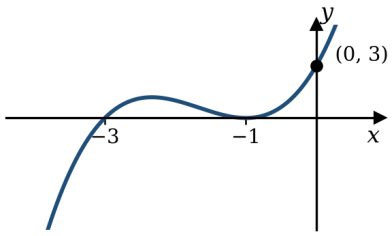
Day 316	A Level Maths: S Tier 10-a-day
1 A data set has lower quartile 15 and upper quartile 31. An outlier is a value more than 1.5 × IQR beyond the nearest quartile. (a) Find the range of values that are not outliers. (b) 15 observations have mean 16. The largest is 60, an outlier, and it is removed. Find the new mean.	
2 A ball is thrown vertically upwards from ground level. It is more than 171.5 m above the ground for 2 s. Find the speed of projection and the greatest height reached. Take $g = 9.8$ m s^{-2}.	
3 Solve $\cos(2\theta + 30°) = \frac{1}{2}$ for $0° \leq \theta \leq 180°$.	
4 Solve $x - 1\sqrt{x} - 6 = 0$.	
5 A curve has parametric equations $x = \ln t$, $y = t^2 - 5t$, $t > 0$. Find the equation of the tangent where $t = 1$, in the form $y = mx + c$.	

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



7 The lengths of a component, in mm are modelled by N(43, σ^2). The probability of a value above 46 is 0.35.
(a) Find σ.
(b) Find the probability of a value above 40.

8 The region bounded by $y = \frac{1}{\sqrt{x+3}}$, the x-axis and the lines
x = 0 and x = 2 is rotated through 2π about the x-axis.
Find the exact volume of the solid formed.

9 Solve $|x - 5| < |2x - 1|$.

10 At time t = 0 hours, ship A is at the point with position vector $(2\mathbf{i} + 6\mathbf{j})$ km relative to a port O, and moves with constant velocity $(2\mathbf{i} + \mathbf{j})$ km h^{-1}. Ship B leaves O at t = 0 with constant speed 5 km h^{-1} and intercepts A.
Find (a) the time at which B intercepts A, (b) the velocity of B as a vector.