Day 100	A Level Maths: B Tier 10-a-day
1 Each of 7 people independently supports a team with probability 0.25; X is the number of supporters. This is done 100 times. Estimate the number of times that X = 1.	
2 A particle has velocity $(5\mathbf{i} + 6\mathbf{j})$ m s^{-1} at time t = 0 and moves with constant acceleration $(2\mathbf{i} + 3\mathbf{j})$ m s^{-2}. Find its velocity and speed when t = 2.	
3 Solve $-5 \leq -x + 2 \leq 5$.	
4 Solve $\log_2 x + \log_2(x + 6) = 4$.	
5 (a) Expand $(1 + x)^{\frac{1}{3}}$ in ascending powers of x up to and including the term in x^3. (b) State the range of values of x for which the expansion is valid.	

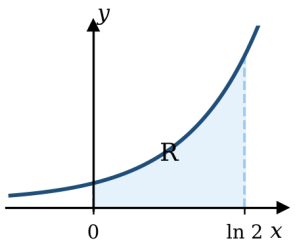
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6 Use the substitution $u = x^2 + 1$ to find the exact value of

$\int_0^1 x(x^2 + 1)^4 \, dx$.

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

8 The region R is bounded by the axes, the line $x = \ln 2$ and the curve $y = 3e^{3x} + 1$. Find the exact area of R.



9 The continuous random variable X has pdf f(x) $= \frac{3x^2}{216}$ for $0 \leq x \leq 6$, and 0 otherwise.
(a) Find P(X > 1).
(b) Find the median of X, to 3 significant figures.

10 A block of mass 7 kg lies on a rough horizontal table (coefficient of friction 0.5). It is joined by a light string over a smooth pulley to a particle of mass 8 kg hanging freely.
Take $g = 9.8$ m s^{-2}.
The system is released. Find the acceleration and the tension in the string.

