

LAWS OF EXPONENTS

Terminology: ax^n where

a: Coefficient

x: Base

n: Exponent or Power

$$x^a \cdot x^b = x^{a+b}$$

ex) $x^2 \cdot x^3 = x^{2+3} = x^5$

$$(x^a)^b = x^{a \cdot b}$$

ex) $(x^2)^3 = x^{2 \cdot 3} = x^6$

$$\frac{x^a}{x^b} = \begin{cases} x^{a-b} & \text{for } a \geq b \\ \frac{1}{x^{b-a}} & \text{for } b > a \end{cases}$$

ex) $\frac{x^5}{x^2} = x^{5-2} = x^3$

ex) $\frac{x^2}{x^5} = \frac{1}{x^{5-2}} = \frac{1}{x^3}$

Note: $\frac{x^2}{x^5} = x^{2-5} = x^{-3} = \frac{1}{x^3}$

$$\left(\frac{a}{b}\right)^n = \frac{a^n}{b^n}$$

ex) $\left(\frac{3}{4}\right)^2 = \frac{3^2}{4^2} = \frac{9}{16}$

$$x^0 = 1 \quad \text{for } x \neq 0$$

ex) $5^0 = 1$

ex) $(-3)^0 = 1$

0^0 is undefined

note: $-3^0 = -(3^0) = -(1) = -1$

$$x^{-n} = \frac{1}{x^n}$$

ex) $3^{-2} = \frac{1}{3^2} = \frac{1}{9}$