Day 44	A Level Maths: B Tier 10-a-day
1 Prove that the sum of 7 consecutive integers is always a multiple of 7.	
2 A boat moves in a straight line with constant acceleration. Its initial speed is 1 m s^{-1}, its final speed is 13 m s^{-1} and its acceleration is 4 m s^{-2}. Find the time taken.	
3 40 customers: 12 buy coffee, 18 buy tea, 20 do neither. (a) How many do both? (b) Given a person who buys coffee, find P(this person buys tea).	
4 Expand and simplify $(-4 + 4\sqrt{5})(-5 + \sqrt{5})$, giving your answer in the form $a + b\sqrt{5}$.	
5 The depth of water at a pier is modelled by $D = 4 + 4\sin(\frac{\pi t}{12})$, where t is in hours after noon. Find (a) the greatest and least values, (b) the values of t with $0 \leq t \leq 24$ when it equals 6 m.	

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6 Solve $(x + 2)(x + 3)(x - 1) < 0$.	
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 4 seconds, (b) the velocity at $t = 4$.	
8 The continuous random variable X has pdf f(x) $= \frac{2x}{64}$ for $0 \leq x \leq 8$, and 0 otherwise. (a) Find $P(X > 3)$. (b) Find the median of X, to 3 significant figures.	
9 (a) Write $\frac{-4x - 19}{(x + 4)(x + 5)}$ in partial fractions. (b) Hence evaluate $\int_0^3 \frac{-4x - 19}{(x + 4)(x + 5)}\,dx$, giving the answer as a single logarithm.	
10 Line l_1: $\mathbf{r} = \begin{pmatrix} 1 \\ -1 \\ -2 \end{pmatrix} + \lambda \begin{pmatrix} 2 \\ 3 \\ 3 \end{pmatrix}$. Line l_2: $\mathbf{r} = \begin{pmatrix} 7 \\ -4 \\ -3 \end{pmatrix} + \mu \begin{pmatrix} -2 \\ 3 \\ 2 \end{pmatrix}$. Show that l_1 and l_2 intersect and find the point.	