Today's Learning Goal(s): By the end of the class, I will be able to:

a) evaluate a power involving a rational exponent.
b) simplify expressions involving rational exponents.

4.3 Working with Rational Exponents

Date: _____

Rational Exponents are exponents that are **fractions**, and are directly related to radicals.

$4^{\frac{1}{2}}$ is the same as $\sqrt{4}$

$8^{\frac{1}{3}}$ = $81^{\frac{3}{4}}$ = $81^{-\frac{3}{4}}$ =

In general:

$$\therefore b^{\frac{1}{n}} = \sqrt[n]{b} \qquad \therefore b^{\frac{m}{n}} = \left(\sqrt[n]{b}\right)^m$$

Ex.1 Write in radical form, then evaluate *without* using a calculator.

a) $36^{\frac{1}{2}}$ b) $27^{-\frac{1}{3}}$ c) $8^{-\frac{2}{3}}$ d) $16^{\frac{3}{4}}$

Ex.2 Write each root as a power with a rational exponent.

a) $\sqrt[3]{27}$ b) $\left(\sqrt[4]{16}\right)^3$ c) $\left(\sqrt[3]{81}\right)^{-2}$

Ex.3 Write as a single power, *do not evaluate*.

a) $\dfrac{\sqrt{16}}{\sqrt{2}}$ b) $\dfrac{\sqrt{8}}{\sqrt{4}}$

Worth remembering:

$1^2 = 1$	$1^3 = 1$	$1^4 = 1$
$2^2 = 4$	$2^3 = 8$	$2^4 = 16$
$3^2 = 9$	$3^3 = 27$	$3^4 = 81$
$4^2 = 16$	$4^3 = 64$	$4^4 = 256$
$5^2 = 25$	$5^3 = 125$	$5^4 = 625$
$10^2 = 100$	$10^3 = 1000$	$10^4 = 10\,000$

Ex.4 Evaluate, *without* using a calculator.

a) $81^{\frac{1}{4}}$ b) $(-8)^{\frac{1}{3}}$ c) $64^{-\frac{1}{2}}$

d) $(-100\,000)^{-\frac{1}{5}}$ e) $8^{\frac{2}{3}}$ f) $16^{-0.75}$

g) $\dfrac{\left(16^{\frac{7}{8}}\right)\left(16^{-\frac{1}{4}}\right)}{16^{\frac{1}{8}}}$

READ p.228

pp. 229-230 #(1 – 6)ace, 8 – 11, 12ace, 14 [16]