Chapter 6

6.1 Find the indicated real nth root(s) of a.

1. $n = 4, a = 81$ 3
2. $n = 3, a = 512$ 8
3. $n = 5, a = -243$ −3

6.1 Evaluate the expression without using a calculator.

4. $36^{-1/2}$ $\frac{1}{6}$
5. $64^{5/6}$ 32
6. $(\sqrt[3]{216})^{-2}$ $\frac{1}{36}$
7. $(\sqrt[5]{-32})^4$ 16

6.1 Solve the equation. Round the result to two decimal places when appropriate.

8. $x^3 = -8$ −2
9. $x^4 + 9 = 90$ ±3
10. $(x - 3)^5 = 60$ 5.27
11. $-4x^6 = -400$ ±2.15

6.2 Simplify the expression.

12. $4^{5/2} \cdot 4^{-1/2}$ 16
13. $\frac{17^{3/7}}{17^{4/7}}$ $\frac{1}{17^{1/7}}$
14. $(\sqrt[4]{5} \cdot \sqrt{5})^4$ 125
15. $\frac{\sqrt[3]{135}}{\sqrt[3]{5}}$ 3
16. $5\sqrt[5]{7} - 7\sqrt[5]{7}$ $-2\sqrt[5]{7}$
17. $\sqrt[3]{2} + 2\sqrt[3]{128}$ $9\sqrt[3]{2}$
18. $\frac{324^{1/4}}{4^{-1/4}}$ 6
19. $4\sqrt[3]{108} \cdot 2\sqrt[3]{4}$ $48\sqrt[3]{2}$

6.2 Write the expression in simplest form. Assume all variables are positive.

20. $\sqrt{20x^6y^7}$ $2x^3y^3\sqrt{5y}$
21. $\sqrt[5]{18x^3y^{14}z^{20}}$ $y^2z^4\sqrt[5]{18x^3y^4}$
22. $\sqrt[4]{\frac{x^5}{y^{16}}}$ $\frac{x}{y^4}\sqrt[4]{x}$
23. $\sqrt[3]{16x^7y^2} \cdot \sqrt[3]{6xy^5}$ $2x^2y^2\sqrt[3]{12x^2y}$

6.3 Let $f(x) = -x + 4$, $g(x) = x^3$, and $h(x) = \frac{x}{4}$. Perform the indicated operation and state the domain. 24–31. See margin.

24. $f(x) + g(x)$
25. $g(x) - f(x)$
26. $g(x) \cdot h(x)$
27. $\frac{f(x)}{g(x)}$
28. $f(g(x))$
29. $g(h(x))$
30. $h(f(x))$
31. $f(f(x))$

6.4 Verify that f and g are inverse functions. 32–33. See margin.

32. $f(x) = 2x - 4, g(x) = \frac{1}{2}x + 2$
33. $f(x) = 3x^2 + 1, x \geq 0; g(x) = \left(\frac{x-1}{3}\right)^{1/2}$

6.4 Find the inverse of the function.

34. $f(x) = 5x - 3$ $f^{-1}(x) = \frac{x+3}{5}$
35. $f(x) = \frac{4}{3}x + 2$ $f^{-1}(x) = \frac{3}{4}x - \frac{3}{2}$
36. $f(x) = \frac{1}{2}x^2, x \geq 0$ $f^{-1}(x) = \sqrt{2x}$
37. $f(x) = -x^6 + 2, x \leq 0$ $f^{-1}(x) = -\sqrt[6]{-x+2}$
38. $f(x) = \frac{4x^4 - 1}{18}, x \geq 0$ $f^{-1}(x) = \sqrt[4]{\frac{18x+1}{4}}$
39. $f(x) = 32x^5 + 4$ $f^{-1}(x) = \sqrt[5]{\frac{x-4}{32}}$

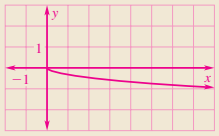
6.5 Graph the function. Then state the domain and range. 40–47. See margin for art.

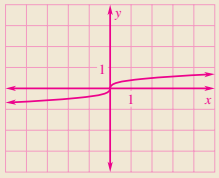
40. $y = -\frac{1}{3}\sqrt{x}$ domain: $x \geq 0$, range: $y \leq 0$
41. $y = \frac{2}{5}\sqrt[3]{x}$ See margin.
42. $y = \frac{5}{6}\sqrt{x}$ domain: $x \geq 0$, range: $y \geq 0$
43. $y = \sqrt{x+2} - 3$ domain: $x \geq -2$, range: $y \geq -3$
44. $y = -2\sqrt[3]{x-1} + 2$ See margin.
45. $f(x) = 3\sqrt[3]{x}$ See margin.
46. $g(x) = -\frac{1}{2}\sqrt{x-2}$ domain: $x \geq 2$, range: $y \leq 0$
47. $h(x) = -\sqrt{x+3} + 4$ domain: $x \geq -3$, range: $y \leq 4$

6.6 Solve the equation. Check your solution.

48. $\sqrt{2x+3} = 7$ 23
49. $-5\sqrt{x+1} + 12 = 2$ 3
50. $\sqrt[3]{5x-1} + 6 = 10$ 13
51. $2\sqrt[3]{8x} + 9 = 5$ −1
52. $7x^{4/3} = 175$ $\pm 5\sqrt{5}$
53. $(x-2)^{3/4} = 1$ 3
54. $x - 8 = \sqrt{18x}$ 32
55. $x = \sqrt{4x-3}$ 1, 3
56. $\sqrt{2x+1} + 5 = \sqrt{x+12} - 8$ no solution

EXTRA PRACTICE

40. 

41. 

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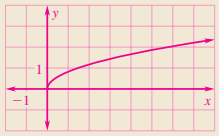
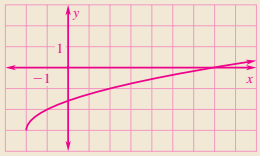
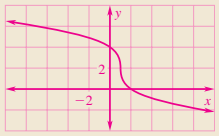
42. 

43. 

44. 

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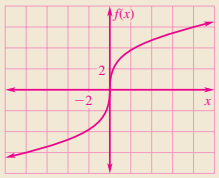
45. 

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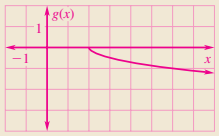
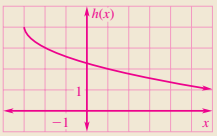
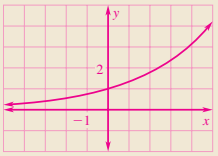
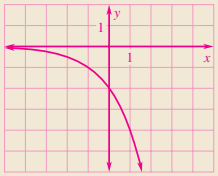
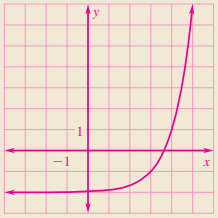
46. 

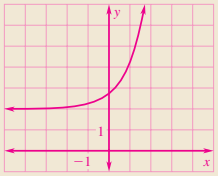
47. 

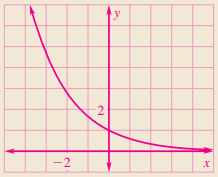
24. $x^3 - x + 4$, all real numbers
25. $x^3 + x - 4$, all real numbers
26. $\frac{x^4}{4}$, all real numbers
27. $\frac{-x+4}{x^3}$, all real numbers except $x = 0$
28. $-x^3 + 4$, all real numbers
29. $\frac{x^3}{64}$, all real numbers
30. $-\frac{x}{4} + 1$, all real numbers
31. x, all real numbers
32, 33. See Additional Answers beginning on p. AA1.

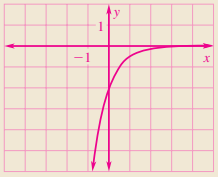
1. 

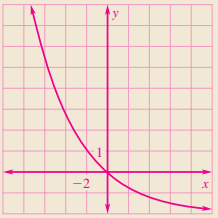
2. 

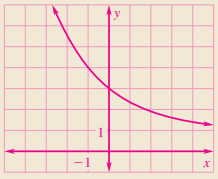
3. 

4. 

5. 

6. 

7. 

8. 

EXTRA PRACTICE

Chapter 7

7.1 Graph the function. State the domain and range. 1–4. See margin for art.

1. $y = \left(\frac{4}{3}\right)^x$ domain: all real numbers, range: $y > 0$
2. $y = -2 \cdot 2^x$ domain: all real numbers, range: $y < 0$
3. $y = 3^{x-3} - 2$ domain: all real numbers, range: $y > -2$
4. $y = \frac{1}{4} \cdot 3^{x+1} + 2$ domain: all real numbers, range: $y > 2$

7.2 Graph the function. State the domain and range. 5–8. See margin for art.

5. $y = \left(\frac{3}{5}\right)^x$ domain: all real numbers, range: $y > 0$
6. $y = -2\left(\frac{1}{4}\right)^x$ domain: all real numbers, range: $y < 0$
7. $y = (0.8)^{x-3} - 2$ domain: all real numbers, range: $y > -2$
8. $y = 2\left(\frac{2}{3}\right)^x + 1$ domain: all real numbers, range: $y > 1$

7.3 Simplify the expression.

9. $e^{-3} \cdot e^{-8}$ $\frac{1}{e^{11}}$
10. $(2e^{2x})^{-5}$ $\frac{1}{32e^{10x}}$
11. $\sqrt{81e^{8x}}$ $9e^{4x}$
12. $\frac{28e^{3x}}{21e^{-x}}$ $\frac{4}{3}e^{4x}$

7.3 Graph the function. State the domain and range. 13–16. See margin for art.

13. $y = 0.5e^{3x}$ domain: all real numbers, range: $y > 0$
14. $y = 2e^{-x} - 2$ See margin.
15. $y = 1.5e^{x+1} + 3$ domain: all real numbers, range: $y > 3$
16. $y = e^{3(x-2)} + 1$ domain: all real numbers, range: $y > 1$

7.4 Evaluate the logarithm without using a calculator.

17. $\log_4 \frac{1}{16}$ -2
18. $\log_6 6$ 1
19. $\log_5 125$ 3
20. $\log_{3/4} \frac{64}{27}$ -3

7.4 Simplify the expression.

21. $5^{\log_5 x}$ x
22. $10^{\log 9}$ 9
23. $\log_4 16^x$ $2x$
24. $e^{\ln 5}$ 5

7.4 Graph the function. State the domain and range. 25–28. See margin for art.

25. $y = \log_7 x$ domain: $x > 0$, range: all real numbers
26. $y = \log_{1/2}(x - 4)$ domain: $x > 4$, range: all real numbers
27. $y = \log_5 x + 3$ domain: $x > 0$, range: all real numbers
28. $y = \log_3(x - 2) + 1$ domain: $x > 2$, range: all real numbers

7.5 Expand the expression.

29. $\log_5 \frac{2x}{5}$ $\log_5 2 + \log_5 x - 1$
30. $\log \frac{100x^2}{y}$ $2 + 2\log x - \log y$
31. $\ln 20x^3y^2$ $\ln 20 + 3\ln x + 2\ln y$
32. $\log_2 \sqrt[3]{8x^4}$ $1 + \frac{4}{3}\log_2 x$

7.5 Condense the expression.

33. $\log_4 20 + 4\log_4 x$ $\log_4 20x^4$
34. $\log 7 + 2\log x - 5\log y$ $\log \frac{7x^2}{y^5}$
35. $0.5\ln 100 - 2\ln x + 8\ln y$ $\ln \frac{10y^8}{x^2}$

7.5 Use the change-of-base formula to evaluate the logarithm.

36. $\log_2 5$ about 2.322
37. $\log_4 80$ about 3.161
38. $\log_5 100$ about 2.861
39. $\log_7 27$ about 1.694

7.6 Solve the equation. Check for extraneous solutions.

40. $2^{4x+2} = 8^{x+2}$ 4
41. $\left(\frac{1}{9}\right)^{x-3} = 3^{3x+1}$ 1
42. $7^{9x} = 18$ about 0.165
43. $\ln(3x + 7) = \ln(x - 1)$ no solution
44. $\log_5(3x + 2) = 3$ 41
45. $\log_6(x + 9) + \log_6 x = 2$ 3

7.7 Write an exponential function $y = ab^x$ whose graph passes through the given points.

46. (1, 8), (2, 32) $y = 2 \cdot 4^x$
47. (1, 3), (3, 12) $y = \frac{3}{2} \cdot 2^x$ or $y = -\frac{3}{2} \cdot (-2)^x$
48. (2, −9), (5, −243) $y = -1 \cdot 3^x$
49. (1, 4), (2, 4) $y = 4 \cdot 1^x$

7.7 Write a power function $y = ax^b$ whose graph passes through the given points.

50. (2, 2), (5, 16) $y = 0.415\,x^{2.27}$
51. (3, 27), (6, 432) $y = \frac{1}{3} \cdot x^4$
52. (1, 4), (8, 17) $y = 4 \cdot x^{0.696}$
53. (5, 36), (10, 220) $y = 0.538 \cdot x^{2.611}$

13–16, 25–28. See Additional Answers beginning on p. AA1.

Chapter 8

8.1 The variables x and y vary inversely. Use the given values to write an equation relating x and y. Then find y when $x = -5$.

1. $x = 2, y = -10$ — $y = \frac{-20}{x}$; 4
2. $x = \frac{1}{3}, y = 24$ — $y = \frac{8}{x}$; $-\frac{8}{5}$
3. $x = -3, y = -5$ — $y = \frac{15}{x}$; -3
4. $x = 25, y = -\frac{2}{5}$ — $y = \frac{-10}{x}$; 2

8.1 Determine whether x and y show *direct variation*, *inverse variation*, or *neither*.

5.

x	y
2.5	32
4	20
5	16
6.4	12.5
8	10

inverse variation

6.

x	y
1	2.5
3.5	8.75
5	12.5
8	20
9	22.5

direct variation

7.

x	y
11	30
14	61
16	85
24	92
27	105

neither

8.

x	y
1	12
3	4
8	1.5
12	1
15	0.8

inverse variation

8.2 Graph the function. State the domain and range. 9–12. See margin.

9. $y = \frac{6}{x}$
10. $y = \frac{-2}{x} + 3$
11. $y = \frac{5}{x - 1} - 2$
12. $y = \frac{4x + 19}{x + 3}$

8.3 Graph the function. 13–16. See margin.

13. $y = \frac{x}{x^2 - 4}$
14. $y = \frac{x^2 + 1}{x^2 + 4x + 3}$
15. $y = \frac{x^2 + 2x - 3}{x + 2}$
16. $f(x) = \frac{2x^2 - 8}{x^2 - 2x}$

8.4 Simplify the rational expression, if possible.

17. $\frac{x^2 + x - 6}{x^2 + 9x + 18}$ — $\frac{x - 2}{x + 6}$
18. $\frac{x^3 - 100x}{x^4 + 20x^3 + 100x^2}$ — $\frac{x - 10}{x(x + 10)}$
19. $\frac{x^2 - 5x - 84}{2x^2 - 98}$ — $\frac{x - 12}{2(x - 7)}$
20. $\frac{x^2 + 7x + 10}{x^2 - 7x + 10}$ — simplified

8.4 Multiply or divide the expressions. Simplify the result.

21. $\frac{6x^2y}{xy^2} \cdot \frac{2y}{9x^3}$ — $\frac{4}{3x^2}$
22. $\frac{2x^2 - x - 6}{2x^2 + 5x + 3} \cdot \frac{x^2 + x}{x^2 - 4}$ — $\frac{x}{x + 2}$
23. $\frac{3x^2 + 15x}{x^2 - 12x + 36} \cdot (x^2 - x - 30)$ — $\frac{3x(x + 5)^2}{x - 6}$
24. $\frac{12x^8y}{5y^5} \div \frac{3y^2}{x^2}$ — $\frac{4x^{10}}{5y^6}$
25. $\frac{6x^2 + x - 1}{4x^3 + 4x^2} \div \frac{6x^2 - 2x}{x^2 - 4x - 5}$ — $\frac{(2x + 1)(x - 5)}{8x^3}$
26. $\frac{x^2 - 4x - 32}{2x^2 - 13x - 24} \div \frac{x}{4x^2 - 9}$ — $\frac{(x + 4)(2x - 3)}{x}$

8.5 Add or subtract the expressions. Simplify the result.

27. $\frac{x^2}{x + 1} - \frac{1}{x + 1}$ — $x - 1$
28. $\frac{x + 5}{x + 6} + \frac{1}{x - 2}$ — $\frac{x^2 + 4x - 4}{(x + 6)(x - 2)}$
29. $\frac{5}{x + 2} + \frac{35}{x^2 - 3x - 10}$ — $\frac{5}{(x - 5)}$

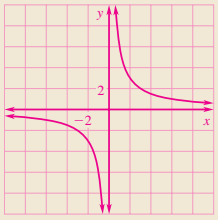
8.5 Simplify the complex fraction.

30. $\frac{\frac{x}{2x + 1}}{5 + \frac{3}{x}}$ — $\frac{x^2}{(5x + 3)(2x + 1)}$
31. $\frac{\frac{x}{3} + 2}{\frac{1}{x} + 3}$ — $\frac{x(x + 6)}{3(1 + 3x)}$
32. $\frac{\frac{3}{x^2 - 4}}{\frac{2}{x + 2} - \frac{x + 1}{x^2 - x - 6}}$ — $\frac{3(x - 3)}{(x - 2)(x - 7)}$

8.6 Solve the equation. Check for extraneous solutions.

33. $\frac{7}{3x - 7} = \frac{14}{x + 1}$ — 3
34. $\frac{1}{3} + \frac{2}{x} = -\frac{3}{x^2}$ — -3
35. $2 - \frac{4}{x + 2} = \frac{2}{x}$ — $-1, 2$
36. $\frac{4}{x - 2} + \frac{6x^2}{x^2 - 4} = \frac{3x}{x + 2}$ — $-\frac{4}{3}$

EXTRA PRACTICE

9. 

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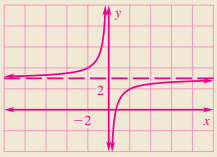
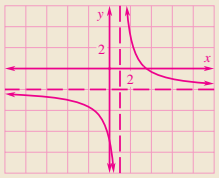
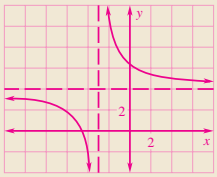
10. 

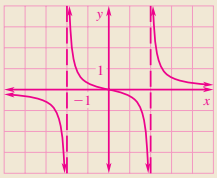
domain: all real numbers except 0, range: all real numbers except 3

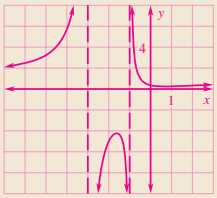
11. 

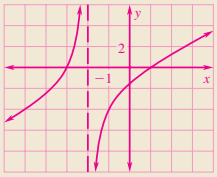
domain: all real numbers except 1, range: all real numbers except −2

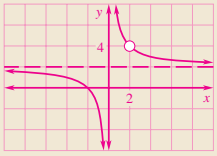
12. 

domain: all real numbers except −3, range: all real numbers except 4

13. 

14. 

15. 

16. 

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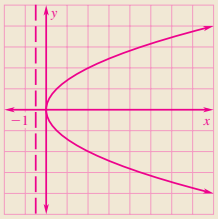

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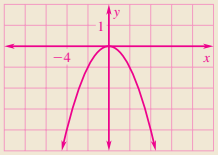

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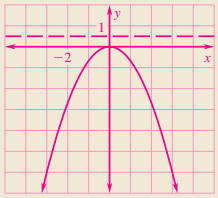

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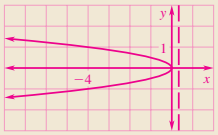

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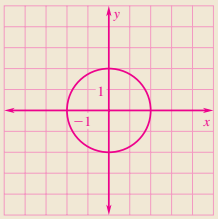

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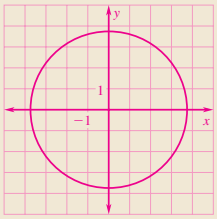

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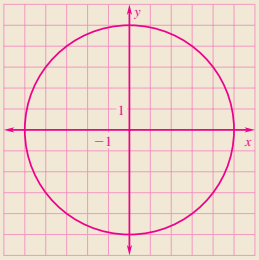

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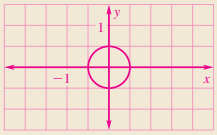


Chapter 9

EXTRA PRACTICE

9.1 **Find the distance between the two points. Then find the midpoint of the line segment joining the two points.**

1. $(-5, 0), (5, 4)$ $2\sqrt{29}$; $(0, 2)$
2. $(2, 1), (3, 7)$ $\sqrt{37}$; $\left(\frac{5}{2}, 4\right)$
3. $(-12, 12), (14, -4)$ $2\sqrt{233}$; $(1, 4)$
4. $(12, -1), (18, -9)$ 10; $(15, -5)$

9.2 **Graph the equation. Identify the focus, directrix, and axis of symmetry of the parabola.** 5–8. See margin for art.

5. $y^2 = 2x$ $\left(\frac{1}{2}, 0\right)$, $x = -\frac{1}{2}$, $y = 0$
6. $x^2 = -4y$ $(0, -1)$, $y = 1$, $x = 0$
7. $14x^2 = -21y$ $\left(0, -\frac{3}{8}\right)$, $y = \frac{3}{8}$, $x = 0$
8. $12y^2 + 3x = 0$ $\left(-\frac{1}{16}, 0\right)$, $x = \frac{1}{16}$, $y = 0$

9.3 **Graph the equation. Identify the radius of the circle.** 9–12. See margin for art.

9. $x^2 + y^2 = 4$ 2
10. $x^2 + y^2 = 14$ $\sqrt{14}$
11. $3x^2 + 3y^2 = 75$ 5
12. $16x^2 + 16y^2 = 4$ $\frac{1}{2}$

9.3 **Write the standard form of the equation of the circle that passes through the given point and whose center is at the origin.**

13. $(8, 0)$ $x^2 + y^2 = 64$
14. $(0, -9)$ $x^2 + y^2 = 81$
15. $(7, -1)$ $x^2 + y^2 = 50$
16. $(-5, -11)$ $x^2 + y^2 = 146$

9.4 **Graph the equation. Identify the vertices, co-vertices, and foci of the ellipse.** 17–20. See margin for art.

17. $\frac{x^2}{81} + \frac{y^2}{16} = 1$ $(\pm 9, 0), (0, \pm 4), (\pm\sqrt{65}, 0)$
18. $x^2 + \frac{y^2}{9} = 1$ $(0, \pm 3), (\pm 1, 0), (0, \pm 2\sqrt{2})$
19. $9x^2 + 4y^2 = 576$ $(0, \pm 12), (\pm 8, 0), (0, \pm 4\sqrt{5})$
20. $49x^2 + 64y^2 = 12{,}544$ $(\pm 16, 0), (0, \pm 14), (\pm 2\sqrt{15}, 0)$

9.4 **Write an equation of the ellipse with the given characteristics and center at (0, 0).**

21. Vertex: $(4, 0)$; Co-vertex: $(0, 2)$ $\frac{x^2}{16} + \frac{y^2}{4} = 1$
22. Vertex: $(0, -5)$; Co-vertex: $(4, 0)$ $\frac{x^2}{16} + \frac{y^2}{25} = 1$
23. Vertex: $(9, 0)$; Focus: $(-3, 0)$ $\frac{x^2}{81} + \frac{y^2}{72} = 1$
24. Co-vertex: $(0, 10)$; Focus: $(8, 0)$ $\frac{x^2}{164} + \frac{y^2}{100} = 1$

9.5 **Graph the equation. Identify the vertices, foci, and asymptotes of the hyperbola.** 25–27. See margin for art.

25. $\frac{x^2}{36} - \frac{y^2}{16} = 1$ $(\pm 6, 0), (\pm 2\sqrt{13}, 0)$, $y = \pm\frac{2}{3}x$
26. $x^2 - y^2 = 4$ $(\pm 2, 0), (\pm 2\sqrt{2}, 0)$, $y = \pm x$
27. $49y^2 - 81x^2 = 3969$ $(0, \pm 9), (0, \pm\sqrt{130})$, $y = \pm\frac{9}{7}x$

9.5 **Write an equation of the hyperbola with the given foci and vertices.**

28. Foci: $(0, -8), (0, 8)$; Vertices: $(0, -6), (0, 6)$ $\frac{y^2}{36} - \frac{x^2}{28} = 1$
29. Foci: $(-2, 0), (2, 0)$; Vertices: $(-1, 0), (1, 0)$ $\frac{x^2}{1} - \frac{y^2}{3} = 1$
30. Foci: $(0, -5), (0, 5)$; Vertices: $(0, -3\sqrt{2}), (0, 3\sqrt{2})$ $\frac{y^2}{18} - \frac{x^2}{7} = 1$

9.6 **Graph the equation. Identify the important characteristics of the graph.** 31–33. See margin.

31. $\frac{(x-3)^2}{25} + \frac{y^2}{9} = 1$
32. $(x+2)^2 + (y-1)^2 = 4$
33. $(y-4)^2 - \frac{(x+1)^2}{16} = 1$

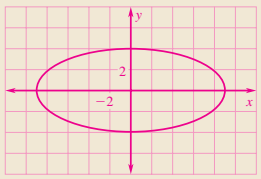
9.6 **Classify the conic section and write its equation in standard form. Then graph the equation.** 34–37. See margin for art.

34. $x^2 + y^2 + 2x + 2y - 7 = 0$ circle, $(x+1)^2 + (y+1)^2 = 9$
35. $9x^2 + 4y^2 - 72x + 16y + 16 = 0$ ellipse, $\frac{(x-4)^2}{16} + \frac{(y+2)^2}{36} = 1$
36. $9x^2 - 4y^2 + 16y - 52 = 0$ hyperbola, $\frac{x^2}{4} - \frac{(y-2)^2}{9} = 1$
37. $x^2 - 6x - 4y + 17 = 0$ parabola, $(x-3)^2 = 4(y-2)$

9.7 **Solve the system.**

38. $x^2 + y^2 = 4$; $9x^2 - 4y^2 = 36$ $(-2, 0)$ $(2, 0)$
39. $y = x - 2$; $x^2 + y^2 - 6x - 4y - 12 = 0$ $(0, -2)$ $(7, 5)$
40. $y^2 = x - 5$; $9x^2 - 25y^2 = 225$ $(5, 0)$

17.



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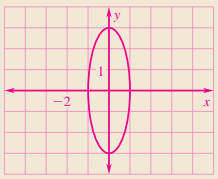

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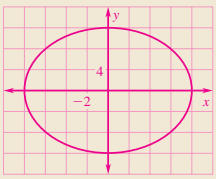


Chapter 12

12.1 For the sequence, describe the pattern, write the next term, and write a rule for the nth term. 1–3. See margin.

1. 9, 16, 25, 36, . . .
2. $\frac{1}{3}, \frac{2}{3}, 1, \frac{4}{3}, \ldots$
3. 12.5, 7, 1.5, −4, . . .

12.1 Write the series using summation notation.

4. $16 + 32 + 48 + 64 + \cdots + 144$ $\sum_{n=1}^{9} 16n$
5. $\frac{1}{6} + \frac{2}{7} + \frac{3}{8} + \frac{4}{9} + \frac{1}{2} + \cdots$ $\sum_{n=1}^{\infty} \frac{n}{5+n}$

12.1 Find the sum of the series.

6. $\sum_{i=1}^{5} (3i + 2)$ 55
7. $\sum_{i=0}^{5} 4i^2$ 220
8. $\sum_{n=4}^{6} \frac{n}{n+3}$ $\frac{313}{168}$
9. $\sum_{k=6}^{8} k^3$ 1071

12.2 Write a rule for the nth term of the arithmetic sequence. Then graph the first six terms of the sequence. 10–12. See margin for art.

10. $a_5 = 15, d = 6$ $a_n = 6n - 15$
11. $a_{10} = -78, d = -10$ $a_n = -10n + 22$
12. $a_6 = -\frac{11}{5}, d = -\frac{2}{5}$ $a_n = -\frac{2}{5}n + \frac{1}{5}$

12.2 Write a rule for the nth term of the arithmetic sequence. Then find a_{15}.

13. 11, 20, 29, 38, . . . $a_n = 9n + 2$; 137
14. −8, −15, −22, −29, . . . $a_n = -7n - 1$; −106
15. $3, \frac{7}{3}, \frac{5}{3}, 1, \ldots$ $a_n = -\frac{2}{3}n + \frac{11}{3}$; $-\frac{19}{3}$

12.2 Write a rule for the nth term of the arithmetic sequence that has the two given terms.

16. $a_2 = 9, a_7 = 37$ $a_n = 5.6n - 2.2$
17. $a_8 = 10.5, a_{16} = 18.5$ $a_n = 2.5 + n$
18. $a_3 = -\frac{14}{5}, a_{10} = -\frac{42}{5}$ $a_n = -\frac{4}{5}n - \frac{2}{5}$

12.3 Write a rule for the nth term of the geometric sequence. Then find a_{10}.

19. $\frac{1}{27}, \frac{1}{9}, \frac{1}{3}, 1, \ldots$ $a_n = \frac{1}{27} \cdot 3^{n-1}$; 729
20. 5, 4, 3.2, 2.56, . . . $a_n = 5 \cdot \left(\frac{4}{5}\right)^{n-1}$; about 0.671
21. $4, \frac{16}{3}, \frac{64}{9}, \frac{256}{27}, \ldots$ $a_n = 4 \cdot \left(\frac{4}{3}\right)^{n-1}$; $\frac{1{,}048{,}576}{19{,}683}$

12.3 Find the sum of the geometric series.

22. $\sum_{i=1}^{4} 3(4)^{i-1}$ 255
23. $\sum_{i=1}^{7} 0.5(-3)^{i-1}$ 273.5
24. $\sum_{i=1}^{5} 10\left(\frac{3}{5}\right)^{i-1}$ 23.056
25. $\sum_{i=1}^{7} 2(1.2)^{i-1}$ about 25.8

12.4 Find the sum of the infinite geometric series, if it exists.

26. $8 + 4 + 2 + 1 + \cdots$ 16
27. $2 - 4 + 8 - 16 + \cdots$ no sum
28. $-6.75 + 4.5 - 3 + 2 - \cdots$ −4.05

12.4 Write the repeating decimal as a fraction in lowest terms.

29. 0.333. . . $\frac{1}{3}$
30. 0.898989. . . $\frac{89}{99}$
31. 0.212121. . . $\frac{7}{33}$
32. 1.50150150. . . $\frac{500}{333}$

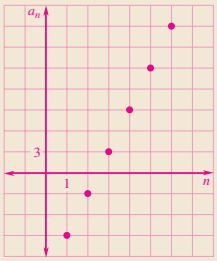
12.5 Write a recursive rule for the sequence. The sequence may be arithmetic, geometric, or neither.

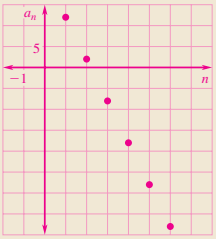
33. 2.5, 5, 10, 20, . . . $a_1 = 2.5, a_n = 2a_{n-1}$
34. 2, −2, −6, −10, . . . $a_1 = 2, a_n = a_{n-1} - 4$
35. 1, 2, 2, 4, 8, 32, . . . $a_1 = 1$ and $a_2 = 2, a_n = (a_{n-2})(a_{n-1})$

12.5 Find the first three iterates of the function for the given initial value.

36. $f(x) = 2x - 5, x_0 = 3$ 1, −3, −11
37. $f(x) = \frac{4}{5}x - 2, x_0 = -10$ −10, −10, −10
38. $f(x) = 3x^2 + x, x_0 = -1$ 2, 14, 602

EXTRA PRACTICE

1. perfect squares beginning with $3^2 = 9$; 49; $a_n = (n+2)^2$
2. multiples of $\frac{1}{3}$; $\frac{5}{3}$; $a_n = \frac{n}{3}$
3. each term is decreased by 5.5; −9.5; $a_n = 18 - 5.5n$
10. 

11. 

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