

## 6-1 Roots and Radical Expressions

Find each real root.

5.  $\sqrt{25}$

6.  $\sqrt{0.49}$

7.  $\sqrt[3]{-8}$

8.  $-\sqrt[3]{8}$

Simplify each radical expression. Use absolute value symbols when needed.

9.  $\sqrt{81x^2}$

10.  $\sqrt[3]{64x^6}$

11.  $\sqrt[4]{16x^{12}}$

12.  $\sqrt[5]{0.00032x^5}$

13.  $\sqrt{\frac{9x^4}{36}}$

14.  $\sqrt[3]{125x^6y^9}$

## 6-2 Multiplying and Dividing Radical Expressions

Multiply if possible. Then simplify.

15.  $\sqrt[3]{9} \cdot \sqrt[3]{3}$

16.  $\sqrt[3]{-7} \cdot \sqrt[3]{49}$

17.  $\sqrt{2} \cdot \sqrt{8}$

Multiply and simplify.

18.  $\sqrt{8x^2} \cdot \sqrt{2x^2}$

19.  $5\sqrt[3]{9y^2} \cdot \sqrt[3]{24y}$

Divide and simplify.

20.  $\frac{\sqrt{128}}{\sqrt{8}}$

21.  $\frac{\sqrt[3]{81x^5y^3}}{\sqrt[3]{3x^2}}$

22.  $\frac{\sqrt[4]{162x^4}}{\sqrt[4]{2y^8}}$

Divide. Rationalize all denominators.

23.  $\frac{\sqrt{8}}{\sqrt{6}}$

24.  $\frac{\sqrt{3x^5}}{8x^2}$

25.  $\frac{\sqrt[3]{6x^2y^4}}{2\sqrt[3]{5x^7y}}$

## 6-3 Binomial Radical Expressions

---

Add or subtract if possible.

26.  $10\sqrt{27} - 4\sqrt{12}$

27.  $3\sqrt{20x} + 8\sqrt{45x} - 4\sqrt{5x}$

28.  $\sqrt[3]{54x^3} - \sqrt[3]{16x^3}$

Multiply.

29.  $(3 + \sqrt{2})(4 + \sqrt{2})$

30.  $(\sqrt{5} + \sqrt{11})(\sqrt{5} - \sqrt{11})$

31.  $(10 + \sqrt{6})(10 - \sqrt{3})$

Divide. Rationalize all denominators.

32.  $\frac{2 + \sqrt{5}}{\sqrt{5}}$

33.  $\frac{3 + \sqrt{18}}{1 + \sqrt{8}}$

## 6-4 Rational Exponents

---

Simplify each expression.

34.  $25^{\frac{1}{2}}$

35.  $81^{\frac{1}{4}}$

36.  $16^{\frac{1}{3}} \cdot 4^{\frac{1}{3}}$

37.  $5^{\frac{3}{2}} \cdot 5^{\frac{1}{2}}$

Write each expression in simplest form.

38.  $(x^{\frac{1}{4}})^4$

39.  $(-8y^9)^{\frac{1}{3}}$

40.  $(\sqrt{9xy^2})^4$

41.  $(x^{\frac{1}{6}} y^{\frac{1}{3}})^{-18}$

42.  $\left(\frac{x^4}{x^{-1}}\right)^{-\frac{1}{5}}$

43.  $\left(\frac{x^{\frac{1}{3}}}{y^{-\frac{2}{3}}}\right)^9$

## 6-5 Solving Square Root and Other Radical Equations

Solve each equation. Check for extraneous solutions.

44.  $2 + \sqrt{x + 5} = 4$

45.  $3\sqrt{2x + 6} = 18$

46.  $5(3x + 1)^{\frac{1}{4}} = 10$

47.  $4(3x - 3)^{\frac{3}{2}} = 36$

48.  $\sqrt{3x + 3} - 1 = x$

49.  $\sqrt{x + 6} + 2 = x + 6$

50.  $\sqrt{5x + 1} - 2\sqrt{x} = 1$

51.  $\sqrt{2x + 9} - \sqrt{x} = 3$

## 6-6 Function Operations

Let  $f(x) = x - 4$  and  $g(x) = x^2 - 16$ . Perform each function operation and then find the domain.

53.  $f(x) + g(x)$

54.  $g(x) - f(x)$

55.  $f(x) \cdot g(x)$

56.  $\frac{g(x)}{f(x)}$

Let  $g(x) = 5x - 2$  and  $h(x) = x^2 + 1$ . Find the value of each expression.

57.  $(h \circ g)(-1)$

58.  $(h \circ g)(0)$

59.  $(g \circ h)(2)$

60.  $(g \circ h)(a)$

## 6-7 Inverse Relations and Functions

Find the inverse of each function. Determine whether each inverse is a function.

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

63.  $f(x) = 15 - 3x$

64.  $f(x) = \sqrt{x + 6}$

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

Graph each function and its inverse. Describe the domain and range of each.

66.  $f(x) = 4x - 1$

67.  $f(x) = (x + 3)^2$

68.  $f(x) = \sqrt{x - 3}$

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

## 6-8 Graphing Radical Functions

Graph each function. Find the domain and range.

71.  $y = \sqrt{x} - 5$

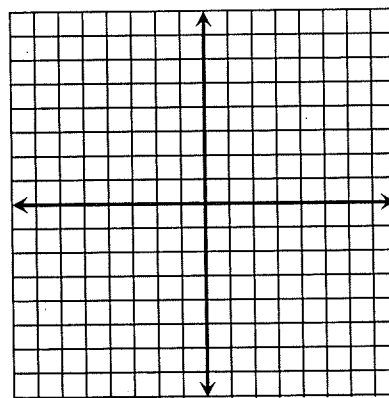
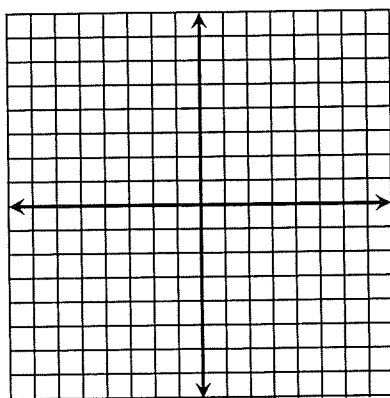
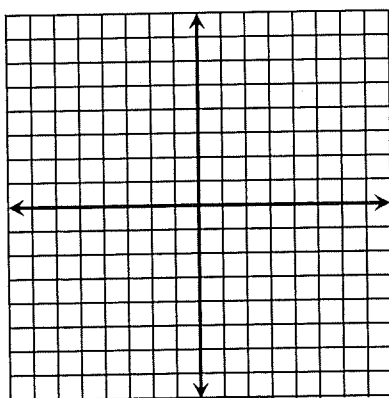
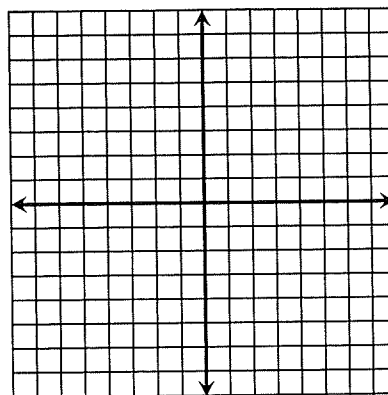
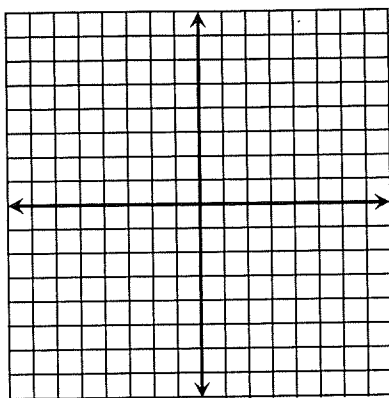
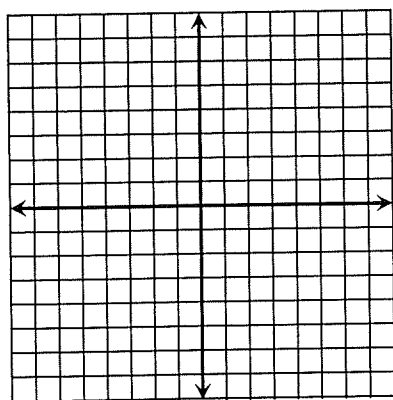
72.  $y = \sqrt{x + 8}$

73.  $y = 5\sqrt{x} + 9$

74.  $y = -\sqrt{x - 4}$

75.  $y = \sqrt[3]{x + 10}$

76.  $y = -\sqrt[3]{x - 2} + 5$



Rewrite each function to make it easy to graph using transformations. Describe each graph.

77.  $y = \sqrt{9x - 27} + 4$

78.  $y = -3\sqrt{4x - 16}$

79.  $y = \sqrt[3]{8x + 24}$

80.  $y = \sqrt{\frac{x - 4}{4}} + 6$