Day 169	A Level Maths: S Tier 10-a-day

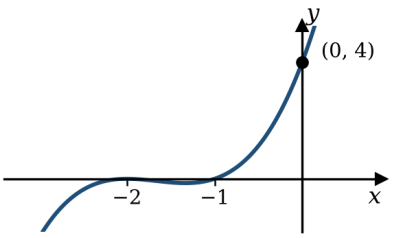
1 Solve $2 \ln x = \ln(x + 2) + \ln 1$,
stating clearly why one root is rejected.

2 A particle P moves on a straight line. At time t = 0, P passes through the fixed point O with velocity -48 m s^{-1}. At time t seconds, P has acceleration $(-3t + 22)$ m s^{-2}.
Find (a) the times at which P is at O again, (b) the greatest distance of P from O before it first returns to O.

3 Find the exact value of

$$\int_0^3 \frac{x}{x^2 + 1}\, dx$$

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

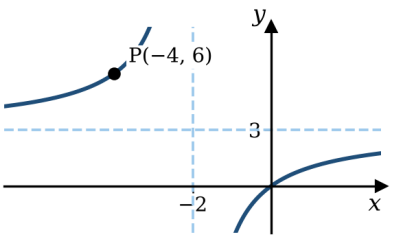


5 Scores are N(58, 9^2). The highest 15% and the lowest 15% of scores are discarded.
Find the range of scores that remain, correct to 3 significant figures.

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6 A curve is given by $x = y^3 + y^2 - 2y$.
Find dy/dx and d^2y/dx^2 when $y = 2$.

7 The diagram shows the curve C, its asymptotes (dashed) and a point P. C has equation $y = \frac{a}{x + p} + q$. Find a, p and q.



8 Find the sum of all the integers from 1 to 473 inclusive that are divisible by 3 or by 7, but not by both.

9 A particle P moves on a straight line. The velocity of P is v m s^{-1} and its acceleration is $-0.05v^2$ m s^{-2}. At t = 0, v = 4.
Find (a) the time taken for the speed of P to halve, (b) the distance P travels in this time, to 3 s.f.

10 The scores in an aptitude test are normally distributed. 15% are less than 49 and 40% are greater than 66.
Find the mean and standard deviation, each correct to 3 significant figures.