Day 67	A Level Maths: B Tier 10-a-day
1 Find (a) $\int \sec^2 3x \, dx$, (b) the exact value of $\int_0^{\frac{\pi}{12}} \sec^2 3x \, dx$.	
2 Regression line (x from 2 to 18): $y = 60 - 2.5x$. x is the temperature, y the gas used per day. (a) Interpret the gradient. (b) Estimate y when x = 10 and comment.	
3 Express $\frac{4x - 27}{(2x - 3)(x - 5)}$ in partial fractions.	
4 Solve $3^x = 16$, giving your answer to 3 s.f.	
5 Solve $\|2x - 6\| = \|x + 4\|$.	

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6 A sledge of mass 2 kg is pulled across smooth horizontal ice by a rope with tension 15 N, inclined at α above the horizontal, where $\tan\alpha = \frac{3}{4}$. Take $g = 9.8$ m s^{-2}. Find (a) the acceleration of the sledge, (b) the normal reaction of the ice.	
7 Given that each component fails independently with probability 0.1, find the least number of components needed for the probability of at least one success to exceed 0.95.	
8 The equation $x^2 + kx + 9 = 0$ has equal roots. Find the possible values of k.	
9 Solve $2\tan^2 x - \sec x - 4 = 0$ for $0 \leq x \leq 360°$, giving answers to 1 d.p.	
10 A uniform plank AB of length 4 m and mass 50 kg rests horizontally on supports at C and D, where AC = 0.5 m and DB = 1.5 m. A girl of mass 20 kg walks from D towards B. Find how far she is from D when the plank is about to tilt. 	