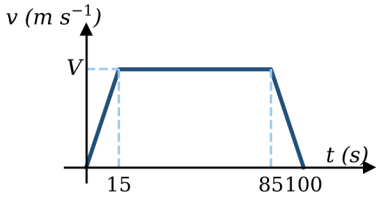
Day 117	A Level Maths: A Tier 10-a-day
1 The diagram shows the speed-time graph for a train journey of 765 m. Find (a) V, (b) the deceleration in the final stage. 	
2 Solve $x - 8\sqrt{x} + 15 = 0$.	
3 X, the height (cm), is $N(171, 7^2)$. Find the symmetric limits about the mean between which the central 90% of values lie (3 s.f.).	
4 Find the exact value of $\int_0^{\frac{\pi}{2}} (2\sin 2x + 3\cos x)\, dx$.	
5 Expand $(5 + 2x)^{-1}$ in ascending powers of x, up to and including x^2. State the range of x for which the expansion is valid.	

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6 Prove the identity
$\sec^2\theta + \operatorname{cosec}^2\theta \equiv 4\operatorname{cosec}^2 2\theta$

7 $f(x) = 3x^2 + 12x + 16$, $x \geq -2$.
Find $f^{-1}(x)$ and state its domain.

8 A 1200 kg car tows a 300 kg trailer by a light tow-bar on a horizontal road. Driving force 1450 N; resistances 600 N (car), 100 N (trailer). Find (a) the acceleration and the tow-bar tension. At 20 m s^{-1} the tow-bar breaks. (b) How far does the trailer then travel?

9 Water drains from a tank so that the depth h metres falls at a rate proportional to $\sqrt{h}$. Initially h = 64, and after 6 hours h = 25.
Form and solve a differential equation to find how long, in total, the tank takes to empty.

10 The diagram shows data and the regression line $y = 50 - 1.2x$.
(a) Interpret the gradient.
(b) Estimate y when x = 19 and comment.

