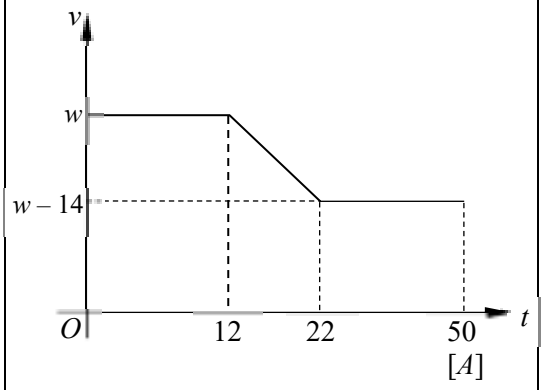
Question	Answer	Marks	Partial Marks
9(a)	Correct *v*-*t* graph soi e.g.  [*A*]	**B1**	
	Equates 'area' and distance e.g. $12w+\frac{1}{2}\times10\times(w+w-14)+28(w-14)=458$	**M2**	implies **B1** **M1** for $12w + ... + 28(w – 14) = 458$ soi or $12w + 70 + 10(w – 14) + ... = 458$ soi or $... + 70 + 10(w – 14) + 28(w – 14) = 458$
	18.4 ($m\,s^{-1}$)	**A1**	
9(b)(i)	$v = t^2 – 9t + 20$, $a = 2t – 9$ or $a = t – 5 + t – 4$ from product rule	**M1**	
	$t = 4.5$	**A1**	
9(b)(ii)	Critical values 4, 5	**M1**	
	$4 < t < 5$	**A1**	
9(b)(iii)	$\int_0^4(t^2-9t+20)\,dt+\left\lvert\int_4^5(t^2-9t+20)\,dt\right\rvert$ oe, soi	**M1**	**FT** *their* $t^2 – 9t + 20$ providing 3 terms
	$\left[\frac{t^3}{3}-\frac{9t^2}{2}+20t\right]_0^4+\left\lvert\left[\frac{t^3}{3}-\frac{9t^2}{2}+20t\right]_4^5\right\rvert$	**B1**	
	$\frac{64}{3}-72+80+\left\lvert\frac{125}{3}-\frac{225}{2}+100-\left(\frac{64}{3}-72+80\right)\right\rvert$	**M1**	**dep** on an attempt to integrate
	$\frac{59}{2}$ oe or 29.5	**A1**	

Question	Answer	Marks	Partial Marks
10(a)	$\overrightarrow{PQ} = 5\mathbf{i} + 15\mathbf{j}$ or $\overrightarrow{OQ} - \overrightarrow{OP} = 5(\overrightarrow{OR} - \overrightarrow{OP})$	**B1**	
	$\overrightarrow{OR} = 3\mathbf{i} - 2\mathbf{j} + \frac{1}{5}(their(5\mathbf{i} + 15\mathbf{j}))$ or $\overrightarrow{OR} = x\mathbf{i} + y\mathbf{j}$ $\overrightarrow{PR} = \mathbf{i} + 3\mathbf{j}$ and $\overrightarrow{PR} = (x-3)\mathbf{i} + (y+2)\mathbf{j}$ $x - 3 = 1$ and $y + 2 = 3$ oe or $5\overrightarrow{OR} = \overrightarrow{OQ} + 4\overrightarrow{OP}$ = $8\mathbf{i} + 13\mathbf{j} + 4(3\mathbf{i} - 2\mathbf{j})$ oe	**M1**	**FT** $\overrightarrow{PR} = \frac{1}{5}(their(5\mathbf{i} + 15\mathbf{j}))$
	$\overrightarrow{OR} = 4\mathbf{i} + \mathbf{j}$	**A1**	
	$\lvert their\ \overrightarrow{OR} \rvert = \sqrt{their(4^2) + their(1^2)}$	**M1**	**FT** *their* $a\mathbf{i} + b\mathbf{j}$
	$\frac{4\mathbf{i} + \mathbf{j}}{\sqrt{17}}$ oe	**A1**	
10(b)	$\overrightarrow{RS} = \lambda\mathbf{j} - their(4\mathbf{i} + \mathbf{j}) = -4\mathbf{i} + (\lambda - 1)\mathbf{j}$ soi or finds [equation RS is] $y = 3x + c$	**M1**	
	Correct method to find λ: $\frac{-4}{5} = \frac{\lambda - 1}{15}$ oe or [for some scalar t, $t(\lambda - 1) = 15$ and $-4t = 5$, therefore] $-\frac{5}{4}(\lambda - 1) = 15$ oe or finds e.g. $-2 = 3(3) + c$ oe	**M1**	**dep** on prev **M1** **FT** *their* $\overrightarrow{PQ}$
	$\lambda = -11$ cao	**A1**	