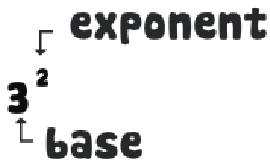
Law of Exponents for Real Numbers



If we have a and b as the base and m and n as the exponents, then

1. $a^m \times a^n = a^{m+n}$
2. $(a^m)^n = a^{mn}$
3. $\frac{a^m}{a^n} = a^{m-n}, m > n$
4. $a^m b^m = (ab)^m$
5. $a^0 = 1$
6. $a^1 = a$
7. $1/a^n = a^{-n}$

Let a > 0 be a real number and n a positive integer.

$$\text{Then } \sqrt[n]{a} = b, \text{if } b^n = a \text{ and } b > 0$$

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

Let a > 0 be a real number. Let m and n be integers such that m and n have no common factors other than 1, and n > 0. Then,

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

Example 21: Simplify

a. $2^{\frac{2}{3}}.2^{\frac{1}{3}}$

b. $(5^{\frac{1}{7}})^4$

c. $\frac{3^{\frac{1}{5}}}{3^{\frac{1}{3}}}$

Surd

If 'n' is a positive integer greater than 1 and '**a**' is a positive rational number but not nth

power of any rational number then $\sqrt[n]{a}$ (or) $a^{\frac{1}{n}}$ is called a surd of nth order. In general, we

say the positive nth root of a is called a surd or a radical. Here a is called radicand, $\sqrt{n}$ is

called radical sign and n is called the degree of radical.