Day 302	A Level Maths: B Tier 10-a-day
1 Find the coordinates of the stationary point of the curve $y = e^{2x} - 6e^{x}$, and determine its nature.	
2 A remote-control car moves with constant velocity $(5\mathbf{i} + 12\mathbf{j})$ 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 Statement: "$n^2 - n + 11$ is prime for every positive integer n." Find a counter-example to show that the statement is false.	
4 A curve has equation $x^2 + 3y^2 - xy - 4x - y = 22$. Find $\frac{dy}{dx}$ in terms of x and y, and the gradient at $(-3, -1)$.	
5 Solve $8^{-2x-2} = 4^{x-3}$.	

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6 X ~ B(7, 0.3) and Y ~ B(6, 0.1) are independent. Find P(X = 2 and Y ≤ 1), to 3 significant figures.	
7 A car of mass 800 kg moves along a horizontal road. The engine works at a constant rate of 20 kW. The resistance to motion is constant at 500 N. Find the acceleration when the speed is 8 m s^{-1}.	
8 (a) Write $\frac{3x + 11}{(x + 1)(x + 5)}$ in partial fractions. (b) Hence evaluate $\int_0^3 \frac{3x + 11}{(x + 1)(x + 5)}\,dx$, giving the answer as a single logarithm.	
9 A geometric series has first term 2 and common ratio 4. Find the smallest value of n for which the sum of the first n terms exceeds 5000.	
10 The masses (kg) of parcels are normally distributed. P(X < 18) = 0.1587 and P(X > 54) = 0.0228. Find the mean and standard deviation (3 s.f.).	