7.2 - Rational Exponents

 $a^{1/n} = \sqrt[n]{a}$ $a^{1/n}$ means $\sqrt[n]{a}$. When a is nonnegative, n can be any natural number greater than 1. When a is negative, n must be odd.

① Write in radical notation
$$4 \text{ simplify.}$$
a) $\chi^{1/2}$
b) $(-27)^{1/3}$
c) $(365^{12})^{1/2}$

2) Write with exponential notation.

a) 477ab

b)
$$5\frac{3x}{7y}$$

(3) (Traph
$$f(x) = 4\sqrt{3}x - 2$$
 on calculator.

Positive Rational Exponents For any natural numbers m and n ($n \ne 1$) and any real number a for which $\sqrt[n]{a}$ exists,

$$a^{m/n}$$
 means $(\sqrt[n]{a})^m$, or $\sqrt[n]{a^m}$.

(4) Write in radical notation & simplify
a) 83/3
b) 36/2

Negative Rational Exponents For any rational number m/n and any nonzero real number a for which $a^{m/n}$ exists,

$$a^{-m/n}$$
 means $\frac{1}{a^{m/n}}$.

(5) Write with positive exponents & simplify
a)
$$49^{1/2}$$
b) (-27)

$$d$$
) $\left(\frac{x}{y}\right)^{-\frac{x}{5}}$

Laws of Exponents For any real numbers a and b and any rational exponents m and n for which a^m , a^n , and b^m are defined:

1. $a^m \cdot a^n = a^{m+n}$ In multiplying, add exponents if the bases are

the same.

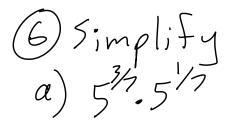
2. $\frac{a^m}{a^n} = a^{m-n}$ 3. $(a^m)^n = a^{m-n}$ In dividing, subtract exponents if the bases are the same. (Assume $a \neq 0$.)

To raise a power to a power, multiply the

exponents.

4. $(ab)^m = a^m b^m$ To raise a product to a power, raise each factor

to the power and multiply.



b) a/6

$$C) (T^{3/4})^{2/3}$$

 $d)\left(r^{-14}\right)^{\frac{3}{2}}$

To Simplify Radical Expressions

- Convert radical expressions to exponential expressions.
- Use arithmetic and the laws of exponents to simplify.
- Convert back to radical notation as needed.

b) (5 x 2 y)

$$d)$$
 $3\sqrt{\sqrt{Y}}$