Day 182	A Level Maths: B Tier 10-a-day
1 Find the exact value of $\int_0^{\frac{\pi}{4}} (4 \sin 2x + 5 \cos 2x)\, dx$.	
2 A trolley of mass 5 kg is moving on a smooth horizontal surface at 8 m s^{-1} when a constant horizontal force of 6 N, in the direction of motion, acts for 2 s. Find the speed of the trolley at the end of this time and the distance it moves.	
3 Solve $-x^2 + 8x \leq 15$.	
4 A sledge of mass 2 kg is pulled across smooth horizontal ice by a rope with tension 39 N, inclined at α above the horizontal, where $\tan \alpha = \frac{5}{12}$. Take g = 9.8 m s^{-2}. Find (a) the acceleration of the sledge, (b) the normal reaction of the ice.	
5 Solve 2 ln x = ln(x + 12).	

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6 A curve has parametric equations $x = 3t - 2$, $y = t^2 - 4t - 3$. The line $y = -x - 3$ meets the curve at two points. Find the coordinates of these points.	
7 (a) Write $\frac{x + 6}{(x + 2)(x + 4)}$ in partial fractions. (b) Hence evaluate $\int_0^4 \frac{x + 6}{(x + 2)(x + 4)}\,dx$, giving the answer as a single logarithm.	
8 A coin is thought to land heads with probability 0.2. It is tossed 30 times and lands heads 13 times. Test, at the 5% significance level, whether the probability of heads is different from 0.2.	
9 A salary starts at £24000 in year 1 and increases by 3% each year. Find the total salary earned in the first 10 years, to the nearest pound.	
10 $X \sim B(100, 0.4)$. Use a normal approximation to find $P(X \geq 44)$, to 3 significant figures.	