Question Number	Scheme	Marks
	Allow column vectors throughout except for the answer to (b).	
8(a)	Use trig to get an equation in a relevant angle e.g tan α = 1 or uses isosceles triangle. M0 if not using the velocity of Q	M1
	135°	A1
		(2)
8(b)	$\mathbf{p} = t(15\mathbf{i})$	M1 A1
	$\mathbf{q} = 200\mathbf{j} + t(20\mathbf{i} - 20\mathbf{j})$ oe	A1
	$\overrightarrow{PQ} = \mathbf{q} - \mathbf{p} = 200\mathbf{j} + t(20\mathbf{i} - 20\mathbf{j}) - t(15\mathbf{i})$ (M0 if they put **p** = **q**) Need to see at least this line of working.	M1
	$\overrightarrow{PQ} = 5t\mathbf{i} + (200 - 20t)\mathbf{j}$ (m) *	A1*
		(5)
8(c)	$\overrightarrow{PQ} = 50\mathbf{i}$ at t = 10 (Allow M1 if they find **p** = 150**i** and **q** = 200**i** at t = 10) **N.B.** This mark could be implied by a correct diagram	M1
	270°	A1
		(2)
8(d)	$5t = 200 - 20t$	M1
	$t = 8$	A1
	$\overrightarrow{PQ} = (5\times 8)\mathbf{i} + (200 - 20\times 8)\mathbf{j}$	M1
	$PQ = \sqrt{40^2 + 40^2} = 40\sqrt{2}$ (m) , 57 or better	M1A1
		(5)
8(e)	$(5t)^2 + (200 - 20t)^2 = 200^2$	M1
	$425t^2 - 8000t = 0$	A1
	t = 0 or $\frac{320}{17}$=18.82… Accept 19 or better Apply isw	A1
		(3)
		(17)
	Notes for question 8	
8(a)	M1 e.g. use of cos or sin or the cosine rule	
	A1 cao	
8(b)	M1 Correct structure for either	
	A1 oe	
	A1 oe	
	M1 Allow **p** – **q**	
	A1* Correct given answer correctly obtained, allow omission of m.	
8(c)	M1 Clear attempt to find $\overrightarrow{PQ}$ at t = 10 or **p** and **q** at t = 10	
	A1 cao	
8(d)	M1 Equating components to give an equation in t only, with no vectors	
	A1 cao	
	M1 Substituting their t value into their $\overrightarrow{PQ}$	
	M1 Finding the magnitude, with square root	

	A1 cao	
8(e)	M1 Use of Pythagoras – allow with square root – to obtain an equation in *t*.	
	A1 Correct unsimplified 2 term quadratic in *t*.	
	A1 For both answers	

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