

Logarithm Intro

	<p>Index Form</p> <p>Logarithmic Form</p>	$y = a^x$ $x = \log_a y$ <p>base $a = \log_a$, base 10 = \log = lg (by default)</p> <p>power = x value = y</p>
	Example	$10^x = 40 \rightarrow x = lg40 \rightarrow x = 1.6$ $3^2 = 9 \rightarrow 2 = \log_3 9 \rightarrow \frac{lg9}{lg3} = 2$ $4^2 = 16 \rightarrow \log_4 16 = 2$
1*	Logarithm Base	$\log_a a = 1$
2*	Logarithm 1	$\log_a 1 = 0$
3*	Logarithm Product rule	$\log_b x + \log_b y = \log_b xy$ <p>Example 1 Solve:</p> $\log_2 3 + \log_2 5 = \log_2 15$ $\log_2 3 + \log_2 5$ $= \log_2 15$ $= 3.9068905956085185293240583734372$ <p>Check $\rightarrow 2^{3.9068905956085185293240583734372} = 15$</p> <p>Example 2:</p> $\log_2 7 + \log_2 x = \log_2 7x$ <p>Example 3:</p> $\log_2 x(x + 3) = \log_2 x + \log_2(x + 3)$
4*	Logarithm Quotient Rule	$\log_b x - \log_b y = \log_b \frac{x}{y}$ <p>Example 1:</p> $\log_2 \frac{x}{(x + 3)} = \log_2 x - \log_2(x + 3)$
5*	Logarithm Power Rule	$\log_b x^r = r \log_b x$

8	Logarithm Base Switch Rule	$\log_b a = \frac{1}{\log_a b}$
9*	Logarithm Base Change Rule	$\log_b a = \frac{\log_c a}{\log_c b}$
10	Logarithm 0	$\log_b 0 = \text{undefined}$
11	Logarithm Negative	$\log_b x = \text{undefined}, \quad x \leq 0$
12	Common Logarithm	$lgy = x$ $y = 10^x$ $lg10 = 1$
12	Natural Logarithm	$\ln y = x$ $y = e^x$ $\ln e = 1$