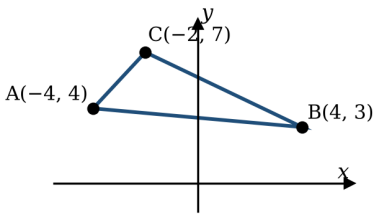
Day 60 **A Level Maths: A Tier 10-a-day**

1 Find the exact value of

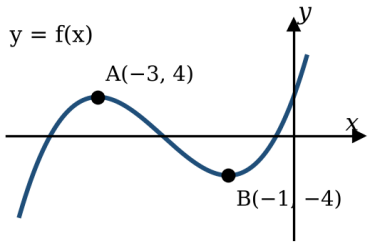
$\int_0^{\frac{\pi}{8}} \sec^2 2x \, dx$.

2 The diagram shows triangle ABC.
(a) Find the equation of the line through C perpendicular to AB.
(b) Hence find the coordinates of D, the foot of the perpendicular from C to AB, and the area of triangle ABC.



3 Given that $\log_a 2 = p$ and $\log_a 3 = q$,
express $\log_a(\frac{8}{9})$ in terms of p and q.

4 The diagram shows the curve y = f(x), with turning points A and B.
Find the coordinates of the turning points of
(a) y = −f(x) (b) y = 3f(x)



5 A particle moves on the x-axis. At time t s its acceleration is $(3t - 6)$ m s^{-2}. When t = 0 it is at O with velocity 8 m s^{-1}. Find (a) its velocity when the acceleration is zero, (b) its displacement from O then.

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6 Solve $x(\sqrt{7} - 1) = 2 + \sqrt{7}$, writing x in the form $p + q\sqrt{7}$.	
7 A particle P has position vector $\mathbf{r} = (t^3 - 4t)\mathbf{i} + (t^2 - 4t)\mathbf{j}$ metres at time t s. Find (a) the speed of P when t = 4, (b) the value of t when P is moving parallel to $\mathbf{i}$. Give answers to 3 s.f. if not exact.	
8 X, the height (cm), is $N(171, 7^2)$. The lowest 95% of values are below k. Find k to 3 significant figures.	
9 The points A, B and C have coordinates (−1, 1, −2), (−2, −2, 3) and (−3, 2, −3). Find angle ABC, in degrees to 1 d.p.	
10 The mass of an egg is $N(41, 8^2)$. An egg is classed as 'special' if its mass is more than 56. 6 eggs are chosen at random. Find the probability that exactly 2 are special (3 s.f.).	