Question Number	Scheme	Marks
	Allow column vectors throughout	
8(a)	$\sqrt{3^2+12^2}$	M1
	$\sqrt{153}$, $3\sqrt{17}$, 12 or better (km h^{-1})	A1
		(2)
8(b)	$(-9\mathbf{i}+6\mathbf{j})+t(3\mathbf{i}+12\mathbf{j})$	M1 A1
	$(16\mathbf{i}+6\mathbf{j})+t(p\mathbf{i}+q\mathbf{j})$	A1
	$\overrightarrow{AB}=\mathbf{b}-\mathbf{a}=(16\mathbf{i}+6\mathbf{j})+t(p\mathbf{i}+q\mathbf{j})-\left((-9\mathbf{i}+6\mathbf{j})+t(3\mathbf{i}+12\mathbf{j})\right)$	M1 A1
	$=\left[25+t(p-3)\right]\mathbf{i}+t(q-12)\mathbf{j}\right]$	
	Compare with: $\left[(25-12t)\mathbf{i}-9t\mathbf{j}\right]$ or e.g. use $\mathbf{b}=\mathbf{AB}+\mathbf{a}$ to obtain an equation in p only and an equation in q only. May be implied by correct answers only. $(-12=p-3$ and $-9=q-12)$ **N.B.** This mark may not be available if they go wrong and the t's don't cancel.	M1
	$p=-9$, $q=3$	A1
		(7)
8(c)	$(25-12t)^2+(-9t)^2=15^2$ $\quad(225t^2-600t+400=0)$	M1A1
	$t=\dfrac{4}{3}$	A1
	$\pm(9\mathbf{i}-12\mathbf{j})$ Note that this a method mark.	**DM**1
	$\tan\theta=\dfrac{9}{12}$	M1
	$\theta=37^o$	A1
	Bearing is 323^o to nearest degree	A1
		(7)
		(16)

	Notes for question 8	
8(a)	M1 Use of Pythagoras with square root	
	A1 cao	
8(b)	M1 Correct structure for either	
	A1 cao	
	A1 cao	
	M1 Allow **a** − **b**	
	A1 for a correct **unsimplified** expression for either **b** – **a** or **a** – **b**	
	M1 for an equation in *p* only and an equation in *q* only	
	A1 cao	
8(c)	M1 Use of Pythagoras to give an equation in *t* only Allow with a square root.	
	A1 Correct unsimplified quadratic equation	
	A1 $t = 1.3$ or better	
	DM1 Use of their *t* to find $\overrightarrow{AB}$ or $\overrightarrow{BA}$, dependent on previous M. May be implied. Allow if they use one of their two incorrect *t* values.	
	M1 For an equation in a relevant angle for their **AB.** Could be implied by a relevant angle seen on a diagram which could need checking with a calculator	
	A1 Correct relevant angle e.g $37^o, 53^o, 127^o, etc$ or better	
	A1 cao	

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