Secondary 2
lesson 1.4

Radical and Rational Exponent Conversions

<u>Objective:</u>

By the end of the lesson you will be able to:

- Explain what a rational number as an exponent represents. (The numerator is a power, the denominator is a root.)
- Rewrite a rational exponent as a radical, and a radical as a base with a rational exponent.

Rational Exponents

Fraction exponents, called rational exponents, are another way to represent roots. For rational exponents, the numerator represents the power, and the denominator represents the root.

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

$$a^{\frac{n}{m}} = \sqrt[m]{a^n} = (\sqrt[m]{a})^n$$

Example:

$$5^{\frac{1}{3}} = \sqrt[3]{5}$$

$$5^{\frac{2}{3}} = \sqrt[3]{5^2} = \left(\sqrt[3]{5}\right)^2$$

Example: Rewrite the following in radical form.

1) $3^{\frac{6}{5}}$

2) $-3^{\frac{6}{5}}$

3) $(-3)^{\frac{6}{5}}$

4) $4^{\frac{2}{3}}$

5) $-4^{\frac{2}{3}}$

6) $(-4)^{\frac{2}{3}}$

Example: Rewrite the following in radical form.

7) $\sqrt[8]{5^3}$

8) $-\sqrt[3]{7}$

9) $\left(\sqrt[3]{4}\right)^2$

10) $\sqrt{6}$

11) $\left(\sqrt[3]{-8}\right)^2$

12) $\left(\sqrt[a]{b}\right)^c$

By rewriting expressions with rational exponents into radical form we can evaluate (simplify) problems.

Evaluate the following:

13) $36^{\frac{1}{2}}$

14) $64^{\frac{1}{3}}$

15) $36^{\frac{3}{2}}$

16) $(-9)^{\frac{3}{2}}$

Evaluate the following: (simplify)

17) $27^{\frac{4}{3}}$

18) $(-27)^{\frac{2}{3}}$

19) $49^{\frac{-1}{2}}$

20) $\sqrt[8]{16^{10}}$

Example: A town's population is decreasing. The population in the year 2000 was 4,000, and the population t years after 2000 can be found by using the formula $f(t) = 4000(.81)^t$ What was the town's approximate population 2.5 years after the year 2000?

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Assignment:

1.4 Packet and XL 1.4