Exponential and Logarithmic Equations Exam Questions

Q1 (OCR 4722, Jun 2009, Q3)

Use logarithms to solve the equation $7^x = 2^{x+1}$, giving the value of x correct to 3 significant figures. **[5]**

Q2, (OCR 4722, Jan 2010, Q8)

(a) Use logarithms to solve the equation $5^{3w-1} = 4^{250}$, giving the value of w correct to 3 significant figures. **[5]**

(b) Given that $\log_x(5y + 1) - \log_x 3 = 4$, express y in terms of x. **[4]**

Q3, (OCR 4722, Jun 2008, Q8)

(i) Sketch the curve $y = 2 \times 3^x$, stating the coordinates of any intersections with the axes. [3]

(ii) The curve $y = 2 \times 3^x$ intersects the curve $y = 8^x$ at the point P. Show that the x-coordinate of P may be written as

$$\frac{1}{3 - \log_2 3}.$$ [5]

Q4, (OCR 4722, Jan 2010, Q9)

(i) Sketch the curve $y = 6 \times 5^x$, stating the coordinates of any points of intersection with the axes. **[3]**

(ii) The point P on the curve $y = 9^x$ has y-coordinate equal to 150. Use logarithms to find the x-coordinate of P, correct to 3 significant figures. **[3]**

(iii) The curves $y = 6 \times 5^x$ and $y = 9^x$ intersect at the point Q. Show that the x-coordinate of Q can be written as $x = \dfrac{1 + \log_3 2}{2 - \log_3 5}$. **[5]**

Q5, (OCR 4722 Jan 2009, Q8)

(a) Given that $\log_a x = p$ and $\log_a y = q$, express the following in terms of p and q.

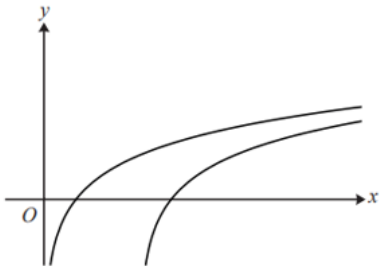
(i) $\log_a(xy)$ **[1]**

(ii) $\log_a\left(\dfrac{a^2x^3}{y}\right)$ **[3]**

(b) **(i)** Express $\log_{10}(x^2 - 10) - \log_{10} x$ as a single logarithm. **[1]**

(ii) Hence solve the equation $\log_{10}(x^2 - 10) - \log_{10} x = 2\log_{10} 3$. **[5]**

Q6, (OCR 4722, Jan 2013, Q8)



The diagram shows the curves $y = \log_2 x$ and $y = \log_2 (x - 3)$.

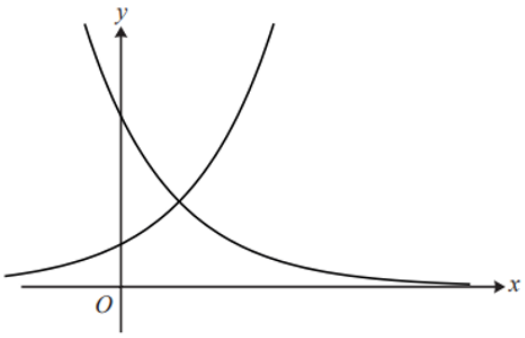
(i) Describe the geometrical transformation that transforms the curve $y = \log_2 x$ to the curve $y = \log_2 (x - 3)$. **[2]**

(ii) The curve $y = \log_2 x$ passes through the point $(a, 3)$. State the value of a. **[1]**

(iii) The curve $y = \log_2 (x - 3)$ passes through the point $(b, 1.8)$. Find the value of b, giving your answer correct to 3 significant figures. **[2]**

(iv) The point P lies on $y = \log_2 x$ and has an x-coordinate of c. The point Q lies on $y = \log_2 (x - 3)$ and also has an x-coordinate of c. Given that the distance PQ is 4 units find the exact value of c. **[4]**

Q7, (OCR 4722, Jun 2013, Q8)



The diagram shows the curves $y = a^x$ and $y = 4b^x$.

(i) **(a)** State the coordinates of the point of intersection of $y = a^x$ with the y-axis. **[1]**

(b) State the coordinates of the point of intersection of $y = 4b^x$ with the y-axis. **[1]**

(c) State a possible value for a and a possible value for b. **[2]**

(ii) It is now given that $ab = 2$. Show that the x-coordinate of the point of intersection of $y = a^x$ and $y = 4b^x$ can be written as

$$x = \frac{2}{2\log_2 a - 1}.$$

[5]