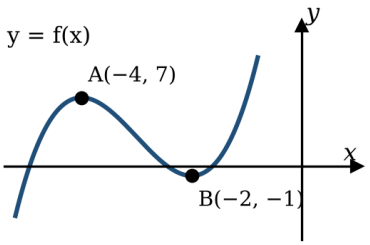
Day 315 **A Level Maths: A Tier 10-a-day**

1 The diagram shows the curve y = f(x), with turning points A and B.
Find the coordinates of the turning points of
(a) y = f(x) − 1 (b) y = −f(x)



2 A ball is projected from a point O on horizontal ground at 10 m s^{-1} at angle α above the horizontal, $\tan\alpha = \frac{12}{5}$, and lands at A. Find (a) the time of flight, (b) the greatest height, (c) OA. Take g = 9.8. Give answers to 3 s.f. if not exact.

3 f(x) = ln x + 5x − 12.
Show that the equation f(x) = 0 has a root α in the interval [2, 3].

4 For n = 9 pairs of (x, y): Σx = 100, Σy = 439, $\Sigma x^2 = 1440$, $\Sigma y^2 = 21877$, Σxy = 5178.
Calculate the product moment correlation coefficient, and describe the correlation.

5 $f(x) = x^3 + 4x^2 + 4x + 1$.
(a) Show that (x + 1) is a factor of f(x).
(b) Solve f(x) = 0, giving surds in simplest form.

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6 The points A, B and C have coordinates (2, 4, −3), (2, −2, −3) and (1, 0, −3). Find angle ABC, in degrees to 1 d.p.	
7 A particle is projected up a line of greatest slope of a smooth plane inclined at α. It passes A, 7.35 m from the start, after 1 s and again after 3 s. Find (a) the speed of projection, (b) α to 1 d.p. Take g = 9.8.	
8 Parts are defective with probability 0.3, independently. A box of 8 parts is rejected if it has at least 2 defective. From 6 such boxes, find the probability that exactly 3 are rejected (3 s.f.).	
9 $f(x) = \frac{-13x + 3}{(1 - 3x)(1 + x)}$. (a) Express f(x) in partial fractions. (b) Hence expand f(x) up to x^2. (c) State the range of x for which the expansion is valid.	
10 The vectors $\begin{pmatrix} k \\ k \\ -1 \end{pmatrix}$ and $\begin{pmatrix} k \\ 4 \\ 5 \end{pmatrix}$ are perpendicular. Find the possible values of k and, for the larger value, the exact length of the first vector.	