Roots,   Radical,   Root Functions

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Find the root if it is a real number.

1) $-\sqrt{0.0004}$ 1) _____
   - A) -0.02 B) 0.02
   - C) -0.002 D) Not a real number

2) $-\sqrt[3]{-216}$ 2) _____
   - A) 6   B) -6 C) 15   D) -36

Find the decimal approximation for the radical. Round the answer to three decimal places if necessary.

3) $\sqrt{9938}$ 3) _____
   - A) 99.695   B) 99.690   C) 9938.000   D) 99.687

4) $\sqrt[4]{2.0736}$ 4) _____
   - A) 0.300   B) 1.2   C) 1.44   D) 1.275

Simplify the expression involving rational exponents.

5) $343^{1/3}$ 5) _____
   - A) 2401   B) 7203   C) 7   D) 21

6) $(-49)^{1/2}$ 6) _____
   - A) -7 B) 7
   - C) Not a real number   D) -3.5

7) $(-64)^{1/3}$ 7) _____
   - A) -64 B) Not a real number
   - C) -4 D) 4

Solve the problem.

8) The cost of manufacturing clocks is given by $c = 36\sqrt{n + 16}$, where c is the total cost and n is the   8) _____
   number produced. What is the cost when no clocks are produced?
   - A) 24   B) 144   C) 36   D) 576

Evaluate the exponential.

9) $\left(-\dfrac{16}{49}\right)^{-1/2}$ 9) _____

   - A) $-\dfrac{7}{4}$ B) not a real number

   - C) $\dfrac{8}{49}$ D) $\dfrac{4}{7}$

1

10) $\left(-\dfrac{8}{125}\right)^{-4/3}$

$\qquad$ 10) _____

   A) $-\dfrac{16}{625}$ B) not a real number

   C) $\dfrac{16}{625}$ D) $\dfrac{625}{16}$

Write with radicals. Assume that all variables represent positive real numbers.

11) $m^{8/3}$

11) _____

    A) $\dfrac{1}{\sqrt[8]{m}}$ B) $\sqrt[8]{m^3}$ C) $\left(\sqrt[8]{m}\right)^3$ D) $\left(\sqrt[3]{m}\right)^8$

12) $(x^2y^2)^{1/7}$

12) _____

    A) $\left(\sqrt[7]{xy}\right)^2$ B) $x^{14}y^{14}$ C) $\dfrac{1}{\left(\sqrt[7]{xy}\right)^2}$ D) $\left(\sqrt[2]{xy}\right)^7$

Simplify by first converting to rational exponents. Assume all variables represent positive real numbers. Give the answer in radical form.

13) $\sqrt{x^{22}}$

13) _____

    A) $x^{4.69}$ B) x^{11} C) $\sqrt{x^{22}}$ D) $\sqrt{x^{11}}$

Use the rules of exponents to simplify the expression. Write the answer with positive exponents. Assume that all variables represent positive real numbers.

14) $\dfrac{x^{1/2}}{x^{5/4}\cdot x^{-2}}$

14) _____

    A) $x^{5/4}$ B) $\dfrac{1}{x^{15/4}}$ C) $x^{15/4}$ D) $\dfrac{1}{x^{5/4}}$

Write with rational exponents, and then apply the properties of exponents. Assume all radicands represent positive real numbers. Give answer in exponential form.

15) $\sqrt[3]{\sqrt[8]{\sqrt{x}}}$

15) _____

    A) $x^{1/11}$ B) x^{11} C) $x^{1/24}$ D) x^{24}

Solve the problem.

16) The cost of manufacturing clocks is given by $C(n) = 81(n + 9)^{1/2}$, where C is the total cost and n is the number of clocks produced. What is the total cost when no clocks are produced?

16) _____

    A) $27   B) $243   C) $81   D) $729

Multiply using the product rule. Assume all variables represent positive real numbers.

17) $\sqrt[3]{9x}\cdot\sqrt[3]{49x}$

17) _____

    A) $21x$ B) $\sqrt[3]{58x^2}$ C) $\sqrt[3]{441x^2}$ D) $10x$

Simplify the radical. Assume that all variables represent positive real numbers.

18) $\sqrt{\dfrac{5}{49}}$

    A) $7\sqrt{5}$ B) $49\sqrt{5}$ C) $\dfrac{\sqrt{5}}{7}$ D) $\dfrac{\sqrt{5}}{\sqrt{49}}$

18) _____

19) $\sqrt{\dfrac{29}{x^4}}$

    A) $\dfrac{\sqrt{29}}{\sqrt{x^4}}$ B) $\dfrac{\sqrt{29}}{x}$ C) $\dfrac{\sqrt{29x^4}}{x^4}$ D) $\dfrac{\sqrt{29}}{x^2}$

19) _____

20) $\sqrt[4]{\dfrac{1296}{625}}$

    A) $\dfrac{6}{5}$ B) $\dfrac{1296}{625}$ C) $\dfrac{36}{25}$ D) $\dfrac{216}{125}$

20) _____

Express the radical in simplified form.

21) $-\sqrt{80}$

    A) $-16\sqrt{5}$ B) 8 C) $-4\sqrt{5}$ D) 4

21) _____

22) $\sqrt{-864}$

    A) $12\sqrt{6}$ B) $-12\sqrt{6}$

    C) $-12\sqrt{-6}$ D) Not a real number

22) _____

Express in simplified form. Assume that all variables represent positive real numbers.

23) $\sqrt{384x^2}$

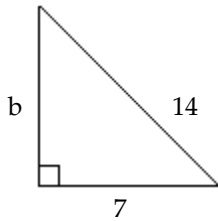   A) $8x\sqrt{6}$ B) $6x^2\sqrt{8}$ C) $384x$ D) $8\sqrt{6x}$

23) _____

24) $-\sqrt[3]{512x^4y^5}$

    A) $-8xy\sqrt[3]{xy^2}$ B) $5xy\sqrt[3]{xy^2}$ C) $8xy\sqrt[2]{xy^2}$ D) $-8xy\sqrt[3]{xy}$

24) _____

Simplify by first writing the radicals with the same index. Then multiply.

25) $\sqrt{3} \cdot \sqrt[3]{4}$

    A) $\sqrt[6]{108}$ B) $\sqrt[6]{432}$ C) $\sqrt[6]{12}$ D) $\sqrt[6]{144}$

25) _____

Find the missing length in the right triangle. Simplify the answer if necessary.

26)

A) $b = 7\sqrt{3}$ B) $b = \sqrt{21}$ C) $b = \sqrt{35}$ D) $b = 7\sqrt{5}$

26) _____

Express in simplified form. Assume that all variables represent positive real numbers.

27) $\sqrt[3]{-27a^8b^5}$

A) $3\sqrt{a^2b^2}$ B) $3ab\sqrt[3]{a^2b^2}$ C) $3ab\sqrt[3]{a^3b^3}$ D) $-3a^2b\sqrt[3]{a^2b^2}$

27) _____

28) $\sqrt[4]{256a^4}$

A) $4a^2$ B) $256a$ C) $4a$ D) $4\sqrt{a}$

28) _____

Find the distance between the pair of points.

29) $(-1, -2)$ and $(1, -6)$

A) $2\sqrt{3}$ B) 18 C) 6 D) $2\sqrt{5}$

29) _____

Perform the indicated operations and simplify. Assume that all variables represent positive real numbers.

30) $3\sqrt{128} - 3\sqrt{50}$

A) $9\sqrt{2}$ B) $-9\sqrt{2}$ C) $-39\sqrt{2}$ D) $39\sqrt{2}$

30) _____

31) $5\sqrt{72} + 6\sqrt{162} + 7\sqrt{200}$

A) $5\sqrt{2}$ B) $154\sqrt{2}$ C) $17\sqrt{2}$ D) $-17\sqrt{2}$

31) _____

Simplify. Assume that all variables represent positive real numbers.

32) $2\sqrt[3]{125x} + 2\sqrt[3]{27x}$

A) $8\sqrt[3]{x}$ B) $2\sqrt[3]{152x}$ C) $16\sqrt[3]{x}$ D) $16x$

32) _____

33) $\sqrt{\dfrac{5}{6}} - \sqrt{\dfrac{180}{216}}$

A) -6 B) $-\dfrac{1}{6}$ C) 0 D) -1

33) _____

Multiply, then simplify the product. Assume that all variables represent positive real numbers.

34) $\sqrt{5}(\sqrt{5} - \sqrt{55})$

A) $5 - 5\sqrt{11}$ B) $5 + 5\sqrt{11}$ C) $5 - \sqrt{275}$ D) $5 - 11\sqrt{5}$

34) _____

35) $(5 - 2\sqrt{3})^2$

A) $37 - 20\sqrt{3}$ B) $25 - 4\sqrt{3}$ C) $25 + 4\sqrt{3}$ D) $37 + 20\sqrt{3}$

35) _____

4

36) $(\sqrt{17} + \sqrt{2})(\sqrt{2} + \sqrt{11})$
    A) $\sqrt{34} + \sqrt{187} + \sqrt{2} + \sqrt{22}$ B) $\sqrt{34} + \sqrt{187} + 2 + \sqrt{22}$
    C) $\sqrt{34} + \sqrt{187} + 4 + \sqrt{22}$ D) $\sqrt{34} + \sqrt{187} + 3 + \sqrt{22}$

36) _____

Rationalize the denominator. Assume that all variables represent positive real numbers.

37) $\dfrac{9}{\sqrt{23}}$

    A) $\dfrac{9\sqrt{23}}{23}$ B) 538   C) $9\sqrt{23}$ D) $\dfrac{81\sqrt{23}}{23}$

37) _____

Simplify. Assume that all variables represent positive real numbers.

38) $\sqrt[3]{\dfrac{5}{3}}$

    A) $\dfrac{\sqrt[3]{45}}{3}$ B) $\dfrac{\sqrt[3]{135}}{3}$ C) $\dfrac{\sqrt[3]{15}}{3}$ D) $\dfrac{45}{3}$

38) _____

Rationalize the denominator. Assume that all variables represent positive real numbers and that the denominator is not zero.

39) $\dfrac{7}{9 - \sqrt{3}}$

    A) $\dfrac{63 + 7\sqrt{3}}{6}$ B) $\dfrac{7}{9} - \dfrac{7}{\sqrt{3}}$ C) $\dfrac{63 + 7\sqrt{3}}{78}$ D) $\dfrac{63 - 7\sqrt{3}}{78}$

39) _____

40) $\dfrac{7 - \sqrt{2}}{7 + \sqrt{2}}$

    A) $\dfrac{51 + 14\sqrt{2}}{47}$ B) $\dfrac{51 - 14\sqrt{2}}{47}$ C) $\dfrac{47 - 14\sqrt{2}}{51}$ D) –1

40) _____

Write the expression in lowest terms. Assume that all variables represent positive real numbers.

41) $\dfrac{18 - 30\sqrt{14}}{30}$

    A) $\dfrac{9 - 15\sqrt{7}}{15}$ B) $\dfrac{3 - 5\sqrt{14}}{5}$ C) $\dfrac{18 - 10\sqrt{7}}{5}$ D) $\dfrac{6 - 30\sqrt{14}}{5}$

41) _____

Solve the equation.

42) $\sqrt{2x - 4} - 6 = 0$
    A) $\{5\}$ B) $\varnothing$ C) $\{20\}$ D) {36}

42) _____

Solve this equation.

43) $\sqrt{p^2 - 3p + 64} = p + 5$

    A) {3}   B) $\left\{ -\dfrac{3}{2} \right\}$ C) {–3}   D) {8}

43) _____

Solve the equation.

44) $\sqrt[4]{2x - 16} + 9 = 11$

    A) {32}   B) {16}   C) {12}   D) {–2072}

44) _____

Rewrite the expressions with rational exponents as radical expressions, and then solve the equation.

45) $(x^2 + 2)^{1/2} - (2x + 5)^{1/2} = 0$

    A) ∅   B) {–3, 1}   C) {3}   D) {3, –1}

45) _____

Write the number as a product of a real number and i. Simplify the radical expression.

46) $\sqrt{-1600}$

    A) 40i   B) ± 40   C) –40i   D) $i\sqrt{40}$

46) _____

Multiply or divide as indicated.

47) $\sqrt{-13} \cdot \sqrt{-13}$

    A) –13i   B) –13   C) 13   D) 13i

47) _____

Add or subtract as indicated. Write your answers in standard form.

48) [(6 + 4i) – (1 + 8i)] – (10 – 2i)

    A) 17 – 2i   B) –5 + 10i   C) –5 – 2i   D) 17 + 10i

48) _____

Multiply.

49) (6 – 4i)(6 + 7i)

    A) 8 – 66i   B) 64 – 18i   C) $-28i^2 + 18i + 36$ D) 64 + 18i

49) _____

Find the power of i.

50) i^{13}

    A) –1   B) –i   C) 1   D) i

50) _____