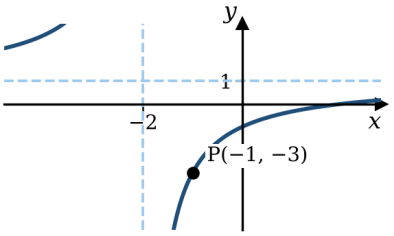
Day 85 **A Level Maths: S Tier 10-a-day**

1 A sector of a circle has radius r cm and angle θ radians, where $\theta < 2\pi$.
Its perimeter is 26 cm and its area is 36 cm^2.
Find the two possible pairs of values of r and θ.

2 A box of mass 12 kg is at rest on rough horizontal ground ($\mu = 0.25$). A horizontal force of 37.8 N acts on it for 7 s and is then removed. Find (a) the speed when the force is removed, (b) the total distance travelled before the box stops. Take g = 9.8 m s^{-2}.

3 The diagram shows the curve C, its asymptotes (dashed) and a point P. C has equation $y = \frac{a}{x + p} + q$. Find a, p and q.



4 A particle P moves on a straight line. The velocity of P is v m s^{-1} and its acceleration is $-0.05v^2$ m s^{-2}. At t = 0, v = 8.
Find (a) the time taken for the speed of P to halve, (b) the distance P travels in this time, to 3 s.f.

5 The curve $y = x\sqrt{75 - x}$, for $0 < x < 75$, has one stationary point. Find its exact coordinates and determine its nature.

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6 Data pairs (x, y) are coded by $u = x - 2$ and $v = \frac{y}{2}$. The regression line of v on u is $v = 19 + 0.8u$. (a) Find the regression line of y on x in the form $y = a + bx$. (b) Use it to estimate y when $x = 7$.	
7 A sequence is defined by $u_1 = -2$ and $u_{n+1} = \frac{3u_n + 1}{2u_n - 3}$. Show that the sequence is periodic and find $\sum_{r=1}^{80} u_r$.	
8 Solve $2\cos 2\theta - 14\cos\theta + 8 = 0$ for $0 \leq \theta < 360°$.	
9 Faults in a cable occur at random at a mean rate of 4 per week. After a modification, 19 faults are found in 2 weeks. Test at the 5% level whether the rate of faults has increased.	
10 Find the binomial expansion of $(9 + 3x)^{\frac{3}{2}}$ in ascending powers of x up to and including the term in x^3. State the values of x for which it is valid.	