Day 90	A Level Maths: B Tier 10-a-day
1 Solve $3^x < 323$, giving your answer to 3 s.f.	
2 A car travelling at 16 m s^{-1} brakes and comes to rest with constant deceleration 5 m s^{-2}. Find (a) the distance travelled while braking, (b) the time taken to stop.	
3 The line segment AB is a diameter of a circle, where A is $(0, -2)$ and B is $(2, -2)$. Find an equation of the circle in the form $(x - a)^2 + (y - b)^2 = k$.	
4 A uniform rod AB of length 3 m and mass 30 kg is hinged at A and held horizontal by a light string attached at B. The string makes an angle θ with the rod, where $\sin\theta = \frac{4}{5}$. Take g = 9.8 m s^{-2}. Find the tension in the string.	
5 Solve $\lvert -x - 2\rvert < 2x - 3$.	

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6 Data are modelled by $y = ax^n$. A plot of $\log_{10} y$ against $\log_{10} x$ is a straight line with intercept 0.778 and gradient 0.5. Find a (2 s.f.) and n, then estimate y when x = 25 (3 s.f.).	
7 (a) Write $\frac{-3x - 7}{(x + 1)(x + 3)}$ in partial fractions. (b) Hence evaluate $\int_0^2 \frac{-3x - 7}{(x + 1)(x + 3)}\,dx$, giving the answer as a single logarithm.	
8 (a) Expand $(1 - 4x)^{-\frac{3}{2}}$ in ascending powers of x up to and including the term in x^3. (b) State the range of values of x for which the expansion is valid.	
9 Squares of side x cm are cut from the corners of a square card of side 18 cm and the sides are folded up to make an open box. Find x for the greatest volume, and that volume.	
10 The masses (kg) of parcels are normally distributed. P(X < 68) = 0.0668 and P(X > 88) = 0.1587. Find the mean and standard deviation (3 s.f.).	