Question	Scheme	Marks	AOs
1(a)	$\dfrac{10}{4}$	M1	3.4
	$2.5, \dfrac{5}{2}, \dfrac{10}{4}$ m s^{-2} units needed.	A1	1.1b
		(2)	
1(b)	Find the area, with correct structure, from $t = 0$ to 18	M1	3.1b
	$\dfrac{1}{2} \times 4 \times 10 + (14 \times 10)$ triangle + rectangle **or** $\dfrac{1}{2} \times 10 \times (14 + 18)$ trapezium **or** $(18 \times 10) - \dfrac{1}{2} \times 4 \times 10$ rectangle – triangle **N.B.** $\dfrac{1}{2} \times 4 \times 10$ may be replaced by $\dfrac{1}{2} \times 2.5 \times 4^2$ using $s = ut + \dfrac{1}{2}at^2$ or by $\dfrac{10^2 - 0^2}{2 \times 2.5}$ using $v^2 = u^2 + 2as$	A1	1.1b
	160 (m)	A1	1.1b
		(3)	
1(c)	Using area, from $t = 18$ to $t = 24$, $= (200 - \text{their (b)})$ with correct structure **OR** $s = (200 - \text{their (b)})$, using *suvat* to find s **N.B.** If their (b) is incorrect and they don't use it, allow a correct restart.	M1	3.1b
	$6U + \dfrac{1}{2} \times 6 \times (10 - U) = 200 - \text{their (b)}$ rectangle + triangle **or** $\dfrac{1}{2} \times 6 \times (10 + U) = 200 - \text{their (b)}$ trapezium ($s = \left(\dfrac{u+v}{2}\right)t$ **or** $(6 \times 10) - \dfrac{1}{2} \times 6 \times (10 - U) = 200 - \text{their (b)}$ rectangle – triangle **or** $(10 \times 6) + \dfrac{1}{2}\left(-\dfrac{(10 - U)}{6}\right) \times 6^2 = 200 - \text{their (b)}$ $s = ut + \dfrac{1}{2}at^2$ **or** $(U \times 6) - \dfrac{1}{2}\left(-\dfrac{(10 - U)}{6}\right) \times 6^2 = 200 - \text{their (b)}$ $s = vt - \dfrac{1}{2}at^2$ **N.B.** Two stage *suvat* method: $(10 \times 6) + \dfrac{1}{2}a \times 6^2 = 200 - \text{their (b)}$ **=>** **AND** $U = 10 + 6 \times \text{their } a$	A1**ft**	1.1b

		$\dfrac{10}{3} = 3\dfrac{1}{3}$ oe	A1	1.1b
			(3)	
			(8 marks)	

Notes:

1a	M1	Any complete *suvat* method to find *a* e.g. use $s = 20$ and $20 = \dfrac{1}{2}a \times 4^2$ **N.B**. Ignore units at this stage
	A1	**Any** equivalent number **with** correct units. Accept m/s^2, m/s/s, m per s per s.
1b	M1	Complete method, they may use s*uvat* on one or more sections, to find the **TOTAL** area. M0 if a single *suvat* equation is used for the whole motion M0 if $\dfrac{1}{2}$ not seen used in an area method
	A1	Correct unsimplified expression.
	A1	cao. Ignore units. **N.B.** Correct answer, **with no working,** can score all 3 marks.
1c	M1	Complete method, using area or *suvat*, to give an equation in *U* only, with correct structure M0 if $\dfrac{1}{2}$ not seen used in an area method M0 if 10 is used instead of $(10 - U)$ or $(10 - U)$ is used instead of $(10 + U)$ in any equation
	A1**ft**	Correct unsimplified equation in *U* only (allow *V* or *v* instead of *U*), **ft on their 160**.
	A1	Accept 3.3 or better. Ignore units. Allow use of *V* throughout instead of *U*, <u>including in the answer</u>. **N.B.** Correct answer, **with no working,** can score all 3 marks.