Day 160	A Level Maths: B Tier 10-a-day
1 A uniform rod AB of length 3 m and mass 24 kg is hinged at A and held horizontal by a light string attached at B. The string makes an angle θ with the rod, where $\sin\theta = \frac{4}{5}$. Take g = 9.8 m s^{-2}. Find the tension in the string.	
2 Solve $\lvert -x - 6\rvert < -3x - 4$.	
3 80 customers: 21 buy coffee, 36 buy tea, 30 do neither. (a) How many do both? (b) Given a person who buys coffee, find P(this person buys tea).	
4 A sector of a circle has radius 7 cm and angle 60°. Find the perimeter of the sector, in terms of π.	
5 A new car costs £15000. Its value falls by 15% each year. (a) Find its value after 4 years (nearest £). (b) In which year does it first fall below £4000?	

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6 A battery lasts X hours, normal with mean 50. Given P(X < 52.5) = 0.8, find the standard deviation (3 s.f.).	
7 A sequence is defined by $u_{n+1} = \frac{u_n - 1}{u_n + 1}$, $u_1 = \frac{1}{2}$. (a) Show that the sequence is periodic, stating the period. (b) Find u_{25} and $\sum_{r=1}^{25} u_r$.	
8 Particles A (1 kg) and B (9 kg) are joined by a light string over a smooth pulley. Both are held with the string taut, B is 2 m above the ground, then released. Take g = 9.8 m s^{-2}. Find the speed with which B hits the ground.	
9 Solve $\tan^2 x - 4 \sec x + 4 = 0$ for $0 \leq x \leq 360°$, giving answers to 1 d.p.	
10 Use the substitution u = cos x to find the exact value of $\int_0^{\frac{\pi}{3}} \sin x \cos^4 x \, dx$.	