1. Solve $\log_2 x + \log_2(x - 2) = 3$, for $x > 2$.

(Total 7 marks)

2. (a) Find $\log_2 32$.

(1)

(b) Given that $\log_2 \left(\frac{32^x}{8^y} \right)$ can be written as $px + qy$, find the value of p and of q.

(4)

(Total 5 marks)

3. Given that $p = \log_a 5$, $q = \log_a 2$, express the following in terms of p and/or q.

(a) $\log_a 10$

(b) $\log_a 8$

(c) $\log_a 2.5$

(Total 6 marks)

4. (a) Let $\log_c 3 = p$ and $\log_c 5 = q$. Find an expression in terms of p and q for

(i) $\log_c 15$;

(ii) $\log_c 25$.

(b) Find the value of d if $\log_d 6 = \frac{1}{2}$.

(Total 6 marks)

5. Let $\ln a = p$, $\ln b = q$. Write the following expressions in terms of p and q.

(a) $\ln a^3 b$

(b) $\ln\left(\frac{\sqrt{a}}{b}\right)$

(Total 6 marks)

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

(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. Let $p = \log_{10} x$, $q = \log_{10} y$ and $r = \log_{10} z$.

Write the expression $\log_{10}\left(\frac{x}{y^2\sqrt{z}}\right)$ in terms of p, q and r.

(Total 6 marks)

9. 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)

10. 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)

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

(Total 4 marks)

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

(Total 6 marks)

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

(Total 4 marks)

14. 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)

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

(Total 4 marks)

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

(Total 4 marks)