Laws of Logarithms and Logarithmic Equations (From Edexcel 6664)

Q1, (Jun 2006, Q3)

(i) Write down the value of $\log_6 36$.

(1)

(ii) Express $2\log_a 3 + \log_a 11$ as a single logarithm to base a.

(3)

Q2, (Jan 2008, Q5)

Given that a and b are positive constants, solve the simultaneous equations

$$a = 3b,$$

$$\log_3 a + \log_3 b = 2.$$

Give your answers as exact numbers.

(6)

Q3, (Jan 2009, Q4)

Given that $0 < x < 4$ and

$$\log_5(4-x) - 2\log_5 x = 1,$$

find the value of x.

(6)

Q4, (Jun 2009, Q8)

(a) Find the value of y such that

$$\log_2 y = -3$$

(2)

(b) Find the values of x such that

$$\frac{\log_2 32 + \log_2 16}{\log_2 x} = \log_2 x$$

(5)

Q5, (Jun 2012, Q2)

Find the values of x such that

$$2\log_3 x - \log_3(x-2) = 2$$

(5)

Q6, (Jan 2010, Q5)

(a) Find the positive value of x such that

$$\log_x 64 = 2$$

(2)

(b) Solve for x

$$\log_2(11 - 6x) = 2\log_2(x - 1) + 3$$

(6)

Q7, (Jun 2010,. Q7)

(a) Given that

$$2\log_3(x-5) - \log_3(2x-13) = 1,$$

show that $x^2 - 16x + 64 = 0$.

(5)

(b) Hence, or otherwise, solve $2\log_3(x-5) - \log_3(2x-13) = 1$.

(2)

Q8, (Jan 2012, Q4)

Given that $y = 3x^2$,

(a) show that $\log_3 y = 1 + 2\log_3 x$

(3)

(b) Hence, or otherwise, solve the equation

$$1 + 2\log_3 x = \log_3(28x - 9)$$

(3)

Q9, (Jan 2013, Q6)

Given that

$$2\log_2(x+15) - \log_2 x = 6$$

(a) Show that

$$x^2 - 34x + 225 = 0$$

(5)

(b) Hence, or otherwise, solve the equation

$$2\log_2(x+15) - \log_2 x = 6$$

(2)

Q10, Jun 2013, Q7)

(i) Find the exact value of x for which

$$\log_2(2x) = \log_2(5x + 4) - 3$$

(4)

(ii) Given that

$$\log_a y + 3\log_a 2 = 5$$

express y in terms of a.
Give your answer in its simplest form.

(3)

Q11, (Jun 2013(R), Q6)

Given that $\log_3 x = a$, find in terms of a,

(a) $\log_3 (9x)$

(2)

(b) $\log_3\left(\frac{x^5}{81}\right)$

(3)

giving each answer in its simplest form.

(c) Solve, for x,

$$\log_3(9x) + \log_3\left(\frac{x^5}{81}\right) = 3$$

giving your answer to 4 significant figures.

(4)
