Day 33	A Level Maths: A Tier 10-a-day
1 $y = \sin^3(x)$. Find $\frac{dy}{dx}$ and its exact value at $x = \frac{\pi}{3}$.	
2 $f(x) = -x - 6$ and $g(x) = x^2 + 2$. Solve $gf(x) = 18$.	
3 A lift of mass 500 kg carries a person of mass 75 kg. The cable tension is 6095 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.	
4 On each independent trial, the probability that a bulb is faulty is $\frac{1}{5}$. 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 $P(X \leq m) > 0.9$.	
5 $y = x \operatorname{cosec}(2x)$. Find the exact gradient at $x = \frac{\pi}{8}$.	

Day 33	A Level Maths: A Tier 10-a-day
6 P(B) = 0.35, P(A) = 0.3 and P(A | B) = 0.25. (a) Find $P(A \cap B)$ and $P(A \cup B)$. (b) Find P(B | A). (c) Determine whether A and B are independent.	
7 $y = 2x - 4\sin x$ for $0 \leq x \leq 2\pi$. Find the exact coordinates of the stationary points and determine their nature.	
8 Given that $(x - 2)$ is a factor of $f(x) = -x^3 - 2x^2 + 13x - 10$, solve $f(x) \leq 0$.	
9 A sequence is defined by $u_1 = \frac{3}{2}$ and $u_{n+1} = \frac{u_n + 1}{u_n - 1}$. (a) Find u_2 and u_3. (b) Find u_{100} and $\sum_{r=1}^{100} u_r$.	
10 A uniform ladder AB (10 m, 15 kg) rests with A on rough ground, $\mu = 0.25$, and B against a smooth wall, B being 8 m above the ground. A man of mass 75 kg climbs the ladder. How far along the ladder from A can he climb before it slips?	