

6-4 Practice

Rational Exponents

Form K

Simplify each expression.

1. $16^{\frac{1}{4}} =$
 $\sqrt[4]{16} =$

2. $(-3)^{\frac{1}{3}} \cdot (-3)^{\frac{1}{3}} \cdot (-3)^{\frac{1}{3}}$

3. $5^{\frac{1}{2}} \cdot 45^{\frac{1}{2}}$

Write each expression in radical form.

4. $x^{\frac{1}{4}}$

5. $x^{\frac{4}{5}}$

6. $x^{\frac{2}{9}}$

Write each expression in exponential form.

7. $\sqrt[3]{2}$

8. $\sqrt[3]{2x^2}$

9. $\sqrt[3]{(2x)^2}$

10. Bone loss for astronauts may be prevented with an apparatus that rotates

to simulate gravity. In the formula $N = \frac{a^{0.5}}{2\pi r^{0.5}}$, N is the rate of rotation in revolutions per second, a is the simulated acceleration in m/s^2 , and r is the radius of the apparatus in meters. How fast would an apparatus with the following radii have to rotate to simulate the acceleration of 9.8 m/s^2 that is due to Earth's gravity?

a. $r = 1.7 \text{ m}$

b. $r = 3.6 \text{ m}$

c. $r = 5.2 \text{ m}$

d. **Reasoning** Would an apparatus with radius 0.8 m need to spin faster or slower than the one in part (a)?

Simplify each number.

$$11. (-216)^{\frac{1}{3}} \\ = \sqrt[3]{-216} =$$

$$12. 243^{1.2}$$

$$13. 32^{-0.4}$$

Find each product or quotient. To start, rewrite the expression using exponents.

$$14. (\sqrt[4]{6})(\sqrt[3]{6}) \\ = \left(6^{\frac{1}{4}}\right)\left(6^{\frac{1}{3}}\right) =$$

$$15. \frac{\sqrt[5]{x^2}}{\sqrt[10]{x^2}}$$

$$16. \sqrt{20} \cdot \sqrt[3]{135}$$

Simplify each number.

$$17. (125)^{\frac{2}{3}}$$

$$18. (216)^{\frac{2}{3}}(216)^{\frac{2}{3}}$$

$$19. (-243)^{\frac{2}{5}}$$

Write each expression in simplest form. Assume that all variables are positive.

$$20. (16x^{-8})^{\frac{3}{4}}$$

$$21. (8x^{15})^{-\frac{1}{3}}$$

$$22. \left(\frac{x^2}{x^{-10}}\right)^{\frac{1}{3}}$$

23. Error Analysis Explain why the following simplification is incorrect. What is the correct simplification?

$$\begin{aligned} & 5\left(4 - 5^{\frac{1}{2}}\right) \\ & = 5(4) - 5\left(5^{\frac{1}{2}}\right) = 20 - 25^{\frac{1}{2}} = 15 \end{aligned}$$