

6-5 Mathematical Literacy and Vocabulary Properties of Logarithms

Product Property	Quotient Property	Power Property	Change of Base
$\log_b(mn) = \log_b m + \log_b n$ Example: $\log_2(15) = \log_2(3) + \log_2(5)$	$\log_b\left(\frac{m}{n}\right) = \log_b m - \log_b n$ Example: $\log_{10}\left(\frac{5}{7}\right) = \log_{10}(5) - \log_{10}(7)$	$\log_b(m^n) = n \log_b m$ Example: $\log_7(5^2) = 2 \log_7(5)$	$\log_b m = \frac{\log_a m}{\log_a b}$ Example: $\log_5(17) = \frac{\log 17}{\log 5}$

Identify the property/(s) that is demonstrated by each equation.

1. $\ln_5 19 = \frac{\ln 19}{\ln 5}$ _____

2. $\log_7\left(\frac{25}{3}\right) = \log_7(25) - \log_7(3)$ _____

3. $\log_{10}(27) = 3 \log_{10}(3)$ _____

4. $\log_5(27) = \log_5(3) + 2 \log_5(3)$ _____

5. $\log_5(77) = \log_5(7) + \log_5(11)$ _____

Use the properties of logarithms to complete each expression.

6. _____ + $\log_{10}(6) = \log_{10}(48)$

7. $\ln_5(7) = \frac{\ln(\underline{\hspace{2cm}})}{\ln(\underline{\hspace{2cm}})}$

Use the properties of logarithms to write each expression as a single logarithm.

8. $2 \log_3 x - \log_3 y$

9. $3 \log 6 + 5 \log x$

9. Use the properties of logarithms to expand the expression: $\ln\left(\frac{x^2}{y}\right)$

10. The following formula can be used to find the concentration of hydrogen ions, $[H^+]$, in a container of baking soda. What is the concentration of hydrogen ions in a container of baking soda. $8.9 = \log \frac{1}{[H^+]}$