Solving Exponential Equations (From OCR 4722)

Q1, (Jun 2007, Q3)

Use logarithms to solve the equation $3^{2x+1} = 5^{200}$, giving the value of x correct to 3 significant figures. [5]

Q2, (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]

Q3, (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]**

Q4, (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, (Jun 2010, Q8a)

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

Q6, (Jun 2014, Q5)

Solve the equation $2^{4x-1} = 3^{5-2x}$, giving your answer in the form $x = \dfrac{\log_{10} a}{\log_{10} b}$. **[6]**

Q7, (Jun 2016, Q8)

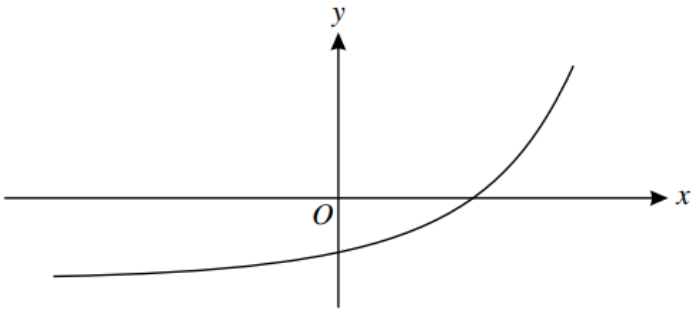
(i) The curve $y = 3^x$ can be transformed to the curve $y = 3^{x-2}$ by a translation. Give details of the translation. **[2]**

(ii) Alternatively, the curve $y = 3^x$ can be transformed to the curve $y = 3^{x-2}$ by a stretch. Give details of the stretch. **[2]**

(iii) Sketch the curve $y = 3^{x-2}$, stating the coordinates of any points of intersection with the axes. **[2]**

(iv) The point P on the curve $y = 3^{x-2}$ has y-coordinate equal to 180. Use logarithms to find the x-coordinate of P, correct to 3 significant figures. **[3]**

Q8, (Jun 2011, Q8i-iv)



The diagram shows the curve $y = 2^x - 3$.

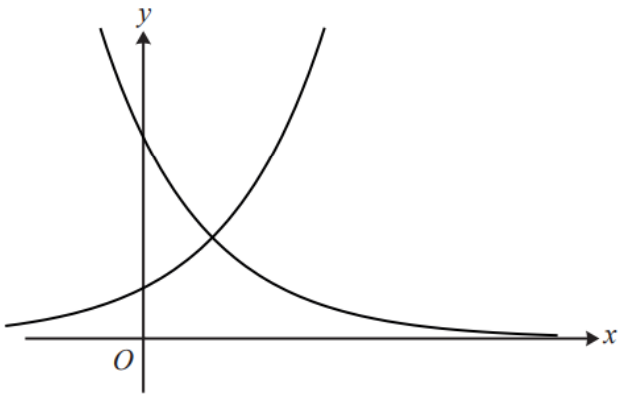
(i) Describe the geometrical transformation that transforms the curve $y = 2^x$ to the curve $y = 2^x - 3$. **[2]**

(ii) State the y-coordinate of the point where the curve $y = 2^x - 3$ crosses the y-axis. **[1]**

(iii) Find the x-coordinate of the point where the curve $y = 2^x - 3$ crosses the x-axis, giving your answer in the form $\log_a b$. **[2]**

(iv) The curve $y = 2^x - 3$ passes through the point $(p, 62)$. Use logarithms to find the value of p, correct to 3 significant figures. **[3]**

Q9, (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]
