

Logarithms  $\Rightarrow$  Solve for exponents

$$\log_b n = p \Rightarrow b^p = n$$

$$\log_7 x = 2 \Rightarrow 7^2 = x \Rightarrow x = 49$$

$$\log_4 8 = x \Rightarrow 4^x = 8 \quad 2^{2x} = 2^3 \quad 2x = 3$$

$$\boxed{x = \frac{3}{2}}$$

$$\log_2 x = -3 \Rightarrow 2^{-3} = x \Rightarrow x = \frac{1}{8}$$

Evaluate:

$$\log_9 27 = x \Rightarrow 9^x = 27 \Rightarrow 3^{2x} = 3^3 \quad 2x = 3$$

$$\boxed{x = \frac{3}{2}}$$

$$\text{Evaluate: } \log_{\frac{1}{8}} 32 = x \quad \frac{1}{8}^x = 32$$

$$2^{-3x} = 2^5$$

$$-3x = 5$$

$$\boxed{x = -\frac{5}{3}}$$

\* Base of log must be  $> 0$

\* Can only take log of something  $> 0$ .

# Log properties !!

$$\log_b(mn) = \log_b m + \log_b n$$

$$\log_b\left(\frac{m}{n}\right) = \log_b m - \log_b n$$

$$\log_b(m^n) = n \log_b m$$

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Condense

Expand

Condense the following:

$$\log_4 6 + \log_4 9 - \log_4 3 \rightarrow \log_4\left(\frac{6 \cdot 9}{3}\right) \\ = \log_4(18)$$

$$2\log_3 x - \log_3 y \rightarrow \log_3\left(\frac{x^2}{y}\right)$$

$$\log_5\left(\frac{x^2 y}{4}\right) \rightarrow 2\log_5 x + \log_5 y - \log_5 4$$

$$\log_2\left(\frac{\sqrt{x} y^3}{w z^4}\right) = \log_2\left(\frac{x^{1/2} y^3}{w z^4}\right) =$$

$$\frac{1}{2}\log_2 x + 3\log_2 y - (\log_2 w + 4\log_2 z)$$

$$\frac{1}{2}\log_2 x + 3\log_2 y - \log_2 w - 4\log_2 z$$

$$\textcircled{1} \log_5 (2x-2) = \log_5 10$$

$$2x-2=10 \Rightarrow 2x=12 \Rightarrow \boxed{x=6}$$

$$\textcircled{2} \log_6 x + \log_6 9 = \log_6 54$$

$$\log_6 (9x) = \log_6 54 \Rightarrow 9x=54 \Rightarrow \boxed{x=6}$$

$$\textcircled{3} \log_6 (x+1) - \log_6 x = \log_6 29$$

$$\log_6 \left( \frac{x+1}{x} \right) = \log_6 29$$

$$\frac{x+1}{x} = 29$$

$$x+1=29x \quad 1=28x$$

$$\boxed{x = \frac{1}{28}}$$

$$\log x = \log_{10} x$$

$$\ln x = \log_e x$$

$$\textcircled{4} \log_3 (x-2) = 2 \quad \text{Write as exp}$$

$$3^2 = x-2$$

$$9 = x-2$$

$$\boxed{x=11}$$

Meaning of logs  
3-30 m3

Log eqn. 2-22 even