Day 251	A Level Maths: S Tier 10-a-day
1 Solve the simultaneous equations $\log_5 x + \log_5 y = 7$ $x - y = 500$	
2 Solve simultaneously: $x + 3y = 5$ $3x^2 + 3y^2 = 15$	
3 A lift of mass 400 kg, carrying a passenger of mass 65 kg, is supported by a vertical cable. The lift is moving downwards and decelerating at 1.4 m s^{-2}. Find (a) the force the floor exerts on the passenger, (b) the tension in the cable. Take g = 9.8 m s^{-2}.	
4 An arithmetic sequence has $u_5 = 19$ and $S_{12} = 300$. (a) Find the first term and common difference. (b) Find the least n for which $S_n > 347$.	
5 The curve $y = ab^x$ passes through (1, 10) and (3, 40). Find the exact values of a and b, and the value of y when x = 5.	

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6 A golf ball is hit from a point O on horizontal ground. It lands 96 m from O, and reaches a maximum height of 12 m above the ground. Find the angle of projection and the speed of projection, to 3 s.f. Take g = 9.8 m s^{-2}.	
7 Data satisfy $y = ax^n$. The line of best fit for lg y against lg x is lg y = 0.6 + 2.5 lg x. (a) Find a and n, giving a to 3 significant figures. (b) Estimate y when x = 10, to 3 significant figures.	
8 A box holds 12 components, each faulty with probability 0.05, independently. A box is rejected if it has at least 2 faulty components. (a) Find the probability that a box is rejected. (b) 12 boxes are inspected. Find the probability that at least 3 are rejected.	
9 Squares of side x cm are cut from the corners of a square sheet of side 36 cm and the sides folded up to make an open box. Find the value of x that maximises the volume, and that maximum volume.	
10 Prove that $7k = n^2 + 1$ has no integer solutions (k and n integers).	