Day 230	A Level Maths: S Tier 10-a-day
1 Express $\frac{6 - 3\sqrt{2}}{4 - 3\sqrt{2}}$ in the form $p + q\sqrt{2}$, where p and q are rational numbers.	
2 Find the exact value of $\tan(\tan^{-1}(\frac{2}{5}) + \tan^{-1}(1))$.	
3 Solve $3^{2x+2} - 10 \times 3^{x} + 1 = 0$.	
4 Find the exact gradient of the curve $y = 2^{4x-2}$ at the point where $x = \frac{3}{2}$.	
5 A circle passes through P(9, −9), Q(−3, −15) and R(12, 0). Find its equation.	

Day 230	A Level Maths: S Tier 10-a-day
6 For events A and B, P(A) = 0.25, P(B) = 0.4 and P(A | B) = 0.5. (a) Find P(A ∩ B). (b) Find P(A | B′).	
7 Particles of mass 12 kg and 6 kg hang on a light string over a smooth fixed pulley. The 12 kg particle is 3.75 m above the ground; the 6 kg one is on the ground. Released from rest, find (a) the tension, (b) the greatest height reached by the 6 kg particle. Take $g = 9.8\ \text{m s}^{-2}$.	
8 A uniform plank AB of length 6 m and mass 30 kg rests on supports at C and D, where AC = 2 m and DB = 2 m. A girl of mass 40 kg stands on it at distance x m from A. Find the range of x for which the plank stays in equilibrium on both supports.	
9 A test of H_0: p = 0.4 against H_1: p > 0.4 uses a sample of 40 at the 5% level. (a) Find the critical region for X, the number of successes. (b) Find the actual significance level. (c) Find P(Type II error) when in fact p = 0.55.	
10 Find the coordinates of the points of inflection of $y = \frac{2}{x^2 + 12}$.	