Day 254	A Level Maths: B Tier 10-a-day
1 $f(x) = \sqrt{2x - 4} - 4$. (a) Find the largest possible domain of f. (b) Find the range of f.	
2 Solve $e^{2x} = 47$, giving your answer to 3 s.f.	
3 A sledge of mass 5 kg is pulled along rough horizontal ground by a horizontal force of 17.25 N. It accelerates at 1 m s^{-2}. Take g = 9.8 m s^{-2}. Find the coefficient of friction between the sledge and the ground.	
4 X ~ B(11, 0.5) and Y ~ B(7, 0.1) are independent. Find P(X = 5 and Y ≤ 1), to 3 significant figures.	
5 A model boat moves so that its position vector relative to O at time t s is $\mathbf{r} = (3t^2)\mathbf{i} + (t^3 - 3t)\mathbf{j}$ metres. Find the velocity when t = 4, and the speed at that time.	

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6 Simplify $\frac{1 - \cos 2x}{\sin 2x}$, giving your answer as a single trigonometric term.	
7 The curve $y = -x^2 + 6x + 6$ and the line $y = 6x + 5$ meet at the points A and B. Find the coordinates of A and B, and the exact length AB.	
8 The curve C has equation $y = (3x - 3)e^{4x}$. Find the equation of the normal to C at the point where $x = 0$, in the form $y = mx + c$.	
9 The equation $x^2 + 2kx + (k + 2) = 0$ has no real roots. Find the possible values of k.	
10 $P(X = x) = k(6 - x)$ for $x = 1, 2, ..., 5$. (a) Find k. (b) Find E(X) and Var(X).	