

Extra Practice

Lesson 1-1

(pages 6–9)

Write an algebraic expression for each verbal expression.

- the sum of b and 21 **$b + 21$**
- the product of x and 7 **$7x$**
- a number t increased by 6 **$t + 6$**
- the sum of 4 and 6 times a number z **$4 + 6z$**
- -10 increased by 4 times a number a **$-10 + 4a$**
- the sum of 8 and -2 times n **$8 + (-2n)$**
- one-half the cube of a number x **$\frac{1}{2}x^3$**
- four-fifths the square of m **$\frac{4}{5}m^2$**

Evaluate each expression.

- 2^4 **16**
- 10^2 **100**
- 7^3 **343**
- 20^3 **8000**
- 3^6 **729**
- 4^5 **1024**

15–23. Sample answers given.

Write a verbal expression for each algebraic expression. **19. five times n squared minus 6**

- $2n$ **2 times n**
- 10^7 **ten to the seventh power**
- m^5 **m to the fifth power**
- xy **the product of x and y**
- $5n^2 - 6$ **5 times n squared minus 6**
- $9a^3 + 1$ **nine times a cubed plus 1**
- $x^3 \cdot y^2$ **x cubed times y squared**
- $c^4 \cdot d^6$ **c to the fourth power times d to the sixth power**
- $3e + 2e^2$ **3 times e plus 2 times e squared**

Lesson 1-2

(pages 11–15)

Evaluate each expression.

- $3 + 8 \div 2 - 5$ **2**
- $4 + 7 \cdot 2 + 8$ **26**
- $5(9 + 3) - 3 \cdot 4$ **48**
- $9 - 3^2$ **0**
- $(8 - 1) \cdot 3$ **21**
- $4(5 - 3)^2$ **16**
- $3(12 + 3) - 5 \cdot 9$ **0**
- $5^3 + 6^3 - 5^2$ **316**
- $16 \div 2 \cdot 5 \cdot 3 \div 6$ **20**
- $7(5^3 + 3^2)$ **938**
- $\frac{9 \cdot 4 + 2 \cdot 6}{6 \cdot 4}$ **2**
- $25 - \frac{1}{3}(18 + 9)$ **16**

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

- $8a + b$ **21**
- $48 + ab$ **58**
- $a(6 - 3n)$ **-48**
- $bx + an$ **40**
- $x^2 - 4n$ **-24**
- $3b + 16a - 9n$ **-43**
- $n^2 + 3(a + 4)$ **118**
- $(2x)^2 + an - 5b$ **59**
- $[a + 8(b - 2)]^2 \div 4$ **169**

Lesson 1-3

(pages 16–20)

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

- $x - 4 = 4$ **8**
- $25 - y = 18$ **7**
- $3x + 1 = 25$ **8**
- $5y - 4 = 11$ **3**
- $14 = \frac{96}{x} + 2$ **8**
- $0 = \frac{y}{3} - 3$ **9**

Solve each equation.

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

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

- $x + 2 > 7$ **{6, 7, 8}**
- $x - 1 < 8$ **{4, 5, 6, 7, 8}**
- $2x \leq 15$ **{4, 5, 6, 7}**
- $3y \geq 36$ **{12, 14, 16}**
- $\frac{x}{3} < 2$ **{4, 5}**
- $\frac{5y}{4} \geq 20$ **{16}**

Lesson 1-4

(pages 21–25)

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

- $4 \cdot 3 = 4 \cdot n$ **Reflexive Prop.; 3**
- $\frac{5}{4} = n + 0$ **Additive Identity; $\frac{5}{4}$**
- $15 = 15 \cdot n$ **Multiplicative Identity; 1**
- $\frac{2}{3}n = 1$ **Multiplicative Inverse; $\frac{3}{2}$**
- $2.7 + 1.3 = n + 2.7$ **Symmetric Prop.; 1.3**
- $n(6^2 \cdot \frac{1}{36}) = 4$ **Multiplicative Identity and Multiplicative Inverse; 4**
- $8n = 0$ **Multiplicative Prop. of 0; 0**
- $n = \frac{1}{9} \cdot 9$ **Multiplicative Inverse; 1**
- $5 + 7 = 5 + n$ **Reflexive Prop.; 7**
- $(13 - 4)(2) = 9n$ **Substitution; 2**

Evaluate each expression. Name the property used in each step. **11–13. See margin.**

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

Lesson 1-5 1–9. See margin for expressions.

(pages 26–31)

Rewrite each expression using the Distributive Property. Then simplify.

- $5(2 + 9)$ **55**
- $8(10 + 20)$ **240**
- $20(8 - 3)$ **100**
- $3(5 + w)$ **$15 + 3w$**
- $(h - 8)7$ **$7h - 56$**
- $6(y + 4)$ **$6y + 24$**
- $9(3n + 5)$ **$27n + 45$**
- $32(x - \frac{1}{8})$ **$32x - 4$**
- $c(7 - d)$ **$7c - cd$**

Use the Distributive Property to find each product.

- $6 \cdot 55$ **330**
- $15(108)$ **1620**
- $1689 \cdot 5$ **8445**
- 7×314 **2198**
- $36(\frac{5}{4})$ **189**
- $(4\frac{1}{18}) \cdot 18$ **73**

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

- $13a + 5a$ **$18a$**
- $21x - 10x$ **$11x$**
- $8(3x + 7)$ **$24x + 56$**
- $4m - 4n$ **simplified**
- $3(5am - 4)$ **$15am - 12$**
- $15x^2 + 7x^2$ **$22x^2$**
- $9y^2 + 13y^2 + 3$ **$22y^2 + 3$**
- $11a^2 - 11a^2 + 12a^2$ **$12a^2$**
- $6a + 7a + 12b + 8b$ **$13a + 20b$**

Lesson 1-6

(pages 32–36)

Evaluate each expression.

- $23 + 8 + 37 + 12$ **80**
- $19 + 46 + 81 + 54$ **200**
- $10.25 + 2.5 + 3.75$ **16.5**
- $22.5 + 17.6 + 44.5$ **84.6**
- $2\frac{1}{3} + 6 + 3\frac{2}{3} + 4$ **16**
- $5\frac{6}{7} + 15 + 4\frac{1}{7} + 25$ **50**
- $6 \cdot 8 \cdot 5 \cdot 3$ **720**
- $18 \cdot 5 \cdot 2 \cdot 5$ **900**
- $0.25 \cdot 7 \cdot 8$ **14**
- $90 \cdot 12 \cdot 0.5$ **540**
- $5\frac{1}{3} \cdot 4 \cdot 6$ **128**
- $4\frac{5}{6} \cdot 10 \cdot 12$ **580**

Simplify each expression. **15. $3a + 13b + 2c$ 22. $-11 + 3uv + u$ 24. $11.8a + 8.8b$**

- $5a + 6b + 7a$ **$12a + 6b$**
- $8x + 4y + 9x$ **$17x + 4y$**
- $3a + 5b + 2c + 8b$
- $\frac{2}{3}x^2 + 5x + x^2$ **$\frac{5}{3}x^2 + 5x$**
- $(4p - 7q) + (5q - 8p)$ **$-4p - 2q$**
- $8q + 5r - 7q - 6r$ **$q - r$**
- $4(2x + y) + 5x$ **$13x + 4y$**
- $9r^5 + 2r^2 + r^5$ **$10r^5 + 2r^2$**
- $12b^3 + 12 + 12b^3$ **$24b^3 + 12$**
- $7 + 3(uv - 6) + u$
- $3(x + 2y) + 4(3x + y)$ **$15x + 10y$**
- $6.2(a + b) + 2.6(a + b) + 3a$
- $3 + 8(st + 3w) + 3st$ **$3 + 11st + 24w$**
- $5.4(s - 3t) + 3.6(s - 4)$ **$9s - 16.2t - 14.4$**
- $3[4 + 5(2x + 3y)]$ **$12 + 30x + 45y$**

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Lesson 1-4

- $\frac{2}{3}[15 \div (10)],$ Substitution; $\frac{2}{3}(\frac{3}{2}),$ Substitution; 1, Multiplicative Inverse
- $\frac{7}{4}[4 \cdot 1],$ Multiplicative Inverse; $\frac{7}{4}(4),$ Multiplicative Identity; 7, Substitution
- $[(6) \cdot 0] \cdot 10,$ Substitution; $(0) \cdot 10,$ Multiplicative Prop. of 0; 0, Multiplicative Prop. of 0

Extra Practice

Extra Practice

Lesson 1-7

1. hypothesis: an animal is a dog;
conclusion: it barks
2. hypothesis: a figure is a pentagon;
conclusion: it has five sides
3. hypothesis: $3x - 1 = 8$;
conclusion: $x = 3$
4. hypothesis: 0.5 is the reciprocal
of 2; conclusion: $0.5 \cdot 2 = 1$
5. hypothesis: a figure is a square;
conclusion: it has four congruent
sides; If a figure is a square, then
it has four congruent sides.
6. hypothesis: $a = 4$; conclusion:
 $6a + 10 = 34$; If $a = 4$, then
 $6a + 10 = 34$.
7. hypothesis: it is night; conclusion:
the video store is open; If it is
night, then the video store is open.
8. hypothesis: it is Thursday; con-
clusion: the band does not have
practice; If it is Thursday, then the
band does not have practice.
9. It can snow in May in some
locations.
10. You may live in Portland, Maine.
11. If $y = 3$, then $2y + 4 = 10$, is
true, but $y < 3$ is false.
12. Sample answer: $a = -1$

Lesson 1-8

1. Sample answer: The temperatures
increase from January through the
summer and then begin to
decrease again.
2. Sample answer: The roller coaster
goes down a small hill, coasts at
about the same speed, increases
in speed on the way down the hill,
decreases again on the way up the
hill, increases down another hill,
and then slows down for the end
of the ride.
3. Sample answer: The jogger
increases in speed, runs about the
same speed, increases again,
runs at a faster pace for a while,
decreases, maintains a speed, and
finally slows down at the finish of
the run.
4. Sample answer: The hiker walks
away from the camp, stops for a
rest, hikes a little further, and
then returns to camp.

Lesson 1-7

(pages 37–42)

Identify the hypothesis and conclusion of each statement. 1–4. See margin.

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. 5–8. See margin.

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. 9–12. See margin.

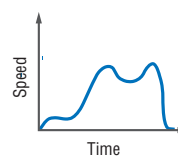
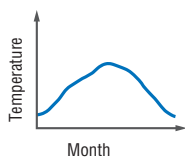
9. If the season is spring, then it does not snow.
10. If you live in Portland, then you live in Oregon.
11. If $2y + 4 = 10$, then $y < 3$.
12. If $a^2 > 0$, then $a > 0$.

Lesson 1-8

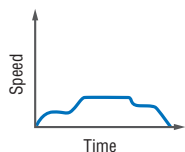
(pages 43–48)

Describe what is happening in each graph. 1–4. See margin.

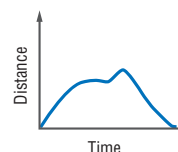
1. The graph shows the average monthly high
temperatures for a city over a one-year period.
2. The graph shows the speed of a roller coaster
car during a two-minute ride.



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.

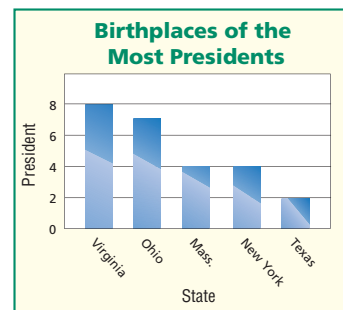


Lesson 1-9

(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. 1–4. See margin.

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?



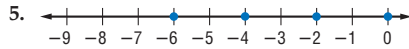
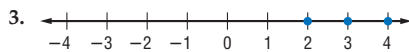
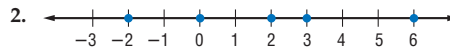
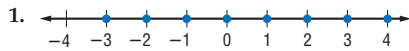
Lesson 1-9

1. 4 times
2. yes; Massachusetts and New York
3. No; you need to have the birthplaces of all presidents to compare parts to the whole in a circle graph.
4. about 16%

Lesson 2-1

(pages 68–72)

Name the coordinates of the points graphed on each number line. **1–6. See margin.**



Graph each set of numbers. **7–10. See margin.**

7. $\{-2, -4, -6\}$

8. $\{\dots, -3, -2, -1, 0\}$

9. $\{\text{integers greater than } -1\}$

10. $\{\text{integers less than } -5 \text{ and greater than } -10\}$

Find each absolute value.

11. $|22|$ **22**

12. $|-2.5|$ **2.5**

13. $|\frac{2}{3}|$ **$\frac{2}{3}$**

14. $|\frac{7}{8}|$ **$\frac{7}{8}$**

Lesson 2-2

(pages 73–78)

Find each sum.

1. $3 + 16$ **19**

2. $-27 + 19$ **-8**

3. $8 + (-13)$ **-5**

4. $-14 + (-9)$ **-23**

5. $-25 + 47$ **22**

6. $97 + (-79)$ **18**

7. $-4.8 + 3.2$ **-1.6**

8. $-1.7 + (-3.4)$ **-5.1**

9. $-0.009 + 0.06$ **0.051**

10. $-\frac{11}{9} + (-\frac{7}{9})$ **-2**

11. $-\frac{3}{5} + \frac{5}{6}$ **$\frac{7}{30}$**

12. $\frac{3}{8} + (-\frac{7}{12})$ **$-\frac{5}{24}$**

Find each difference.

13. $27 - 14$ **13**

14. $8 - 17$ **-9**

15. $12 - (-15)$ **27**

16. $-35 - (-12)$ **-23**

17. $-2 - (-1.3)$ **-0.7**

18. $1.9 - (-7)$ **8.9**

19. $-4.5 - 8.6$ **-13.1**

20. $89.3 - (-14.2)$ **103.5**

21. $-18 - (-1.3)$ **-16.7**

22. $\frac{5}{11} - \frac{6}{11}$ **$-\frac{1}{11}$**

23. $\frac{2}{7} - \frac{3}{14}$ **$\frac{1}{14}$**

24. $-\frac{7}{15} - (-\frac{5}{12})$ **$-\frac{1}{20}$**

Lesson 2-3

(pages 79–83)

Find each product.

1. $5(12)$ **60**

2. $(-6)(11)$ **-66**

3. $(-7)(-5)$ **35**

4. $(-6)(4)(-3)$ **72**

5. $(-\frac{7}{8})(-\frac{1}{3})$ **$\frac{7}{24}$**

6. $(5)(-\frac{2}{5})$ **-2**

7. $(-4\frac{1}{2})(2\frac{1}{3})$ **$-10\frac{1}{2}$**

8. $(-1\frac{2}{7})(-3\frac{5}{9})$ **$4\frac{4}{7}$**

9. $(-5.34)(3.2)$ **-17.088**

10. $(-6.8)(-5.415)$ **36.822**

11. $(4.2)(-5.1)(3.6)$ **-77.112**

12. $(-3.9)(1.6)(8.4)$ **-52.416**

Simplify each expression.

13. $5(-3a) - 6a$ **-21a**

14. $-8(-x) - 3x$ **5x**

15. $2(6y - 2y)$ **8y**

16. $(c + 7c)(-3)$ **-24c**

17. $-3n(4b) + 2a(3b)$ **-12bn + 6ab**

18. $-7(2m - 3n)$ **-14m + 21n**

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Lesson 2-1

1. $\{-3, -2, -1, 0, 1, 2, 3, 4\}$

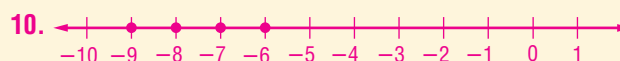
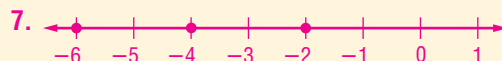
2. $\{-2, 0, 2, 3, 6\}$

3. $\{2, 3, 4\}$

4. $\{7, 8, 9, 10, 11, 12, 13\}$

5. $\{-6, -4, -2, 0\}$

6. $\{-2, -1, 0, 1, 2, 3, 4\}$



Lesson 2-4

(pages 84–87)

Find each quotient.

- $-49 \div (-7)$ **7**
- $52 \div (-4)$ **-13**
- $-66 \div (0.5)$ **-132**
- $25.8 \div (-2)$ **-12.9**
- $-55.25 \div (-0.25)$ **221**
- $-82.1 \div (16.42)$ **-5**
- $-\frac{2}{5} \div 5$ **$-\frac{2}{25}$**
- $\frac{7}{8} \div (-4)$ **$-\frac{7}{32}$**
- $-4 \div \left(-\frac{7}{10}\right)$ **$5\frac{5}{7}$**
- $\frac{3}{2} \div \left(-\frac{1}{2}\right)$ **-3**
- $-\frac{8}{5} \div \left(-\frac{5}{8}\right)$ **$\frac{64}{25}$**
- $-\frac{13}{15} \div \frac{3}{25}$ **$-7\frac{2}{9}$**

Simplify each expression.

- $\frac{32a}{4}$ **8a**
- $\frac{12x}{-2}$ **-6x**
- $\frac{5n+15}{-5}$ **-n-3**
- $\frac{-2b-10}{-2}$ **b+5**
- $\frac{65x-15y}{5}$ **13x-3y**
- $\frac{2a-10b}{-2}$ **-a+5b**
- $\frac{-27c+(-99b)}{9}$ **-3c-11b**
- $\frac{-3n+(-3m)}{-3}$ **n+m**

Lesson 2-5

(pages 88–94)

Use each set of data to make a line plot. **1–4. See margin.**

- 134, 147, 137, 138, 156, 140, 134, 145, 139, 152, 139, 155, 144, 135, 144
- 19, 12, 11, 11, 7, 7, 8, 13, 12, 12, 9, 9, 8, 15, 11, 4, 12, 7, 7, 6
- 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
- 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. **5–7. See margin.**

- 22 17 35 19 45 23 35 18 22 47 39 23 17 44 35 19 18 40 10
- 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
- 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.

- A coin will land tails up. **$\frac{1}{2}$**
- You eat this month. **1**
- A baby will be a girl. **$\frac{1}{2}$**
- You will see a blue elephant. **0**
- This is an algebra book. **1**
- Today is Wednesday. **$\frac{1}{7}$**

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

- the letter e **$\frac{1}{7}$**
- $P(\text{not c})$ **$\frac{5}{7}$**
- the letter s **$\frac{3}{7}$**
- the letter b **0**
- $P(\text{vowel})$ **$\frac{2}{7}$**
- the letters u or c **$\frac{3}{7}$**

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

- a 4 **1:5**
- a number greater than 3 **1:1**
- a multiple of 3 **1:2**
- a number less than 5 **2:1**
- an odd number **1:1**
- not a 6 **5:1**

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Lesson 2-5

1–4. See below.

5.

Stem	Leaf
1	0 7 7 8 8 9 9
2	2 2 3 3
3	5 5 5 9
4	0 4 5 7

10 = 10

6.

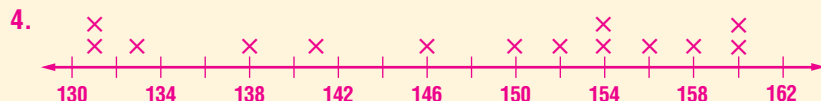
Stem	Leaf
1	0 1 2 2 3 8 9
2	0 1 2 5
3	0 2
4	1 1 5
5	6

10 = 1.0

7.

Stem	Leaf
10	1 1 4 5 8 9
11	1
12	1 3 9
13	0 3 4 5 7 9

101 = 101



Lesson 2-7

(pages 103–109)

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

1. $\sqrt{121}$ **11**
2. $-\sqrt{36}$ **-6**
3. $\sqrt{2.89}$ **1.7**
4. $-\sqrt{125}$ **-11.18**
5. $\sqrt{\frac{81}{100}}$ **$\frac{9}{10}$**
6. $-\sqrt{\frac{36}{196}}$ **$-\frac{3}{7}$**
7. $\pm\sqrt{9.61}$ **± 3.1**
8. $\pm\sqrt{\frac{7}{8}}$ **± 0.94**

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

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

Replace each $\bullet$ with $<$, $>$, or $=$ to make each sentence true.

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

11. rationals, integers, whole numbers, natural numbers

13. rationals, integers, whole numbers, natural numbers

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. **$2z - 6 = m \div 3$**
2. The cube of a decreased by the square of b is equal to c . **$a^3 - b^2 = c$**
3. Twenty-nine decreased by the product of x and y is the same as z . **$29 - xy = z$**
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 . **$P = 2a + b$**
5. Thirty increased by the quotient of s and t is equal to v . **$30 + (s \div t) = v$**
6. The area A of a rhombus is half the product of lengths of the diagonals a and b . **$A = 0.5ab$**

Translate each equation into a verbal sentence. **7–12. See margin for sample answers.**

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. $-2 + g = 7$ **9**
2. $9 + s = -5$ **-14**
3. $-4 + y = -9$ **-5**
4. $m + 6 = 2$ **-4**
5. $t + (-4) = 10$ **14**
6. $v - 7 = -4$ **3**
7. $a - (-6) = -5$ **-11**
8. $-2 - x = -8$ **6**
9. $d + (-44) = -61$ **-17**
10. $e - (-26) = 41$ **15**
11. $p - 47 = 22$ **69**
12. $-63 - f = -82$ **19**
13. $c + 5.4 = -11.33$ **-16.73**
14. $-6.11 + b = 14.321$ **20.431**
15. $-5 = y - 22.7$ **17.7**
16. $-5 - q = 1.19$ **-6.19**
17. $n + (-4.361) = 59.78$ **64.141**
18. $t - (-46.1) = -3.673$ **-49.773**
19. $\frac{7}{10} - a = \frac{1}{2}$ **$\frac{1}{5}$**
20. $f - (-\frac{1}{8}) = \frac{3}{10}$ **$\frac{7}{40}$**
21. $-4\frac{5}{12} = t - (-10\frac{1}{36})$ **$-14\frac{4}{9}$**
22. $x + \frac{3}{8} = \frac{1}{4}$ **$-\frac{1}{8}$**
23. $1\frac{7}{16} + s = \frac{9}{8}$ **$-\frac{5}{16}$**
24. $17\frac{8}{9} = d + (-2\frac{5}{6})$ **$20\frac{13}{18}$**

Extra Practice 825

Lesson 3-1

7. Sample answer: The sum of five-tenths times x and three is equal to negative ten.

8. Sample answer: The quotient of n and negative six is the same as the sum of two times n and one.

9. Sample answer: Eighteen decreased by five times h is the same as thirteen times h .

10. Sample answer: The square of n is equal to sixteen.

11. Sample answer: The sum of 3 and twice x squared is equal to twenty-one.

12. Sample answer: The sum of 4 and the quotient of m and n is equal to twelve.

Extra Practice

Extra Practice

Lesson 3-3

(pages 135–140)

Solve each equation. Then check your solution.

1. $7p = 35$ **5**
2. $-3x = -24$ **8**
3. $2y = -3$ **-1.5**
4. $62y = -2356$ **-38**
5. $\frac{a}{-6} = -2$ **12**
6. $\frac{c}{-59} = -7$ **413**
7. $\frac{f}{14} = -63$ **-882**
8. $84 = \frac{x}{97}$ **8148**
9. $\frac{w}{5} = 3$ **15**
10. $\frac{q}{9} = -3$ **-27**
11. $\frac{2}{5}x = \frac{4}{7}$ **$\frac{10}{7}$**
12. $\frac{z}{6} = -\frac{5}{12}$ **$-\frac{5}{2}$**
13. $-\frac{5}{9}r = 7\frac{1}{2}$ **$-13\frac{1}{2}$**
14. $2\frac{1}{6}j = 5\frac{1}{5}$ **$2\frac{2}{5}$**
15. $3 = 1\frac{7}{11}q$ **$1\frac{5}{6}$**
16. $-1\frac{3}{4}p = -\frac{5}{8}$ **$\frac{5}{14}$**
17. $57k = 0.1824$ **0.0032**
18. $0.0022b = 0.1958$ **89**
19. $5j = -32.15$ **-6.43**
20. $\frac{w}{-2} = -2.48$ **4.96**
21. $\frac{z}{2.8} = -6.2$ **-17.36**
22. $\frac{x}{-0.063} = 0.015$ **-0.000945**
23. $15\frac{3}{8} = -5p$ **$-3\frac{3}{40}$**
24. $-18\frac{1}{4} = 2.5x$ **-7.3**

Lesson 3-4

(pages 142–148)

Solve each equation. Then check your solution.

1. $2x - 5 = 3$ **4**
2. $4t + 5 = 37$ **8**
3. $7a + 6 = -36$ **-6**
4. $47 = -8g + 7$ **-5**
5. $-3c - 9 = -24$ **5**
6. $5k - 7 = -52$ **-9**
7. $5s + 4s = -72$ **-8**
8. $3x - 7 = 2$ **3**
9. $8 + 3x = 5$ **-1**
10. $-3y + 7.569 = 24.069$ **-5.5**
11. $7 - 9.1f = 137.585$ **-14.35**
12. $6.5 = 2.4m - 4.9$ **4.75**
13. $\frac{e}{5} + 6 = -2$ **-40**
14. $\frac{d}{4} - 8 = -5$ **12**
15. $-\frac{4}{13}y - 7 = 6$ **$-42\frac{1}{4}$**
16. $\frac{p+3}{10} = 4$ **37**
17. $\frac{h-7}{6} = 1$ **13**
18. $\frac{5f+1}{8} = -3$ **-5**
19. $\frac{4n-8}{-2} = 12$ **-4**
20. $\frac{-3t-4}{2} = 8$ **$-6\frac{2}{3}$**
21. $4.8a - 3 + 1.2a = 9$ **2**

Lesson 3-5

(pages 149–154)

Solve each equation. Then check your solution.

1. $5x + 1 = 3x - 3$ **-2**
2. $6 - 8n = 5n + 19$ **-1**
3. $-3z + 5 = 2z + 5$ **0**
4. $\frac{2}{3}h + 5 = -4 - \frac{1}{3}h$ **-9**
5. $\frac{1}{2}a - 4 = 3 - \frac{1}{4}a$ **$9\frac{1}{3}$**
6. $6(y - 5) = 18 - 2y$ **6**
7. $-28 + p = 7(p - 10)$ **7**
8. $\frac{1}{3}(b - 9) = b + 9$ **-18**
9. $-4x + 6 = 0.5(x + 30)$ **-2**
10. $4(2y - 1) = -8(0.5 - y)$ **all real numbers**
11. $1.9s + 6 = 3.1 - s$ **-1**
12. $2.85y - 7 = 12.85y - 2$ **-0.5**
13. $2.9m + 1.7 = 3.5 + 2.3m$ **3**
14. $3(x + 1) - 5 = 3x - 2$ **all real numbers**
15. $\frac{x}{2} - \frac{1}{3} = \frac{x}{3} - \frac{1}{2}$ **-1**
16. $\frac{6v-9}{3} = v$ **3**
17. $\frac{3t+1}{4} = \frac{3}{4}t - 5$ **no solution**
18. $0.4(x - 12) = 1.2(x - 4)$ **0**
19. $3y - \frac{4}{5} = \frac{1}{3}y$ **$\frac{3}{10}$**
20. $\frac{3}{4}x - 4 = 7 + \frac{1}{2}x$ **44**
21. $-0.2(1 - x) = 2(4 + 0.1x)$ **no solution**

Lesson 3-6

(pages 155–159)

Solve each proportion.

1. $\frac{4}{5} = \frac{x}{20}$ **16**
2. $\frac{b}{63} = \frac{3}{7}$ **27**
3. $\frac{y}{5} = \frac{3}{4}$ **3.75**
4. $\frac{7}{4} = \frac{3}{a}$ **$\frac{12}{7}$**
5. $\frac{t-5}{4} = \frac{3}{2}$ **11**
6. $\frac{x}{9} = \frac{0.24}{3}$ **0.72**
7. $\frac{n}{3} = \frac{n+4}{7}$ **3**
8. $\frac{12q}{-7} = \frac{30}{14}$ **$-\frac{5}{4}$**
9. $\frac{1}{y-3} = \frac{3}{y-5}$ **2**
10. $\frac{x}{8.71} = \frac{4}{17.42}$ **2**
11. $\frac{a-3}{8} = \frac{3}{4}$ **9**
12. $\frac{6p-2}{7} = \frac{5p+7}{8}$ **5**
13. $\frac{2}{9} = \frac{k+3}{2}$ **$-\frac{23}{9}$ or $-2.\bar{5}$**
14. $\frac{5m-3}{4} = \frac{5m+3}{6}$ **3**
15. $\frac{w-5}{4} = \frac{w+3}{3}$ **-27**
16. $\frac{96.8}{t} = \frac{12.1}{7}$ **56**
17. $\frac{r-1}{r+1} = \frac{3}{5}$ **4**
18. $\frac{4n+5}{5} = \frac{2n+7}{7}$ **0**

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 **decrease; 33%**
2. original: 62 acres
new: 98 acres **increase, 58%**
3. original: 322 people
new: 289 people **decrease, 10%**
4. original: 78 pennies
new: 36 pennies **decrease, 54%**
5. original: \$212
new: \$230 **increase, 8%**
6. original: 35 mph
new: 65 mph **increase, 86%**

Find the final price of each item.

7. television: \$299
discount: 20% **\$239.20**
8. book: \$15.95
sales tax: 7% **\$17.07**
9. software: \$36.90
sales tax: 6.25% **\$39.21**
10. boots: \$49.99
discount: 15%
sales tax: 3.5% **\$43.98**
11. jacket: \$65
discount: 30%
sales tax: 4% **\$47.32**
12. backpack: \$28.95
discount: 10%
sales tax: 5% **\$27.36**

Lesson 3-8

(pages 166–170)

Solve each equation or formula for x .

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

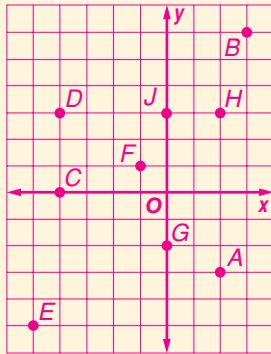
Extra Practice 827

Extra Practice

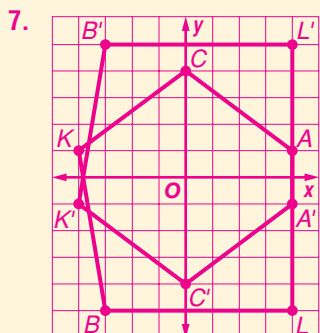
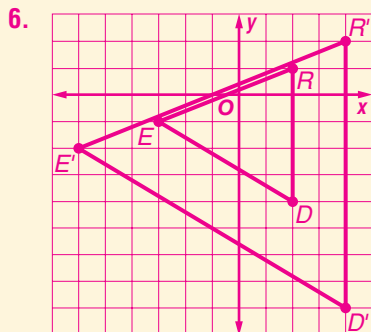
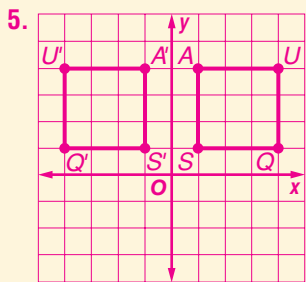
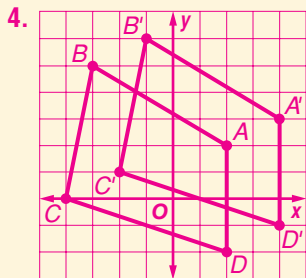
Extra Practice

Lesson 4-1

10-18.



Lesson 4-2



Lesson 3-9

(pages 171-177)

- 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? **2.5 qt**
- 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? **87%**
- 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? **5 adults, 16 children**
- 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? **3 lb**
- 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? **1.75 h; 113.75 mi**

Lesson 4-1

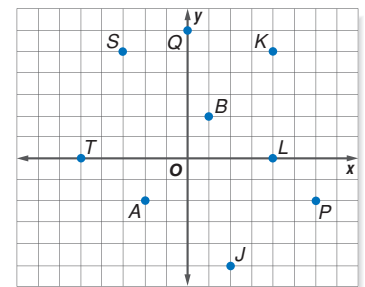
(pages 192-196)

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

- B** (1, 2); **I**
- T** (-5, 0); **none**
- P** (6, -2); **IV**
- Q** (0, 6); **none**
- A** (-2, -2); **III**
- K** (4, 5); **I**
- J** (2, -5); **IV**
- L** (4, 0); **none**
- S** (-3, 5); **II**

Plot each point on a coordinate plane. **10-18. See margin.**

- A**(2, -3)
- B**(3, 6)
- C**(-4, 0)
- D**(-4, 3)
- E**(-5, -5)
- F**(-1, 1)
- G**(0, -2)
- H**(2, 3)
- J**(0, 3)



Lesson 4-2

(pages 197-203)

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

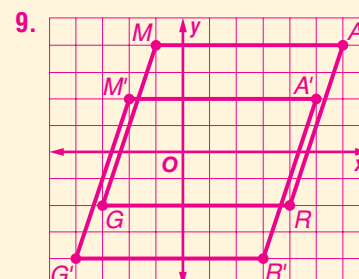
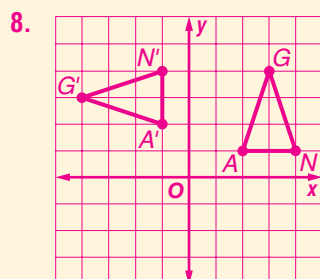
- reflection**
- translation**
- dilation**

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

- Find the coordinates of the vertices of each figure after the given transformation is performed.
 - Graph the preimage and its image. **4-9. See margin for graphs.**
- quadrilateral **ABCD** with **A**(2, 2), **B**(-3, 5), **C**(-4, 0), and **D**(2, -2) translated 1 unit up and 2 units right **A'**(4, 3), **B'**(-1, 6), **C'**(-2, 1), **D'**(4, -1)
 - square **SQUA** with **S**(1, 1), **Q**(4, 1), **U**(4, 4), and **A**(1, 4) reflected over the **y**-axis
 - $\triangle RED$ with **R**(2, 1), **E**(-3, -1), and **D**(2, -4) dilated by a scale factor of 2
 - pentagon **BLACK** with **B**(-3, -5), **L**(4, -5), **A**(4, 1), **C**(0, 4), and **K**(-4, 1) reflected over the **x**-axis **B'**(-3, 5), **L'**(4, 5), **A'**(4, -1), **C'**(0, -4), **K'**(-4, -1)
 - $\triangle ANG$ with **A**(2, 1), **N**(4, 1), and **G**(3, 4) rotated 90° counterclockwise about the origin
 - parallelogram **GRAM** with **G**(-3, -2), **R**(4, -2), **A**(6, 4), and **M**(-1, 4) translated 2 units down and 1 unit left **G'**(-4, -4), **R'**(3, -4), **A'**(5, 2), **M'**(-2, 2)

- S'**(-1, 1), **Q'**(-4, 1), **U'**(-4, 4), **A'**(-1, 4)
- R'**(4, 2), **E'**(-6, -2), **D'**(4, -8)
- A'**(-1, 2), **N'**(-1, 4), **G'**(-4, 3)

828 Extra Practice



Lesson 4-3

(pages 205–211)

Express each relation as a table, a graph, and a mapping. Then determine the domain and range. **1–4. See pp. 852A–852H.**

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

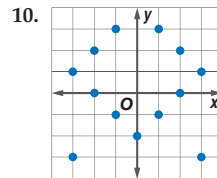
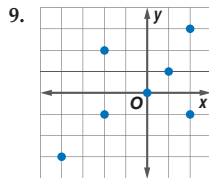
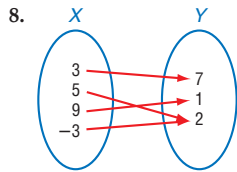
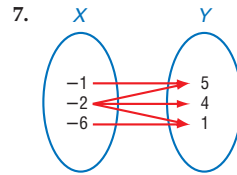
Express the relation shown in each table, mapping, or graph as a set of ordered pairs. Then write the inverse of the relation. **5–10. See margin.**

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



Lesson 4-4

(pages 212–217)

Find the solution set for each equation, given the replacement set. **1. $\{(0, -1), (2, 5)\}$**

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

Solve each equation if the domain is $\{-2, -1, 0, 1, 2\}$. **5–13. See margin.**

- $x + y = 3$
- $y = x$
- $y = 5x + 1$
- $4x + 3y = 13$
- $5y = 8 - 4x$
- $2x + y = 4$
- $y = 4 + x$
- $2x + 3y = 10$
- $2y = 3x + 1$

Solve each equation for the given domain. Graph the solution set. **14–21. See margin.**

- $x = y + 1$ for $x = \{-2, -1, 0, 1, 2\}$
- $y = x + 1$ for $x = \{-3, -1, 0, 1, 3\}$
- $x + 4y = 2$ for $x = \{-8, -4, 0, 4, 8\}$
- $y - 3 = x$ for $x = \{-5, -1, 3, 7, 9\}$
- $x + y = -2$ for $x = \{-4, -3, 0, 1, 3\}$
- $2x - 3y = -5$ for $x = \{-5, -3, 0, 5, 6\}$
- $3y = \frac{2}{3}x - 4$ for $x = \{-6, -3, 0, 1, 3\}$
- $-2y = 8 - \frac{3}{2}x$ 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. **1–6. See pp. 852A–852H.**

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

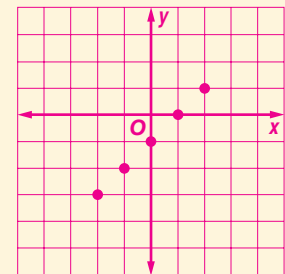
Graph each equation. **7–18. See pp. 852A–852H.**

- $3x + y = 4$
- $y = 3x + 1$
- $3x - 2y = 12$
- $2x - y = 6$
- $2x - 3y = 8$
- $y = -2$
- $y = 5x - 7$
- $x = 4$
- $x + \frac{1}{3}y = 2$
- $5x - 2y = 8$
- $4.5x + 2.5y = 9$
- $\frac{1}{2}x + 3y = 12$

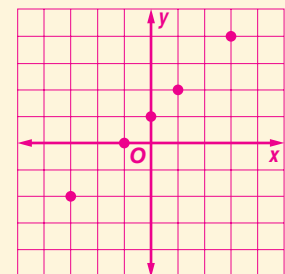
Extra Practice 829

Lesson 4-4

- $\{(-2, 5), (-1, 4), (0, 3), (1, 2), (2, 1)\}$
- $\{(-2, -2), (-1, -1), (0, 0), (1, 1), (2, 2)\}$
- $\{(-2, -9), (-1, -4), (0, 1), (1, 6), (2, 11)\}$
- $\{(-2, 7), (-1, \frac{17}{3}), (0, \frac{13}{3}), (1, 3), (2, \frac{5}{3})\}$
- $\{(-2, \frac{16}{5}), (-1, \frac{12}{5}), (0, \frac{8}{5}), (1, \frac{4}{5}), (2, 0)\}$
- $\{(-2, 8), (-1, 6), (0, 4), (1, 2), (2, 0)\}$
- $\{(-2, 2), (-1, 3), (0, 4), (1, 5), (2, 6)\}$
- $\{(-2, \frac{14}{3}), (-1, 4), (0, \frac{10}{3}), (1, \frac{8}{3}), (2, 2)\}$
- $\{(-2, -\frac{5}{2}), (-1, -1), (0, \frac{1}{2}), (1, 2), (2, \frac{7}{2})\}$
- $\{(-2, -3), (-1, -2), (0, -1), (1, 0), (2, 1)\}$



- $\{(-3, -2), (-1, 0), (0, 1), (1, 2), (3, 4)\}$

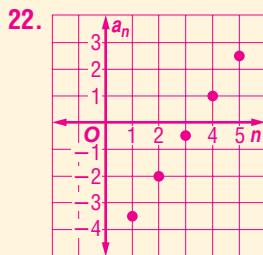
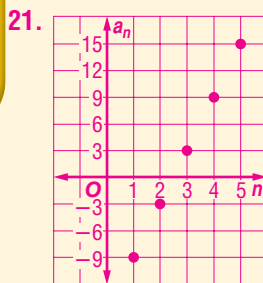
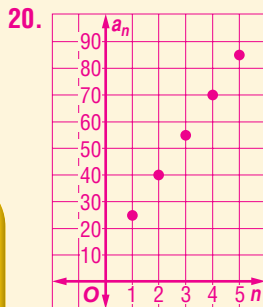
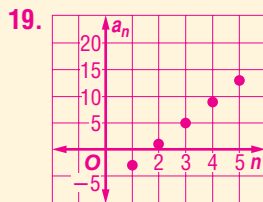


Answers continued on page 852A.

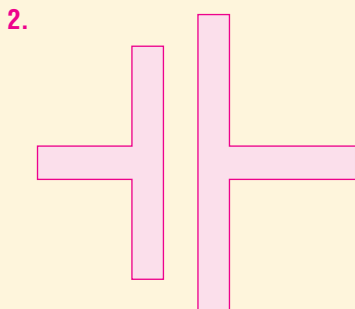
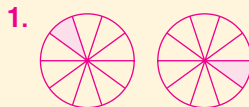
Lesson 4-3

- $\{(1, 3), (2, 4), (3, 5), (4, 6), (5, 7)\}; \{(3, 1), (4, 2), (5, 3), (6, 4), (7, 5)\}$
- $\{(-4, 1), (-2, 3), (0, 1), (2, 3), (4, 1)\}; \{(1, -4), (3, -2), (1, 0), (3, 2), (1, 4)\}$
- $\{(-1, 5), (-2, 5), (-2, 4), (-2, 1), (-6, 1)\}; \{(5, -1), (5, -2), (4, -2), (1, -2), (1, -6)\}$
- $\{(3, 7), (5, 2), (9, 1), (-3, 2)\}; \{(7, 3), (2, 5), (1, 9), (2, -3)\}$
- $\{(-4, -3), (-2, 2), (-2, -1), (0, 0), (1, 1), (2, 3), (2, -1)\}; \{(-3, -4), (2, -2), (-1, -2), (0, 0), (1, 1), (3, 2), (-1, 2)\}$
- $\{(-3, 1), (-3, -3), (-2, 2), (-2, 0), (-1, 3), (-1, -1), (0, -2), (1, -1), (1, 3), (2, 0), (2, 2), (3, 1), (3, -3)\}; \{(1, -3), (-3, -3), (2, -2), (0, -2), (3, -1), (-1, -1), (-2, 0), (-1, 1), (3, 1), (0, 2), (2, 2), (1, 3), (-3, 3)\}$

Lesson 4-7



Lesson 4-8



3. 56, 67, 78
4. 15, 9, 3
5. 10.8, 12.0, 13.2
6. 68, 63.5, 59
7. 64, 128, 256
8. 5, 1, 0.2

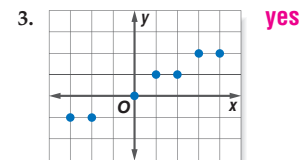
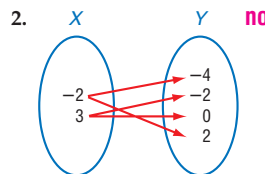
Lesson 4-6

(pages 226–231)

Determine whether each relation is a function.

1. **no**

x	y
1	3
2	5
1	-7
2	9



4. $\{(-2, 4), (1, 3), (5, 2), (1, 4)\}$ **no**
5. $\{(5, 4), (-6, 5), (4, 5), (0, 4)\}$ **yes**
6. $\{(3, 1), (5, 1), (7, 1)\}$ **yes**
7. $\{(3, -2), (4, 7), (-2, 7), (4, 5)\}$ **no**
8. $y = 2$ **yes**
9. $x^2 + y = 11$ **yes**

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

10. $f(-4)$ **-3**
11. $g(2)$ **11**
12. $f(3) - 5$ **6**
13. $g(-2) + 4$ **15**
14. $f(b^2)$ **$2b^2 + 5$**
15. $g(a + 1)$ **$3a^2 + 6a + 2$**
16. $f(0) + g(3)$ **31**
17. $f(n) + g(n)$ **$3n^2 + 2n + 4$**

(pages 233–238)

Lesson 4-7

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

1. $-2, -1, 0, 1, \dots$ **yes; 1**
2. $3, 5, 8, 12, \dots$ **no**
3. $2, 4, 8, 16, \dots$ **no**
4. $-21, -16, -11, -6, \dots$ **yes; 5**
5. $0, 0.25, 0.5, 0.75, \dots$ **yes; 0.25**
6. $\frac{1}{3}, \frac{1}{9}, \frac{1}{27}, \frac{1}{81}, \dots$ **no**

Find the next three terms of each arithmetic sequence. **8. -12, -14, -16 9. 0.4, 1.0, 1.6**

7. $3, 13, 23, 33, \dots$ **43, 53, 63**
8. $-4, -6, -8, -10, \dots$ **-12, -14, -16**
9. $-2, -1.4, -0.8, -0.2, \dots$ **0.4, 1.0, 1.6**
10. $5, 13, 21, 29, \dots$ **37, 45, 53**
11. $\frac{3}{4}, \frac{7}{8}, 1, \frac{9}{8}, \dots$ **$\frac{5}{4}, \frac{11}{8}, \frac{3}{2}$**
12. $-\frac{1}{3}, -\frac{5}{6}, -\frac{4}{3}, -\frac{11}{6}, \dots$ **$-\frac{7}{3}, -\frac{17}{6}, -\frac{10}{3}$**

Find the n th term of each arithmetic sequence described.

13. $a_1 = 3, d = 6, n = 12$ **69**
14. $a_1 = -2, d = 4, n = 8$ **26**
15. $a_1 = -1, d = -3, n = 10$ **-28**
16. $a_1 = 2.2, d = 1.4, n = 5$ **7.8**
17. $-2, -7, -12, \dots$ for $n = 12$ **-57**
18. $2\frac{1}{2}, 2\frac{1}{8}, 1\frac{3}{4}, 1\frac{3}{8}, \dots$ for $n = 10$ **$-\frac{7}{8}$**

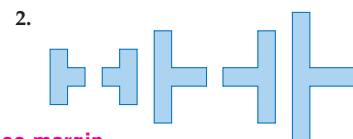
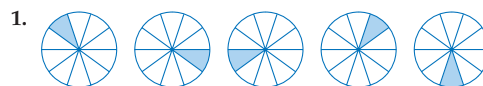
Write an equation for the n th term of the arithmetic sequence. Then graph the first five terms in the sequence. **19–22. See margin for graphs.**

19. $-3, 1, 5, 9, \dots$ **$a_n = -7 + 4n$**
20. $25, 40, 55, 70, \dots$ **$a_n = 10 + 15n$**
21. $-9, -3, 3, 9, \dots$ **$a_n = -15 + 6n$**
22. $-3.5, -2, -0.5, 1, \dots$ **$a_n = -5 + 1.5n$**

(pages 240–245)

Lesson 4-8

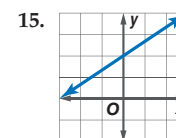
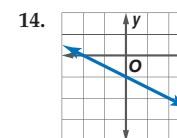
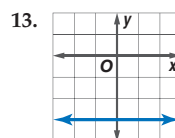
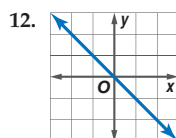
Find the next two items for each pattern. **1–2. See margin.**



Find the next three terms in each sequence. **3–11. See margin.**

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. $w - 2, w - 4, w - 6, w - 8, \dots$
11. 13, 10, 11, 8, 9, 6, ...

Write an equation in function notation for each relation. **12–15. See margin.**

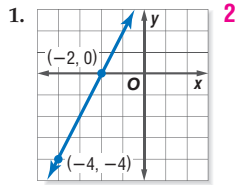


9. 36, 43, 51
10. $w - 10, w - 12, w - 14$
11. 7, 4, 5
12. $f(x) = -x$
13. $f(x) = -3$
14. $f(x) = -\frac{1}{2}x - 1$
15. $f(x) = \frac{2}{3}x + 2$

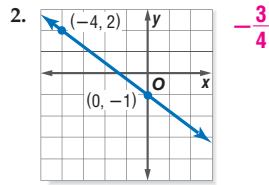
Lesson 5-1

(pages 256–262)

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



2



$-\frac{3}{4}$

3. $(-2, 2), (3, -3)$ $-\frac{1}{1}$ 4. $(-2, -8), (1, 4)$ 4 5. $(3, 4), (4, 6)$ 2 6. $(-5, 4), (-1, 11)$ $\frac{7}{4}$
7. $(18, -4), (6, -10)$ $\frac{1}{2}$ 8. $(-4, -6), (-4, -8)$ undefined 9. $(0, 0), (-1, 3)$ -3 10. $(-8, 1), (2, 1)$ 0

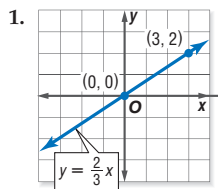
Find the value of r so the line that passes through each pair of points has the given slope.

11. $(-1, r), (1, -4), m = -5$ 6 12. $(r, -2), (-7, -1), m = -\frac{1}{4}$ -3 13. $(-3, 2), (7, r), m = \frac{2}{3}$ $\frac{26}{3}$

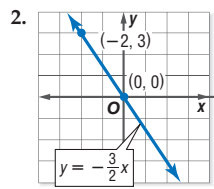
Lesson 5-2

(pages 264–270)

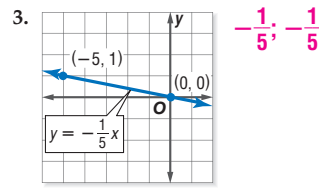
Name the constant of variation for each equation. Then determine the slope of the line that passes through each pair of points.



$\frac{2}{3}, \frac{2}{3}$



$-\frac{3}{2}, -\frac{3}{2}$



$-\frac{1}{5}, -\frac{1}{5}$

Graph each equation. 4–6. See margin.

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. 7–10. See margin for equations.

7. If $y = 45$ when $x = 9$, find y when $x = 7$. 35 8. If $y = -7$ when $x = -1$, find x when $y = -84$. -12
9. If $y = 450$ when $x = -6$, find y when $x = 10$. -750 10. If $y = 6$ when $x = 48$, find y when $x = 20$. 2.5

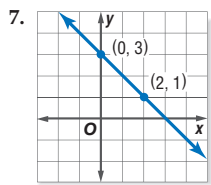
Lesson 5-3

(pages 272–277)

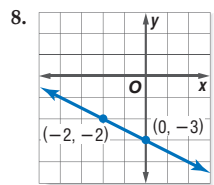
Write an equation of the line with the given slope and y -intercept. 1–6. See margin.

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

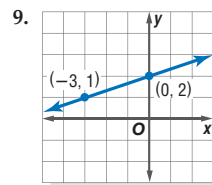
Write an equation of the line shown in each graph.



$y = -x + 3$



$y = -\frac{1}{2}x - 3$



$y = \frac{1}{3}x + 2$

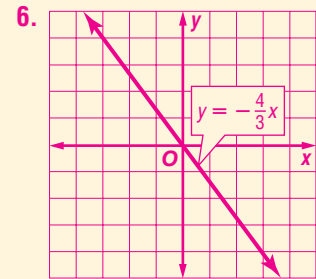
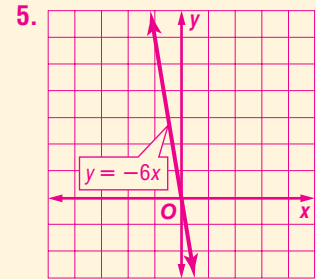
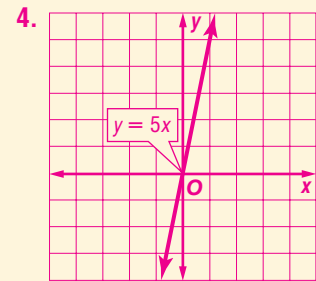
Graph each equation. 10–12. See margin.

10. $y = 5x - 1$

11. $y = -2x + 3$

12. $3x - y = 6$

Lesson 5-2



7. $y = 5x$

8. $y = 7x$

9. $y = -75x$

10. $y = -x$

Lesson 5-3

1. $y = 5x - 15$

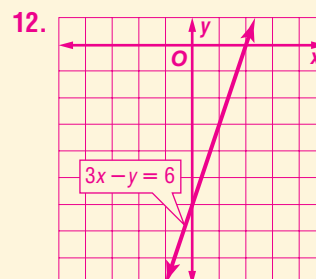
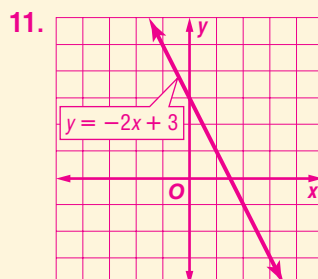
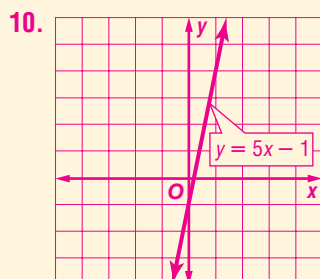
2. $y = -6x + 3$

3. $y = 0.3x - 2.6$

4. $y = -\frac{4}{3}x + \frac{5}{3}$

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

6. $y = \frac{7}{4}x - 2$



Extra Practice

Extra Practice

Lesson 5-5

7. $2x - y = 11$
8. $x + 2y = -12$
9. $2x + 3y = 22$
10. $4x - 3y = 30$
11. $3x - 2y = -11$
12. $19x + 5y = 8$
13. $y = -2x - 9$
14. $y = 4x - 7$
15. $y = -4x + 14$
16. $y = \frac{4}{5}x + 3$
17. $y = -\frac{3}{4}x + \frac{7}{2}$
18. $y = \frac{2}{3}x + \frac{1}{12}$

Lesson 5-6

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

Lesson 5-4

(pages 280–285)

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

1. $(0, 0); m = -2$ $y = -2x$
2. $(-3, 2); m = 4$ $y = 4x + 14$
3. $(0, 5); m = -1$ $y = -x + 5$
4. $(-2, 3); m = -\frac{1}{4}$ $y = -\frac{1}{4}x + \frac{5}{2}$
5. $(1, -5); m = \frac{2}{3}$ $y = \frac{2}{3}x - \frac{17}{3}$
6. $(\frac{1}{2}, \frac{1}{4}); m = 8$ $y = 8x - \frac{15}{4}$

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

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

Write an equation of the line that has each pair of intercepts. **16–21. See margin.**

16. x -intercept: 2, y -intercept: 1 $y = -\frac{1}{2}x + 1$
17. x -intercept: 1, y -intercept: -4 $y = 4x - 4$
18. x -intercept: 5, y -intercept: 5 $y = -x + 5$
19. x -intercept: -1, y -intercept: 3 $y = 3x + 3$
20. x -intercept: -4, y -intercept: -1 $y = -\frac{1}{4}x - 1$
21. x -intercept: 3, y -intercept: -3 $y = x - 3$

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. **2. $y - 4 = -5(x - 5)$**

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

Write each equation in standard form. **7–12. See margin.**

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. **13–18. See margin.**

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. $y + \frac{1}{4} = \frac{2}{3}(x + \frac{1}{2})$

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. **1–6. See margin.**

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. $(2, 3), x - 5y = 7$

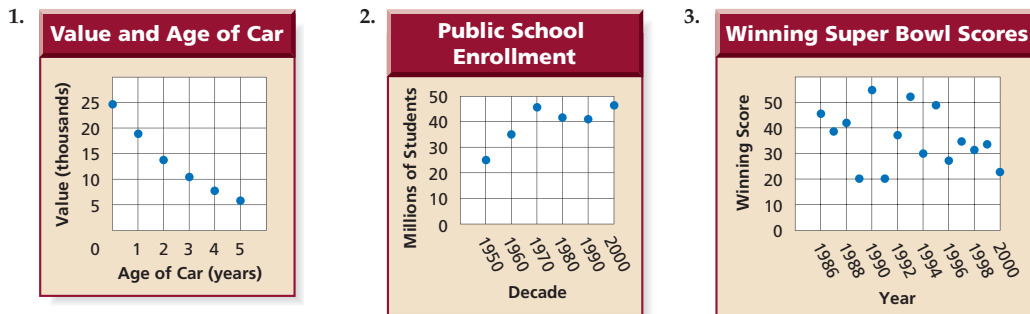
Write the slope-intercept form of an equation that passes through the given point and is perpendicular to the graph of each equation. **7–12. See margin.**

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. $(5, -1), 8x + 4y = 15$

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. **1–3. See margin.**



5. $y = \frac{7}{2}x - 6955$ 6. 62.5 million metric tons of fish

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. **positive correlation**
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: ESPN Almanac



Source: The World Almanac

Lesson 6-1 1–16. See margin for graphs. 2, 5, 8–12. See margin.

(pages 318–323)

Solve each inequality. Then check your solution and graph it on a number line. 4. $\{h | h > -9\}$

1. $c + 9 \leq 3$ $\{c | c \leq -6\}$
2. $d - (-3) < 13$
3. $z - 4 > 20$ $\{z | z > 24\}$
4. $h - (-7) > -2$
5. $-11 > d - 4$
6. $2x > x - 3$ $\{x | x > -3\}$
7. $2x - 3 \geq x$ $\{x | x \geq 3\}$
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. $9x < 8x - 2$ $\{x | x < -2\}$
14. $-2 + 9n \leq 10n$ $\{n | n \geq -2\}$
15. $a - 2.3 \geq -7.8$ $\{a | a \geq -5.5\}$
16. $5z - 6 > 4z$ $\{z | z > 6\}$

Define a variable, write an inequality, and solve each problem. **17–18. See margin for sample answers: Let n = the number.**

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 3. $\{w | w > -36\}$ 8. $\{x | x > 0.6\}$ 11. $\{m | m \geq -33\}$

(pages 325–331)

Solve each inequality. Then check your solution. 12. $\{a | a > 500\}$

1. $7b \geq -49$ $\{b | b \geq -7\}$
2. $-5j < -60$ $\{j | j > 12\}$
3. $\frac{w}{3} > -12$
4. $\frac{p}{5} < 8$ $\{p | p < 40\}$
5. $-8f < 48$ $\{f | f > -6\}$
6. $-0.25t \geq -10$ $\{t | t \leq 40\}$
7. $\frac{g}{-8} < 4$ $\{g | g > -32\}$
8. $-4.3x < -2.58$
9. $4c \geq -6$ $\{c | c \geq -1.5\}$
10. $6 \leq 0.8n$ $\{n | n \geq 7.5\}$
11. $\frac{2}{3}m \geq -22$
12. $-25 > -0.05a$
13. $-15a < -28$
14. $-\frac{7}{9}x < 42$ $\{x | x > -54\}$
15. $0.375y \leq 32$
16. $-7y \geq 91$ $\{y | y \leq -13\}$

Define a variable, write an inequality, and solve each problem. **17–19. Let n = the number.**

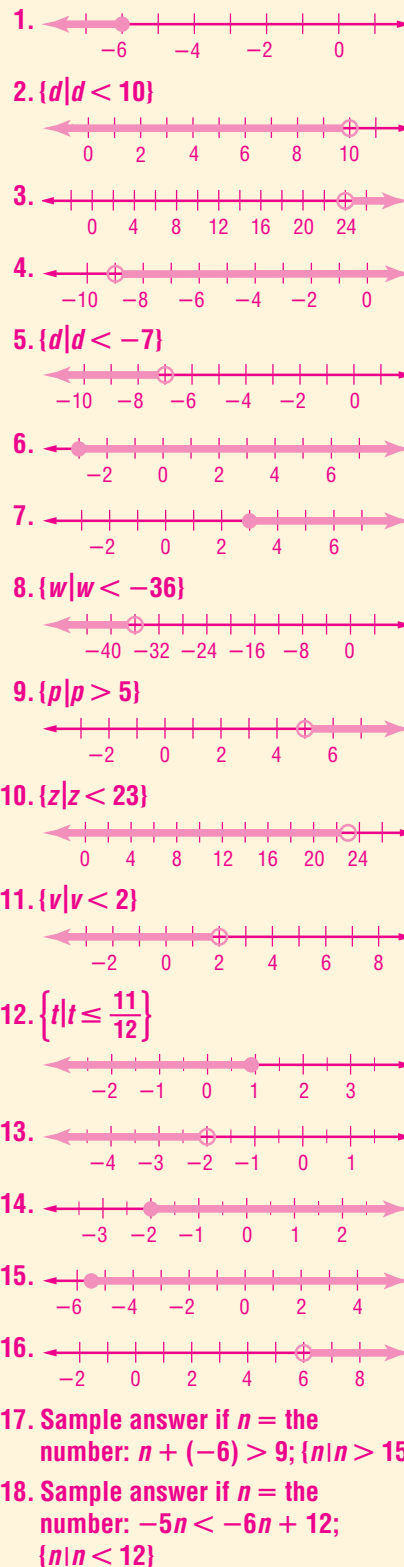
17. Negative one times a number is greater than -7 . $-n > -7$; $\{n | n < 7\}$
18. Three fifths of a number is at least negative 10. $\frac{3}{5}n \geq -10$; $\{n | n \geq -\frac{50}{3}\}$
19. Seventy-five percent of a number is at most 100. $0.75n \leq 100$; $\{n | n \leq 133.\bar{3}\}$
13. $\{a | a > \frac{28}{15}\}$
15. $\{y | y \leq \frac{256}{3}\}$

Extra Practice 833

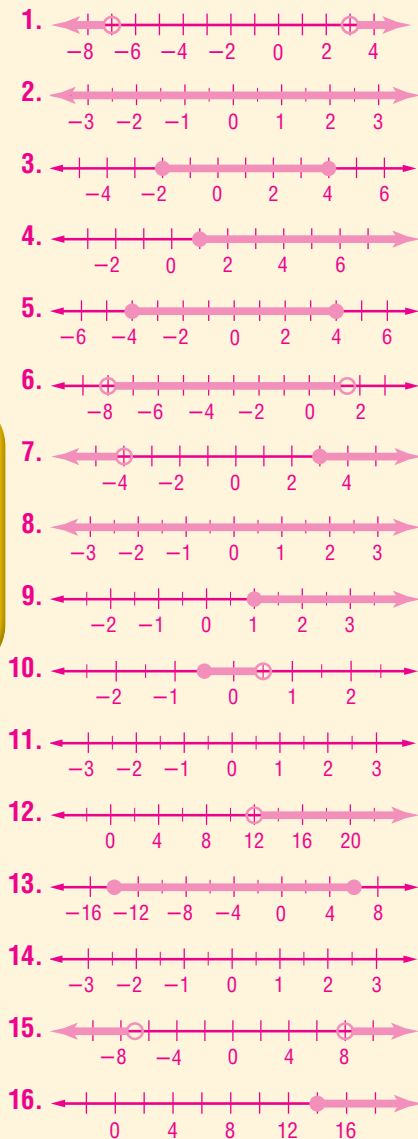
Lesson 5-7

1. Negative; the value of a car decreases as it ages.
2. Positive; the number of students enrolled has been increasing.
3. no correlation

Lesson 6-1



Lesson 6-4



Extra Practice

Lesson 6-3

(pages 332–337)

Solve each inequality. Then check your solution.

- $3y - 4 > -37$ $\{y | y > -11\}$
 - $7s - 12 < 13$
 - $-5e + 9 > 24$ $\{e | e < -3\}$
 - $-6v - 3 \geq -33$ $\{v | v \leq 5\}$
 - $-2k + 12 < 30$ $\{k | k > -9\}$
 - $-2x + 1 < 16 - x$ $\{x | x > -15\}$
 - $15t - 4 > 11t - 16$ $\{t | t > -3\}$
 - $13 - y \leq 29 + 2y$
 - $5q + 7 \leq 3(q + 1)$ $\{q | q \leq -2\}$
 - $2(w + 4) \geq 7(w - 1)$ $\{w | w \leq 3\}$
 - $-4t - 5 > 2t + 13$ $\{t | t < -3\}$
 - $\frac{2t + 5}{3} < -9$ $\{t | t < -16\}$
 - $\frac{z}{4} + 7 \geq -5$ $\{z | z \geq -48\}$
 - $13r - 11 > 7r + 37$ $\{r | r > 8\}$
 - $8c - (c - 5) > c + 17$ $\{c | c > 2\}$
 - $-5(k + 4) \geq 3(k - 4)$ $\{k | k \leq -1\}$
 - $9m + 7 < 2(4m - 1)$ $\{m | m < -9\}$
 - $3(3y + 1) < 13y - 8$
 - $5x \leq 10(3x + 4)$ $\{x | x \geq -\frac{8}{5}\}$
 - $3(a + \frac{2}{3}) \geq a - 1$ $\{a | a \geq -\frac{3}{2}\}$
2. $\{s | s < \frac{25}{7}\}$ 8. $\{y | y \geq -\frac{16}{3}\}$ 18. $\{y | y > \frac{11}{4}\}$

Lesson 6-4

(pages 339–344)

Solve each compound inequality. Then graph the solution set. 1–16. See margin for graphs.

- $2 + x < -5$ or $2 + x > 5$ $\{x | x < -7$ or $x > 3\}$
- $-4 + t > -5$ or $-4 + t < 7$ $\{t | t \text{ is a real number.}\}$
- $3 \leq 2g + 7$ and $2g + 7 \leq 15$ $\{g | -2 \leq g \leq 4\}$
- $2v - 2 \leq 3v$ and $4v - 1 \geq 3v$ $\{v | v \geq 1\}$
- $3b - 4 \leq 7b + 12$ and $8b - 7 \leq 25$ $\{b | -4 \leq b \leq 4\}$
- $-9 < 2z + 7 < 10$ $\{z | -8 < z < 1.5\}$
- $5m - 8 \geq 10 - m$ or $5m + 11 < -9$
- $12c - 4 \leq 5c + 10$ or $-4c - 1 \leq c + 24$
- $3p + 6 < 8 - p$ and $5p + 8 \geq p + 6$
- $-4j + 3 < j + 22$ and $j - 3 < 2j - 15$ $\{j | j > 12\}$
- $2h - 2 \leq 3h \leq 4h - 1$ $\{h | h \geq 1\}$
- $2r + 8 > 16 - 2r$ and $7r + 21 < r - 9$ $\emptyset$
- $\frac{1}{2}w + 5 \geq w + 2 \geq \frac{1}{2}w + 9$ $\emptyset$
- $2(q - 4) \leq 3(q + 2)$ or $q - 8 \leq 4 - q$
- $n - (6 - n) > 10$ or $-3n - 1 > 20$
- $-(2x + 5) \leq x + 5 \leq 2x - 9$ $\{x | x \geq 14\}$
- $\{m | m < -4$ or $m \geq 3\}$ 8. $\{c | c \text{ is a real number.}\}$ 10. $\{p | -\frac{1}{2} \leq p < \frac{1}{2}\}$ 13. $\{q | -14 \leq q \leq 6\}$
- $\{n | n < -7$ or $n > 8\}$

Lesson 6-5

(pages 345–351)

Solve each open sentence. Then graph the solution set. 1–20. See pp. 852A–852H for graphs.

- $|y - 9| < 19$ $\{y | -10 < y < 28\}$
- $|g + 6| > 8$ $\{g | g < -14$ or $g > 2\}$
- $|t - 5| \leq 3$ $\{t | 2 \leq t \leq 8\}$
- $|a + 5| \geq 0$ $\{a | a \text{ is a real number.}\}$
- $|14 - 2z| = 16$ $\{-1, 15\}$
- $|a - 5| = -3$ $\emptyset$
- $|2m - 5| > 13$ $\{m | m < -4$ or $m > 9\}$
- $|14 - w| \geq 20$ $\{w | w \leq -6$ or $w \geq 34\}$
- $|3p + 5| \leq 23$ $\{p | -\frac{28}{3} \leq p \leq 6\}$
- $|25 - 3x| < 5$
- $|6b - 12| \leq 36$ $\{b | -4 \leq b \leq 8\}$
- $|4c + 5| \geq 25$ $\{c | c \leq -7.5$ or $c \geq 5\}$
- $|7 + 8x| > 39$ $\{x | x < -5.75$ or $x > 4\}$
- $|4 - 5s| > 46$ $\{s | s < -8.4$ or $s > 10\}$
- $|4 - (1 - x)| \geq 10$ $\{x | x \leq -13$ or $x \geq 7\}$
- $|\frac{2n - 1}{3}| = 10$ $\{-14.5, 15.5\}$
- $|\frac{7 - 2b}{2}| \leq 3$ $\{b | 0.5 \leq b \leq 6.5\}$
- $|-2 + (x - 3)| \leq 7$ $\{x | -2 \leq x \leq 12\}$
- $|-3 - (2b - 6)| \geq 10$ $\{b | b \leq -3.5$ or $b \geq 6.5\}$
- $\{-1, \frac{21}{5}\}$ 12. $\{x | 6\frac{2}{3} < x < 10\}$

Lesson 6-6

(pages 352–357)

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

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

Graph each inequality. 5–19. See margin.

- $y \leq -2$
- $x < 4$
- $x + y < -2$
- $x + y \geq -4$
- $y > 4x - 1$
- $3x + y > 1$
- $3y - 2x \leq 2$
- $x < y$
- $3x + y \leq 4$
- $5x - y < 5$
- $-2x + 6y \geq 12$
- $-x + 3y \leq 5$
- $y > -3x + 7$
- $3x + 8y \leq 4$
- $5x - 2y \geq 6$

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. 1–15. See pp. 852A–852H for graphs.

- $y = 3x$
 $4x + 2y = 30$ **$(3, 9)$**
- $x = -2y$
 $x + y = 1$ **$(2, -1)$**
- $y = x + 4$
 $3x + 2y = 18$ **$(2, 6)$**
- $x + y = 6$
 $x - y = 2$ **$(4, 2)$**
- $x + y = 6$
 $3x + 3y = 3$ **no solution**
- $y = -3x$
 $4x + y = 2$ **$(2, -6)$**
- $2x + y = 8$
 $x - y = 4$ **$(4, 0)$**
- $\frac{1}{5}x - y = \frac{12}{5}$
 $3x - 5y = 6$ **$(-3, -3)$**
- $x + 2y = 0$
 $y + 3 = -x$ **$(-6, 3)$**
- $x + 2y = -9$
 $x - y = 6$ **$(1, -5)$**
- $x + \frac{1}{2}y = 3$
 $y = 3x - 4$ **$(2, 2)$**
- $\frac{2}{3}x + \frac{1}{2}y = 2$
 $4x + 3y = 12$ **infinitely many**
- $y = x - 4$
 $x + \frac{1}{2}y = \frac{5}{2}$ **$(3, -1)$**
- $2x + y = 3$
 $4x + 2y = 6$ **infinitely many**
- $12x - y = -21$
 $\frac{1}{2}x + \frac{2}{3}y = -3$ **$(-2, -3)$**

Lesson 7-2

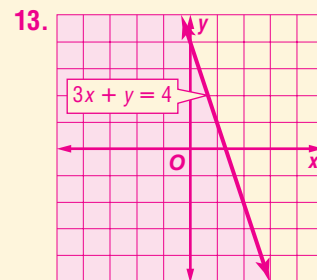
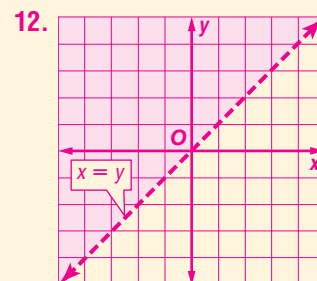
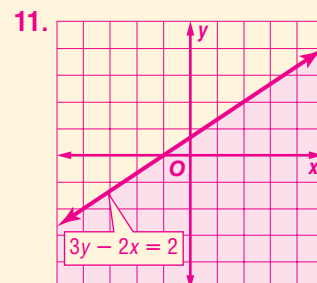
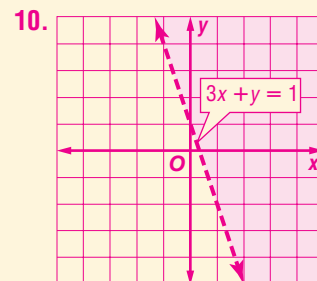
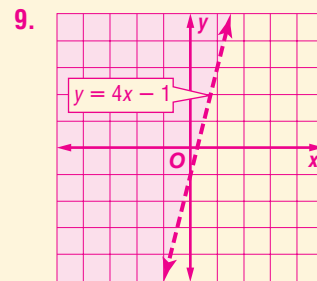
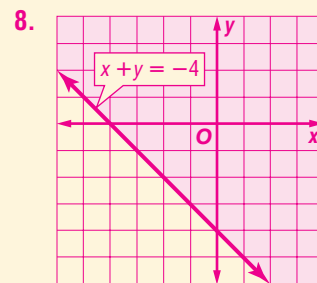
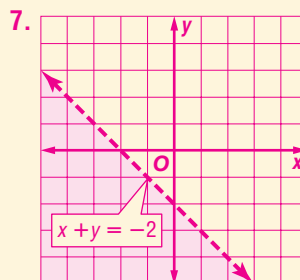
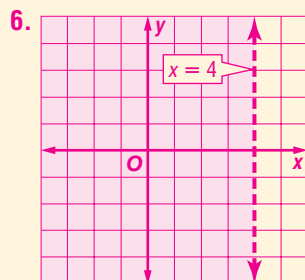
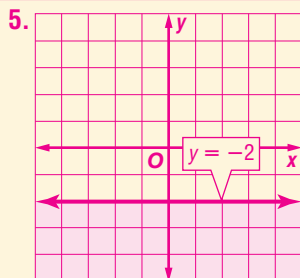
(pages 376–381)

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.

- $y = x$
 $5x = 12y$ **$(0, 0)$**
- $y = 7 - x$
 $2x - y = 8$ **$(5, 2)$**
- $x = 5 - y$
 $3y = 3x + 1$ **$(\frac{7}{3}, \frac{8}{3})$**
- $3x + y = 6$
 $y + 2 = x$ **$(2, 0)$**
- $x - 3y = 3$
 $2x + 9y = 11$ **$(4, \frac{1}{3})$**
- $3x = -18 + 2y$
 $x + 3y = 4$ **$(-\frac{46}{11}, \frac{30}{11})$**
- $x + 2y = 10$
 $-x + y = 2$ **$(2, 4)$**
- $2x = 3 - y$
 $2y = 12 - x$ **$(-2, 7)$**
- $6y - x = -36$
 $y = -3x$ **$(\frac{36}{19}, -\frac{108}{19})$**
- $\frac{3}{4}x + \frac{1}{3}y = 1$
 $x - y = 10$ **$(4, -6)$**
- $x + 6y = 1$
 $3x - 10y = 31$ **$(7, -1)$**
- $3x - 2y = 12$
 $\frac{3}{2}x - y = 3$ **no solution**
- $2x + 3y = 5$
 $4x - 9y = 9$ **$(\frac{12}{5}, \frac{1}{15})$**
- $x = 4 - 8y$
 $3x + 24y = 12$ **infinitely many**
- $3x - 2y = -3$
 $25x + 10y = 215$ **$(5, 9)$**

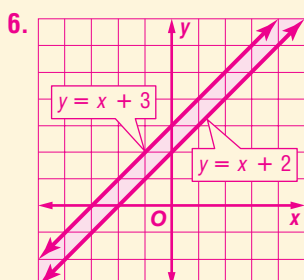
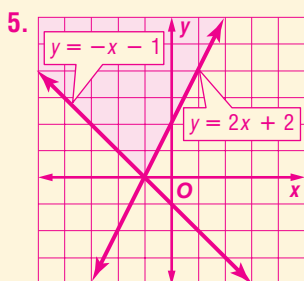
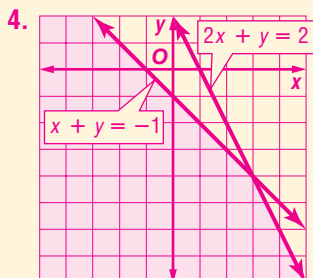
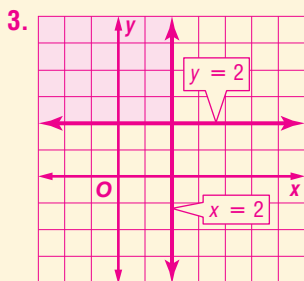
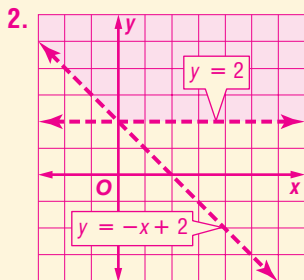
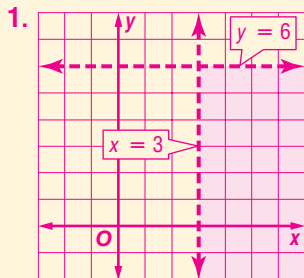
Extra Practice 835

Lesson 6-6



Answers continued on page 852C.

Lesson 7-5



Lesson 7-3

(pages 382–386)

Use elimination to solve each system of equations.

- $x + y = 7$
 $x - y = 9$ **(8, -1)**
- $s + 2t = 6$
 $3s - 2t = 2$ **(2, 2)**
- $x - y = 3$
 $x + y = 3$ **(3, 0)**
- $-6x + 16y = -8$
 $6x - 42 = 16y$ **no solution**
- $x = y$
 $x + y = 7$ **(3.5, 3.5)**
- $2x - y = 32$
 $2x + y = 60$ **(23, 14)**
- $x = y - 7$
 $2x - 5y = -2$ **(-11, -4)**
- $x + y = 8$
 $2x - y = 6$ **(14/3, 10/3)**
- $3x + 0.2y = 7$
 $3x = 0.4y + 4$ **(2, 5)**
- $4x - \frac{1}{3}y = 8$
 $5x + \frac{1}{3}y = 6$ **(14/9, -16/3)**
- $-y + x = 6$
 $y + x = 5$ **(11/2, -1/2)**
- $3x + 5y = -16$
 $3x - 2y = -2$ **(-2, -2)**
- $2s - 3t = -4$
 $s = 7 - 3t$ **(1, 2)**
- $9x + 2y = 26$
 $1.5x - 2y = 13$ **(26/7, -26/7)**
- $2x - y = 3$
 $\frac{2}{3}x - y = -1$ **(3, 3)**

Lesson 7-4

(pages 387–392)

Use elimination to solve each system of equations.

- $-3x + 2y = 10$
 $-2x - y = -5$ **(0, 5)**
- $\frac{1}{3}x - y = -1$
 $\frac{1}{5}x - \frac{2}{5}y = -1$ **(-9, -2)**
- $x + 8y = 3$
 $4x - 2y = 7$ **(31/17, 5/34)**
- $x + 4y = 30$
 $2x - y = -6$ **(2/3, 22/3)**
- $2x - 7y = 9$
 $-3x + 4y = 6$ **(-6, -3)**
- $2x + 5y = 13$
 $4x - 3y = -13$ **(-1, 3)**
- $3x - 5y = 8$
 $4x - 7y = 10$ **(6, 2)**
- $4x - y = 4$
 $x + 2y = 3$ **(11/9, 8/9)**
- $3x - 2y = 0$
 $4x + 4y = 5$ **(1/2, 3/4)**
- $2x - 6y = -16$
 $5x + 7y = -18$ **(-5, 1)**
- $5x + 3y = 4$
 $-4x + 5y = -18$ **(2, -2)**
- $x - 0.5y = 1$
 $0.4x + y = -2$ **(0, -2)**
- $3y - 8x = 9$
 $y - x = 2$ **(-3/5, 7/5)**
- $9x - 3y = 5$
 $x + y = 1$ **(2/3, 1/3)**
- $6x - 3y = -9$
 $-8x + 2y = 4$ **(1/2, 4)**

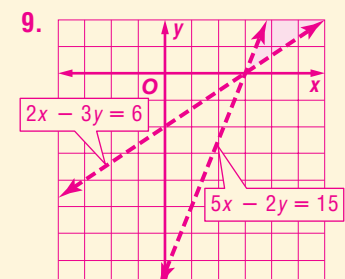
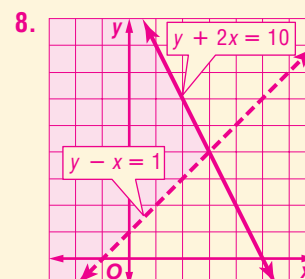
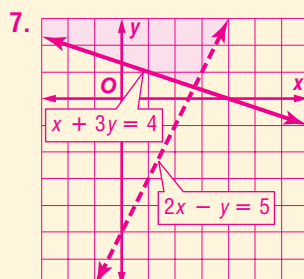
Lesson 7-5

(pages 394–398)

Solve each system of inequalities by graphing. 1–15. See margin.

- $x > 3$
- $y < 6$
- $x + y \leq -1$
 $2x + y \leq 2$
- $x + 3y \geq 4$
 $2x - y < 5$
- $4x + 3y > 4$
 $2x - y < 0$
- $y - x \geq 0$
 $y \leq 3$
 $x \geq 0$
- $y > 2$
- $y > -x + 2$
- $y \geq 2x + 2$
 $y \geq -x - 1$
- $y - x > 1$
 $y + 2x \leq 10$
- $4x + 5y \geq 20$
 $y \geq x + 1$
- $y > 2x$
 $x > -3$
 $y < 4$
- $x \leq 2$
 $y + 3 \geq 5$
- $y \leq x + 3$
 $y \geq x + 2$
- $5x - 2y > 15$
 $2x - 3y < 6$
- $-4x + 10y \leq 5$
 $-2x + 5y < -1$
- $y \leq x$
 $x + y < 4$
 $y \geq -3$

836 Extra Practice



Answers continued on page 852D.

Lesson 8-1

(pages 410–415)

Determine whether each expression is a monomial. Write *yes* or *no*. Explain your reasoning. **1–4. See margin for explanations.**

1. $n^2 - 3$ **no** 2. 53 **yes** 3. $9a^2b^3$ **yes** 4. $15 - x^2y$ **no**

Simplify.

5. $a^5(a)(a^7)$ **a^{13}** 6. $(r^3t^4)(r^4t^4)$ **r^7t^8** 7. $(x^3y^4)(xy^3)$ **x^4y^7**
 8. $(bc^3)(b^4c^3)$ **b^5c^6** 9. $(-3mn^2)(5m^3n^2)$ **$-15m^4n^4$** 10. $[(3^3)^2]^2$ **531,441**
 11. $(3s^3t^2)(-4s^3t^2)$ **$-12s^6t^4$** 12. $x^3(x^4y^3)$ **x^7y^3** 13. $(1.1g^2h^4)^3$ **$1.331g^6h^{12}$**
 14. $-\frac{3}{4}a(a^2b^3c^4)$ **$-\frac{3}{4}a^3b^3c^4$** 15. $(\frac{1}{2}w^3)^2(w^4)^2$ **$\frac{1}{4}w^{14}$** 16. $[(-2^3)^3]^2$ **262,144**
 17. $(\frac{2}{3}y^3)(3y^2)^3$ **$18y^9$** 18. $(10s^3t)(-2s^2t^2)^3$ **$-80s^9t^7$** 19. $(-0.2u^3w^4)^3$ **$-0.008u^9w^{12}$**

Lesson 8-2

(pages 417–423)

Simplify. Assume that no denominator is equal to zero.

1. $\frac{6^{10}}{6^7}$ **6^3 or 216** 2. $\frac{b^6c^5}{b^3c^2}$ **b^3c^3** 3. $\frac{(-a)^4b^8}{a^4b^7}$ **b**
 4. $\frac{(-x)^3y^3}{x^3y^6}$ **$-\frac{1}{y^3}$** 5. $\frac{12ab^5}{4a^4b^3}$ **$\frac{3b^2}{a^3}$** 6. $\frac{24x^5}{-8x^2}$ **$-3x^3$**
 7. $\frac{-9h^2k^4}{18h^5j^3k^4}$ **$-\frac{1}{2h^3j^3}$** 8. $(\frac{2a^2b^4}{3a^3b})^2$ **$\frac{4b^6}{9a^2}$** 9. $\frac{9a^2b^7c^3}{2a^3b^4c^5}$ **$\frac{9b^3}{2a^3c^2}$**
 10. $\frac{-15xy^{-5}z^7}{-10x^{-4}y^6z^{-4}}$ **$\frac{3x^5z^{11}}{2y^{11}}$** 11. 3^{-4} **$\frac{1}{81}$** 12. $(\frac{5}{6})^{-2}$ **$\frac{36}{25}$**
 13. $a^5b^0a^{-7}$ **$\frac{1}{a^2}$** 14. $\frac{(-u^{-3}v^3)^2}{(u^3v)^{-3}}$ **u^3v^9** 15. $(\frac{a^3}{b^2})^{-3}$ **$\frac{b^6}{a^9}$**
 16. $(\frac{2x}{y^{-3}})^{-2}$ **$\frac{1}{4x^2y^6}$** 17. $\frac{(-r)s^5}{r^{-3}s^{-4}}$ **$-r^4s^9$** 18. $\frac{28a^{-4}b^0}{14a^3b^{-1}}$ **$\frac{2b}{a^7}$**
 19. $\frac{(j^2k^3m)^4}{(jk^4)^{-1}}$ **$j^9k^{16}m^4$** 20. $(\frac{-2x^4y^0}{4y^2})^0$ **1** 21. $(\frac{-18x^0a^{-3}}{-6x^{-2}a^{-3}})^3$ **$3x^2$**
 22. $(\frac{2a^3b^{-2}}{2^{-1}a^{-5}b^3})^{-1}$ **$\frac{b^5}{4a^8}$** 23. $(\frac{5n^{-1}m^2}{2nm^{-2}})^0$ **1** 24. $\frac{(3ab^2c)^{-3}}{(2a^2bc^2)^2}$ **$\frac{1}{108a^7b^8c^7}$**

Lesson 8-3

(pages 425–430)

Express each number in standard notation.

1. 2.6×10^5 **260,000** 2. 4×10^{-3} **0.004** 3. 6.72×10^3 **6720**
 4. 4.93×10^{-4} **0.000493** 5. 1.654×10^{-6} **0.000001654** 6. 7.348×10^7 **73,480,000**

Express each number in scientific notation. **13. 1.21212×10^{-1}**

7. 6500 **6.5×10^3** 8. 953.56 **9.5356×10^2** 9. 0.697 **6.97×10^{-1}** 10. 843.5 **8.435×10^2**
 11. 568,000 **5.68×10^5** 12. 0.0000269 **2.69×10^{-5}** 13. 0.121212 14. 543×10^4 **5.43×10^6**
 15. 739.9×10^{-5} **7.399×10^{-3}** 16. 6480×10^{-2} **6.48×10^1** 17. 0.366×10^{-7} **3.66×10^{-8}** 18. 167×10^3 **1.67×10^5**

Evaluate. Express each result in scientific and standard notation. **19–27. See margin.**

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. $\frac{2.31 \times 10^{-2}}{3.3 \times 10^{-3}}$

Extra Practice 837

Lesson 8-1

1. It shows subtraction, not multiplication of variables.
2. It is a real number and therefore a monomial.
3. It is a product of a number and two variables.
4. It shows subtraction, not multiplication of variables.

Lesson 8-3

19. 6×10^{-3} ; 0.006
 20. 3.0×10^2 ; 300
 21. 6.0×10^8 ; 600,000,000
 22. 3.0×10^5 ; 300,000
 23. 6.0×10^2 ; 600
 24. 7.04×10^3 ; 7040
 25. 1.302×10^0 ; 1.302
 26. 7.8×10^{10} ; 78,000,000,000
 27. 7.0×10^0 ; 7

Lesson 8-4

13. $-3x + 2x^2 + 4x^3 - x^5$
14. $-1 + x - x^2 + x^3$
15. $2a - 4ax + 3ax^2$
16. $-b^3 - 2bx + 4x^2 - 5bx^3$
17. $1 + 2x^2 - x^6 + x^8$
18. $d^3 - c^2d^2x + cdx^2$
19. $-3x^3 + 5x^2 + 2x + 7$
20. $x^5 + 4x^3 - 6x - 20$
21. $b^3x^2 + \frac{2}{3}bx + 5b$
22. $3px^3 + 21p^2x + p^4$
23. $-6a^2x^3 + 3ax^2 - 8x + 7a^3$
24. $4x^4 + \frac{1}{3}s^2x^3 - \frac{2}{5}s^4x^2 + \frac{1}{4}x$

Lesson 8-5

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

Lesson 8-6

7. $-3ab^3 - 4a^2b^2 + 6a^3b$
8. $36m^4n + 4m^3n - 20m^2n^2$
9. $-16s^3t^5 + 28s^6t^2 - 12s^2t^5$
10. $-3x^3 - \frac{1}{3}x^2 + \frac{5}{3}x$
11. $-16m^3n + 6m^2n^2 - 2mn^3$
12. $-\frac{1}{4}ab^4 + \frac{1}{3}ab^3 - \frac{3}{4}ab^2$
13. $-6a^2 + 41a$
14. $72b^2 - 33b - 14$
15. $2x^2 - 6x$
16. $2n^2 + 55n - 33$
17. $-2x^2 - 3x + 9$
18. $4mn - 4m - 5n^2 - 5n$
19. $-3x$
20. $-2c^2 - 6c + 15a$
21. $-5n + 13n^2$

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. $5x^2y + 3xy - 7$
yes; trinomial | 2. 0
yes; monomial | 3. $\frac{5}{k} - k^2y$
no | 4. $3a^2x - 5a$
yes; binomial |
|---|--------------------------------|--------------------------------------|---|
- Find the degree of each polynomial.
- | | | | |
|----------------------|--|-----------------------------|--------------------------------|
| 5. $a + 5c$ 1 | 6. $14abcd - 6d^3$ 4 | 7. $\frac{a^3}{4}$ 3 | 8. 10 0 |
| 9. $-4h^5$ 5 | 10. $\frac{x^2}{3} - \frac{x}{2} + \frac{1}{5}$ 2 | 11. -6 0 | 12. $a^2b^3 - a^3b^2$ 5 |

Arrange the terms of each polynomial so that the powers of x are in ascending order. **13–18. See margin.**

- | | | |
|---------------------------------|----------------------------|-----------------------------|
| 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. **19–24. See margin.**

- | | | |
|----------------------------|-----------------------------------|---|
| 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. **5–14. See margin.**

- | | |
|---|--|
| 1. $(3a^2 + 5) + (4a^2 - 1)$ $7a^2 + 4$ | 2. $(5x - 3) + (-2x + 1)$ $3x - 2$ |
| 3. $(6z + 2) - (9z + 3)$ $-3z - 1$ | 4. $(-4n + 7) - (-7n - 8)$ $3n + 15$ |
| 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. $(6 - 7y + 3y^2) + (3 - 5y - 2y^2) + (-12 - 8y + y^2)$ $2y^2 - 20y - 3$ | |
| 16. $(-7c^2 - 2c - 5) + (9c - 6) + (16c^2 + 3) + (-9c^2 - 7c + 7)$ -1 | |

Lesson 8-6

(pages 444–449)

Find each product. **7–12. See margin.**

- | | | |
|---|---|--|
| 1. $-3(8x + 5)$ $-24x - 15$ | 2. $3b(5b + 8)$ $15b^2 + 24b$ | 3. $1.1a(2a + 7)$ $2.2a^2 + 7.7a$ |
| 4. $\frac{1}{2}x(8x - 6)$ $4x^2 - 3x$ | 5. $7xy(5x^2 - y^2)$ $35x^3y - 7xy^3$ | 6. $5y(y^2 - 3y + 6)$ $5y^3 - 15y^2 + 30y$ |
| 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. $-\frac{3}{4}ab^2(\frac{1}{3}b^2 - \frac{4}{9}b + 1)$ |

Simplify. **13–21. See margin.**

- | | | |
|--------------------------------|----------------------------------|--------------------------------|
| 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. $-6(11 - 2x) = 7(-2 - 2x)$ 2 | 23. $11(n - 3) + 5 = 2n + 44$ 8 |
| 24. $a(a - 6) + 2a = 3 + a(a - 2)$ -1.5 | 25. $q(2q + 3) + 20 = 2q(q - 3)$ $-\frac{20}{9}$ |
| 26. $w(w + 12) = w(w + 14) + 12$ -6 | 27. $x(x - 3) + 4x - 3 = 8x + x(3 + x)$ $-\frac{3}{10}$ |
| 28. $-3(x + 5) + x(x - 1) = x(x + 2) - 3$ -2 | 29. $n(n - 5) + n(n + 2) = 2n(n - 1) + 1.5$ -1.5 |

Lesson 8-7

(pages 452–457)

Find each product. 12, 15, 16, 20–22, 25–27, 30. See margin.

- $(d + 2)(d + 5)$ $d^2 + 7d + 10$
- $(z + 7)(z - 4)$ $z^2 + 3z - 28$
- $(m - 8)(m - 5)$ $m^2 - 13m + 40$
- $(a + 2)(a - 19)$ $a^2 - 17a - 38$
- $(c + 15)(c - 3)$ $c^2 + 12c - 45$
- $(x + y)(x - 2y)$ $x^2 - xy - 2y^2$
- $(2x - 5)(x + 6)$ $2x^2 + 7x - 30$
- $(7a - 4)(2a - 5)$ $14a^2 - 43a + 20$
- $(4x + y)(2x - 3y)$ $8x^2 - 10xy - 3y^2$
- $(7v + 3)(v + 4)$ $7v^2 + 31v + 12$
- $(7s - 8)(3s - 2)$ $21s^2 - 38s + 16$
- $(4g + 3h)(2g - 5h)$
- $(4a + 3)(2a - 1)$ $8a^2 + 2a - 3$
- $(7y - 1)(2y - 3)$ $14y^2 - 23y + 3$
- $(2x + 3y)(4x + 2y)$
- $(12r - 4s)(5r + 8s)$
- $(-a + 1)(-3a - 2)$ $3a^2 - a - 2$
- $(2n - 4)(-3n - 2)$ $-6n^2 + 8n + 8$
- $(x - 2)(x^2 + 2x + 4)$ $x^3 - 8$
- $(3x + 5)(2x^2 - 5x + 11)$
- $(4s + 5)(3s^2 + 8s - 9)$
- $(3a + 5)(-8a^2 + 2a + 3)$
- $(a - b)(a^2 + ab + b^2)$ $a^3 - b^3$
- $(c + d)(c^2 - cd + d^2)$ $c^3 + d^3$
- $(5x - 2)(-5x^2 + 2x + 7)$
- $(-n + 2)(-2n^2 + n - 1)$
- $(x^2 - 7x + 4)(2x^2 - 3x - 6)$
- $(x^2 + x + 1)(x^2 - x - 1)$
- $(a^2 + 2a + 5)(a^2 - 3a - 7)$
- $(5x^4 - 2x^2 + 1)(x^2 - 5x + 3)$

Lesson 8-8

(pages 458–463)

Find each product. 4. $100x^2 - 121y^2$ 17. $25a^2 - 120ab + 144b^2$ 27–30. See margin.

- $(t + 7)^2$ $t^2 + 14t + 49$
- $(w - 12)(w + 12)$ $w^2 - 144$
- $(q - 4h)^2$ $q^2 - 8qh + 16h^2$
- $(10x + 11y)(10x - 11y)$
- $(4e + 3)^2$ $16e^2 + 24e + 9$
- $(2b - 4d)(2b + 4d)$ $4b^2 - 16d^2$
- $(a + 2b)^2$ $a^2 + 4ab + 4b^2$
- $(3x + y)^2$ $9x^2 + 6xy + y^2$
- $(6m + 2n)^2$ $36m^2 + 24mn + 4n^2$
- $(3m - 7d)^2$ $9m^2 - 42md + 49d^2$
- $(5b - 6)(5b + 6)$ $25b^2 - 36$
- $(1 + x)^2$ $1 + 2x + x^2$
- $(5x - 9y)^2$ $25x^2 - 90xy + 81y^2$
- $(8a - 2b)(8a + 2b)$ $64a^2 - 4b^2$
- $(\frac{1}{4}x + 4)^2$ $\frac{1}{16}x^2 + 2x + 16$
- $(c - 3d)^2$ $c^2 - 6cd + 9d^2$
- $(5a - 12b)^2$
- $(\frac{1}{2}x + y)^2$ $\frac{1}{4}x^2 + xy + y^2$
- $(n^2 + 1)^2$ $n^4 + 2n^2 + 1$
- $(k^2 - 3j)^2$ $k^4 - 6k^2j + 9j^2$
- $(a^2 - 5)(a^2 + 5)$ $a^4 - 25$
- $(2x^3 - 7)(2x^3 + 7)$ $4x^6 - 49$
- $(3x^3 - 9y)(3x^3 + 9y)$ $9x^6 - 81y^2$
- $(7a^2 - b)(7a^2 + b)$ $49a^4 - b^2$
- $(\frac{1}{2}x - 10)(\frac{1}{2}x + 10)$ $\frac{1}{4}x^2 - 100$
- $(\frac{1}{3}n - m)(\frac{1}{3}n + m)$ $\frac{1}{9}n^2 - m^2$
- $(a - 1)(a - 1)(a - 1)$
- $(x + 2)(x - 2)(2x + 5)$
- $(4x - 1)(4x + 1)(x - 4)$
- $(x - 5)(x + 5)(x + 4)(x - 4)$
- $(a + 1)(a + 1)(a - 1)(a - 1)$ $a^4 - 2a^2 + 1$
- $(n - 1)(n + 1)(n - 1)$ $n^3 - n^2 - n + 1$
- $(2c + 3)(2c + 3)(2c - 3)(2c - 3)$ $16c^4 - 72c^2 + 81$
- $(4d + 5e)(4d + 5e)(4d - 5e)(4d - 5e)$ $256d^4 - 800e^2d^2 + 625e^4$

Lesson 9-1

(pages 474–479)

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

- 23 **1, 23; prime**
- 21 **1, 3, 7, 21; composite**
- 81 **1, 3, 9, 27, 81; composite**
- 24 **1, 2, 3, 4, 6, 8, 12, 24; composite**
- 18 **1, 2, 3, 6, 9, 18; composite**
- 22 **1, 2, 11, 22; composite**

Find the prime factorization of each integer.

- 42 **$2 \cdot 3 \cdot 7$**
- 267 **$3 \cdot 89$**
- 72 **$-1 \cdot 2^3 \cdot 3^2$**
- 164 **$2^2 \cdot 41$**
- 57 **$-1 \cdot 3 \cdot 19$**
- 60 **$-1 \cdot 2^2 \cdot 3 \cdot 5$**

Factor each monomial completely. 13–18. See margin.

- $240mn$
- $-64a^3b$
- $-26xy^2$
- $-231xy^2z$
- $44rs^2t^3$
- $-756m^2n^2$

Find the GCF of each set of monomials.

- 16, 60 **4**
- 15, 50 **5**
- 45, 80 **5**
- 29, 58 **29**
- 55, 305 **5**
- 126, 252 **126**
- 128, 245 **1**
- $7y^2, 14y^2$ **$7y^2$**
- $4xy, -6x$ **$2x$**
- $35t^2, 7t$ **$7t$**
- $16pq^2, 12p^2q, 4pq$ **$4pq$**
- 5, 15, 10 **5**
- $12mn, 10mn, 15mn$ **mn**
- $14xy, 12y, 20x$ **2**
- $26jk^4, 16jk^3, 8j^2$ **$2j$**

Extra Practice 839

Lesson 8-7

- $8g^2 - 14gh - 15h^2$
- $8x^2 + 16xy + 6y^2$
- $60r^2 + 76rs - 32s^2$
- $6x^3 - 5x^2 + 8x + 55$
- $12s^3 + 47s^2 + 4s - 45$
- $-24a^3 - 34a^2 + 19a + 15$
- $-25x^3 + 20x^2 + 31x - 14$
- $2n^3 - 5n^2 + 3n - 2$
- $2x^4 - 17x^3 + 23x^2 + 30x - 24$
- $5x^6 - 25x^5 + 13x^4 + 10x^3 - 5x^2 - 5x + 3$

Lesson 8-8

- $a^3 - 3a^2 + 3a - 1$
- $2x^3 + 5x^2 - 8x - 20$
- $16x^3 - 64x^2 - x + 4$
- $x^4 - 41x^2 + 400$

Lesson 9-1

- $2 \cdot 2 \cdot 2 \cdot 2 \cdot 3 \cdot 5 \cdot m \cdot n$
- $-1 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot a \cdot a \cdot a \cdot b$
- $-1 \cdot 2 \cdot 13 \cdot x \cdot y \cdot y$
- $-1 \cdot 3 \cdot 7 \cdot 11 \cdot x \cdot y \cdot y \cdot z$
- $2 \cdot 2 \cdot 11 \cdot r \cdot s \cdot s \cdot t \cdot t \cdot t$
- $-1 \cdot 2 \cdot 2 \cdot 3 \cdot 3 \cdot 3 \cdot 7 \cdot m \cdot m \cdot n \cdot n$

Extra Practice

Extra Practice

Lesson 9-2

8. $2mn(m^2n - 8n + 4)$
9. $(2x + b)(a + 3c)$
10. $(2m + r)(3x - 2)$
11. $(3x - 4)(a - 2b)$
12. $(a + 1)(a - 2b)$
13. $(2a + b)(4c - d)$
14. $2(e^2 + f)(g + 2h)$
15. $(x - y)(x - y)$

Lesson 9-2

(pages 481–486)

Factor each polynomial. 8–15. See margin.

1. $10a^2 + 40a$ **$10a(a + 4)$**
2. $15wx - 35wx^2$ **$5wx(3 - 7x)$**
3. $27a^2b + 9b^3$ **$9b(3a^2 + b^2)$**
4. $11x + 44x^2y$ **$11x(1 + 4xy)$**
5. $16y^2 + 8y$ **$8y(2y + 1)$**
6. $14mn^2 + 2mn$ **$2mn(7n + 1)$**
7. $25a^2b^2 + 30ab^3$ **$5ab^2(5a + 6b)$**
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. $a(a - 9) = 0$ **$\{0, 9\}$**
17. $d(d + 11) = 0$ **$\{-11, 0\}$**
18. $z(z - 2.5) = 0$ **$\{0, 2.5\}$**
19. $(2y + 6)(y - 1) = 0$ **$\{-3, 1\}$**
20. $(4n - 7)(3n + 2) = 0$ **$\{-\frac{2}{3}, \frac{7}{4}\}$**
21. $(a - 1)(a + 1) = 0$ **$\{-1, 1\}$**
22. $10x^2 - 20x = 0$ **$\{0, 2\}$**
23. $8b^2 - 12b = 0$ **$\{0, 1.5\}$**
24. $14d^2 + 49d = 0$ **$\{0, -3.5\}$**
25. $15a^2 = 60a$ **$\{0, 4\}$**
26. $33x^2 = -22x$ **$\{-\frac{2}{3}, 0\}$**
27. $32x^2 = 16x$ **$\{0, \frac{1}{2}\}$**

Lesson 9-3

(pages 489–494)

Factor each trinomial.

1. $x^2 - 9x + 14$ **$(x - 7)(x - 2)$**
2. $a^2 - 9a - 36$ **$(a - 12)(a + 3)$**
3. $x^2 + 2x - 15$ **$(x + 5)(x - 3)$**
4. $n^2 - 8n + 15$ **$(n - 5)(n - 3)$**
5. $b^2 + 22b + 21$ **$(b + 21)(b + 1)$**
6. $c^2 + 2c - 3$ **$(c + 3)(c - 1)$**
7. $x^2 - 5x - 24$ **$(x - 8)(x + 3)$**
8. $n^2 - 8n + 7$ **$(n - 7)(n - 1)$**
9. $m^2 - 10m - 39$ **$(m - 13)(m + 3)$**
10. $z^2 + 15z + 36$ **$(z + 12)(z + 3)$**
11. $s^2 - 13st - 30t^2$ **$(s - 15t)(s + 2t)$**
12. $y^2 + 2y - 35$ **$(y + 7)(y - 5)$**
13. $r^2 + 3r - 40$ **$(r + 8)(r - 5)$**
14. $x^2 + 5x - 6$ **$(x + 6)(x - 1)$**
15. $x^2 - 4xy - 5y^2$ **$(x - 5y)(x + y)$**
16. $r^2 + 16r + 63$ **$(r + 9)(r + 7)$**
17. $v^2 + 24v - 52$ **$(v + 26)(v - 2)$**
18. $k^2 - 27kj - 90j^2$ **$(k - 30j)(k + 3j)$**

Solve each equation. Check your solutions.

19. $a^2 + 3a - 4 = 0$ **$\{-4, 1\}$**
20. $x^2 - 8x - 20 = 0$ **$\{-2, 10\}$**
21. $b^2 + 11b + 24 = 0$ **$\{-8, -3\}$**
22. $y^2 + y - 42 = 0$ **$\{-7, 6\}$**
23. $k^2 + 2k - 24 = 0$ **$\{-6, 4\}$**
24. $r^2 - 13r - 48 = 0$ **$\{-3, 16\}$**
25. $n^2 - 9n = -18$ **$\{3, 6\}$**
26. $2z + z^2 = 35$ **$\{-7, 5\}$**
27. $-20x + 19 = -x^2$ **$\{1, 19\}$**
28. $10 + a^2 = -7a$ **$\{-5, -2\}$**
29. $z^2 - 57 = 16z$ **$\{-3, 19\}$**
30. $x^2 = -14x - 33$ **$\{-11, -3\}$**
31. $22x - x^2 = 96$ **$\{6, 16\}$**
32. $-144 = q^2 - 26q$ **$\{8, 18\}$**
33. $x^2 + 84 = 20x$ **$\{6, 14\}$**

Lesson 9-4

(pages 495–500)

Factor each trinomial, if possible. If the trinomial cannot be factored using integers, write *prime*. 10. $(2m - 3)(4m + 1)$ 17. $(3c + d)(4c - 5d)$ 18. $(5n - m)(6n + m)$

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

- Solve each equation. Check your solutions. 24. $\{-\frac{1}{6}, \frac{3}{2}\}$ 28. $\{-2, \frac{3}{2}\}$ 29. $\{-2, \frac{5}{13}\}$ 30. $\{-\frac{2}{7}, 2\}$
19. $8t^2 + 32t + 24 = 0$ **$\{-3, -1\}$**
 20. $6y^2 + 72y + 192 = 0$ **$\{-8, -4\}$**
 21. $5x^2 + 3x - 2 = 0$ **$\{-1, \frac{2}{5}\}$**
 22. $9x^2 + 18x - 27 = 0$ **$\{-3, 1\}$**
 23. $4x^2 - 4x - 4 = 4$ **$\{-1, 2\}$**
 24. $12n^2 - 16n - 3 = 0$
 25. $12x^2 - x - 35 = 0$ **$\{-\frac{5}{3}, \frac{7}{4}\}$**
 26. $18x^2 + 36x - 14 = 0$ **$\{-\frac{7}{3}, \frac{1}{3}\}$**
 27. $15a^2 + a - 2 = 0$ **$\{-\frac{2}{5}, \frac{1}{3}\}$**
 28. $14b^2 + 7b - 42 = 0$
 29. $13r^2 + 21r - 10 = 0$
 30. $35y^2 - 60y - 20 = 0$
 31. $16x^2 - 4x - 6 = 0$ **$\{-\frac{1}{2}, \frac{3}{4}\}$**
 32. $28d^2 + 5d - 3 = 0$ **$\{-\frac{3}{7}, \frac{1}{4}\}$**
 33. $30x^2 - 9x - 3 = 0$ **$\{-\frac{1}{5}, \frac{1}{2}\}$**

Lesson 9-5

(pages 501–506)

Factor each polynomial, if possible. If the polynomial cannot be factored, write prime. 13. $(3x - 10y)(3x + 10y)$

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

Solve each equation by factoring. Check your solutions.

19. $4x^2 = 16$ $\{\pm 2\}$
20. $2x^2 = 50$ $\{\pm 5\}$
21. $9n^2 - 4 = 0$ $\{\pm \frac{2}{3}\}$
22. $a^2 - \frac{25}{36} = 0$ $\{\pm \frac{5}{6}\}$
23. $\frac{16}{9} - b^2 = 0$ $\{\pm \frac{4}{3}\}$
24. $18 - \frac{1}{2}x^2 = 0$ $\{\pm 6\}$
25. $20 - 5g^2 = 0$ $\{\pm 2\}$
26. $16 - \frac{1}{4}p^2 = 0$ $\{\pm 8\}$
27. $\frac{1}{4}c^2 - \frac{4}{9} = 0$ $\{\pm \frac{4}{3}\}$
28. $3z^2 - 48 = 0$ $\{\pm 4\}$
29. $72 - 2z^2 = 0$ $\{\pm 6\}$
30. $25a^2 = 1$ $\{\pm \frac{1}{5}\}$
31. $2q^3 - 2q = 0$ $\{-1, 0, 1\}$
32. $3r^3 = 48r$ $\{-4, 0, 4\}$
33. $100d - 4d^3 = 0$ $\{-5, 0, 5\}$

Lesson 9-6

(pages 508–514)

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

1. $x^2 + 12x + 36$ yes; $(x + 6)^2$
2. $n^2 - 13n + 36$ no
3. $a^2 + 4a + 4$ yes; $(a + 2)^2$
4. $x^2 - 10x - 100$ no
5. $2n^2 + 17n + 21$ no
6. $4a^2 - 20a + 25$ yes; $(2a - 5)^2$

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

7. $3x^2 - 75$ $3(x - 5)(x + 5)$
8. $n^2 - 8n + 16$ $(n - 4)^2$
9. $4p^2 + 12pr + 9r^2$ $(2p + 3r)^2$
10. $6a^2 + 72$ $6(a^2 + 12)$
11. $s^2 + 30s + 225$ $(s + 15)^2$
12. $24x^2 + 24x + 9$ $3(8x^2 + 8x + 3)$
13. $1 - 10z + 25z^2$ $(1 - 5z)^2$
14. $28 - 63b^2$ $7(2 - 3b)(2 + 3b)$
15. $4c^2 + 2c - 7$ prime

Solve each equation. Check your solutions.

16. $x^2 + 22x + 121 = 0$ $\{-11\}$
17. $343d^2 = 7$ $\{\pm \frac{1}{7}\}$
18. $(a - 7)^2 = 5$ $7 \pm \sqrt{5}$
19. $c^2 + 10c + 36 = 11$ $\{-5\}$
20. $16s^2 + 81 = 72s$ $\{\frac{9}{4}\}$
21. $9p^2 - 42p + 20 = -29$ $\{\frac{7}{3}\}$

Lesson 10-1

(pages 524–530)

Use a table of values to graph each function. 1–6. See margin.

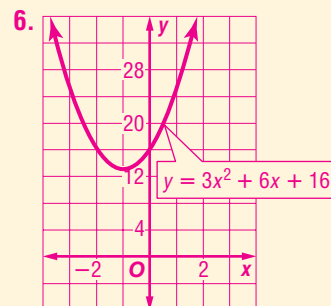
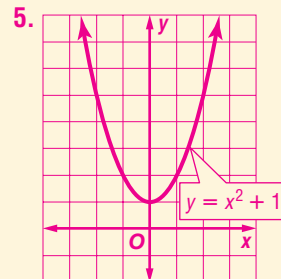
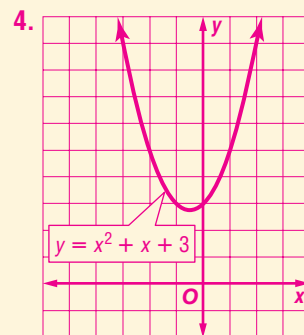
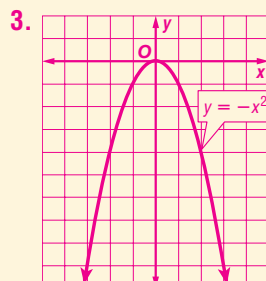
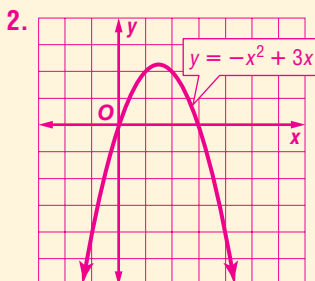
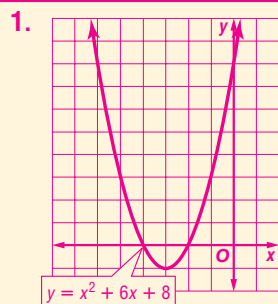
1. $y = x^2 + 6x + 8$
2. $y = -x^2 + 3x$
3. $y = -x^2$
4. $y = x^2 + x + 3$
5. $y = x^2 + 1$
6. $y = 3x^2 + 6x + 16$

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. 7–24. See margin.

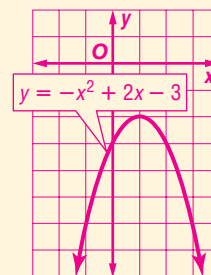
7. $y = -x^2 + 2x - 3$
8. $y = 3x^2 + 24x + 80$
9. $y = x^2 - 4x - 4$
10. $y = 5x^2 - 20x + 37$
11. $y = 3x^2 + 6x + 3$
12. $y = 2x^2 + 12x$
13. $y = x^2 - 6x + 9$
14. $y = x^2 + 6x + 9$
15. $y = -x^2 + 16x - 15$
16. $y = 4x^2 - 1$
17. $y = -2x^2 - 2x + 4$
18. $y = 6x^2 - 12x - 4$
19. $y = -x^2 - 1$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

Extra Practice 841

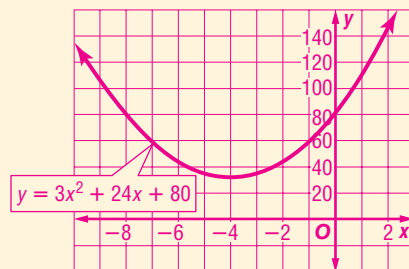
Lesson 10-1



7. $x = 1$; $(1, -2)$; maximum



8. $x = -4$; $(-4, 32)$; minimum

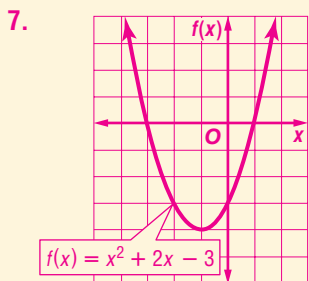
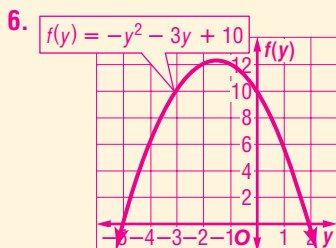
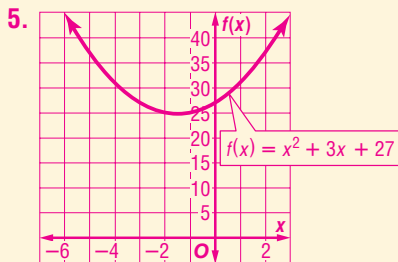
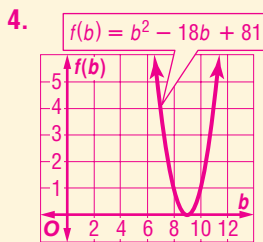
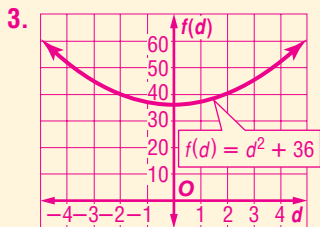
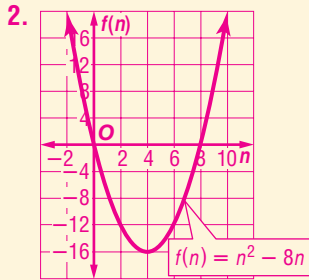
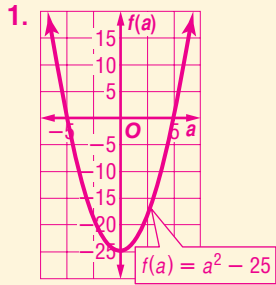


Answers continued on page 852D.

Extra Practice

Extra Practice

Lesson 10-2



Lesson 10-2

(pages 533–538)

Solve each equation by graphing. **1–6. See margin for graphs.**

1. $a^2 - 25 = 0$ **-5, 5**
2. $n^2 - 8n = 0$ **0, 8**
3. $d^2 + 36 = 0$ **∅**
4. $b^2 - 18b + 81 = 0$ **9**
5. $x^2 + 3x + 27 = 0$ **∅**
6. $-y^2 - 3y + 10 = 0$ **-5, 2**

Solve each equation by graphing. If integral roots cannot be found, estimate the roots by stating the consecutive integers between which the roots lie. **7–24. See margin for graphs.**

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

Lesson 10-3

(pages 539–544)

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

1. $x^2 - 4x + 4 = 9$ **-1, 5**
2. $t^2 - 6t + 9 = 16$ **-1, 7**
3. $b^2 + 10b + 25 = 11$ **-8.3, -1.7**
4. $a^2 - 22a + 121 = 3$ **9.3, 12.7**
5. $x^2 + 2x + 1 = 81$ **-10, 8**
6. $t^2 - 36t + 324 = 85$ **8.8, 27.2**

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

7. $a^2 + 20a + c$ **100**
8. $x^2 + 10x + c$ **25**
9. $t^2 + 12t + c$ **36**
10. $y^2 - 9y + c$ **$\frac{81}{4}$**
11. $p^2 - 14p + c$ **49**
12. $b^2 + 13b + c$ **$\frac{169}{4}$**

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

13. $a^2 - 8a - 84 = 0$ **-6, 14**
14. $c^2 + 6 = -5c$ **-3, -2**
15. $p^2 - 8p + 5 = 0$ **0.7, 7.3**
16. $2y^2 + 7y - 4 = 0$ **$-4, \frac{1}{2}$**
17. $t^2 + 3t = 40$ **5, -8**
18. $x^2 + 8x - 9 = 0$ **-9, 1**
19. $y^2 + 5y - 84 = 0$ **-12, 7**
20. $t^2 + 12t + 32 = 0$ **-4, -8**
21. $2x - 3x^2 = -8$ **2, $-\frac{4}{3}$**
22. $2y^2 - y - 9 = 0$ **-1.9, 2.4**
23. $2z^2 - 5z - 4 = 0$ **-0.6, 3.1**
24. $8t^2 - 12t - 1 = 0$ **-0.1, 1.6**

Lesson 10-4

(pages 546–552)

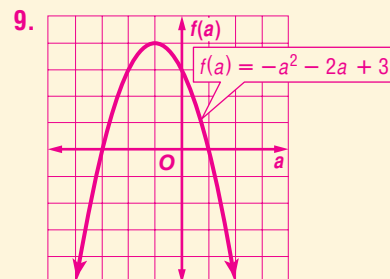
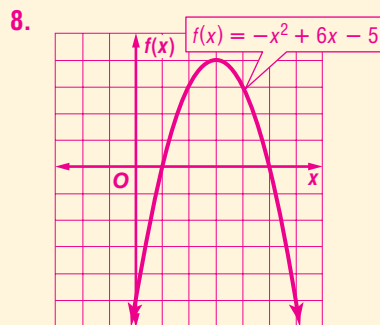
Solve each equation by using the Quadratic Formula. Round to the nearest tenth, if necessary.

1. $x^2 - 8x - 4 = 0$ **-0.5, 8.5**
2. $x^2 + 7x - 8 = 0$ **-8, 1**
3. $x^2 - 5x + 6 = 0$ **2, 3**
4. $y^2 - 7y - 8 = 0$ **-1, 8**
5. $m^2 - 2m = 35$ **-5, 7**
6. $4n^2 - 20n = 0$ **0, 5**
7. $m^2 + 4m + 2 = 0$ **-0.6, -3.4**
8. $2t^2 - t - 15 = 0$ **-2.5, 3**
9. $5t^2 = 125$ **-5, 5**
10. $t^2 + 16 = 0$ **∅**
11. $-4x^2 + 8x = -3$ **-0.3, 2.3**
12. $3k^2 + 2 = -8k$ **-2.4, -0.3**
13. $8t^2 + 10t + 3 = 0$ **$-\frac{3}{4}, -\frac{1}{2}$**
14. $3x^2 - \frac{5}{4}x - \frac{1}{2} = 0$ **$\frac{2}{3}, -\frac{1}{4}$**
15. $-5b^2 + 3b - 1 = 0$ **∅**
16. $s^2 + 8s + 7 = 0$ **-7, -1**
17. $d^2 - 14d + 24 = 0$ **2, 12**
18. $3k^2 + 11k = 4$ **-4, $\frac{1}{3}$**
19. $n^2 - 3n + 1 = 0$ **2.6, 0.4**
20. $2z^2 + 5z - 1 = 0$ **0.2, -2.7**
21. $3h^2 = 27$ **3, -3**

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

22. $3f^2 + 2f = 6$ **76; 2 real roots**
23. $2x^2 = 0.7x + 0.3$ **2.89; 2 real roots**
24. $3w^2 - 2w + 8 = 0$ **-92; no real roots**
25. $4r^2 - 12r + 9 = 0$ **0; 1 real root**
26. $x^2 - 5x = -9$ **-11; no real roots**
27. $25t^2 + 30t = -9$ **0; 1 real root**

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Answers continued on page 852E.

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. **1–3. See margin for graphs.**

1. $y = 7^x$; $7^{1.5}$ **1; 18.5** 2. $\left(\frac{1}{3}\right)^x$; $\left(\frac{1}{3}\right)^{5.6}$ **1; 0.002** 3. $y = \left(\frac{3}{5}\right)^x$; $\left(\frac{3}{5}\right)^{-4.2}$ **1; 8.5**

Graph each function. State the y -intercept. **4–15. See margin for graphs.**

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

Determine whether the data in each table display exponential behavior. Explain why or why not. **16–17. See margin.**

16.

x	-1	0	1	2
y	-5	-1	3	7

17.

x	1	2	3	4
y	25	125	625	3125

1a. $M = 8500\left(1 + \frac{0.0725}{12}\right)^{12(4)}$ (pages 561–565)

Lesson 10-6

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. **\$11,349.73**
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. $V = 21,500(1 - 0.08)^5$
 b. Find the value of the car in 5 years. **\$14,170.25**
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. $P = 3422(1 + 0.049)^8$
 b. Find the population of Belgrade in 1998. **5017**

Lesson 10-7

(pages 567–572)

Determine whether each sequence is geometric.

1. 12, 23, 34, 45, ... **no** 2. 6, 7.2, 8.64, 10.368, ... **yes** 3. 39, 33, 27, 21, ... **no**
 4. 86, 68.8, 55.04, 44.032, ... **yes** 5. 4, 8, 16, 32, ... **yes** 6. 13, 10, 11, 8, 9, 6, ... **no**

Find the next three terms in each geometric sequence. **7–12. See margin.**

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. $\frac{1}{4}, \frac{1}{10}, \frac{1}{25}, \frac{2}{125}, \dots$

Find the n th term of each geometric sequence. **13–21. See margin.**

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.

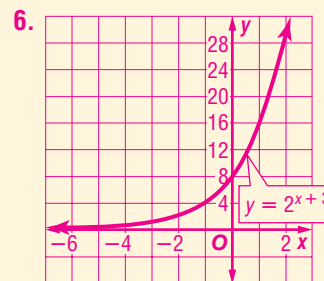
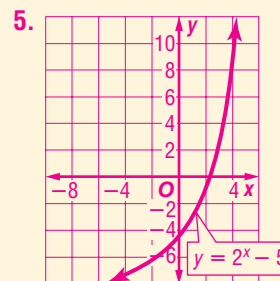
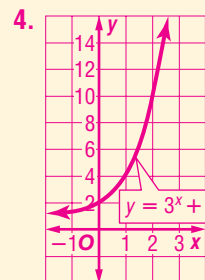
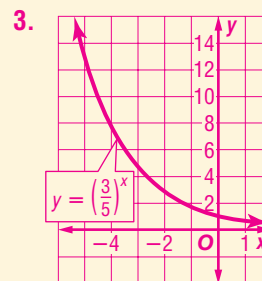
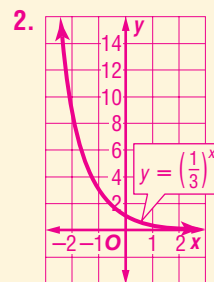
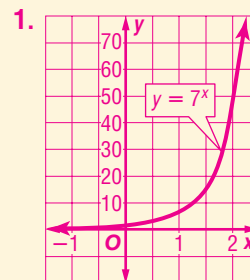
22. 1, ____, 81 **± 9** 23. -81, ____, -9 **± 27** 24. 504, ____, 14 **± 84**
 25. 0.5, ____, 162 **± 9** 26. -1, ____, -4 **± 2** 27. 0.25, ____, 0.36 **± 0.3**
 28. $\frac{1}{2}, \frac{1}{8}, \frac{1}{4}$ **$\pm \frac{1}{4}$** 29. $-\frac{2}{3}, \frac{32}{27}, -\frac{32}{27}$ **$\pm \frac{8}{9}$** 30. 6.25, ____, 2.25 **± 3.75**

Extra Practice 843

Lesson 10-7

7. 5, 1, 0.2 12. $\frac{4}{625}, \frac{8}{3125}, \frac{16}{15,625}$ 17. -3796.875
 8. 1215, -3645, 10,935 13. 10,077,696 18. 262,144
 9. 3, 1, $\frac{1}{3}$ 14. -4096 19. 50,000,000
 10. 0.9375, -0.46875, 0.234375 15. -0.384 20. -1953.125
 11. -3.24, -1.944, -1.1664 16. 0.0000001 21. -255.15

Lesson 10-5



Answers continued on page 852F.

Lesson 11-1

(pages 587–593)

Simplify.

1. $\sqrt{50}$ **$5\sqrt{2}$**
2. $\sqrt{200}$ **$10\sqrt{2}$**
3. $\sqrt{162}$ **$9\sqrt{2}$**
4. $\sqrt{700}$ **$10\sqrt{7}$**
5. $\frac{\sqrt{3}}{\sqrt{5}}$ **$\frac{\sqrt{15}}{5}$**
6. $\frac{\sqrt{72}}{\sqrt{6}}$ **$2\sqrt{3}$**
7. $\sqrt{\frac{8}{7}}$ **$\frac{2\sqrt{14}}{7}$**
8. $\sqrt{\frac{7}{32}}$ **$\frac{\sqrt{14}}{8}$**
9. $\sqrt{\frac{5}{8}} \cdot \sqrt{\frac{2}{6}}$ **$\frac{\sqrt{30}}{12}$**
10. $\sqrt{\frac{2}{3}} \cdot \sqrt{\frac{3}{2}}$ **1**
11. $\sqrt{\frac{2x}{30}}$ **$\frac{\sqrt{15x}}{15}$**
12. $\sqrt{\frac{50}{z^2}}$ **$\frac{5\sqrt{2}}{|z|}$**
13. $\sqrt{10} \cdot \sqrt{20}$ **$10\sqrt{2}$**
14. $\sqrt{7} \cdot \sqrt{3}$ **$\sqrt{21}$**
15. $6\sqrt{2} \cdot \sqrt{3}$ **$6\sqrt{6}$**
16. $5\sqrt{6} \cdot 2\sqrt{3}$ **$30\sqrt{2}$**
17. $\sqrt{4x^4y^3}$ **$2x^2|y|\sqrt{y}$**
18. $\sqrt{200m^2y^3}$ **$10|my|\sqrt{2y}$**
19. $\sqrt{12ts^3}$ **$2|s|\sqrt{3st}$**
20. $\sqrt{175a^4b^6}$ **$5a^2|b^3|\sqrt{7}$**
21. $\sqrt{\frac{54}{g^2}}$ **$\frac{3\sqrt{6}}{|g|}$**
22. $\sqrt{99x^3y^7}$ **$3|xy^3|\sqrt{11xy}$**
23. $\sqrt{\frac{32c^5}{9d^2}}$ **$\frac{4c^2\sqrt{2c}}{3|d|}$**
24. $\sqrt{\frac{27p^4}{3p^2}}$ **$3|p|$**
25. $\frac{1}{3+\sqrt{5}}$ **$\frac{3-\sqrt{5}}{4}$**
26. $\frac{2}{\sqrt{3}-5}$ **$\frac{\sqrt{3}+5}{-11}$**
27. $\frac{\sqrt{3}}{\sqrt{3}-5}$ **$\frac{3+5\sqrt{3}}{-22}$**
28. $\frac{\sqrt{6}}{7-2\sqrt{3}}$ **$\frac{7\sqrt{6}+6\sqrt{2}}{37}$**

Lesson 11-2

(pages 594–598)

Simplify each expression.

1. $3\sqrt{11} + 6\sqrt{11} - 2\sqrt{11}$ **$7\sqrt{11}$**
2. $6\sqrt{13} + 7\sqrt{13}$ **$13\sqrt{13}$**
3. $2\sqrt{12} + 5\sqrt{3}$ **$9\sqrt{3}$**
4. $9\sqrt{7} - 4\sqrt{2} + 3\sqrt{2} + 5\sqrt{7}$
5. $3\sqrt{5} - 5\sqrt{3}$ **in simplest form**
6. $4\sqrt{8} - 3\sqrt{5}$ **$8\sqrt{2} - 3\sqrt{5}$**
7. $2\sqrt{27} - 4\sqrt{12}$ **$-2\sqrt{3}$**
8. $8\sqrt{32} + 4\sqrt{50}$ **$52\sqrt{2}$**
9. $\sqrt{45} + 6\sqrt{20}$ **$15\sqrt{5}$**
10. $2\sqrt{63} - 6\sqrt{28} + 8\sqrt{45}$
11. $14\sqrt{3t} + 8\sqrt{3t}$ **$22\sqrt{3t}$**
12. $7\sqrt{6x} - 12\sqrt{6x}$ **$-5\sqrt{6x}$**
13. $5\sqrt{7} - 3\sqrt{28}$ **$-\sqrt{7}$**
14. $7\sqrt{8} - \sqrt{18}$ **$11\sqrt{2}$**
15. $7\sqrt{98} + 5\sqrt{32} - 2\sqrt{75}$
16. $4\sqrt{6} + 3\sqrt{2} - 2\sqrt{5}$
17. $-3\sqrt{20} + 2\sqrt{45} - \sqrt{7}$ **$-\sqrt{7}$**
18. $4\sqrt{75} + 6\sqrt{27}$ **$38\sqrt{3}$**
19. $10\sqrt{\frac{1}{5}} - \sqrt{45} - 12\sqrt{\frac{5}{9}}$ **$-5\sqrt{5}$**
20. $\sqrt{15} - \sqrt{\frac{3}{5}}$ **$\frac{4\sqrt{15}}{5}$**
21. $3\sqrt{\frac{1}{3}} - 9\sqrt{\frac{1}{12}} + \sqrt{243}$ **$\frac{17\sqrt{3}}{2}$**

16. in simplest form

Find each product.

27. $4\sqrt{21} - 12\sqrt{35} + \sqrt{6} - 3\sqrt{10}$
28. $\sqrt{3}(\sqrt{5} + 2)$ **$\sqrt{15} + 2\sqrt{3}$**
29. $\sqrt{2}(\sqrt{2} + 3\sqrt{5})$ **$2 + 3\sqrt{10}$**
30. $(\sqrt{2} + 5)^2$ **$27 + 10\sqrt{2}$**
31. $(3 - \sqrt{7})(3 + \sqrt{7})$ **2**
32. $(\sqrt{2} + \sqrt{3})(\sqrt{3} + \sqrt{2})$ **$2\sqrt{6} + 5$**
33. $(4\sqrt{7} + \sqrt{2})(\sqrt{3} - 3\sqrt{5})$

Lesson 11-3

(pages 599–604)

Solve each equation. Check your solution.

1. $\sqrt{5x} = 5$ **5**
2. $4\sqrt{7} = \sqrt{-m}$ **-112**
3. $\sqrt{t} - 5 = 0$ **25**
4. $\sqrt{3b} + 2 = 0$ **no solution**
5. $\sqrt{x-3} = 6$ **39**
6. $5 - \sqrt{3x} = 1$ **$\frac{16}{3}$**
7. $2 + 3\sqrt{y} = 13$ **$\frac{121}{9}$**
8. $\sqrt{3g} = 6$ **12**
9. $\sqrt{a-2} = 0$ **4**
10. $\sqrt{2j} - 4 = 8$ **72**
11. $5 + \sqrt{x} = 9$ **16**
12. $\sqrt{5y} + 4 = 7$ **9**
13. $7 + \sqrt{5c} = 9$ **$\frac{4}{5}$**
14. $2\sqrt{5t} = 10$ **5**
15. $\sqrt{44} = 2\sqrt{p}$ **11**
16. $4\sqrt{x-5} = 15$ **$\frac{305}{16}$**
17. $4 - \sqrt{x-3} = 9$ **no solution**
18. $\sqrt{10x^2-5} = 3x$ **$\sqrt{5}$**
19. $\sqrt{2a^2-144} = a$ **12**
20. $\sqrt{3y+1} = y-3$ **8**
21. $\sqrt{2x^2-12} = x$ **$2\sqrt{3}$**
22. $\sqrt{b^2+16} + 2b = 5b$ **$\sqrt{2}$**
23. $\sqrt{m+2} + m = 4$ **2**
24. $\sqrt{3-2c} + 3 = 2c$ **$\frac{3}{2}$**

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. $b = 20, c = 29, a = ?$ **21**
2. $a = 7, b = 24, c = ?$ **25**
3. $a = 2, b = 6, c = ?$ **6.32**
4. $b = 10, c = \sqrt{200}, a = ?$ **10**
5. $a = 3, c = 3\sqrt{2}, b = ?$ **3**
6. $a = 6, c = 14, b = ?$ **12.65**
7. $a = \sqrt{11}, c = \sqrt{47}, b = ?$ **6**
8. $a = \sqrt{13}, b = 6, c = ?$ **7**
9. $a = \sqrt{6}, b = 3, c = ?$ **3.87**
10. $b = \sqrt{75}, c = 10, a = ?$ **5**
11. $b = 9, c = \sqrt{130}, a = ?$ **7**
12. $a = 9, c = 15, b = ?$ **12**
13. $b = 5, c = 11, a = ?$ **9.80**
14. $a = \sqrt{33}, b = 4, c = ?$ **7**
15. $a = 5, c = \sqrt{34}, b = ?$ **3**

Determine whether the following side measures form right triangles.

16. 14, 48, 50 **yes**
17. 20, 30, 40 **no**
18. 21, 72, 75 **yes**
19. 5, 12, $\sqrt{119}$ **yes**
20. 15, 39, 36 **yes**
21. $\sqrt{5}$, 12, 13 **no**
22. 10, 12, $\sqrt{22}$ **no**
23. 2, 3, 4 **no**
24. $\sqrt{7}$, 8, $\sqrt{71}$ **yes**

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. $(4, 2), (-2, 10)$ **10**
2. $(-5, 1), (7, 6)$ **13**
3. $(4, -2), (1, 2)$ **5**
4. $(-2, 4), (4, -2)$ **$6\sqrt{2}$ or 8.49**
5. $(3, 1), (-2, -1)$ **$\sqrt{29}$ or 5.39**
6. $(-2, 4), (7, -8)$ **15**
7. $(-5, 0), (-9, 6)$ **$2\sqrt{13}$ or 7.21**
8. $(5, -1), (5, 13)$ **14**
9. $(2, -3), (10, 8)$ **$\sqrt{185}$ or 13.60**
10. $(-7, 5), (2, -7)$ **15**
11. $(-6, -2), (-5, 4)$ **$\sqrt{37}$ or 6.08**
12. $(8, -10), (3, 2)$ **13**
13. $(4, -3), (7, -9)$ **$3\sqrt{5}$ or 6.71**
14. $(6, 3), (9, 7)$ **5**
15. $(10, 0), (9, 7)$ **$5\sqrt{2}$ or 7.07**
16. $(2, -1), (-3, 3)$ **$\sqrt{41}$ or 6.40**
17. $(-5, 4), (3, -2)$ **10**
18. $(0, -9), (0, 7)$ **16**
19. $(-1, 7), (8, 4)$ **$3\sqrt{10}$ or 9.49**
20. $(-9, 2), (3, -3)$ **13**
21. $(3\sqrt{2}, 7), (5\sqrt{2}, 9)$ **$2\sqrt{3}$ or 3.46**
22. $(6, 3), (10, 0)$ **5**
23. $(3, 6), (5, -5)$ **$5\sqrt{5}$ or 11.18**
24. $(-4, 2), (5, 4)$ **$\sqrt{85}$ or 9.22**

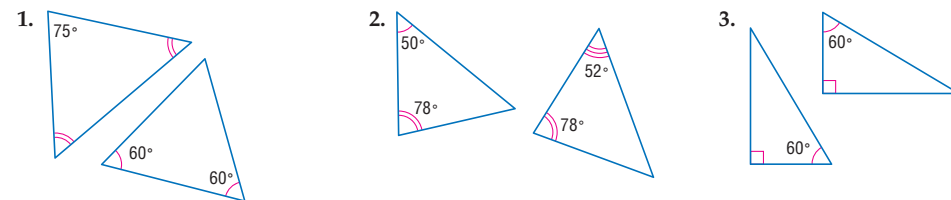
Find the possible values of a if the points with the given coordinates are the indicated distance apart.

25. $(0, 0), (a, 3); d = 5$ **-4 or 4**
26. $(2, -1), (-6, a); d = 10$ **-7 or 5**
27. $(1, 0), (a, 6); d = \sqrt{61}$ **-4 or 6**
28. $(-2, a), (5, 10); d = \sqrt{85}$ **4 or 16**
29. $(15, a), (0, 4); d = \sqrt{274}$ **-3 or 11**
30. $(3, 3), (a, 9); d = \sqrt{136}$ **-7 or 13**

Lesson 11-6

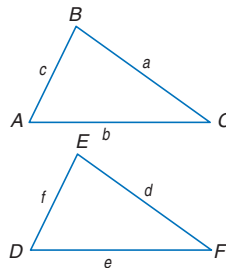
(pages 617–622)

Determine whether each pair of triangles is similar. Justify your answer. **1–3. See margin.**



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

4. $a = 5, d = 10, b = 8, c = 7$ **$e = 16, f = 14$**
5. $a = 2, b = 3, c = 4, d = 3$ **$e = 4.5, f = 6$**
6. $a = 6, d = 4.5, e = 7, f = 7.5$ **$b = 9, c = 10$**
7. $a = 15, c = 20, b = 18, f = 10$ **$d = 7.5, e = 9$**
8. $f = 17.5, d = 8.5, e = 11, a = 1.7$ **$b = 2.2, c = 3.5$**
9. $b = 5.6, e = 7, a = 4, c = 7.2$ **$d = 5, f = 9$**
10. $e = 125, a = 80, d = 100, f = 218.75$ **$b = 100, c = 175$**



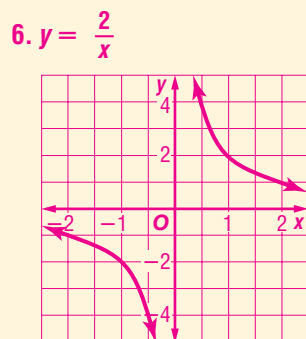
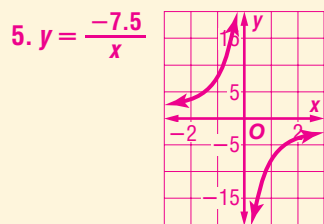
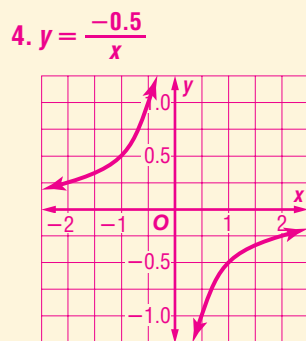
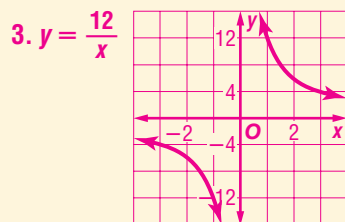
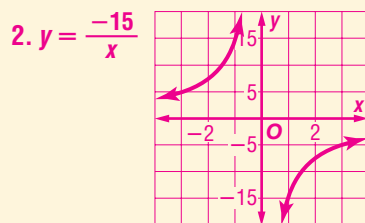
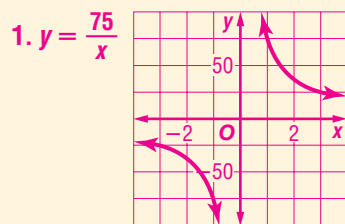
Lesson 11-6

1. No; corresponding angles do not have equal measures.
2. Yes; corresponding angles have equal measures.
3. Yes; corresponding angles have equal measures.

Lesson 11-7

16. $\angle A = 30^\circ$, $BC \approx 8.7$, $AB \approx 17.3$
 17. $\angle Z = 35^\circ$, $XY \approx 14.7$, $XZ \approx 25.6$
 18. $\angle M \approx 63^\circ$, $\angle L \approx 27^\circ$, $LM \approx 17.9$

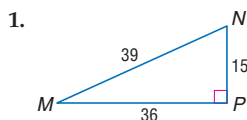
Lesson 12-1



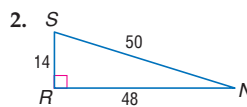
Lesson 11-7

(pages 624–631)

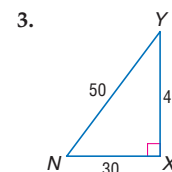
For each triangle, find $\sin N$, $\cos N$, and $\tan N$ to the nearest ten thousandth.



$\sin N = 0.9231$,
 $\cos N = 0.3846$,
 $\tan N = 2.4$



$\sin N = 0.28$,
 $\cos N = 0.96$,
 $\tan N = 0.2917$



$\sin N = 0.8$, $\cos N = 0.6$,
 $\tan N = 1.3333$

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

4. $\cos 25^\circ$ **0.9063**
 7. $\cos 64^\circ$ **0.4384**

5. $\tan 31^\circ$ **0.6009**
 8. $\tan 9^\circ$ **0.1584**

6. $\sin 71^\circ$ **0.9455**
 9. $\sin 2^\circ$ **0.0349**

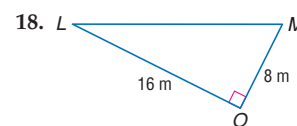
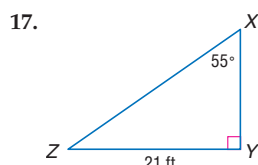
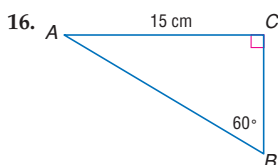
Use a calculator to find the measure of each angle to the nearest degree.

10. $\tan B = 0.5427$ **28°**
 13. $\cos Q = 0.3645$ **69°**

11. $\cos A = 0.8480$ **32°**
 14. $\sin R = 0.2104$ **12°**

12. $\sin J = 0.9654$ **75°**
 15. $\tan V = 11.4301$ **85°**

Solve each right triangle. State the side lengths to the nearest tenth and the angle measures to the nearest degree. **16–18. See margin.**



Lesson 12-1

(pages 642–647)

Graph each variation if y varies inversely as x . **1–6. See margin.**

1. $y = 10$ when $x = 7.5$
 4. $y = 1$ when $x = -0.5$

2. $y = -5$ when $x = 3$
 5. $y = -2.5$ when $x = 3$

3. $y = -6$ when $x = -2$
 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. **7–16. See margin.**

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. $\frac{x}{x+1}$ **-1**

2. $\frac{m}{n}$ **$n \neq 0$**

3. $\frac{c-2}{c^2-4}$ **-2, 2**

4. $\frac{b^2-5b+6}{b^2-8b+15}$ **3, 5**

Simplify each expression. State the excluded values of the variables. **9, 10, 12, 15, 16. See margin.**

5. $\frac{13a}{39a^2}$ **$\frac{1}{3a}$; $a \neq 0$**

6. $\frac{38x^2}{42xy}$ **$\frac{19x}{21y}$; $x, y \neq 0$**

7. $\frac{p+5}{2(p+5)}$ **$\frac{1}{2}$; $p \neq -5$**

8. $\frac{a+b}{a^2-b^2}$ **$\frac{1}{a-b}$; $a \neq \pm b$**

9. $\frac{y+4}{y^2-16}$

10. $\frac{c^2-4}{c^2+4c+4}$

11. $\frac{a^2-a}{a-1}$ **a ; $a \neq 1$**

12. $\frac{x^2+4}{x^4-16}$

13. $\frac{r^3-r^2}{r-1}$ **r^2 ; $r \neq 1$**

14. $\frac{4t^2-8}{4t-4}$ **$\frac{t^2-2}{t-1}$; $t \neq 1$**

15. $\frac{6y^3-12y^2}{12y^2-18}$

16. $\frac{5x^2+10x+5}{3x^2+6x+3}$

846 Extra Practice

7. $y = \frac{216}{x}$; 8

12. $y = \frac{9}{x}$; 12

8. $y = \frac{108}{x}$; 9

13. $y = \frac{24}{x}$; 12

9. $y = \frac{288}{x}$; 32

14. $y = \frac{9}{x}$; 2.25

10. $y = \frac{-64}{x}$; 4

15. $y = \frac{-18.75}{x}$; 7.5

11. $y = \frac{-24}{x}$; -6

16. $y = \frac{1.28}{x}$; -6.4

Lesson 12-2

9. $\frac{1}{y-4}$; $y \neq 4$ 15. $\frac{y^2(y-2)}{2y^2-3}$; $y \neq \pm \frac{\sqrt{6}}{2}$

10. $\frac{c-2}{c+2}$; $c \neq -2$ 16. $\frac{5}{3}$; $x \neq -1$

12. $\frac{1}{x^2-4}$; $x \neq \pm 2$

Lesson 12-3

(pages 655–659)

Find each product.

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

Lesson 12-4

(pages 660–664)

Find each quotient.

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

Lesson 12-5

(pages 666–671)

Find each quotient.

- $(2x^2-11x-20) \div (2x+3) \cdot x-7+\frac{1}{2x+3}$
- $(a^2+10a+21) \div (a+3) \cdot a+7$
- $(m^2+4m-5) \div (m+5) \cdot m-1$
- $(x^2-2x-35) \div (x-7) \cdot x+5$
- $(c^2+6c-27) \div (c+9) \cdot c-3$
- $(y^2-6y-25) \div (y+7) \cdot y-13+\frac{66}{y+7}$
- $(3t^2-14t-24) \div (3t+4) \cdot t-6$
- $(2r^2-3r-35) \div (2r+7) \cdot r-5$
- $\frac{12n^2+36n+15}{6n+3} \cdot 2n+5$
- $\frac{10x^2+29x+21}{5x+7} \cdot 2x+3$
- $\frac{4t^3+17t^2-1}{4t+1} \cdot t^2+4t-1$
- $\frac{2a^3+9a^2+5a-12}{a+3} \cdot 2a^2+3a-4$
- $\frac{4m^2+4m-15}{2m-3} \cdot 2m+5$
- $\frac{6t^3+5t^2+12}{2t+3} \cdot 3t^2-2t+3+\frac{3}{2t+3}$
- $\frac{27c^2-24c+8}{9c-2} \cdot 3c-2+\frac{4}{9c-2}$
- $\frac{4b^3+7b^2-2b+4}{b+2} \cdot 4b^2-b+\frac{4}{b+2}$
- $\frac{t^3-19t+9}{t-4} \cdot t^2+4t-3-\frac{3}{t-4}$
- $\frac{9x^3+2x-10}{3x-2} \cdot 3x^2+2x+2-\frac{6}{3x-2}$

Extra Practice 847

Extra Practice

Extra Practice

Lesson 12-6

(pages 672–677)

Find each sum.

1. $\frac{4}{z} + \frac{3}{z} = \frac{7}{z}$

4. $\frac{y}{2} + \frac{y}{2} = y$

7. $\frac{x}{x+1} + \frac{1}{x+1} = 1$

10. $\frac{r^2}{r-s} + \frac{s^2}{r-s} = \frac{r^2 + s^2}{r-s}$

2. $\frac{a}{12} + \frac{2a}{12} = \frac{3a}{12} = \frac{a}{4}$

5. $\frac{b}{x} + \frac{2}{x} = \frac{b+2}{x}$

8. $\frac{2n}{2n-5} + \frac{5}{5-2n} = 1$

11. $\frac{12n}{3n+2} + \frac{8}{3n+2} = 4$

3. $\frac{5}{2t} + \frac{-7}{2t} = -\frac{2}{2t} = -\frac{1}{t}$

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

9. $\frac{x-y}{2-y} + \frac{x+y}{y-2} = \frac{2y}{y-2}$

12. $\frac{6x}{x+y} + \frac{6y}{x+y} = 6$

Find each difference.

13. $\frac{5x}{24} - \frac{3x}{24} = \frac{2x}{24} = \frac{x}{12}$

16. $\frac{8}{m-2} - \frac{6}{m-2} = \frac{2}{m-2}$

19. $\frac{2a}{2a+5} - \frac{5}{2a+5} = \frac{2a-5}{2a+5}$

22. $\frac{n}{n-1} - \frac{1}{1-n} = \frac{n+1}{n-1}$

14. $\frac{7p}{3} - \frac{8p}{3} = -\frac{p}{3}$

17. $\frac{y}{b+6} - \frac{2y}{b+6} = -\frac{y}{b+6}$

20. $\frac{1}{4z+1} - \frac{(-4z)}{4z+1} = 1$

23. $\frac{a}{a-7} - \frac{(-7)}{7-a} = 1$

15. $\frac{8k}{5m} - \frac{3k}{5m} = \frac{5k}{5m} = \frac{k}{m}$

18. $\frac{a+2}{6} - \frac{a+3}{6} = -\frac{1}{6}$

21. $\frac{3a}{a-2} - \frac{3a}{a-2} = 0$

24. $\frac{2a}{6a-3} - \frac{(-1)}{3-6a} = \frac{1}{3}$

Lesson 12-7

(pages 678–683)

Find the LCM for each pair of expressions.

1. $27a^2bc, 36ab^2c^2$ **$108a^2b^2c^2$**

2. $3m-1, 6m-2$ **$6m-2$**

3. x^2+2x+1, x^2-2x-3
 $(x+1)^2(x-3)$

Find each sum.

4. $\frac{s}{3} + \frac{2s}{7} = \frac{13s}{21}$

7. $\frac{5}{xy} + \frac{6}{yz} = \frac{5z+6x}{xyz}$

10. $\frac{4a}{2a+6} + \frac{3}{a+3} = \frac{2a+3}{a+3}$

5. $\frac{5}{2a} + \frac{-3}{6a} = \frac{2}{a}$

8. $\frac{2}{t} + \frac{t+3}{s} = \frac{2s+t^2+3t}{st}$

11. $\frac{3t+2}{3t-2} + \frac{t+2}{t^2-4} = \frac{3t^2-t-6}{3t^2-8t+4}$

6. $\frac{6}{5x} + \frac{7}{10x^2} = \frac{12x+7}{10x^2}$

9. $\frac{a}{a-b} + \frac{b}{2b+3a} = \frac{3a^2+3ab-b^2}{3a^2-ab-2b^2}$

12. $\frac{-3}{a-5} + \frac{-6}{a^2-5a} = \frac{-3a-6}{a^2-5a}$

Find each difference.

13. $\frac{2n}{5} - \frac{3m}{4} = \frac{8n-15m}{20}$

16. $\frac{a}{a^2-4} - \frac{4}{a+2} = \frac{-3a+8}{a^2-4}$

19. $\frac{t+10}{t^2-100} - \frac{1}{10-t} = \frac{2}{t-10}$

14. $\frac{3z}{7w^2} - \frac{2z}{w} = \frac{3z-14wz}{7w^2}$

17. $\frac{m}{m-n} - \frac{5}{m} = \frac{m^2-5m+5n}{m(m-n)}$

20. $\frac{2a-6}{a^2-3a-10} - \frac{3a+5}{a^2-4a-12} = \frac{-a^2-8a+61}{(a+2)(a-5)(a-6)}$

15. $\frac{s}{t^2} - \frac{r}{3t} = \frac{3s-rt}{3t^2}$

18. $\frac{y+5}{y-5} - \frac{2y}{y^2-25} = \frac{y^2+8y+25}{y^2-25}$

Lesson 12-8

(pages 684–689)

Write each mixed expression as a rational expression.

1. $4 + \frac{2}{x} = \frac{4x+2}{x}$

2. $8 + \frac{5}{3t} = \frac{24t+5}{3t}$

3. $\frac{b+1}{2b} + 3b = \frac{6b^2+b+1}{2b}$

4. $3z + \frac{z+2}{z} = \frac{3z^2+z+2}{z}$

5. $\frac{2}{a-2} + a^2 = \frac{a^3-2a^2+2}{a-2}$

6. $3r^2 + \frac{4}{2r+1} = \frac{6r^3+3r^2+4}{2r+1}$

Simplify each expression. 14. $\frac{(a-2)(a^2+a+2)}{(a+1)(a^2-2a-3)}$

7. $\frac{3\frac{1}{2}}{4\frac{3}{4}} = \frac{14}{19}$

8. $\frac{\frac{x^2}{y}}{\frac{y}{x^3}} = \frac{x^5}{y^2}$

9. $\frac{\frac{t^4}{u}}{\frac{t^3}{u^2}} = tu$

10. $\frac{\frac{x-3}{x+1}}{\frac{x^2}{y^2}} = \frac{y^2(x-3)}{x^2(x+1)}$

11. $\frac{\frac{y}{3} + \frac{5}{6}}{2 + \frac{5}{y}} = \frac{y}{6}$

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

13. $\frac{t-2}{t^2-4} = t+3$

14. $\frac{a + \frac{2}{a+1}}{a - \frac{3}{a-2}}$

Lesson 12-9

(pages 690–695)

Solve each equation. State any extraneous solutions.

1. $\frac{k}{6} + \frac{2k}{3} = -\frac{5}{2}$ **-3**
2. $\frac{2x}{7} + \frac{27}{10} = \frac{4x}{5}$ **5.25**
3. $\frac{18}{b} = \frac{3}{b} + 3$ **5**
4. $\frac{3}{5x} + \frac{7}{2x} = 1$ **$\frac{41}{10}$**
5. $\frac{2a-3}{6} = \frac{2a}{3} + \frac{1}{2}$ **-3**
6. $\frac{3x+2}{x} + \frac{x+3}{x} = 5$ **5**
7. $\frac{2b-3}{7} - \frac{b}{2} = \frac{b+3}{14}$ **$-\frac{9}{4}$**
8. $\frac{2y}{y-4} - \frac{3}{5} = 3$ **9**
9. $\frac{2t}{t+3} + \frac{3}{t} = 2$ **3**
10. $\frac{5x}{x+1} + \frac{1}{x} = 5$ **$\frac{1}{4}$**
11. $\frac{r-2}{r+2} - \frac{2r}{r+9} = 6$ **-6, -3**
12. $\frac{m}{m+1} + \frac{5}{m-1} = 1$ **$-\frac{3}{2}$**
13. $\frac{2x}{x-3} - \frac{4x}{3-x} = 12$ **6**
14. $\frac{14}{b-6} = \frac{1}{2} + \frac{6}{b-8}$ **10, 20**
15. $\frac{a}{4a+15} - 3 = -2$ **-5**
16. $\frac{5x}{3x+10} + \frac{2x}{x+5} = 2$ **-4, 5**
17. $\frac{2a-3}{a-3} - 2 = \frac{12}{a+2}$ **$\frac{14}{3}$**
18. $\frac{z+3}{z-1} + \frac{z+1}{z-3} = 2$ **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*. **1–8. See margin.**

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

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*. **5–16. See margin.**

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. $2C + 3A$

Extra Practice 849

Lesson 13-1

1. 10 dogs from a county; all dogs in the county; biased; convenience
2. 25 students; all students at the school; biased; voluntary response
3. ice cream cones made during three shifts; all ice cream cones made during three shifts; unbiased; systematic random sample
4. a group of automobiles manufactured at a particular plant; all automobiles manufactured at the plant; unbiased; stratified random sample
5. a group of people shopping at a department store; all people shopping at the department store; biased; voluntary response
6. a group of community residents; all residents of the community; unbiased; systematic random sample
7. a group of malformed frogs; all frogs in a state's lakes; biased; voluntary response
8. 10 cartons of strawberries; all cartons of strawberries in a store; biased; convenience

Lesson 13-2

5. impossible

6. $\begin{bmatrix} 3 & -4 \\ -3 & 6 \end{bmatrix}$

7. $\begin{bmatrix} -4 & 0 & 0 \\ -3 & 3 & 0 \end{bmatrix}$

8. $\begin{bmatrix} -6 & 2 & -8 \\ -3 & -3 & 4 \end{bmatrix}$

9. $\begin{bmatrix} 2 & -2 & 8 \\ 0 & 6 & -4 \end{bmatrix}$

10. $\begin{bmatrix} 3 & 0 \\ 0 & 3 \end{bmatrix}$

11. $\begin{bmatrix} 1 & -4 \\ -3 & 4 \end{bmatrix}$

12. $\begin{bmatrix} -5 & 0 \\ 0 & -5 \end{bmatrix}$

13. $\begin{bmatrix} 5 & -8 \\ -6 & 11 \end{bmatrix}$

14. $\begin{bmatrix} -16 & 4 & -16 \\ -9 & -3 & 8 \end{bmatrix}$

15. impossible

16. $\begin{bmatrix} 8 & -12 \\ -9 & 17 \end{bmatrix}$

Lesson 13-3

- 1000–1500 miles; The data appear to be skewed to the left.
- 70–75 percent; About half of the data lie in the 70–80 percent range.

Lesson 13-4

- 46; 43; 33.5; 47.5; 14; 10
- 34; 81; 68; 95; 27; none
- 70; 65; 45; 85; 40; none
- 8; 4; 2.4; 7.1; 4.7; none
- 73; 31; 13; 56; 43; none
- 663; 400; 251; 587.5; 336.5; none

Lesson 13-5

- -
 -
 -
 -
- The A data are much more diverse than the B data. In general, the B data are greater than the A data.
-
- The two data sets have about the same range, but the middle 50% of the data are greater for set A.

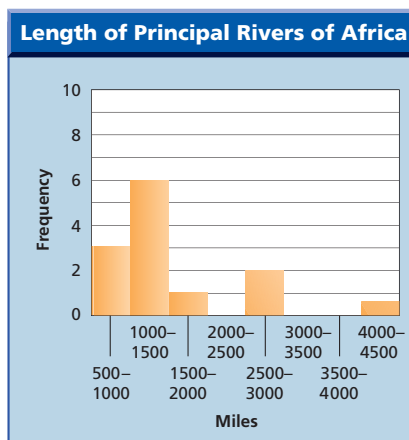
Lesson 13-3

(pages 722–728)

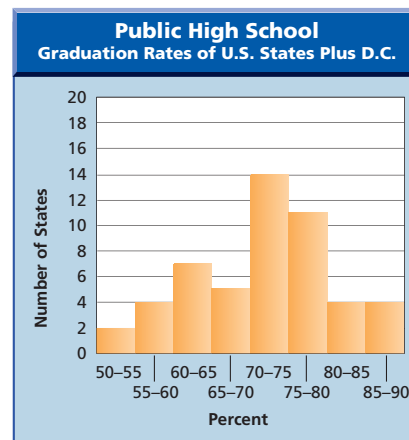
For each histogram, answer the following.

- In what measurement class does the median occur?
- Describe the distribution of the data. 1–2. See margin.

1.



2.



Create a histogram to represent each data set. 3–5. See pp. 852A–852H.

- 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
- 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
- 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. 1–6. See margin.

- 56, 45, 37, 43, 10, 34, 33, 45, 50
- 77, 78, 68, 96, 99, 84, 65, 95, 65, 84
- 30, 90, 40, 70, 50, 100, 80, 60
- 4, 5.2, 1, 3, 2.4, 6, 3.7, 8, 1.3, 7.1, 9
- 25°, 56°, 13°, 44°, 0°, 31°, 73°, 66°, 4°, 29°, 37°
- 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. 1–4. See margin.

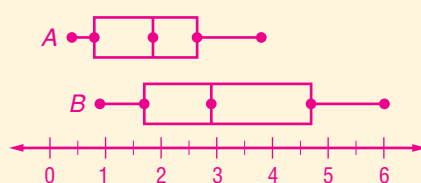
- 3, 2, 1, 5, 7, 9, 2, 11, 3, 4, 8, 10, 12, 4
- 59, 63, 69, 69, 49, 40, 55, 69, 55, 89, 45, 55
- 1.8, 2.2, 1.2, 3.5, 5.5, 3.2, 1.2, 4.2, 3.0, 2.6, 1.7, 1.8
- 15, 18, 25, 37, 52, 69, 22, 35, 50, 65, 15, 99, 35, 25

Draw a parallel box-and-whisker plot for each set of data. Compare the data. 5–8. See margin.

- 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
- 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
- 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
- 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

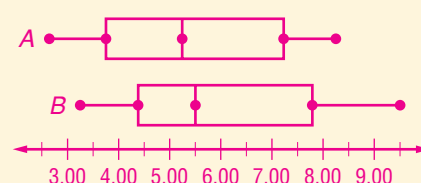
850 Extra Practice

7.



The B data are more diverse than the A data. In general, the B data are greater than the A data.

8.



The distribution of both sets are similar. The values for B are somewhat greater than the values for A.

Lesson 14-1

(pages 754–758)

Draw a tree diagram to show the sample space for each event. Determine the number of possible outcomes. 1–4. See pp. 852A–852H for diagrams.

- 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 **18**
- tossing a coin four times **16**
- spinning a spinner with five equal-sized sections, one each of white, yellow, blue, red, and green, two times **25**
- selecting a sundae with choice of vanilla or butter pecan ice cream; chocolate, strawberry, or marshmallow topping; and walnuts or peanuts **12**

Determine the number of possible outcomes for each situation.

- 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. **67,600**
- 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. **48**
- At the Big Mountain Ski Resort, you can choose from three types of boots, four types of skis, and five types of poles. **60**
- A game is played by rolling three four-sided dice, one red, one blue, and one white. **64**

Find the value of each expression.

- | | | | |
|-----------------------|-------------------------|-------------------|---------------------------------|
| 9. $8!$ 40,320 | 10. $1!$ 1 | 11. $0!$ 1 | 12. $5!$ 120 |
| 13. $2!$ 2 | 14. $9!$ 362,880 | 15. $3!$ 6 | 16. $14!$ 87,178,291,200 |

Lesson 14-2

(pages 760–767)

Determine whether each situation involves a *permutation* or *combination*. Explain your reasoning. 1–7. See margin for explanations.

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

Evaluate each expression.

- | | | | |
|--------------------------------------|-------------------------------------|--|---|
| 8. ${}_5P_2$ 20 | 9. ${}_7P_7$ 5040 | 10. ${}_{10}C_2$ 45 | 11. ${}_6C_5$ 6 |
| 12. ${}_8P_2$ 56 | 13. ${}_{18}C_{10}$ 43,758 | 14. ${}_{13}C_{13}$ 1 | 15. ${}_9P_6$ 60,480 |
| 16. $({}_7P_3)({}_4P_2)$ 2520 | 17. $({}_8C_6)({}_7C_5)$ 588 | 18. $({}_3C_2)({}_{10}P_{10})$ 10,886,400 | 19. $({}_3P_2)({}_{10}C_{10})$ 6 |

Lesson 14-3

(pages 769–776)

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

- | | | |
|---|---|--|
| 1. $P(\text{red } 1, \text{blue } 1)$ $\frac{1}{36}$ | 2. $P(\text{red even, blue even})$ $\frac{1}{4}$ | 3. $P(\text{red prime number, blue even})$ $\frac{1}{4}$ |
| 4. $P(\text{red } 6, \text{blue greater than } 4)$ $\frac{1}{18}$ | 5. $P(\text{red greater than } 2, \text{blue greater than } 3)$ $\frac{1}{3}$ | |

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. $P(\text{red, then gold})$ $\frac{4}{1485}$ | 7. $P(2 \text{ black})$ $\frac{52}{99}$ | 11. $\frac{4}{78,705}$ | 8. $P(2 \text{ yellow})$ $\frac{1}{1485}$ |
| 9. $P(\text{black, then gold})$ $\frac{1}{297}$ | 10. $P(3 \text{ blacks, then red})$ $\frac{304}{5247}$ | 11. $P(\text{yellow, then blue, then gold})$ | |
| 12. $P(2 \text{ gold})$ 0 | 13. $P(4 \text{ blue})$ $\frac{1}{341,055}$ | 14. $P(4 \text{ blue, then gold})$ $\frac{1}{17,393,805}$ | |

Extra Practice 851

Lesson 14-2

- Order is not important.
- Order of runners can make a difference.
- Order is not important.
- Order of winning is important.
- Order is important with letters.
- Order is important with a lock.
- Order is not important.

Extra Practice

Extra Practice

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. **1–2. See margin.**

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

- Draw a table to show the sample space of all possible outcomes.
- Find the probability for $X = 9$, $X = 12$, and $X = 24$.
- What is the probability that the product of two dice is greater than 15 on two separate rolls? $\frac{121}{1296}$

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. **4. See margin.**

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

- Define a random variable and list its values.
- Show that this is a valid probability distribution. $0.05 + 0.25 + 0.35 + 0.30 + 0.05 = 1$
- During a business day, what is the probability that fewer than 1001 customers enter? **0.30**
- During a business day, what is the probability that more than 500 customers enter? **0.95**

Lesson 14-5

(pages 782–788)

For Exercises 1–3, toss 4 coins, one at a time, 50 times and record your results. **1–2. See students' work.**

- Based on your results, what is the probability that any two coins will show tails?
- Based on your results, what is the probability that the first and fourth coins show heads?
- What is the theoretical probability that all four coins show heads? $\frac{1}{16}$

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

- Based on your results, what is the probability that the product is 15? **See students' work.**
- If you roll the dice 50 more times, which product would you expect to see about 10% of the time? **6 or 12**
- What is the theoretical probability that the product of the dice will be 2? $\frac{1}{18}$

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.

- Find the experimental probability distribution for the number of households of each size. **See margin.**
- Based on the survey, what is the probability that a person chosen at random lives in a household with five or more people? **about 0.11 or 11%**
- Based on the survey, what is the probability that a person chosen at random lives in a household with 1 or 2 people? **about 0.34 or 34%**

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

Lesson 14-4

1.	$\times$	1	2	3	4	5	6
	1	1	2	3	4	5	6
	2	2	4	6	8	10	12
	3	3	6	9	12	15	18
	4	4	8	12	16	20	24
	5	5	10	15	20	25	30
	6	6	12	18	24	30	36

$$2. P(X = 9) = \frac{1}{36}; P(X = 12) = \frac{1}{9};$$

$$P(X = 24) = \frac{1}{18}$$

4. Let X = number of customers;
 $x = 500, 1000, 1500, 2000, 2500$

Lesson 14-5

$$7. P(1) \approx 12.7\%; P(2) \approx 21.7\%;$$

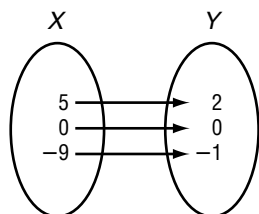
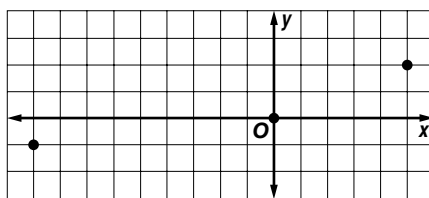
$$P(3) \approx 35.7\%; P(4) \approx 18.9\%;$$

$$P(5 \text{ or more}) \approx 11.0\%$$

Page 829, Lesson 4-3

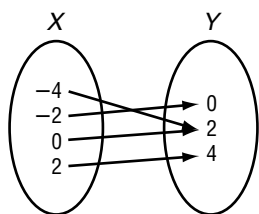
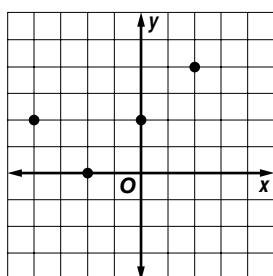
1. $D = \{-9, 0, 5\}$; $R = \{-1, 0, 2\}$

x	y
5	2
0	0
-9	-1



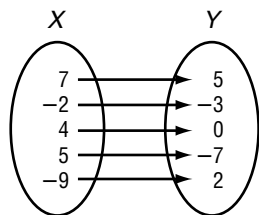
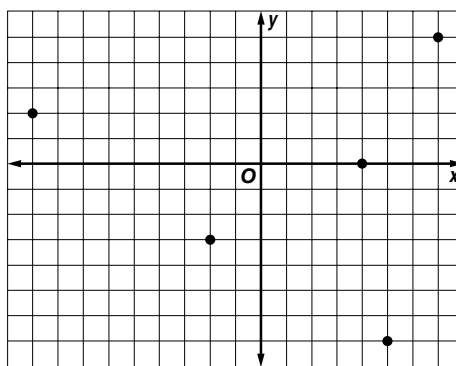
2. $D = \{-4, -2, 0, 2\}$; $R = \{0, 2, 4\}$

x	y
-4	2
-2	0
0	2
2	4



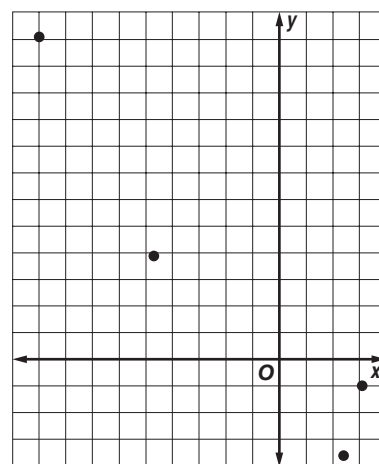
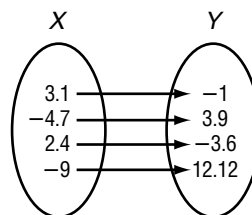
3. $D = \{-9, -2, 4, 5, 7\}$; $R = \{-7, -3, 0, 2, 5\}$

x	y
7	5
-2	-3
4	0
5	-7
-9	2



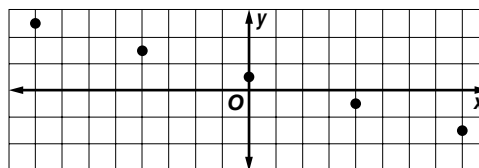
4. $D = \{-9, -4.7, 2.4, 3.1\}$; $R = \{-3.6, -1, 3.9, 12.12\}$

x	y
3.1	-1
-4.7	3.9
2.4	-3.6
-9	12.12

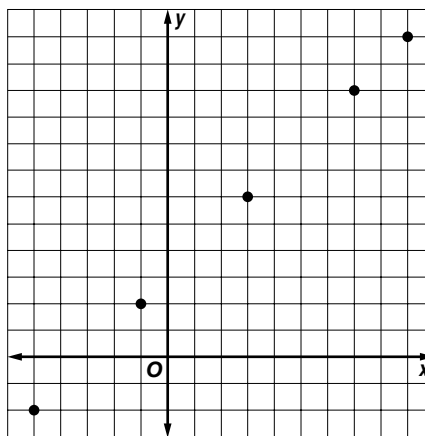


Page 829, Lesson 4-4

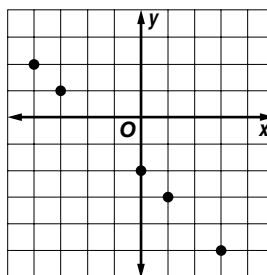
16. $\{(-8, 2.5), (-4, 1.5), (0, 0.5), (4, -0.5), (8, -1.5)\}$



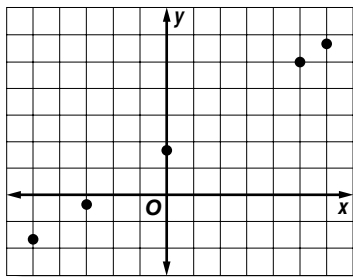
17. $\{(-5, -2), (-1, 2), (3, 6), (7, 10), (9, 12)\}$



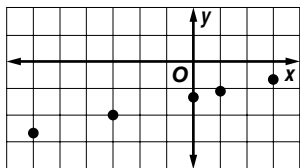
18. $\{(-4, 2), (-3, 1), (0, -2), (1, -3), (3, -5)\}$



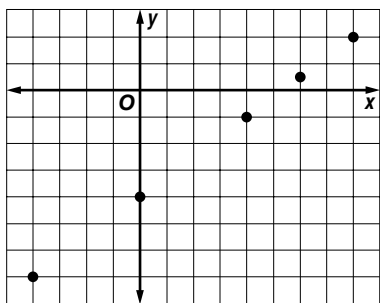
19. $\left\{\left(-5, -\frac{5}{3}\right), \left(-3, -\frac{1}{3}\right), \left(0, \frac{5}{3}\right), (5, 5), \left(6, \frac{17}{3}\right)\right\}$



20. $\left\{\left(-6, -\frac{8}{3}\right), (-3, -2), \left(0, -\frac{4}{3}\right), \left(1, -\frac{10}{9}\right), \left(3, -\frac{2}{3}\right)\right\}$



21. $\{(-4, -7), (0, -4), (4, -1), (6, 0.5), (8, 2)\}$



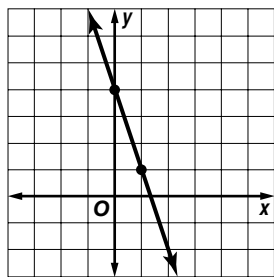
Page 829, Lesson 4-5

1. yes; $3x - 2y = 0$

3. yes; $4x - 2y = 8$

5. yes; $7x - 7y = 2$

7.

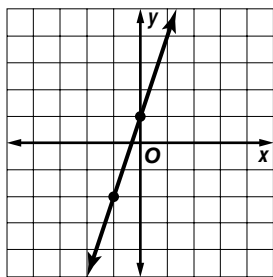


2. no

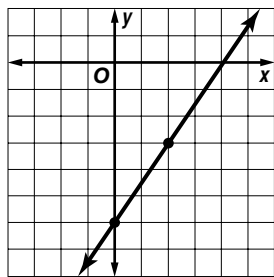
4. yes; $3x - 7y = -7$

6. no

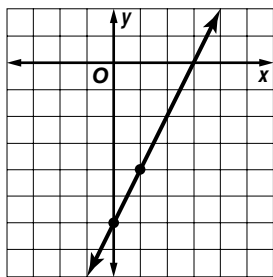
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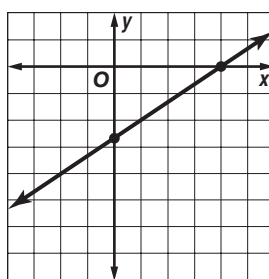
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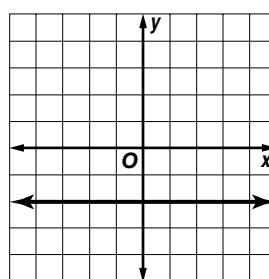
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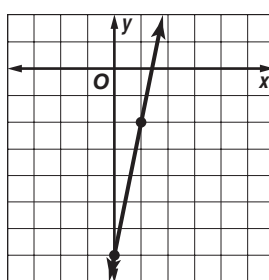
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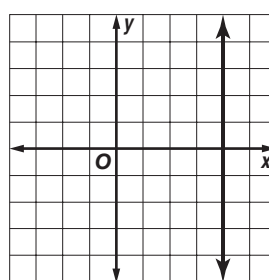
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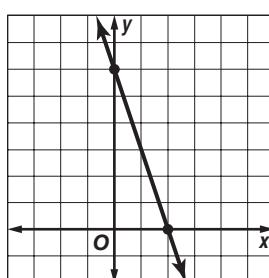
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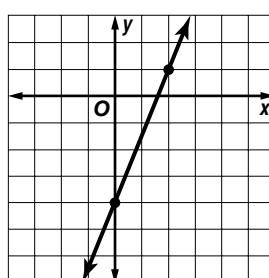
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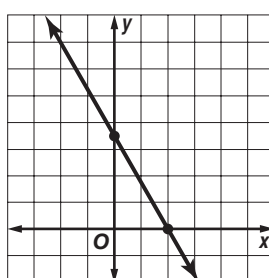
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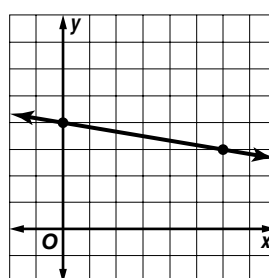
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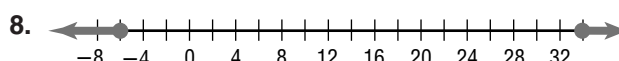
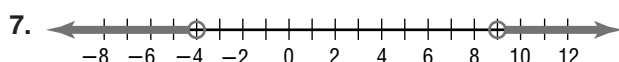
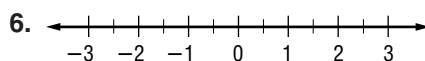
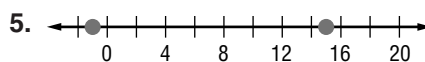
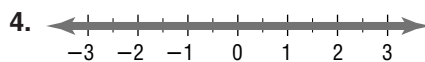
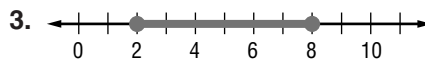
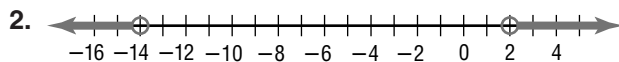
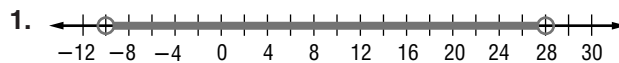
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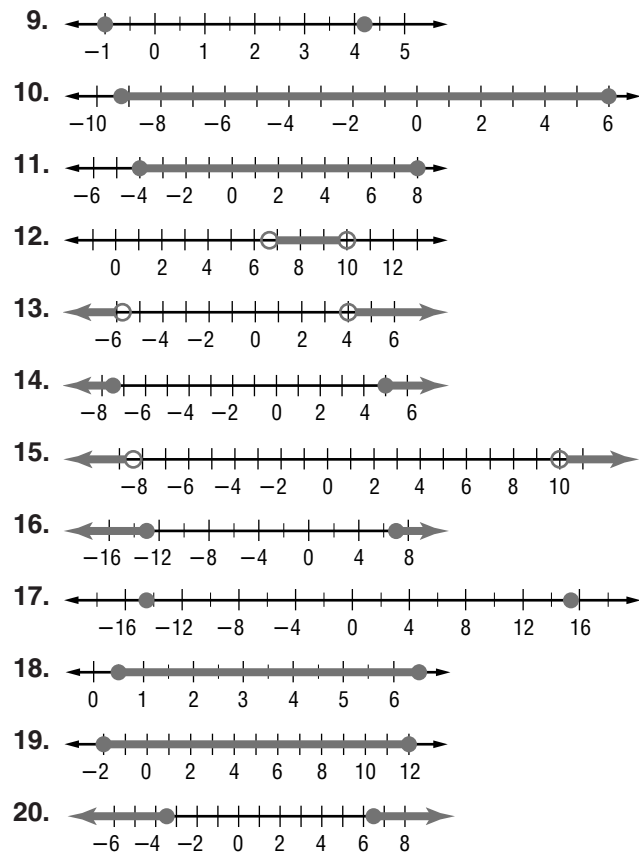


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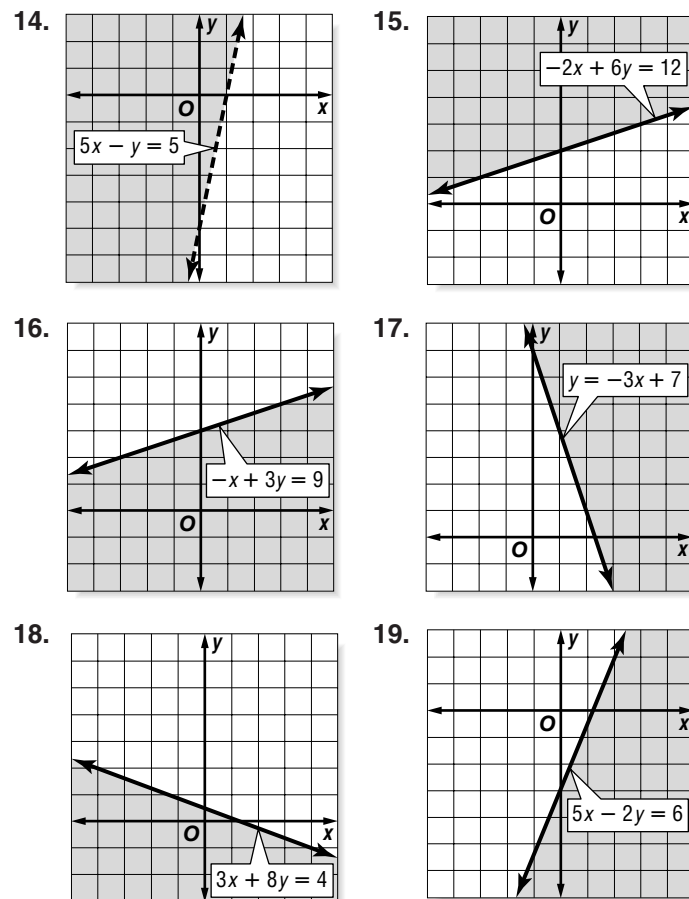


Page 834, Lesson 6-5

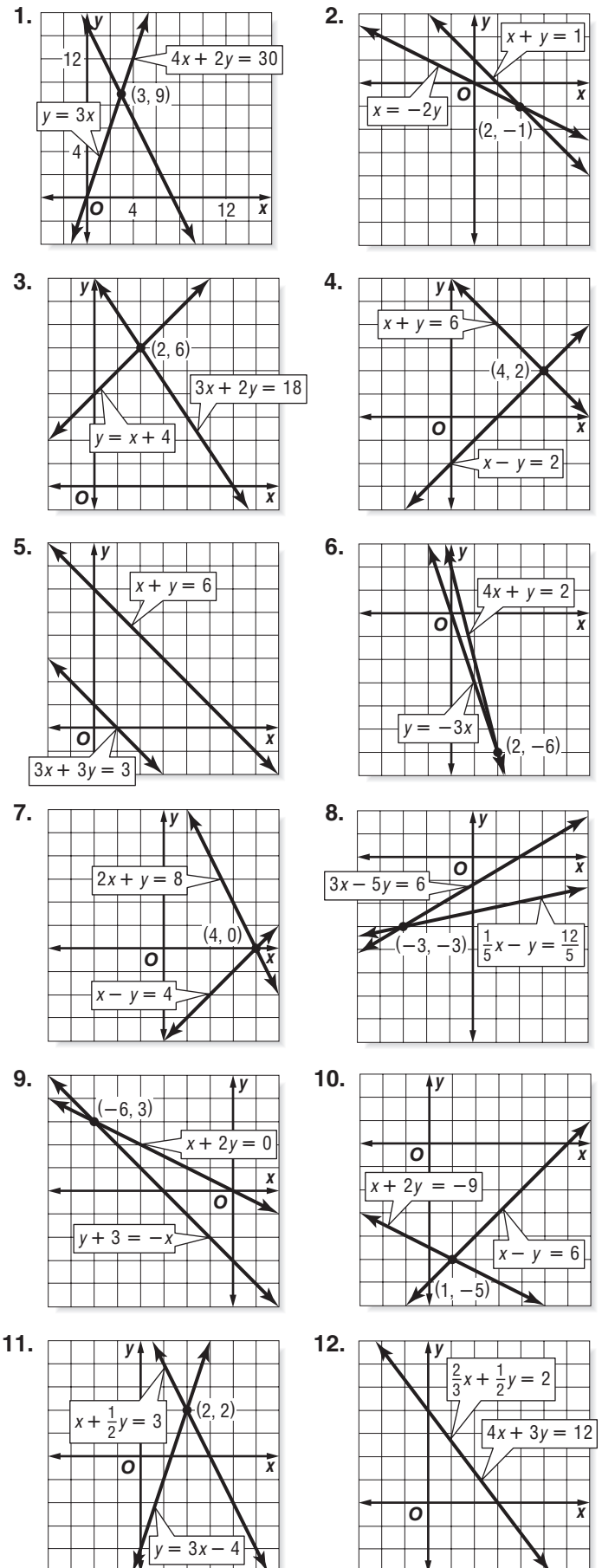


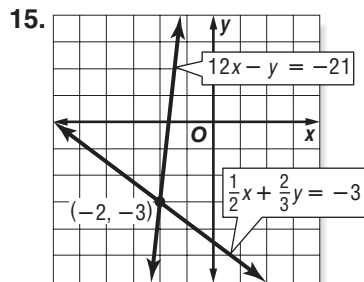
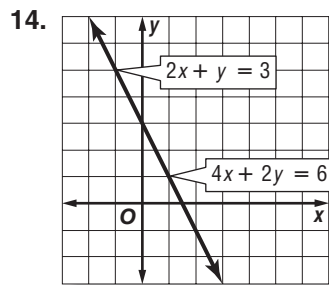
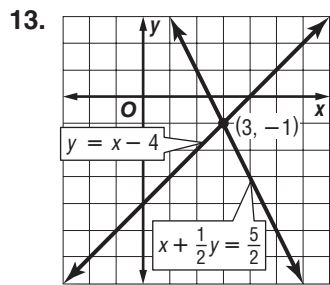


Page 835, Lesson 6-6

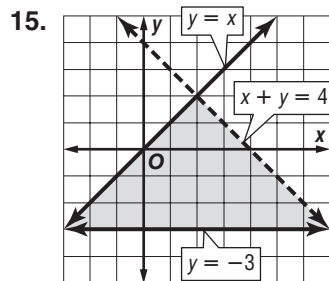
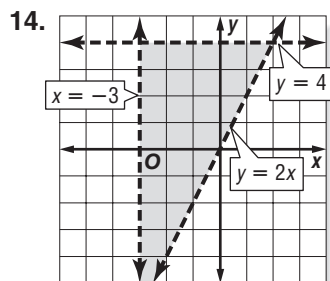
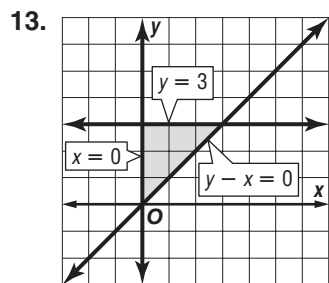
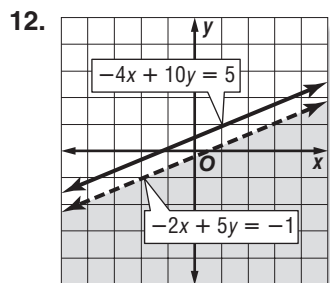
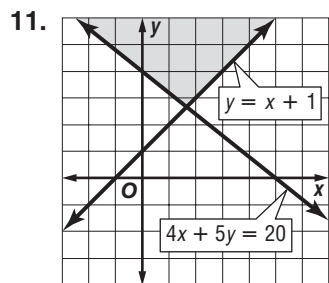
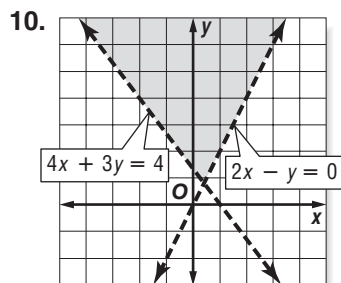


Page 835, Lesson 7-1



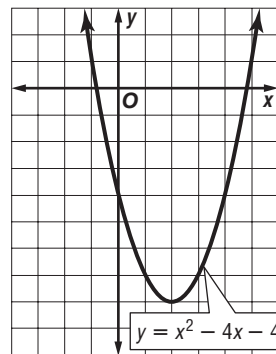


Page 836, Lesson 7-5

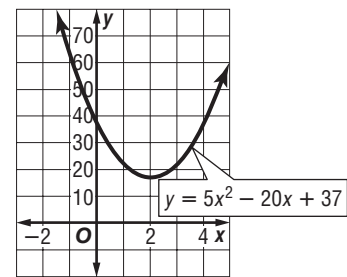


Page 841, Lesson 10-1

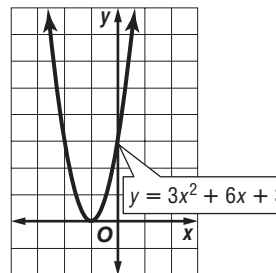
9. $x = 2$; $(2, -8)$; minimum



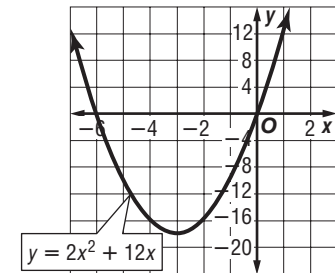
10. $x = 2$; $(2, 17)$; minimum



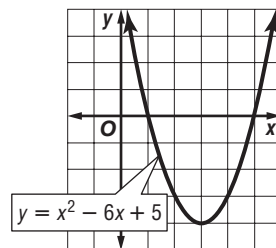
11. $x = -1$; $(-1, 0)$; minimum



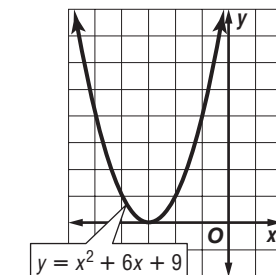
12. $x = -3$; $(-3, -18)$; minimum



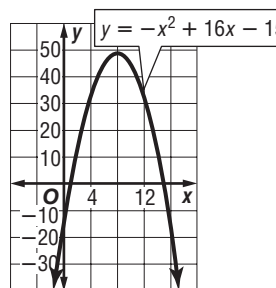
13. $x = 3$; $(3, -4)$; minimum



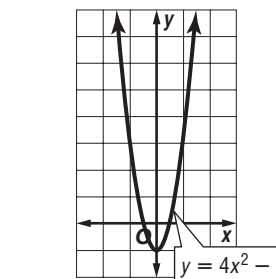
14. $x = -3$; $(-3, 0)$; minimum



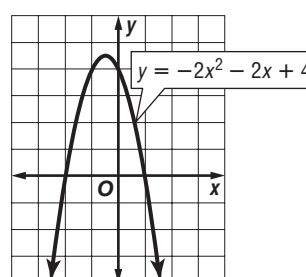
15. $x = 8$; $(8, 49)$; maximum



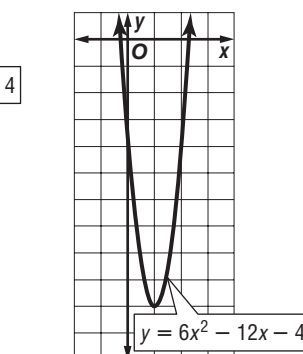
16. $x = 0$; $(0, -1)$; minimum



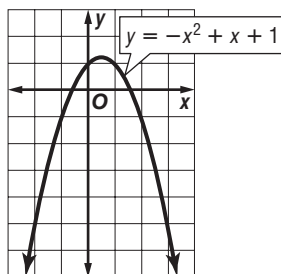
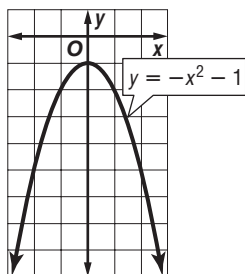
17. $x = -\frac{1}{2}$; $(-\frac{1}{2}, 4\frac{1}{2})$; maximum



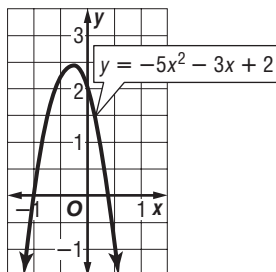
18. $x = 1$; $(1, -10)$; minimum



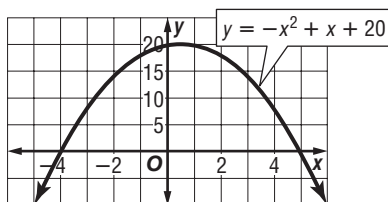
19. $x = 0$; $(0, -1)$; maximum 20. $x = \frac{1}{2}$; $(\frac{1}{2}, 1\frac{1}{4})$; maximum



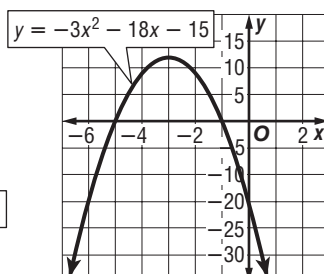
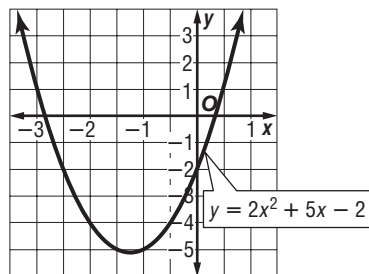
21. $x = -0.3$; $(-0.3, 2.45)$; maximum



22. $x = \frac{1}{2}$; $(\frac{1}{2}, 20\frac{1}{4})$; maximum

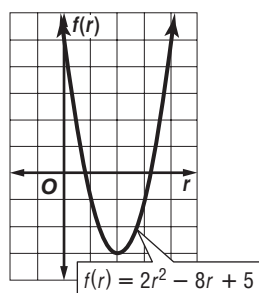


23. $x = -1.25$; $(-1.25, -5.125)$; minimum 24. $x = -3$; $(-3, 12)$; maximum

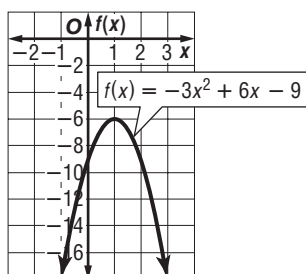


Page 842, Lesson 10-2

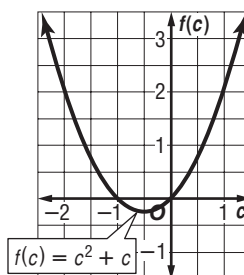
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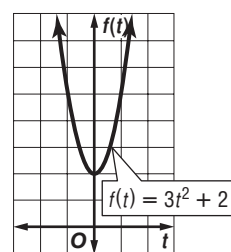
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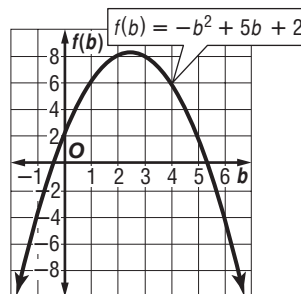
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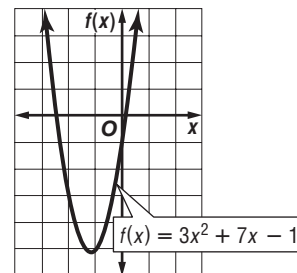
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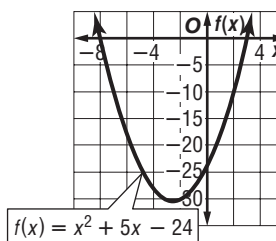
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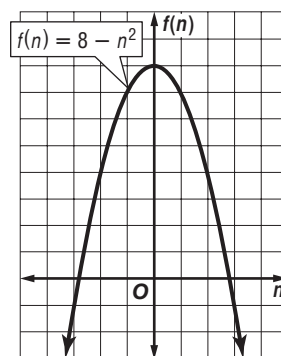
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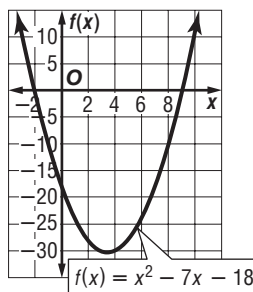
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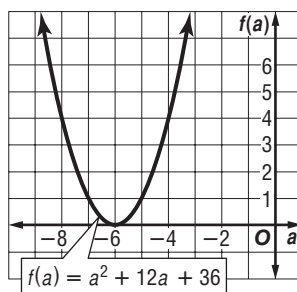
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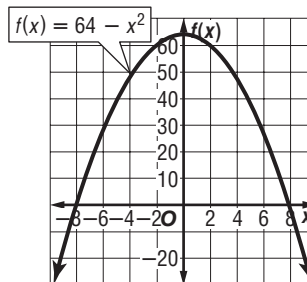
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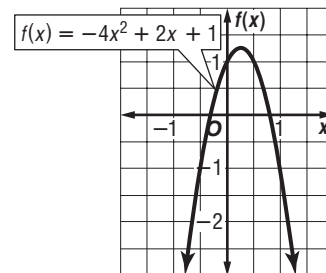
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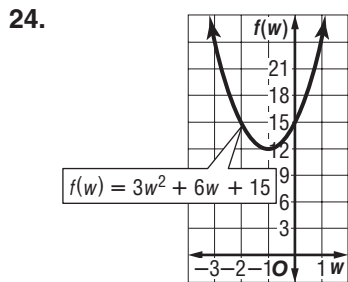
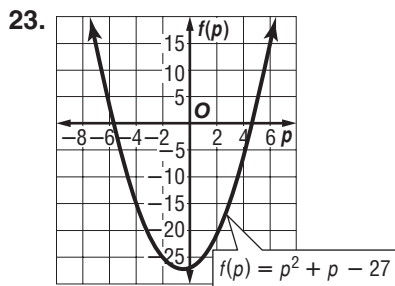
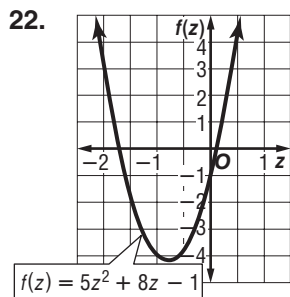


20.

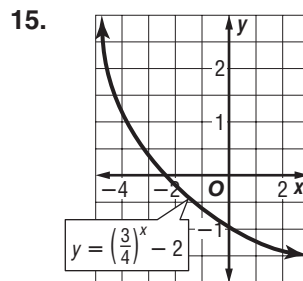
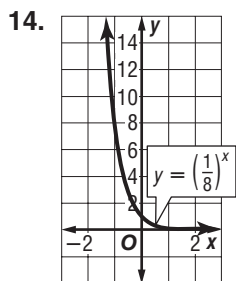
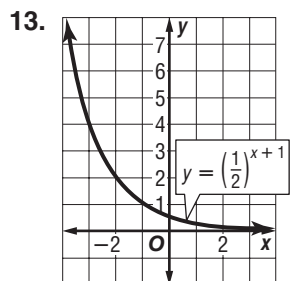
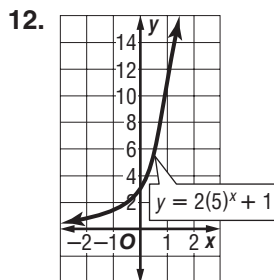
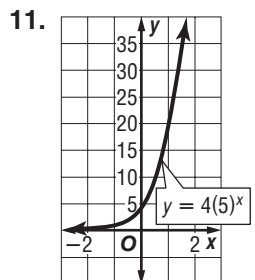
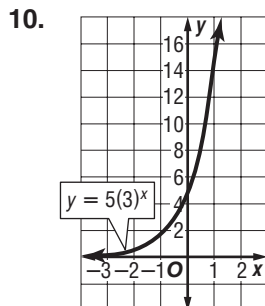
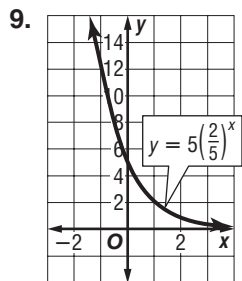
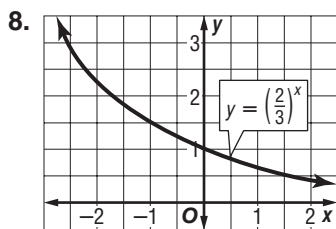
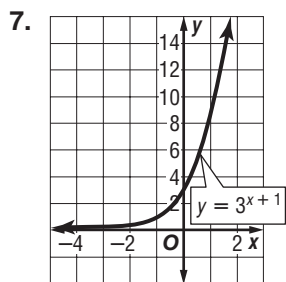


21.





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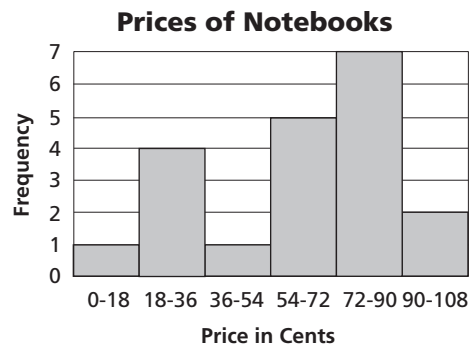


16. No; the domain values are at regular intervals and the range values have a common difference of 4.

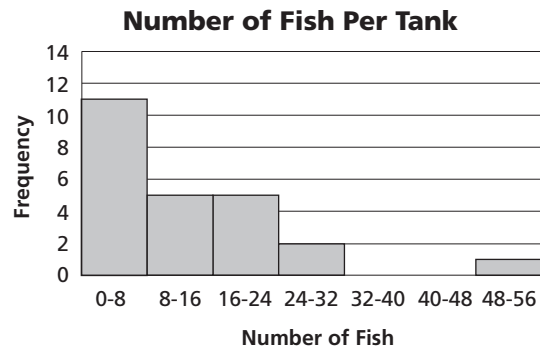
17. Yes; the domain values are at regular intervals and the range values have a common factor of 5.

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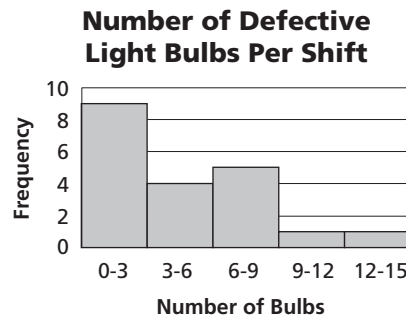
3. Sample answer:



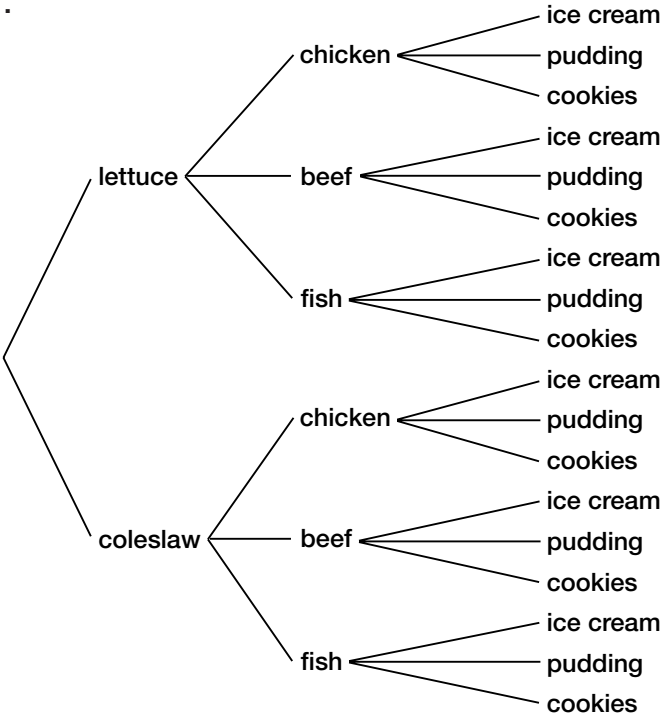
4. Sample answer:



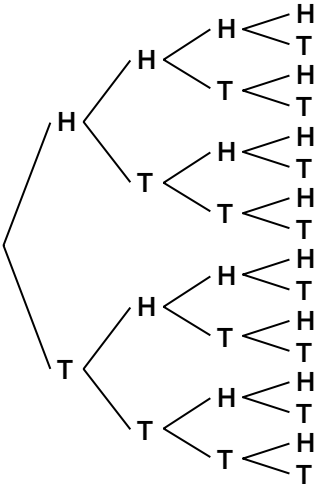
5. Sample answer:



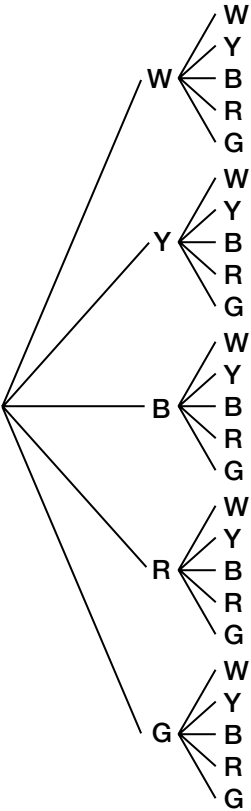
1.



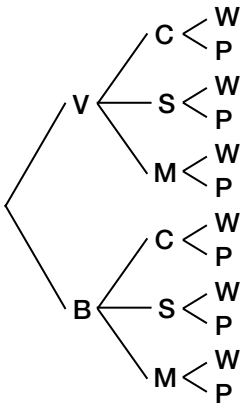
2.



3.



4.



Notes