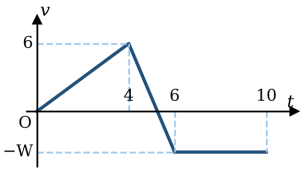
Day 97 **A Level Maths: S Tier 10-a-day**

1 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 10 s, P is back at its starting point.
Find (a) the value of W, (b) the greatest distance of P from its starting point.



2 Solve $e^{2x} - 10 \times e^{x} + 24 = 0$,
giving each answer exactly and, where not an integer, to 3 s.f.

3 Given that $\sum_{r=1}^{n}(5r + 1) = 1650$, find n.

4 A box of mass 10 kg is at rest on rough horizontal ground ($\mu = 0.5$). A horizontal force of 63 N acts on it for 7 s and is then removed. Find (a) the speed when the force is removed, (b) the total distance travelled before the box stops. Take g = 9.8 m s^{-2}.

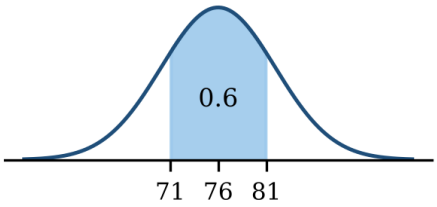
5 Prove that $n(n + 2)(n + 4)(n + 6) + 16$ is a perfect square for every integer n.

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6 A chord AB of a circle, centre O and radius 10 cm, subtends an angle of $\frac{\pi}{2}$ at O.

Find the exact area and the exact perimeter of the minor segment cut off by AB.

7 The pdf of $X \sim N(76, \sigma^2)$ is shown; the shaded area is symmetrical.
(a) Find σ. (b) Find $P(X > 87)$.



8 Use a suitable trigonometric identity to find the exact value of

$$\int_0^{\pi/2} \cos^4 x \, dx$$

9 The circle $x^2 + y^2 - 6x + 2y - 90 = 0$ passes through $P(-5, -7)$. The tangent at P meets the axes at A and B. Find the area of triangle OAB.

10 A biased coin lands on 'win' with the same unknown probability p each time. It is used 7 times in round 1 and 5 times in round 2.
Given that exactly 9 wins occur altogether, find the probability that exactly 5 of them were in round 1.