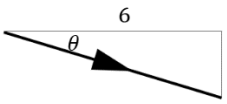
Question Number	Scheme	Marks
3(a)	Velocity $= (14\mathbf{i} - 5\mathbf{j}) + 2(-4\mathbf{i} + \mathbf{j})$	M1
	Speed $= \sqrt{6^2 + (-3)^2}$	M1
	Speed $= \sqrt{45} = 3\sqrt{5} = 6.7\left(\text{ms}^{-1}\right)$ or better	A1 cso
		(3)
3(b)	 $\tan^{-1}\left(\frac{3}{6}\right)$	M1 A1ft
	27° or better **OR** 333° or better 0.46 rads or better **OR** 5.8 rads or better	A1
		(3)
3(c)	$\mathbf{v} = (14\mathbf{i} - 5\mathbf{j}) + (-4\mathbf{i} + \mathbf{j})T$ (allow t) **OR** $\mathbf{v} = (6\mathbf{i} - 3\mathbf{j}) + (-4\mathbf{i} + \mathbf{j})t$ $(t = T - 2)$	M1
	$\frac{14 - 4T}{-5 + T} = \frac{2}{-3}$	M1 A1
	$T = 3.2$	A1
		(4)
(10)		
	NOTES	
	Accept the use of column vectors throughout	
(a) **M1** **M1** **A1**	Correct use of $t = 2$ to find the velocity (unsimplified). Use of Pythagoras to find the speed when $t = 2$ with <u>their</u> velocity. $\sqrt{45} = 3\sqrt{5} = 6.7\left(\text{ms}^{-1}\right)$ or better $(6.70820\ldots)$. Must come from correct velocity.	
(b) **M1** **A1ft** **A1**	Use trig to find an equation in a relevant angle e.g. $(90° - \theta)$ for their *velocity*. Correct equation for a relevant angle, ft on their **v** Cao. No isw (A0 for a negative answer)	

(c) **M1** **M1** **A1** **A1**	Use of $\mathbf{v} = \mathbf{u} + \mathbf{a}T$ to obtain a velocity vector in T (allow t) Use ratios, using *their* **velocity**, to produce an equation in T only (Allow reciprocal and incorrect sign) Correct equation in T only Cao **N.B.** If they use their answer to (a) instead of $\mathbf{u} = (14\mathbf{i} - 5\mathbf{j})$ but never correct their value of t, can score M1M1A0A0 **N.B.** If they use $\mathbf{v} = k(2\mathbf{i} - 3\mathbf{j})$ to produce 2 simultaneous equations in k and T, and then they use a calculator to solve and get $T = 3.2$, award all the marks, but if they get the wrong answer, they lose the last 3 marks.	