Evaluate the expression without using a calculator.

$\log_2 16$

$\log_2 (\frac{1}{8})$

$\log_{81} 3$

$\log 0.001$

$\log_7 1$

$\ln e^3$

$\log 1000$

$\log_{10} 10$

$\log_{27} 9$

Assuming x and y are positive, use properties of logarithms to write the expression as a **sum or difference** of logarithms or multiples of logarithms

$\log 3x^2$

$\ln\left(\frac{3}{y^4}\right)$

$\ln\left(\frac{\sqrt[4]{x^5}}{2\sqrt{y}}\right)$

Assuming x, y and z are positive, use properties of logarithms to write the expression as a **single** logarithm

$$\ln 3 + \frac{1}{3}\ln(4 - x^2) - \ln x$$

$$4\ln x - 6\ln y + 5\ln z$$

$$3(\ln 3 - \ln x) + (\ln x - \ln 9)$$