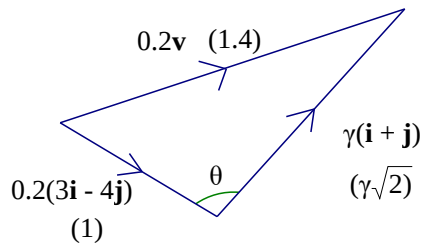
Q	Mark Scheme	Marks	Marking guidance
3.	Use of $\mathbf{I} = m\mathbf{v} - m\mathbf{u}$	M1	Accept equivalent e.g. $\mathbf{I}+m\mathbf{u}= m\mathbf{v}$. Dimensionally correct and must be using subtraction (but could be the wrong way round). The use of 7 in place of the velocity in the impulse momentum equation is M0 unless they recover. **See below**
	$0.2\left(\mathbf{v}-4\mathbf{i}+3\mathbf{j}\right)=\lambda\left(\mathbf{i}+\mathbf{j}\right)$ $\left(\left(x-4\right)\mathbf{i}+\left(y+3\right)\mathbf{j}=5\lambda\mathbf{i}+5\lambda\mathbf{j}\right)$	A1	Correct unsimplified vector equation or pair of separate equations for the **i** and **j** components. Condone column vectors with **i** and **j** included in the components.
	Use of Pythagoras for the speed	M1	Correct use of Pythagoras and 49 for their speed
	$x^2+y^2=49$	A1	Correct unsimplified equation for their x, y
	Form quadratic in x, y or λ and solve for λ	DM1	Dependent on both previous M marks. $x^2 + -(x\ 7)^2 = 49$ or $(y+7)^2 + = y^2\ 49$ or $(5\lambda+ 4)^2 + (5\lambda- =3)^2\ 49$
	$\lambda=\frac{3}{5}$ or $\lambda=-\frac{4}{5}$	A1	Or equivalent
** ** ** ** ** ** **	Special case: Candidates who use 7 as a vector can score a **maximum** of M1A0M1A0 for $1.4^2 = +(\lambda\ 0.8)^2 + -(\lambda\ 0.6)^2$ or equivalent DM1A0 for forming and solving a quadratic in λ.		This maximum of 3 marks is only available for those candidates who "recover". So, **if all you see** is $\lambda\ \lambda\mathbf{i}+ = -\mathbf{j}$ $1.4 \quad 0.2 \quad 4(\mathbf{i}-3\mathbf{j})$ they score M0M0M0 If they recover to go on to form a "sensible" equation using Pythagoras then they can score the first 2 M marks, and potentially the third M1 as well.
		(6)	
3 alt			
	Form vector triangle	M1	Dimensionally correct. Allow incorrect configuration
	Correct triangle and correct lengths	A1	In speeds or momentum but not a mixture
	Use scalar product to find cosine of angle	M1	Or equivalent method
	$\cos\theta=-\frac{1}{5\sqrt{2}}$	A1	Allow $\pm$
	Form equation in λ $\left(2\lambda^2+.4\lambda-0.96=0\right)$	DM1	e.g. by use of cosine rule Dependent on the first 2 M marks
	$\lambda=\frac{3}{5}$ or $\lambda=-\frac{4}{5}$	A1	Or equivalent
		(6)	