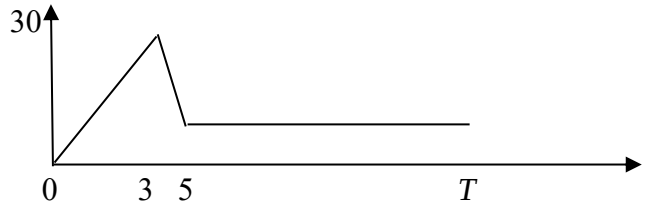
Question	Scheme	Marks	AOs	Notes
1 (a)	$V = 30\ (\text{m s}^{-1})$	B1	3.4	cao
		(1)		
(b)	 shape	B1	1.1b	Overall shape of the graph, starting at the origin. Dotted vertical line at end is OK but solid vertical line is B0
	figs	B1**ft**	1.1b	3, 5 and T marked on the t-axis, and **ft** on their 30 marked on the speed axis. 3 must be where graph reaches a peak. Allow delineators: 3, 2 and $T - 5$ or a mixture
		(2)		
(c)	Using total area = 550 to set up an equation in **one unknown,** Or they may use *suvat* on one or more of the sections (but must still be considering all sections) M0 if they use one *suvat* equation for the whole motion	M1	2.1	Need all sections to be included, with <u>correct structure for each section.</u> e.g. triangle + trapezium + rectangle oe = 550 to give an equation in **one unknown (may not be *T*)**
	$\frac{1}{2}\times 3\times 30+\frac{(30+6)}{2}\times 2+6(T-5)=550$ **OR**: $\frac{1}{2}\times 3\times 30+\frac{1}{2}\times 2\times 24+6(T-3)=550$ **OR:** $\frac{1}{2}\times 3\times 30+\frac{1}{2}\times 2\times 24+(2\times 6)+6(T-5)=550$	A2 **ft**	1.1b	**ft** on their answer to (a). -1 each error. **N.B.** If '6' is incorrect, treat as one error, unless it is correct ft from their 30.

	Solve for T	M1	1.1b	Attempt to solve for T provided they have tried to find the area using at least 3 sections. (M0 if they only solve for their unknown and never try to find T)
	$T = 83$ (nearest whole number)	A1	1.1b	83 is the only answer
		(5)		
(d)	New value of T would be bigger (ignore their reasons whether correct or not)	B1	3.5a	Clear statement about the value of T Allow '*it* would increase, get larger etc' B0 for 'Takes longer' or 'the value of T would be longer'
		(1)		
(e)	e.g. effect of wind; allow for dimensions of parachutist; use a more accurate value for g; parachutist does not fall vertically after chute opens; smooth changes in v; time for parachute to open; deceleration not constant (but B0 if they say *acceleration* not constant); smooth changes in a; B0 for: moves horizontally; mass/weight of parachutist; upthrust; air pressure;air resistance; terminal velocity	B1	3.5c	Any appropriate refinement of the model. B0 if incorrect (or irrelevant) extras
		(1)		
		(10 marks)		