Logarithmic and exponential functions – 2021 O Level Additional Math

1. Nov/2021/Paper_12/No.3

(a) Write $3+2\lg a-4\lg b$ as a single logarithm to base 10. [4]

(b) Solve the equation $3\log_a 4+2\log_4 a=7$. [5]

2. Nov/2021/Paper_13/No.2

A particle moves in a straight line such that its velocity, v ms^{-1}, at time t seconds after passing through a fixed point O, is given by $v = e^{3t} - 25$. Find the speed of the particle when $t = 1$. [2]

3. Nov/2021/Paper_22/No.5

(a) Solve the following simultaneous equations.

$$e^x + e^y = 5$$
$$2e^x - 3e^y = 8$$

[5]

(b) Solve the equation $e^{(2t-1)} = 5e^{(5t-3)}$. [4]

4. Nov/2021/Paper_23/No.4

(a) Solve the equation $\log_6(2x-3) = \frac{1}{2}$. Give your answer in exact form. [2]

(b) Solve the equation $\ln 2u - \ln(u-4) = 1$. Give your answer in exact form. [3]

(c) Solve the equation $\frac{3^v}{27^{2v-5}} = 9$. [3]

5. June/2021/Paper_12/No.5

(a) Given that $\log_a p + \log_a 5 - \log_a 4 = \log_a 20$, find the value of p. [2]

(b) Solve the equation $3^{2x+1} + 8(3^x) - 3 = 0$. [3]

(c) Solve the equation $4\log_y 2 + \log_2 y = 4$. [3]

6. June/2021/Paper_12/No.8

Variables x and y are such that $y = Ax^b$, where A and b are constants. When $\lg y$ is plotted against $\lg x$, a straight line graph passing through the points (0.61, 0.57) and (5.36, 4.37) is obtained.

(a) Find the value of A and of b. [5]

Using your values of A and b, find

(b) the value of y when $x = 3$, [2]

(c) the value of x when $y = 3$. [2]

7. June/2021/Paper_14/No.6

(a) Solve the simultaneous equations

$$\log_a(x+y) = 0,$$
$$\log_a(x+1) = 2\log_a y.$$

[4]

(b) Given that $\log_p q^2 \times \log_q p^3 = A$, find the value of the constant A. [3]

8. June/2021/Paper_21/No.2

Variables x and y are such that, when $\ln y$ is plotted against $\ln x$, a straight line graph passing through the points (6, 5) and (8, 9) is obtained. Show that $y = e^p x^q$ where p and q are integers. [4]

9. June/2021/Paper_21/No.8

In this question, a, b, c and d are positive constants.

(a) **(i)** It is given that $y = \log_a(x+3) + \log_a(2x-1)$. Explain why x must be greater than $\frac{1}{2}$. [1]

(ii) Find the exact solution of the equation $\dfrac{\log_a 6}{\log_a(y+3)} = 2$. [3]

(b) Write the expression $\log_a 9 + (\log_a b)(\log_{\sqrt{b}} 9a)$ in the form $c + d\log_a 9$, where c and d are integers. [4]

10. June/2021/Paper_24/No.3

Variables x and y are such that when $\lg y$ is plotted against $\lg x$ a straight line passing through the points $(-1, -4)$ and $(2, 11)$ is obtained. Show that $y = ax^n$, where a and n are integers. [6]