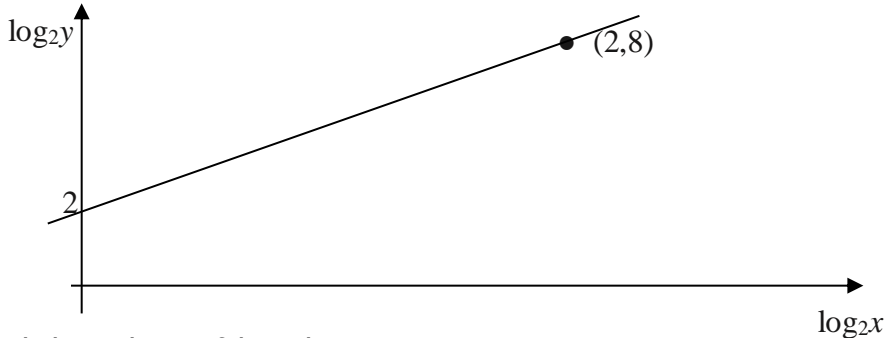
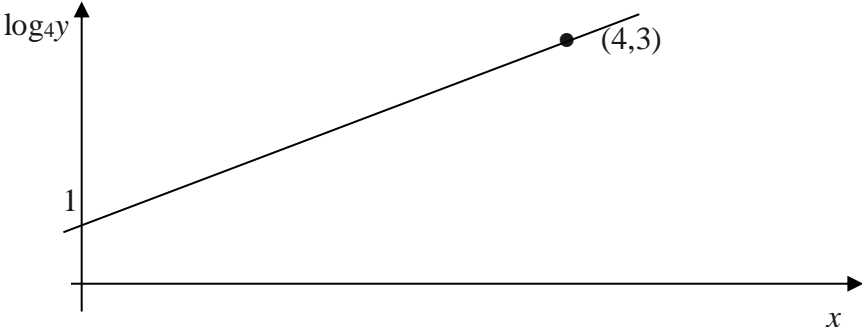


Log equations and graphs of experimental data		
1.	Evaluate $\log_5 2 + \log_5 50 - \log_5 4$	3
2.	Find x if $4\log_x 6 - 2\log_x 4 = 1$	3
3.	Find x -intercept for the graph of $y = \log_2(3x - 4) + 1$	4
4.	Solve $\log_3(x^2 - 4) - \log_3(x - 2) = 3$	5
5.	(a) Show that $x = 1$ is a root of $x^3 + 8x^2 + 11x - 20 = 0$	2
	(b) Hence fully solve $x^3 + 8x^2 + 11x - 20 = 0$	3
	(c) Solve $\log_2(x + 3) + \log^2(x^2 + 5x - 4) = 3$	5
6.	<p>Two variables x and y are connected by the equation $y = kx^n$ The graph of $\log_2 y$ against $\log_2 x$ is a straight line as shown below</p>  <p>Find the values of k and n</p>	5
7.	<p>Two variables x and y are related by the equation $y = ka^x$ When $\log_4 y$ is plotted against x, a straight line is formed which passes through the points $(0,1)$ and $(4,3)$. This is shown in the diagram</p>  <p>Find the values of k and a</p>	5

	Logs - Answers		
1	Use laws of logs Simplify	$\log_5 \frac{2 \times 50}{4} = \log_5 25$ $\log_5 25 = \log_5 5^2 = 2$	
2	Use laws of logs Use $\log_x a = b \rightarrow a = x^b$ Solve	$\log_x \left(\frac{6^4}{4^2}\right) = 1$ $\frac{6^4}{4^2} = x^1$ $\frac{6 \times 6 \times 6 \times 6}{4 \times 4} = x^1, \frac{3 \times 3 \times 3 \times 3}{1 \times 1} = x^1, x = 81$	
3	Set up equation Use $\log_2 a = b \rightarrow a = 2^b$ Solve	$0 = \log_2(3x - 4) + 1,$ $-1 = \log_2(3x - 4)$ $2^{-1} = 3x - 4, \quad \frac{1}{2} = 3x - 4$ $x = 3/2$	
4	Use laws of logs Factorise and simplify Use $\log_3 a = b \rightarrow a = 3^b$ Solve	$\log_3 \left(\frac{x^2 - 4}{x - 2}\right) = 3$ $\log_3 \left(\frac{(x-2)(x+2)}{x-2}\right) = 3, \log_2(x + 2) = 3,$ $x + 2 = 3^3, x + 2 = 27$ $x = 25$	
5	using synthetic division for $x = 1$ $\begin{array}{r rrrr} 1 & 1 & 8 & 11 & -20 \\ & & 0 & 1 & 9 & 20 \\ \hline & 1 & 9 & 20 & 0 \end{array}$ Use laws of logs Use $\log_2 a = b \rightarrow a = 2^b$ Set = 0 Factorisation from (a) Solutions from (a) Final answer	No remainder so $x = 1$ is a root $0 = (x - 1)(x^2 + 9x + 20)$ $0 = (x - 1)(x + 4)(x + 5)$ solutions are $x = 1, x = -4, x = -5$ $\log_2(x + 3)(x^2 + 5x - 4) = 3$ $\log_2(x^3 + 8x^2 + 11x - 12) = 3$ $x^3 + 8x^2 + 11x - 12 = 2^3$ $x^3 + 8x^2 + 11x - 20 = 0$ $(x - 1)(x + 4)(x + 5) = 0$ $x = 1, x = -4, x = -5$ $x = 1$ as log function is undefined for $x = -4$ & -5	
6	Find the equation of the straight line Take \log_2 of both sides for $y = kx^n$ Use laws of logs Compare with straight line to find n Compare with straight line to find k	$\log_2 y = 3 \log_2 x + 2$ $\log_2 y = \log_2 kx^n$ $\log_2 y = n \log_2 x + \log_2 k$ $n = 3,$ $\log_2 k = 2$ so $k = 2^2 \quad y = 4x^3$	
7	Find the equation of the straight line Take \log_4 of both sides for $y = ka^x$ Use laws of logs Compare with straight line to find a Compare with straight line to find k	$\log_4 y = \frac{1}{2}x + 1$ $\log_4 y = \log_4 ka^x$ $\log_4 y = x \log_4 a + \log_4 k$ $\frac{1}{2} = \log_4 a, a = 4^{1/2} = 2$ $\log_4 k = 1$ so $k = 4 \quad y = 4(2^x)$	