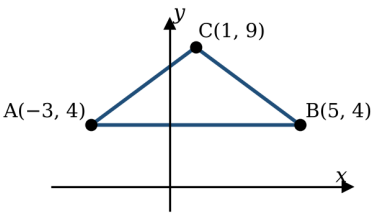
Day 309 **A Level Maths: A Tier 10-a-day**

1 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.



2 Find the exact value of

$$\int_1^5 \frac{4}{2x+1}\,dx.$$

3 (a) Solve $4x - 3 < -5$.
(b) Solve $x^2 + 2x - 24 > 0$.
(c) Hence find the values of x satisfying both inequalities.

4 The table summarises the mass, m kg, of parcels of 49 items.
Use linear interpolation to estimate the upper quartile.

Class	Frequency
$20 \le m < 40$	10
$40 \le m < 60$	13
$60 \le m < 80$	2
$80 \le m < 100$	14
$100 \le m < 120$	10

5 $y = x \tan(3x)$.

Find the exact gradient at $x = \frac{\pi}{9}$.

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6 X ~ B(40, 0.3). Use a normal approximation to estimate P(X ≥ 16) to 3 significant figures.	
7 Solve the differential equation $x\frac{dy}{dx} = 2y$, given that y = 3 when x = 1 (x > 0, y > 0). Give y in terms of x.	
8 A crate of mass 4 kg is pulled at constant speed along rough horizontal ground, $\mu = 0.2$, by a force of P N at angle θ above the horizontal, $\tan\theta = \frac{3}{4}$. Find P and the normal reaction. Take g = 9.8. Give answers to 3 s.f. if not exact.	
9 The line 3x + 4y = 9 meets the circle $(x + 3)^2 + (y - 3)^2 = 9$ at the points A and B. Find the exact length of AB.	
10 A ball is projected from the ground at 14 m s^{-1} at angle α above the horizontal, $\tan\alpha = \frac{15}{8}$. At time T s, while in flight, it is moving perpendicular to its initial direction. Find (a) T, (b) the height of the ball then. Take g = 9.8. Give answers to 3 s.f. if not exact.	