

Warm up -

From the lesson video, what is the value of each?

$$\sqrt{16} = 16^{\left(\frac{1}{2}\right)} = 4 \quad \sqrt{81} = 81^{\left(\frac{1}{2}\right)} = 9$$

What are you actually doing when the exponent is 1/2?

$$\sqrt[3]{8} = 8^{\left(\frac{1}{3}\right)} = 2 \quad \sqrt[3]{27} = 27^{\left(\frac{1}{3}\right)} = 3$$

What are you actually doing when the exponent is 1/3?

Jan 28-10:26 AM

7.4 Rational Exponents

Lesson Objectives

Teacher's Notes

Lesson Notes

1. Convert a square root to a rational exponent. *rational = fraction*
2. Convert a cube root to a rational exponent.
3. Convert an "nth" root to a rational exponent.
4. Reduce a rational exponent.

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Begin Lesson

Objectives

Square Roots

A square root is equivalent to an exponent of one-half.

Pull for Hint

$$\sqrt[2]{x^1} = x^{\frac{1}{2}}$$

exponent = power
index = roots

Erase the blue oval to check your explanation.

Square Roots

Cube roots

What exponent is equivalent to a cube root?

Pull for Directions

$$\sqrt[3]{x^1} = x^{\frac{1}{3}}$$

Cube Roots

Converting Practice

Write using rational exponents.

$$\sqrt[2]{x^3} \quad \underline{x^{\frac{3}{2}}}$$

$$\sqrt[3]{x^2} \quad \underline{x^{\frac{2}{3}}}$$

$$\sqrt[3]{x^4} \quad \underline{x^{\frac{4}{3}}}$$

$$\sqrt[2]{x^5} \quad \underline{x^{\frac{5}{2}}}$$

Press tiles to reveal solutions.

Converting Practice

Write using rational exponents.

$$\sqrt[3]{(5x)^6} = (5x)^{\frac{6}{3}} = (5x)^2 = 25x^2$$

$$\begin{aligned} \sqrt[3]{5x^6} &= 5^{\frac{1}{3}} x^{\frac{6}{3}} \\ &= 5^{\frac{1}{3}} x^2 \end{aligned}$$

Converting Practice

Pull for Teacher's Notes

nth Roots

What exponent is equivalent to an nth root?

$$n\sqrt{x^m} = x^{\frac{m}{n}}$$

Use the magnifying glass to reveal the answer.

nth Roots

Challenge

Write these in radical form.

$x^{\frac{2}{5}}$ <p style="font-size: small; color: purple;">power root</p>	$x^{\frac{5}{6}}$	$x^{\frac{2}{3}}$
$\underline{\underline{\sqrt[5]{x^2} = (\sqrt[5]{x})^2}}$	$\underline{\underline{\sqrt[6]{x^5}}}$	$\underline{\underline{\sqrt[3]{x^2}}}$

Challenge

Challenge

Let's look at the last problem. $x^{\frac{2}{3}}$

What would you do if the exponent were negative?

$$x^{-\frac{2}{3}} = \frac{1}{x^{\frac{2}{3}}}$$

$$\frac{1}{\sqrt[3]{x^2}}$$

Challenge

Examples

Pull for Hint

Simplify.

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

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

$$5$$

2) $125^{\frac{2}{3}}$

$$\sqrt[3]{125^2}$$

$$(\sqrt[3]{125})^2$$

$$5^2$$

$$25$$

3) $2^{\frac{1}{2}} \cdot 18^{\frac{1}{2}}$

$$(2 \cdot 18)^{\frac{1}{2}}$$

$$\sqrt{2 \cdot 18}$$

$$\sqrt{36}$$

$$6$$

$$\begin{array}{c} \sqrt{2 \cdot 18} \\ | \quad \wedge \\ | \quad 9 \cdot 2 \\ | \quad \wedge \quad | \\ | \quad 3 \cdot 3 \cdot 2 \\ \hline 2 \cdot 3 \cdot 3 \cdot 2 \end{array} \rightarrow 6$$

Square Roots

Challenge

7) Simplify completely.

$$\left(\frac{x^{\frac{1}{6}}}{y^{\frac{5}{3}}} \right)^{12}$$

$$\frac{5}{8} \cdot \frac{4}{1}$$

$$(x^{\frac{1}{6}} y^{\frac{5}{3}})^{12}$$

$$x^2 y^{20}$$

Challenge

Pull for Hint

Examples

Simplify.

4)

$$4^{2.5}$$

$$4^{5/2}$$

$$(\sqrt{4})^5$$

$$2^5$$

$$32$$

5)

$$16^{-3/2}$$

$$\frac{1}{16^{3/2}}$$

$$\frac{1}{(\sqrt{16})^3}$$

$$\frac{1}{4^3}$$

$$\frac{1}{64}$$

6)

$$(27x^{18})^{-1/3}$$

$$\frac{1}{\sqrt[3]{27x^{18}}}$$

$$\frac{1}{3x^6}$$

Square Roots



**HW 7.4 Rational Exponents Matching
Google Slides in the google classroom
We will work through the first slide
together.**

*Optional for extra practice:
p. 388 #1-25 odd, #31-35 odd
and #39-49 odd*

End of Lesson