Day 313	A Level Maths: C Tier 10-a-day
1 Solve $(\cos x + 1)(2\cos x - 1) = 0$ for $0° \leq x \leq 360°$.	
2 Write $-2x^2 + 8x - 9$ in the form $a(x + p)^2 + q$.	
3 5 runners take part in a race. In how many ways can the first 4 places be filled?	
4 Three forces $(-\mathbf{i} + \mathbf{j})$ N, $(6\mathbf{i} - \mathbf{j})$ N and $(p\mathbf{i} + q\mathbf{j})$ N act on a particle which is in equilibrium. $\mathbf{i}$ and $\mathbf{j}$ are perpendicular unit vectors. Find the values of p and q.	
5 Find the exact value of $\int_0^{\frac{\pi}{2}} 10 \sin 2x \, dx$.	

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6 Prove by contradiction that if n^2 is even, then n is even. Begin: "Assume n is odd, so $n = 2k + 1$ for an integer k."	
7 A population is $N(\mu, 4^2)$. H_0: $\mu = 155$, H_1: $\mu > 155$. A sample of 9 has mean $\bar{x} = 158.6$. Test at the 5% level. Critical value: $z = 1.645$.	
8 A stone is projected from level ground with velocity $(11\mathbf{i} + 19.6\mathbf{j})$ m s^{-1} ($\mathbf{i}$ horizontal, $\mathbf{j}$ vertically up). Take $g = 9.8$ m s^{-2}. (a) Find the time of flight. (b) Find the horizontal range.	
9 Simplify $(3x^4)^2 \div 9x$.	
10 θ is small and measured in radians. Use the small angle approximations to find an approximation for $\cos\theta + \theta \sin 4\theta$.	