

1. Write as a single logarithm and evaluate.

$$\begin{aligned}
 \text{(A)} \log_4 64 + \log_4 16 & \\
 &= \log_4 (64 \cdot 16) \\
 &= \log_4 1024 \\
 &= \frac{\log 1024}{\log 4} \\
 &= 5
 \end{aligned}$$

$$\begin{aligned}
 \text{(D)} \frac{1}{2} \log_3 36 - \log_3 2 & \\
 &= \log_3 36^{\frac{1}{2}} - \log_3 2 \\
 &= \log_3 6 - \log_3 2 \\
 &= \log_3 \frac{6}{2} \\
 &= \log_3 3 \\
 &= 1
 \end{aligned}$$

$$\begin{aligned}
 \text{(G)} 3 \log_8 2 - \frac{1}{2} \log_8 64 & \\
 &= \log_8 2^3 - \log_8 64^{\frac{1}{2}} \\
 &= \log_8 8 - \log_8 8 \\
 &= 0
 \end{aligned}$$

$$\begin{aligned}
 \text{(B)} 2 \log 5 + \log 8 - \log 2 & \\
 &= \log 5^2 + \log 8 - \log 2 \\
 &= \log 25 + \log 8 - \log 2 \\
 &= \log \left( \frac{25 \cdot 8}{2} \right) \\
 &= \log (100) \\
 &= \frac{\log 100}{\log 10} \\
 &= 2
 \end{aligned}$$

$$\begin{aligned}
 \text{(E)} \log 625 + 2 \log 4 & \\
 &= \log 625 + \log 4^2 \\
 &= \log 625 + \log 16 \\
 &= \log (625 \cdot 16) \\
 &= \log (10000) \\
 &= \frac{\log 10000}{\log 10} \\
 &= 4
 \end{aligned}$$

$$\begin{aligned}
 \text{(H)} 2 \log_5 25 + \frac{1}{2} \log_5 625 & \\
 &= \log_5 25^2 + \log_5 625^{\frac{1}{2}} \\
 &= \log_5 625 + \log_5 25 \\
 &= \log_5 (625 \cdot 25) \\
 &= \log_5 (3125) \\
 &= \frac{\log 3125}{\log 5} \\
 &= 5
 \end{aligned}$$

$$\begin{aligned}
 \text{(C)} 2 \log A + \log B^3 - 5 \log C & \\
 &= \log A^2 + \log B^3 - \log C^5 \\
 &= \log \frac{A^2 B^3}{C^5}
 \end{aligned}$$

$$\begin{aligned}
 \text{(F)} 3 \log_8 2 - \frac{1}{2} \log_8 64 & \\
 &= \log_8 2^3 - \log_8 64^{\frac{1}{2}} \\
 &= \log_8 8 - \log_8 8 \\
 &= 0
 \end{aligned}$$

$$\begin{aligned}
 \text{(I)} 2 \log A + \log B - 5 \log C & \\
 &= \log A^2 + \log B - \log C^5 \\
 &= \log \frac{A^2 B}{C^5}
 \end{aligned}$$

$$\begin{aligned}
 1. \text{ Expand: } \log \left( \frac{A^3 B}{C^2} \right) & \\
 &= \log A^3 + \log B - \log C^2 \\
 &= 3 \log A + \log B - 2 \log C
 \end{aligned}$$

2. Identify the error(s) in the solution below and provide the correct solution.

$$\frac{1}{2} \log_2 64 - (2 \log_2 6 - \frac{1}{2} \log_2 81)$$

$$= \log_2 64^{\frac{1}{2}} - (\log_2 6^2 - \log_2 81^{\frac{1}{2}})$$

$$= \log_2 8 - (\log_2 12 - \log_2 9)$$

$$= \log_2 8 - (\log_2 3)$$

$$= \log_2 5$$

$$= \log_2 8 - (\log_2 36 - \log_2 9)$$

$$= \log_2 8 - (\log_2 \frac{36}{9})$$

$$= \log_2 8 - \log_2 4$$

$$= \log_2 \frac{8}{4}$$

$$= \log_2 2$$

$$= 1$$