Rational Exponents

Learning Goal:

By the end of today, I will be able to recognize and evaluate a rational (fraction) exponent on a whole number base.

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Evaluate the following:

$\sqrt{16}$ $\sqrt{25}$

$\sqrt[3]{8}$ $\sqrt[3]{27}$

$\sqrt[5]{32}$ $\sqrt[8]{128}$

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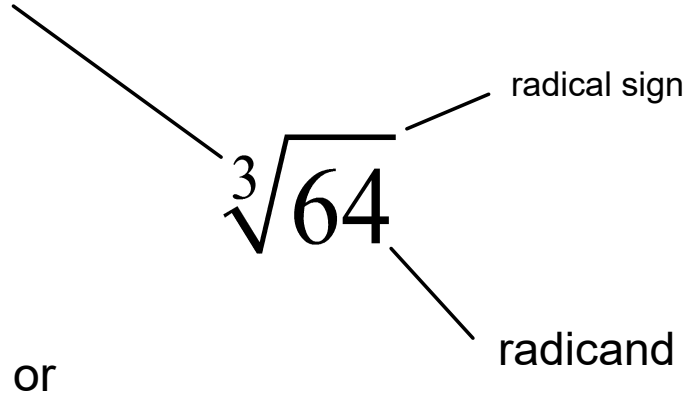
(how many times a number must be multiplied by itself to get the radicand)



or

$$64^{\frac{1}{3}}$$

Try both on your calculator

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Rational Exponents

$$\sqrt[m]{a} = a^{\frac{1}{m}}$$

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Evaluate the following:

$$\sqrt[4]{81}$$

calculator approach

exponent approach

$$(81)^{\frac{1}{4}}$$

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Evaluate the following:

$$\sqrt[3]{125}$$

calculator approach

exponent approach

$$(125)^{\frac{1}{3}}$$

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Reminder

$$(a^m)^n = a^{mn}$$

Breaking down Rational Exponents into manageable steps.

Evaluate

$$27^{\frac{2}{3}} \qquad \text{or} \qquad \left(27^{\frac{1}{3}}\right)^2$$

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Reminder

$$(a^m)^n = a^{mn}$$

Breaking down Rational Exponents into manageable steps.

Evaluate

$$(-8)^{\frac{5}{3}}$$

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Reminder

$$(a^m)^n = a^{mn}$$

Breaking down Rational Exponents into manageable steps.

Evaluate

$$64^{-\frac{3}{2}}$$

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Reminder

$$(a^m)^n = a^{mn}$$

Breaking down Rational Exponents into manageable steps.

Evaluate

$$0.027^{\frac{1}{3}}$$

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Common Decimal to Fraction Conversions

$$0.5 = \frac{1}{2}$$

$$0.25 = \frac{1}{4}$$

$$0.1 = \frac{1}{10}$$

$$0.001 = \frac{1}{1000}$$

$$0.4 = \frac{2}{5}$$

$$0.625 = \frac{5}{8}$$

$$0.125 = \frac{1}{8}$$

$$0.375 = \frac{3}{8}$$

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Are the following the same?

$$\left((8)^{\frac{1}{3}}\right)^2 = 8^{\frac{2}{3}} = \sqrt[3]{8^2} = \left(\sqrt[3]{8}\right)^2$$

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Write as a single power of "2" with only positive exponents.

$$2^{\frac{1}{4}} \times 2^{\frac{3}{2}} \div 2^{\frac{3}{4}}$$

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Write as a single power of "2" with only positive exponents.

$$\frac{2^{0.8} \times (2^{2.5} \div 2^{1.9})}{(2^{-2})^3}$$

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Consolidation Questions:

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