^2 + 2 = -8k$
13. $8t^2 + 10t + 3 = 0$
14. $3x^2 - \frac{5}{4}x - \frac{1}{2} = 0$
15. $-5b^2 + 3b - 1 = 0$
16. $s^2 + 8s + 7 = 0$
17. $d^2 - 14d + 24 = 0$
18. $3k^2 + 11k = 4$
19. $n^2 - 3n + 1 = 0$
20. $2z^2 + 5z - 1 = 0$
21. $3h^2 = 27$

State the value of the discriminant for each equation. Then determine the number of real roots of the equation.

22. $3f^2 + 2f = 6$
23. $2x^2 = 0.7x + 0.3$
24. $3w^2 - 2w + 8 = 0$
25. $4r^2 - 12r + 9 = 0$
26. $x^2 - 5x = -9$
27. $25t^2 + 30t = -9$

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Lesson 10-5 *(pages 554–560)*

Graph each function. State the *y*-intercept. Then use the graph to determine the approximate value of the given expression. Use a calculator to confirm the value.

1. $y = 7^x$; $7^{1.5}$
2. $\left(\frac{1}{3}\right)^x$; $\left(\frac{1}{3}\right)^{5.6}$
3. $y = \left(\frac{3}{5}\right)^x$; $\left(\frac{3}{5}\right)^{-4.2}$

Graph each function. State the *y*-intercept.

4. $y = 3^x + 1$
5. $y = 2^x - 5$
6. $y = 2^{x+3}$
7. $y = 3^{x+1}$
8. $y = \left(\frac{2}{3}\right)^x$
9. $y = 5\left(\frac{2}{5}\right)^x$
10. $y = 5(3^x)$
11. $y = 4(5)^x$
12. $y = 2(5)^x + 1$
13. $y = \left(\frac{1}{2}\right)^{x+1}$
14. $y = \left(\frac{1}{8}\right)^x$
15. $y = \left(\frac{3}{4}\right)^x - 2$

Determine whether the data in each table display exponential behavior. Explain why or why not.

16.

x	−1	0	1	2
y	−5	−1	3	7

17.

x	1	2	3	4
y	25	125	625	3125

Lesson 10-6 *(pages 561–565)*

1. **EDUCATION** Marco is saving for tuition costs at a state university. He deposited $8500 in a 4-year certificate of deposit earning 7.25% compounded monthly.
   a. Write an equation for the amount of money Marco will have at the end of four years.
   b. Find the amount of money he will have for his tuition at the end of the four years.
2. **TRANSPORTATION** Elise is buying a new car selling for $21,500. The rate of depreciation on this type of car is 8% per year.
   a. Write an equation for the value of the car in 5 years.
   b. Find the value of the car in 5 years.
3. **POPULATION** In 1990, the town of Belgrade, Montana, had a population of 3422. For each of the next 8 years, the population increased by 4.9% per year.
   a. Write an equation for the population of Belgrade in 1998.
   b. Find the population of Belgrade in 1998.

Lesson 10-7 *(pages 567–572)*

Determine whether each sequence is geometric.

1. 12, 23, 34, 45, …
2. 6, 7.2, 8.64, 10.368, …
3. 39, 33, 27, 21, …
4. 86, 68.8, 55.04, 44.032, …
5. 4, 8, 16, 32, …
6. 13, 10, 11, 8, 9, 6, …

Find the next three terms in each geometric sequence.

7. 3125, 625, 125, 25, …
8. 15, −45, 135, −405, …
9. 243, 81, 27, 9, …
10. 15, −7.5, 3.75, −1.875, …
11. −25, −15, −9, −5.4, …
12. $\frac{1}{4}, \frac{1}{10}, \frac{1}{25}, \frac{2}{125}, \ldots$

Find the *n*th term of each geometric sequence.

13. $a_1 = 1, n = 10, r = 6$
14. $a_1 = -1, n = 7, r = -4$
15. $a_1 = -6, n = 4, r = 0.4$
16. $a_1 = 100, n = 10, r = 0.1$
17. $a_1 = -750, n = 5, r = -1.5$
18. $a_1 = 64, n = 5, r = 8$
19. $a_1 = 0.5, n = 9, r = -10$
20. $a_1 = -20, n = 6, r = 2.5$
21. $a_1 = 350, n = 4, r = -0.9$

Find the geometric means in each sequence.

22. 1, ____, 81
23. −81, ____, −9
24. 504, ____, 14
25. 0.5, ____, 162
26. −1, ____, −4
27. 0.25, ____, 0.36
28. $\frac{1}{2}$, ____, $\frac{1}{8}$
29. $-\frac{2}{3}$, ____, $-\frac{32}{27}$
30. 6.25, ____, 2.25

Lesson 11-1

(pages 587–593)

Simplify.

1. $\sqrt{50}$
2. $\sqrt{200}$
3. $\sqrt{162}$
4. $\sqrt{700}$
5. $\frac{\sqrt{3}}{\sqrt{5}}$
6. $\frac{\sqrt{72}}{\sqrt{6}}$
7. $\sqrt{\frac{8}{7}}$
8. $\sqrt{\frac{7}{32}}$
9. $\sqrt{\frac{5}{8}} \cdot \sqrt{\frac{2}{6}}$
10. $\sqrt{\frac{2}{3}} \cdot \sqrt{\frac{3}{2}}$
11. $\sqrt{\frac{2x}{30}}$
12. $\sqrt{\frac{50}{z^2}}$
13. $\sqrt{10} \cdot \sqrt{20}$
14. $\sqrt{7} \cdot \sqrt{3}$
15. $6\sqrt{2} \cdot \sqrt{3}$
16. $5\sqrt{6} \cdot 2\sqrt{3}$
17. $\sqrt{4x^4y^3}$
18. $\sqrt{200m^2y^3}$
19. $\sqrt{12ts^3}$
20. $\sqrt{175a^4b^6}$
21. $\sqrt{\frac{54}{g^2}}$
22. $\sqrt{99x^3y^7}$
23. $\sqrt{\frac{32c^5}{9d^2}}$
24. $\sqrt{\frac{27p^4}{3p^2}}$
25. $\frac{1}{3+\sqrt{5}}$
26. $\frac{2}{\sqrt{3}-5}$
27. $\frac{\sqrt{3}}{\sqrt{3}-5}$
28. $\frac{\sqrt{6}}{7-2\sqrt{3}}$

Lesson 11-2

(pages 594–598)

Simplify each expression.

1. $3\sqrt{11} + 6\sqrt{11} - 2\sqrt{11}$
2. $6\sqrt{13} + 7\sqrt{13}$
3. $2\sqrt{12} + 5\sqrt{3}$
4. $9\sqrt{7} - 4\sqrt{2} + 3\sqrt{2} + 5\sqrt{7}$
5. $3\sqrt{5} - 5\sqrt{3}$
6. $4\sqrt{8} - 3\sqrt{5}$
7. $2\sqrt{27} - 4\sqrt{12}$
8. $8\sqrt{32} + 4\sqrt{50}$
9. $\sqrt{45} + 6\sqrt{20}$
10. $2\sqrt{63} - 6\sqrt{28} + 8\sqrt{45}$
11. $14\sqrt{3t} + 8\sqrt{3t}$
12. $7\sqrt{6x} - 12\sqrt{6x}$
13. $5\sqrt{7} - 3\sqrt{28}$
14. $7\sqrt{8} - \sqrt{18}$
15. $7\sqrt{98} + 5\sqrt{32} - 2\sqrt{75}$
16. $4\sqrt{6} + 3\sqrt{2} - 2\sqrt{5}$
17. $-3\sqrt{20} + 2\sqrt{45} - \sqrt{7}$
18. $4\sqrt{75} + 6\sqrt{27}$
19. $10\sqrt{\frac{1}{5}} - \sqrt{45} - 12\sqrt{\frac{5}{9}}$
20. $\sqrt{15} - \sqrt{\frac{3}{5}}$
21. $3\sqrt{\frac{1}{3}} - 9\sqrt{\frac{1}{12}} + \sqrt{243}$

Find each product.

22. $\sqrt{3}(\sqrt{5} + 2)$
23. $\sqrt{2}(\sqrt{2} + 3\sqrt{5})$
24. $(\sqrt{2} + 5)^2$
25. $(3 - \sqrt{7})(3 + \sqrt{7})$
26. $(\sqrt{2} + \sqrt{3})(\sqrt{3} + \sqrt{2})$
27. $(4\sqrt{7} + \sqrt{2})(\sqrt{3} - 3\sqrt{5})$

Lesson 11-3

(pages 599–604)

Solve each equation. Check your solution.

1. $\sqrt{5x} = 5$
2. $4\sqrt{7} = \sqrt{-m}$
3. $\sqrt{t} - 5 = 0$
4. $\sqrt{3b} + 2 = 0$
5. $\sqrt{x - 3} = 6$
6. $5 - \sqrt{3x} = 1$
7. $2 + 3\sqrt{y} = 13$
8. $\sqrt{3g} = 6$
9. $\sqrt{a} - 2 = 0$
10. $\sqrt{2j} - 4 = 8$
11. $5 + \sqrt{x} = 9$
12. $\sqrt{5y + 4} = 7$
13. $7 + \sqrt{5c} = 9$
14. $2\sqrt{5t} = 10$
15. $\sqrt{44} = 2\sqrt{p}$
16. $4\sqrt{x - 5} = 15$
17. $4 - \sqrt{x - 3} = 9$
18. $\sqrt{10x^2 - 5} = 3x$
19. $\sqrt{2a^2 - 144} = a$
20. $\sqrt{3y + 1} = y - 3$
21. $\sqrt{2x^2 - 12} = x$
22. $\sqrt{b^2 + 16} + 2b = 5b$
23. $\sqrt{m + 2} + m = 4$
24. $\sqrt{3 - 2c} + 3 = 2c$

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Lesson 11-4

(pages 606–611)

If c is the measure of the hypotenuse of a right triangle, find each missing measure. If necessary, round to the nearest hundredth.

1. $b = 20, c = 29, a = ?$
2. $a = 7, b = 24, c = ?$
3. $a = 2, b = 6, c = ?$
4. $b = 10, c = \sqrt{200}, a = ?$
5. $a = 3, c = 3\sqrt{2}, b = ?$
6. $a = 6, c = 14, b = ?$
7. $a = \sqrt{11}, c = \sqrt{47}, b = ?$
8. $a = \sqrt{13}, b = 6, c = ?$
9. $a = \sqrt{6}, b = 3, c = ?$
10. $b = \sqrt{75}, c = 10, a = ?$
11. $b = 9, c = \sqrt{130}, a = ?$
12. $a = 9, c = 15, b = ?$
13. $b = 5, c = 11, a = ?$
14. $a = \sqrt{33}, b = 4, c = ?$
15. $a = 5, c = \sqrt{34}, b = ?$

Determine whether the following side measures form right triangles.

16. 14, 48, 50
17. 20, 30, 40
18. 21, 72, 75
19. 5, 12, $\sqrt{119}$
20. 15, 39, 36
21. $\sqrt{5}$, 12, 13
22. 10, 12, $\sqrt{22}$
23. 2, 3, 4
24. $\sqrt{7}$, 8, $\sqrt{71}$

Lesson 11-5

(pages 612–616)

Find the distance between each pair of points whose coordinates are given. Express answers in simplest radical form and as decimal approximations rounded to the nearest hundredth if necessary.

1. (4, 2), (−2, 10)
2. (−5, 1), (7, 6)
3. (4, −2), (1, 2)
4. (−2, 4), (4, −2)
5. (3, 1), (−2, −1)
6. (−2, 4), (7, −8)
7. (−5, 0), (−9, 6)
8. (5, −1), (5, 13)
9. (2, −3), (10, 8)
10. (−7, 5), (2, −7)
11. (−6, −2), (−5, 4)
12. (8, −10), (3, 2)
13. (4, −3), (7, −9)
14. (6, 3), (9, 7)
15. (10, 0), (9, 7)
16. (2, −1), (−3, 3)
17. (−5, 4), (3, −2)
18. (0, −9), (0, 7)
19. (−1, 7), (8, 4)
20. (−9, 2), (3, −3)
21. $(3\sqrt{2}, 7), (5\sqrt{2}, 9)$
22. (6, 3), (10, 0)
23. (3, 6), (5, −5)
24. (−4, 2), (5, 4)

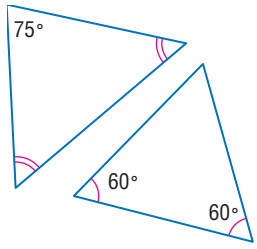
Find the possible values of a if the points with the given coordinates are the indicated distance apart.

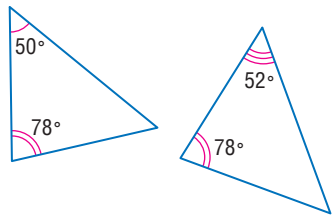
25. $(0, 0), (a, 3); d = 5$
26. $(2, -1), (-6, a); d = 10$
27. $(1, 0), (a, 6); d = \sqrt{61}$
28. $(-2, a), (5, 10); d = \sqrt{85}$
29. $(15, a), (0, 4); d = \sqrt{274}$
30. $(3, 3), (a, 9); d = \sqrt{136}$

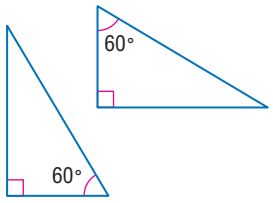
Lesson 11-6

(pages 617–622)

Determine whether each pair of triangles is similar. Justify your answer.

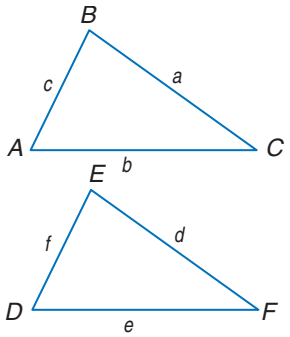
1. 

2. 

3. 

For each set of measures given, find the measures of the missing sides if $\triangle ABC \sim \triangle DEF$.

4. $a = 5, d = 10, b = 8, c = 7$
5. $a = 2, b = 3, c = 4, d = 3$
6. $a = 6, d = 4.5, e = 7, f = 7.5$
7. $a = 15, c = 20, b = 18, f = 10$
8. $f = 17.5, d = 8.5, e = 11, a = 1.7$
9. $b = 5.6, e = 7, a = 4, c = 7.2$
10. $e = 125, a = 80, d = 100, f = 218.75$

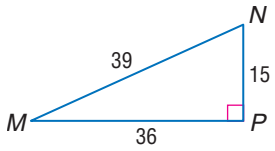


Lesson 11-7

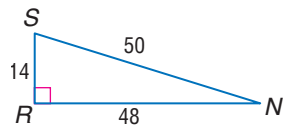
(pages 624–631)

For each triangle, find sin N, cos N, and tan N to the nearest ten thousandth.

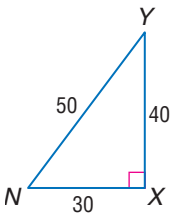
1.



2.



3.



Use a calculator to find the value of each trigonometric ratio to the nearest ten thousandth.

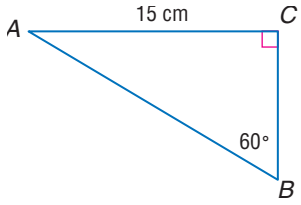
4. cos 25°
5. tan 31°
6. sin 71°
7. cos 64°
8. tan 9°
9. sin 2°

Use a calculator to find the measure of each angle to the nearest degree.

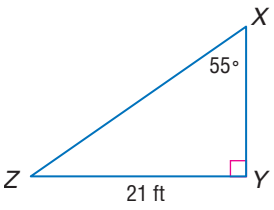
10. tan $B = 0.5427$
11. cos $A = 0.8480$
12. sin $J = 0.9654$
13. cos $Q = 0.3645$
14. sin $R = 0.2104$
15. tan $V = 11.4301$

Solve each right triangle. State the side lengths to the nearest tenth and the angle measures to the nearest degree.

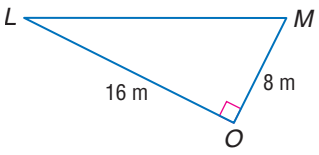
16.



17.



18.



Lesson 12-1

(pages 642–647)

Graph each variation if y varies inversely as x.

1. $y = 10$ when $x = 7.5$
2. $y = -5$ when $x = 3$
3. $y = -6$ when $x = -2$
4. $y = 1$ when $x = -0.5$
5. $y = -2.5$ when $x = 3$
6. $y = -2$ when $x = -1$

Write an inverse variation equation that relates x and y. Assume that y varies inversely as x. Then solve.

7. If $y = 54$ when $x = 4$, find x when $y = 27$.
8. If $y = 18$ when $x = 6$, find x when $y = 12$.
9. If $y = 12$ when $x = 24$, find x when $y = 9$.
10. If $y = 8$ when $x = -8$, find y when $x = -16$.
11. If $y = 3$ when $x = -8$, find y when $x = 4$.
12. If $y = 27$ when $x = \frac{1}{3}$, find y when $x = \frac{3}{4}$.
13. If $y = -3$ when $x = -8$, find y when $x = 2$.
14. If $y = -3$ when $x = -3$, find x when $y = 4$.
15. If $y = -7.5$ when $x = 2.5$, find y when $x = -2.5$.
16. If $y = -0.4$ when $x = -3.2$, find x when $y = -0.2$.

Lesson 12–2

(pages 648–653)

State the excluded values for each rational expression.

1. $\frac{x}{x+1}$
2. $\frac{m}{n}$
3. $\frac{c-2}{c^2-4}$
4. $\frac{b^2-5b+6}{b^2-8b+15}$

Simplify each expression. State the excluded values of the variables.

5. $\frac{13a}{39a^2}$
6. $\frac{38x^2}{42xy}$
7. $\frac{p+5}{2(p+5)}$
8. $\frac{a+b}{a^2-b^2}$
9. $\frac{y+4}{y^2-16}$
10. $\frac{c^2-4}{c^2+4c+4}$
11. $\frac{a^2-a}{a-1}$
12. $\frac{x^2+4}{x^4-16}$
13. $\frac{r^3-r^2}{r-1}$
14. $\frac{4t^2-8}{4t-4}$
15. $\frac{6y^3-12y^2}{12y^2-18}$
16. $\frac{5x^2+10x+5}{3x^2+6x+3}$

CONTENTS

Lesson 12-3

(pages 655–659)

Find each product.

1. $\frac{a^2b}{b^2c} \cdot \frac{c}{d}$
2. $\frac{6a^2n}{8n^2} \cdot \frac{12n}{9a}$
3. $\frac{2a^2d}{3bc} \cdot \frac{9b^2c}{16ad^2}$
4. $\frac{10n^3}{6x^3} \cdot \frac{12n^2x^4}{25n^2x^2}$
5. $\frac{6m^3n}{10a^2} \cdot \frac{4a^2m}{9n^3}$
6. $\frac{(a-5)(a+1)}{(a+1)(a+7)} \cdot \frac{(a+7)(a-6)}{(a+8)(a-5)}$
7. $\frac{x-1}{(x+2)(x-3)} \cdot \frac{x+2}{(x-3)(x-1)}$
8. $\frac{5n-5}{3} \cdot \frac{9}{n-1}$
9. $\frac{a^2}{a-b} \cdot \frac{3a-3b}{a}$
10. $\frac{2a+4b}{5} \cdot \frac{25}{6a+8b}$
11. $\frac{3}{x-y} \cdot \frac{(x-y)^2}{6}$
12. $\frac{x+5}{3x} \cdot \frac{12x^2}{x^2+7x+10}$
13. $\frac{a^2-b^2}{4} \cdot \frac{16}{a+b}$
14. $\frac{4a+8}{a^2-25} \cdot \frac{a-5}{5a+10}$
15. $\frac{r^2}{r-s} \cdot \frac{r^2-s^2}{s^2}$
16. $\frac{a^2-b^2}{a-b} \cdot \frac{7}{a+b}$
17. $\frac{x^2+10x+9}{x^2+11x+18} \cdot \frac{x^2+3x+2}{x^2+7x+6}$
18. $\frac{x^2-6x+5}{x^2+7x+12} \cdot \frac{x^2+14x+40}{x^2+5x-50}$

Lesson 12-4

(pages 660–664)

Find each quotient.

1. $\frac{5m^2n}{12a^2} \div \frac{30m^4}{18an}$
2. $\frac{25g^7h}{28t^3} \div \frac{5g^5h^2}{42s^2t^3}$
3. $\frac{6a+4b}{36} \div \frac{3a+2b}{45}$
4. $\frac{x^2y}{18z} \div \frac{2yz}{3x^2}$
5. $\frac{p^2}{14qr^3} \div \frac{2r^2p}{7q}$
6. $\frac{5e-f}{5e+f} \div (25e^2-f^2)$
7. $\frac{t^2-2t-15}{t-5} \div \frac{t+3}{t+5}$
8. $\frac{5x+10}{x+2} \div (x+2)$
9. $\frac{3d}{2d^2-3d} \div \frac{9}{2d-3}$
10. $\frac{3v^2-27}{15v} \div \frac{v+3}{v^2}$
11. $\frac{3g^2+15g}{4} \div \frac{g+5}{g^2}$
12. $\frac{b^2-9}{4b} \div (b-3)$
13. $\frac{p^2}{y^2-4} \div \frac{p}{2-y}$
14. $\frac{k^2-81}{k^2-36} \div \frac{k-9}{k+6}$
15. $\frac{2a^3}{a+1} \div \frac{a^2}{a+1}$
16. $\frac{x^2-16}{16-x^2} \div \frac{7}{x}$
17. $\frac{y}{5} \div \frac{y^2-25}{5-y}$
18. $\frac{3m}{m+1} \div (m-2)$
19. $\frac{2m+16}{m-2} \div \frac{m^2+6m-16}{m^2+m-6}$
20. $\frac{a^2+3a-10}{a^2+3a+2} \div \frac{a^2+3a-10}{a^2-2a-3}$
21. $\frac{x^2-x-2}{x^2+4x+3} \div \frac{x^2-6x+8}{x^2-x-12}$

Lesson 12-5

(pages 666–671)

Find each quotient.

1. $(2x^2-11x-20) \div (2x+3)$
2. $(a^2+10a+21) \div (a+3)$
3. $(m^2+4m-5) \div (m+5)$
4. $(x^2-2x-35) \div (x-7)$
5. $(c^2+6c-27) \div (c+9)$
6. $(y^2-6y-25) \div (y+7)$
7. $(3t^2-14t-24) \div (3t+4)$
8. $(2r^2-3r-35) \div (2r+7)$
9. $\frac{12n^2+36n+15}{6n+3}$
10. $\frac{10x^2+29x+21}{5x+7}$
11. $\frac{4t^3+17t^2-1}{4t+1}$
12. $\frac{2a^3+9a^2+5a-12}{a+3}$
13. $\frac{4m^2+4m-15}{2m-3}$
14. $\frac{6t^3+5t^2+12}{2t+3}$
15. $\frac{27c^2-24c+8}{9c-2}$
16. $\frac{4b^3+7b^2-2b+4}{b+2}$
17. $\frac{t^3-19t+9}{t-4}$
18. $\frac{9x^3+2x-10}{3x-2}$

Lesson 12-6 (pages 672–677)

Find each sum.

1. $\frac{4}{z} + \frac{3}{z}$
2. $\frac{a}{12} + \frac{2a}{12}$
3. $\frac{5}{2t} + \frac{-7}{2t}$
4. $\frac{y}{2} + \frac{y}{2}$
5. $\frac{b}{x} + \frac{2}{x}$
6. $\frac{y}{2} + \frac{y-6}{2}$
7. $\frac{x}{x+1} + \frac{1}{x+1}$
8. $\frac{2n}{2n-5} + \frac{5}{5-2n}$
9. $\frac{x-y}{2-y} + \frac{x+y}{y-2}$
10. $\frac{r^2}{r-s} + \frac{s^2}{r-s}$
11. $\frac{12n}{3n+2} + \frac{8}{3n+2}$
12. $\frac{6x}{x+y} + \frac{6y}{x+y}$

Find each difference.

13. $\frac{5x}{24} - \frac{3x}{24}$
14. $\frac{7p}{3} - \frac{8p}{3}$
15. $\frac{8k}{5m} - \frac{3k}{5m}$
16. $\frac{8}{m-2} - \frac{6}{m-2}$
17. $\frac{y}{b+6} - \frac{2y}{b+6}$
18. $\frac{a+2}{6} - \frac{a+3}{6}$
19. $\frac{2a}{2a+5} - \frac{5}{2a+5}$
20. $\frac{1}{4z+1} - \frac{(-4z)}{4z+1}$
21. $\frac{3a}{a-2} - \frac{3a}{a-2}$
22. $\frac{n}{n-1} - \frac{1}{1-n}$
23. $\frac{a}{a-7} - \frac{(-7)}{7-a}$
24. $\frac{2a}{6a-3} - \frac{(-1)}{3-6a}$

Lesson 12-7 (pages 678–683)

Find the LCM for each pair of expressions.

1. $27a^2bc,\ 36ab^2c^2$
2. $3m - 1,\ 6m - 2$
3. $x^2 + 2x + 1,\ x^2 - 2x - 3$

Find each sum.

4. $\frac{s}{3} + \frac{2s}{7}$
5. $\frac{5}{2a} + \frac{-3}{6a}$
6. $\frac{6}{5x} + \frac{7}{10x^2}$
7. $\frac{5}{xy} + \frac{6}{yz}$
8. $\frac{2}{t} + \frac{t+3}{s}$
9. $\frac{a}{a-b} + \frac{b}{2b+3a}$
10. $\frac{4a}{2a+6} + \frac{3}{a+3}$
11. $\frac{3t+2}{3t-2} + \frac{t+2}{t^2-4}$
12. $\frac{-3}{a-5} + \frac{-6}{a^2-5a}$

Find each difference.

13. $\frac{2n}{5} - \frac{3m}{4}$
14. $\frac{3z}{7w^2} - \frac{2z}{w}$
15. $\frac{s}{t^2} - \frac{r}{3t}$
16. $\frac{a}{a^2-4} - \frac{4}{a+2}$
17. $\frac{m}{m-n} - \frac{5}{m}$
18. $\frac{y+5}{y-5} - \frac{2y}{y^2-25}$
19. $\frac{t+10}{t^2-100} - \frac{1}{10-t}$
20. $\frac{2a-6}{a^2-3a-10} - \frac{3a+5}{a^2-4a-12}$

Lesson 12-8 (pages 684–689)

Write each mixed expression as a rational expression.

1. $4 + \frac{2}{x}$
2. $8 + \frac{5}{3t}$
3. $\frac{b+1}{2b} + 3b$
4. $3z + \frac{z+2}{z}$
5. $\frac{2}{a-2} + a^2$
6. $3r^2 + \frac{4}{2r+1}$

Simplify each expression.

7. $\frac{3\frac{1}{2}}{4\frac{3}{4}}$
8. $\frac{\frac{x^2}{y}}{\frac{y}{x^3}}$
9. $\frac{\frac{t^4}{u}}{\frac{t^3}{u^2}}$
10. $\frac{\frac{x-3}{x+1}}{\frac{x^2}{y^2}}$
11. $\frac{\frac{y}{3} + \frac{5}{6}}{2 + \frac{5}{y}}$
12. $\frac{\frac{1}{x} + \frac{1}{y}}{\frac{1}{y} - \frac{1}{x}}$
13. $\frac{t-2}{\frac{t^2-4}{t^2+5t+6}}$
14. $\frac{a + \frac{2}{a+1}}{a - \frac{3}{a-2}}$

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Lesson 12-9

(pages 690–695)

Solve each equation. State any extraneous solutions.

1. $\frac{k}{6} + \frac{2k}{3} = -\frac{5}{2}$
2. $\frac{2x}{7} + \frac{27}{10} = \frac{4x}{5}$
3. $\frac{18}{b} = \frac{3}{b} + 3$
4. $\frac{3}{5x} + \frac{7}{2x} = 1$
5. $\frac{2a-3}{6} = \frac{2a}{3} + \frac{1}{2}$
6. $\frac{3x+2}{x} + \frac{x+3}{x} = 5$
7. $\frac{2b-3}{7} - \frac{b}{2} = \frac{b+3}{14}$
8. $\frac{2y}{y-4} - \frac{3}{5} = 3$
9. $\frac{2t}{t+3} + \frac{3}{t} = 2$
10. $\frac{5x}{x+1} + \frac{1}{x} = 5$
11. $\frac{r-2}{r+2} - \frac{2r}{r+9} = 6$
12. $\frac{m}{m+1} + \frac{5}{m-1} = 1$
13. $\frac{2x}{x-3} - \frac{4x}{3-x} = 12$
14. $\frac{14}{b-6} = \frac{1}{2} + \frac{6}{b-8}$
15. $\frac{a}{4a+15} - 3 = -2$
16. $\frac{5x}{3x+10} + \frac{2x}{x+5} = 2$
17. $\frac{2a-3}{a-3} - 2 = \frac{12}{a+2}$
18. $\frac{z+3}{z-1} + \frac{z+1}{z-3} = 2$

Lesson 13-1

(pages 708–713)

Identify each sample, suggest a population from which it was selected, and state if it is unbiased (random) or biased. If unbiased, classify the sample as *simple*, *stratified*, or *systematic*. If biased, classify as *convenience* or *voluntary response*.

1. The sheriff has heard that many dogs in the county do not have licenses. He drives from his office and checks the licenses of the first ten dogs he encounters.
2. The school administration wants to check on the incidence of students leaving campus without permission at lunch. An announcement is placed in the school bulletin for 25 students to volunteer to answer questions about leaving campus.
3. The store manager of an ice cream store wants to see whether employees are making ice cream cones within the weight guidelines he provided. During each of three shifts, he selects every tenth cone to weigh.
4. Every fifth car is selected from the assembly line. The cars are also identified by the day of the week during which they were produced.
5. A table is set up outside of a large department store. All people entering the store are given a survey about their preference of brand for blue jeans. As people leave the store, they can return the survey.
6. A community is considering building a new swimming pool. Every twentieth person on a list of residents is contacted in person for their opinion on the new pool.
7. A state wildlife department is concerned about a report that malformed frogs are increasing in the state's lakes. Residents are asked to write in to the state department if they see a malformed frog.
8. The manager at a grocery store has been told that many cartons of strawberries are spoiled. She asks one of her employees to bring in the top 10 cartons on the shelf.

Lesson 13-2

(pages 715–721)

State the dimensions of each matrix.

1. $\begin{bmatrix} 1 & 0 & -2 & 5 \end{bmatrix}$
2. $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$
3. $\begin{bmatrix} 1 & -1 & 1 \\ -1 & 1 & -1 \\ 1 & -1 & 1 \end{bmatrix}$
4. $\begin{bmatrix} 10 \end{bmatrix}$

If $A = \begin{bmatrix} 2 & -4 \\ -3 & 5 \end{bmatrix}$, $B = \begin{bmatrix} 1 & -1 & 4 \\ 0 & 3 & -2 \end{bmatrix}$, $C = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$, and $D = \begin{bmatrix} -5 & 1 & -4 \\ -3 & 0 & 2 \end{bmatrix}$, find each sum, difference, or product. If the sum or difference does not exist, write *impossible*.

5. $A + B$
6. $A + C$
7. $B + D$
8. $D - B$
9. $2B$
10. $3C$
11. $A - C$
12. $-5C$
13. $2A + C$
14. $3D - B$
15. $5B + C$
16. $2C + 3A$

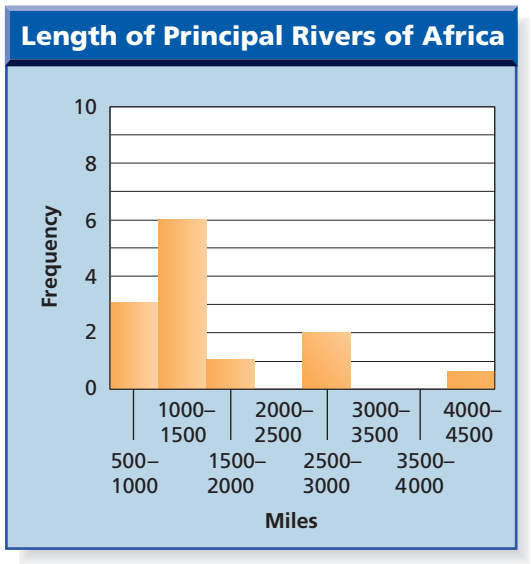
Lesson 13-3

(pages 722–728)

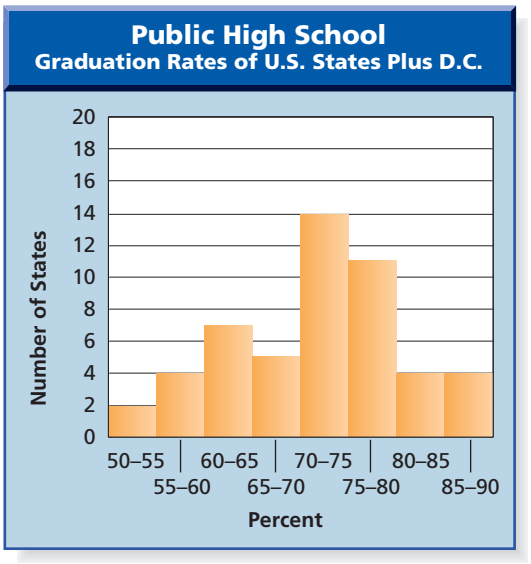
For each histogram, answer the following.

- **In what measurement class does the median occur?**
- **Describe the distribution of the data.**

1.



2.



Create a histogram to represent each data set.

3. Sale prices of notebooks at various department stores, in cents: 13, 69, 89, 25, 55, 20, 99, 75, 42, 18, 66, 88, 89, 79, 75, 65, 25, 99, 66, 78

4. Number of fish in tanks at a pet store: 1, 25, 7, 4, 54, 15, 12, 6, 2, 1, 25, 17, 20, 5, 6, 15, 24, 2, 17, 1, 5, 7, 20, 12, 12, 3

5. Number of defective light bulbs found on the assembly line during each of 20 shifts: 5, 1, 7, 6, 4, 3, 2, 1, 10, 12, 1, 2, 0, 7, 6, 2, 8, 4, 2, 0

Lesson 13-4

(pages 731–736)

Find the range, median, lower quartile, upper quartile, and interquartile range of each set of data. Identify any outliers.

1. 56, 45, 37, 43, 10, 34, 33, 45, 50

2. 77, 78, 68, 96, 99, 84, 65, 95, 65, 84

3. 30, 90, 40, 70, 50, 100, 80, 60

4. 4, 5.2, 1, 3, 2.4, 6, 3.7, 8, 1.3, 7.1, 9

5. 25°, 56°, 13°, 44°, 0°, 31°, 73°, 66°, 4°, 29°, 37°

6. 234, 648, 369, 112, 527, 775, 406, 268, 400

Lesson 13-5

(pages 737–742)

Draw a box-and-whisker plot for each set of data.

1. 3, 2, 1, 5, 7, 9, 2, 11, 3, 4, 8, 8, 10, 12, 4

2. 59, 63, 69, 69, 49, 40, 55, 69, 55, 89, 45, 55

3. 1.8, 2.2, 1.2, 3.5, 5.5, 3.2, 1.2, 4.2, 3.0, 2.6, 1.7, 1.8

4. 15, 18, 25, 37, 52, 69, 22, 35, 50, 65, 15, 99, 35, 25

Draw a parallel box-and-whisker plot for each set of data. Compare the data.

5. A: 21, 24, 34, 46, 58, 67, 72, 70, 61, 50, 40, 27
B: 67, 69, 72, 75, 79, 81, 83, 83, 82, 78, 74, 69

6. A: 100, 85, 65, 72, 83, 92, 92, 60, 99, 88, 75, 76, 92, 91, 70
B: 98, 82, 85, 62, 77, 85, 91, 95, 77, 65, 99, 73, 81, 92, 88

7. A: 3.6, 2.2, 2.2, 1.5, 1.1, 0.5, 0.8, 0.4, 0.8, 2.3, 3.0, 3.8
B: 5.4, 4.0, 3.8, 2.5, 1.8, 1.6, 0.9, 1.2, 1.9, 3.3, 5.7, 6.0

8. A: 4.75, 6.25, 7.95, 2.65, 5.25, 6.50, 8.25, 3.25, 4.25
B: 9.50, 8.65, 3.25, 5.25, 4.50, 5.75, 6.95, 5.50, 4.25

Lesson 14-1 *(pages 754–758)*

Draw a tree diagram to show the sample space for each event. Determine the number of possible outcomes.

1. choosing a dinner special at a restaurant offering the choice of lettuce salad or coleslaw; chicken, beef, or fish; and ice cream, pudding, or cookies
2. tossing a coin four times
3. spinning a spinner with five equal-sized sections, one each of white, yellow, blue, red, and green, two times
4. selecting a sundae with choice of vanilla or butter pecan ice cream; chocolate, strawberry, or marshmallow topping; and walnuts or peanuts

Determine the number of possible outcomes for each situation.

5. A state offers special graphic license plates. Each license plate features two digits followed by two letters. Any digit and any letter can be used in the appropriate space.
6. A lounge chair can be ordered with a choice of rocking or non-rocking, swivel or non-swivel, cotton, leather, or plush cover, and in green, blue, maroon, or black.
7. At the Big Mountain Ski Resort, you can choose from three types of boots, four types of skis, and five types of poles.
8. A game is played by rolling three four-sided dice, one red, one blue, and one white.

Find the value of each expression.

9. $8!$ **10.** $1!$ **11.** $0!$ **12.** $5!$
13. $2!$ **14.** $9!$ **15.** $3!$ **16.** $14!$

Lesson 14-2 *(pages 760–767)*

Determine whether each situation involves a *permutation* or *combination*. Explain your reasoning.

1. three topping flavors for a sundae from ten topping choices
2. selection and placement of four runners on a relay team from 8 runners
3. five rides to ride at an amusement park with twelve rides
4. first, second, and third place winners for a 10K race
5. a three-letter arrangement from eight different letters
6. selection of five digits from ten digits for a combination lock
7. selecting six items from twelve possible items to include in a custom gift basket

Evaluate each expression.

8. ${}_5P_2$ **9.** ${}_7P_7$ **10.** ${}_{10}C_2$ **11.** ${}_6C_5$
12. ${}_8P_2$ **13.** ${}_{18}C_{10}$ **14.** ${}_{13}C_{13}$ **15.** ${}_9P_6$
16. $({}_7P_3)({}_4P_2)$ **17.** $({}_8C_6)({}_7C_5)$ **18.** $({}_3C_2)({}_{10}P_{10})$ **19.** $({}_3P_2)({}_{10}C_{10})$

Lesson 14-3 *(pages 769–776)*

A red die and a blue die are rolled. Find each probability.

1. P(red 1, blue 1)
2. P(red even, blue even)
3. P(red prime number, blue even)
4. P(red 6, blue greater than 4)
5. P(red greater than 2, blue greater than 3)

At a carnival game, toy ducks are selected from a pond to win prizes. Once a duck is selected, it is not replaced. The pond contains 8 red, 2 yellow, 1 gold, 4 blue, and 40 black ducks. Find each probability.

6. P(red, then gold)
7. P(2 black)
8. P(2 yellow)
9. P(black, then gold)
10. P(3 blacks, then red)
11. P(yellow, then blue, then gold)
12. P(2 gold)
13. P(4 blue)
14. P(4 blue, then gold)

Lesson 14-4

(pages 777–781)

For Exercises 1–3, use the table that shows the possible products when rolling two dice and the number of ways each product can be found.

Product	Ways	Product	Ways	Product	Ways
1	1	8	2	18	2
2	2	9	1	20	2
3	2	10	2	24	2
4	3	12	4	25	1
5	2	15	2	30	2
6	4	16	1	36	1

1. Draw a table to show the sample space of all possible outcomes.
2. Find the probability for $X = 9$, $X = 12$, and $X = 24$.
3. What is the probability that the product of two dice is greater than 15 on two separate rolls?

For Exercises 4–7, use the table that shows a probability distribution for the number of customers that enter a particular store during a business day.

Number of Customers	0–500	501–1000	1001–1500	1501–2000	2000–2500
Probability	0.05	0.25	0.35	0.30	0.05

4. Define a random variable and list its values.
5. Show that this is a valid probability distribution.
6. During a business day, what is the probability that fewer than 1001 customers enter?
7. During a business day, what is the probability that more than 500 customers enter?

Lesson 14-5

(pages 782–788)

For Exercises 1–3, toss 4 coins, one at a time, 50 times and record your results.

1. Based on your results, what is the probability that any two coins will show tails?
2. Based on your results, what is the probability that the first and fourth coins show heads?
3. What is the theoretical probability that all four coins show heads?

For Exercises 4–6, roll two dice 50 times and record the products.

4. Based on your results, what is the probability that the product is 15?
5. If you roll the dice 50 more times, which product would you expect to see about 10% of the time?
6. What is the theoretical probability that the product of the dice will be 2?

For Exercises 7–9, use the following information.
A survey was sent to randomly selected households asking the number of people living in each of the households. The results of the survey are shown in the table.

7. Find the experimental probability distribution for the number of households of each size.
8. Based on the survey, what is the probability that a person chosen at random lives in a household with five or more people?
9. Based on the survey, what is the probability that a person chosen at random lives in a household with 1 or 2 people?

Number of People Per Household Surveyed	
Number in Household	Number of Households
1	172
2	293
3	482
4	256
5 or more	148

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