44. (a) Given that $x > 0$, show that

$$\log_a\left(x^n\right) = n\log_a x. \qquad [3]$$

(b) Solve the equation

$$5^{3x+1} = 6,$$

giving your answer correct to four decimal places. [4]

June 2006

45. (a) Given that $x > 0$, $y > 0$, show that $\log_a(xy) = \log_a x + \log_a y$. [3]

(b) Express $\log_a 36 + \frac{1}{2}\log_a 256 - 2\log_a 48$ as a single logarithm. [4]

(c) Solve the equation

$$2^{x+1} = 5,$$

giving your answer correct to three decimal places. [2]

Jan 2007

46. (a) (i) Given that $p > 0$, $q > 0$, show that $\log_a pq = \log_a p + \log_a q$.

(ii) Given that

$$\log_a x + \log_a(3x+4) = 2\log_a(3x-4), \text{ where } x > \frac{4}{3},$$

find the value of x. [8]

(b) Solve $3^x = 11$, giving your answer correct to three decimal places. [2]

June 2007

47. (a) Given that $x > 0$, $y > 0$, show that

$$\log_a \frac{x}{y} = \log_a x - \log_a y. \qquad [3]$$

(b) (i) Solve the equation

$$3^{2x-1} = 11,$$

giving your answer correct to three decimal places.

(ii) Express $\frac{3}{2}\log_a 16 + \log_a 6 - 2\log_a 12$ as a single logarithm in its simplest form. [7]

Jan 2008