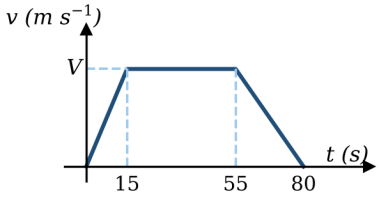
Day 295	A Level Maths: A Tier 10-a-day
1 P(A) = 0.3, P(B) = 0.75 and P(A ∩ B) = 0.15. Find (a) P(A ∪ B) (b) P(B′ | A′) (c) P(A′ ∩ B′)	
2 $y = 3^x$. Find the exact gradient of the curve at x = 1 and the equation of the tangent there.	
3 The diagram shows the speed-time graph for a train journey of 1140 m. Find (a) V, (b) the deceleration in the final stage. 	
4 A claim is that the probability p that a patient recovers is 0.2. In a sample of 28, the number of successes is 3. Test at the 10% level whether p has decreased.	
5 The sum of the first n terms of an arithmetic series is $S_n = n^2 - 3n$. (a) Find the first term and the common difference. (b) Find u_{20}.	

Day 295 **A Level Maths: A Tier 10-a-day**

6 Particle A (7 kg) rests on a smooth table, joined by a light string over a smooth pulley at the edge to particle B (3 kg), hanging 0.5 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. Give answers to 3 s.f. if not exact.

7 Expand $(8 + 3x)^{-\frac{1}{3}}$ in ascending powers of x, up to and including x^2.
State the range of x for which the expansion is valid.

8 l_1: $\mathbf{r} = \begin{pmatrix} 3 \\ 0 \\ 9 \end{pmatrix} + \lambda \begin{pmatrix} -1 \\ 1 \\ 2 \end{pmatrix}$
l_2: $\mathbf{r} = \begin{pmatrix} 4 \\ -3 \\ 4 \end{pmatrix} + \mu \begin{pmatrix} 1 \\ 1 \\ 1 \end{pmatrix}$
Determine whether l_1 and l_2 intersect. If they do, find the point of intersection.

9 $y = \cot(2x)$.
Find $\frac{dy}{dx}$ and its exact value at $x = \frac{\pi}{8}$.

10 Express $\frac{x^2 + 10x - 6}{(x - 2)(x + 4)}$ in the form $1 + \frac{A}{(x - 2)} + \frac{B}{(x + 4)}$, where A and B are constants to be found.