Day 36	A Level Maths: A Tier 10-a-day
1 The 6th term of an arithmetic sequence is 37 and the 12th term is 67. Find the first term and common difference, and the sum of the first 20 terms.	
2 $y = (x - 5)e^{-x}$. Find the exact coordinates of the stationary point and determine its nature.	
3 5% of people have a fault. The inspection test is positive for 90% of those who have it and for 1% of those who do not. (a) Find the probability that a person tests positive. (b) Given a positive test, find the probability that the person has the fault (3 s.f.).	
4 A driver at constant speed sees a hazard 30 m ahead. After a reaction time of 1 s she brakes with deceleration 4 m s^{-2} and stops exactly at the hazard. Find (a) her initial speed, (b) the total time from seeing the hazard to stopping.	
5 An arithmetic series has first term 14 and common difference 6. The sum of the first n terms is 840. Find n.	

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6 X has a binomial distribution with mean 9 and variance 3.6. (a) Find n and p. (b) Find P(X = 7) to 3 significant figures.	
7 A salary is £25000 in year 1 and increases by 4% each year. In which year does the salary first exceed £37500?	
8 A hemispherical bowl of radius 10 cm is filled at 50 cm^3s^{-1}. When the depth is h, $V = \pi(10h^2 - \frac{1}{3}h^3)$. Find $\frac{dh}{dt}$ when h = 4 cm.	
9 An open-topped box has a square base of side x cm and volume 32 cm^3. Show that its surface area is $A = x^2 + \frac{128}{x}$, and find the least possible value of A, justifying that it is a minimum.	
10 Particles A (5 kg) and B (3 kg) hang on a light string over a smooth pulley, A being 1.5 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.	