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Practice

Form K

Rocks and Radical Expressions

Find all the real square roots of each number.

1. 625

2. -1.44

3. $\frac{16}{81}$

Find all the real cube roots of each number.

4. -216

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

6. 0.027

Find all the real fourth roots of each number.

7. 0.2401

8. 1

9. -1296

Find each real root. To start, find a number whose square, cube, or fourth is equal to the radicand.

10. $\sqrt{400}$
 $= \sqrt{(20)^2}$

11. $-\sqrt[4]{256}$

12. $\sqrt[3]{-729}$

Simplify each radical expression. Use absolute value symbols when needed. To start, write the factors of the radicand as perfect squares, cubes, or fourths.

13. $\sqrt{25x^6}$
 $= \sqrt{(5)^2(x^3)^2}$

14. $\sqrt[3]{343x^9y^{12}}$

15. $\sqrt[4]{16x^{16}y^{20}}$

6-1

Practice (continued)

Form K

Roots and Radical Expressions

16. The formula for the volume of a sphere is $V = \frac{4}{3}\pi r^3$. Solving for r , the radius of a sphere is $r = \sqrt[3]{\frac{3V}{4\pi}}$. If the volume of a sphere is 20 ft^3 , what is the radius of the sphere to the nearest hundredth?

Find the two real solutions of each equation.

17. $x^4 = 81$

18. $x^2 = 144$

19. $x^4 = \frac{2401}{625}$

20. **Writing** Explain how you know whether or not to include the absolute value symbol on your root.

21. Arrange the numbers $\sqrt[3]{-64}$, $-\sqrt[3]{-64}$, $\sqrt{64}$, and $\sqrt[6]{64}$, in order from least to greatest.

22. **Open-Ended** Write a radical that has no real values.

23. **Reasoning** There are no real n th roots of a number b . What can you conclude about the index n and the number b ?

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Practice

Form K

Multiplying and Dividing Radical Expressions

Multiply, if possible. Then simplify. To start, identify the index of each radical.

1. $\sqrt[3]{4} \cdot \sqrt[3]{6}$

index of both radicals is 3

$$\sqrt[3]{4 \cdot 6}$$

2. $\sqrt{5} \cdot \sqrt{8}$

3. $\sqrt[3]{6} \cdot \sqrt[4]{9}$

Simplify. Assume all variables are positive. To start, change the radicand to factors with the necessary exponent.

4. $\sqrt[3]{27x^6}$

$$= \sqrt[3]{3^3 \cdot (x^2)^3}$$

5. $\sqrt{48x^3y^4}$

6. $\sqrt[5]{128x^2y^{25}}$

Multiply and simplify. Assume all variables are positive.

7. $\sqrt{12} \cdot \sqrt{3}$

8. $\sqrt[4]{7x^6} \cdot \sqrt[4]{32x^2}$

9. $2\sqrt[3]{6x^4y} \cdot 3\sqrt[3]{9x^5y^2}$

Simplify each expression. Assume all variables are positive.

10. $\sqrt[3]{4} \cdot \sqrt[3]{80}$

11. $5\sqrt{2xy^6} \cdot 2\sqrt{2x^3y}$

12. $\sqrt{5}(\sqrt{5} + \sqrt{15})$

13. **Error Analysis** Your classmate simplified $\sqrt{5x^3} \cdot \sqrt[3]{5xy^2}$ to $5x^2y$. What mistake did she make? What is the correct answer?

14. A square rug has sides measuring $\sqrt[3]{16}$ ft by $\sqrt[3]{16}$ ft. What is the area of the rug?

6-2

Practice (continued)

Form K

Multiplying and Dividing Radical Expressions

Divide and simplify. Assume all variables are positive. To start, write the quotient of roots as a root of a quotient.

$$15. \frac{\sqrt{36x^6}}{\sqrt{9x^4}}$$
$$= \sqrt{\frac{36x^6}{9x^4}}$$

$$16. \frac{\sqrt[4]{405x^8y^2}}{\sqrt[4]{5x^3y^2}}$$

$$17. \frac{\sqrt[3]{75x^7y^2}}{\sqrt[3]{25x^4}}$$

Rationalize the denominator of each quotient. Assume all variables are positive. To start, multiply the numerator and denominator by the appropriate radical expression to eliminate the radical.

$$18. \frac{\sqrt{26}}{\sqrt{3}}$$
$$= \frac{\sqrt{26}}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}}$$

$$19. \frac{\sqrt[3]{x}}{\sqrt[3]{2}}$$

$$20. \frac{\sqrt{7x^4y}}{\sqrt{5xy}}$$

21. Einstein's famous formula $E = mc^2$ relates energy E , mass m , and the speed of light c . Solve the formula for c . Rationalize the denominator.

22. The formula $h = 16t^2$ is used to measure the time t it takes for an object to free fall from height h . If an object falls from a height of $h = 18a^5$ ft, how long did it take for the object to fall in terms of a ?