**Recall:** 

 $\sqrt{4} = 2$  since

Converting between Radical Form and Rational Exponent Form

What is  $\sqrt[3]{8}$ ?

 $\sqrt[n]{x} = x^{\frac{||}{|}}$ 

Example 1: Rewrite the expression using rational exponent notation or radical notation. Evaluate

- a.  $\sqrt{n} =$  d.  $\sqrt[n]{x} =$
- b.  $\sqrt[3]{n} =$  e.  $4^{1/2} =$
- c.  $\sqrt[4]{81} =$  f.  $8^{1/3} =$

Example 2: Evaluate without using a calculator. Show all work!

- a.  $\sqrt[3]{8} =$  f.  $(4^{1/2})^3 =$
- b.  $\sqrt[3]{-8} =$  g.  $\sqrt[n]{x^m} =$
- c.  $\sqrt[4]{16} =$  h.  $8^{-2/3} =$
- d.  $\sqrt[4]{-16} =$  i.  $16^{5/2} =$
- e.  $4^{3/2} =$  j.  $64^{-2/3} =$

Example 3: Solve each equation.

a. 
$$5y^4 = 80$$
 c.  $\sqrt[5]{x+1} = 2$ 

b.  $(x+1)^3 = 2$ 

d.  $4(2x+4)^2 - 7 = 9$ 

## 7.2 Properties of Rational Exponents

Multiplication Property: keep the base and add the exponents.

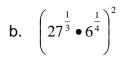
**Division Property:** keep the base and subtract the exponents.

**Power to a Power Property**: keep the base and multiply the exponents.

**Example 1**: Simplify the expression.

**a.**  $6^{\frac{1}{2}} \bullet 6^{\frac{1}{3}}$  **c.**  $(4^3 \bullet 2^3)^{-\frac{1}{3}}$ 

d. 
$$\frac{6}{6^{3/4}}$$





**Example 2**: Write the expression in simplest form.

a.  $\sqrt[4]{64}$  c.  $\frac{\sqrt[3]{32}}{\sqrt[3]{4}}$ 

b. 
$$\sqrt[3]{25} \cdot \sqrt[3]{5}$$
 d.

 $\sqrt[4]{\frac{7}{8}}$ 

## Adding and Subtracting Roots and Radicals

**Example 3**: Perform the indicated operation.

a. 
$$5\left(4^{\frac{3}{4}}\right) + 3\left(4^{\frac{3}{4}}\right)$$
 b.  $\sqrt[3]{81} - \sqrt[3]{3}$ 

## 7.2 (Day 2 Notes)

The properties of rational exponents and radicals can also be applied to expressions involving variables. Because a variable can be either positive or negative, sometimes an absolute value is needed when simplifying a variable expression.

$$\sqrt[n]{x^n} = x$$
 when n is an odd integer

 $\sqrt[n]{x^n} = |x|$  when n is an even integer

**NOTE:** Absolute value is not needed when all the variables are assumed to be positive.

**Example 1**: Simplify the expression. Assume all variables are positive.

a. 
$$\sqrt[3]{27a^9}$$
 d.  $(16g^4h^2)^{\frac{1}{2}}$ 

b. 
$$\sqrt[5]{\frac{x^5}{y^{10}}}$$
 e.  $\frac{18rs^{2/3}t^4}{6r^{1/4}t^{-3}}$ 

C. 
$$\sqrt[4]{32d^4e^9f^{14}}$$

f. 
$$\sqrt[5]{\frac{g^2}{h^7}}$$

**Example 2**: Perform the indicated operation. Assume all variables are positive.

a.  $8\sqrt{x} - 3\sqrt{x}$ 

b.  $3gh^{\frac{1}{4}} - 6gh^{\frac{1}{4}}$ 

c.  $2\sqrt[4]{6x^5} + x\sqrt[4]{6x}$