			Allow use of column vectors apart from in given answer.
Q	Scheme	Marks	Notes
3a	Use of $\mathbf{v}=\frac{\mathbf{r}-\mathbf{r}_0}{2}$ to find $\mathbf{v}$	M1	Or equivalent, allow difference reversed. Allow 120 min
	$\mathbf{v}=\frac{1}{2}\left(\left(55\mathbf{i}+34\mathbf{j}\right)-\left(25\mathbf{i}+10\mathbf{j}\right)\right)$ $\left(=15\mathbf{i}+12\mathbf{j}\right)$	A1	Correct unsimplified expression for $\mathbf{v}$
	$\mathbf{r}_A=25\mathbf{i}+10\mathbf{j}+t\left(15\mathbf{i}+12\mathbf{j}\right)$	M1	With the correct structure Possible use of $\mathbf{r}_A=\left(55\mathbf{i}+34\mathbf{j}\right)+(t-2)\left(15\mathbf{i}+12\mathbf{j}\right)$.
	$(\mathbf{r}_A=)\ \ \left(25+15t\right)\mathbf{i}+\left(10+12t\right)\mathbf{j}$ *	A1*	We are looking for the RHS **only** to be correct. Allow order of terms to be reversed in the brackets. **N.B** Use of i's and j's in columns i.e. poor notation, can score Max M1A1M1A0*
		[4]	
3b	$\sqrt{12^2+15^2}$	M1	Correct use of Pythagoras for their $\mathbf{v}$
	$\sqrt{12^2+15^2}\times\frac{1000}{3600}=\frac{5\sqrt{369}}{18}=\frac{5\sqrt{41}}{6}$	A1	5.3 or better (5.3359……)
		[2]	
3c	Position of B at $t=1.5$ (allow t = 1.30)	M1	Correct use of position and direction vectors with correct structure.
	$\mathbf{r}_B=\left(35\mathbf{i}+51\mathbf{j}\right)+1.5\left(20\mathbf{i}-6\mathbf{j}\right)$	A1	Correct unsimplified
	$\Rightarrow\begin{pmatrix}65\\42\end{pmatrix}=\begin{pmatrix}25+15t\\10+12t\end{pmatrix}$ oe	M1	Use $\mathbf{r}_P=\mathbf{r}_A$ and use one component to solve for t **N.B.** If they use $\frac{65}{42}=\frac{25+15t}{10+12t}$ oe and solve for t, it's M0 unless they go on and substitute $t=\frac{8}{3}$ into $\mathbf{r}_A$ and obtain $65\mathbf{i}+42\mathbf{j}$, in which case it is M1A1, and could earn the final A1* with a correct conclusion.
	Obtain $t=\frac{8}{3}$ for one component	A1	**N.B.** Allow t = 2.7 or better for A1 but not for the second A1* but allow 2.6 recurring for both A marks.

	Obtain $t = \frac{8}{3}$ for both components and hence confirm *A* passes through *P* **OR** sub $t = \frac{8}{3}$ into $\mathbf{r}_A$ and obtain $65\mathbf{i} + 42\mathbf{j}$ and hence confirm *A* passes through *P*	A1*	Obtain given result from correct work. **N.B** Use of i's and j's in columns i.e. poor notation, can score Max M1A1M1A1A0* but only penalise ONCE for the whole question.
		[5]	
		(11)	