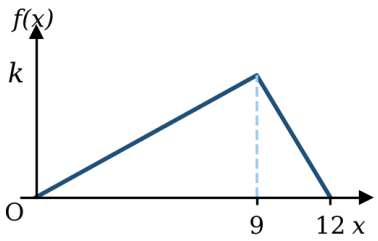
Day 261 **A Level Maths: S Tier 10-a-day**

1 The diagram shows the pdf of X.
Find (a) k, (b) E(X), (c) the median of X (3 s.f.).



2 Solve the simultaneous equations
$\log_2 x + \log_2 y = 8$
$x - y = 24$

3 A car of mass 1200 kg, with engine power 35.52 kW, climbs a straight road with $\sin\alpha = \frac{1}{10}$ against a constant resistance of 600 N.
Find (a) the greatest steady speed up the hill, (b) the acceleration at $\frac{20}{3}$ m s^{-1}. Take g = 9.8 m s^{-2}.

4 Solve $|-x + 4| \geq |2x - 3|$.

5 A cone with its vertex downwards and semi-vertical angle α, where
$\tan\alpha = \frac{1}{2}$, is filled at 3π $cm^3 s^{-1}$. Find the rate at which
the depth h is rising when h = 4 cm. ($V = \frac{1}{3}\pi r^2 h$)

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6 Given that $\sum_{r=1}^{n}(3r + 6) = 561$, find n.	
7 Line l_1: $\mathbf{r} = \begin{pmatrix}-3\\-6\\-5\end{pmatrix} + s\begin{pmatrix}1\\-2\\-2\end{pmatrix}$, line l_2: $\mathbf{r} = \begin{pmatrix}-1\\-7\\0\end{pmatrix} + t\begin{pmatrix}-2\\3\\-3\end{pmatrix}$. Show whether the lines meet, giving the point of intersection if they do, and find the acute angle between them to 1 d.p.	
8 A box of weight 130 N is pulled at constant speed up a line of greatest slope of a rough plane ($\tan\alpha = \frac{3}{4}$, $\mu = \frac{5}{12}$) by a force P N at angle β above the plane. (a) Find P when $\tan\beta = \frac{5}{12}$. (b) Find the least possible value of P as β varies.	
9 A biased spinner lands on 'win' with the same unknown probability p each time. It is used 9 times in round 1 and 8 times in round 2. Given that exactly 6 wins occur altogether, find the probability that exactly 3 of them were in round 1.	
10 Solve $\frac{-1}{(x-1)} > \frac{-2}{(x-2)}$.	