

6.6 Rational Exponents & Radicals - Day 1 Notes

Objective: Writing expressions with rational exponents and in radical form.
Simplifying expressions in exponential or radical form

Rational Exponents & Radicals

$$\sqrt[n]{b} = b^{\frac{1}{n}}$$

Index of the root is **ALWAYS**
on the **bottom** of rational exponents!

Examples. $\sqrt[3]{27} =$

$$(16)^{\frac{1}{2}} =$$

Write each example in radical or exponential form.

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

2. $\sqrt[3]{-216} =$

3. $\sqrt{121}$

4. $256^{\frac{1}{2}} =$

5. $32^{\frac{1}{5}} =$

6. $(-64)^{\frac{1}{3}}$

Definition: $b^{\frac{m}{n}} = (\sqrt[n]{b})^m$ **OR** $b^{\frac{m}{n}} = \sqrt[n]{b^m}$

Examples. $27^{\frac{2}{3}} =$

or

$$27^{\frac{2}{3}} =$$

Write each example in radical or exponential form.

7. $16^{\frac{3}{2}}$

8. $(-27)^{\frac{4}{3}}$

9. $\sqrt[4]{15^3}$

10. $(\sqrt[5]{-32})^3$

11. $2^{\frac{5}{6}}$

12. $(\sqrt[3]{8x^9})^5$

Negative Rational Exponents

$$16^{-\frac{1}{2}} = \frac{1}{16^{\frac{1}{2}}}$$

Rewrite each expression using positive rational exponents. Simplify if possible.

13. $16^{\frac{1}{4}} =$

14. $64^{\frac{1}{3}} =$

15. $(-32)^{-\frac{1}{5}}$

All the Rules for Integer Exponents Also Apply to Rational Exponents

Simplify each expression. Translate between rational and radical form.

16. $27^{\frac{1}{3}} \cdot 27^{\frac{5}{3}}$

17. $\left(\frac{4}{9}\right)^{\frac{3}{2}}$

18. $c^{\frac{12}{5}} \cdot c^{\frac{3}{5}}$

19. $x^{\frac{6}{11}} \cdot x^{\frac{5}{11}}$

20. $\left(\frac{125}{216}\right)^{\frac{2}{3}}$

21. $\frac{q^{\frac{3}{5}}}{q^{\frac{2}{5}}}$

22. $\frac{x^{\frac{3}{4}}}{x^{\frac{1}{4}}}$

23. $\left(5^{\frac{1}{3}}\right)^6$

24. $\left(3^{\frac{2}{5}}\right)^{10}$