Day 141	A Level Maths: B Tier 10-a-day
1 $f(x) = -3x + 2$ and $g(x) = x^2 - 3$ for $x \in \mathbb{R}$. (a) Find $fg(x)$. (b) Solve $gf(x) = 1$.	
2 A sector of a circle has area 30 cm^2 and angle 0.6 radians. Find (a) the radius, (b) the perimeter of the sector.	
3 Prove that $2x^2 + 20x + 57 > 0$ for all real values of x.	
4 Two forces $(-6\mathbf{i} - 2\mathbf{j})$ N and $(-2\mathbf{i} + 8\mathbf{j})$ N act on a particle of mass 4 kg. Find the magnitude of the acceleration of the particle.	
5 A manufacturer claims that a proportion 0.5 of its sweets are red. A sample of 25 sweets has 10 red. Test, at the 1% level, whether the true proportion is lower than claimed.	

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6 For small θ (in radians), find an approximation of the form $1 + p\theta + q\theta^2$ for $\sin 3\theta + \cos 4\theta + 2\tan\theta$.	
7 $X \sim B(9, 0.4)$ and $Y \sim B(12, 0.6)$ are independent. Find $P(X = 3 \text{ and } Y \leq 7)$, to 3 significant figures.	
8 A population is modelled by $N = N_0e^{kt}$, where t is in hours. Initially N = 200 and after 2 hours N = 300. Find (a) k to 3 s.f., (b) when N reaches 1600, to 3 s.f.	
9 Prove by contradiction that there are no integers m and n such that $12m + 15n = 35$.	
10 A marble is projected vertically upwards from ground level with speed 19.6 m s^{-1}. Take g = 9.8 m s^{-2}. Find (a) the greatest height reached, (b) the total time before it returns to the ground.	