Day 110	A Level Maths: B Tier 10-a-day
1 A cyclist moves in a straight line with constant acceleration. Its final speed is 41 m s^{-1}, its acceleration is 4 m s^{-2} and the motion lasts 10 s. Find the initial speed.	
2 A and B are independent events with P(A) = 0.25 and P(A ∪ B) = 0.8125. (a) Find P(B). (b) Find P(A' ∩ B').	
3 Solve $2\sin^2 x + 1 - \cos x = 0$ for $0 \leq x \leq 360°$, giving answers to 1 d.p. where necessary.	
4 X ~ B(6, 0.3) and Y ~ B(12, 0.25) are independent. Find P(X = 2 and Y ≤ 4), to 3 significant figures.	
5 The curve $y = -x^2 - 3x + 1$ and the line $y = -4x - 1$ meet at the points A and B. Find the coordinates of A and B.	

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6 For small θ (in radians), use the small angle approximations to find the value of $\lim_{\theta \to 0} \frac{\tan \theta \sin 3\theta}{1 - \cos 2\theta}$.	
7 A particle moves along a straight line so that its displacement from O after t s is $s = 2t^3 + 4t^2$ metres. Find (a) the average velocity over the first 6 seconds, (b) the velocity at t = 6.	
8 Points A, B and C have position vectors $\begin{pmatrix} 3 \\ 1 \\ 0 \end{pmatrix}$, $\begin{pmatrix} 2 \\ 3 \\ 0 \end{pmatrix}$ and $\begin{pmatrix} 4 \\ q \\ 0 \end{pmatrix}$ respectively. Given that A, B, C are collinear, find q.	
9 The line $y = -2x - 25$ meets the circle $(x + 3)^2 + (y - 1)^2 = 100$ at the points A and B. Find the coordinates of A and B, and the exact length of the chord AB.	
10 $f(x) = 3x^3 + px^2 + qx - 9$. When f(x) is divided by $(x - 2)$ the remainder is -11, and when divided by $(x - 3)$ the remainder is 21. Find p and q.	