

Wednesday, November 9, 2016

3.4 - Properties of Logs

Answer the problems below in your notebook:

$$\textcircled{1} x^5 \cdot x^3 = x^8$$

$$\textcircled{5} a^{-3} = \frac{1}{a^3}$$

$$\textcircled{2} \frac{x^6}{x^2} = x^4$$

$$\textcircled{6} 4x^{-2} = \frac{4}{x^2}$$

$$\textcircled{3} (a^3b)^2 = a^6b^2$$

$$\textcircled{7} 2^{\frac{3}{2}} = \sqrt[3]{2^2} = \sqrt[3]{4}$$

$$\textcircled{4} (2x^2y^5)^3 = 8x^6y^{15}$$

* Remember, Logs are Exponents!

$$y = b^x \iff \log_b y = x \leftarrow \text{exponent}$$

3.4 Properties of Logs

Product Rule

$$\log_b(x \cdot y) = \log_b x + \log_b y$$

$$\textcircled{1} \log_9 9y \\ = \log_9 9 + \log_9 y$$

$$\textcircled{2} \log_2 4x \\ = \log_2 4 + \log_2 x \\ = 2 + \log_2 x$$

$$\textcircled{3} \text{ Write as a single log:} \\ \log_3 2 + \log_3 5 \\ = \log_3 10$$

Quotient Rule

$$\log_b\left(\frac{x}{y}\right) = \log_b x - \log_b y$$

$$\textcircled{1} \log 700 - \log 7 \\ = \log 100 \\ = 2$$

QUICK FACT

Today I found out...

The equal sign, "=", was invented in 1557 by Welsh mathematician Robert Recorde, who was fed up with writing "is equal to" in his equations. He chose the two lines because "no two things can be more equal".

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$$\begin{aligned} \textcircled{2} \log \frac{x}{2} \\ = \log x - \log 2 \end{aligned}$$

Power Rule

$$\log_b x^m = m \log_b x$$

$$\textcircled{1} \log 5^3 = 3 \log 5 \quad (\text{also } \log 125)$$

$$\textcircled{2} \ln x^2 = 2 \ln x$$

$$\textcircled{3} \log \sqrt[3]{z} = \frac{1}{3} \log z$$

$$\begin{aligned} \textcircled{4} \log 2x^5 &= \log 2 + \log x^5 \\ &= \log 2 + 5 \log x \end{aligned}$$

Change of Base

helps to log/ln in calculator

$$\log_b x = \frac{\log x}{\log b}$$

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$$\begin{aligned} \textcircled{1} \log_2 5 &= \frac{\log 5}{\log 2} \approx 2.322 \\ &= \frac{\ln 5}{\ln 2} \approx 2.322 \end{aligned}$$