Logarithms

Specification: AQA 7357: F3, B1 · Edexcel 9MA0: 6.3, 2.1

INDEPENDENT **You do**

A · Switch and evaluate

1 Write as a logarithm:
(a) $2^6 = 64$
(b) $10^{-1} = 0.1$
(c) $8^{\frac{1}{3}} = 2$
(d) $7^0 = 1$

2 Write using a power:
(a) $\log_4 1024 = 5$
(b) $\log_9 3 = \frac{1}{2}$
(c) $\log_2 0.25 = -2$
(d) $\log_a b = c$

3 Find the value of:
(a) $\log_2 128$
(b) $\log_3 243$
(c) $\log_{10} 1000000$
(d) $\log_7 7$

4 Find the value of:
(a) $\log_2 \frac{1}{32}$
(b) $\log_5 0.2$
(c) $\log_4 8$
(d) $\log_2 \sqrt{2}$

B · Solve

5 Solve:
(a) $\log_2 x = 6$
(b) $\log_5 x = -1$
(c) $\log_9 x = \frac{1}{2}$

6 Solve:
(a) $\log_x 125 = 3$
(b) $\log_x 16 = 4$
(c) $\log_x 0.5 = -1$

7 Solve:
(a) $\log_3 (x - 2) = 2$
(b) $\log_2 (3x + 1) = 4$

8 Use a calculator to find, to 3 d.p.:
(a) $\log_2 30$
(b) $\log_7 100$
(c) $\log 0.5$

C · Reasoning No calculator.

9 Explain why $\log_a 1 = 0$ and $\log_a a = 1$ for every $a > 0, a \neq 1$.

10 Between which two consecutive integers does $\log_2 100$ lie? Explain.

11 Explain why the graph of $y = \log_2 x$ has no y-intercept.

D · Algebra

12 Simplify:
(a) $\log_a a^7$
(b) $a^{\log_a 5}$

13 Solve $\log_2 (\log_3 x) = 2$.

14 Solve $\log_4 x = \log_2 8$.

E · Exam-style question AQA-style. No calculator. Use the mark scheme to self-assess.

15 (a) Write down the value of $\log_5 125$. [1 mark]
(b) Find the value of $\log_4 0.5$. [2 marks]
(c) Solve $\log_x 27 = \frac{3}{2}$. [3 marks]