

QUESTION NUMBER	SCHEME	MARKS
6(a)	$\frac{(20\mathbf{i} + 34\mathbf{j}) - (15\mathbf{i} + 36\mathbf{j})}{0.5}$ oe $(10\mathbf{i} - 4\mathbf{j})^*$	M1 A1* (2)
6(b)	$(15\mathbf{i} + 36\mathbf{j}) + t(10\mathbf{i} - 4\mathbf{j})$	M1 A1 (2)
6(c)(i)	Verify using $t = 1.5$ in p or q $\mathbf{p} = (15\mathbf{i} + 36\mathbf{j}) + 1.5(10\mathbf{i} - 4\mathbf{j}) = 30\mathbf{i} + 30\mathbf{j}$ $\mathbf{q} = (42 - 8 \times 1.5)\mathbf{i} + (9 + 14 \times 1.5)\mathbf{j} = 30\mathbf{i} + 30\mathbf{j}$	M1 A1 A1
(ii)	$30\mathbf{i} + 30\mathbf{j}$	A1 (B1)
	N.B. The A mark for (ii) is now to be treated as a B mark.	(4)
ALT1 (i)	Find t by equating i or j components of p and q Equate i 's $15 + 10t = 42 - 8t \rightarrow t = 1.5$ j 's $36 - 4t = 9 + 14t \rightarrow t = 1.5$	M1 A1 A1
(ii)	$30\mathbf{i} + 30\mathbf{j}$	A1 (B1)
ALT2 (i)	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
(ii)	$30\mathbf{i} + 30\mathbf{j}$	A1 (B1)
		(4)
6(d)	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 $\mathbf{q} = (38\mathbf{i} + 16\mathbf{j}) + 2(15\mathbf{j})$ N.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}$ $= \sqrt{404}$ or $2\sqrt{101}$ (km)	dM1 A1
		(7)
		(15)