Day 320	A Level Maths: S Tier 10-a-day
1 Solve $\text{cosec}(3\theta + 45°) = \sqrt{2}$ for $0° \leq \theta \leq 180°$.	
2 The line $8y = 6x + k$ is a tangent to the circle $(x + 3)^2 + (y + 3)^2 = 4$. Find the two possible values of k.	
3 The lengths of a component, in mm are modelled by $N(92, \sigma^2)$. The probability of a value below 87 is 0.30. (a) Find σ. (b) Find the probability of a value below 79.	
4 The equation $x^3 = 5x + 7$ has a root α. (a) Show that the equation can be written as $x = \sqrt[3]{(5x + 7)}$. (b) Use $x_{n+1} = \sqrt[3]{(5x_n + 7)}$ with $x_0 = 2$ to find x_1, x_2, x_3 to 4 d.p., and hence state α to 3 d.p.	
5 Solve $\frac{-3x + 1}{2x + 2} \geq -2$.	

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6 Solve $12\text{cosec}^2\theta + 14\cot\theta - 8 = 0$ for $0 \leq \theta < 360°$, giving answers to 1 d.p.	
7 A shell is projected from a point O on horizontal ground with speed 24.5 m s^{-1} at an angle θ above the horizontal, where $\tan\theta = \frac{3}{4}$. Find the horizontal distance between the two points at which the shell is 6.125 m above the ground. Take g = 9.8 m s^{-2}.	
8 A particle P moves on a line. Its displacement from a fixed point O at time t seconds is s metres, where $s = 3\sin t + 4\cos t$. Find (a) the greatest distance of P from O, (b) the greatest speed of P, (c) the first time P is at its greatest distance from O (3 s.f.).	
9 A test of H_0: $p = 0.1$ against H_1: $p > 0.1$ uses a sample of 30 at the 5% level. (a) Find the critical region for X, the number of successes. (b) Find the actual significance level. (c) Find P(Type II error) when in fact $p = 0.3$.	
10 $u_{n+1} = -\frac{1}{3}u_n + 4$, $u_1 = 13$. (a) Find the limit L of the sequence. (b) Find the least n such that $\lvert u_n - L\rvert < 0.001$.	