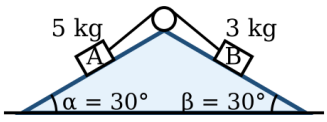
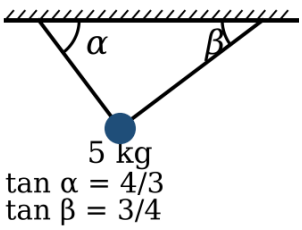
Day 276	A Level Maths: A Tier 10-a-day
1 The 5th term of an arithmetic sequence is -2 and the 8th term is -14. Find the first term and common difference, and the sum of the first 20 terms.	
2 Water pours into a cone, vertex down, at 30 cm^3s^{-1}. The surface radius is always $\frac{h}{3}$. Find the rate at which the depth is rising when h = 4 cm.	
3 A circle has equation $x^2 + y^2 + 6x + 4y - 12 = 0$. (a) Find the centre and radius of the circle. (b) Determine whether P$(-5, -3)$ lies inside or outside the circle.	
4 The system is released from rest. Find (a) the magnitude of the acceleration and which particle moves down, (b) the tension. Take g = 9.8. Give answers to 3 s.f. if not exact. 	
5 X ~ B(120, 0.2). Use a normal approximation to estimate P$(X \leq 26)$ to 3 significant figures.	

Day 276	A Level Maths: A Tier 10-a-day
6 Use the substitution u = cos x to find the exact value of $\int_0^{\frac{\pi}{2}} \sin x \cos^4 x \, dx$.	
7 Faults are reported at random at an average of 10 per hour. Find the probability that in a 30-minute period there are (a) zero events (b) at least 1. (c) Find the probability that at least one occurs in each of two separate 30-minute periods.	
8 Express $\frac{-2x^2 + 17x - 17}{(x + 1)(x - 2)^2}$ in the form $\frac{A}{(x + 1)} + \frac{B}{(x - 2)} + \frac{C}{(x - 2)^2}$, and find A, B and C.	
9 A 5 kg particle hangs in equilibrium from two light strings, as shown. Find the tension in each string (T_1 in the string at angle α). Take g = 9.8. 	
10 A curve has parametric equations $x = t^2 + 1$, $y = t^3 - t$. Find $\frac{dy}{dx}$ in terms of t, and the equation of the normal at the point where $t = -2$, in the form ax + by + c = 0 (integers).	