Day 85	A Level Maths: B Tier 10-a-day
1 7 values of x are coded using $y = \frac{(x - 100)}{5}$. $\Sigma y = -6$ and $\Sigma y^2 = 150$. Find the mean and standard deviation of x (3 s.f.).	
2 Describe the single transformation that maps the graph of y = f(x) onto the graph of: (a) $y = -f(x)$ (b) $y = f(2x)$ (c) $y = 3f(x)$	
3 Points A and B have position vectors $\begin{pmatrix} -1 \\ 1 \\ -4 \end{pmatrix}$ and $\begin{pmatrix} 11 \\ -3 \\ -7 \end{pmatrix}$. Find AB and the distance AB.	
4 A sledge of mass 10 kg is pulled along rough horizontal ground by a horizontal force of 44.2 N. It accelerates at 0.5 m s^{-2}. Take g = 9.8 m s^{-2}. Find the coefficient of friction between the sledge and the ground.	
5 Find the quotient and the remainder when $2x^3 + 3x^2 - 2x - 6$ is divided by (x + 2).	

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6 A particle of mass 5 kg is acted on by forces $(-2\mathbf{i} + 6\mathbf{j})$ N and $\mathbf{P}$ N only. Its acceleration is $(4\mathbf{i} + \mathbf{j})$ m s^{-2}. Find $\mathbf{P}$, and its magnitude to 3 significant figures.	
7 Solve $5 \sin x + 3 \cos^2 x - 5 = 0$ for $0 \leq x \leq 360°$, giving answers to 1 d.p. where necessary.	
8 Bottle volumes are normal, s.d. 5 ml. Set mean 100 ml; 36 bottles have mean 101.5 ml. Test at the 5% level whether the true mean differs from 100.	
9 Express $\frac{-3x^2 + 12x - 30}{(x-5)(x-2)^2}$ in partial fractions.	
10 The depth of water at a pier is modelled by $D = 12 + 2\sin(\frac{\pi t}{6})$, where t is in hours after noon. Find (a) the greatest and least values, (b) the values of t with $0 \leq t \leq 12$ when it equals 13 m.	