Day 269	A Level Maths: B Tier 10-a-day
1 A particle is in equilibrium under three forces: P N at angle θ above the positive x-axis, a force of 30 N in the negative x-direction and a force of Q N in the negative y-direction. $\cos\theta = \frac{15}{17}$. Find P and Q.	
2 The vector $\mathbf{a} = \begin{pmatrix} 1 \\ 12 \\ 12 \end{pmatrix}$. Find $\lvert\mathbf{a}\rvert$ and a unit vector in the direction of a.	
3 A sequence is defined by $u_{n+1} = k\,u_n + 6$, $u_1 = 2$. Given that $u_3 = 6$, find the possible values of k.	
4 Find the exact value of $\int_0^{\frac{\pi}{2}} (4\sin 2x + 3\cos 2x)\,dx$.	
5 A manufacturer claims that a proportion 0.25 of its sweets are red. A sample of 30 sweets has 14 red. Test, at the 5% level, whether the true proportion is higher than claimed.	

Day 269	A Level Maths: B Tier 10-a-day
6 Line l_1 has equation $2x + 3y = 10$ and line l_2 has equation $2x + y = 6$. The lines meet at P. Find the area of the triangle formed by l_1, l_2 and the x-axis.	
7 A ball is thrown vertically upwards at 4.9 m s^{-1} from a point 9.8 m above horizontal ground. Take g = 9.8 m s^{-2}. Find the time before it hits the ground.	
8 The line l has equation $y = -3x + 2$. The point P is $(-7, -7)$. (a) Find the line through P perpendicular to l, as $ax + by + c = 0$ with integer a, b, c. (b) Find the foot F and the exact distance PF.	
9 (a) Write $\frac{5x + 18}{(x + 3)(x + 4)}$ in partial fractions. (b) Hence evaluate $\int_0^3 \frac{5x + 18}{(x + 3)(x + 4)}\,dx$, giving the answer as a single logarithm.	
10 The continuous random variable X has pdf $f(x) = \frac{2x}{64}$ for $0 \leq x \leq 8$, and 0 otherwise. (a) Find $P(X > 5)$. (b) Find the median of X, to 3 significant figures.	