

Logarithmic Properties

While working in a group make sure you:

- Expect to make mistakes but be sure to reflect/learn from them!
- Are civil and are aware of your impact on others.
- Assume and engage with the strongest argument while assuming best intent.

Let $b > 0$, $b \neq 1$ and let v and w be positive real numbers. Let k be a real number.

0. $\log_b(b^x) = x$ $b^{\log_b(x)} = x$

1. $\log_b(vw) = \log_b(v) + \log_b(w)$

2. $\log_b\left(\frac{v}{w}\right) = \log_b(v) - \log_b(w)$

3. $\log_b(v^k) = k \log_b(v)$

4. $\log_b(x) = \frac{\log(x)}{\log(b)}$ $\log_b(x) = \frac{\ln(x)}{\ln(b)}$

1. Write the expressions as a single logarithm:

$$\ln(x) - \ln(y) + 3 \ln(z) \qquad \frac{1}{3} \log(2x + 1) - 2 \log(x^4 - x^2 - 1)$$

2. Expand the expressions:

$$\log_2(2xy^3) \qquad \log\left(\frac{a\sqrt{c}}{b^4}\right)$$

3. Given $\ln(x) = 5$ and $\ln(y) = 7.5$, find $\ln\left(\frac{x^2}{y}\right)$.