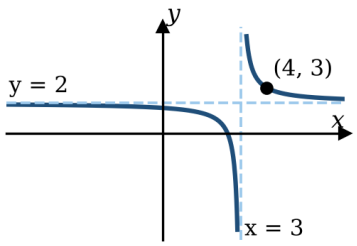
Day 132	A Level Maths: A Tier 10-a-day
1 A cyclist passes P with speed 2 m s^{-1} and accelerates uniformly. She travels 160 m in the next 20 s, reaching Q. Find (a) her acceleration, (b) her speed at Q, (c) her speed at the midpoint of PQ.	
2 Find the coefficient of x^2 in the expansion of $(-2 + 2x)^6$.	
3 X, the journey time (minutes), is normally distributed with mean 35 and standard deviation 6. Find (a) P(X > 26.6) (b) P(26.6 < X < 30.2), each to 3 s.f.	
4 $f(x) = \ln x + x - 8$. Show that the equation $f(x) = 0$ has a root α in the interval [6, 7].	
5 The sum of the first n terms of an arithmetic series is $S_n = 3n^2 + 5n$. (a) Find the first term and the common difference. (b) Find u_{29}.	

Day 132 **A Level Maths: A Tier 10-a-day**

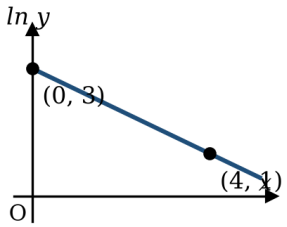
6 At 12:00 ship P has position $(-14\mathbf{i} - 10\mathbf{j})$ km and velocity $(4\mathbf{i} + 5\mathbf{j})$ km h^{-1}; ship Q has position $(-12\mathbf{i} + 8\mathbf{j})$ km and velocity $(3\mathbf{i} - 4\mathbf{j})$ km h^{-1}. Show that the ships collide and find the time and position vector of the collision.

7 The diagram shows the curve $y = \frac{k}{x - a} + b$ with asymptotes as shown. Find the values of k, a and b, and the coordinates where the curve crosses the axes.



8 A curve has equation $3x^2 - 2xy + 2y^2 = 60$. Find the coordinates of the points where the tangent is parallel to the x-axis.

9 The diagram shows the graph of ln y against x for $y = A\,b^x$.
Find the exact values of A and b.



10 n = 9 pairs of (x, y): $\Sigma x = 137$, $\Sigma y = 408$, $\Sigma x^2 = 2735$, $\Sigma xy = 7156$.
(a) Find the equation of the regression line of y on x (3 s.f.).
(b) Estimate y when x = 14.