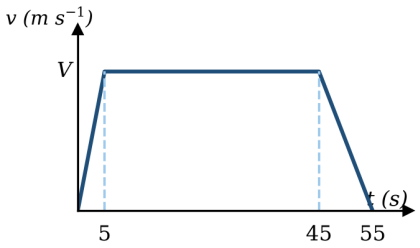
Day 289	A Level Maths: B Tier 10-a-day
1 The vector $\mathbf{a} = \begin{pmatrix} 12 \\ 1 \\ 12 \end{pmatrix}$. Find $\lvert\mathbf{a}\rvert$ and a unit vector in the direction of $\mathbf{a}$.	
2 Describe the single transformation that maps the graph of $y = f(x)$ onto the graph of: (a) $y = f(\frac{x}{4})$ (b) $y = 3f(x)$ (c) $y = f(-x)$	
3 A particle moves on a straight line. Its displacement from O at time t seconds is $s = 4t^3 + 2t^2 + 8t$ metres. Find its velocity and acceleration when $t = 3$.	
4 Prove that $n^3 + 3n + 4$ is even for all integers n.	
5 Given that $\sin\theta = \frac{24}{25}$ and $0 < \theta < 90°$, find the exact value of $\sin 2\theta$.	

Day 289 **A Level Maths: B Tier 10-a-day**

6 A lift travels between floors in 55 s. The speed-time graph is a trapezium, with the maximum speed V m s^{-1} held from t = 5 to t = 45.
The floors are 950 m apart. Find V, and the deceleration in the final stage.



7 (a) Write $\frac{-5x - 13}{(x + 2)(x + 3)}$ in partial fractions.
(b) Hence evaluate $\int_0^3 \frac{-5x - 13}{(x + 2)(x + 3)}\,dx$, giving the answer as a single logarithm.

8 The continuous random variable X has pdf f(x) = $\frac{2x}{64}$ for $0 \leq x \leq 8$, and 0 otherwise.
(a) Find P(X > 7).
(b) Find the median of X, to 3 significant figures.

9 Solve $(x + 2)(x + 1)(x + 5) \geq 0$.

10 Meteors are seen at random at an average rate of 8 per hour.
Find the probability that in 15 minutes there are exactly 3 (3 s.f.).