Day 159	A Level Maths: B Tier 10-a-day
1 A curve has equation $y = \frac{1}{x-3} - 3$. (a) Write down the asymptotes. (b) Find where the curve crosses the axes.	
2 Solve $\sin x = 0.5$ for $0 \leq x \leq 2\pi$, giving answers to 3 significant figures.	
3 Solve $(x + 5)(x + 2)(x + 4) > 0$.	
4 Differentiate $y = 3 \sec 2x$ with respect to x, and find the exact gradient when $x = \frac{\pi}{8}$.	
5 X has a binomial distribution with mean 4.5 and variance 3.15. (a) Find n and p. (b) Find P(X = 4) to 3 significant figures.	

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6 A golf ball is projected from ground level with initial velocity components 32 m s^{-1} horizontally and 9.8 m s^{-1} vertically upwards. Take g = 9.8 m s^{-2}. Find (a) the greatest height, (b) the speed at the greatest height.	
7 A geometric series has first term a and common ratio r, where $\|r\| < 1$. The sum to infinity is $\frac{25}{4}$ times the second term. Find the possible values of r.	
8 Given that each trap catches a rabbit independently with probability 0.25, find the least number of traps needed for the probability of at least one success to exceed 0.95.	
9 A box of mass 12 kg rests on a rough horizontal floor, with coefficient of friction 0.25. A horizontal force of 35 N is applied to the box. Take g = 9.8 m s^{-2}. Determine whether the box moves. Find the friction force, or the acceleration if it moves.	
10 (a) Write $\frac{-4x-16}{(x+1)(x+5)}$ in partial fractions. (b) Hence evaluate $\int_0^2 \frac{-4x-16}{(x+1)(x+5)}\,dx$, giving the answer as a single logarithm.	