Day 108	A Level Maths: S Tier 10-a-day
1 Solve $3\cos 2\theta - 9\sin\theta - 6 = 0$ for $0 \leq \theta < 360°$.	
2 A stone is thrown vertically upwards with speed 13 m s^{-1} from the top of a cliff. The top of the cliff is 26.4 m above the sea. Find (a) the time taken for the stone to reach the sea, (b) the total distance travelled by the stone, to 3 s.f. Take g = 9.8 m s^{-2}.	
3 X ~ B(5, p). It is given that $P(X = 2) = \frac{2}{5} \times P(X = 1)$. (a) Find the value of p. (b) Find P(X = 0), correct to 3 significant figures.	
4 Prove that $n^3 + 11n$ is divisible by 3 for every positive integer n.	
5 A school has 240 students in Year 10, 60 in Year 11 and 180 in the sixth form. A stratified sample of 24 students is taken. (a) Find the number sampled from each group. (b) Two students are chosen at random from the sample. Find the probability they are from the same group.	

Day 108	A Level Maths: S Tier 10-a-day
6 A curve is given by $x = e^y + 3y$. Find dy/dx and d^2y/dx^2 when $y = 0$.	
7 A particle P moves on a straight line. At time t seconds its velocity is v m s^{-1}, where $v = 3\sin(\frac{\pi t}{2})$ for $t \geq 0$. Find (a) the greatest magnitude of the acceleration of P, (b) the distance P travels between the first two times at which it is at rest. Give (b) to 3 s.f.	
8 The circle with equation $(x - 4)^2 + (y + 0)^2 = 169$ passes through $P(-1, 12)$. The tangent at P meets the axes at A and B. Find the area of triangle OAB.	
9 (a) Express $\frac{x + 6}{(x + 3)(x + 2)}$ in partial fractions. (b) Hence find the exact value of $\int_0^1 \frac{x + 6}{(x + 3)(x + 2)}\,dx$.	
10 The first term of an arithmetic sequence is 1 and its common difference d is non-zero. The 2nd, 4th and 9th terms are the first three terms of a geometric sequence. Find d and the common ratio.	