Day 325	A Level Maths: S Tier 10-a-day
1 A disease is present in 2% of a population. A test is positive for 90% of those with it and for 5% of those without it. Find P(positive) and P(has it | positive).	
2 A train accelerates uniformly from rest at 2.4 m s^{-2} to a speed of V m s^{-1}, travels at this speed, then decelerates uniformly at 1.5 m s^{-2} to rest. The journey takes 50 s and covers 888 m. Find V and the time spent at constant speed.	
3 Solve $2 \ln x = \ln(x + 6) + \ln 8$, stating clearly why one root is rejected.	
4 Find the coefficient of x^2 in the expansion of $(2x - 2)(1 - 2x)^6$.	
5 A curve has parametric equations $x = 2t^2$, $y = 2t^3 + 18t$. Find the coordinates of the points on the curve where the gradient is -6.	

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6 Class R has 12 students with mean mark 72 and standard deviation 4. Class S has 15 students with mean mark 80 and standard deviation 4. (a) Find the mean mark of all 27 students. (b) Find the standard deviation of all 27 students.	
7 A particle P of mass 5 kg moves under a single force F N, where $F = (10t - 10)\mathbf{i} + (30t^2 - 30)\mathbf{j}$ and t is the time in seconds. At t = 0, P is at the origin with velocity $(4\mathbf{i} + 2\mathbf{j})$ m s^{-1}. Find (a) the velocity of P at t = 3, (b) the position vector of P at t = 3.	
8 Solve $\lvert -x + 2\rvert \leq \lvert -3x - 6\rvert$.	
9 The curve C has equation $x^2 - 3xy + 5y^2 = 99$. Find the coordinates of the points on C where the tangent is parallel to the x-axis.	
10 The roots of $x^2 + kx + 21 = 0$ differ by 4. Find the possible values of k.	