Day 156 **A Level Maths: B Tier 10-a-day**

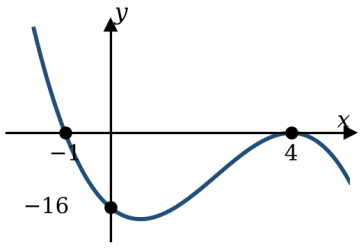
1 Find the exact value of

$\int_1^4 (x^2 + \frac{6}{x})\, dx$.

2 The line segment AB is a diameter of a circle, where A is $(6, -3)$ and B is $(-2, -5)$.
Find an equation of the circle in the form $(x - a)^2 + (y - b)^2 = k$.

3 A bag has 6 green and 9 yellow beads; two are taken without replacement.
(a) Find P(exactly one green).
(b) Find P(at least one green).

4 The diagram shows a sketch of the curve $y = f(x)$, where f is a cubic. The curve meets the axes at the labelled points. Find f(x) in factorised form.



5 A has position vector $\begin{pmatrix} 2 \\ -4 \\ 5 \end{pmatrix}$ and B has position vector $\begin{pmatrix} 14 \\ 4 \\ 17 \end{pmatrix}$.
The point P lies on AB with AP : PB = 1 : 3.
Find the position vector of P.

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6 R: made by machine A; L: item is faulty.
P(R) = 0.6, P(L | R) = 0.5, P(L | R') = 0.1.
(a) Find P(L).
(b) Find P(R | L).

7 A particle moves so that at time t s its velocity is $\mathbf{v} = (2t^2 + 4)\mathbf{i} + (4t - 16)\mathbf{j}$ m s^{-1}.
Find the time when the particle is moving in the direction of $\mathbf{i}$, and its speed then.

8 Given that $\sqrt{5}$ is irrational, prove by contradiction that $6 + 6\sqrt{5}$ is irrational.

9 Line l_1: $\mathbf{r} = \begin{pmatrix} -6 \\ -3 \\ -1 \end{pmatrix} + \lambda \begin{pmatrix} 3 \\ 1 \\ 0 \end{pmatrix}$.
Line l_2: $\mathbf{r} = \begin{pmatrix} 6 \\ 5 \\ -7 \end{pmatrix} + \mu \begin{pmatrix} -2 \\ -2 \\ 2 \end{pmatrix}$.
Show that l_1 and l_2 intersect and find the point.

10 A lift travels between floors in 65 s. The speed-time graph is a trapezium, with the maximum speed V m s^{-1} held from t = 15 to t = 55.
The floors are 525 m apart. Find V, and the deceleration in the final stage.

