

Honors Algebra II

Notes Section 4.5

Apply Properties of Logarithms

PROPERTIES

I. Product $\log_b mn =$ _____

II. Quotient $\log_b m/n =$ _____

III. Power $\log_b m^n =$ _____

EXAMPLE 1 Use $\log_4 3 \approx 0.792$ and $\log_4 7 \approx 1.404$ to evaluate.

a) $\log_4 3/7$ _____

b) $\log_4 21$ _____

c) $\log_4 49$ _____

EXAMPLE 2 Expand the logarithmic expression.

a) $\log_6 \frac{5x^3}{y}$ _____

b) $\log_3 x^4$ _____

EXAMPLE 3 Condense the logarithm or natural logarithm.

a) $\log 9 + 3\log 2 - \log 3$

b) $\ln 4 + 3\ln 3 - \ln 2$

Change of Base Formula: $\log_c a = \frac{\log a}{\log c}$

EXAMPLE 4 Evaluate using common logarithms or natural logarithms.

a) $\log_3 8$ _____

b) $\log_3 8$ _____

EXAMPLE 5 For a sound with intensity I (in watts/meters squared), the loudness L (l) of the sound (in decibels) is given by the function

$$L(I) = 10 \log I/I_0$$

where I_0 is the intensity of a barely audible sound (about 10^{-12} watts/meters squared). An artist in a recording studio turns up the volume of a track so that the sound's intensity doubles. By how many decibels does the loudness increase?

I: Original Intensity

2I: Doubled Intensity

Increase in Loudness = _____