Day 273	A Level Maths: A Tier 10-a-day
1 X ~ B(18, 0.15). Find, to 3 significant figures: (a) P(X = 5) (b) P(X ≥ 5) (c) P(X ≤ 4)	
2 Find the coefficient of x^4 in the expansion of $(4 + 3x)^8$.	
3 A sector of a circle of radius 9 cm has angle 135°. Find, in terms of π, the arc length, the area and the perimeter of the sector.	
4 $f(x) = \frac{x + 2}{3x - 1}$, $x \in \mathbb{R}$, $x \neq \frac{1}{3}$. Find $f^{-1}(x)$ and state its domain.	
5 A 3 kg particle moves on a smooth horizontal line. At time t s a single force of (15 − 3t) N acts along the line. When t = 0 its speed is 2 m s^{-1}. Find (a) its speed when t = 3, (b) its greatest speed.	

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6 A regression line of v on w is $v = 5005 + 25w$, where $w = \frac{t - 2000}{10}$. (a) Find the regression line of v on t in the form $v = p + qt$. (b) Estimate v when $t = 2040$.	
7 A curve has equation $x^2y - y^3 + 3x = -21$. Find $\frac{dy}{dx}$ in terms of x and y, and the gradient of the normal at (1, 3).	
8 A 6 kg block is released from rest on a rough plane inclined at α, $\tan\alpha = \frac{3}{4}$, $\mu = 0.3$, and slides 5 m down a line of greatest slope. Use work and energy to find (a) the work done against friction, (b) its speed after 5 m. Take $g = 10$.	
9 A sequence is defined by $u_1 = \frac{5}{2}$ and $u_{n+1} = \frac{u_n + 1}{u_n - 1}$. (a) Find u_2 and u_3. (b) Find u_{50} and $\sum_{r=1}^{50} u_r$.	
10 A curve has equation $3x^2 + 2xy + 3y^2 = 96$. Find the coordinates of the points where the tangent is parallel to the x-axis.	