Day 2	A Level Maths: A Tier 10-a-day
1 Show by counter-example that the statement "If ab is a multiple of 8, then a or b is a multiple of 8" is false.	
2 Solve $2\cos^2 x - 3\sin x - 3 = 0$ for $0 \leq x \leq 2\pi$.	
3 For n = 9 pairs of (x, y): $\Sigma x = 96$, $\Sigma y = 407$, $\Sigma x^2 = 1376$, $\Sigma y^2 = 18897$, $\Sigma xy = 4642$. Calculate the product moment correlation coefficient, and describe the correlation.	
4 Particles A (4 kg) and B (1 kg) hang on a light string over a smooth pulley, A being 2 m above the ground. Released from rest; A lands without rebounding. Find (a) the tension while both move, (b) the greatest height of B above its start. Take g = 9.8.	
5 A is $(4, -1)$ and B is $(-6, -3)$. (a) Find the equation of the perpendicular bisector of AB, in the form $ax + by = c$. (b) The perpendicular bisector meets the x-axis at P. Find the area of triangle ABP.	

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6 A ball is projected horizontally at 10 m s^{-1} from a point 4.9 m above horizontal ground. Find (a) the horizontal distance to the landing point, (b) the speed and direction (angle below the horizontal, 1 d.p.) on landing. Take g = 9.8. Give answers to 3 s.f. if not exact.	
7 Prove by contradiction that there are no integers x and y such that $x^2 - y^2 = 34$.	
8 The radius of a sphere increases at $\frac{1}{2}$ cm s^{-1}. Find the rate of increase of its volume when r = 5 cm, in terms of π.	
9 Bulbs are defective with probability 0.25, independently. A pack of 10 bulbs is rejected if it has at least 3 defective. From 8 such packs, find the probability that exactly 4 are rejected (3 s.f.).	
10 Find the exact coordinates of the stationary point of $y = \frac{\ln x}{x}$ for $x > 0$.	