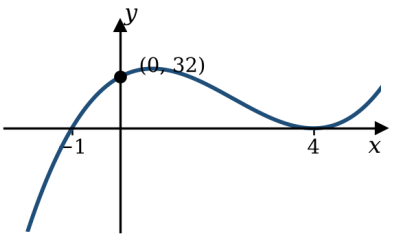
Day 136	A Level Maths: S Tier 10-a-day
1 A particle P moves with constant acceleration. At t = 0 seconds P is at $(4\mathbf{i} - 3\mathbf{j})$ m with velocity $(\mathbf{i} + 14\mathbf{j})$ m s^{-1}. At t = 6, P has velocity $(7\mathbf{i} + 2\mathbf{j})$ m s^{-1}. Find (a) the acceleration of P, (b) the time at which P moves parallel to $(3\mathbf{i} + 2\mathbf{j})$, (c) the position vector of P at that time.	
2 A spinner is said to land on blue with probability 0.2. In 30 trials it does so 3 times. Test at the 10% level whether the probability is different from 0.2.	
3 The curve $y = ax^n$ passes through (1, 3) and (3, 27). Find the values of a and n.	
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 The curve C has equation $x^2y + xy^2 = 84$. Find the equation of the tangent to C at the point (4, 3), in the form ax + by + c = 0 with integers a, b, c.	

Day 136	A Level Maths: S Tier 10-a-day
6 Prove by contradiction that $\log_9 6$ is irrational.	
7 Find the exact coordinates of the stationary point of $y = 3x \ln x$ for $x > 0$, and determine its nature.	
8 A particle of weight W N is on a rough plane inclined at α to the horizontal, where $\sin\alpha = \frac{5}{13}$. A force P N acts up a line of greatest slope; the particle stays at rest for $2.2 \leq P \leq 107.8$. Find (a) W, (b) the coefficient of friction, (c) the acceleration when P = 215.6. Take g = 9.8 m s^{-2}.	
9 A(6, −3) and B(2, −5). The point C lies on the x-axis and CA = CB. Find the coordinates of C and the area of triangle ABC.	
10 $X \sim N(\mu, 100)$. H_0: $\mu = 40$ is tested against H_1: $\mu < 40$ using the mean of a sample of size 16 at the 10% level. (a) Find the critical region for the sample mean. (b) Find the probability of a Type II error when $\mu = 35$.	