

C2 Logarithms Questions

Specimen

9. (a) Given that $x = a^y$ where $a > 0$, write y in terms of x . Hence show that

$$\log_a x^n = n \log_a x. \quad [3]$$

- (b) Solve the equation

$$2^{y+1} = 3,$$

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

2005 Winter

10. (a) Show that if $x > 0$,

$$\log_a x^k = k \log_a x. \quad [3]$$

- (b) Solve the equation

$$\log_{10} (x^2 + 48) = \log_{10} x + 2 \log_{10} 4. \quad [5]$$

2005 Summer

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

$$\log_a \left(\frac{x}{y} \right) = \log_a x - \log_a y. \quad [3]$$

- (b) (i) Solve the equation

$$5^{2x+1} = 7,$$

giving your answer correct to four decimal places.

- (ii) Express $\log_{10} 2 + 2 \log_{10} 18 - \frac{3}{2} \log_{10} 36$ as a single logarithm in its simplest form. [8]

2006 Winter

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

$$\log_a(xy) = \log_a x + \log_a y. \quad [3]$$

- (b) Given that $\int_1^3 \log_{10} x \, dx$ has an approximate value of 0.5628, find an approximate value for $\int_1^3 \log_{10}(10x) \, dx$. Give your answer correct to four decimal places. [4]

2006 Summer

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

$$\log_a(x^n) = n \log_a x. \quad [3]$$

- (b) Solve the equation

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

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

2007 Winter

8. (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]

2007 Summer

7. (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]

mathswizard.net

2008 Winter

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

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

- (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]

2008 Summer

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

$$\log_a x^n = n \log_a x. \quad [3]$$

- (b) Solve the equation

$$\log_a(3x + 4) - \log_a x = 3 \log_a 2. \quad [4]$$

- (c) Solve the equation

$$4^{3y+2} = 7,$$

giving your answer correct to three decimal places. [3]

2009 Winter

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

$$\log_a xy = \log_a x + \log_a y. \quad [3]$$

- (b) Solve the equation

$$\log_9 x = -\frac{1}{2}. \quad [2]$$

- (c) Solve the equation

$$\log_a(4x + 7) = \log_a x + 2 \log_a 3. \quad [4]$$

mathswizard.net

2009 Summer

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

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

- (b) Solve the equation

$$3^{5-2x} = 7.$$

Show your working and give your answer correct to three decimal places. [3]

- (c) Solve the equation

$$\log_a(x-3) + \log_a(x+3) = 2\log_a(x-2). \quad [4]$$

2010 Winter

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

$$\log_a x^n = n \log_a x. \quad [3]$$

- (b) Express $\frac{1}{2} \log_a 324 + \log_a 56 - 2 \log_a 12$ in the form $\log_a b$, where b is a constant whose value is to be found. [4]

- (c) (i) Rewrite the equation

$$3^x = 2^{x+1}$$

in the form

$$c^x = d,$$

where the values of the constants c and d are to be found.

- (ii) Hence or otherwise, solve the equation

$$3^x = 2^{x+1},$$

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

mathswizard.net

2010 Summer

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

$$\log_a x^n = n \log_a x. \quad [3]$$

- (b) Solve the equation

$$6^{2y-1} = 4.$$

Show your working and give your answer correct to three decimal places. [3]

- (c) Given that $\log_a 4 = \frac{1}{2}$, find the value of a . [2]

2011 Winter

7. Find all values of x satisfying the equation

$$\log_a(6x^2 + 11) - \log_a x = 2 \log_a 5. \quad [5]$$

2011 Summer

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

$$\log_a \left(\frac{x}{y} \right) = \log_a x - \log_a y. \quad [3]$$

- (b) Express

$$\frac{1}{2} \log_a x^8 - \log_a 4x + 3 \log_a \frac{2}{x}$$

as a single logarithm in its simplest form. [4]

mathswizard.net

2012 Winter

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

$$\log_a xy = \log_a x + \log_a y. \quad [3]$$

- (b) Solve the equation

$$2^{3-5x} = 12.$$

Show your working and give your answer correct to three decimal places. [3]

- (c) (i) Express

$$\log_9(3x-1) + \log_9(x+4) - 2\log_9(x+1)$$

as a single logarithm.

- (ii) Hence solve the equation

$$\log_9(3x-1) + \log_9(x+4) - 2\log_9(x+1) = \frac{1}{2}. \quad [5]$$

2012 Summer

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

$$\log_a x^n = n \log_a x. \quad [3]$$

- (b) Solve the equation

$$9^{\frac{x}{2}-3} = 6.$$

Show your working and give your answer correct to three decimal places. [3]

- (c) Solve the equation

$$\log_a(x-2) + \log_a(4x+1) = 2\log_a(2x-3). \quad [4]$$

mathswizard.net

2013 Winter

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

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

- (b) Solve the equation

$$6^{2x+5} = 7.$$

Show your working and give your answer correct to three decimal places. [3]

2013 Summer

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

$$\log_a xy = \log_a x + \log_a y. \quad [3]$$

- (b) Solve the equation

$$5^{2-3x} = 8.$$

Show your working and give your answer correct to three decimal places. [3]

- (c) Solve the equation

$$\log_a 90x^2 - \log_a \left(\frac{5}{x}\right) = \frac{1}{2} \log_a 144x^8. \quad [4]$$

2014 Winter

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

$$\log_a x^n = n \log_a x. \quad [3]$$

- (b) Solve the equation

$$7^{5-4x} = 11.$$

Show your working and give your answer correct to three decimal places. [3]

- (c) Solve the equation

$$\log_8 x = -\frac{1}{3}. \quad [2]$$

2014 Summer

7. (a) Solve the equation

$$3^{\frac{5x}{4}-2} = 7.$$

Show your working and give your answer correct to three decimal places. [3]

- (b) The positive numbers a and b are such that

$$\log_a b = 5.$$

- (i) Express b as a power of a .

- (ii) Using your answer to part (i), evaluate $\log_b a$. [3]

mathswizard.net

2015

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

$$\log_a \left(\frac{x}{y} \right) = \log_a x - \log_a y. \quad [3]$$

- (b) Find all values of x satisfying the equation

$$\log_a(6x^2 + 9x + 2) - \log_a x = 4 \log_a 2. \quad [5]$$

2016

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

$$\log_a x^n = n \log_a x. \quad [3]$$

- (b) Solve the equation

$$4^{3x+1} = 22.$$

Show your working and give your answer correct to two decimal places. [3]

- (c) Given that

$$\log_d z = 2 \log_d 6 - \log_d 9 - 1,$$

express z in terms of d , giving your answer in a form not involving logarithms. [4]

2017

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

$$\log_a \left(\frac{x}{y} \right) = \log_a x - \log_a y. \quad [3]$$

- (b) Express

$$\frac{1}{3} \log_b x^{15} - \log_b 27x + 4 \log_b \frac{3}{x}$$

as a single logarithm in its simplest form. [4]

- (c) Given that $\log_d 5 = \frac{1}{3}$, find the value of d . [2]