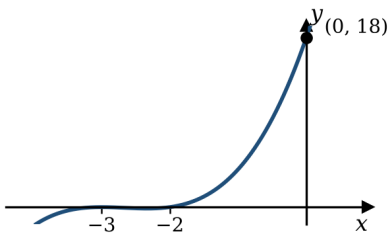
Day 67	A Level Maths: S Tier 10-a-day

1 Solve $\sqrt{6x + 1} = x - 1$.

2 A sector of a circle has radius r cm and angle θ radians, where $\theta < 2\pi$.
Its perimeter is 40 cm and its area is 91 cm^2.
Find the two possible pairs of values of r and θ.

3 The diagram shows the cubic y = f(x), which touches the x-axis once. Find f(x), giving your answer in expanded form.



4 A train accelerates uniformly from rest at 1.4 m s^{-2} to a speed of V m s^{-1}, travels at this speed, then decelerates uniformly at 1.75 m s^{-2} to rest.
The journey takes 54 s and covers 630 m. Find V and the time spent at constant speed.

5 Each shot Amira takes scores with probability $\frac{2}{5}$, independently.
(a) Find the probability that her third score comes on shot number 8.
(b) Find the probability that her third score comes on or before shot number 8.

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6 Find the sum of all the integers from 1 to 807 inclusive that are divisible by 6 or by 10, but not by both.	
7 Use integration by parts to find the exact value of $\int_1^e \frac{\ln x}{x^3}\,dx$	
8 A particle P moves on a straight line. The velocity of P is v m s^{-1} and its acceleration is $-0.25v$ m s^{-2}. At t = 0, v = 10. Find (a) the time taken for the speed of P to halve, to 3 s.f., (b) the distance P travels in this time.	
9 Find the exact coordinates of the point of inflection of $y = xe^{-x}$, justifying that it is a point of inflection.	
10 A box holds 11 components, each faulty with probability 0.1, independently. A box is rejected if it has at least 3 faulty components. (a) Find the probability that a box is rejected. (b) 12 boxes are inspected. Find the probability that at least 2 are rejected.	