

Question Number	Scheme	Marks
7(a)	$\mathbf{F}_2 = k\mathbf{i} + k\mathbf{j}$ $(-1+a)\mathbf{i} + (2+b)\mathbf{j}$ $\frac{-1+a}{2+b} = \frac{1}{3}$ $a = b = k = 2.5; \quad \mathbf{F}_2 = 2.5\mathbf{i} + 2.5\mathbf{j}$	B1 M1 DM1 A1 DM1 A1; A1 (7)
	ALTERNATIVE: $\mathbf{F}_2 = k\mathbf{i} + k\mathbf{j}$ $(-1+a)\mathbf{i} + (2+b)\mathbf{j} = p(\mathbf{i} + 3\mathbf{j})$ $-1+a = p$ $2+b = 3p$ $a = b = k = 2.5; \quad \mathbf{F}_2 = 2.5\mathbf{i} + 2.5\mathbf{j}$	B1 M1 for LHS DM1 A1 DM1 A1; A1 (7)
(b)	$\mathbf{v} = 3\mathbf{i} - 22\mathbf{j} + 3(3\mathbf{i} + 9\mathbf{j})$ $= 12\mathbf{i} + 5\mathbf{j}$ $ \mathbf{v} = \sqrt{12^2 + 5^2} = 13 \text{ ms}^{-1}$	M1 A1 M1 A1 cso (4) 11
Notes		
7(a)	<p>B1 for $\mathbf{F}_2 = k\mathbf{i} + k\mathbf{j}$ ($k \neq 1$) seen or implied in working, including for an incorrect final answer, with the wrong k value.</p> <p>First M1 for adding the 2 forces (for this M mark we only need $\mathbf{F}_2 = a\mathbf{i} + b\mathbf{j}$), with \mathbf{i}'s and \mathbf{j}'s collected (which can be implied by later working) but allow a slip. <u>(M0 if a and b both assumed to be 1)</u></p> <p>Second M1, dependent on first M1, for ratio of their cpts = 1/3 or 3/1 (Must be correct way up for the M mark)</p> <p>First A1 for a correct equation which may involve two unknowns</p> <p>Third M1, dependent on first and second M1, for solving for k oe</p> <p>Second A1 for a correct k value</p> <p>Third A1 for $2.5\mathbf{i} + 2.5\mathbf{j}$</p>	