Day 121	A Level Maths: B Tier 10-a-day
1 Given that $y = e^{2x} \cos x$, find $\frac{dy}{dx}$, and its value when $x = \frac{\pi}{2}$.	
2 Solve $\|2x - 7\| < 5$.	
3 X ~ Po(2.5), modelling the number of flaws per metre of cloth. Find, to 3 significant figures, (a) $P(X \geq 4)$ (b) $P(X \leq 4)$	
4 Find the exact value of $\int_0^{\ln 3} \frac{e^x}{e^x + 2}\, dx$, giving your answer in the form a ln b.	
5 A trunk of mass 12 kg is dragged at constant speed along rough horizontal ground by a rope inclined at angle α above the horizontal, where $\cos \alpha = \frac{12}{13}$. The coefficient of friction is 0.2. Take g = 9.8 m s^{-2}. Find the tension in the rope.	

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6 The continuous random variable X has pdf f(x) = kx^3 for $0 \leq x \leq 3$, and 0 otherwise. (a) Find the value of k. (b) Find P(X > 1). (c) Find E(X).	
7 Solve $(x + 3)(x + 2)(x - 5) < 0$.	
8 Particles A (5 kg) and B (9 kg) are joined by a light string over a smooth pulley. Both are held with the string taut, B is 8.75 m above the ground, then released. Take g = 9.8 m s^{-2}. Find the speed with which B hits the ground.	
9 Find the exact value of cot 45°, giving your answer with a rational denominator.	
10 The line $y = x - 15$ meets the circle $x^2 + (y + 2)^2 = 125$ at the points A and B. Find the coordinates of A and B, and the exact length of the chord AB.	