

1. (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)

2. 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)

3. (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)

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

(a)  $\ln a^3b$

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

**(Total 6 marks)**

5. 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  $r$ .

*Working:*

*Answer:*

.....  
**(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  $c$ .

*Working:*

*Answer:*

.....  
**(Total 6 marks)**



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

*Working:*

*Answer:*

.....

**(Total 4 marks)**

9. 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  $z$ .

*Working:*

*Answer:*

.....

**(Total 4 marks)**

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

(a)  $\log_2 5$ ;

(b)  $\log_a 20$ .

*Working:*

*Answers:*

(a) .....

(b) .....

**(Total 4 marks)**