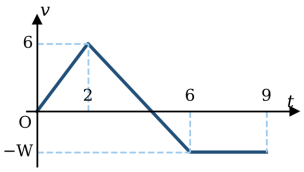
Day 155 **A Level Maths: S Tier 10-a-day**

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 9 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 A data set has lower quartile 34 and upper quartile 51. 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) 15 observations have mean 46. The largest is 87, an outlier, and it is removed. Find the new mean.

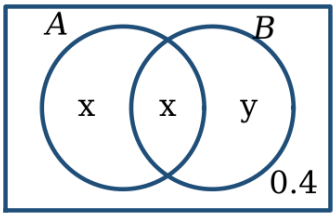
3 A population of bacteria is modelled by $P = P_0e^{kt}$, t in hours.
Initially P = 200 and after 5 hours P = 800.
Find k, and the time for the population to reach 2400, to 3 s.f.

4 Solve $\sqrt{x + 8} = x + 6$.

5 A ball is projected from the top of a vertical cliff, 58.8 m high, at 24.5 m s^{-1} at angle α below the horizontal ($\tan \alpha = \frac{4}{3}$), and lands on horizontal ground.
Find (a) the time of flight and the distance from the cliff, (b) the speed and direction on landing.
Take g = 9.8 m s^{-2}.

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6 The Venn diagram shows probabilities; A and B are independent.
Find x and y.



7 Find the sum of all the integers from 1 to 596 inclusive that are divisible by 3 or by 4, but not by both.

8 Find the exact value of
$\sin(\sin^{-1}(\frac{7}{25}) + \cos^{-1}(\frac{4}{5}))$.

9 A(−6, −5) and B(1, 12). The point C lies on the x-axis and CA = CB. Find the coordinates of C and the area of triangle ABC.

10 Line l_1: $\mathbf{r} = \begin{pmatrix}-8\\-6\\-5\end{pmatrix} + s\begin{pmatrix}2\\2\\1\end{pmatrix}$,
line l_2: $\mathbf{r} = \begin{pmatrix}-1\\-5\\-1\end{pmatrix} + t\begin{pmatrix}3\\-3\\2\end{pmatrix}$.
Show whether the lines meet, giving the point of intersection if they do, and find the acute angle between them to 1 d.p.