

Properties of Logarithms

Rules of exponents

- when you multiply with exponents you add the exponents of like bases

$$b^x b^y = b^{x+y}$$

- when you divide with exponents you subtract the exponents of like bases

$$\frac{b^x}{b^y} = b^{x-y}$$

example

$$\begin{aligned}\log 5^2 &= \log(5 \cdot 5) \\ &= \log 5 + \log 5 \\ &= 2 \log 5\end{aligned}$$

Rules of logs

Product Property of Logs

$$\log(x \cdot y) = \log x + \log y$$

- when you add logs you multiply the argument

Quotient Property of Logs

$$\log\left(\frac{x}{y}\right) = \log x - \log y$$

- when you subtract logs you divide the arguments

Power Property of Logs

$$\log(a^b) = (b) \log a$$

- the exponent of the argument can be moved to be the coefficient of the log.

Change of Base Formula

$$\log_a n = \frac{\log_b n}{\log_b a}$$

* use 10 for b

← the argument is in the numerator

← the base is the argument in the denominator

ex

$$\log_3 12 = \frac{\log 12}{\log 3} \approx 2.26$$

↑
calculate