Day 309	A Level Maths: B Tier 10-a-day
1 A puck of mass 2 kg is moving on a smooth horizontal surface at 1 m s^{-1} when a constant horizontal force of 20 N, in the direction of motion, acts for 2 s. Find the speed of the puck at the end of this time and the distance it moves.	
2 Solve $x^2 - x > 30$.	
3 Given that $\sin A = \frac{21}{29}$ and $\cos B = \frac{9}{41}$, where A and B are acute, find the exact value of $\sin(A + B)$.	
4 A curve has parametric equations $x = -1 + 5\cos t$, $y = 2 + 5\sin t$, for $0 \leq t < 2\pi$. Find a Cartesian equation of the curve.	
5 A manufacturer claims that a proportion 0.25 of its sweets are red. A sample of 20 sweets has 2 red. Test, at the 5% level, whether the true proportion is lower than claimed.	

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6 The variables x and y satisfy $y = ab^x$. A graph of ln y against x is a straight line with gradient ln 10 that passes through (0, ln 4). Find the values of a and b.	
7 The scores on a test are normally distributed. P(X < 62) = 0.0668 and P(X > 92) = 0.1587. Find the mean and standard deviation (3 s.f.).	
8 A cup of tea cools in a room at 20°C: $\frac{dT}{dt} = -k(T - 20)$. Initially T = 80 and after 6 minutes T = 55. Find k to 3 s.f. and the time to cool to 30°C, to 3 s.f.	
9 A stone is thrown vertically upwards at 14.7 m s^{-1} from a point 19.6 m above horizontal ground. Take g = 9.8 m s^{-2}. Find the time before it hits the ground.	
10 Evaluate $81^{\frac{3}{4}}$.	