Day 226	A Level Maths: B Tier 10-a-day
1 A particle of mass 2 kg is acted on by forces $(-3\mathbf{i} + 7\mathbf{j})$ N and $\mathbf{P}$ N only. Its acceleration is $(-\mathbf{j})$ m s^{-2}. Find $\mathbf{P}$, and its magnitude to 3 significant figures.	
2 (a) Write $-x^2 - 6x - 21$ in the form $a(x + p)^2 + q$. (b) Write down the coordinates of the maximum point of $y = -x^2 - 6x - 21$.	
3 The vector $\mathbf{a} = \begin{pmatrix} -2 \\ 1 \\ -2 \end{pmatrix}$. Find $\lvert\mathbf{a}\rvert$ and a unit vector in the direction of $\mathbf{a}$.	
4 Solve $x^2 + 3x + 2 < 0$.	
5 $X \sim B(50, p)$. H_0: $p = 0.2$ is to be tested against H_1: $p > 0.2$ at the 10% significance level. Find the critical region and the actual significance level.	

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6 Line l_1 has equation $x - y = 2$ and line l_2 has equation $x - 2y = -1$. The lines meet at P. Find the area of the triangle formed by l_1, l_2 and the x-axis.	
7 Solve $6\sin^2 x - 7\cos x - 8 = 0$ for $0 \leq x \leq 360°$, giving answers to 1 d.p. where necessary.	
8 A particle moves so that its position vector relative to O at time t s is $\mathbf{r} = (2t^2 + 4t)\mathbf{i} + (3t^3 - 3t)\mathbf{j}$ metres. Find the velocity when t = 1, and the speed at that time.	
9 The masses (kg) of parcels are normally distributed. $P(X < 92) = 0.0228$ and $P(X > 104) = 0.1587$. Find the mean and standard deviation (3 s.f.).	
10 A car's value, £V, after t years is given by $V = 20000 \times 0.8^t$. Find (a) the value after 3 years, (b) when it first falls below £4000, to 3 s.f.	