

# Log

$$y = \log_b x$$

where,  $x > 0$   
 $b > 0$   
 $b \neq 1$

log of  $x$  with base  $b$

Also,  $x = b^y$

## Antilog

$$\text{antilog}_b y = x$$

Then  $y = b^x$

Eg:

$$\log_{10} 1000 = 3 \quad \& \quad \text{antilog}_{10} 3 = 10^3 = 1000$$

## Notes-

$$\log_b 1 = 0$$

$$\log_b b = 1$$

$$\log_b a = \frac{1}{\log_a b}$$

$$\log_b b^c = c$$

$$b^{\log_b d} = d$$

If  $\log_b x = \log_b y$  Then,  $x = y$

$$\log_b \left(\frac{1}{a}\right) = -\log_b a$$

# Rules

## ① Multiplication law

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

In general

$$\log\left(\prod_{i=1}^n a_i\right) = \sum_{i=1}^n \log a_i$$

## ② Quotient law

$$\log_b \frac{x}{y} = \log_b x - \log_b y$$

## ③ Power law

$$\log_b x^n = n \log_b x$$

Also  $\log_{b^m} x = \frac{1}{m} \log_b x$

## ④ Change of Base

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



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