

Question Number	Scheme	Marks	Notes
7(a)	Use of $\mathbf{r} = \mathbf{r}_0 + \mathbf{v}t$	M1	At least once. Must be adding, not subtracting
	$\mathbf{r}_A = (8\mathbf{i} + 7\mathbf{j}) + t(2\mathbf{i} - 14\mathbf{j})$	A1	\mathbf{r}_A correct $\begin{pmatrix} 8 + 2t \\ 7 - 14t \end{pmatrix}$
	$\mathbf{r}_B = (\mathbf{i} + 2\mathbf{j}) + t(12\mathbf{i} - 4\mathbf{j})$	A1	\mathbf{r}_B correct $\begin{pmatrix} 1 + 12t \\ 2 - 4t \end{pmatrix}$
	$\overrightarrow{BA} = (8\mathbf{i} + 7\mathbf{j}) + t(2\mathbf{i} - 14\mathbf{j}) - [(\mathbf{i} + 2\mathbf{j}) + t(12\mathbf{i} - 4\mathbf{j})]$	M1	Need to see an indication of method as leading to a given answer
	$= (7 - 10t)\mathbf{i} + (5 - 10t)\mathbf{j}$	A1	Obtain given answer from correct working
		(5)	
(b)	Use of Pythagoras to equate distance to 2 km	M1	
	$(7 - 10t)^2 + (5 - 10t)^2 = 2^2$	A1	Correct unsimplified equation in t
	$20t^2 - 24t + 7 = 0$	M1	Form 3 term quadratic in t
	$(10t - 7)(2t - 1) = 0$	DM1	Solve for t . Dependent on the preceding M1. Must see working if using an incorrect quadratic
	$t = \frac{7}{10}$ or $\frac{1}{2}$	A1	
	Time $= \frac{7}{10} - \frac{1}{2}$	DM1	Correct method to find the time interval. Dependent on the preceding M1
	$= \frac{2}{10}$ h (12 min)	A1	
		(7)	
		(12)	