QUESTION NUMBER	SCHEME	MARKS
5	Accept column vectors throughout the question.	
	Velocity in component form eg $\mathbf{v}=(v\cos 45°)\mathbf{i}\pm(v\sin 45°)\mathbf{j}$ OR $\mathbf{v}=\lambda\mathbf{i}\pm\lambda\mathbf{j}$	M1 A1
	Change in momentum in vector form $0.5\mathbf{v}-0.5(6\mathbf{i})$	M1 A1
	Use of magnitude of impulse to form an equation **in one unknown**. eg $\frac{3\sqrt{2}}{2}=\sqrt{(0.5v\cos 45°-3)^2+(0.5v\sin 45°)^2}$ OR $\frac{3\sqrt{2}}{2}=\sqrt{(0.5\lambda-3)^2+(0.5\lambda)^2}$	M1 A1
	$-\frac{3}{2}\mathbf{i}+\frac{3}{2}\mathbf{j}$ $-\frac{3}{2}\mathbf{i}-\frac{3}{2}\mathbf{j}$	A1 A1
		(8)
	Notes for question	
	Accept column vectors throughout the question.	
M1	Velocity after impact as components in variable form.	
A1	Correct unsimplified expressions Eg $\mathbf{v}=(v\cos 45)\mathbf{i}\pm(v\sin 45)\mathbf{j}$ or $\mathbf{v}=\lambda\mathbf{i}\pm\lambda\mathbf{j}$	
M1	$m(\mathbf{v}-\mathbf{u})$ used in vector form.	
A1	Correct unsimplified expression, $0.5\mathbf{v}-0.5(6\mathbf{i})$	
M1	Use of magnitude of **impulse** to form an equation in one unknown. Eg $\frac{3\sqrt{2}}{2}=\sqrt{(0.5v\cos 45°-3)^2+(0.5v\sin 45°)^2}$ $(\Rightarrow v=3\sqrt{2})$ Or $\frac{3\sqrt{2}}{2}=\sqrt{(0.5\lambda-3)^2+(0.5\lambda)^2}$ $(\Rightarrow \lambda=3)$	
A1	Correct unsimplified equation.	
A1	At least one correct expression for impulse must be in $p\mathbf{i}+q\mathbf{j}$ form for this mark	
A1	Two correct expressions for impulse. Do not penalise lack of $p\mathbf{i}+q\mathbf{j}$ form twice.	
	N.B. Case1: If solution appears as per scheme, then full marks possible **Case 2**: If no ± in line one but two solutions emerge at end, then full marks available **Case 3**: If only one sign used in line one, and only one solution appears at end, then max M1A0M1A1 M1A1A1A0	