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)
- $\log_b\left(\frac{m}{n}\right) = \log_b(m) \log_b(n)$ (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.