Day 26	A Level Maths: B Tier 10-a-day
1 For 15 pairs of data, $S_{xx} = 72$, $S_{yy} = 60$ and $S_{xy} = 53$. Find the PMCC (3 s.f.) and describe the correlation.	
2 A particle moves so that at time t s its velocity is $\mathbf{v} = (3t^2 + 4)\mathbf{i} + (6t - 12)\mathbf{j}$ m s^{-1}. Find the time when the particle is moving in the direction of $\mathbf{i}$, and its speed then.	
3 Find the exact value of $\int_1^2 (5x^3 + 1 - \frac{4}{x^2})\,dx$.	
4 Find the quotient and the remainder when $2x^3 - 7x^2 + 2x - 18$ is divided by $(x - 4)$.	
5 A uniform rod AB of length 2 m and mass 18 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.	

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6 The equation $x^2 + 2kx + (k + 6) = 0$ has no real roots. Find the possible values of k.	
7 Solve $2^{3x+1} = 159$, giving your answer to 3 s.f.	
8 A geometric series has first term 6 and common ratio 2. Find the smallest value of n for which the sum of the first n terms exceeds 20000.	
9 The random variable X is normally distributed. $P(X < 42.5) = 0.0668$ and $P(X > 55) = 0.1587$. Find the mean and standard deviation (3 s.f.).	
10 Line l_1: $\mathbf{r} = \begin{pmatrix} -6 \\ -3 \\ 6 \end{pmatrix} + \lambda \begin{pmatrix} 1 \\ 2 \\ -1 \end{pmatrix}$. Line l_2: $\mathbf{r} = \begin{pmatrix} 3 \\ 0 \\ 3 \end{pmatrix} + \mu \begin{pmatrix} -2 \\ 1 \\ 0 \end{pmatrix}$. Show that l_1 and l_2 intersect and find the point.	