Day 89	A Level Maths: A Tier 10-a-day
1 Solve $2\sec^2\theta + 6\tan\theta + 2 = 0$ for $0° \leq \theta \leq 360°$. Give answers to 1 d.p.	
2 A 5 kg particle rests on a rough plane inclined at α, $\tan\alpha = \frac{24}{7}$, $\mu = 0.25$. A force of P N acts up a line of greatest slope and the particle stays at rest. Find the range of values of P. Take g = 9.8.	
3 A circle has equation $x^2 + y^2 + 12x + 10y + 25 = 0$. (a) Find the centre and radius of the circle. (b) Determine whether P(1, −4) lies inside or outside the circle.	
4 A lift of mass 500 kg carries a person of mass 40 kg. The cable tension is 5562 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.	
5 For small θ (in radians), use the small angle approximations to find the value that $\frac{\cos 2\theta - \cos\theta}{\theta^2}$ approaches as $\theta \to 0$.	

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6 X ~ B(120, 0.25). Use a normal approximation to estimate P(X ≤ 27) to 3 significant figures.	
7 The line $12x + 5y = k$ is a tangent to the circle $(x + 3)^2 + (y + 1)^2 = 4$. Find the two possible values of k.	
8 Solve the differential equation $\frac{dy}{dx} = 2y \sin x$, given that $y = 1$ when $x = \frac{\pi}{2}$. Give y in terms of x.	
9 The life of a battery is $N(55, 8^2)$. A battery is classed as 'special' if its life is less than 40. 9 batterys are chosen at random. Find the probability that exactly 3 are special (3 s.f.).	
10 $u_1 = 0$ and $u_{n+1} = \frac{1}{4} u_n + 15$. (a) Find the limit L of the sequence as $n \to \infty$. (b) Find the least n for which $\lvert u_n - L \rvert < 0.1$.	