Day 221 **A Level Maths: B Tier 10-a-day**

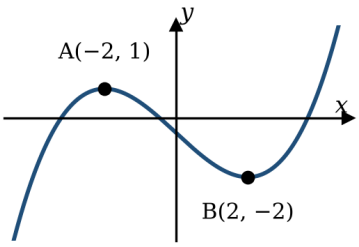
1 (a) Write $x^2 + 4x - 7$ in the form $a(x + p)^2 + q$.
(b) Write down the coordinates of the minimum point of $y = x^2 + 4x - 7$.

2 A motorcycle starts from rest and accelerates at 0.5 m s^{-2}. At that moment it is passed by a lorry travelling at constant speed 20 m s^{-1}. Find how long it takes to catch up, and the distance travelled.

3 Points A and B have position vectors $\begin{pmatrix} -3 \\ 1 \\ -4 \end{pmatrix}$ and $\begin{pmatrix} -9 \\ -5 \\ 3 \end{pmatrix}$.
Find AB and the distance AB.

4 A bag has 6 green and 3 yellow beads; two are taken without replacement.
(a) Find P(exactly one green).
(b) Find P(at least one green).

5 The diagram shows the curve y = f(x). A and B are the turning points. Find the turning points of:
(a) y = f(x − 1) (b) y = 2f(x)

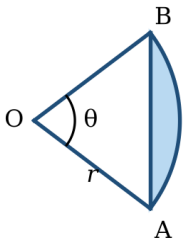


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6 A block of mass 3 kg is released from rest on a rough plane inclined at angle α to the horizontal, where $\tan \alpha = \frac{3}{4}$.

The coefficient of friction is 0.125. Take g = 9.8 m s^{-2}. Find the acceleration down the plane, and the distance moved in 3 s.

7 The shaded region is the segment cut off by the chord AB of a circle with centre O and radius 8 cm. Angle AOB = 1.2 radians.
Find the area of the segment, to 3 s.



8 $f(x) = x^3 - 2x^2 - 5x + k$.
Given that (x + 2) is a factor of f(x),
(a) find the value of k,
(b) factorise f(x) completely.

9 The scores on a test are normally distributed.
P(X < 45) = 0.1587 and P(X > 55) = 0.1587.
Find the mean and standard deviation (3 s.f.).

10 Solve $\tan^2 x - 3 = 0$ for $0 \leq x \leq 360°$, giving answers to 1 d.p.