

QUESTION NUMBER	SCHEME	MARKS
<b>6(a)</b>	$\frac{(20\mathbf{i} + 34\mathbf{j}) - (15\mathbf{i} + 36\mathbf{j})}{0.5}$ oe	M1
	$(10\mathbf{i} - 4\mathbf{j})^*$	A1*
		(2)
<b>6(b)</b>	$(15\mathbf{i} + 36\mathbf{j}) + t(10\mathbf{i} - 4\mathbf{j})$	M1 A1
		(2)
<b>6(c)(i)</b>	Verify using $t = 1.5$ in <b>p</b> or <b>q</b>  $\mathbf{p} = (15\mathbf{i} + 36\mathbf{j}) + 1.5(10\mathbf{i} - 4\mathbf{j}) = 30\mathbf{i} + 30\mathbf{j}$  $\mathbf{q} = (42 - 8 \times 1.5)\mathbf{i} + (9 + 14 \times 1.5)\mathbf{j} = 30\mathbf{i} + 30\mathbf{j}$	M1  A1  A1
<b>(ii)</b>	$30\mathbf{i} + 30\mathbf{j}$	A1 (B1)
	<b>N.B.</b> The A mark for (ii) is now to be treated as a B mark.	
		(4)
<b>ALT1 (i)</b>	Find $t$ by equating <b>i</b> or <b>j</b> components of <b>p</b> and <b>q</b>  Equate <b>i</b> 's $15 + 10t = 42 - 8t \rightarrow t = 1.5$ <b>j</b> 's $36 - 4t = 9 + 14t \rightarrow t = 1.5$	M1  A1 A1
<b>(ii)</b>	$30\mathbf{i} + 30\mathbf{j}$	A1 (B1)
<b>ALT2 (i)</b>	Uses ratio: $\frac{15 + 10t}{36 - 4t} = \frac{42 - 8t}{9 + 14t}$ $\rightarrow t = 1.5$ or $-8.5$ verifies that components are both 30 at $t = 1.5$	M1  A1 A1
<b>(ii)</b>	$30\mathbf{i} + 30\mathbf{j}$	A1 (B1)
		(4)
<b>6(d)</b>	Position of $P$ at 14:30 is $40\mathbf{i} + 26\mathbf{j}$	B1
	Position of $Q$ when $t = 0.5$ $\mathbf{q} = (42 - 8 \times 0.5)\mathbf{i} + (9 + 14 \times 0.5)\mathbf{j}$ $(= (38\mathbf{i} + 16\mathbf{j}))$	M1
	$15\mathbf{j}$ seen or implied	B1
	New position of $Q$ at time 14:30 $\mathbf{q} = (38\mathbf{i} + 16\mathbf{j}) + 2(15\mathbf{j})$ <b>N.B.</b> M0 if 2.5 is used.	M1
	$\mathbf{q} = 38\mathbf{i} + 46\mathbf{j}$	A1
	$ PQ  = \sqrt{(40 - 38)^2 + (26 - 46)^2}$	dM1
	$= \sqrt{404}$ or $2\sqrt{101}$ (km)	A1
		(7)
		<b>(15)</b>