Day 47	A Level Maths: B Tier 10-a-day
1 A has position vector $\begin{pmatrix} -4 \\ 2 \end{pmatrix}$ and B has position vector $\begin{pmatrix} -10 \\ -4 \end{pmatrix}$. The point P lies on AB with AP : PB = 1 : 1. Find the position vector of P.	
2 The points A and B have coordinates $(-4, -6)$ and $(8, 2)$. (a) Find the midpoint of AB. (b) Find the line AB as $ax + by + c = 0$, with integer a, b, c.	
3 Solve $e^{2x} - 3e^{x} - 10 = 0$, giving any answers as exact values.	
4 A particle has velocity $(2\mathbf{i} + 4\mathbf{j})$ m s^{-1} at time t = 0 and moves with constant acceleration $(\mathbf{i} + \mathbf{j})$ m s^{-2}. Find its velocity and speed when t = 4.	
5 A sequence is defined by $u_{n+1} = -\frac{1}{2}u_n + \frac{15}{2}$, $u_1 = 18$. (a) Find u_2. (b) Given that the sequence converges to a limit L, find L.	

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6 (a) Write $\frac{-x-6}{(x+3)(x+4)}$ in partial fractions. (b) Hence evaluate $\int_0^4 \frac{-x-6}{(x+3)(x+4)}\,dx$, giving the answer as a single logarithm.	
7 A particle moves on a straight line. Its displacement from O at time t seconds is $s = 3t^3 + 5t^2 - t$ metres. Find its velocity and acceleration when $t = 2$.	
8 X has a binomial distribution with mean 5 and variance 4. (a) Find n and p. (b) Find P(X = 5) to 3 significant figures.	
9 Given that $\sqrt{3}$ is irrational, prove by contradiction that $2 + 2\sqrt{3}$ is irrational.	
10 The masses (kg) of parcels are normally distributed. P(X < 56) = 0.1587 and P(X > 68) = 0.0228. Find the mean and standard deviation (3 s.f.).	