Question Number	Scheme	Marks
5a	Use of $\mathbf{a}=\dfrac{\mathrm{d}\mathbf{v}}{\mathrm{d}t}$: $\mathbf{a}=6t\mathbf{i}+2\mathbf{j}$	M1
	$t=0 \Rightarrow \mathbf{a}=2\mathbf{j}\ \left(\mathrm{m\,s^{-2}}\right)$	A1 (2)
5b	$11(2t-4)=\left(3t^2-4\right)$	M1
	$3t^2-22t+40=0 \Rightarrow \left(t=\dfrac{10}{3}\right)\ t=4$	M1
	$\mathbf{v}=44\mathbf{i}+4\mathbf{j}$, speed $=\sqrt{44^2+4^2}$	DM1
	$=4\sqrt{122}\ \left(\mathrm{m\ s^{-1}}\right)$	A1 (4)
5c	Use of $\mathbf{r}=\int \mathbf{v}\mathrm{d}t$	M1
	$\mathbf{r}=\left(t^3-4t\right)\mathbf{i}+\left(t^2-4t\right)\mathbf{j}$	A1
	Set $\mathbf{r}=0$ and solve for t	M1
	$t^3-4t=0 \Rightarrow t=0,2,(-2)$	
	$t^2-4t=0 \Rightarrow t=0,4$	
	the only common value is $t=0$, so does not return to O.*	A1* (4)
	Notes	**[10]**

5a M1 Powers going down

A1 Must see vector answer but ISW if go on to state the magnitude.

5b M1 Use of velocity parallel to $11\mathbf{i}+\mathbf{j}$ 11 must be on the correct side.

DM1 Select the larger root (dependent on the previous 2 M1 marks and on 2 positive roots) and use Pythagoras. Condone if they find both speeds

A1 Any equivalent simplified surd form $\left(\sqrt{1952}\right)$ ISW

44.18... implies M1 if correct surd form not seen.
Both values for speed given is A0

M1 Powers going up

A1 If a constant of integration is introduced, they must conclude it is equal to the zero vector

M1 Consider both components

Or equivalent clear explanation of **given result**.

A1* Condone if they ignore $t=0$. Do not need to see the roots. But do need to see the factorised form for each component if using this method.