



Core Mathematics 2

Chapter 3: Exponentials and Logarithms

1. Express the following as a single logarithm to base a .

(a) $2\log_a 3 + \log_a 11$

(b) $(2\log_a 5 + \log_a 4) - 2\log_a \sqrt{10}$

2. Solve the following equations:

(a) $3^{x+1} = 5$

(b) $\log_2 x = \log_2(2x^2 - 6)$

(c) $\log_a(x^2 - 10) - \log_a x = 2\log_a 3$

(d) $\log(y + 6) = 2\log(y - 6)$

(e) $\log_x 8 + \log_2 x = 4$

(f) $7 \cdot 3^x - 8 = 3^{x+1}$

(g) $\log_x 32 = 5$

(h) $\log_8 x + \log_2 x = 12\log_x 2$

(i) $25^x + 5^{x+1} - 50 = 0$

(j) $\log_3 y = 4\log_4 1 - \log_3 6$

(k) $2^{x+3} + 3 = 8$

(l) $x = \log_8 16 + \log_8 4$

(m) $\log_2(x + 4) - \log_2 x = 3$

(n) $2\log_5 x - \log_5 3 = \log_5(x + 6)$

(o) $\log_4(x - 6) + \log_4 x = 2$

(p) $3^{1+2x} - 3^x = 4$

(q) $\log_2(x + 1) = \log_4(7x - 5)$

(r) $3\log_x 2 = \log_3 3$

Answers:

1. (a) $\log_a 99$ (b) $\log_a 10$

2. (a) 0.465 (b) $\frac{3}{2}$ (c) 10 (d) 10 (e) 3 or 1 (f) 2 (g) 2 (h) 8 or $\frac{1}{8}$ (i) 1 (j) $\frac{1}{6}$

(k) -0.678 (l) 2 (m) $\frac{4}{7}$ (n) 6 (o) 8 (p) 0.262 (q) 2 or 3 (r) 8