Day 278	A Level Maths: S Tier 10-a-day
1 X ~ B(200, 0.015). (a) Explain why a Poisson approximation is suitable and state its distribution. (b) Use it to estimate P(X > 1), to 4 s.f. (c) Find the exact value of P(X > 1), to 4 s.f.	
2 A geometric series has first term 4 and common ratio 4. Find the least n for which $S_n > 25651$.	
3 A uniform plank AB of length 6 m and mass 50 kg rests on supports at C and D, where AC = 2 m and DB = 2 m. A girl of mass 40 kg stands on it at distance x m from A. Find the range of x for which the plank stays in equilibrium on both supports.	
4 Describe a sequence of two transformations that maps the curve $y = x^2$ onto the curve $y = 3x^2 + 6x + 1$.	
5 Large Data Set, daily mean air temperature (°C), Hurn, September 2015 (n = 184): mean 10.9, sd 3.7. (F = 1.8C + 32) (a) Find the mean and sd in °F. (b) Is a reading of 16.4 more than 2 sd above the mean?	

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6 A curve has parametric equations $x = \ln t$, $y = 4t^2 + 2t$, $t > 0$. Find the equation of the tangent where $t = 1$, in the form $y = mx + c$.	
7 Given that $\sum_{r=1}^{n}(5r + 6) = 776$, find n.	
8 The line l has equation $\mathbf{r} = \begin{pmatrix} 6 \\ -2 \\ 7 \end{pmatrix} + t\begin{pmatrix} 2 \\ 0 \\ 2 \end{pmatrix}$. The point P has coordinates $(1, -5, 4)$. Find the coordinates of the foot F of the perpendicular from P to l, and the exact distance PF.	
9 A ball is projected from a point O on horizontal ground at 21 m s^{-1}, at angle θ above the horizontal. It passes through the point P, 27 m horizontally and 8 m vertically from O. Find the two possible values of $\tan\theta$, and the two possible values of θ to 1 d.p. Take $g = 9.8$ m s^{-2}.	
10 The curve C has equation $x^2 + 2xy + 2y^2 = 16$. Find the coordinates of the points on C where the tangent is parallel to the x-axis.	