Day 327	A Level Maths: B Tier 10-a-day
1 (a) Write $x^2 - 10x + 22$ in the form $a(x + p)^2 + q$. (b) Write down the coordinates of the minimum point of $y = x^2 - 10x + 22$.	
2 Given that $y = \sin^2 4x$, find $\frac{dy}{dx}$, and the gradient of the curve when $x = \frac{\pi}{16}$.	
3 A summary of the masses, m grams, of 9 eggs gives $\Sigma m = 292$ and $\Sigma m^2 = 10480$. Find the mean and the standard deviation (3 s.f.).	
4 Prove that $n^2 + 5n + 15$ is odd for all integers n.	
5 A trolley of mass 3 kg is moving on a smooth horizontal surface at 5 m s^{-1} when a constant horizontal force of 12 N, in the direction of motion, acts for 8 s. Find the speed of the trolley at the end of this time and the distance it moves.	

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6 The function f is defined by f(x) = arccos x. State (a) the domain, (b) the range of f, in radians.	
7 A block of mass 4 kg is released from rest on a rough plane inclined at angle α to the horizontal, where $\tan\alpha = \frac{3}{4}$. The coefficient of friction is 0.25. Take g = 9.8 m s^{-2}. Find the acceleration down the plane, and the distance moved in 4 s.	
8 Solve the equation $5^{2x} - 30\times5^{x} + 125 = 0$.	
9 Points A, B and C have position vectors $\begin{pmatrix}2\\-3\\-1\end{pmatrix}$, $\begin{pmatrix}-1\\-5\\-4\end{pmatrix}$ and $\begin{pmatrix}5\\-1\\r\end{pmatrix}$ respectively. Given that A, B, C are collinear, find r.	
10 X has a binomial distribution with mean 16.8 and variance 5.04. (a) Find n and p. (b) Find P(X = 16) to 3 significant figures.	