Review Exercises

In Exercises 1 and 2, determine which numbers in the set are (a) natural numbers, (b) integers, (c) rational numbers, and (d) irrational numbers.

1. $\{11, -14, -\frac{8}{9}, \frac{5}{2}, \sqrt{6}, 0.4\}$
2. $\{\sqrt{15}, -22, -\frac{10}{3}, 0, 5.2, \frac{3}{7}\}$

In Exercises 3 and 4, use a calculator to find the decimal form of the rational number. If it is a nonterminating decimal, write the repeating pattern.

3. (a) $\frac{5}{6}$ (b) $\frac{7}{8}$
4. (a) $\frac{9}{25}$ (b) $\frac{5}{7}$

In Exercises 5 and 6, give a verbal description of the subset of real numbers represented by the inequality, and sketch the subset on the real number line.

5. $x \leq 7$
6. $x > 1$

In Exercises 7–10, use absolute value notation to describe the expression.

7. The distance between x and 7 is at least 4.
8. The distance between x and 25 is no more than 10.
9. The distance between y and -30 is less than 5.
10. The distance between y and $\frac{1}{2}$ is greater than 2.

In Exercises 11–14, identify the rule of algebra illustrated by the equation.

11. $2x + (3x - 10) = (2x + 3x) - 10$
12. $\frac{2}{y + 4} \cdot \frac{y + 4}{2} = 1, \quad y \neq -4$
13. $0 + (a - 5) = a - 5$
14. $(t + 4)(2t) = (2t)(t + 4)$

In Exercises 15–18, simplify the expression.

15. (a) $(-2z)^3$
    (b) $(a^2 b^4)(3ab^{-2})$

16. (a) $\frac{(8y)^0}{y^2}$ (b) $\frac{40(b - 3)^5}{75(b - 3)^2}$

17. (a) $\frac{6^2 u^3 v^{-3}}{12u^{-2}v}$ (b) $\frac{3^{-4}m^{-1}n^{-3}}{9^{-2}mn^{-3}}$

18. (a) $(x + y^{-1})^{-1}$ (b) $\left(\frac{x^{-3}}{y}\right)\left(\frac{x}{y}\right)^{-1}$

In Exercises 19 and 20, write the number in scien notation.

19. 1994 Net Sales of Procter and Gamble Comp $30,296,000,000   (Source: 1994 Annual Repor

20. Number of Meters in One Foot: 0.3048

In Exercises 21 and 22, write the number in dec form.

21. Distance Between Sun and Jupiter: 4.833 ⨯ miles

22. Ratio of Day to Year: 2.74×10^{-3}

In Exercises 23 and 24, use a calculator to evaluat expression. (Round your answer to three dec places.)

23. (a) $1800(1 + 0.08)^{24}$
    (b) $0.0024(7,658,400)$

24. (a) $50,000\left(1 + \frac{0.075}{12}\right)^{48}$
    (b) $\frac{28,000,000 + 34,000,000}{87,000,000}$

In Exercises 25 and 26, fill in the missing expressic

Radical Form	Rational Exponent Form
25. $\sqrt{16} = 4$	$\quad = 4$
26. $\quad = 2$	$16^{1/4} = 2$

In Exercises 27 and 28, simplify by removing all possible factors from the radical.

27. (a) $\sqrt{4x^4}$ (b) $\sqrt{\dfrac{18u^2}{b^3}}$

28. (a) $\sqrt[3]{\dfrac{2x^3}{27}}$ (b) $\sqrt[5]{64x^6}$

In Exercises 29 and 30, rewrite the expression by rationalizing the denominator. Simplify your answer.

29. $\dfrac{1}{2-\sqrt{3}}$ 30. $\dfrac{1}{\sqrt{x}-1}$
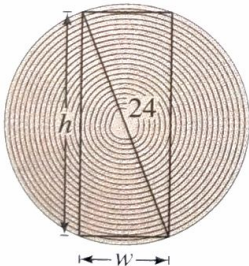
In Exercises 31 and 32, simplify the expression.

31. $\sqrt{50}-\sqrt{18}$ 32. $\sqrt{8x^3}+\sqrt{2x}$

33. **Strength of a Wooden Beam** The rectangular cross section of a wooden beam cut from a log of diameter 24 inches (see figure) will have a maximum strength if its width w and height h are given by

$$w = 8\sqrt{3} \quad \text{and} \quad h = \sqrt{24^2 - (8\sqrt{3})^2}.$$

Find the area of the rectangular cross section and express the answer in simplest form.

34. **Geometric Modeling** Use the area model to write two expressions for the total area in the figure. Then equate the two expressions and name the algebraic property illustrated.
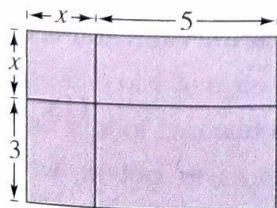
In Exercises 35–46, describe and correct the error.

35. $10(4 \cdot 7) = 40 \cdot 70$ 36. $\left(\frac{1}{3}x\right)\left(\frac{1}{3}y\right) = \frac{1}{3}xy$

37. $4\left(\frac{3}{7}\right) = \frac{12}{28}$ 38. $\frac{2}{9} \times \frac{4}{9} = \frac{8}{9}$

39. $\dfrac{x-1}{1-x} = 1$ 40. $(2x)^4 = 2x^4$

41. $(-x)^6 = -x^6$ 42. $(3^4)^4 = 3^8$

43. $\sqrt{3^2 + 4^2} = 3 + 4$ 44. $(5+8)^2 = 5^2 + 8^2$

45. $\sqrt{10x} = 10\sqrt{x}$ 46. $\sqrt{7x}\sqrt[3]{2} = \sqrt{14x}$

In Exercises 47–52, perform the operations and write the result in standard form.

47. $-(3x^2 + 2x) + (1 - 5x)$

48. $8y - [2y^2 - (3y - 8)]$

49. $(2x - 3)^2$

50. $(3\sqrt{5} + 2)(3\sqrt{5} - 2)$

51. $(x^3 - 3x)(2x^2 + 3x + 5)$

52. $\left(x - \dfrac{1}{x}\right)(x + 2)$

In Exercises 53–58, factor completely.

53. $x^3 - x$ 54. $x(x - 3) + 4(x - 3)$

55. $2x^2 + 21x + 10$ 56. $3x^2 + 14x + 8$

57. $x^3 - x^2 + 2x - 2$ 58. $x^3 - 1$

59. **Exploration** The surface area of a right circular cylinder is $S = 2\pi r^2 + 2\pi rh$.

(a) Draw a right circular cylinder of radius r and height h. Use the figure to explain how the surface area formula was obtained.

(b) Factor the expression for the surface area.

60. **Revenue** The revenue for selling x units of a product at a price of p dollars per unit is $R = xp$. For a particular product the revenue is

$$R = 1600x - 0.50x^2.$$

Factor the expression, and determine an expression that gives the price in terms of x.