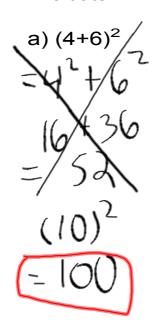
Warm Up

Evaluate:



b)
$$(x^{6})(x^{9})(x^{2})(x^{15})$$

= $x^{6+9+2+15}$
= x^{32}

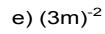
c)
$$(-3q^2rs)^2$$

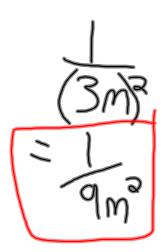
= $-3^3 \cdot (4)^2 r^3 s^2$
= $994 r^3 s^3$

$$\frac{d) (4x^{0})^{4}}{(4(1))}4$$

$$= 256$$

BEDMAS







g)
$$\frac{5h^{-3}}{h^4}$$
 = $\frac{5}{h^4}$ = $\frac{5}{h^7}$ = $\frac{5}{$

Exponents and Radicals

Earlier, you learned that powers with integral exponents have a special meaning. The exponent $\frac{1}{2}$ has a special meaning $\sqrt{2} = 2^{\frac{1}{2}}$ $\sqrt{3} = 3^{\frac{1}{2}}$ $\sqrt{5} = 5^{\frac{1}{2}}$ related to the principal square roots

In order to learn mathematics, it is helpful to make comparisons.

- The cube of 2 is 8, since 2 × 2 × 2 = 8.
- The cube of 2 is shown by the symbol $2^3 = 8$.
- The principal cube root of 8 is 2, since $2 \times 2 \times 2 = 8$.
- The principal cube root of 8 is shown by the radical symbol $\sqrt[3]{8} = 2$. means the principal cube root of 8.

Similarly, exponents that are rational have a special meaning.

Using exponent laws

Using radicals

$$8^{\frac{1}{3}} \times 8^{\frac{1}{3}} \times 8^{\frac{1}{3}} = 8^{\frac{1}{3} + \frac{1}{3} + \frac{1}{3}}$$

$$3\sqrt{8} \times \sqrt[3]{8} \times$$

Based on the above comparison, $\sqrt[3]{8}$ and $8^{\frac{1}{3}}$ behave in a similar way.

It seems reasonable to define $\sqrt[3]{8} = 8^{\frac{1}{3}}$

In general, the *n*th principal root of a number is shown by

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

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

Fraction Exponents - To evaluate exponents that are fractions, the denominator of the fraction indicates which root to take and the numerator indicates which power the entire base is to be raised.

numerator indicates which power the entire bas
$$\frac{7}{\sqrt[3]{7}} = \frac{1}{\sqrt[n]{a}} = \frac{1}{\sqrt[n]{a}}$$

EXERCISE...

Simplify.

(a) $\sqrt[3]{27}$ (b) $\sqrt[4]{16}$ (c) $\sqrt[3]{64}$ (d) $\sqrt[5]{32}$ (e) $\sqrt[4]{625}$ (f) $\sqrt[5]{1024}$ 27 3 16 4 3 32 6 625 4 1024 5

Simplify.

(a) $8^{\frac{1}{3}}$

•

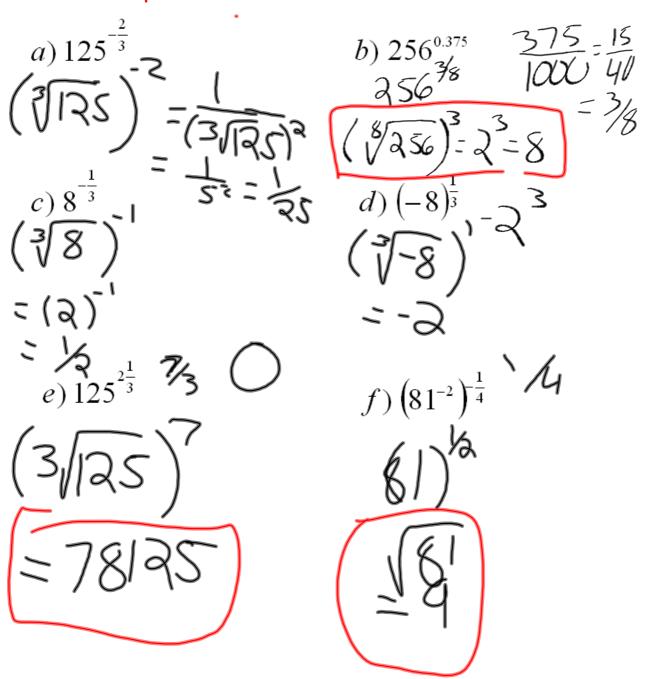
(b) 16[‡]

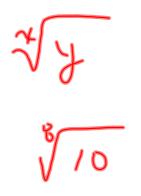
 $\frac{16^{\frac{1}{4}}}{6} = \frac{5}{243^{\frac{1}{4}}}$

(d) $125^{\frac{1}{3}}$

(e) $256^{\frac{1}{4}}$

More Examples...





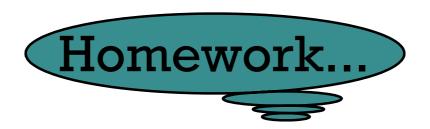
Exercise - Simplify...

$$a)\left(16x^8y^2\right)^{\frac{1}{4}}$$

$$b) \left(\frac{a^3 b^{-4}}{x^{-1} y^2} \right) \times \frac{x^{-1} b^{-1}}{a^{\frac{3}{2}} \dot{y}^{\frac{4}{5}}}$$

$$c)\left(\frac{\sqrt[3]{x^5}}{\sqrt{x}}\right)^3$$

$$d) 32^{-\frac{3}{5}} - 32^{\frac{3}{5}}$$



Worksheet - Laws of Exponents Review.doc

Pg.164 6,7,8,9,10,12