

8.6 Radicals & Rational Exponents DAY TWO

Objectives

Rewrite radical expressions by using rational exponents.
Simplify and evaluate radical expressions and expressions containing rational exponents.

May 6-1:06 PM

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

$$8^{\frac{1}{3}} = (\sqrt[3]{8})^1$$

$$8^{\frac{2}{3}} = (\sqrt[3]{8})^2 \quad 2^2 = 4$$

May 15-1:40 PM

A **rational exponent** is an exponent that can be expressed as $\frac{m}{n}$, where m and n are integers and $n \neq 0$. Radical expressions can be written by using rational exponents.

Rational Exponents

For any natural number n and integer m ,

WORDS	NUMBERS	ALGEBRA
The exponent $\frac{1}{n}$ indicates the n th root.	$16^{\frac{1}{4}} = \sqrt[4]{16} = 2$	$a^{\frac{1}{n}} = \sqrt[n]{a}$
The exponent $\frac{m}{n}$ indicates the n th root raised to the m th power.	$8^{\frac{2}{3}} = (\sqrt[3]{8})^2 = 2^2 = 4$	$a^{\frac{m}{n}} = (\sqrt[n]{a})^m = \sqrt[n]{a^m}$

May 2-2:11 PM

Write the expression $(-32)^{\frac{3}{5}}$ in radical form and simplify.

$$(\sqrt[5]{-32})^3 \quad (-2)^3 = -8$$

Write with a radical.

Evaluate the root.

Evaluate the power.

May 3-12:23 PM

Write the expression $64^{\frac{1}{3}}$ in radical form, and simplify.

$$\sqrt[3]{64} = 4$$

What is the index and exponent?

Write the expression $4^{\frac{5}{2}}$ in radical form, and simplify.

$$(\sqrt[2]{4})^5$$

$$2^5 = 32$$

May 3-12:26 PM

Write each expression by using rational exponents.

What is the fraction exponent?

A. $\sqrt[4]{13^8} = 13^{\frac{8}{4}} = 13^2$

B. $\sqrt[15]{13^{45}} = 13^{\frac{45}{15}} = 13^3$

C. $(\sqrt[3]{81})^3 = 81^{\frac{3}{3}} = 81$

D. $\sqrt[3]{10^9} = 10^{\frac{9}{3}} = 10^3$

E. $\sqrt[5]{5^2} = 5^{\frac{2}{5}}$

$5^{\frac{2}{4}} = 5^{\frac{1}{2}}$

May 3-12:29 PM

Simplify each expression.

Remember your exponent rules!

1. $7^{\frac{7}{9}} \cdot 7^{\frac{11}{9}}$ 2. $\frac{16^{\frac{3}{5}}}{5}$

$7^{\frac{18}{9}} = 7^2 = 49$ $16^{\frac{3}{5}} = 16^{\frac{3}{5}}$
 $(\sqrt[5]{16})^3$
 $4^{-1} = \frac{1}{4}$

3. $36^{\frac{3}{4}} \cdot 36^{\frac{1}{4}}$ $\frac{1}{4^1} = \frac{1}{4}$

$36^{\frac{4}{4}} = 36^1 = 36$ $\sqrt[4]{36} = 6$

4. $\frac{5^{\frac{9}{4}}}{5^{\frac{1}{4}}}$ $5^{\frac{8}{4}} = 5^2 = 25$

$(-8)^{-\frac{1}{3}}$ $(\sqrt[3]{8})^{-1}$
 $(-2)^{-1}$ $(-2)^{-1}$

5. $(-2)^{-1}$ 6. $(125^{\frac{2}{3}})^{\frac{3}{2}}$

$(-2)^{-1} = \frac{1}{-2} = -\frac{1}{2}$ $125^{\frac{10}{6}}$
 $125^{\frac{5}{3}}$
 $(\sqrt[3]{125})^5 = 5^5 = 3125$

May 3-12:33 PM

Assignment:

pages 614-615

Problems: (13-28), ~~43-52~~
 (49-51)

May 3-12:37 PM

22. $\frac{9^{\frac{4}{3}}}{9^{\frac{2}{3}}} = 9^{\frac{2}{3}} = (\sqrt[3]{9})^2$

$\sqrt[3]{9^2}$ $\sqrt[3]{81}$

$3\sqrt[3]{3}$ $\frac{9^{\frac{2}{3}}}{3^{\frac{2}{3}}}$

May 15-2:06 PM