Day 52 **A Level Maths: B Tier 10-a-day**

1 A particle moves on a straight line. Its displacement from O at time t seconds is $s = t^3 + 3t^2 + 3t$ metres.
Find its velocity and acceleration when $t = 4$.

2 $X \sim B(28, 0.1)$. Find, to 3 significant figures,
(a) $P(X > 2)$
(b) $P(X \leq 2)$

3 (a) Write $\frac{-5x - 13}{(x + 2)(x + 3)}$ in partial fractions.
(b) Hence evaluate $\int_0^1 \frac{-5x - 13}{(x + 2)(x + 3)}\,dx$, giving the answer as a single logarithm.

4 The table shows the number of siblings, x, of 23 students.
Calculate the mean and standard deviation (3 s.f.).

x	1	2	3	4
Frequency	2	7	5	9

5 $f(x) = x^3 + 2x - 5$. Use the Newton-Raphson method with
$x_0 = 1$ to find x_1 and x_2, to 4 d.p.

Day 52	A Level Maths: B Tier 10-a-day
6 The circle C has equation $(x + 4)^2 + (y + 3)^2 = 25$. The point P$(-1, 1)$ lies on C. Find an equation of the tangent to C at P, in the form $ax + by + c = 0$ with integer a, b, c.	
7 A particle of mass 4 kg is suspended in equilibrium by two light strings attached to a horizontal ceiling. The strings make angles α and β with the ceiling, where $\tan\alpha = \frac{3}{4}$ and $\tan\beta = \frac{4}{3}$. Take $g = 9.8$ m s^{-2}. Find the tension in each string.	
8 Given that $6\cos\theta + 8\sin\theta \equiv 10\cos(\theta - 53.1°)$, solve $6\cos\theta + 8\sin\theta = -5$ for $0 \leq \theta \leq 360°$. (1 d.p.)	
9 Solve $\lvert 3x + 7\rvert < 5$.	
10 The line $5x + 12y = k$ is a tangent to the circle $(x + 1)^2 + (y - 3)^2 = 169$. Find the two possible values of k.	