LAWS OF EXPONENTS

Terminology: ax^n where
- a: Coefficient
- x: Base
- n: Exponent or Power

$x^a \cdot x^b = x^{a+b}$ ex) $x^2 \cdot x^3 = xx \cdot xxx = x^5$

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

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

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

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

ex) $\dfrac{x^5}{x^2} = \dfrac{\not{x}\not{x}xxx}{\not{x}\not{x}} = x^3$

$\dfrac{x^5}{x^2} = x^{5-2} = x^3$

ex) $\dfrac{x^2}{x^5} = \dfrac{\not{x}\not{x}}{\not{x}\not{x}xxx} = \dfrac{1}{x^3}$

$\dfrac{x^2}{x^5} = \dfrac{1}{x^{5-2}} = \dfrac{1}{x^3}$

$\left(\dfrac{a}{b}\right)^n = \dfrac{a^n}{b^n}$ ex) $\left(\dfrac{3}{4}\right)^2 = \dfrac{3}{4} \cdot \dfrac{3}{4} = \dfrac{3^2}{4^2} = \dfrac{9}{16}$

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

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

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

$\left(\dfrac{a}{b}\right)^n = \dfrac{a^n}{b^n}$ ex) $\left(\dfrac{3}{4}\right)^2 = \dfrac{3^2}{4^2} = \dfrac{9}{16}$

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

ex) $5^0 = 1$

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

0^0 is undefined

note: $-3^0 = -\left(3^0\right) = -(1) = -1$

$x^{-n} = \dfrac{1}{x^n}$ ex) $3^{-2} = \dfrac{1}{3^2} = \dfrac{1}{9}$