

Logarithmic and Exponential Functions

Question Paper 4

Level	International A Level
Subject	Maths
Exam Board	CIE
Topic	Logarithmic and Exponential Functions
Sub Topic	
Booklet	Question Paper 4

Time Allowed: 45 minutes

Score: /37

Percentage: /100

Grade Boundaries:

A*	A	B	C	D	E	U
>85%	77.5%	70%	62.5%	57.5%	45%	<45%

- 1 The variables x and y satisfy the relation $3^y = 4^{x+2}$.
- (i) By taking logarithms, show that the graph of y against x is a straight line. Find the exact value of the gradient of this line. [3]
- (ii) Calculate the x -coordinate of the point of intersection of this line with the line $y = 2x$, giving your answer correct to 2 decimal places. [3]

- 2 (i) Express 4^x in terms of y , where $y = 2^x$. [1]
- (ii) Hence find the values of x that satisfy the equation
- $$3(4^x) - 10(2^x) + 3 = 0,$$
- giving your answers correct to 2 decimal places. [5]

- 3 Solve the inequality $(0.8)^x < 0.5$. [3]

- 4 (a) Use logarithms to solve the equation $3^x = 8$, giving your answer correct to 2 decimal places. [2]
- (b) It is given that

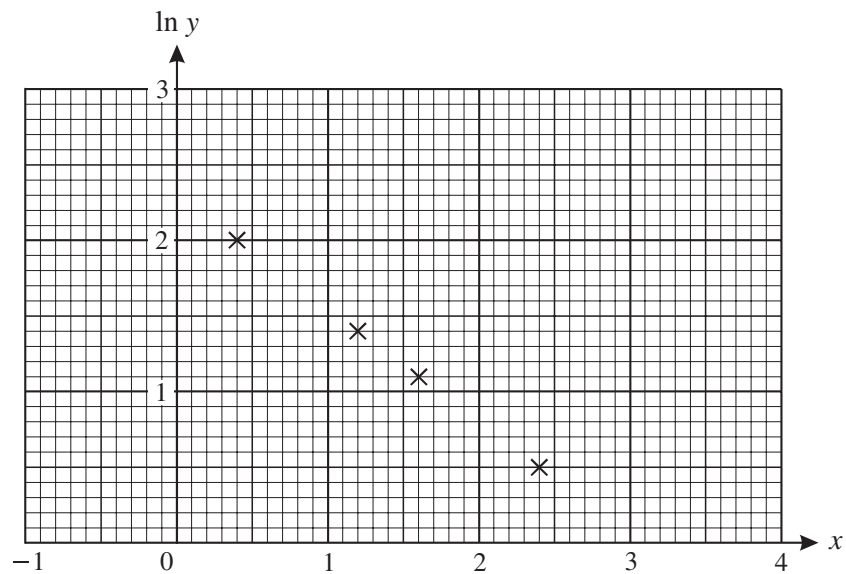
$$\ln z = \ln(y + 2) - 2 \ln y,$$

where $y > 0$. Express z in terms of y in a form not involving logarithms. [3]

- 5 Solve the equation $x^{3.9} = 11x^{3.2}$, where $x \neq 0$. [3]

- 6 Given that $2^x = 5^y$, use logarithms to find the value of $\frac{x}{y}$ correct to 3 significant figures. [3]

7



Two variable quantities x and y are related by the equation

$$y = k(a^{-x}),$$

where a and k are constants. Four pairs of values of x and y are measured experimentally. The result of plotting $\ln y$ against x is shown in the diagram. Use the diagram to estimate the values of a and k .

[5]

8 (i) Express 9^x in terms of y , where $y = 3^x$.

[1]

(ii) Hence solve the equation

$$2(9^x) - 7(3^x) + 3 = 0,$$

expressing your answers for x in terms of logarithms where appropriate.

[5]