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IBDP – Mathematics SL

Test | Topic: Logarithm and Exponents

Marks: 40 | Time: 40 minutes

Answer the following questions

1. If $= \log x$, $b = \log y$ and $c = \log z$, express the following common logarithms in terms of a, b and c.

   [a] $\log \frac{x^2\sqrt{y}}{z}$ [b] $\log \sqrt{0.1x}$ [c] $log_{100}\left(\frac{y}{z}\right)$

   [6 marks]

2. Find the exact value of x which satisfies the equation $2 \times 3^{x-2} = 36^{x-1}$. Give your answer in the simplified form $\frac{\ln p}{\ln q}$, where p, $q \in Z$

   [5 marks]

3. Solve $e^{3x} = 5^{1-x}$, giving an exact answer.

   [4 marks]

4. Without using calculator solve , $e^{2x} - 9\,e^{x} + 20 = 0$ leave your answer in simplest ln form.

   [4 marks]

5. Without using calculator solving

   $log_2 x = 6 - 5\,log_x 2$

   [6marks]

6. Without using calculator solve $9 \times (1 + 9^{x-1}) = 10 \times 3^x$

[5marks]

7. Solve for t (to 3 s.f) given that $200 \times 2^{0.04t} = 6$

[4marks]

8. An entomologist, monitoring a grasshopper plague, notices that the area affected by the grasshoppers is given by $A_n = 1000 \times 2^{0.2n}$ hectares, where n is the number of weeks after the initial observation.

   [a] find the original affected area

   [b] Find the affected area after (i) 5 weeks (ii) 10 weeks

   [c] After how many weeks the affected area would be 5278 hectares.

   [d] Draw the graph of A_n against n.

[6marks]

Answers:

Q. No	Answer	Q. No	Answers
1	$[a] 2a + \frac{b}{2} - c$ [b] $\frac{a-1}{2}$ [c] $\frac{b-c}{2}$	6	$x = 2, \quad x = 0$
2	$x = \frac{\ln 8}{\ln 12}$,	7	$x \approx -127$
3	$x = \frac{\ln 3}{(3 + \ln 5)}$	8 [a]	1000
4	$x = \ln 4$, $x = \ln 5$	8 [b]	2000 , 4000
5	$x = 2$, $x = 32$	8 [c]	$12\ weeks$