Day 68	A Level Maths: B Tier 10-a-day
1 Find the exact value of $\int_0^{\ln 2} (3x + 6e^{-2x})\,dx$.	
2 (a) Write $3x^2 + 24x + 42$ in the form $a(x + p)^2 + q$. (b) Write down the coordinates of the minimum point of $y = 3x^2 + 24x + 42$.	
3 Large data set: mean pressure (hPa) at Camborne has mean 1017, sd 4. Outliers are more than 2 sd from the mean. Are the values 1028 and 1007 outliers?	
4 £1000 is invested at 4% compound interest per year. Find the least whole number of years for the investment to exceed £2000.	
5 A sequence is defined by $u_{n+1} = -2u_n - 5$, $u_1 = 1$. (a) Find u_2 and u_3. (b) Find $\sum_{r=1}^{4} u_r$.	

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6 A particle of mass 5 kg is acted on by forces $(-2\mathbf{i} + \mathbf{j})$ N and $\mathbf{P}$ N only. Its acceleration is $(4\mathbf{i} + 4\mathbf{j})$ m s^{-2}. Find $\mathbf{P}$, and its magnitude to 3 significant figures.	
7 A curve has parametric equations $x = -t - 1$, $y = -t^2 + t$. The line $y = x - 2$ meets the curve at two points. Find the coordinates of these points.	
8 A sprinter moves in a straight line with constant acceleration. Its initial speed is 11 m s^{-1}, its acceleration is 1.5 m s^{-2} and the motion lasts 12 s. Find the final speed.	
9 The mass M kg of a substance satisfies $\frac{dM}{dt} = -0.125M$, where t is in years. Initially M = 80. Find M when t = 10, and the half-life, each to 3 s.f.	
10 The scores on a test are normally distributed. $P(X < 36) = 0.1587$ and $P(X > 46) = 0.0668$. Find the mean and standard deviation (3 s.f.).	