

Properties of Logarithms

Logarithmic form to Exponential form	$\log_b x = y \Leftrightarrow b^y = x$ where $b > 0$ and $b \neq 1$
Common Logarithms	$\log x = \log_{10} x$
Natural Logarithms	$\ln x = \log_e x$
Log of Product	$\log_b MN = \log_b M + \log_b N$
Log of a Quotient	$\log_b \frac{M}{N} = \log_b M - \log_b N$
Log of Power	$\log_b M^p = p \log_b M$
Log of Root	$\log_b \sqrt[q]{M} = \frac{1}{q} \log_b M$
Log of 1	$\log_b 1 = 0$
Log of the Base	$\log_b b = 1$
Log of the Base Raised to the Power	$\log_b b^n = n$
Base Raised to a Logarithm of the Same Base	$b^{\log_b x} = x$ and, in particular, $10^{\log x} = x$ and $e^{\ln x} = x$
Change of Base	$\log_b N = \frac{\log_a N}{\log_a b}$ $\log_b N = \frac{\ln N}{\ln b}, \log N = \frac{\ln N}{\ln 10} \text{ where } \ln N = 2.30259 \log N$

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