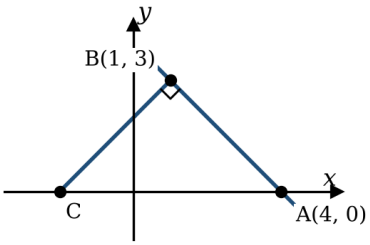
Day 326 **A Level Maths: S Tier 10-a-day**

1 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.



2 Three forces $(-3\mathbf{i} - 7\mathbf{j})$ N, $(3\mathbf{i} + k\mathbf{j})$ N and $(-\mathbf{i} - 8\mathbf{j})$ N act on a particle of mass 4 kg. The resultant is parallel to $(-\mathbf{i} - 15\mathbf{j})$.
Find (a) the value of k, (b) the magnitude of the acceleration of the particle, to 3 s.f.

3 Solve $\tan(2\theta + 15°) = -\frac{1}{\sqrt{3}}$
for $0° \leq \theta \leq 180°$.

4 Find the sum of all the integers from 1 to 233 inclusive that are divisible by 6 or by 8, but not by both.

5 $X \sim B(150, 0.02)$.
(a) Explain why a Poisson approximation is suitable and state its distribution.
(b) Use it to estimate $P(X > 2)$, to 4 s.f.
(c) Find the exact value of $P(X > 2)$, to 4 s.f.

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6 A particle P moves with constant acceleration. At t = 0 seconds P is at ($\mathbf{i}$ + 2$\mathbf{j}$) m with velocity (4$\mathbf{i}$ − 12$\mathbf{j}$) m s^{-1}. At t = 8, P has velocity (4$\mathbf{i}$ + 12$\mathbf{j}$) m s^{-1}. Find (a) the acceleration of P, (b) the time at which P moves parallel to ($\mathbf{i}$), (c) the position vector of P at that time.	
7 The curve $y = x^2 - 4x - 2$ is translated by $\begin{pmatrix} -3 \\ -2 \end{pmatrix}$ and then a reflection in the y-axis. Find the equation of the resulting curve in the form $y = ax^2 + bx + c$.	
8 Use integration by parts to find the exact value of $\int_0^{\pi} x \sin 2x \, dx$	
9 The journey time is N(μ, 64) with known variance 64. The mean was claimed to be 64 minutes. A random sample of 49 has mean 62. Test at the 5% level whether the mean is greater than 64.	
10 $f(\theta) = \frac{1}{18 + 15 \sin\theta + 8 \cos\theta}$ (a) Write 15 sin θ + 8 cos θ as R sin(θ + α), R > 0, 0 < α < 90°. (b) Find the greatest and least values of f(θ), and the smallest positive θ at which the greatest value occurs, to 1 d.p.	