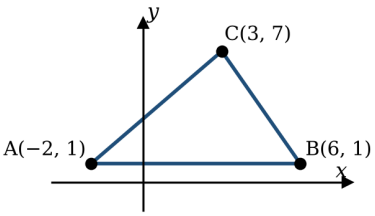
Day 175 **A Level Maths: A Tier 10-a-day**

1 A ball is thrown vertically upwards at 4.9 m s^{-1} from a point h m above horizontal ground, and hits the ground 4 s later. Find (a) h, (b) the greatest height above the ground. Take g = 9.8.

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 $y = (2x + 3)^{-1}$.
Find $\frac{dy}{dx}$ and the gradient of the curve at x = 1.

4 Find the sum of all the multiples of 8 that lie strictly between 21 and 316.

5 Given that $\cos\theta = \frac{2}{7}$, find the exact value of $\cos 3\theta$.

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6 Flaws occur in a metre of cable at a mean rate of 4 per metre, as a Poisson process. Find the probability that in one such period there are (a) exactly 3 (b) at least 3 (c) fewer than 3 (3 s.f.).	
7 Expand $(3 - 3x)^{-2}$ in ascending powers of x, up to and including x^2. State the range of x for which the expansion is valid.	
8 A bag has 7 black and 6 white counters. Two are taken at random without replacement. Given that the second counter is black, find the probability that the first was black.	
9 A particle is projected up a line of greatest slope of a smooth plane inclined at α. It passes A, 58.8 m from the start, after 4 s and again after 6 s. Find (a) the speed of projection, (b) α to 1 d.p. Take g = 9.8.	
10 An open-topped box has a square base of side x cm and volume 108 cm^3. Show that its surface area is $A = x^2 + \frac{432}{x}$, and find the least possible value of A, justifying that it is a minimum.	