	Take moments about the centre of *ABCD*	M1	
	$M \times \frac{2\sqrt{2}}{11} a = kM \times 4\sqrt{2}a$	A1	Correct unsimplified equation in k Allow with a not seen
	$\Rightarrow k = \frac{1}{22}$	A1	Allow with a not seen
		[9]	
Question Number	Solution	Marks	Notes
5a	$\mathbf{a} = \frac{\mathrm{d}\mathbf{v}}{\mathrm{d}t}$	M1	Differentiate to obtain **a** – powers going down
	$= (6t - 9)\mathbf{i} + (2t + 1)\mathbf{j}$	A1	differentiation correct
	$= 9\mathbf{i} + 7\mathbf{j}$ $(\mathrm{m\,s^{-2}})$	A1	ISW if go on to find $\lvert\mathbf{a}\rvert$
		(3)	
5b	Instantaneous rest $\Rightarrow \mathbf{v} = 0\mathbf{i} + 0\mathbf{j}$ $\Rightarrow 3(t-1)(t-2) = 0$ and $(t-2)(t+3) = 0$	M1	Set **v** = 0 and solve for t (Need **both components** equal to zero)
	$\Rightarrow t = 2$	A1	
	$\mathbf{r} = \int \mathbf{v}\mathrm{d}t$	M1	Integrate to obtain **r** – powers going up. Condone if no constant of integration seen.
	$= \left(t^3 - \frac{9}{2}t^2 + 6t\right)\mathbf{i} + \left(\frac{1}{3}t^3 + \frac{1}{2}t^2 - 6t\right)\mathbf{j}$	A1 A1	At most one error Correct integration Allow column vector. Allow A1A0 for correct integration and non-zero constants(s) of integration
	$= 2\mathbf{i} - \frac{22}{3}\mathbf{j}$, distance $= \sqrt{2^2 + \left(\frac{22}{3}\right)^2}$	DM1	Correct strategy to find the distance, i.e. substitute their value for t and use Pythagoras Dependent on the two preceding M marks
	$= \frac{2\sqrt{130}}{3} = 7.60$ (m)	A1	7.6 or better from correct work
		(7)	
		[10]	