

Examples

1. $\log_3 18 + \log_3 \left(\frac{3}{2}\right)$

↳ add means multiply

$$\log_3(18)\left(\frac{3}{2}\right)$$

$$\log_3 27$$

$$\log_3 27 = x$$

$$3^x = 27$$

$$\cancel{3}^x = 3^3$$

$$x = 3$$

2. $\log_5 40 - 3 \log_5 2$

subtraction
means
division

power rule
(do this first)

$$\log_5 40 - \log_5 2^3$$

$$\log_5 40 - \log_5 8$$

$$\log_5 \frac{40}{8}$$

$$\log_5 5$$

$$5^x = 5$$

$$x = 1$$

$$3. \log 625 + 2\log 4$$

$$\log 625 + \log 4^2$$

$$\log 625 + \log 16$$

$$\log(625)(16)$$

$$\log 10000$$

$\log_{10} 10000$	$\log_{10} 10000 = x$
calculator	$10^x = 10000$
$= 4$	$10^x = 10^4$
	$x = 4$

$$4. \frac{1}{2} \log_3 36 - \log_3 2$$

$$\log_3 36^{1/2} - \log_3 2$$

$$\log_3 6 - \log_3 2$$

$$\log_3 \frac{6}{2}$$

$$\log_3 3$$

$$= 1$$

$$\begin{aligned} 5. \log_3 27 - \frac{1}{3} \log_3 27 \\ \log_3 27 - \log_3 27^{1/3} \\ \log_3 27 - \log_3 3 \\ \log_3 \frac{27}{3} = \log_3 9 = 2 \end{aligned}$$

$$27^{1/3} \Rightarrow \sqrt[3]{27}$$

$$\begin{aligned} 6. 3 \log_8 2 - \frac{1}{2} \log_8 64 \\ \log_8 2^3 - \log_8 64^{1/2} \\ \log_8 8 - \log_8 8 \\ \log_8 \frac{8}{8} \\ \log_8 1 \end{aligned}$$