Laws of Logarithms

Date:

Law	General Rule	Proofs	Examples: Use the laws to expand the following single logarithms
Product	$\log_a xy = \log_a x + \log_a y$		$\log 35 =$ $\log_a 7a =$
Quotient	$\log_a \frac{x}{y} = \log_a x - \log_a y$		$\log_a\left(\frac{xy}{2}\right) =$ $\log\left(\frac{x}{100}\right) =$
Power	$\log_a x^n = n\log_a x$		$\log_a 8 =$ $\log_a \sqrt{x} =$

Example 1

Express as sum and difference of logarithms: $\log_a \frac{x^3\sqrt{y^5}z^7}{w^4\sqrt[7]{v^3}}$

Example 2

Express as a single logarithm: $3\log_a x - \frac{1}{2}\log_a y + \frac{3}{2}\log_a w - 7\log_a m$

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Example 3

Simplify the following:

a) $\log_3(\frac{27}{81})$ b) $\log_2 48 - \log_2 3$ c) $\log_5 45$

Example 4

If x=log2 and y=log3, express the following in terms of x and y.

a) $\log\sqrt{6}$ b) log 24

Example 5

If $\log_8 3 = k$ then express $\log_8 18$ in terms of k.

Example 6

Evaluate $3^{-\frac{1}{2}\log_3 49}$

Example 7

Solve to two decimals.

a) $7^x = 400$ b) $7(1.06^x) = 5.20$

Homework

Textbook: Power Law: P. 347 #1-6,9,10,15,20
Product & Quotient P. 384 #1-7,9,10