Day 49	A Level Maths: B Tier 10-a-day
1 A fair die is rolled 11 times and the number of sixes is X. This is done 500 times. Estimate the number of times that X = 4.	
2 Solve $3\sin^2 x - 2\cos x - 3 = 0$ for $0 \leq x \leq 360°$, giving answers to 1 d.p. where necessary.	
3 A car of mass 1000 kg moves along a horizontal road. The engine works at a constant rate of 36 kW. The resistance to motion is constant at 1000 N. Find the acceleration when the speed is 25 m s^{-1}.	
4 (a) Show that $e^x - x - 5 = 0$ can be written as $x = \ln(x + 5)$. (b) Use $x_{n+1} = \ln(x_n + 5)$ with $x_0 = 1$ to find x_1, x_2, x_3 to 4 d.p.	
5 A class of width 20, frequency 24, is a bar 5 cm wide, 4.8 cm tall. (a) Find the bar height for width 10, frequency 12. (b) Find the frequency of a 1.5 cm by 4 cm bar.	

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6 $f(x) = \sqrt{2x - 3}$ for $x \geq \frac{3}{2}$. Find $f^{-1}(x)$ and state its domain.	
7 A particle of mass 6 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 $\tan \alpha = \frac{4}{3}$ and $\tan \beta = \frac{3}{4}$. Take $g = 9.8$ m s^{-2}. Find the tension in each string.	
8 The mass M kg of a substance satisfies $\frac{dM}{dt} = -0.1M$, where t is in years. Initially $M = 40$. Find M when $t = 10$, and the half-life, each to 3 s.f.	
9 Solve the equation $2^{2x} - 3 \times 2^x + 2 = 0$.	
10 Solve the simultaneous equations $2x + y = 15$ $x^2 + y^2 = 65$	