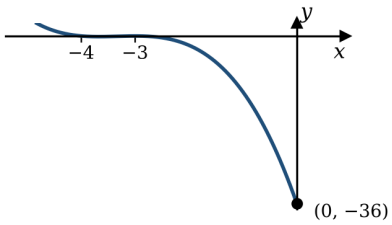
Day 233	A Level Maths: S Tier 10-a-day
1 Each bulb is faulty with probability 0.08, independently. Find the least number n of bulbs that must be tested so that the probability of finding at least two faulty is greater than 0.95.	
2 $f(x) = x^3 + ax^2 + bx + 36$, where a and b are constants. $(x + 3)$ is a factor of f(x), and f(x) leaves remainder 40 when divided by $(x + 1)$. Find a and b, and hence solve $f(x) = 0$.	
3 A ball is thrown vertically upwards from ground level with speed 78.4 m s^{-1}. Find the length of time for which the ball is more than 269.5 m above the ground, and the greatest height it reaches. Take g = 9.8 m s^{-2}.	
4 The diagram shows the cubic y = f(x), which touches the x-axis once. Find f(x), giving your answer in expanded form. 	
5 Given that $\sin 3\theta \equiv 3\sin\theta - 4\sin^3\theta$, solve $\sin 3\theta = -\sin\theta$ for $0 < \theta < \pi$, in terms of π.	

Day 233	A Level Maths: S Tier 10-a-day
6 A particle starts from rest at the top of a rough slope of length 25 m ($\sin\alpha = \frac{4}{5}$, $\mu = 0.25$), then slides along rough horizontal ground with the same μ. Use energy to find (a) its speed at the foot of the slope (3 s.f.), (b) the distance it slides on the ground. Take $g = 9.8$ m s^{-2}.	
7 The cdf of X is $F(x) = 0$ for $x < 0$, $F(x) = \frac{x^3}{64}$ for $0 \leq x \leq 4$, and $F(x) = 1$ for $x > 4$. (a) Find the pdf of X. (b) Find E(X). (c) Find $P(1 < X < 2)$ and the median, to 3 significant figures.	
8 The points A, B, C have coordinates $(0, 0, -3)$, $(4, 3, -2)$, $(0, -3, 1)$. Find angle ABC to 1 d.p., and the exact area of triangle ABC.	
9 Solve $2^{2x} - 6 \times 2^x + 8 = 0$.	
10 Two drones P and Q move so that, t seconds after launch, their position vectors in metres are $\mathbf{r}_P = \begin{pmatrix} 0 \\ -5 \\ 0 \end{pmatrix} + t\begin{pmatrix} 0 \\ 3 \\ -2 \end{pmatrix}$ and $\mathbf{r}_Q = \begin{pmatrix} 0 \\ -7 \\ 5 \end{pmatrix} + t\begin{pmatrix} 0 \\ 3 \\ -3 \end{pmatrix}$. Find the time at which they are closest and the exact minimum distance between them.	