

Logarithm

Logarithm is a mathematical operation that is the inverse of the exponent or power

Basic

$$\log_{base} argument = exponent$$

$$(\log_{base} x = y) = (base^y = x)$$

$$\{b \mid b \in \mathbb{R}, b > 0, b \neq 1\}$$

$$\{x \mid x \in \mathbb{R}, x > 0\}$$

$$\log_e x = \ln x$$

In common logarithm **base** is **10**, In natural logarithm **base** is **e**

natural number (**e**) = **2.718281828459**

log Rules

$$\log_b 1 = 0$$

$$\log_b b = 1$$

$$\log_b (b^k) = k$$

$${}_b \log_b k = k$$

$$\log_b x = \frac{\log_b x}{\log_b b}$$

$$\log_b (x) + \log (y) = \log_b (xy)$$

$$\log_b (x) - \log (y) = \log_b \left(\frac{x}{y}\right)$$

$$\log_b (a)^2 = 2 \log_b (a)$$

$$\log x - \log y + \log z - \log r = \log \frac{xz}{yr}$$

$$2 \log x - 3 \log y + 4 \log z - 5 \log r = \log \frac{x^2 z^4}{y^3 r^5}$$

$$\log_b x = n$$

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

if **base** is larger than **x**, change **n** to **1/n**

In Rules

$$\ln 1 = 0$$

$$\ln e = 1$$

$$\ln e^x = x$$

$${}_e \ln_e x$$

$$\cancel{e} \ln \cancel{e} x$$

$${}_e \ln_e x = x$$

Reference

https://youtu.be/LRbi_pMX1DM

<https://www.chilimath.com/wp-content/uploads/2020/03/log-rules.gif>

<https://www.wikipedia.org>