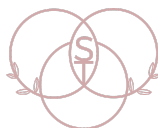


Spark's Guide: Logarithm Rules

Your one-stop guide to Logarithm Rules



SPARK TUTORS

Definition of Logs:

If $B^y = x$ then $y = \log_B(x)$

Ex: $6^y = 2x \rightarrow y = \log_6(2x)$

Basic Rules:

$$\log_B(B) = 1$$

Ex: $\log_3(3) = 1$

$$\log_B(1) = 0$$

Ex: $\log_8(1) = 0$

$$\log_B(x) = \log_B(y) \rightarrow x = y$$

Ex: If $\log_4(x) = \log_4(7)$ then $x = 7$

Product Property:

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

Ex: $\log_9(x) + \log_9(2x) = \log_9(2x^2)$

Quotient Property:

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

Ex: $\log_5(2x^2) - \log_5(3x) = \log_5\left(\frac{2x^2}{3x}\right) = \log_5\left(\frac{2x}{3}\right)$

$$-\log_B(y) = \log_B\left(\frac{1}{y}\right)$$

Ex: $-\log_6(8x) = \log_6\left(\frac{1}{8x}\right)$

Exponent Property:

$$\log_B(x^n) = n \cdot \log_B(x)$$

Ex: $\log_2(9x^2) = \log_2((3x)^2) = 2 \cdot \log_2(3x)$

Base Change Rule:

$$\log_B(x) = \frac{\log_{10}(x)}{\log_{10}(B)}$$

Ex: $\log_8(76) = \frac{\log_{10}(76)}{\log_{10}(8)} \rightarrow \text{plug into calculator}$