Day 93	A Level Maths: B Tier 10-a-day
1 The curve C has equation $y = x^2 - 4x + 5$. C is reflected in the y-axis and then reflected in the x-axis. Find its new equation.	
2 A boat moves with constant velocity $(6\mathbf{i} - 8\mathbf{j})$ m s^{-1}, where $\mathbf{i}$ and $\mathbf{j}$ are unit vectors east and north. Find its speed and the acute angle its direction makes with $\mathbf{i}$, to 1 d.p.	
3 Solve $2 \ln x = \ln(x + 30)$.	
4 Prove that $x^2 + 6x + 14 > 0$ for all real values of x.	
5 Regression line (x from 2 to 18): $y = 60 - 2.5x$. x is the temperature, y the gas used per day. (a) Interpret the gradient. (b) Estimate y when x = 17 and comment.	

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6 A geometric series has second term 54 and fifth term 2. Find (a) the common ratio, (b) the first term, (c) the sum to infinity.	
7 Bottle volumes are normal, s.d. 6 ml. Set mean 50 ml; 50 bottles have mean 52 ml. Test at the 5% level whether the true mean is greater than 50.	
8 Find the coordinates of the stationary point of the curve $y = x \ln x$, and determine its nature.	
9 A stone is thrown vertically upwards at 9.8 m s^{-1} from a point 14.7 m above horizontal ground. Take g = 9.8 m s^{-2}. Find the time before it hits the ground.	
10 A curve has equation $4x^2y + 2xy + 2y^3 = 20$. Find $\frac{dy}{dx}$ in terms of x and y, and the gradient at $(-1, 2)$.	