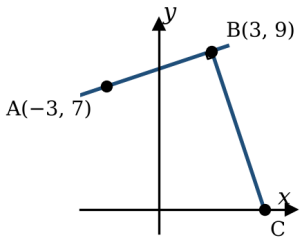
Day 75 **A Level Maths: S Tier 10-a-day**

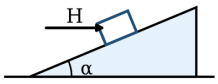
1 Solve $\cos 2\theta + \sin \theta = 0$ for $0 \leq \theta < 360°$.

2 $X \sim B(8, p)$. It is given that $P(X = 2) = \frac{7}{6} \times P(X = 1)$.
(a) Find the value of p.
(b) Find $P(X = 0)$, correct to 3 significant figures.

3 In the diagram, line l_1 passes through A and B. Line l_2 is perpendicular to l_1 at B and meets the x-axis at C. Find the coordinates of C and the area of triangle ABC.



4 A particle of weight 55 N rests on a rough plane inclined at α to the horizontal, where $\tan \alpha = \frac{5}{12}$ and $\mu = 0.2$.
A horizontal force H N, in the vertical plane through a line of greatest slope, holds it in equilibrium. Find the range of possible values of H.



5 $f(x) = \frac{12}{2x^2 - 12x + 24}$ for all real x.
Find the greatest value of f(x), the value of x at which it occurs, and the range of f.

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6 The curves y = 6 cos x and y = 6 cos 2x meet at x = 0 and at x = $\frac{2\pi}{3}$. Find the exact area enclosed between them for $0 \leq x \leq \frac{2\pi}{3}$.	
7 20 recorded times (seconds) have mean 22 and standard deviation 8. One value was recorded as 42 but should have been 62. Find the correct mean and the correct standard deviation.	
8 The first row of a theatre has 17 seats. Each row has 6 more seats than the row in front. Find (a) the number of seats in row 35, (b) the least number of rows for at least 1696 seats.	
9 Two drones P and Q move so that, t seconds after launch, their position vectors in metres are $\mathbf{r}_P = \begin{pmatrix} 1 \\ 4 \\ -3 \end{pmatrix} + t\begin{pmatrix} 0 \\ 2 \\ -1 \end{pmatrix}$ and $\mathbf{r}_Q = \begin{pmatrix} -7 \\ -1 \\ -3 \end{pmatrix} + t\begin{pmatrix} 0 \\ 4 \\ 0 \end{pmatrix}$. Find the time at which they are closest and the exact minimum distance between them.	
10 A particle P moves on a straight line. At time t seconds its velocity is v m s^{-1}, where $v = 5\sin(\frac{\pi t}{3})$ for $t \geq 0$. Find (a) the greatest magnitude of the acceleration of P, (b) the distance P travels between the first two times at which it is at rest. Give (b) to 3 s.f.	