Write the following logs in exponential form:

$y = \log_8 25$ $\qquad$ $30 = \log_3 x$

Write the following exponential equations in log form:

$12 = 5^x$ $\qquad$ $y = 2^{-3x}$



## Properties of Logs

for all positive #'s M, N, b, and x:

Product Rule

$$\log_b M \bullet N = \log_b M + \log_b N$$

Quotient Rule

$$\log_b \frac{M}{N} = \log_b M - \log_b N$$

Power Rule

$$\log_b M^x = x \log_b M$$

Product Rule | Quotient Rule | Power Rule

Write the following logs in expanded form:

$\log_4 5x$

$\log_4 12$

$\log_4 \frac{x}{6}$

$\log 3x^2$

$\log_4 \frac{x^2}{y^3}$

$\ln x^5$

$\ln \frac{3x^2}{5y^3}$

Write the following expression as a single log:

$\log_4 7 + \log_4 5$

$\ln x - \ln y$

$2\log_4 3 - \log_4 5$

$4\ln x + 2\ln y$

$\frac{1}{3}\ln xy - \frac{2}{3}\ln xy$

## Change of Base

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$$\log_b a = \frac{\log_x a}{\log_x b} \quad or \quad \frac{\ln a}{\ln b}$$

Write the log using only common logs:

$\log_2 x$ $\qquad$ $\ln 4x$

$\log_{\frac{1}{2}} x$

Write the log using only natural logs:

$\log_3 m$

$\log_2 (a+b)$

Solve:

$\log_2 16$

$\log_5 16$

Describe how to transform the graph of y = ln$x$ into the given function:

$f(x) = \log_3 x$

$f(x) = \log_{\frac{1}{4}} x$