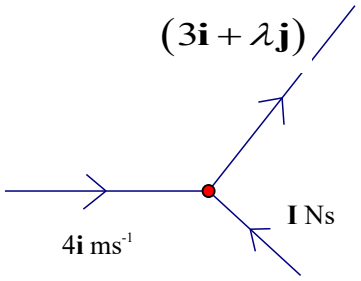
Question Number		Mark	Note
2a			
	Impulse momentum equation	M1	Must be subtracting but condone subtraction in the wrong order Condone poor notation e.g. $\sqrt{29}=2(3\mathbf{i}+\lambda\mathbf{j})-2(4\mathbf{i})\left(=2(-\mathbf{i}+\lambda\mathbf{j})\right)$
	$(\mathbf{I}=)\ 2(3\mathbf{i}+\lambda\mathbf{j})-2(4\mathbf{i})\left(=2(-\mathbf{i}+\lambda\mathbf{j})\right)$	A1	Correct unsimplified expression for **I** Accept $2(\mathbf{i}-\lambda\mathbf{j})$
	Correct use of magnitude for their impulse e.g. $29=4(1+\lambda^2)$	M1	Allow with square roots on both sides
	$\lambda=2.5$	A1	Or equivalent. Must be positive.
		[4]	
2b	Correct use of trig or scalar product to find ratio for a relevant angle, for $4\mathbf{i}$ and their **I** e.g. $\tan\theta=\pm\frac{2}{2\lambda}$ or $\pm\frac{2\lambda}{2}$ or equivalent sin or cos equation.	M1	M0 if they use $(3\mathbf{i}+\lambda\mathbf{j})$ M0 for $\tan^{-1}\frac{2}{5}-\tan^{-1}4$ or similar
	Correct ratio for a relevant angle e.g. $\tan\theta=\pm\frac{2}{5}$ or $\pm\frac{5}{2}$ or equivalent sin or cos equation e.g. $\cos\theta=\frac{-2}{\sqrt{29}}$	A1ft	Follow their λ
	$111.801409...°$ or 1.9513027…. radians	A1	Accept $110°$ or 2, 2.0 radians or better
		[3]	
		(7)	