

**Logarithmic and exponential functions***(Past Year Topical Questions 2012-2017)*May/June 2012 (11)

8.

(a) Find the value of  $x$  for which  $2\lg x - \lg(5x + 60) = 1$ . [5]

(b) Solve  $\log_5 y = 4\log_y 5$ . [4]

May/June 2012 (12)

2.

Using the substitution  $u = 2^x$ , find the values of  $x$  such that  $2^{2x+2} = 5(2^x) - 1$ . [5]

May/June 2012 (13)

8.

(a) Find the value of  $x$  for which  $2\lg x - \lg(5x + 60) = 1$ . [5]

(b) Solve  $\log_5 y = 4\log_y 5$ . [4]

Oct/Nov 2012 (11)

3.

Given that  $p = \log_q 32$ , express, in terms of  $p$ ,

(i)  $\log_q 4$ ,

[2]

(ii)  $\log_q 16q$ .

[2]

4.

Using the substitution  $u = 5^x$ , or otherwise, solve

$$5^{2x+1} = 7(5^x) - 2.$$

[5]

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4.

Given that  $\log_a pq = 9$  and  $\log_a p^2q = 15$ , find the value of

(i)  $\log_a p$  and of  $\log_a q$ ,

[4]

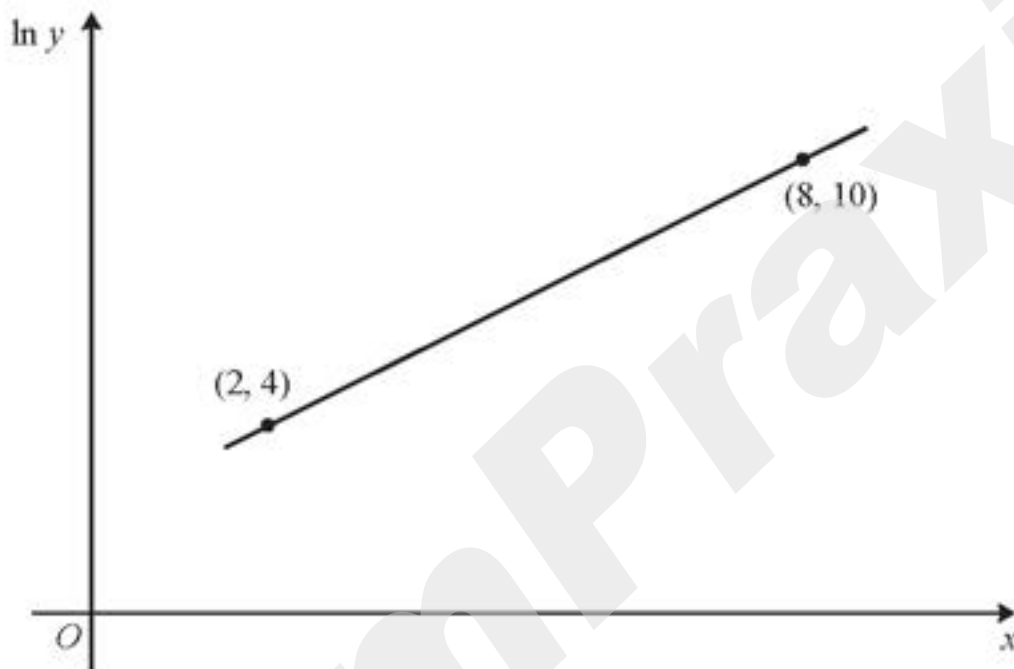
(ii)  $\log_p a + \log_q a$ .

[2]

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2.

Variables  $x$  and  $y$  are such that  $y = Ab^x$ , where  $A$  and  $b$  are constants. The diagram shows the graph of  $\ln y$  against  $x$ , passing through the points  $(2, 4)$  and  $(8, 10)$ .



Find the value of  $A$  and of  $b$ .

[5]

4.

(i) Given that  $\log_4 x = \frac{1}{2}$ , find the value of  $x$ . [1]

(ii) Solve  $2\log_4 y - \log_4(5y - 12) = \frac{1}{2}$ . [4]

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2.

Solve  $2\lg y - \lg(5y + 60) = 1$ . [5]

Oct/Nov 2014 (13)

7.

Solve the equation  $1 + 2\log_5 x = \log_5(18x - 9)$ . [5]

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3.

By using the substitution  $y = \log_3 x$ , or otherwise, find the values of  $x$  for which

$$3(\log_3 x)^2 + \log_3 x^5 - \log_3 9 = 0. [6]$$

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11.

The variables  $x$  and  $y$  are such that when  $\ln y$  is plotted against  $x$ , a straight line graph is obtained. This line passes through the points  $x = 4, \ln y = 0.20$  and  $x = 12, \ln y = 0.08$ .

(i) Given that  $y = Ab^x$ , find the value of  $A$  and of  $b$ . [5]

(ii) Find the value of  $y$  when  $x = 6$ . [2]

(iii) Find the value of  $x$  when  $y = 1.1$ . [2]

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5.

(i) Given that  $\log_9 xy = \frac{5}{2}$ , show that  $\log_3 x + \log_3 y = 5$ . [3]

(ii) Hence solve the equations

$$\log_9 xy = \frac{5}{2},$$

$$\log_3 x \times \log_3 y = -6.$$

[5]

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7.

It is given that  $y = A(10^{bx})$ , where  $A$  and  $b$  are constants. The straight line graph obtained when  $\lg y$  is plotted against  $x$  passes through the points (0.5, 2.2) and (1.0, 3.7).

(i) Find the value of  $A$  and of  $b$ . [5]

Using your values of  $A$  and  $b$ , find

(ii) the value of  $y$  when  $x = 0.6$ , [2]

(iii) the value of  $x$  when  $y = 600$ . [2]

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4.

When  $\lg y$  is plotted against  $x^2$  a straight line is obtained which passes through the points (4, 3) and (12, 7).

(i) Find the gradient of the line.

[1]

(ii) Use your answer to part (i) to express  $\lg y$  in terms of  $x$ .

[2]

(iii) Hence express  $y$  in terms of  $x$ , giving your answer in the form  $y = A(10^{bx^2})$  where  $A$  and  $b$  are constants.

[3]



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5.

When  $\lg y$  is plotted against  $x$ , a straight line is obtained which passes through the points (0.6, 0.3) and (1.1, 0.2).

(i) Find  $\lg y$  in terms of  $x$ .

[4]

(ii) Find  $y$  in terms of  $x$ , giving your answer in the form  $y = A(10^{bx})$ , where  $A$  and  $b$  are constants.

[3]

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6.

When  $\ln y$  is plotted against  $x^2$  a straight line is obtained which passes through the points (0.2, 2.4) and (0.8, 0.9).

(i) Express  $\ln y$  in the form  $px^2 + q$ , where  $p$  and  $q$  are constants. [3]

(ii) Hence express  $y$  in terms of  $z$ , where  $z = e^{x^2}$ . [3]