Q	Scheme	Mark	Notes
2a	Use of $\mathbf{I} = m\mathbf{v} - m\mathbf{u}$	M1	NB: Column vectors are acceptable. Condone wrong order but must be subtracting. Condone 5 in place of 0.5.
	$2\mathbf{i} + 5\mathbf{j} = 0.5\left(\mathbf{v} - \left(3\mathbf{i} + \mathbf{j}\right)\right)$ $\left(\mathbf{v} = 7\mathbf{i} + 11\mathbf{j}\right)$	A1	Correct unsimplified equation Accept as a vector equation or as a pair of equations, one for each component. Accept alternative notations provided the meaning is clear.
	Use of Pythagoras	M1	For their **v** Independent M1 but they must have a **v**
	$\lvert v\rvert = \sqrt{121 + 49} = \sqrt{170}\ \left(\text{m s}^{-1}\right)$	A1	$13\left(\text{m s}^{-1}\right)$ or better. (13.038…….)
		[4]	
2b	Correct use of trigonometry e.g. $\theta = \tan^{-1}\frac{11}{7} - \tan^{-1}\frac{1}{3}$ $\left(= 57.5 - 18.4\right)$	M1	Condone subtraction in either order. Allow if **both** fractions are the other way up. Alternatives: scalar product $\theta = \cos^{-1}\left(\frac{21+11}{\sqrt{10}\sqrt{170}}\right)$ cosine rule $4 \times 29 = 10 + 170 - 2\sqrt{10}\sqrt{170}\cos\theta$
	$\theta = 39.1$	A1	Accept ± 39 or better (39.0938…) 0.68(2) radians is M1A0 Accept $\pm\left(360 - 39\right) = \pm 321$ or better
		[2]	
		(6)	