

Rational and Radical Functions

Radical Functions

Radical Expressions and Rational Exponents

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Example 1

Find all real roots.

1. cube roots of 27

2. fourth roots of 625

3. cube roots of 0

Example 2

Simplify each expression. Assume that all variables are positive.

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

5. $\sqrt[4]{\frac{32}{x^4}}$

6. $\sqrt[3]{\frac{125x^6}{6}}$

7. $\sqrt{50x^3}$

8. $\sqrt[4]{x^8} \cdot \sqrt[3]{x^4}$

9. $\sqrt[3]{\frac{x^5}{4}}$

10. $\frac{\sqrt{40x^4}}{\sqrt[3]{-x^3}}$

11. $\sqrt[4]{\frac{x^{12}y^4}{3}}$

Example 3

Write each expression in radical form, and simplify.

12. $36^{\frac{3}{2}}$

13. $32^{\frac{3}{5}}$

14. $(-27)^{\frac{1}{3}}$

15. $8^{\frac{2}{3}}$

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Example 4

Write each expression by using rational exponents.

16. $\sqrt[5]{9^{10}}$

17. $\sqrt{8^3}$

18. $(\sqrt[6]{5})^3$

19. $(\sqrt[3]{27})^2$

Example 5

Simplify each expression.

20. $13^{\frac{1}{2}} \cdot 13^{\frac{3}{2}}$

21. $\frac{9^{\frac{4}{3}}}{9^{\frac{2}{3}}}$

22. $(64^{\frac{1}{2}})^{\frac{1}{3}}$

23. $(\frac{8}{27})^{\frac{1}{3}}$

24. $25^{-\frac{1}{2}}$

25. $7^{\frac{1}{4}} \cdot 7^{-\frac{3}{4}}$

26. $(-125)^{-\frac{1}{3}}$

27. $(\frac{1}{6^2})^6$

Example 6

28. **Geometry** The side length of a cube can be determined by finding the cube root of the volume. What is the side length to the nearest *inch* of the cube shown?

