SM 3H

Date: **Section:**

Objective:

******Memorize the following:**

***Definition of Logarithm*:** $y = \log_a x \Leftrightarrow$ _____

***Properties of Logarithms*:** For any positive numbers M, N, and a, where $a \neq 1$ and r is any real number:

$\log_a 1 =$ _____ $\log_a a =$ _____ $a^{\log_a M} =$ _____ $\log_a a^r =$ _____

$\log_a (MN) =$ _____ $\log_a M^r =$ _____

$\log_a \left(\frac{M}{N}\right) =$ _____ $\log_a M = \log_a N \Leftrightarrow$ _____

***Change of Base Formula*:**

$\log_a M =$ _____ $\log_a M =$ _____ $\log_a M =$ _____

Examples: Find the exact value of each expression. (Do not use a calculator).

a) $\log_{0.6} 0.6^{-3.2}$ b) $5^{\log_5 3}$ c) $\log_7 7^{-1}$ d) $e^{\ln 12}$

Examples: Use the change of base formula to evaluate each logarithm. Round to the nearest ten-thousandths.

a) $\log_6 9$ b) $\log_{\sqrt{2}} 7$ c) $\log_\pi \sqrt{3}$ d) $\log_3 5$

Examples: Use properties of logarithms to find the exact value of each expression. (Do not use a calculator).

a) $\log_4 36 - \log_4 9$ b) $5^{\log_5 6 + \log_5 7}$ c) $e^{\log_{e^2} 9}$ d) $\log_2 6 \cdot \log_6 16$

Examples: Write each expression as a sum/difference of logarithms. Express powers as factors.
Another way to write the directions: Expand each logarithm.

a) $\log_7\left(x^5\right)$

b) $\ln\left(xe^x\right)$

c) $\log_2\left(\dfrac{a}{b^2c}\right),\ a>0,\ b>0,\ c>0$

d) $\ln\left[\dfrac{\left(x-4\right)^2}{x^2-1}\right]^{2/3};\ x>4$

Examples: Write each expression as a single logarithm.
Another way to write the directions: Condense each logarithm.

a) $3\log_5 u+4\log_5 v$

b) $\log_4\left(x^2-1\right)-5\log_4(x+1)$

c) $\log\left(\dfrac{x^2-2x-3}{x^2-4}\right)-\log\left(\dfrac{x^2+7x+6}{x+2}\right)$

d) $21\log_3\sqrt[3]{x}+\log_3\left(9x^2\right)-\log_3 9$

e) $\dfrac{1}{3}\log\left(x^3+1\right)+\dfrac{1}{2}\log\left(x^2+1\right)$