Day 185	A Level Maths: B Tier 10-a-day
1 The points A and B have coordinates $(5, -4)$ and $(1, -6)$. (a) Find the midpoint of AB. (b) Find the line AB as $ax + by + c = 0$, with integer a, b, c.	
2 Given that $y = \sqrt{4x - 15}$, find $\frac{dy}{dx}$, and the gradient of the curve when $x = 4$.	
3 $P(X = x) = kx^2$ for $x = 1, 2, ..., 3$. (a) Find k. (b) Find E(X) and Var(X).	
4 Describe the single transformation that maps the graph of $y = f(x)$ onto the graph of: (a) $y = f(-x)$ (b) $y = f(x - 5)$ (c) $y = f(\frac{x}{4})$	
5 A and B are mutually exclusive events with $P(A) = 0.2$ and $P(A \cup B) = 0.4$. (a) Find P(B). (b) Find $P(A' \cap B')$.	

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6 A stone is projected vertically upwards with speed 18 m s^{-1} from ground level. Take g = 9.8 m s^{-2}. Find, to 3 significant figures, (a) the greatest height reached, (b) the time of flight.	
7 Find y in terms of x, given that $\frac{dy}{dx} = 5y^2e^x$ and y = 0.25 when x = 0.	
8 Solve $\|3x + 5\| < 4$.	
9 Line l_1: $\mathbf{r} = \begin{pmatrix} 6 \\ -3 \\ 7 \end{pmatrix} + \lambda \begin{pmatrix} 1 \\ -2 \\ 2 \end{pmatrix}$. Line l_2: $\mathbf{r} = \begin{pmatrix} 1 \\ -2 \\ -3 \end{pmatrix} + \mu \begin{pmatrix} 1 \\ 1 \\ 2 \end{pmatrix}$. Show that l_1 and l_2 intersect and find the point.	
10 A uniform rod AB of length 6 m and mass 24 kg is hinged at A and held horizontal by a light string attached at B. The string makes an angle θ with the rod, where $\sin\theta = \frac{3}{5}$. Take g = 9.8 m s^{-2}. Find the tension in the string.	