6.R.3 Exercises

Concept Check

True/False. Determine whether each statement is true or false. If a statement is false, explain how it can be changed so the statement will be true. (**Note:** There may be more than one acceptable change.)

1. The same rules for exponents apply to both integer exponents and rational exponents.

2. If the cube root of 7 were to be converted into exponential notation it would be $\sqrt[3]{7}$.

3. Any expression to the power 0, such as $\left(\sqrt[4]{x}\right)^0$, is equal to 1.

4. The expression $y^{\frac{1}{2}}$ can be rewritten in radical notation as $\sqrt{y^2}$.

Practice

5. Use radical notation to write an expression that is equivalent to $8^{\frac{1}{3}}$.

6. Use exponential notation to write an expression that is equivalent to $\sqrt{3}$.

Simplify each numerical expression.

7. $100^{-\frac{1}{2}}$

8. $64^{\frac{2}{3}}$

9. Simplify $\dfrac{a^{\frac{1}{2}} \cdot a^{-\frac{3}{4}}}{a^{-\frac{1}{2}}}$. Assume that all variables represent positive real numbers.

10. Simplify $\dfrac{\sqrt[4]{y^3}}{\sqrt[6]{y}}$ by first changing it into an equivalent expression with rational exponents. Rewrite the answer in simplified radical form. Assume that all variables represent positive real numbers.

Applications

Solve.

11. ***Area:*** The width of a rectangle is $\sqrt[3]{64^2}$ ft and the length is $216^{\frac{2}{3}}$ ft. What is the area of the rectangle?

12. ***Amusement Parks:*** An amusement park is creating signs to indicate the velocity of the roller coaster car on certain hills of the most popular rides. A roller coaster car gains kinetic energy as it goes down a hill. The velocity, or speed, of an object in kilometers per hour (km/h) can be determined by $V = \left(\dfrac{2k}{m}\right)^{\frac{1}{2}}$, where k is the kinetic energy of the object in joules (J) and m is the mass of the object in kilograms (kg).

a. For the most popular roller coaster, the car has a mass of 300 kg and the car has a kinetic energy of 375,000 J on the first hill. What velocity does the car obtain on the first hill?

b. For the second most popular roller coaster, the car has a mass of 350 kg and the car has a kinetic energy of 70,000 on the first hill. What velocity does the car obtain on the first hill?

Writing & Thinking

13. Is $\sqrt[5]{a} \cdot \sqrt{a}$ the same as $\sqrt[5]{a^2}$? Explain why or why not.

14. Assume that x represents a positive real number. Describe what kind of number the exponent n must be for x^n to mean

a. a product.

b. a quotient.

c. 1.

d. a radical expression.