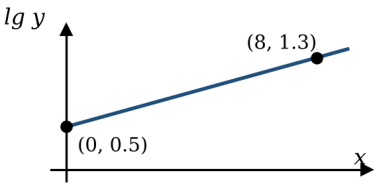
Day 223	A Level Maths: S Tier 10-a-day
1 Solve $\log_3(x + 14) + \log_3(x - 4) = 5$, justifying clearly any root that you reject.	
2 Each shot Amira takes scores with probability $\frac{1}{2}$, independently. (a) Find the probability that her fourth score comes on shot number 8. (b) Find the probability that her fourth score comes on or before shot number 8.	
3 Solve $6\sec^2\theta - 16\tan\theta + 2 = 0$ for $0 \leq \theta < 360°$, giving answers to 1 d.p.	
4 Express $\frac{-1 + 5\sqrt{6}}{2 + \sqrt{6}}$ in the form $p + q\sqrt{6}$, where p and q are rational numbers.	
5 A ball is projected from level ground with horizontal and vertical velocity components 34.3 and 39.2 m s^{-1}. Find (a) the two times at which it moves at 45° to the horizontal, (b) the horizontal distance between those two points. Take g = 9.8 m s^{-2}.	

Day 223 **A Level Maths: S Tier 10-a-day**

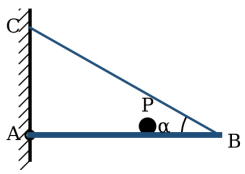
6 A curve has parametric equations $x = \ln t$, $y = 5t^2 + 5t$, $t > 0$.
Find the equation of the tangent where $t = 1$, in the form $y = mx + c$.

7 $y = ab^x$. The graph of lg y against x is the straight line shown.
Find a and b to 3 significant figures.



8 The line $5y = 12x + k$ is a tangent to the circle $(x + 0)^2 + (y - 2)^2 = 4$.
Find the two possible values of k.

9 A uniform rod AB (3 m, 120 N) is hinged at A to a vertical wall and held horizontal by a string BC, C on the wall above A, with $\tan \alpha = 0.75$, where α is the angle between string and rod. A 30 N particle hangs at P, AP = 2.25 m.
Find (a) the tension, (b) the magnitude and direction of the hinge force (3 s.f. and 1 d.p.).



10 The first term of an arithmetic sequence is 6 and its common difference d is non-zero. The 4th, 9th and 19th terms are the first three terms of a geometric sequence. Find d and the common ratio.