Logarithm laws

6 questions | 14 marks

Equivalent correct methods earn the corresponding marks.

1. Simplify $\log_2 8 + \log_2 4$. [2 marks]

It equals $\log_2 32 = 5$.

Answer: 5

2. Write $\log_5 75 - \log_5 3$ as one log and evaluate. [2 marks]

$\log_5 (\frac{75}{3}) = \log_5 25 = 2$.

Answer: 2

3. Expand $\log_{10} (\frac{x^3}{y})$ for $x, y > 0$. [2 marks]

Use quotient and power laws.

Answer: $3\log_{10} x - \log_{10} y$

4. Solve $\log_2 x + \log_2 4 = 5$. [2 marks]

$\log_2 (4x) = 5$, so $4x = 32$ and $x = 8$.

Answer: $x = 8$

5. Solve $\log_{10} (x - 1) + \log_{10} (x + 1) = \log_{10} 8$. [3 marks]

Domain $x > 1$. The product gives $x^2 - 1 = 8$, so $x = \pm 3$; only 3 is valid.

Answer: $x = 3$

6. A student claims $\log_{10} 2 + \log_{10} 3 = \log_{10} 5$. Give the correct single log. [3 marks]

The product law multiplies 2 and 3, rather than adding them.

Answer: $\log_{10} 6$