Day 46 **A Level Maths: S Tier 10-a-day**

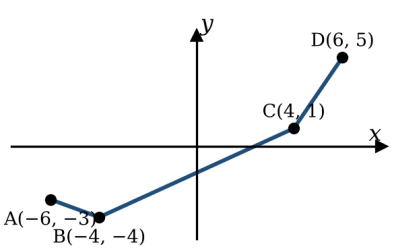
1 $u_{n+1} = u_n + 2n + 2$, $u_1 = -5$.
(a) Show that $u_n = an^2 + bn + c$ and find a, b, c.
(b) Find the least n for which $u_n > 295$.

2 The curve $y = ab^x$ passes through (2, 50) and (5, 6250).
Find the exact values of a and b, and the value of y when x = 7.

3 For 25 observations x, $\Sigma(x - 30) = 45$ and $\Sigma(x - 30)^2 = 406$.
(a) Find the mean of x.
(b) Find the standard deviation of x.
(c) Find the value of Σx^2.

4 Car P passes a point O travelling at a constant speed of 9.6 m s^{-1}. 2 s later, car Q leaves O from rest with constant acceleration 3 m s^{-2}, travelling in the same direction.
Q overtakes P at the point X. Find (a) the time Q takes to reach X, (b) the distance OX, (c) the speed of Q at X.

5 The diagram shows y = f(x), made of three straight line segments. Find the coordinates of the images of A, B, C and D on the graph of $y = -f(2x - 8)$.



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6 The equation $x^3 = 3x + 17$ has a root α.
(a) Show that the equation can be written as $x = \sqrt[3]{(3x + 17)}$.
(b) Use $x_{n+1} = \sqrt[3]{(3x_n + 17)}$ with $x_0 = 3$ to find x_1, x_2, x_3
to 4 d.p., and hence state α to 3 d.p.

7 Find the sum of all the integers from 1 to 284 inclusive that are divisible by 4 or by 6, but not by both.

8 For events A and B, P(A) = 0.75, P(B) = 0.6 and P(A | B) = 0.65.
(a) Find $P(A \cap B)$.
(b) Find $P(A \mid B')$.

9 The curve C has equation $x^2 + xy + 3y^2 = 132$. Find the coordinates of the points on C where the
tangent is parallel to the y-axis.

10 Particle A (2 kg) lies on a rough table with $\mu = 0.1$, and is joined by a light string over a smooth pulley (see diagram) to particle B (7 kg) on a smooth slope, $\sin \alpha = \frac{4}{5}$.

Released from rest, the string is cut when B has moved 4 m. Find the further distance A slides before stopping.

