Day 97	A Level Maths: A Tier 10-a-day
1 Summary statistics for the daily mean temperature (°C) in the same month are: Perth: mean 15.5, standard deviation 3.1; Jacksonville: mean 28, standard deviation 5.5. Make two comparisons.	
2 A ball is projected horizontally at 20 m s^{-1} from a point 44.1 m above horizontal ground. Find (a) the horizontal distance to the landing point, (b) the speed and direction (angle below the horizontal, 1 d.p.) on landing. Take g = 9.8. Give answers to 3 s.f. if not exact.	
3 Solve $2\log_2 x - \log_2(x + 24) = 1$.	
4 A curve has parametric equations $x = t^2 + 4$, $y = 2t(t^2 - 1)$. Find the coordinates of the points where the curve meets the x-axis.	
5 A 1000 kg car has engine power 45 kW and constant resistance 1000 N. Find (a) its greatest steady speed on a horizontal road, (b) its acceleration at 24 m s^{-1} up a hill where $\sin\alpha = \frac{1}{20}$. Take g = 10.	

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6 The circle $x^2 + y^2 + 4x + 6y - 87 = 0$ passes through P(6, −9). (a) Find the equation of the tangent at P, in the form ax + by = c. (b) Find the coordinates of the point where this tangent crosses the x-axis.	
7 Solve $2\text{cosec}^2 x + 6\cot x + 2 = 0$ for $-180° < x < 180°$, $x \neq 0$. Give answers to 1 d.p.	
8 $X \sim N(67, 5^2)$. Find $P(X > 73 \mid X > 68)$ to 3 significant figures.	
9 A, B and C have position vectors $\begin{pmatrix} 3 \\ 3 \\ -1 \end{pmatrix}$, $\begin{pmatrix} 3 \\ 6 \\ 2 \end{pmatrix}$ and $\begin{pmatrix} 3 \\ k \\ 3 \end{pmatrix}$ relative to O, where k is a constant. Given that A, B and C are collinear, find k and the ratio AB : BC.	
10 Solve $2^{2x} - 9 \times 2^x + 8 = 0$.	