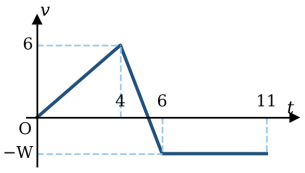
Day 73	A Level Maths: S Tier 10-a-day

1 A sector of a circle has radius r cm and angle θ radians, where $\theta < 2\pi$.
Its perimeter is 44 cm and its area is 117 cm^2.
Find the two possible pairs of values of r and θ.

2 A stone is projected from a point O on horizontal ground with speed 49 m s^{-1} at an angle α above the horizontal, where $\tan\alpha = \frac{3}{4}$.
Find (a) the greatest height, (b) the speed when it is at half of this height (3 s.f.). Take g = 9.8 m s^{-2}.

3 Solve $\sqrt{x-3} = x - 5$.

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

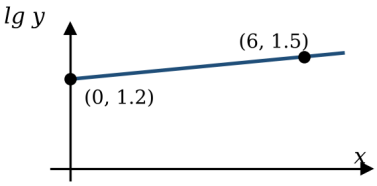


5 Find the exact value of
$\tan(\tan^{-1}(\frac{1}{6}) + \tan^{-1}(\frac{1}{2}))$.

Day 73 **A Level Maths: S Tier 10-a-day**

6 $f(x) = \dfrac{5}{x^2 + 8x + 21}$ for all real x.
Find the greatest value of f(x), the value of x at which it occurs, and the range of f.

7 $y = ab^x$. The graph of lg y against x is the straight line shown.
Find a and b to 3 significant figures.



8 Class Q has 30 students with mean mark 53 and standard deviation 7. Class S has 40 students with mean mark 37 and standard deviation 6.
(a) Find the mean mark of all 70 students.
(b) Find the standard deviation of all 70 students.

9 Find the exact coordinates of the stationary point of
$y = x^2e^{-3x}$ for $x > 0$,
and determine its nature.

10 In the expansion of $(1 + kx)^n$, where n is a positive integer, the coefficient of x is -12 and the coefficient of x^2 is 54. Find n and k.