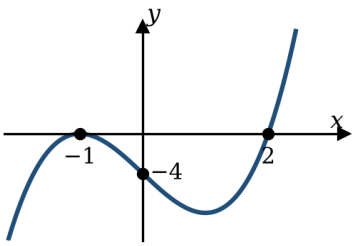
Day 220	A Level Maths: A Tier 10-a-day
1 Solve $2\cos^2 x + \sin x - 1 = 0$ for $0° \leq x \leq 360°$.	
2 Find the quotient and the remainder when $2x^3 + 14x^2 + 21x + 11$ is divided by $(x + 5)$.	
3 At one location, the daily mean temperature in August is modelled by $N(16, 2.6^2)$. (a) Find the probability that on a randomly chosen day the value exceeds 20 °C. (b) Estimate the number of such days in a period of 92 days.	
4 A crate of mass 20 kg is pushed at constant speed along rough horizontal ground, $\mu = 0.25$, by a force of P N at angle θ below the horizontal, $\tan\theta = \frac{12}{5}$. Find P and the normal reaction. Take $g = 9.8$.	
5 $f(x) = x^2 - 6x + 14$, $x \geq 3$. Find $f^{-1}(x)$ and state its domain.	

Day 220 **A Level Maths: A Tier 10-a-day**

6 The vectors $\begin{pmatrix} k \\ k \\ -3 \end{pmatrix}$ and $\begin{pmatrix} k \\ -2 \\ 1 \end{pmatrix}$ are perpendicular.
Find the possible values of k and, for the larger value, the exact length of the first vector.

7 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 $k(x - p)(x - q)^2$.



8 X ~ B(35, p). H_0: p = 0.3 is tested against H_1: $p \neq 0.3$ at the 10% level.
(a) Find the critical region.
(b) Find the actual significance level of the test (3 s.f.).

9 A curve has equation $2x^2 + 2xy + 4y^2 = 14$.
Find the coordinates of the points where the tangent is parallel to the x-axis.

10 A particle is projected at 4.2 m s^{-1} up a line of greatest slope of a rough plane inclined at α, where $\tan \alpha = \frac{12}{5}$. The coefficient of friction is 0.6. Find (a) the greatest distance it moves up the plane, (b) its speed on returning to the start. Take g = 9.8. Give answers to 3 s.f. if not exact.