Monday, April 18, 2016 8:27 AM

Properties of Logarithms

$$\log_b M \cdot N = \log_b M + \log_b N$$

Product Property

Expand

$$\log_6 7b$$

$$\log_6 7 + \log_6 b$$

Combine / Simplify

$$\log_4 6 + \log_4 8$$

$$\log_4 6 \cdot 8 = \log_4 48$$

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

Combine

$$\log_2 8 - \log_2 4 = \log_2 \frac{8}{4} = \log_2 2 = 1$$

Expand

$$\log_3 \left(\frac{6x}{m}\right) = \log_3 6x - \log_3 m$$

$$\log_3 6 + \log_3 x - \log_3 m$$

$$\log_b M^{\wedge} = \wedge \cdot \log_b M$$

Power Property

$$2 \cdot \log_3 18^2 = 2 \cdot \log_3 18$$

$$\log_2 \sqrt{5} = \log_2 5^{\frac{1}{2}}$$

$$\frac{1}{2} \log_2 5$$

Expand

$\log_2\left(\frac{6}{5}\right)^2$

$2\left(\log_2 \frac{6}{5}\right)$

$2(\log_2 6 - \log_2 5)$

$2\log_2 6 - 2\log_2 5$

$\log_4\left(\frac{10x^2}{3}\right)^6$

$6\left(\log_4\left(\frac{10x^2}{3}\right)\right)$

$6\log_4 10x^2 - 6\log_4 3$

$6\log_4 10 + 6\log_4 x^2 - 6\log_4 3$

$6\log_4 10 + 12\log_4 x - 6\log_4 3$

Combine

$10\log_2 6 + 10\log_2 8 = 10\log_2 48 = \boxed{\log_2 48^{10}}$

$\log_2 6^{10} + \log_2 8^{10} = \log_2 (6 \cdot 8)^{10}$

$2\log_2 6 + 3\log_2 7$ $\quad \log_2 6^2 + \log_2 7^3 = \log_2 6^2 \cdot 7^3$

$\log_2 12348$

b

Combine

$$\frac{1}{2}\log_2 x - \frac{1}{3}\log_2 y$$

$$\log_2 \sqrt{x} - \log_2 \sqrt[3]{y} = \log_2 \frac{\sqrt{x}}{\sqrt[3]{y}}$$

Expand $\log \dfrac{m^6}{n^7 \cdot p^{-2}}$

$$\log m^6 - (\log n^7 p^{-2})$$

$$\log n^6 - (\log n^7 + \log p^{-2}) = \log m^6 - \log n^7 - \log p^{-2}$$

$$= 6\log n - 7\log n + 2\log p$$

0.3 Solving

$\log 8^{2x} = \log 10$

$\log 8^{2x} = \log 10 \Rightarrow \frac{2x \cdot \log 8}{2 \cdot \log 8} = \frac{\log 10}{2 \log 8} = x \approx .55$

Solve

$\log 6^{8x} = \log 1000$

$\log_{10} 6^{8x} = \log_{10} 1000$

$8x \log_{10} 6 = 3$

$\frac{8x \cdot \log 6}{8 \cdot \log 6} = \frac{3}{8 \cdot \log 6} \Rightarrow x \approx .48$

Change of Base Formula

$$\log_b M = \frac{\log_c M}{\log_c b}$$

Convert $\log_3 8$ to base 6.

$\log_3 8 = \log_6 X$

$1.89 = \log_6 X$

$\frac{\log 8}{\log 3} \approx 1.89$

$6^{1.89} \approx 29.56$

$\log_6 29.56$

$\log_2 32$ to new base 10

$$\frac{\log 32}{\log 2} = 5$$

$$5 = \log_{10} X$$

$$10^5 = X = 100{,}000$$

$\log_{10} 100000$