Day 208	A Level Maths: A Tier 10-a-day
1 The points A, B and C have coordinates (5, 2, −1), (4, −2, −2) and (−2, 0, 1). Find angle ABC, in degrees to 1 d.p.	
2 Particle A (6 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.	
3 $y = 2 \times 3^x$. Find the exact gradient of the curve at x = 1 and the equation of the tangent there.	
4 P(A) = 0.65, P(B) = 0.3 and P(A ∩ B) = 0.15. Find (a) P(A ∪ B) (b) P(A | B) (c) P(B | A)	
5 Solve $2\cos^2 x + 3\sin x - 3 = 0$ for $0° \leq x \leq 180°$.	

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6 Solve $x(\sqrt{7} - 3) = -5 + 2\sqrt{7}$, writing x in the form $p + q\sqrt{7}$.	
7 A 3 kg particle rests on a smooth plane inclined at α, $\tan\alpha = \frac{3}{4}$, held by a string in the vertical plane through a line of greatest slope, at angle θ above the slope, $\tan\theta = \frac{5}{12}$. Find the tension and the normal reaction. Take $g = 9.8$.	
8 The line $y = kx - 3$ is a tangent to the curve $y = x^2 - x - 2$. (a) Find the possible values of k. (b) For the larger value of k, find the coordinates of the point of contact.	
9 Prove by contradiction that there are no integers x and y such that $x^2 - y^2 = 26$.	
10 $X \sim Po(20)$. Use a suitable approximation to find $P(X \geq 15)$, to 3 significant figures.	