

Honors Math 3: Logarithm Practice

Basics of Logarithms

Write the logarithmic equation in exponential form.

- $\log_4 16 = 2$ $4^2 = 16$
- $\log_9 3 = \frac{1}{2}$ $9^{1/2} = 3$
- $\log_2 1 = 0$ $2^0 = 1$
- $\log_5 \frac{1}{5} = -1$ $5^{-1} = \frac{1}{5}$

Write the exponential equation in logarithmic form.

- $2^3 = 8$ $\log_2 8 = 3$
- $10^{-2} = 0.01$ $\log 0.01 = -2$
- $5^0 = 1$ $\log_5 1 = 0$
- $9^{3/2} = 27$ $\log_9 27 = 3/2$

Evaluate the logarithm without using a calculator.

- $\log_2 4$ 2
- $\log_4 1$ 0
- $\log_3 3$ 1
- $\log_4 (64)$ 3
- $\log_5 5^{2/3}$ $2/3$
- $\log_8 (\frac{1}{64})$ -2
- $\log_{25} (5)$ $1/2$
- $\log(0.001)$ -3
- $\ln(e^{-3})$ -3

Logarithmic Properties

Key

Expand the expression.

- $\log_6 3x$ $\log_6 3 + \log_6 x$
- $\ln \frac{x^3}{y^2}$ $3 \ln x - 2 \ln y$
- $\log_{10} xy^2$ $\log x + 2 \log y$
- $\ln \frac{4y^2}{x}$ $\ln 4 + 2 \ln y - \ln x$
- $\log_3 x^{1/2} yz$ $\frac{1}{2} \log_3 x + \log y + \log z$
- $\log_5 2\sqrt{x}$ $\log_5 2 + \frac{1}{2} \log_5 x$
- $\ln \left(\frac{xy^4}{z} \right)^2$ $2(\ln x + 4 \ln y - \ln z)$ OR $2 \ln x + 8 \ln y - 2 \ln z$

Condense the expression.

- $\log_3 7 - \log_3 x$ $\log_3 \left(\frac{7}{x} \right)$
- $2 \log_5 x + \log_5 3$ $\log_5 (3x^2)$
- $\ln x + \ln 4$ $\ln(4x)$
- $3 \ln x + 2 \ln y$ $\ln(x^3 y^2)$
- $\log_4 5 + \log_4 x + \log_4 y$ $\log_4 (5xy)$
- $\frac{1}{2} \log_{10} x - \log_{10} 4 - \log_{10} y$ $\log \left(\frac{\sqrt{x}}{4y} \right)$
- $\frac{2}{3} \log_2 x - 3 \log_2 y$ $\log_2 \left(\frac{x^{2/3}}{y^3} \right) = \log_2 \left(\frac{\sqrt[3]{x^2}}{y^3} \right)$
- $\ln 4 - (\ln x + \ln y)$ $\ln \left(\frac{4}{xy} \right)$
- $\log_3 4 - (2 \log_3 x + \log_3 5)$
 $\log_3 \left(\frac{4}{5x^2} \right)$