

# LAWS OF EXPONENTS

Terminology:  $c x^n$  where

$c$ : Coefficient

$x$ : Base

$n$ : Exponent or Power

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

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

ex)  $5x^3 \cdot 6x^4 = (5 \cdot 6)x^{3+4} = 30x^7$

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

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

ex)  $(5x^3)^2 = 5^2 \cdot x^{3 \cdot 2} = 25x^6$

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

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