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A LEVEL MATHS

(84) Logarithms (The Log Laws)

WORKING AT D/E

(1) Write each of the following as a single logarithm:

(a) $\log 2 + \log 8$

(b) $\log 15 - \log 5$

(c) $\log 3 + \log 8 - \log 2$

(d) $\log 2 - \log 5$

(2) (a) Show that $\log x^2 y^3 \equiv 2\log x + 3\log y$

(b) Show that $\log \frac{x^5}{\sqrt{y}} \equiv 5\log x - \frac{1}{2}\log y$

(3) (a) By combining logarithms show that the equation
$$\log_2 3 + \log_2(x-1) = 0$$

can be written as $\quad 3(x-1) = 1$.

(b) Hence, solve the equation
$$\log_2 3 + \log_2(x-1) = 0$$

WORKING AT B/C

(1) Write each of the following in terms of $\log_2 x$, $\log_2 y$ and $\log_2 z$.

(a) $\log_2\left(\frac{x^6}{y}\right)$ 　　(b) $\log_2 x^7 z y^3$ 　　(c) $\log_2 8xz^3$

(2) Solve the equation
$$\log_2(5x-6) + \log_2(3x+10) = 6$$

Giving your answer as an integer.

(3) (a) Show that the equation
$$2\log_3(2x+1) = 5 - \log_3(x-1),$$

Can be written as $(2x+1)^2(x-1) = 243$

(b) Hence, **verify** the solution $x = 4$ is a solution to the equation $2\log_3(2x+1) = 5 - \log_3(x-1)$

WORKING AT A*/A

(1) (a) Find the solution to the equation
$$2\log_4(x-1) = 0.5 + \log_4(x+3), \quad x \in R$$

Showing step by step workings.

(b) Explain why there is only one solution to the equation.

(2) Beryl is trying to find the real solutions to the equation
$$a\log_b(4x+3) = c, \quad x \in R$$

Find the set of values for which x is valid.

(3) (a) Given that $p = \log_8 x$ and $q = \log_8 y$, write each of the following in terms of p and q

(i) $\log_8 2x^4 y^{\frac{1}{3}}$

(ii) $\log_8 \frac{x^9}{4\sqrt{y}}$

(b) Write the following as a single logarithm
$$100 + 2\log x - 0.5\log y$$