Day 272	A Level Maths: A Tier 10-a-day
1 P(A) = 0.5, P(B) = 0.55 and P(A ∩ B) = 0.2. Find (a) P(A ∪ B) (b) P(A | B) (c) P(B | A)	
2 Find the coefficient of x^3 in the expansion of $(4 - x)^8$.	
3 A uniform rod AB (6 kg, 4 m) is smoothly hinged at A to a vertical wall, with a 6 kg particle at B. A light string from B to the wall above A holds the rod horizontal, at angle θ to it, $\tan\theta = \frac{3}{4}$. Find (a) the tension, (b) the magnitude of the hinge force. Take g = 9.8. Give answers to 3 s.f. if not exact.	
4 $f(x) = x^2 - 5$. Show that the Newton-Raphson formula gives $x_{n+1} = \frac{1}{2}(x_n + \frac{5}{x_n})$, and use it with $x_0 = \frac{5}{2}$ to find x_2 as an approximation to $\sqrt{5}$, to 4 d.p.	
5 A sequence is defined by $u_1 = k$ and $u_{n+1} = -2u_n + 5$. Given that $u_3 = -21$, find (a) the value of k, (b) $\sum_{r=1}^{4} u_r$.	

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6 A curve has equation $2x^2y - 2y^3 + 4x = -16$. Find $\frac{dy}{dx}$ in terms of x and y, and the gradient of the normal at (0, 2).	
7 $f(x) = 2x^2 + 16x + 35$, $x \geq -4$. Find $f^{-1}(x)$ and state its domain.	
8 Car A passes P at constant speed 20 m s^{-1}. 5 s later car B leaves P from rest, in the same direction, with acceleration 2.5 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 P(B) = 0.55, P(A) = 0.3 and P(A | B) = 0.3. (a) Find $P(A \cap B)$ and $P(A \cup B)$. (b) Find P(B | A). (c) Determine whether A and B are independent.	
10 $y = \sec(2x)$. Find $\frac{dy}{dx}$ and its exact value at $x = \frac{\pi}{12}$.	