Question Number	Scheme	Marks
6(a)	$(11\mathbf{i}+11\mathbf{j})+t(3\mathbf{i}-\mathbf{j})$	M1A1 (2)
6(b)	When t = 6, $\mathbf{r}_A=(29\mathbf{i}+5\mathbf{j})$	M1
	$\mathbf{r}_B=(7\mathbf{i}+16\mathbf{j})+t(4\mathbf{i}-2\mathbf{j})=(29\mathbf{i}+5\mathbf{j})$	M1
	Solve **both** $4t+7=29$ and $16-2t=5$ **explicitly** to give t = 5.5 for **both equations** **(**Division by vectors is DM0)	**D**M1 A1* (4)
6(c)	$\overrightarrow{AB}=(7\mathbf{i}+16\mathbf{j})+t(4\mathbf{i}-2\mathbf{j})-\{(11\mathbf{i}+11\mathbf{j})+t(3\mathbf{i}-\mathbf{j})\}$	M1
	$\overrightarrow{AB}=[(t-4)\mathbf{i}+(5-t)\mathbf{j}]$ m GIVEN ANSWER	A1* (2)
6(d)	$AB^2=(t-4)^2+(5-t)^2$ oe seen or implied by a numerical calculation	M1
	$=2(t-4.5)^2+0.5$	A1
	Complete method using the above to find the minimum	M1
	Minimum $AB=\sqrt{0.5}=0.71$ m (or better)	A1
	OR $AB^2=(t-4)^2+(5-t)^2$ oe seen or implied by a numerical calculation M1	
	$4t-18$ **or** $2(t-4)-2(5-t)$ A1 **N.B**. Either of these could be implied by seeing t = 4.5	
	Complete method using the above to find the minimum M1	
	Minimum $AB=\sqrt{0.5}=0.71$ m (or better) A1	(4)
	OR $AB^2=(t-4)^2+(5-t)^2$ oe seen or implied by a numerical calculation M1	
	$2t^2-18t+(41-d^2)=0$ $(d=AB)$ A1	
	Complete method using $b^2-4ac=0$: $(-18)^2-4\times2(41-d^2)=0$ to find minimum M1	
	Minimum $AB=\sqrt{0.5}=0.71$ m (or better) A1	
	Accept column vectors throughout except in (c)	**(12)**
	Notes for question 6	
6(a)	M1 for an attempt at $\mathbf{r}_A$ with a correct structure	
	A1 cao	
6(b)	M1 for putting t = 6 into their $\mathbf{r}_A$ to find $\mathbf{r}_P$	
	M1 for equating their $\mathbf{r}_B$ at time t (with correct structure) to their $\mathbf{r}_P$	
	DM1 Solve their vector equation for **both** components, dependent on both previous M marks. Need to see 5.5 occurring **twice**. **N.B**. One ratio equation is not sufficient for this mark	