

# Logarithmic and Exponential Functions

## Question Paper 1

<b>Level</b>	International A Level
<b>Subject</b>	Maths
<b>Exam Board</b>	CIE
<b>Topic</b>	Logarithmic and Exponential Functions
<b>Sub Topic</b>	
<b>Booklet</b>	Question Paper 1

**Time Allowed:** 53 minutes

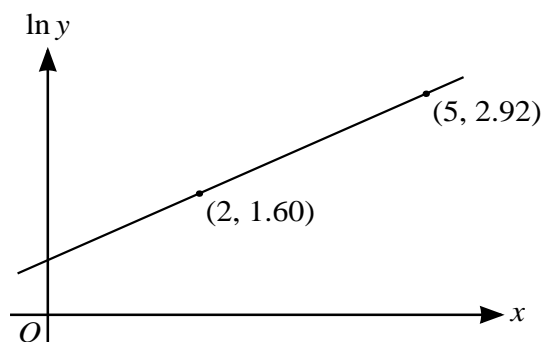
**Score:** /44

**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 equation

$$y = Ae^{p(x-1)},$$

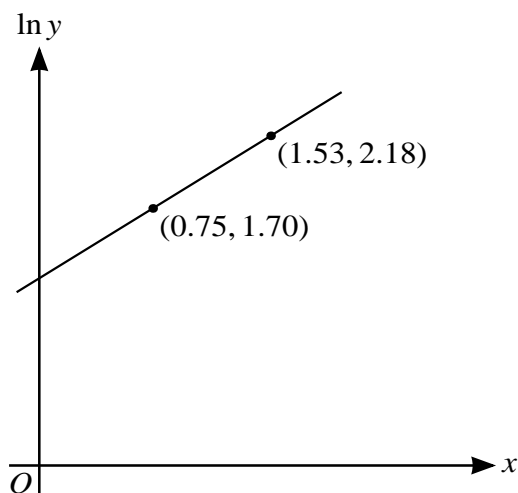
where  $A$  and  $p$  are constants. The graph of  $\ln y$  against  $x$  is a straight line passing through the points (2, 1.60) and (5, 2.92), as shown in the diagram. Find the values of  $A$  and  $p$  correct to 2 significant figures. [5]

2 (i) Use logarithms to solve the equation  $2^x = 20^5$ , giving the answer correct to 3 significant figures. [2]

(ii) Hence determine the number of integers  $n$  satisfying

$$20^{-5} < 2^n < 20^5. \quad [2]$$

3



The variables  $x$  and  $y$  satisfy the equation  $y = a(b^x)$ , where  $a$  and  $b$  are constants. The graph of  $\ln y$  against  $x$  is a straight line passing through the points  $(0.75, 1.70)$  and  $(1.53, 2.18)$ , as shown in the diagram. Find the values of  $a$  and  $b$  correct to 2 decimal places. [5]

4 (i) Given that  $(x + 2)$  and  $(x + 3)$  are factors of

$$5x^3 + ax^2 + b,$$

find the values of the constants  $a$  and  $b$ .

[4]

(ii) When  $a$  and  $b$  have these values, factorise

$$5x^3 + ax^2 + b$$

completely, and hence solve the equation

$$5^{3y+1} + a \times 5^{2y} + b = 0,$$

giving any answers correct to 3 significant figures.

[5]

5 A curve has equation

$$3 \ln x + 6xy + y^2 = 16.$$

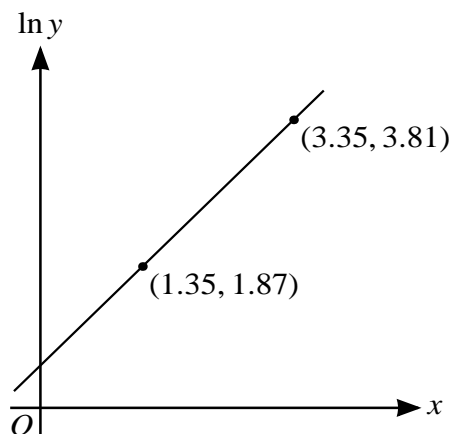
Find the equation of the normal to the curve at the point (1, 2). Give your answer in the form  $ax + by + c = 0$ , where  $a$ ,  $b$  and  $c$  are integers. [7]

6 (a) Find the value of  $x$  satisfying the equation  $2 \ln(x - 4) - \ln x = \ln 2$ . [5]

(b) Use logarithms to find the smallest integer satisfying the inequality

$$1.4^y > 10^{10}. \quad [3]$$

7



The variables  $x$  and  $y$  satisfy the equation  $y = K(2^{px})$ , where  $K$  and  $p$  are constants. The graph of  $\ln y$  against  $x$  is a straight line passing through the points (1.35, 1.87) and (3.35, 3.81), as shown in the diagram. Find the values of  $K$  and  $p$  correct to 2 decimal places. [6]