

Definition: **The symbol $\log_a b$ represents the number that if we write as an exponent of a , we achieve b .** This expression is only meaningful if both a and b are positive numbers and $a \neq 1$.

Every logarithmic statement can be re-written as an exponential statement.

$$\log_a b = x \text{ is the same as } a^x = b$$

Rules of Logarithms:

1. $\log_a (a^x) = x$
2. $a^{\log_a x} = x$
3. When both sides exist, $\log_a b + \log_a c = \log_a bc$
4. When both sides exist, $\log_a b - \log_a c = \log_a \left(\frac{b}{c}\right)$
5. When both sides exist, $x \log_a b = \log_a (b^x)$
6. The change-base theorem: $\log_a b = \frac{\log_c b}{\log_c a}$