Day 8 **A Level Maths: B Tier 10-a-day**

1 A particle moves in a straight line. At time t seconds its velocity is $v = 3t^2 + 8t + 1$ m s^{-1}.
Find the distance moved between t = 1 and t = 5. (The particle does not change direction.)

2 An arithmetic sequence has 10th term 26 and 12th term 30.
(a) Find the first term and the common difference.
(b) Find the sum of the first 20 terms.

3 The table shows the number of siblings, x, of 26 students.
Calculate the mean and standard deviation (3 s.f.).

x	1	2	3	4
Frequency	3	7	7	9

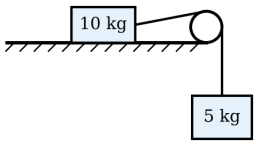
4 Given that $y = x^4 \sin 4x$,
find $\frac{dy}{dx}$, and its value when $x = \frac{\pi}{8}$.

5 A curve has parametric equations $x = 3t + 3$, $y = -t^2 - 4t - 1$.
The line $y = -2x + 5$ meets the curve at two points.
Find the coordinates of these points.

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6 Find the coordinates of the stationary point of the curve $y = \frac{\ln x}{x}$,
and determine its nature.

7 A block of mass 10 kg lies on a rough horizontal table (coefficient of friction 0.2). It is joined by a light string over a smooth pulley to a particle of mass 5 kg hanging freely.
Take $g = 9.8\ \text{m s}^{-2}$.
The system is released. Find the acceleration and the tension in the string.



8 Express $\frac{-3x^2 + 25x - 56}{(x-4)(x-5)^2}$ in partial fractions.

9 The probability that a student passes a driving test first time is thought to be 0.25. In a sample of 50 students, 17 pass first time.
Test, at the 5% significance level, whether the probability is different from 0.25.

10 A sector of a circle has radius 6 cm and angle 120°.
Find the perimeter of the sector, in terms of π.