

Question Number	Scheme	Marks
7(a)	$\tan q = \frac{2}{9} \quad q = 12.5^\circ \quad \text{bearing } 103^\circ$	M1 A1 A1 (3)
(b) (i) (ii)	$\mathbf{p} = (9\mathbf{i} + 10\mathbf{j}) + t(9\mathbf{i} - 2\mathbf{j})$ $\mathbf{q} = (\mathbf{i} + 4\mathbf{j}) + t(4\mathbf{i} + 8\mathbf{j})$	M1 A1 A1 (3)
(c)	$\overrightarrow{QP} = (8 + 5t)\mathbf{i} + (6 - 10t)\mathbf{j}$	M1 A1 (2)
(d)	$D^2 = (8 + 5t)^2 + (6 - 10t)^2$ $= 125t^2 - 40t + 100$ $100 = 125t^2 - 40t + 100$ $0 = 5t(25t - 8)$ $t = 0 \quad \text{or} \quad 0.32$	M1 A1  M1 M1 A1 A1 (6)  <b>14</b>
<b>Notes</b>		
7(a)	M1 for $\tan q = \pm \frac{2}{9}$ or $\pm \frac{2}{9}$ or use $\sin q$ or $\cos q$	
	First A1 for $q = \pm 13^\circ$ or $\pm 77^\circ$ or $\pm 12.5^\circ$ or $\pm 77.5^\circ$ or better	
	Second A1 for $103^\circ$	
7(b)	M1 for clear attempt at $\mathbf{p} = (9\mathbf{i} + 10\mathbf{j}) + t(9\mathbf{i} - 2\mathbf{j})$ or $\mathbf{q} = (\mathbf{i} + 4\mathbf{j}) + t(4\mathbf{i} + 8\mathbf{j})$ (Allow slips but must be a '+' sign and $\mathbf{r} + t\mathbf{v}$ )	
(i)	First A1 for $\mathbf{p} = (9\mathbf{i} + 10\mathbf{j}) + t(9\mathbf{i} - 2\mathbf{j})$ oe	
(ii)	Second A1 for $\mathbf{q} = (\mathbf{i} + 4\mathbf{j}) + t(4\mathbf{i} + 8\mathbf{j})$ oe	
7(c)	M1 for $\mathbf{p} - \mathbf{q}$ or $\mathbf{q} - \mathbf{p}$ with their $\mathbf{p}$ and $\mathbf{q}$ substituted A1 for correct answer $\overrightarrow{QP} = (8 + 5t)\mathbf{i} + (6 - 10t)\mathbf{j}$ (don't need $\overrightarrow{QP}$ but on R.H.S must be <b>identical</b> coefficients of $\mathbf{i}$ and $\mathbf{j}$ but allow column vectors)	
7(d)	First M1 for attempt to find $QP$ or $QP^2$ in terms of $t$ only, using correct formula First A1 for a correct expression (with or without $\sqrt{\phantom{x}}$ ) $125t^2 - 40t + 100$ Second M1 for $\sqrt{\phantom{x}}$ (3 term quadratic) = 10 or (3 term quadratic) = 100. Third M1 for quadratic expression = 0 and attempt to solve (e.g. factorising or using formula) Second A1 for $t = 0$ (if they divide by $t$ and lose this value but get 0.32, M1A0A1) Third A1 for $t = 0.32$ oe	