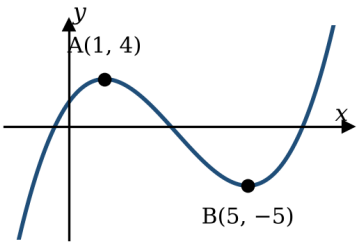
Day 61 **A Level Maths: B Tier 10-a-day**

1 Given that $y = \frac{1}{(3x + 1)}$,

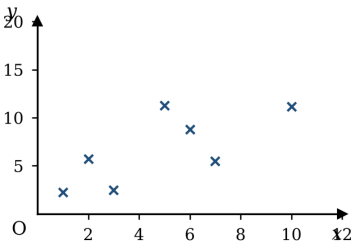
find $\frac{dy}{dx}$, and the gradient of the curve when $x = -1$.

2 The diagram shows the curve y = f(x). A and B are the turning points. Find the turning points of:

(a) y = f(x) + 5 (b) $y = f(\frac{x}{2})$



3 The scatter diagram shows eight pairs of values of x and y.
(a) Describe the correlation.
(b) Why should y = 2 + x not be used for x = 15?



4 The curve C has equation $y = 2x^2 + e^{2x} + 1$.
Find the equation of the tangent to C at the point where x = 0, in the form y = mx + c.

5 The curve $y = x^2 - 5x + 6$ and the line $y = -4x + 6$ meet at the points A and B.
Find the coordinates of A and B, and the exact length AB.

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6 A uniform rod AB of length 4 m and mass 30 kg is hinged at A and held horizontal by a light string attached at B. The string makes an angle θ with the rod, where $\sin\theta = \frac{3}{5}$. Take g = 9.8 m s^{-2}. Find the tension in the string.	
7 A curve has equation $3x^2y + 2xy + 2y^3 = -78$. Find $\frac{dy}{dx}$ in terms of x and y, and the gradient at $(-2, -3)$.	
8 A particle is in equilibrium under three forces: P N at angle θ above the positive x-axis, a force of 12 N in the negative x-direction and a force of Q N in the negative y-direction. $\cos\theta = \frac{12}{13}$. Find P and Q.	
9 The line $4x + 3y = k$ is a tangent to the circle $(x - 1)^2 + (y + 3)^2 = 25$. Find the two possible values of k.	
10 The scores on a test are normally distributed. $P(X < 80) = 0.0228$ and $P(X > 110) = 0.1587$. Find the mean and standard deviation (3 s.f.).	