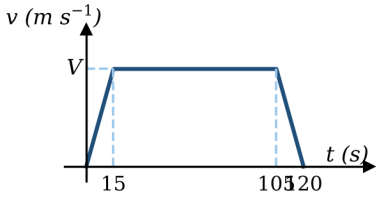
Day 104	A Level Maths: A Tier 10-a-day
1 Given that $\log_a 2 = p$ and $\log_a 3 = q$, express $\log_a(36)$ in terms of p and q.	
2 Particle A (7 kg) rests on a smooth table, joined by a light string over a smooth pulley at the edge to particle B (1 kg), hanging 0.5 m above the floor. Released from rest. 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.	
3 Express $\frac{5}{(x+1)} - \frac{1}{(x-1)}$ as a single fraction in its simplest form.	
4 The diagram shows the speed-time graph for a train journey of 1890 m. Find (a) V, (b) the deceleration in the final stage. 	
5 A curve has parametric equations $x = 3\cos t$, $y = 3\sin t$. Find $\frac{dy}{dx}$ in terms of t and the exact equation of the tangent at the point where $t = \frac{\pi}{6}$, in the form $y = mx + c$.	

Day 104	A Level Maths: A Tier 10-a-day
6 Express $\frac{4-3\sqrt{3}}{5+3\sqrt{3}}$ in the form $p+q\sqrt{3}$, where p and q are rational numbers.	
7 X ~ Po(40). Use a suitable approximation to find P(X ≥ 48), to 3 significant figures.	
8 A radioactive sample decays so that its mass is $M = M_0e^{-kt}$ grams, with t in days. Its half-life is 5 days. Show that $k = \frac{\ln 2}{5}$ and find how long it takes for 90% of the sample to decay.	
9 Parts are defective with probability 0.05, independently. A box of 8 parts is rejected if it has at least 2 defective. From 12 such boxes, find the probability that exactly 2 are rejected (3 s.f.).	
10 $f(x) = \frac{-12x-6}{(1+x)(1+3x)}$. (a) Express f(x) in partial fractions. (b) Hence expand f(x) up to x^2. (c) State the range of x for which the expansion is valid.	