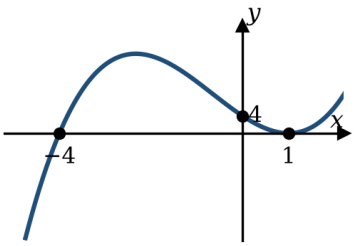
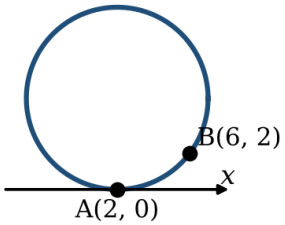
Day 292	A Level Maths: A Tier 10-a-day
1 Complaints occur as a Poisson process at a mean rate of 2 per day. After a change, the number recorded in one day is 1. Test at the 5% level whether the mean rate has decreased.	
2 The diagram shows a sketch of the curve y = f(x), where f(x) is a cubic. Find f(x), giving your answer in the form $k(x - p)(x - q)^2$. 	
3 Particles A (7 kg) and B (3 kg) move towards each other on a smooth horizontal line at 6 m s^{-1} and 4 m s^{-1}. They collide and coalesce. Find (a) the speed of the combined particle, (b) the kinetic energy lost in the collision.	
4 A curve has parametric equations $x = 3t^2 - 1$, $y = t(t^2 - 9)$. Find the coordinates of the points where the curve meets the x-axis.	
5 0.5% of people have a fault. The inspection test is positive for 90% of those who have it and for 1% of those who do not. (a) Find the probability that a person tests positive. (b) Given a positive test, find the probability that the person has the fault (3 s.f.).	

Day 292 **A Level Maths: A Tier 10-a-day**

6 A curve has equation $x^2 - 3xy + 2x = 24$. Show that P(3, −1) lies on the curve and find the equation of the tangent at P in the form ax + by + c = 0 with integer a, b, c.

7 The diagram shows a circle that touches the x-axis at A(2, 0) and passes through B(6, 2). Find the equation of the circle.



8 The line l has equation $\mathbf{r} = \begin{pmatrix} 1 \\ 2 \\ -2 \end{pmatrix} + t\begin{pmatrix} 0 \\ -1 \\ -1 \end{pmatrix}$.
Find the coordinates of the foot of the perpendicular from P(2, 2, 2) to l, and the exact distance from P to l.

9 A uniform rod AB (20 kg, 2 m) is smoothly hinged at A to a vertical wall, with a 2 kg particle at B. A light string from B to the wall above A holds the rod horizontal, at angle θ to it, $\tan\theta = \frac{12}{5}$. Find (a) the tension, (b) the magnitude of the hinge force. Take g = 9.8. Give answers to 3 s.f. if not exact.

10 Solve $4\operatorname{cosec}^2 x - 14\cot x + 8 = 0$ for $0° < x < 360°$. Give answers to 1 d.p.