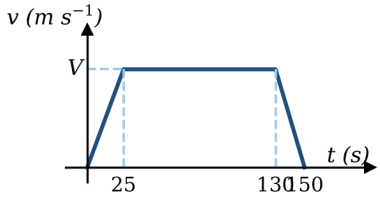
Day 165	A Level Maths: A Tier 10-a-day
1 Particle A (2 kg) rests on a smooth table, joined by a light string over a smooth pulley at the edge to particle B (3 kg), hanging 1.5 m above the floor. Released from rest. Find (a) the tension, (b) the speed of B as it hits the floor. Take g = 9.8.	
2 Solve $x - 5\sqrt{x} + 4 = 0$.	
3 A and B have position vectors $\begin{pmatrix}2\\1\end{pmatrix}$ and $\begin{pmatrix}2\\-2\end{pmatrix}$. The point P lies on AB with AP : PB = 1 : 2. Find the position vector of P and the exact distance OP.	
4 The equation $3x^2 + (2k - 2)x + (k - 1) = 0$ has real roots. Find the set of possible values of k.	
5 For a sample of 24 pairs of values of age of a car and its price, r = 0.582. The critical value for a one-tailed test at the 1% level is 0.4716. Test, at this level, whether there is positive correlation between the two variables.	

Day 165 **A Level Maths: A Tier 10-a-day**

6 The diagram shows the speed-time graph for a train journey of 3315 m. Find (a) V, (b) the deceleration in the final stage.



7 The vectors $\begin{pmatrix} k \\ k \\ -1 \end{pmatrix}$ and $\begin{pmatrix} k \\ 3 \\ 4 \end{pmatrix}$ are perpendicular.
Find the possible values of k and, for the larger value, the exact length of the first vector.

8 $X \sim N(\mu, \sigma^2)$, with $P(X < 49) = 0.0668$ and $P(X > 61) = 0.3085$.
Find μ and σ.

9 The tangent to the curve $y = e^x$ at the point P passes through the origin.
Find the coordinates of P and the equation of the tangent.

10 (a) Expand $(1 + x)^{\frac{1}{2}}$ in ascending powers of x up to x^2.
(b) Use x = 0.01 to estimate $\sqrt{101}$ to 3 decimal places.