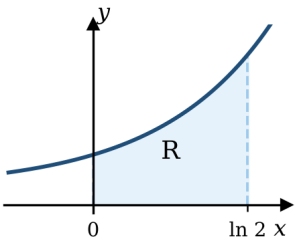
Day 183 **A Level Maths: B Tier 10-a-day**

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

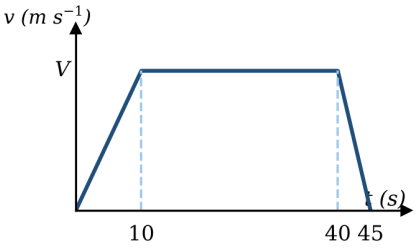


2 Solve $0 < -2x + 5 \leq 5$.

3 Given that $\tan\theta = \frac{3}{2}$ and θ is acute, find the exact value of cosec θ.

4 The mass X g of a flour bag is normal with mean 250, s.d. 12.
Find k (3 s.f.): (a) P(X < k) = 0.1,
(b) P(X > k) = 0.01.

5 A lift travels between floors in 45 s. The speed-time graph is a trapezium, with the maximum speed V m s^{-1} held from t = 10 to t = 40.
The floors are 675 m apart. Find V, and the deceleration in the final stage.



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6 Meteors are seen at random at an average rate of 4 per hour. Find the probability that in 15 minutes there are exactly 0 (3 s.f.).	
7 A particle of mass 6 kg is suspended in equilibrium by two light strings attached to a horizontal ceiling. The strings make angles α and β with the ceiling, where $\tan\alpha = \frac{4}{3}$ and $\tan\beta = \frac{12}{5}$. Take $g = 9.8\ \text{m s}^{-2}$. Find the tension in each string.	
8 Squares of side x cm are cut from the corners of a square card of side 12 cm and the sides are folded up to make an open box. Find x for the greatest volume, and that volume.	
9 The line $3x + 4y = k$ is a tangent to the circle $(x + 3)^2 + (y - 4)^2 = 25$. Find the two possible values of k.	
10 Prove by contradiction that $\sqrt{5}$ is irrational.	