Day 304 **A Level Maths: B Tier 10-a-day**

1 Find the exact value of

$\int_0^4 \frac{1}{(3x+1)}\,dx$,

giving your answer in the form a ln b.

2 The table shows the number of siblings, x, of 24 students.

Calculate the mean and standard deviation (3 s.f.).

x	1	2	3	4
Frequency	6	7	7	4

3 Find the exact value of

$\int_0^{\frac{\pi}{4}} \sin^2 2x\,dx$.

4 Two forces $(7\mathbf{i} + 3\mathbf{j})$ N and $(\mathbf{i} + 3\mathbf{j})$ N act on a particle of mass 4 kg.

Find the magnitude of the acceleration of the particle.

5 X ~ Po(1.5), modelling the number of flaws per metre of cloth.

Find, to 3 significant figures,

(a) P(X = 3)

(b) P(X ≤ 3)

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6 The curve C has equation $y = x^3 - x^2 - 4x + 3$. C is reflected in the x-axis. Find its new equation.	
7 Solve $2 \ln x = \ln(x + 20)$.	
8 A geometric series has first term 4 and common ratio 4. Find the smallest value of n for which the sum of the first n terms exceeds 10000.	
9 A block of mass 4 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.	
10 The line $3x - 4y = k$ is a tangent to the circle $(x - 4)^2 + (y - 4)^2 = 100$. Find the two possible values of k.	