Day 281	A Level Maths: B Tier 10-a-day
1 Use the trapezium rule with 4 strips to estimate $\int_0^2 e^{-x^2}\,dx$, giving your answer to 3 significant figures.	
2 A box of mass 2 kg is pulled along rough horizontal ground by a horizontal force of 8.9 N. It accelerates at 2 m s^{-2}. Take g = 9.8 m s^{-2}. Find the coefficient of friction between the box and the ground.	
3 A journey takes X minutes, normal with mean 45, s.d. 8. Find, to 3 s.f., the probability a value is (a) less than 53, (b) between 53 and 57.	
4 A block of mass 5 kg is projected along a rough horizontal surface with speed 7 m s^{-1} and comes to rest after sliding 10 m. Take g = 9.8 m s^{-2}. Use work and energy to find the coefficient of friction.	
5 The line $4x - 3y = k$ is a tangent to the circle $(x - 2)^2 + (y + 2)^2 = 100$. Find the two possible values of k.	

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6 Find y in terms of x, given that $\frac{dy}{dx} = 4y^2e^x$ and y = 0.5 when x = 0.	
7 A geometric sequence has first term 200 and common ratio 0.75. Find the smallest n for which the nth term is less than 0.01.	
8 The depth of water at a pier is modelled by $D = 4 + 4\sin(\frac{\pi t}{6})$, where t is in hours after noon. Find (a) the greatest and least values, (b) the values of t with $0 \leq t \leq 12$ when it equals 2 m.	
9 The continuous random variable X has pdf $f(x) = \frac{3x^2}{64}$ for $0 \leq x \leq 4$, and 0 otherwise. (a) Find P(X > 3). (b) Find the median of X, to 3 significant figures.	
10 The line $y = -2x - 14$ meets the circle $(x + 2)^2 + y^2 = 25$ at the points A and B. Find the coordinates of A and B, and the exact length of the chord AB.	