2.1 Logarithmic & Exponential Functions

Question Paper

Course	CIE A Level Maths
Section	2. Logs & Exponentials
Topic	2.1 Logarithmic & Exponential Functions
Difficulty	Hard

Time allowed: 50

Score: /40

Percentage: /100

Question la

(a) On the same axes, sketch the graphs of $y = 4^x$ and $y = 5^x$. Label any points of intersection with the coordinate axes. Write down the equations of any asymptotes.

[4 marks]

Question 1b

(b) Write down an equation for the graph that is a reflection of $y = 4^x$ in the y-axis.

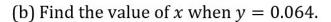
[1 mark]

Question 2a

- (a) (i) Sketch the graph of $y = 0.4^x$.
 - (ii) State whether this graph indicates exponential growth or exponential decay.

[3 marks]

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[1 mark]

Question 3a

(a) Find the value of $\log 1000 + \log 10000$.

[1 mark]

Question 3b

(b) Write down the value of a in the statement $6^{\log_6 a} = 36$.

[1 mark]

Question 3c

(c) Evaluate $\frac{2\log_4 64 + 3^{\log_2 8} - \log_5 5}{\log 100}$.

[2 marks]

Question 4a

(a) Solve $2 \log 1000 = x \log_{16} 4$.

[2 marks]

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(b) Solve $3 \log_4 x = \log_4 x + 3 \log_5 25$.

[2 marks]

Question 5

Solve
$$2(2^{2x}) + 4 = 9(2^x)$$
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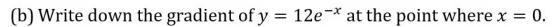
[3 marks]

Question 6a

(a) Sketch the graph of $y = 12e^{-x}$ for $x \ge 0$. Label any points of intersection with the coordinate axes. Write down the equations of any asymptotes.

[3 marks]

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[1 mark]

Question 7a

The function f(x) is defined by $f(x) = 3e^{2x}$ for $x \in \mathbb{R}$.

(a) Find f(2x).

[2 marks]

Question 7b

(b) Find f'(2x).

[2 marks]

Question 8

Solve $2e^{2x} = e^x + 10$, giving your answer to 3 significant figures.

[3 marks]

Question 9a	
(a) Find the gradient of the curve $y = ae^{bx}$, where a and b are constants.	
	[1 mark]
Question 9b	
(b) At the point $(0, a)$ the gradient is 12, find b in terms of a .	
	[2 marks]
Question 9c	
(c) Hence write down y in terms of a (and x) only.	
	[1 mark]
Question 10a	
(a) Show that the equation $e^x - e^{-x} = 0$ has only one real solution.	
	[3 marks]

Question 10b

(b) Explain why the equation $e^x + e^{-x} = 0$ has no real solutions.

[2 marks]