

Properties of Logarithms

$$\log_b (MN) = \log_b M + \log_b N$$

$$\log_b \left(\frac{M}{N} \right) = \log_b M - \log_b N$$

$$\log_b (M^N) = N \cdot \log_b M$$

Expanding Logarithms

$$\log_b(MN) = \log_b M + \log_b N$$

Expand: $\log_3(\underline{5x}) = \log_3 5 + \log_3 x$

$$\log_b\left(\frac{M}{N}\right) = \log_b M - \log_b N$$

Expand: $\ln\left(\frac{x}{8}\right) = \ln x - \ln 8$

Expanding Logarithms

$$\log_b (M^N) = N \cdot \log_b M$$

Expand: $\log_5 (x^9) = 9 \cdot \log_5 x$

Expand: $\log \left(\frac{x}{9y^5} \right) = \log x - \log 9 - \log y^5$

$\log x - \log 9 - 5 \log y$

Condensing Logarithms

Condense: $\frac{1}{2} \log 36 - 6 \log x$

$$\log \sqrt{36} - \log x^6$$

$$= \log \left(\frac{6}{x^6} \right)$$

Condense: $3 \log_2 5 - 4 \log_2 x + 2 \log_2 y$

$$\log_2 5^3 - \log_2 x^4 + \log_2 y^2$$

$$\log_2 \left(\frac{125y^2}{x^4} \right)$$