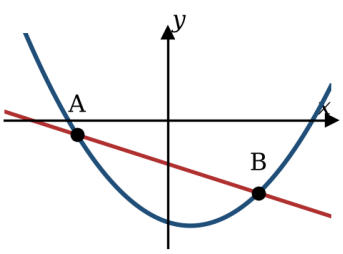
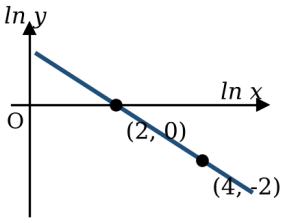
Day 103	A Level Maths: A Tier 10-a-day
1 A 3 kg block is released from rest on a rough plane inclined at α, $\tan\alpha = \frac{4}{3}$, $\mu = 0.5$, and slides 10 m down a line of greatest slope. Use work and energy to find (a) the work done against friction, (b) its speed after 10 m. Take $g = 10$.	
2 Prove that $n^2 + n + 5$ is odd for every positive integer n.	
3 A college has 248 students: 64 Arts, 112 Science and 72 Humanities. A stratified sample of size 31 is taken. Find the number of students sampled from each group.	
4 $f(x) = e^x - x - 4$. Show that the equation $f(x) = 0$ has a root α in the interval [1, 2].	
5 The diagram shows the curve $y = x^2 - x - 7$ and the line $y = -x - 3$, meeting at A and B. (a) Find the coordinates of A and B. (b) Find the coordinates of the midpoint of AB. 	

Day 103	A Level Maths: A Tier 10-a-day
6 A curve has equation $x^2 + xy + 2x - 2y = -4$. Show that P(0, 2) lies on the curve and find the equation of the tangent at P in the form ax + by + c = 0 with integer a, b, c.	
7 The line $3x + 4y = -2$ meets the circle $(x - 1)^2 + (y + 3)^2 = 49$ at the points A and B. Find the exact length of AB.	
8 Car A passes P at constant speed 6 m s^{-1}. 9 s later car B leaves P from rest, in the same direction, with acceleration 1 m s^{-2}. B overtakes A at Q. Find (a) the time B takes to reach Q, (b) PQ, (c) the speed of B at Q.	
9 The diagram shows the graph of ln y against ln x for $y = A x^n$. Find the value of n and the exact value of A. 	
10 The probability that a driver passes the test is 0.25 on each independent trial. Find the least number of trials needed so that the probability of this happening at least once is greater than 0.995.	