Day 109	A Level Maths: B Tier 10-a-day
1 $f(x) = x^3 + px^2 + qx - 3$. When f(x) is divided by (x + 2) the remainder is −35, and when divided by (x + 3) the remainder is −78. Find p and q.	
2 (a) Show that $e^x - x - 3 = 0$ can be written as $x = \ln(x + 3)$. (b) Use $x_{n+1} = \ln(x_n + 3)$ with $x_0 = 1$ to find x_1, x_2, x_3 to 4 d.p.	
3 A biased coin with P(head) = $\frac{1}{6}$ is tossed 8 times; X is the number of heads. This is done 2000 times. Estimate the number of times that X = 2.	
4 Find the term independent of x in the expansion of $(x^2 + \frac{1}{x})^6$.	
5 A ball is thrown vertically upwards at 9.8 m s^{-1} from a point 39.2 m above horizontal ground. Take g = 9.8 m s^{-2}. Find the time before it hits the ground.	

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6 A curve has equation $xe^y - 3y = 2$. Find $\frac{dy}{dx}$ in terms of x and y, and the gradient at (2, 0).	
7 A woman of mass 40 kg stands on weighing scales in a lift. The lift decelerates at 1 m s^{-2} while moving upwards. Take g = 9.8 m s^{-2}. Find the force exerted on the woman by the scales.	
8 Given that $\sqrt{5}$ is irrational, prove by contradiction that $1 + 5\sqrt{5}$ is irrational.	
9 The volume of a sphere increases at a constant rate of 12 cm^3s^{-1}. Find the rate at which the radius is increasing when r = 6 cm, to 3 s.f.	
10 9 values of x are coded using $y = \frac{(x - 100)}{2}$. $\Sigma y = 8$ and $\Sigma y^2 = 224$. Find the mean and standard deviation of x (3 s.f.).	