Day 233	A Level Maths: B Tier 10-a-day
1 (a) Write $2x^2 - 20x + 58$ in the form $a(x + p)^2 + q$. (b) Write down the coordinates of the minimum point of $y = 2x^2 - 20x + 58$.	
2 The function $f(x) = \ln x + x - 3$. Show that $f(x) = 0$ has a root between $x = 2$ and $x = 2.5$.	
3 A and B are mutually exclusive events with $P(A) = 0.2$ and $P(A \cup B) = 0.45$. (a) Find $P(B)$. (b) Find $P(A' \cap B')$.	
4 Prove that $n^3 + 5n + 2$ is even for all integers n.	
5 A particle moves along a straight line so that its displacement from O after t s is $s = 2t^3 + 2t^2$ metres. Find (a) the average velocity over the first 3 seconds, (b) the velocity at $t = 3$.	

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6 The line l has equation $y = -\frac{3}{2}x - 6$. The point P is $(1, -1)$. (a) Find the line through P perpendicular to l, as $ax + by + c = 0$ with integer a, b, c. (b) Find the foot F and the exact distance PF.	
7 Differentiate $y = \sec 3x$ with respect to x, and find the exact gradient when $x = \frac{\pi}{9}$.	
8 A tennis ball is projected vertically upwards with speed 18 m s^{-1} from ground level. Take $g = 9.8$ m s^{-2}. Find, to 3 significant figures, (a) the greatest height reached, (b) the time of flight.	
9 Given that each component fails independently with probability 0.05, find the least number of components needed for the probability of at least one success to exceed 0.99.	
10 Solve $\cot^2 x + 5 \operatorname{cosec} x + 7 = 0$ for $0 \leq x \leq 360°$, giving answers to 1 d.p.	