

Definition of logarithm:

$\log_b x = y \iff b^y = x$: **a logarithm is an exponent.**

Properties of logarithms: for all bases $b > 0, b \neq 1$ we have

- $\log_b mn = \log_b m + \log_b n$ (**The log of a product is the sum of the logs**)
- $\log_b \frac{m}{n} = \log_b m - \log_b n$ (**The log of a quotient is the difference of the logs**)
- $\log_b m^a = a \log_b m$ (**The log of a power is the power times the log**)
- $\log_b b = 1$
- $\log_b 1 = 0$
- $b^{\log_b x} = x$
- $\log_b(b^x) = x$

The last two properties just come from the fact that logarithms are the inverse functions of exponential functions: put together they are the “Round-trip theorem” for these functions.