Day 286	A Level Maths: C Tier 10-a-day
1 The velocity of a particle is $(3\mathbf{i} + 4\mathbf{j})$ m s^{-1}, where $\mathbf{i}$ and $\mathbf{j}$ are perpendicular unit vectors. (a) Find the speed. (b) Find the acute angle between the direction of motion and the line of $\mathbf{i}$. Give 1 d.p.	
2 Solve $(2\cos x - 1)(2\cos x + 1) = 0$ for $0° \leq x \leq 360°$.	
3 An arithmetic series has first term -5, last term 142 and 22 terms. Find the sum of the series.	
4 The discrete random variable X has $P(X = x) = k(x^2 + 1)$ for $x = 1, 2, 3, 4$. (a) Find the value of k. (b) Find $P(X \geq 2)$.	
5 A ball is projected from level ground with velocity $(7\mathbf{i} + 9.8\mathbf{j})$ m s^{-1} ($\mathbf{i}$ horizontal, $\mathbf{j}$ vertically up). Take $g = 9.8$ m s^{-2}. (a) Find the time of flight. (b) Find the greatest height reached.	

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6 A sequence is defined by $u_{n+1} = \frac{1}{3} u_n + 4$. The sequence converges to a limit L. Find L.	
7 The curve $y = ab^x$ passes through (0, 3) and (4, 48). Find the values of a and b.	
8 X ~ B(20, p). H_0: p = 0.5, H_1: p < 0.5. Find the critical region for a test at the 10% significance level.	
9 A is (5, −3) and B is (13, 3). Find the equation of the perpendicular bisector of AB, in the form ax + by = c with integer a, b and c.	
10 Simplify $\frac{\sin x \cos x}{\tan x}$.	