Day 39	A Level Maths: B Tier 10-a-day
1 X ~ B(27, 0.7). Find, to 3 significant figures, (a) P(X ≥ 19) (b) P(X = 18)	
2 A radio-controlled car moves with constant velocity $(3\mathbf{i} + 4\mathbf{j})$ m s^{-1}. At time t = 0 its position vector relative to a fixed origin O is $(4\mathbf{i} - 8\mathbf{j})$ m. Find (a) its position vector when t = 6, (b) the value of t when it crosses the line through O in the direction of $\mathbf{i}$.	
3 f(x) = 4x + 6 and $g(x) = x^2 + 4$ for $x \in \mathbb{R}$. (a) Find fg(x). (b) Solve gf(x) = 200.	
4 The area of a square increases at a constant rate of 6 cm^2s^{-1}. Find the rate of increase of the side length when the side is 2 cm.	
5 A is the point (1, 0) and B is the point (2, −5). Find the perpendicular bisector of AB as ax + by + c = 0, with integer a, b, c.	

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6 $a = \begin{pmatrix} 5 \\ 4 \\ 5 \end{pmatrix}$ and $b = \begin{pmatrix} -4 \\ -2 \\ 3 \end{pmatrix}$. Find the angle between a and b, to 1 d.p.	
7 Given that $\sqrt{2}$ is irrational, prove by contradiction that $1 + 3\sqrt{2}$ is irrational.	
8 X ~ B(60, 0.2). Use a normal approximation to find P(X ≥ 10), to 3 significant figures.	
9 Find the x-coordinate(s) of the stationary point(s) of the curve $y = \frac{\ln x}{x}$.	
10 A block of mass 6 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 3 s.	