

$$12.3.3) \log_5(7 \cdot 11) = \log_5 7 + \log_5 11$$

$$6) \log_b 5d = \log_b 5 + \log_b d$$

$$9) \log_b \left(\frac{H}{10}\right) = \log_b H - \log_b 10$$

$$12) \log_b \left(\frac{8}{M}\right) = \log_b 8 - \log_b M$$

$$15) \log_b A^{-2} = -2 \log_b A$$

$$18) \log_b \sqrt{z} = \log_b z^{1/2} = \frac{1}{2} \log_b z$$

$$30) 3 \log_8 5 - \log_8 z = \log_8 (5^3) - \log_8 z = \log_8 125 - \log_8 z = \log_8 \left(\frac{125}{z}\right)$$

$$31) 2 \log_b 7 + 3 \log_b y - \frac{1}{2} \log_b z$$

$$= \log_b 7^2 + \log_b y^3 - \log_b z^{1/2}$$

$$= \log_b 49 + \log_b y^3 - \log_b \sqrt{z} = \log_b \left(\frac{49y^3}{\sqrt{z}}\right)$$

$$53) 3 \log_5 x = \log_5 8$$

$$\log_5 x^3 = \log_5 8$$

$$\rightarrow \text{so } x^3 = 8$$

$$x = \sqrt[3]{8} = 2.$$

$$57) \log_6 (5x+21) - \log_6 (x+3) = 1$$

$$\log_6 \left(\frac{5x+21}{x+3}\right) = 1$$

↑
base

↑
exponent

$$6^1 = \frac{5x+21}{x+3}$$

$$6x+18 = 5x+21$$

$$\underline{x=3}$$