Day 355	A Level Maths: B Tier 10-a-day
1 Given that $y = (3x^2 + 1)^3$, find $\frac{dy}{dx}$, and the gradient of the curve when $x = -2$.	
2 Two forces $(3\mathbf{i} + 6\mathbf{j})$ N and $(3\mathbf{i} + 2\mathbf{j})$ N act on a particle of mass 2 kg. Find the magnitude of the acceleration of the particle.	
3 Each of 9 people independently supports a team with probability $\frac{1}{3}$; X is the number of supporters. This is done 500 times. Estimate the number of times that X = 2.	
4 A car moving in a straight line with constant acceleration increases its speed from 7 m s^{-1} to 24.5 m s^{-1} while covering 110.25 m. Find (a) the acceleration, (b) the time taken.	
5 Line l_1 has equation $4x + 3y = 0$ and line l_2 has equation $2x - y = -10$. The lines meet at P. Find the area of the triangle formed by l_1, l_2 and the x-axis.	

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6 (a) Write $\frac{4x + 6}{(x + 1)(x + 3)}$ in partial fractions. (b) Hence evaluate $\int_0^2 \frac{4x + 6}{(x + 1)(x + 3)}\,dx$, giving the answer as a single logarithm.	
7 A geometric series has second term -27 and fifth term 1. Find (a) the common ratio, (b) the first term, (c) the sum to infinity.	
8 The region R is bounded by the curve $y = e^{2x}$, the x-axis and the lines $x = 0$ and $x = 1$. R is rotated through 360° about the x-axis. Find the exact volume generated.	
9 Bottle volumes are normal, s.d. 10 ml. Set mean 100 ml; 9 bottles have mean 106.9 ml. Test at the 5% level whether the true mean is greater than 100.	
10 Show that the equation $x^2 - 2x + 6 = 0$ has no real roots.	