

로그의 계산 1

예제1

$$\log_{10}2 = a, \quad \log_{10}3 = b$$

$$\textcircled{1} \quad \log_{10}5$$

$$= \log_{10}\frac{10}{2} = \log_{10}10 - \log_{10}2 = 1 - \log_{10}2 = 1 - a$$

$$\textcircled{2} \quad \log_{10}600$$

$$= \log_{10}2 \cdot 3 \cdot 10^2 = \log_{10}2 + \log_{10}3 + \log_{10}10^2 = a + b + 2$$

$$\textcircled{3} \quad \log_{10}0.72$$

$$\begin{aligned} &= \log_{10}\frac{72}{100} = \log_{10}72 - \log_{10}100 = \log_{10}2^3 \cdot 3^2 - 2 \\ &= \log_{10}2^3 + \log_{10}3^2 - 2 \\ &= 3\log_{10}2 + 2\log_{10}3 - 2 = 3a + 2b - 2 \end{aligned}$$

$$\textcircled{4} \quad \log_{10}^3 \sqrt{500}$$

$$\begin{aligned} &= \log_{10}500^{\frac{1}{3}} = \frac{1}{3}\log_{10}500 = \frac{1}{3}\log_{10}\frac{1000}{2} \\ &= \frac{1}{3}(\log_{10}1000 - \log_{10}2) = \frac{1}{3}(3 - a) \end{aligned}$$

예제2

$$\log_3 6 = a \quad \dots \quad \log_3 288 = ?$$

$$\rightarrow \log_3 2 \cdot 3 = a \quad \log_3 288 = \log_3 4 \cdot 72$$

$$\log_3 2 + 1 = a \quad = \log_3 2^5 \cdot 3^2$$

$$\begin{aligned} \log_3 2 = a - 1 & \quad = \log_3 2^5 + \log_3 3^2 \\ & \quad = 5(a - 1) + 2 = 5a - 3 \end{aligned}$$

예제3

$$\log 0.5 = a, \quad \log 9 = b, \quad \log 72 = ?$$

$$\rightarrow \log \frac{1}{2} = a \quad \dots \quad \log 2^{-1} = a \quad \dots \quad -\log 2 = a$$

$$\log = b \quad \dots \quad \log 3^2 = b \quad \dots \quad 2\log 3 = b$$

$$\log 72 = \log 2^3 \cdot 3^2 = 3\log 2 + 2\log 3 = 3(-a) + b = b - 3a$$

예제4

$$\log 6 = 2a, \quad \log 1.5 = 2b, \quad \log 24 = ?$$

$$\rightarrow \log 2 + \log 3 = 2a \quad 2\log 3 = 2a + 2b \quad \log 2 = a - b$$

$$\log \frac{3}{2} = 2b \quad \log 3 = a + b$$

$$\therefore \log 24 = \log 3 + \log 2^3$$

$$\begin{aligned} &\log 3 - \log 2 = 2b & \log 2 + a + b = 2a \\ &= \log 3 + 3\log 2 & \\ &= a + b + 3(a - b) = 4a - 2b & \end{aligned}$$

예제5

$$\log_2 12 = a \quad \text{일 때} \quad \log_2 9 = ?$$

$$\log_2 3 \cdot 2^2 = a \quad \log_2 9 = \log_2 3^2$$

$$\log_2 3 + 2\log_2 2 = a \quad = 2\log_2 3$$

$$\log_2 3 = a - 2 \quad = 2(a - 2) = 2a - 4$$

예제6

$$\log(1 - \frac{1}{3}) = a, \quad \log(1 - \frac{1}{9}) = b \quad \dots \quad \log(1 - \frac{1}{81}) = ?$$

$$\rightarrow \log \frac{2}{3} = \log 2 - \log 3 = a \quad b - 2a - \log 3 = a$$

$$\log \frac{8}{9} = \log 8 - \log 9 = b \quad \log 3 = b - 3a$$

$$= 3\log 2 - 2\log 3 = b$$

$$\therefore \log \frac{80}{81} = \log 80 - \log 81 \quad 2\log 2 - 2\log 3 = 2a$$

$$= \log 8 + \log 10 - \log 3^4 \quad \therefore \log 2 = b - 2a$$

$$= \log 2^3 + 1 - 4\log 3 = 3\log 2 + 1 - 4\log 3$$

$$\therefore 3(b - 2a) + 1 - 4(b - 3a) = 3b - 6a + 1 - 4b + 12a = 6a - b + 1$$