Day 126	A Level Maths: B Tier 10-a-day
1 A curve has parametric equations $x = -2 + 4\cos t$, $y = -4 + 4\sin t$, for $0 \leq t < 2\pi$. Find a Cartesian equation of the curve.	
2 A curve has equation $xe^y + y = 3$. Find $\frac{dy}{dx}$ in terms of x and y, and the gradient at (3, 0).	
3 Marks are normal: Maths $N(55, 10^2)$, Physics $N(40, 8^2)$. Anna scores 67.5 in Maths and 52 in Physics. Which is her better performance, relatively?	
4 The first term of an arithmetic series is 8 and the common difference is 3. The sum of the first n terms is 869. Find the value of n.	
5 Solve $2\sin 2x = 3\sin x$ for $0 \leq x \leq 360°$, giving answers to 1 d.p. where necessary.	

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6 Given that each component fails independently with probability 0.4, find the least number of components needed for the probability of at least one success to exceed 0.99.	
7 A cup of tea cools in a room at 20°C: $\frac{dT}{dt} = -k(T - 20)$. Initially T = 90 and after 10 minutes T = 50. Find k to 3 s.f. and the time to cool to 30°C, to 3 s.f.	
8 Given that $\sqrt{3}$ is irrational, prove by contradiction that $3 + 6\sqrt{3}$ is irrational.	
9 A ball is thrown horizontally at 13 m s^{-1} from the top of a cliff 11.025 m above level ground. Take g = 9.8 m s^{-2}. Find the time of flight and the horizontal distance from the base where it lands.	
10 A particle of mass 4 kg lies on a smooth horizontal table. It is attached by a light string over a smooth pulley at the edge of the table to a particle of mass 1 kg hanging freely. Take g = 9.8 m s^{-2}. The system is released from rest. Find the acceleration and the tension in the string. 	