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A LEVEL MATHS

(83) Logarithms (Simplifying & Evaluating)

WORKING AT D/E

(1) Rewrite each of the following using a logarithm.

(a) $3^2 = 9$ (b) $5^3 = 125$ (c) $8^2 = 64$

(d) $4^{-1} = \frac{1}{4}$ (e) $9^0 = 1$ (f) $8^{\frac{2}{3}} = 4$

(2) Without a calculator, find the value of each:

(a) $\log_2 8$ (b) $\log_3 81$ (c) $\log_4 16$

(d) $\log_5 125$ (e) $\log_2 32$ (f) $\log_7 7$

(3) Use your calculator to find the value of each to 3SF.

(a) $\log_2 27$ (b) $\log_7 3$ (c) $\log_{0.1} 0.05$

WORKING AT B/C

(1) Without a calculator, find the value of x in each:

(a) $\log_2 x = 3$ (b) $\log_3 1 = x$ (c) $\log_4 2 = x$

(d) $\log_3 3 = x$ (e) $\log_6\left(\frac{1}{36}\right) = x$ (f) $\log_5 0.2 = x$

(g) $\log_2(x-1) = 4$ (h) $\log_5(2x) = 4$

(2) Given that $\log x$ is the same as $\log_{10} x$, without a calculator, find the value of each.

(a) $\log 100$ (b) $\log 0.1$ (c) $\log 1$

(3) Explain why $\log_a a^b = b$ for when a is positive and $a \neq 1$.

WORKING AT A*/A

(1) Given that $x > 0$, without a calculator, find the value of x in each:

(a) $\log_x 9 = 2$ (b) $\log_4(3-x) = 1$

(c) $\log_5 0.04 = x - 3$ (d) $\log_4 1 = 2x - 1$

(e) $\log_x 0.125 = -3$ (f) $\log_8 2 = x + 7$

(2) Without using a calculator, **estimate** the value of x in each:

(a) $\log_3 25 = x$ (b) $\log_4 14 = x$

(c) $\log_2 x = 3.5$ (b) $\log 110 = x$

(3) Alan is trying to solve the inequality below for x.

$$(\log_8 0.5)\, x > 14$$

He writes:

$$x > \frac{14}{(\log_8 0.5)}$$

$$x > -42$$

Is he correct? You must justify your answer.