* Only Complete Even Numbers

Chapter 1 Supplementary Problems

Write an equation for each statement. Let x be the variable in each equation.

1. 3 times a number is 30

2. 8 less than a number is 12

3. 5 added to 2 times a numbers is 20

4. $\frac{3}{4}$ a number increased by 22 is 30

5. a number divided by 9 plus 15 is 25

Solve each equation. Check your answer.

6. $x - 8 = 17$

7. $x + 3 = 19$

8. $16 - x = 4$

9. $9x = 360$

10. $-x + 5.5 = 8.5$

11. $\frac{2}{3}x = 42$

12. $10 - x = -48$

13. $7\frac{1}{2}x - 3 = 12$

14. $-6.3 + x = -14.2$

15. $\frac{x}{8} = 7$

16. $4x + 3 = 15$

17. $9x - 14 = 31$

18. $16 - 3x = -2$

19. $4x - 12 = 53$

20. $\frac{4}{5}x - 7 = 25$

21. $6x + 3 = -8x - 13$

22. $x - 74 = \frac{3}{8}x + 36$

23. $15x - 9 = -27$

24. $\frac{3}{10}x + 15 = \frac{1}{5}x - 12$

25. $12x - 56 = -4x + 24$

Graph each inequality using a number line.

26. $x > 4$

27. $x \leq 12$

28. $9x > 18$

29. $3x < 21$

30. $8x - 3 \geq 29$

31. $5x + 14 \leq -6$

32. $12x - 1 < 35$

33. $\frac{1}{2}x - \frac{1}{3} \geq \frac{2}{3}$

34. $7 + 6x \leq 43$

35. $-8 + 12x \geq 40$

Find the solution for each equality or inequality. Graph the solution on a number line.

36. $|x| \geq 5$

37. $|x| = 8$

38. $|x + 3| = 7$

39. $|x| < 9$

40. $|x + 4| \leq 1$

41. $|x - 3| > 4$

42. $|x + 6| = 11$

43. $|3x + 6| = 15$

44. $|2x - 4| \leq 12$

45. $|8x - 3| > 5$

46. $|3x + 5| = 22$

47. $|9x + 3| < 15$

Solve each problem.

48. A number subtracted from 64 is 12. What is the number?

49. Four more than 8 times a number is 28. What is the number?

50. Marisa is $3\frac{1}{2}$ years younger than Calvin, who is 24. How old is Marisa?

Chapter 2 Supplementary Problems

Use the vertical line test to determine if the following are graphs of functions. Write *yes* or *no*.

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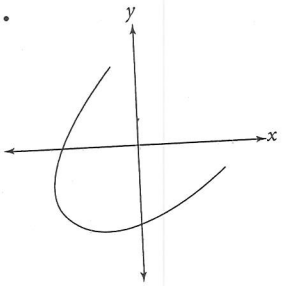

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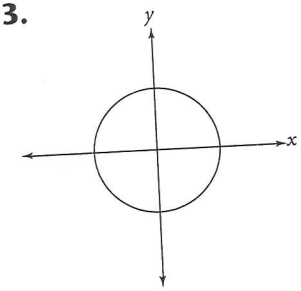

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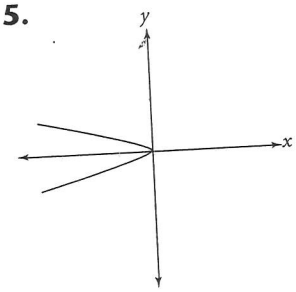

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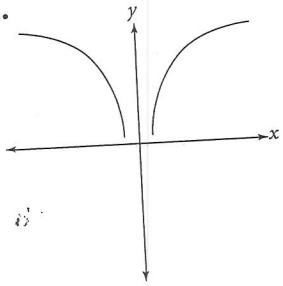

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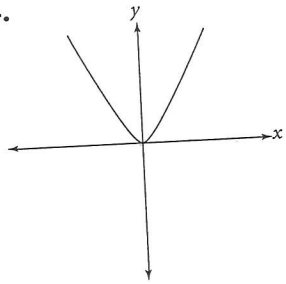

Find the slope of the line that passes through the given points.

6. $(1, 0), (2, 4)$

7. $(3, 2), (-3, 0)$

8. $(8, 5), (4, -4)$

9. $(-2, -5), (-1, 6)$

10. $(12, 4), (10, 0)$

11. $(2, 2), (5, 5)$

12. $(6, -1), (8, -1)$

13. $(0, 0), (10, 10)$

14. $(-9, 2), (-9, -6)$

15. $(3\frac{1}{2}, 7), (6, 5\frac{1}{2})$

Given m and b, write the equation of the line.

16. $m = 3, b = -4$

17. $m = 0, b = 12$

18. $m = -3\frac{1}{2}, b = 6$

19. $m = 14, b = 1\frac{7}{8}$

Write the equation of the line passing through the two given points.

20. $(1, -5)$ and $(4, -5)$

21. $(1, -7)$ and $(-3, 1)$

22. $(0, 4)$ and $(7, 7)$

23. $(8, -2)$ and $(10, 8)$

Write each equation in the form $y = mx + b$. Give the slope, y-intercept, and zero for each.

24. $3y = 6x + 9$

25. $4y = 2x - 12$

26. $-2y = 5x + 18$

27. $4x - 3x = 21$

Give the slope (positive, zero, negative, or no slope), the y-intercept, and the zero or root for each graph.

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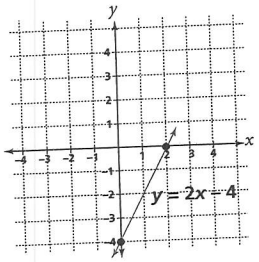

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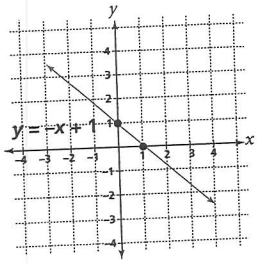

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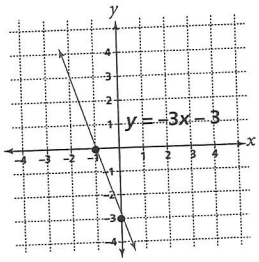

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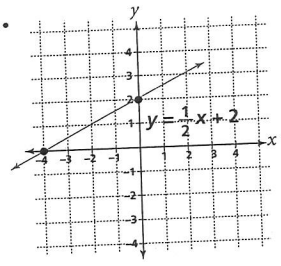

Graph each linear function and label the y-intercept.

32. $f(x) = 4x$

33. $f(x) = x - 3$

34. $f(x) = 2x + 3$

35. $f(x) = -x + 4$

36. $f(x) = \frac{2}{5}x + 1$

Graph the following inequalities.

37. $y \geq 2x - 3$

38. $y < 4x + 2$

39. $y > -3x - 4$

40. $y \leq x - \frac{1}{2}$

Chapter 3 Supplementary Problems

Solve each equation for x and check your answer.

1. $x^2 + 3x = 0$

2. $x^2 - 8x = 0$

3. $x^2 + 12x = 0$

4. $x^2 - \frac{2}{3}x = 0$

5. $x^2 + 4.5x = 0$

6. $2x^2 + 5x = 0$

7. $4x^2 - 3x = 0$

8. $3x^2 + 10x = 0$

9. $5x^2 - 15x = 0$

10. $9x^2 - 6x = 0$

Find the solution for each equation by factoring.

11. $x^2 - x - 6 = 0$

12. $x^2 + 5x + 4 = 0$

13. $x^2 + 2x - 15 = 0$

14. $x^2 - 9x + 8 = 0$

15. $x^2 + x - 30 = 0$

16. $x^2 + 5x - 14 = 0$

17. $x^2 + 8x + 15 = 0$

18. $2x^2 + 9x + 4 = 0$

19. $x^2 - 7x + 10 = 0$

20. $x^2 + x + \frac{1}{4} = 0$

21. $2x^2 + 5x - 12 = 0$

22. $6x^2 - x - 1 = 0$

23. $12x^2 + 7x - 10 = 0$

24. $30x^2 - 8x - 6 = 0$

25. $3x^2 + 5x - 28 = 0$

26. $2x^2 + 5x - 3 = 0$

27. $4x^2 - 12x - 27 = 0$

28. $6x^2 + 16x - 6 = 0$

29. $20x^2 - 3x - 2 = 0$

30. $36x^2 - 3x - 5 = 0$

31. $16x^2 - 62x + 21 = 0$

32. $12x^2 - 7x - 49 = 0$

33. $9x^2 + 21x - 60 = 0$

34. $8x^2 - 34x + 21 = 0$

Find the solution to each equation by completing the square.

35. $x^2 + 5x + 6 = 0$

36. $x^2 - 10x + 21 = 0$

37. $x^2 - 4x - 5 = 0$

38. $x^2 - 2x - 15 = 0$

39. $x^2 + 4x + 1 = 0$

40. $x^2 - 2x - 14 = 0$

41. $x^2 - 3x - 10 = 0$

42. $x^2 + 3x - 1 = 0$

43. $x^2 - 5x + 6 = 0$

44. $x^2 + 4x - 5 = 0$

45. $x^2 - 4x + 4 = 0$

46. $x^2 + 14x + 9 = 0$

47. $x^2 - 4x - 7 = 0$

48. $x^2 - 9x + 2 = 0$

49. $x^2 + 6x + 3 = 0$

50. $x^2 + 3x - 4 = 0$

Use the quadratic formula to solve each equation. You may express your answer in terms of square roots.

51. $x^2 - 6x + 6 = 0$

52. $x^2 + 4x - 2 = 0$

53. $x^2 + 6x - 4 = 0$

54. $2x^2 + 3x - 2 = 0$

55. $3x^2 + 7x + 2 = 0$

56. $x^2 - 2x - 2 = 0$

57. $2x^2 - 3x - 1 = 0$

58. $2x^2 - 5x + 2 = 0$

59. $x^2 - 2x - 4 = 0$

60. $x^2 + 4x + 1 = 0$

Use any method to solve the equations. You may express your answer in terms of i.

61. $x^2 - 3x + 7 = 0$

62. $x^2 - 4x + 8 = 0$

63. $2x^2 + 4x + 10 = 0$

64. $x^2 + 16 = 0$

65. $4x^2 - 5x + 10 = 0$

Chapter 4 Supplementary Problems

Find the values of the function for the given domain values.

1. $f(x) = 2x^2 - x + 3 \quad x = -2, -1, 0, 1, 2$

2. $f(x) = -x^2 + 2x - 4 \quad x = -2, -1, 0, 1, 2$

3. $f(x) = 10x^2 - 5x + 2 \quad x = -1, -\frac{1}{2}, 0, \frac{1}{2}, 1$

4. $f(x) = x^2 + 8x + 16 \quad x = -\frac{1}{2}, -\frac{1}{4}, 0, \frac{1}{4}, \frac{1}{2}$

5. $f(x) = -3x^2 - 6x + 1 \quad x = -2, -1, 0, 1, 2$

Find seven points for each function, and then sketch the parabola.

6. $f(x) = -2x^2$

7. $f(x) = 3x^2$

8. $f(x) = -\frac{1}{2}x^2$

9. $f(x) = -6x^2$

10. $f(x) = \frac{1}{4}x^2$

Sketch the graph using the function and three points.

11. $f(x) = x^2 - x - 2$

12. $f(x) = x^2 - 5x + 6$

13. $f(x) = x^2 - 5x + 4$

14. $f(x) = x^2 + x - 6$

15. $f(x) = x^2 - 3x - 10$

16. $f(x) = x^2 - x - 12$

17. $f(x) = x^2 + 2x - 3$

18. $f(x) = x^2 - 2x - 8$

19. $f(x) = x^2 - 2x - 3$

20. $f(x) = x^2 - 3x - 4$

Sketch the graphs, using the roots to find the function and the turning point.

21. $x = 3, x = -5$

22. $x = -1, x = -3$

23. $x = 2, x = -6$

24. $x = 7, x = -5$

25. $x = 6, x = 4$

26. $x = -8, x = -3$

27. $x = 4, x = -4$

28. $x = -7, x = -4$

29. $x = 2, x = 8$

30. $x = -1, x = -6$

Find the common solutions to the systems of equations.

31. $f(x) = x^2$ and $y = 4x$

32. $f(x) = 4x^2$ and $y = -2x + 2$

33. $f(x) = x^2$ and $y = -x + 2$

34. $f(x) = x^2 + 3$ and $y = x - 3$

35. $f(x) = x^2 - 1$ and $y = 2x + 2$

36. $f(x) = x^2 + 4$ and $y = -7x + 12$

37. $f(x) = x^2 - x + 1$ and $y = 2x - 1$

38. $f(x) = x^2 + 4x + 5$ and $y = -4x - 2$

39. $f(x) = x^2 - 4x + 1$ and $y = -2$

40. $f(x) = x^2 - 4x - 5$ and $y = 3x - 5$

Find the common solution to the systems of linear equations.

41. $y = 4x + 2$
$y = x - 1$

42. $y = 2x - 2$
$y = 3x$

43. $y = 5x - 3$
$y = 2x + 1$

44. $y = x - 4$
$y = x + 1$

45. $y = -x + 3$
$y = 2x - 6$

46. $y = 3x + 5$
$y = 5x - 3$

47. $2y + 3x = 12$
$-4y + 3x = 0$

48. $5x + 3y = -2$
$5x - 4y = 12$

49. $-2y + 5x = 5$
$2y - 2x = 1$

50. $y + 3x = 5$
$2y + 4x = 4$

Chapter 5 Supplementary Problems

Write the expressions in expanded form.

1. $(x + y)^2$

2. $(3x - y)^2$

3. $(2x - 2y)^2$

4. $(3x + 4y)^2$

5. $(5m - 3n)^2$

6. $(t - 7s)^2$

7. $(6q + 3p)^2$

8. $(y + x)^3$

Find the factors.

9. $a^2 - b^2$

10. $9x^2 - 4y^2$

11. $4x^2 - 16y^2$

12. $25x^2 - 36y^2$

13. $100x^2 - 49y^2$

14. $8x^3 - 27y^3$

15. $64x^3 - y^3$

16. $125x^3 - 8y^3$

Find each sum.

17. $(x^4 - 5x^3 + 2x^2 - 25)$ and $(x^2 - 7)$

18. $(mn^3 - 16m^2n + 24mn^2 + mn)$ and $(3mn^3 - m^2n - 24mn^2)$

19. $(3x^5 + 5x^3 - 8x^2 + 14)$ and $(-8x^3 + 7x^2 - 9x + 2)$

20. $(4a^3b^2 - 6a^2b^2 + 5ab^3)$ and $(a^3b^2 + a^2b^2 + 7ab^3)$

Find each difference.

21. Subtract $(x^2y^2 + 3xy^2 - 8x)$ from $(10x^2y^2 - 5xy^2 + 3x - 4)$

22. Subtract $(16p^2 + 33p - 17)$ from $(19p^2 + 13p)$

23. Subtract $(5p^2q - 17pq^2 + 12pq^3)$ from $(4pq^2 - 2pq^3)$

24. Subtract $(x^2 - y^2)$ from $(x^4 - 5x^3 + 2x^2 - 25)$

Find the products.

25. $(3x - 7y)^2$

26. $(6a + 4b)^2$

27. $(2x - 9y)^2$

28. $(10r + 8s)^2$

29. $(x + y)^3$

30. $(2a - 3)^3$

31. $(3g - 2h)^3$

32. $(4a + b)^3$

33. $(x - 2y)(x^2 + 4x - 4)$

Divide by factoring.

34. $(x^2 + 5x + 6) \div (x + 2)$

35. $(6x^2 + 13y - 28) \div (2x + 7)$

36. $(3x^2y + 15x^2y^2 - 6xy^2) \div (3xy)$

37. $(4x + y)^3 \div (4x + y)^2$

38. $(x^2y - y) \div y$

39. $(4a^2b - 4ab^2) \div (-2ab)$

40. $(8m^3 - 27n^3) \div (2m - 3n)$

41. $(16a^2 - 4b^2) \div (4a - 2b)$

Use long division to find the quotient.

42. $(a^2 + 4a + 4) \div (a + 2)$

43. $(x^3 - 7x - 6) \div (x + 1)$

44. $(x^3 + 3x^2 - x - 3) \div (x^2 + 4x + 3)$

45. $(x^3 + 6x^2 - x - 30) \div (x^2 + 8x + 15)$

Simplify the complex fractions. Write the answers in simplest form.

46. $\frac{1}{x} \div \frac{1}{x^3}$

47. $x \div \frac{2}{y^2}$

48. $\frac{y}{2} \div y^3$

49. $\frac{2x}{y} \div \frac{2x^2}{3y}$

50. $\frac{x}{6} \div \frac{x^4}{3}$

51. $\frac{8}{p} \div \frac{p^3}{3}$

52. $\frac{4z}{3} \div \frac{1}{z^3}$

53. $\frac{1}{p^3} \div \frac{3}{p^2}$

Use the letters of the given geometric figures to write a formula for each figure's perimeter. Let p = perimeter. Write in simplest form.

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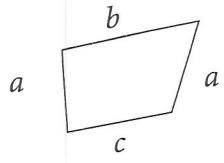

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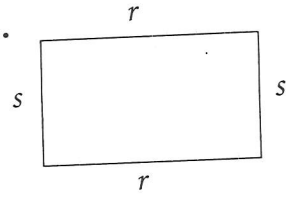


Chapter 6 Supplementary Problems

Simplify each rational expression. If there are no common factors, write "in lowest terms."

1. $\frac{x^4}{x^5}$

2. $\frac{9y^3}{3y}$

3. $\frac{4m^2}{10m^5}$

4. $\frac{24xy^3}{16x^3y}$

5. $\frac{15x^2}{20x^4}$

6. $\frac{5x^3y^2}{3x^4y}$

7. $\frac{16a^5b^3}{2ab^4}$

8. $\frac{29x^2y^4z^3}{9x^2y^5z^2}$

9. $\frac{\frac{1}{2x^2y}}{\frac{1}{3x^3}}$

10. $\frac{\frac{7}{4m^2n^3p}}{\frac{3}{16m^3np^3}}$

11. $\frac{(x^2-y)(x-y)}{(x^2-y)^2(x-y)^2}$

12. $\frac{(4x^2-y^2)}{(2x-y)}$

13. $\frac{(x^3+9y^3)}{(x+3y)}$

14. $\frac{(27m^3-n^3)}{(m+n)}$

15. $\frac{(6x^2-7x-3)}{(3x+1)}$

16. $\frac{(2x-y)^3}{2x-y}$

17. $\frac{(4x^2+8x+4)}{x+1}$

18. $\frac{(x^2-10x+9)}{(x^2+2x-3)}$

19. $\frac{(x^2-6x+9)}{(x^2-9)}$

20. $\frac{(x^2-25)}{(x^2-10x+25)}$

Find the least common denominator, then add or subtract. Express you answer in lowest terms.

21. $\frac{(x+7)}{3}+\frac{(4x+1)}{9}$

22. $\frac{15}{ab}+\frac{6}{a^2b^3}$

23. $\frac{9a^3b^2}{4x^3y^2z}-\frac{2ab^2}{xyz}$

24. $\frac{1}{3}x^4y^2-6x^6y^4z$

25. $\frac{x}{(x^2-4)}-\frac{2}{(x-2)}$

26. $\frac{2x}{(x+3)}-\frac{(x-3)}{(x^2+6x+9)}$

27. $\frac{-3}{(x+2)}+\frac{7x}{(x^2-x-6)}$

28. $\frac{5x}{(3x^2-7x+4)}+\frac{5}{(3x-4)}$

29. $\frac{(8x^3-y)}{4(x-2)}-\frac{(2x^3-y)}{(x-2)}$

30. $\frac{x^2}{(x^3-y^3)}+\frac{y^2}{(x-y)}$

Find the products.

31. $(\frac{2x^2}{y})(\frac{y^2}{x^3})$

32. $(\frac{3x^2}{2y^2})(\frac{3y^3}{x})$

33. $(\frac{6a}{3a^2})(\frac{1}{a})$

34. $(\frac{y^3}{4x^2})(\frac{12x^3y}{3x^3y})$

35. $(a\frac{2}{b^2})(\frac{b}{c^2})$

36. $[\frac{(x+1)}{3x^2}][\frac{(3x^3+3x^2)}{(x^2-1)}]$

37. $[\frac{(1-2x)}{x}][\frac{3x^2}{(1-4x^2)}]$

38. $[\frac{(x-1)}{3}][\frac{(x^2+1)}{(x^2-1)}]$

39. $[\frac{(x^2-x-6)}{(x^2-3x)}][\frac{(x^3+x^2)}{(x+2)}]$

40. $[\frac{(x^2-9)}{(x^3+4x^2+4x)}][\frac{(2x^2+4x)}{(x^2+2x-15)}]$

Find the quotient.

41. $\frac{3x^2}{2y^2} \div \frac{3x^3}{y}$

42. $\frac{6x^3y}{7} \div \frac{21x}{14y^3}$

43. $\frac{8xy^2}{z} \div \frac{5x^2y}{z^3}$

44. $\frac{(4x^2-4y^2)}{(x-y)} \div \frac{(x+y)^2}{(x-y)}$

45. $\frac{(25x^2-25y^2)}{(x+y)} \div \frac{(5x+5y)}{(x+y)^2}$

46. $\frac{(5x+3y)}{(x-2)} \div \frac{(10x^2-9xy-9y^2)}{(x^2-x-2)}$

47. $\frac{(27x^3-y^3)}{(a+b)} \div \frac{(a^2+2ab+b^2)}{(3x-y)}$

48. $\frac{(1-x)}{(2+x)} \div \frac{(x^2-x)}{(x^2+2x)}$

49. $\frac{(x^2+3x)}{(x^2+4x+3)} \div \frac{(x^2-2x)}{(x+1)}$

50. $\frac{(x^2+2xy+y^2)}{(x^2-y^2)} \div \frac{(x^2+3xy+2y^2)}{(x^2-3xy+2y^2)}$

Evaluate each expression. Give your answer as a ratio in simplest terms.

51. $\frac{(x^2-y^2)}{(x-2)}; x=3, y=1$

52. $\frac{(x-y)^2(x^2+xy+y^2)}{x^3-y^3}; x=2, y=-2$

53. $\frac{(x^2+y^2)(x^2-y^2)}{(x^4-y^4)}; x=-3, y=2$

54. $\frac{z+x(y+4)}{3x^2+y}; x=-1, y=0$

55. $\frac{x^2yz(x+y)}{2x^2+5xy+3y^2}; x=-2, y=-3, z=-1$

Chapter 7 Supplementary Problems

Multiply.

1. x^3x^2
2. m^5m^3
3. y^ay^b
4. x^5x^2x
5. $x^{2a}x^4$
6. $(a^4)^2$
7. $(xy)^3$
8. $(x^4y^3)^2$
9. $(m^2n)^5$
10. $(qr^5s^3)^x$
11. $(x+y)^2(x+y)^4$
12. $(x+y)^3(x+y)^7$
13. $(a+b)^8(a+b)$
14. $(c+d)^5(c+d)^3$
15. $(q+r)^9(q+r)^5$
16. $(x+y)^a(x+y)^b$

Divide.

17. $5^5 \div 5^4$
18. $x^7 \div x^2$
19. $\frac{x^4}{x}$
20. $\frac{a^8}{a^3}$
21. $\frac{(xy)^3}{(xy)}$
22. $\frac{x^5y^2}{xy}$
23. $\frac{(x+y)^6}{(x+y)^3}$
24. $\frac{m^a}{m^b}$
25. $\frac{(a+b)^x}{(a+b)^y}$
26. $\frac{(x-3)^8(x+y)^4}{(x-3)^5(x+y)^a}$
27. $x^5 \div x^7$
28. $e^5 \div e^9$
29. $\frac{x^2}{x^7}$
30. $\frac{(xy)^3}{(xy)^9}$
31. $\frac{(ab)}{(ab)^5}$
32. $\frac{x^7y^3}{xy^5}$

Rewrite using positive exponents.

33. x^{-4}
34. $4a^{-3}b^{-2}$
35. $3x^2y^{-5}$
36. $(a-b)^{-3}$
37. $\frac{2}{x^{-5}}$
38. $\frac{x^{-4}y^{-2}}{x^5y^{-5}}$

Perform the indicated operations. Give answers in simplified form.

39. $5\sqrt{3} - 2\sqrt{3}$

40. $6(\sqrt[3]{9}) + 2(\sqrt[3]{9}) - 4(\sqrt[3]{9})$

41. $\sqrt{2}\sqrt{32}$

42. $\sqrt{20}\sqrt{5}$

43. $\sqrt{\frac{9}{25}}$.

44. $2\sqrt{\frac{16}{25}}$

45. $\frac{\sqrt{x^4}}{\sqrt{y^2}}$

46. $\sqrt[4]{\frac{16}{81}}$

Solve for the unknown.

47. $\sqrt{x} + 6 = -3$

48. $\sqrt{y} - 7 = -5 + 3\sqrt{y}$

49. $2\sqrt{x} + 4 = \sqrt{x} - 1$

50. $-4\sqrt{x} - 6 = 10 - 3\sqrt{x}$

51. $3(\sqrt{x} + 2) = 3 - 2(\sqrt{x} + 2)$

52. $\frac{\sqrt{x}}{2} = 4$

53. $\sqrt[3]{x} - 2 = -5$

54. $(\sqrt{x} - 5) = 1$

Rationalize the denominators.

55. $\frac{4}{\sqrt{x} + 2}$

56. $\frac{8}{(\sqrt{6} - \sqrt{3})}$

57. $\frac{5}{(\sqrt{3} + \sqrt{2})}$

58. $\frac{\sqrt{3}}{\sqrt{5} - 4}$

59. $\frac{3\sqrt{6}}{(2\sqrt{3} - 3\sqrt{5})}$

60. $\frac{4\sqrt{3}}{(\sqrt{2} + 3\sqrt{7})}$

Write as decimals. Use bar notation for repeating digits.

61. $\frac{2}{3}$

62. $\frac{5}{16}$

63. $\frac{4}{7}$

64. $1\frac{1}{3}$

65. $\frac{11}{12}$

66. $3\frac{5}{6}$

Write as rational numbers.

67. $0.\overline{5}$

68. $2.\overline{3}$

69. $8.\overline{04}$

70. $2.\overline{45}$

Chapter 8 Supplementary Problems

Write the number below in scientific notation.

1. 8,280

2. 326

3. 0.0000432

4. 0.0732

5. 0.000100327

6. 381.89

7. 19.4

8. 1,000,300,219,697

Compute. Write your answer in scientific notation.

9. $(2 \times 10^4)(5 \times 10^8)$

10. $(4.5 \times 10^{-5})(6 \times 10^3)$

11. $\frac{(6 \times 10^4)}{(3 \times 10^9)}$

12. $\frac{(5.5 \times 10^{-6})}{(2.5 \times 10^{-9})}$

Solve for x. Use the substitution principle to check your answers.

13. $5^{x+1} = 5^{3x-5}$

14. $8^{2x} = 8^{6x+1}$

15. $12^{4x+2} = 12^{x-1}$

16. $3^{4x} = 9^{2x+1}$

17. $16^x = 48^{4x+9}$

18. $\sqrt{5^x} = \sqrt{5^{2x-3}}$

Use a calculator to solve for x. Round your answers to the nearest thousandth.

19. $e^x = 5$

20. $10^3 = x$

21. $10^x = 15$

22. $e^{0.7} = x$

23. $10^{-2.3} = x$

24. $e^x = 28$

Write the equation in logarithmic form. Round answers to the nearest thousandth.

25. $4^5 = 1{,}024$

26. $9^{-2} = 0.028$

27. $3^6 = 729$

28. $10^{-3}\ 0.001$

29. $18^2 = 324$

Write the equation in exponential form.

30. $\log_8 512 = 3$

31. $\ln 2.718 = 1$

32. $\log_{10} 2 = 100$

33. $\log_2 8 = 3$

Find an equation for $f^{-1}(x)$.

34. $f(x) = x - 3$

35. $f(x) = 3x + 1$

36. $f(x) = x^{-2}$

37. $f(x) = \frac{x}{4}$

Express as a sum of logarithms.

38. $\log_4(64)(16)$

39. $ln\ 2x$

40. $ln\ 3^2$

41. $\log_{10}15$

Express as a difference of logarithms.

42. $\log \frac{4}{5}$

43. $ln \frac{(3 + x)}{5}$

44. $\log \frac{10x}{9}$

45. $ln \frac{x}{y}$

Express as a product of the exponent and the logarithm.

46. $\log_5 3^2$

47. $\log_x 3^{-4}$

48. $\ln \sqrt[3]{20}$

49. $\log_4 \sqrt{x}$

Rewrite as logarithmic equations. Use your calculator to solve for x. Round your answers to the nearest thousandth.

50. $7^x = 25$

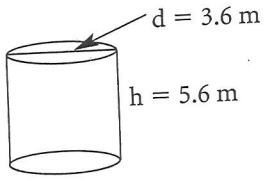
51. $4^x = 10$

52. $32^x = 75$

53. $5^{x+1} = 50$

Find the measurement. Use 3.14 for π.

54. Find the volume of the cylinder.



55. Find the area of the circle.