Warm Up:
8(k + 3) + 2k = 94
95 = 5 + 3(3b + 6)

7.5 Rational Exponents and Radicals

Learning Goal: I will be able to rewrite expressions involving radicals and rational exponents.

Vocabulary:
Index: gives the degree of the root

Key Concept:
If the nth root of a is a real number and m and n are positive integers, then:

\[ a^{\frac{1}{n}} = \sqrt[n]{a} \]

and

\[ a^{\frac{m}{n}} = \sqrt[n]{a^m} = (\sqrt[n]{a})^m \]
Examples 1-3:
What is the value of each expression?

\[ \sqrt[3]{27} = 3 \quad \sqrt[5]{32} = 2 \quad \sqrt[5]{64} = 4 \]

\[ 3 \times \sqrt{27} \]

2nd \ [ ]

Examples 4-6:
What is the value of each expression?

\[ \sqrt[3]{125} = 5 \quad \sqrt[4]{16} = 2 \quad \sqrt[4]{81} = 3 \]

Examples 7-9:
Write each expression in radical form

\[ \frac{12a^2}{3} \quad \frac{5x^3}{\sqrt[3]{5a}} \quad \sqrt[5]{a} \]

\[ 12 \sqrt[3]{a^2} \quad 5 \sqrt[3]{x^3} \quad \sqrt[5]{a} \]

Examples 10-12:
Write each expression in radical form

\[ (64a)^{\frac{4}{5}} \quad \sqrt[5]{(64a)^{\frac{4}{5}}} \quad (54y)^{\frac{3}{4}} \]

\[ (64b)^{\frac{3}{4}} \quad \sqrt[4]{(64b)^{\frac{3}{4}}} \quad \sqrt[4]{262,144b^3} \]
Examples 13-15:
Write each expression in exponential form

\[ \sqrt[5]{b^3} = b^{3/5} \]
\[ \sqrt[3]{s^2} = s^{2/3} \]
\[ 12\sqrt[4]{x^4} = 12x^{4/4} \]

Examples 16-18:
Write each expression in exponential form

\[ \sqrt[3]{27d^5} = 27d^{5/3} \]
\[ \sqrt[4]{(4y)^{5/2}} = (4y)^{5/2} \]
\[ \sqrt[3]{32b^3} = 32^{1/3}b^{3/3} \]

Examples 19-21:
(with your shoulder buddy)
What is the value of the expression?

\[ \sqrt[3]{216} = 6 \]
Write the expression in radical form
\[ 27a^{2/3} = 27\sqrt[3]{a^2} \]
Write the expression in exponential form
\[ \sqrt[3]{(8x)^2} = 8^{2/3}x^{2/3} \]

Summary
Where do you find the root in a rational exponent?

**denominator!**

What is an index?
**gives degree of root**
Coursework:
7.5 Worksheet