

Exponentials & Logarithms

1. 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)

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

(Total 4 marks)

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

(Total 4 marks)

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

(a) $\log_5 x^2$

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

(c) $\log_{25} x$

(Total 6 marks)

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

(Total 6 marks)

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

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

(Total 6 marks)

7. (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)

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

(Total 4 marks)

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

(Total 6 marks)

10. Non Calculator: Solve the equation $9^{x-1} = \left(\frac{1}{3}\right)^{2x}$.

(Total 4 marks)