Day 7	A Level Maths: S Tier 10-a-day

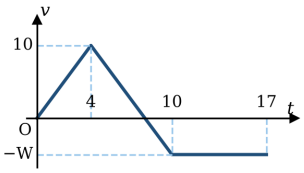
1 Find the exact value of

$$\int_0^{\pi/2} \frac{\cos x}{2 + \sin x}\, dx$$

2 A data set has lower quartile 32 and upper quartile 50. An outlier is a value more than 1.5 × IQR beyond the nearest quartile.
(a) Find the range of values that are not outliers.
(b) 8 observations have mean 38. The largest is 89, an outlier, and it is removed. Find the new mean.

3 A pile of logs has 40 logs in its bottom row. Each row above has 2 fewer logs than the row below, and the pile has as many rows as possible, each with at least one log. Find the number of rows and the total number of logs.

4 The diagram shows the velocity-time graph of a particle P moving on a straight line (velocity in m s^{-1}, time in s). At time 17 s, P is back at its starting point.
Find (a) the value of W, (b) the greatest distance of P from its starting point.



5 A sector of a circle has radius r cm and angle θ radians, where $\theta < 2\pi$.
Its perimeter is 46 cm and its area is 132 cm^2.
Find the two possible pairs of values of r and θ.

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6 Solve $2^{2x+1} - 17 \times 2^x + 8 = 0$.	
7 A non-uniform rod AB of length 5 m and mass 8 kg rests on supports at C and D, where AC = 2 m and AD = 4 m, with R_C = $\frac{1}{3}$ R_D. Find (a) the distance of the centre of mass from A. A particle of mass m kg at B puts the rod on the point of tilting about D. (b) Find m.	
8 Find the exact coordinates of the point of inflection of $y = (x - 1)e^{-2x}$, justifying that it is a point of inflection.	
9 The pdf of X is f(x) = a + bx for $0 \leq x \leq 4$, and 0 otherwise, where a and b are constants. E(X) = $\frac{12}{5}$. (a) Find a and b. (b) Find P(X < 2).	
10 A circle passes through P(6, 5), Q(2, −3) and R(−3, 2). Find its equation.	