

$$\begin{array}{r} 2 \overline{)24} \\ 2 \overline{)12} \\ 2 \overline{)6} \\ 3 \end{array} \quad \begin{array}{r} 2 \overline{)18} \\ 3 \overline{)9} \\ 3 \end{array}$$

$18 = 2 \cdot 3^2$

### 對數律

(1)  $\log_a 1 = 0$   $a > 0, a \neq 1$  (2)  $\log(A \cdot B) = \log A + \log B$

(3)  $\log \frac{A}{B} = \log A - \log B$  (4)  $\log A^r = r \log A$   $\log_a b = \frac{\log_c b}{\log_c a}$

(1) 已知  $\log_2 2 = a$ ,  $\log_2 3 = b$ , 則  $\log_2 24 = ?$

$$\log_2 24 = \log_2 2^3 \cdot 3 = \log_2 2^3 + \log_2 3 = 3 \log_2 2 + \log_2 3 = 3a + b$$

(2) 已知  $\log_2 2 = a$ ,  $\log_2 3 = ?$   $\log_3 18 = ?$  (以  $a$  表示)

$$\log_3 2 = \frac{\log_2 2}{\log_2 3} = \frac{1}{\log_2 3} \quad \log_3 18 = \log_3 (2 \cdot 3^2) = \log_3 2 + 2 = a + 2$$

(3) 若  $\log 18 = a$ ,  $\log 15 = b$ ,  $\log 2 = ?$   $\log 3 = ?$  ( $a, b$  表示)

$$a = \log 18 = \log 2 + 2 \log 3 \quad \text{--- (1)}$$

$$15 = 3 \cdot 5 = \frac{3 \cdot 10}{2}$$

$$b = \log 15 = -\log 2 + \log 3 + 1 \quad \text{--- (2)}$$

$$(1) + (2)$$

$$(1) - 2 \times (2)$$

$$a + b = 3 \log 3 + 1$$

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

$$a + b - 1 = 3 \log 3$$

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

$$\log 3 = \frac{a + b - 1}{3}$$

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