Logarithms

10th Grade

A log is an exponent — reading the definition backwards makes everything easier.

log_b(x) asks: what power of b gives x? A logarithm is simply an exponent.

$$\log_b(x) = y \iff b^y = x$$

$\log_2(8)$ → **3**

Because $2^3 = 8$.

$\log_{10}(1000)$ → **3**

Because $10^3 = 1000$.

$\log(ab)$ → **$\log a + \log b$**

Multiplying inside becomes adding outside.

$\log(a^n)$ → **$n \log a$**

The power comes out to the front.

THE COMMON MISTAKE

× $\log(a + b) = \log a + \log b$

✓ $\log(ab) = \log a + \log b$

The product rule applies to multiplication inside, never addition.

You cannot take the log of zero or of a negative. The domain restriction matters.