

Question	Scheme		Marks
5(a)	$(2\mathbf{i} - 3\mathbf{j}) + (p\mathbf{i} + q\mathbf{j}) = (p+2)\mathbf{i} + (q-3)\mathbf{j}$	Resultant force = $\mathbf{F}_1 + \mathbf{F}_2$ in the form $a\mathbf{i} + b\mathbf{j}$	M1
	$\left. \begin{array}{l} \frac{p+2}{q-3} = \frac{1}{2} \quad \text{or} \quad p+2 = n \\ q-3 = 2n \end{array} \right\} \text{ for } n \neq 1$	Use parallel vector to form a scalar equation in p and q .	M1
		Correct equation (accept any equivalent form)	A1
	$4 + 2p = -3 + q$	Dependent on no errors seen in comparing the vectors. Rearrange to obtain given answer. At least one stage of working between the fraction and the given answer	DM1
	$2p - q + 7 = 0$	Given Answer	A1
			(5)
5(b)	$q = 11 \Rightarrow p = 2$		B1
	$\mathbf{R} = 4\mathbf{i} + 8\mathbf{j}$	$(2+p)\mathbf{i} + 8\mathbf{j}$ for their p	M1
	$4\mathbf{i} + 8\mathbf{j} = 2\mathbf{a} \quad (\mathbf{a} = 2\mathbf{i} + 4\mathbf{j})$	Use of $\mathbf{F} = m\mathbf{a}$	M1
	$ \mathbf{a} = \sqrt{2^2 + 4^2}$	Correct method for $ \mathbf{a} $ Dependent on the preceding M1	DM1
	$= \sqrt{20} = 4.5 \text{ or } 4.47 \text{ or better (m s}^{-2}\text{)}$	$2\sqrt{5}$	A1
			(5)
	Alternative for the last two M marks:		
	$ \mathbf{F} = \sqrt{16 + 64} (= \sqrt{80})$	Correct method for $ \mathbf{F} $	M1
	$\sqrt{80} = 2 \times \mathbf{a} $	Use of $ \mathbf{F} = m \mathbf{a} $ Dependent on the preceding M1	DM1
			(5)
(10 marks)			