Day 92	A Level Maths: B Tier 10-a-day
1 $f(x) = x^2 + 8x + 10$ for $x \geq -4$. Find the range of f.	
2 A model boat moves so that its position vector relative to O at time t s is $r = (2t^2 + 4t)\mathbf{i} + (t^3 + 3t)\mathbf{j}$ metres. Find the velocity when t = 1, and the speed at that time.	
3 The probability that a student passes a driving test first time is thought to be 0.4. In a sample of 20 students, 15 pass first time. Test, at the 5% significance level, whether the probability is different from 0.4.	
4 (a) Show that $x^3 - 2x - 3 = 0$ can be written as $x = \sqrt[3]{2x + 3}$. (b) Use $x_{n+1} = \sqrt[3]{2x_n + 3}$ with $x_0 = 2$ to find x_1, x_2, x_3 to 4 d.p.	
5 A curve has parametric equations $x = 3t + 2$, $y = t^2 + 2t + 4$. The line $y = x + 8$ meets the curve at two points. Find the coordinates of these points.	

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6 The time, X minutes, to complete a task is normally distributed with mean 40 and s.d. 6. A random sample of 16 is taken. Find the probability that the mean time is less than 37.75 (3 s.f.).	
7 A particle of mass 1 kg is suspended in equilibrium by two light strings attached to a horizontal ceiling. The strings make angles α and β with the ceiling, where $\tan\alpha = \frac{3}{4}$ and $\tan\beta = \frac{5}{12}$. Take $g = 9.8\ \text{m s}^{-2}$. Find the tension in each string.	
8 Find the exact value of $\int_1^2 (6e^{4x} + \frac{2}{x})\,dx$.	
9 A geometric sequence has first term 20 and common ratio 0.75. Find the smallest n for which the nth term is less than 0.1.	
10 Solve $2\tan^2 x + 3\sec x - 7 = 0$ for $0 \leq x \leq 360°$, giving answers to 1 d.p.	