Day 25	A Level Maths: S Tier 10-a-day
1 Solve $\cos(3\theta - 10°) = -\frac{1}{2}$ for $0° \leq \theta \leq 360°$.	
2 Solve $x - 6\sqrt{x} + 8 = 0$.	
3 Calls arrive at a switchboard at an average rate of 6 per hour, independently and at random. (a) Find the probability of at least 3 in a 15-minute period. (b) Find the probability that, of 6 separate 15-minute periods, exactly 2 have no arrivals.	
4 The curve $y = x^2 - 2x + 5$ is translated by $\begin{pmatrix} 2 \\ 3 \end{pmatrix}$ and then a stretch, scale factor 3, parallel to the x-axis. Find the equation of the resulting curve in the form $y = ax^2 + bx + c$.	
5 A golf ball is hit from a point O on horizontal ground. It lands 80 m from O, and reaches a maximum height of 40 m above the ground. Find the angle of projection and the speed of projection, to 3 s.f. Take $g = 9.8$ m s^{-2}.	

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6 $\frac{dy}{dx} = y(4 - y)$, and $y = 2$ when $x = 0$. Solve to find the value of x when y = 3.	
7 $P(X = x) = kx^2$ for x = 1, 2, ..., 4, and 0 otherwise. (a) Show that $k = \frac{1}{30}$. (b) Find E(X) and Var(X). (c) Find Var(3X + 1).	
8 The points A, B, C have coordinates (−1, 3, 4), (5, 5, −3), (0, −1, 5). Find angle ABC to 1 d.p., and the exact area of triangle ABC.	
9 A non-uniform rod AB of length 8 m and mass 10 kg rests on supports at C and D, where AC = 2 m and AD = 7 m, with R_C = 1.5 R_D. Find (a) the distance of the centre of mass from A. A particle of mass m kg at B puts the rod on the point of tilting about D. (b) Find m.	
10 $f(x) = \frac{21x - 1}{(1 + 3x)(1 - 3x)}$. (a) Express f(x) in partial fractions. (b) Hence expand f(x) in ascending powers of x up to x^3, stating the range of validity.	