Interpreting logarithmic scales

6 questions | 13 marks

Equivalent correct methods earn the corresponding marks.

1. What quantity sits halfway between 10 and 1000 on a base-10 logarithmic axis? [2 marks]

The midpoint exponent is $(1 + 3)/2 = 2$, so the value is 10^2.

Answer: 100

2. How many equal log intervals separate 1 and 10000 when adjacent labels differ by a factor of 10? [2 marks]

$10000 = 10^4$.

Answer: 4

3. For $M = \log_{10}(A/A_0)$, find M when $A = 1000A_0$. [2 marks]

$M = \log_{10} 1000 = 3$.

Answer: 3

4. Two amplitudes have scale values 4 and 6 under $M = \log_{10}(A/A_0)$. Find their larger-to-smaller ratio. [2 marks]

$10^{6-4} = 100$.

Answer: 100

5. For $p = -\log_{10} c$, find c when $p = 5$. [2 marks]

$\log_{10} c = -5$, so $c = 10^{-5}$.

Answer: $c = 10^{-5}$

6. Why can zero not appear as a value on an ordinary real logarithmic axis? [3 marks]

No real exponent of a positive valid base gives zero.

Answer: Its logarithm is undefined.