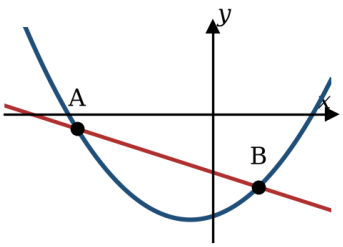
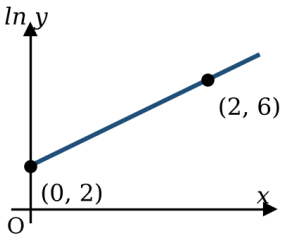
Day 365	A Level Maths: A Tier 10-a-day
1 The volume of a spherical balloon increases at a constant rate of 120 cm^3s^{-1}. Find the rates of increase of its radius and of its surface area when r = 2 cm.	
2 A charity raises £400 in its first year and in each later year raises £50 more than in the previous year. (a) How much does it raise in year 20? (b) In which year does the total raised first exceed £6000?	
3 A crate of mass 20 kg is pulled at constant speed along rough horizontal ground, $\mu = 0.3$, by a force of P N at angle θ above the horizontal, $\tan\theta = \frac{12}{5}$. Find P and the normal reaction. Take g = 9.8. Give answers to 3 s.f. if not exact.	
4 The diagram shows the curve $y = x^2 + x - 7$ and the line $y = -x - 4$, meeting at A and B. (a) Find the coordinates of A and B. (b) Find the coordinates of the midpoint of AB. 	
5 Particles A (9 kg) and B (5 kg) hang on a light string over a smooth pulley, A being 2 m above the ground. Released from rest; A lands without rebounding. Find (a) the tension while both move, (b) the greatest height of B above its start. Take g = 9.8. Give answers to 3 s.f. if not exact.	

Day 365	A Level Maths: A Tier 10-a-day
6 A group of 4 boys and 3 girls. A team of 3 is chosen at random. Find the probability that all the team are of the same sex.	
7 The diagram shows the graph of ln y against x for $y = A e^{kx}$. Find the exact values of A and k. 	
8 Solve $x(\sqrt{2} - 1) = -4 - 3\sqrt{2}$, writing x in the form $p + q\sqrt{2}$.	
9 Given that $\cos\theta = \frac{2}{5}$, find the exact value of $\cos 3\theta$.	
10 Eggs are defective with probability 0.2, independently. A tray of 6 eggs is rejected if it has at least 3 defective. From 11 such trays, find the probability that exactly 3 are rejected (3 s.f.).	