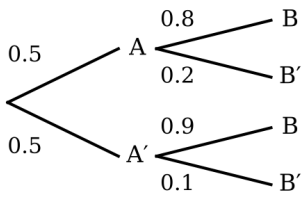
Day 124 **A Level Maths: A Tier 10-a-day**

1 The tree diagram shows probabilities for events A and B.
(a) Find P(B).
(b) Find P(A | B).



2 Find the exact value of
$\int_0^{\frac{\pi}{2}} (\sin 2x + 4\cos x)\, dx$.

3 Prove that $x^2 - 12x + 38 > 0$ for all real values of x.

4 A claim is that the probability p that a spinner lands on red is 0.5. In a sample of 12, the number of successes is 5.
Test at the 5% level whether p has decreased.

5 $f(x) = 2x^2 + 16x + 26$.
(a) Write f(x) in the form $a(x + p)^2 + q$.
(b) State the minimum value of f(x) and the value of x at which it occurs.
(c) Solve f(x) = 0, giving surds in simplest form.

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6 θ is small and measured in radians. Use small angle approximations to show that $\sin\theta + 2\cos 3\theta = 0.5$ can be written as $a\theta^2 + b\theta + c = 0$ with integers a, b, c. Hence find the approximate solution with $0 < \theta < 0.8$, to 3 s.f.	
7 The second term of a geometric series is 4 and its sum to infinity is 25. Find the two possible values of the first term.	
8 Car A passes P at constant speed 10 m s^{-1}. 10 s later car B leaves P from rest, in the same direction, with acceleration 1.5 m s^{-2}. B overtakes A at Q. Find (a) the time B takes to reach Q, (b) PQ, (c) the speed of B at Q.	
9 A curve has equation $-x^2 + 4xy - 4x = -12$. Show that P(−2, 2) lies on the curve and find the equation of the tangent at P in the form ax + by + c = 0 with integer a, b, c.	
10 A ball is projected from the ground at 12 m s^{-1} at angle α above the horizontal, $\tan\alpha = \frac{12}{5}$. 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.	