

## Unit 9 Objective 5 – The Laws of Logs

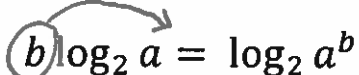
### 1. Single log multiplication is double log addition

$$\log_2 ab = \log_2 a + \log_2 b$$

### 2. Single log division is double log subtraction

$$\log_2 \frac{a}{b} = \log_2 a - \log_2 b$$

### 3. The leading coefficient of a log term began its life as an exponent

$$b \log_2 a = \log_2 a^b$$


# Unit 9 Objective 5

Using the 3 laws of logs

$$\begin{aligned} \textcircled{6} \quad \ln \frac{e^3}{5} & \leftarrow \ln e^{\textcircled{3}} - \ln 5 \\ & 3 \cdot \ln e - \ln 5 \\ & 3 \cdot 1 - \ln 5 \\ & \boxed{3 - \ln 5} \end{aligned}$$

$$\begin{aligned} \textcircled{12} \quad \log 1000x^3\sqrt[3]{y} & \leftarrow \log 1000 + \log x^{\textcircled{3}} + \log y^{\textcircled{\frac{1}{3}}} \\ & \boxed{3 + 3\log x + \frac{1}{3}\log y} \end{aligned}$$

$$\begin{aligned} \textcircled{18} \quad \textcircled{2} \log x^2 + \log 11 & \leftarrow \log x^2 + \log 11 \\ & \boxed{\log 11x^2} \end{aligned}$$

$$\textcircled{25} \quad 2 \log_6 2^2 + 2 \log_6 3^2$$

$$\log_6 4 + \log_6 9$$



$$\log_6 36$$

$$= \boxed{2}$$

$$\textcircled{29} \quad 3 - \frac{1}{2} \log_2 x + \log_2 y$$

hint: convert the constant to a log

$$\log_2 8 - \left(\frac{1}{2}\right) \log_2 x^{\frac{1}{2}} + \log_2 y$$

$$\log_2 8 - \log_2 \sqrt{x} + \log_2 y$$



$$\log_2 \frac{8}{\sqrt{x}} + \log_2 y$$



$$= \boxed{\log_2 \frac{8y}{\sqrt{x}}}$$