Logs they are not just for Rolling

$x = 2^y \leftrightarrow \log_2 x = y$

(base #)

Logarithmic Functions

$b^y = x \leftrightarrow \log_b x = y$

$2^x = y$

$\sqrt{x^2} = \sqrt{25}$

$x = \pm 5$

$\sqrt[x]{2^x} = 32$

$\log_2 32 = y$ $\quad 2^y = 32$

$y = 5$

$\log_2 32 = 5$ $\quad 2^5 = 32$

$\log_2 1 = y \leftrightarrow 2^y = 1$

$y = 0$

Rule → $\log_b 1 = 0$ $\quad b^0 = 1$

$\log_{10} 10 = y$ $10^y = 10$

$y = 1$

Rule → $\log_b b = 1$

$\log_? \rightarrow \log_{10}$

Find $\log 100 = 2 \leftrightarrow 10^2 = 100$

$\log .01 = -2 \leftrightarrow 10^{-2} = \frac{1}{100}$

$\log 15/8 = .273$

$\frac{\log 15}{\log 8} = 1.302$

$\log(15) / \log(8)$

$\log_2 32 = x$

Rule Change of Base

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

$$\log_2 32 = \frac{\log 32}{\log 2} = 5$$

$$\log_5 18 = \frac{\log 18}{\log 5} = 1.796$$

$\log(20) \cdot \log(5) = .909$

$5 \cdot \log(20) = 6.505$ ←

$\log(20) + \log(5) = 2$

1) $\log(20 \cdot 5) = 2$

Rule $\log(xy) = \log x + \log y$

2) $\log(20^5) = 6.505$

Rule $\log x^y = y \log x$

$\log 100 = \log 10^2$

$= 2 \log_{10} 10$

$= 2(1) = 2$

$2^x = 32 \quad \leftrightarrow \log_2 32 = x$

$\log 2^x = \log 32$

$x \log 2 = \log 32$

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

$\log(20) \cdot \log(5) = .909$

$\log(20) / \log(5) = 1.86$

$\log(20) - \log(5) = .602$

$\log\left(\frac{20}{5}\right) = .602$

Rule $\log \frac{x}{y} = \log x - \log y$

rewrite

$\log_3(81 \cdot 27)$

$\log_3(81) + \log_3(27)$

$\log_3 3^4 + \log_3 3^3$

$4\log_3 3 + 3\log_3 3$

$4 + 3$

7

$\log_5(5x^2y) =$

$\log_5 5 + \log_5 x^2 + \log_5 y$

$1 + 2\log_5 x + \log_5 y$

$\log_5 \left(\frac{25}{18}\right)$

$\log_5 25 - \log_5 18$

$\log_5 5^2 - \log_5 18$

$2\log_5 5 - \log_5 18$

$2 - \log_5 18$

$\log_a(a^3b^2c^5)$

$\log_a a^3 + \log_a b^2 + \log_a c^5$

$3\log_a a + 2\log_a b + 5\log_a c$

$3 + 2\log_a b + 5\log_a c$

$$\log_3 \sqrt{\frac{x^4}{y^3z^2}} = \log_3 \left(\frac{x^4}{y^3z^2}\right)^{1/2}$$

$$\frac{1}{2}\log_3 \frac{x^4}{y^3z^2}$$

$$\frac{1}{2}(\log_3 x^4 - \log_3 y^3z^2)$$

$$-(\log_3 y^3 + \log_3 z^2)$$

$$\frac{1}{2}(\log_3 x^4 - \log_3 y^3 - \log_3 z^2)$$

$$\frac{1}{2}(4\log_3 x - 3\log_3 y - 2\log_3 z)$$

Done $\rightarrow 2\log_3 x - \frac{3}{2}\log_3 y - \log_3 z$

Homework

12-3 pg 884 # 9-35 odd
#65-109 odd

12-4 pg 891-892 # 7-11, 13-53 odd