Day 324	A Level Maths: C Tier 10-a-day
1 A line has equation $\mathbf{r} = \begin{pmatrix} 1 \\ -2 \\ 4 \end{pmatrix} + t\begin{pmatrix} 3 \\ -1 \\ 2 \end{pmatrix}$. Write down a vector equation of the line through the origin, parallel to this line.	
2 For 25 values, $\Sigma x = 300$ and $\Sigma x^2 = 3800$. Find the mean and the standard deviation.	
3 A block of mass 10 kg is pulled along rough horizontal ground by a horizontal force of 54.2 N. The coefficient of friction is 0.4. Take $g = 9.8$ m s^{-2}. Find the acceleration.	
4 Expand and simplify $(6 + \sqrt{5})(6 - \sqrt{5})$.	
5 The continuous random variable X has probability density function $f(x) = k(x + 2)$ for $0 \leq x \leq 3$, and 0 otherwise. Find the value of k.	

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6 By writing 105° as 45° + 60°, find the exact value of cos 105°.	
7 A is (0, −1) and B is (6, −5). Find the equation of the perpendicular bisector of AB, in the form ax + by = c with integer a, b and c.	
8 Use $\sin\theta \approx \theta$ and $\cos\theta \approx 1 - \frac{\theta^2}{2}$ to estimate $\frac{\sin 0.08}{\cos 0.08}$.	
9 Find the set of values of x satisfying both $2x - 3 > 3$ and $x^2 - 8x + 12 < 0$.	
10 A particle of mass 4 kg changes its speed from 1 m s^{-1} to 6 m s^{-1}. Find the increase in its kinetic energy.	