

8.4 Laws of Logarithms



"I can prove any logarithmic property and any logarithmic law studied. Moreover, I know when they apply in a given mathematical scenario. I can apply what I have learned in unfamiliar settings."

Recall:

Properties of Logarithms:

i) $\log_a 1 =$ ii) $\log_a a =$ iii) $\log_a a^x =$ iv) $a^{\log_a x} =$

Exponent Laws:

multiplication

division

power

1) $a^m \cdot a^n =$

2) $a^m \div a^n =$

3) $(a^m)^n =$

Ex. 1: Prove $\log_a mn = \log_a m + \log_a n$, where a, m, n are positive, and $a \neq 1$.

Ex. 2: Prove $\log_a \left(\frac{m}{n} \right) = \log_a m - \log_a n$, where a, m, n are positive, and $a \neq 1$.

Ex. 3: Prove $\log_a(m^n) = n \log_a m$, where a, m, n are positive, and $a \neq 1$.

Ex. 4: Without a calculator, express as a single logarithm, then evaluate.

a) $\log_4 192 - \log_4 3$ b) $\log_8 6 - \log_8 3 + \log_8 4$ c) $2 \log_4 8$

Ex. 5: Using algebraic reasoning, compare $f(x) = \log(100x)$ and $g(x) = 2 + \log x$

Ex. 6: Evaluate without a calculator: $3^{-\frac{1}{2} \log_3 49}$

Entertainment

pp. 475-476 #1ade, 2ade, 3ade, 4ade, 5, 6ade, 7ad, 9ade, 10a, 11ade, 13*, 16

*answer is: vertical stretch by a factor of 3, and vertical translation up 3 units