SL - Exponents and Logs Questions

49 min
62 marks

1. Solve the equation $9^{x-1} = \left(\dfrac{1}{3}\right)^{2x}$.

(Total 4 marks)

2. Solve the equation $4^{3x-1} = 1.5625 \times 10^{-2}$.

(Total 4 marks)

3. If $\log_a 2 = x$ and $\log_a 5 = y,$ find in terms of x and $y,$ expressions for

   (a) $\log_2 5$;

   (b) $\log_a 20$.

(Total 4 marks)

4. Let $\log_{10}P = x$, $\log_{10}Q = y$ and $\log_{10}R = z$. Express $\log_{10}\left(\dfrac{P}{QR^3}\right)^2$ in terms of x, y and z.

(Total 4 marks)

5. Solve the equation $\log_9 81 + \log_9 \dfrac{1}{9} + \log_9 3 = \log_9 x$.

(Total 4 marks)

6. Solve the equation $\log_{27} x = 1 - \log_{27} (x - 0.4)$.

(Total 6 marks)

7. Consider the following statements

A: $\log_{10}(10^x) > 0$.

B: $-0.5 \le \cos(0.5x) \le 0.5$.

C: $-\pi/2 \le \arctan x \le \pi/2$.

(a) Determine which statements are true for all real numbers x. Write your answers (yes or no) in the table below.

Statement	(a) Is the statement true for all real numbers x? (Yes/No)	(b) If not true, example
A		
B		
C		

(b) If a statement is not true for all x, complete the last column by giving an example of one value of x for which the statement is false.(Total 6 marks)

8. Given that $\log_5 x = y$, express each of the following in terms of y.

(a) $\log_5 x^2$

(b) $\log_5\left(\dfrac{1}{x}\right)$

(c) $\log_{25} x$

(Total 6 marks)

9. The table below shows the marks gained in a test by a group of students.

Mark	1	2	3	4	5
Number of students	5	10	p	6	2

The median is 3 and the mode is 2. Find the **two** possible values of p.

(Total 6 marks)

10. Find the **exact** solution of the equation $9^{2x} = 27^{(1-x)}$.

(Total 6 marks)

11. Let $a = \log x$, $b = \log y$, and $c = \log z$.

Write $\log \left(\dfrac{x^2 \sqrt{y}}{z^3} \right)$ in terms of a, b and c.

(Total 6 marks)

12. (a) Given that $\log_3 x - \log_3(x - 5) = \log_3 A$, express A in terms of x.

(b) Hence or otherwise, solve the equation $\log_3 x - \log_3(x - 5) = 1$.

(Total 6 marks)