1a	Use of $\mathbf{I} = m\mathbf{v} - m\mathbf{u}$	M1	Condone subtraction in the wrong order.
	$\begin{pmatrix} -4 \\ 6 \end{pmatrix} = \frac{1}{2}\begin{pmatrix} x-2 \\ y-4 \end{pmatrix}$	A1	Correct unsimplified equation Any equivalent form. Allow with **v**
	$\mathbf{v} = -6\mathbf{i} + 16\mathbf{j}\left(\text{m s}^{-1}\right)$	A1	Correct only. Seen or implied SR: Allow 3/3 if stop at $\mathbf{v} = 6\mathbf{i} - 16\mathbf{j}\left(\text{m s}^{-1}\right)$
	$\lvert\mathbf{v}\rvert = \sqrt{(-6)^2 + 16^2}$	M1	Correct use of Pythagoras with their **v**
	$= \sqrt{292}\ \left(= 2\sqrt{73}\right)\left(\text{m s}^{-1}\right)$	A1	Correct simplified value. 17 or better (17.088……)
			Allow 5/5 if working from the negative of the velocity.
		[5]	
1b	Correct use of trigonometry to find 2 relevant angles - as values or in inverse tangent form	M1	For their **v** e.g. $\pm 69.44..°, 63.43..°$ or $\pm 1.212..., 0.4636..$
	$\theta = \left(180° - \tan^{-1}\frac{16}{6}\right) - \tan^{-1}\frac{4}{2}$	A1ft	Correct unsimplified expression for θ Any equivalent form
	$= 47°$	A1	$47°$ or better (47.121..) $312.9°$ Accept radians (0.8224..)
		[3]	
1b alt	Use of scalar product with two relevant vectors	M1	For their **v**
	$\theta = \cos^{-1}\left(\frac{-12+64}{\sqrt{20}\sqrt{292}}\right)$	A1ft	Correct unsimplified expression for $\cos\theta$ or equivalent
	$= 47°$	A1	$47°$ or better (47.121..) $312.9°$ Accept radians (0.8224..)
		[3]	
		(8)	