Day 255	A Level Maths: B Tier 10-a-day
1 $f(x) = x^2 + 6x + 3$ for $x \geq -5$. Find the range of f.	
2 A boat moves in a straight line with constant acceleration. Its initial speed is 1 m s^{-1}, its final speed is 2.5 m s^{-1} and it travels 5.25 m. Find the time taken.	
3 The line segment AB is a diameter of a circle, where A is $(-3, -6)$ and B is $(-7, -4)$. Find an equation of the circle in the form $(x - a)^2 + (y - b)^2 = k$.	
4 Given that $y = (x + 1)e^{3x}$, find $\frac{dy}{dx}$, and its value when $x = 0$.	
5 Solve $\lvert -x + 3 \rvert < -2x - 1$.	

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6 The variables x and y satisfy $y = ax^n$. A graph of ln y against ln x is a straight line with gradient 3 that passes through (0, ln 4). Find the values of a and n.	
7 X ~ B(60, 0.2). Use a normal approximation to find P(X ≥ 14), to 3 significant figures.	
8 Line l_1: $\mathbf{r} = \begin{pmatrix}3\\0\\0\end{pmatrix} + \lambda\begin{pmatrix}2\\-1\\3\end{pmatrix}$. Line l_2: $\mathbf{r} = \begin{pmatrix}-5\\5\\-9\end{pmatrix} + \mu\begin{pmatrix}3\\-2\\3\end{pmatrix}$. Show that l_1 and l_2 intersect and find the point.	
9 A ball is projected horizontally at 392 m s^{-1} from a point high above the ground. Take g = 9.8 m s^{-2}. Find the speed and the direction of motion 30 s later, to 1 d.p. below the horizontal.	
10 The scores on a test are normally distributed. P(X < 75) = 0.1587 and P(X > 87.5) = 0.0668. Find the mean and standard deviation (3 s.f.).	