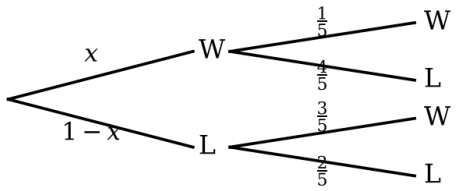
Day 70 **A Level Maths: S Tier 10-a-day**

1 The tree diagram shows two games played in turn.

Given the second is a W, P(first was a W) = $\frac{1}{7}$.

Find x.

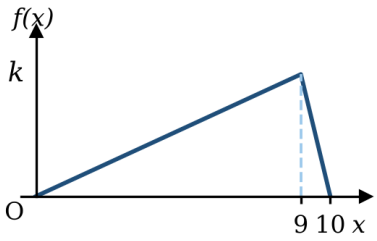
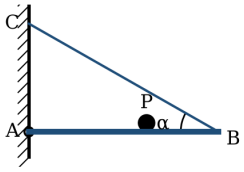


2 The region bounded by $y = xe^{-x}$, the x-axis and the lines
$x = 0$ and $x = 2$ is rotated through 2π about the x-axis.
Find the exact volume of the solid formed.

3 Prove that $(n + 4)^3 - n^3 - 64$ is a multiple of 12 for every integer n.

4 A particle P moves on a straight line. At time t seconds its velocity is v m s^{-1}, where
$v = t^2 - 8t + 12$ for $0 \leq t \leq 7$
Find (a) the times at which P is at instantaneous rest, (b) the total distance travelled by P in the first 7 seconds.

5 Prove that $8k = n^2 + 1$ has no integer solutions (k and n integers).

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6 Find the exact coordinates of the stationary points of $y = 3x - 6\sin x$ for $0 \leq x \leq 2\pi$, and determine their nature.	
7 The diagram shows the pdf of X. Find (a) k, (b) E(X), (c) the median of X (3 s.f.). 	
8 A uniform rod AB (3 m, 80 N) is hinged at A to a vertical wall and held horizontal by a string BC, C on the wall above A, with $\tan\alpha = 2.4$, where α is the angle between string and rod. A 40 N particle hangs at P, AP = 1.5 m. Find (a) the tension, (b) the magnitude and direction of the hinge force (3 s.f. and 1 d.p.). 	
9 A(−6, 6) and B(2, 10). The point C lies on the x-axis and CA = CB. Find the coordinates of C and the area of triangle ABC.	
10 A curve has parametric equations $x = 4\sin t$, $y = 6\cos t$, for $0 \leq t \leq \frac{\pi}{2}$. Find the exact area bounded by the curve and the coordinate axes.	