Properties of Logarithms

- The properties of **logarithms** follow directly from the properties of exponents. Keep in mind that "a log is an exponent."
- **REMEMBER:** A log is an exponent!
- A log written without a "*b*" value is the **common log**.
  y* = log*x
  In a common log, the "*b*" value is understood to be 10. In other words, $y = \log x$ is equivalent to the statement $10^y = x$.

The log of a product $\log_b (xy) = \log_b x + \log_b y$ *sum of two logs*	When dealing with a product of exponents of the same base, you add the exponents. When dealing with the log of a product, you add the logs.
The log of a quotient $\log_b \left(\frac{x}{y}\right) = \log_b x - \log_b y$ *difference of two logs*	When you have a quotient of bases raised to different exponents, you subtract the exponents. When you have the log of a quotient, you subtract the logs.
The log of a power $\log_b (x^y) = y \log_b x$	When you raise a number with an exponent to another power, you multiply the exponents. When taking the log of a number raised to another power, you multiply that number by the log.
$\log_b b = 1 \quad b^1 = b$	Here is another useful property of logs. **REMEMBER:** $\log_b b = x$ means $b^x = b$. The only exponent that produces its base is 1. So, the log*b* that produces *b* has to be 1.