Day 175	A Level Maths: S Tier 10-a-day
1 A geometric series has sum to infinity 9 and second term -10. Find the possible values of the common ratio r and the first term a in each case.	
2 The curve $y = ax^n$ passes through (4, 64) and (16, 512). Find the values of a and n.	
3 Solve $x^4 - x^3 - 15x^2 + 9x + 54 \leq 0$.	
4 A curve has parametric equations $x = t^2 - 3t$, $y = 2t^3 + t$. Find the equation of the tangent at the point where t = 2, in the form $y = mx + c$.	
5 A die is said to show heads with probability 0.25. In 40 trials it does so 5 times. Test at the 5% level whether the probability is different from 0.25.	

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6 Solve $\frac{x+1}{-x+2} > 1$.	
7 Faults in a cable occur at random at a mean rate of 1.5 per day. After a modification, 3 faults are found in 1 day. Test at the 10% level whether the rate of faults has increased.	
8 A golf ball is hit from a point O on horizontal ground. It lands 48 m from O, and reaches a maximum height of 30 m above the ground. Find the angle of projection and the speed of projection, to 3 s.f. Take g = 9.8 m s^{-2}.	
9 The curve C has equation $x^2 + 3xy + 5y^2 = 495$. Find the coordinates of the points on C where the tangent is parallel to the y-axis.	
10 A particle P moves on a straight line. The velocity of P is v m s^{-1} and its acceleration is $-0.05v^2$ m s^{-2}. At t = 0, v = 20. Find (a) the time taken for the speed of P to halve, (b) the distance P travels in this time, to 3 s.f.	