Day 296	A Level Maths: B Tier 10-a-day
1 In the binomial expansion of $(1 + kx)^n$, where n is a positive integer, the coefficient of x is 24 and the coefficient of x^2 is 240. Find the values of n and k.	
2 Solve $\tan x = 3.5$ for $0 \leq x \leq 2\pi$, giving answers to 3 significant figures.	
3 The random variable X has E(X) = 6 and Var(X) = 2. Find (a) E(3X + 5), (b) Var(3X + 5), (c) $E(X^2)$.	
4 A car of mass 800 kg tows a trailer of mass 200 kg along a straight horizontal road by a light horizontal tow bar. The resistances are 300 N on the car and 100 N on the trailer. The engine's driving force is 2000 N. Find the acceleration and the tension in the tow bar.	
5 (a) Expand $(8 - x)^{-\frac{1}{3}}$ in ascending powers of x up to and including the term in x^3. (b) State the range of values of x for which the expansion is valid.	

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6 A javelin is projected from level ground with horizontal velocity component 40 m s^{-1} and vertical velocity component 39.2 m s^{-1} upwards. Take g = 9.8 m s^{-2}. Find (a) the time of flight, (b) the horizontal range.	
7 Solve $\cot^2 x - 5 \operatorname{cosec} x + 7 = 0$ for $0 \leq x \leq 360°$, giving answers to 1 d.p.	
8 Given that each lottery ticket wins a prize independently with probability 0.2, find the least number of tickets needed for the probability of at least one success to exceed 0.9.	
9 A curve has equation $y = \frac{-5}{x+2} - 3$. (a) Write down the asymptotes. (b) Find where the curve crosses the axes.	
10 Solve $e^{2x} - 16e^x + 48 = 0$, giving your answers as exact values.	