Day 17	A Level Maths: A Tier 10-a-day
1	
|a| = 2, |b| = 7 and the angle between a and b is 60°. Find the exact values of a·b and |a + b|.	
2	
A lift of mass 200 kg carries a person of mass 75 kg. The cable tension is 2832.5 N and the lift is accelerating. Find (a) the magnitude and direction of the acceleration, (b) the force of the floor on the person. Take g = 9.8.	
3	
(a) Solve $3x + 6 > 5$. (b) Solve $x^2 - 6x + 5 \geq 0$. (c) Hence find the values of x satisfying both inequalities.	
4	
A and B have position vectors $\begin{pmatrix} 5 \\ -4 \end{pmatrix}$ and $\begin{pmatrix} 1 \\ 4 \end{pmatrix}$. The point P lies on AB with AP : PB = 3 : 1. Find the position vector of P and the exact distance OP.	
5	
The sum of the first n terms of an arithmetic series is $S_n = 3n^2 - 2n$. (a) Find the first term and the common difference. (b) Find u_{17}.	

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6 The random variable X has P(X = x) = k(x + 2) for x = 2, 3, 4, 5. (a) Show that k = $\frac{1}{22}$. (b) Find E(X) and Var(X). (c) Find P(X ≥ 3).	
7 Particle A (2 kg) rests on a smooth table, joined by a light string over a smooth pulley at the edge to particle B (8 kg), hanging 1 m above the floor. Released from rest. Find (a) the tension, (b) the speed of B as it hits the floor. Take g = 9.8. Give answers to 3 s.f. if not exact.	
8 The line through the origin is a tangent to the curve $y = x^2 + 2$. Find the gradients of the two possible tangents and the points of contact.	
9 X ~ B(20, p). H_0: p = 0.4 is tested against H_1: p > 0.4 using a 5% significance level. (a) Find the critical region. (b) State the probability of a Type I error. (c) Find the probability of a Type II error when p = 0.6 (3 s.f.).	
10 The line y = k − x is a tangent to the curve y = $\frac{1}{x}$. Find the possible values of k.	