Day 320	A Level Maths: A Tier 10-a-day
1 (a) Solve $2x + 5 \geq -1$. (b) Solve $x^2 + 4x - 5 \geq 0$. (c) Hence find the values of x satisfying both inequalities.	
2 $y = \sqrt{3x^2 - 8}$. Find $\frac{dy}{dx}$ and the gradient of the curve at $x = 2$.	
3 $f(x) = -x^2 - 10x - 22$. (a) Write f(x) in the form $a(x + p)^2 + q$. (b) State the maximum value of f(x) and the value of x at which it occurs. (c) Solve $f(x) = 0$, giving surds in simplest form.	
4 On each independent trial, the probability that a basketball player scores is $\frac{2}{5}$. X is the number of trials up to and including the first success. (a) Find $P(X = 6)$ and $E(X)$. (b) Find the least m with $P(X \leq m) > 0.99$.	
5 θ is small and measured in radians. Use small angle approximations to show that $5\sin\theta + \cos 2\theta = 2$ can be written as $a\theta^2 + b\theta + c = 0$ with integers a, b, c. Hence find the approximate solution with $0 < \theta < 0.8$, to 3 s.f.	

Day 320	A Level Maths: A Tier 10-a-day
6 $f(x) = 3x^2 + 4, x \geq 0$. Find $f^{-1}(x)$ and state its domain.	
7 Solve $4\text{cosec}^2 x - 20\cot x + 20 = 0$ for $0° < x < 360°$. Give answers to 1 d.p.	
8 A stone is projected from a cliff top 32.4 m above the sea at 40 m s^{-1}, at angle α above the horizontal, $\tan \alpha = \frac{3}{4}$. Find (a) the time to reach the sea, (b) the horizontal distance travelled, (c) the speed on impact. Take g = 9.8. Give answers to 3 s.f. if not exact.	
9 A ball is projected from the ground at 11 m s^{-1} at angle α above the horizontal, $\tan \alpha = \frac{15}{8}$. At time T s, while in flight, it is moving perpendicular to its initial direction. Find (a) T, (b) the height of the ball then. Take g = 9.8. Give answers to 3 s.f. if not exact.	
10 Of 40 students, 16 study Maths (M), 17 Physics (P) and 19 Chemistry (C). 7 study M and P, 7 study M and C, 6 study P and C, and 4 study all three. One student is chosen at random. Given that a student does not study Maths, find the probability that they study Physics.	