

# 5.1 Laws of Logarithms

## Question Paper

Course	Edexcel IAL Maths: Pure 2
Section	5. Logs & Exponentials
Topic	5.1 Laws of Logarithms
Difficulty	Medium

**Time allowed:** 50

**Score:** /44

**Percentage:** /100

**Question 1**

(a) Evaluate

$$\log_2 4 + \log_3 27 - \log_4 4$$

**[2 marks]****Question 1**

(b) Evaluate

$$3 \ln 2 + \frac{1}{2} \ln 81 - 2 \ln 3,$$

giving your answer in the form  $\ln q$  where  $q$  is an integer to be found.**[3 marks]****Question 2**

Solve the following equations, giving your answers in exact form.

(a)  $e^x = 5$

**[2 marks]**

**Question 2**

(b)  $3e^{2x} = 9$

**[3 marks]****Question 2**

(c)  $e^{2x-1} = 4$

**[3 marks]****Question 3**By writing  $1 = \log_a a$ , show that

$$1 + 2 \log_a b + 3 \log_a c = \log_a ab^2c^3.$$

**[3 marks]**

**Question 4**

(a) Write the following as a single logarithm

$$2\log_a 6 + 3\log_a 2 - \log_a 4$$

**[3 marks]****Question 4**

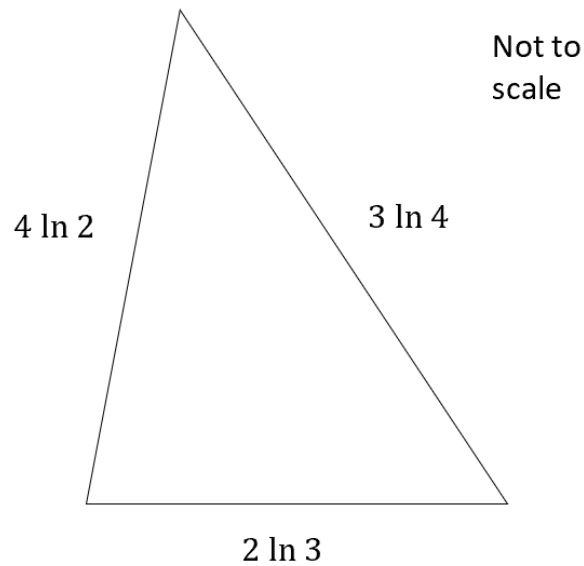
(b) Write the following in the form  $a\ln b$ , where  $a$  and  $b$  are integers to be found.

$$2\ln 3^4 + \ln 3^3 - \ln 9$$

**[3 marks]**

### Question 5

The diagram below shows the length of three sides of a triangle, with each side measured in centimetres.



Work out the perimeter of the triangle, giving your answer in the form  $2\ln b$ , where  $b$  is an integer to be found.

**[4 marks]**

### Question 6

Solve the equation

$$\log_x(2x - 1) = 2$$

**[3 marks]**

### Question 7

Show that

$$2\ln x^3 - 3\ln x^2 = 0.$$

**[3 marks]**

### Question 8

(a) Solve the equation

$$5^{2x} - 25 = 0$$

**[2 marks]**

**Question 8**

(b) Solve the equation

$$3^{2x-1} = 4^3 + 4^2 + 1$$

**[2 marks]**

**Question 9**

- (i) On the same axes, sketch the graphs of  $y = e^x$  and  $y = e^{-x}$ .  
Label any points of intersection between each graph and the coordinate axes.  
Write down the equations of any asymptotes.
- (ii) Write down the equation of the line of reflection between the graphs of  $y = e^x$  and  $y = e^{-x}$ .

**[5 marks]**

**Question 10**

Solve the equation

$$\log_x(5x - 6) = 2.$$

**[3 marks]**



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