Question	Scheme	Marks	AOs
7(a)	$\overrightarrow{AB} = \left(\begin{pmatrix} t \\ 2t \\ 5t \end{pmatrix} - \begin{pmatrix} 8 \\ -3 \\ 2 \end{pmatrix}\right)$	M1	1.1b
	$\overrightarrow{AB} = \begin{pmatrix} t-8 \\ 2t+3 \\ 5t-2 \end{pmatrix} \Rightarrow \left\lvert\overrightarrow{AB}\right\rvert^2 = (t-8)^2 + (2t+3)^2 + (5t-2)^2 = \ldots$	M1	1.1b
	$= t^2 - 16t + 64 + 4t^2 + 12t + 9 + 25t^2 - 20t + 4$ $= 30t^2 - 24t + 77$*	A1*	2.1
		(3)	
(b)(i)	$\left\lvert\overrightarrow{AB}\right\rvert^2 = 30t^2 - 24t + 77 \Rightarrow \frac{\mathrm{d}\left\lvert\overrightarrow{AB}\right\rvert^2}{\mathrm{d}t} = 60t - 24 = 0 \Rightarrow t = \ldots$ or $\left\lvert\overrightarrow{AB}\right\rvert^2 = 30t^2 - 24t + 77 = 30\left(t^2 - \frac{4}{5}t + \frac{77}{30}\right)$ $= 30\left(\left(t - \frac{2}{5}\right)^2 + \frac{361}{150}\right) \Rightarrow t = \ldots$	M1	3.1a
	$t = \frac{2}{5}$	A1	2.2a
(ii)	$\left\lvert\overrightarrow{AB}\right\rvert = \sqrt{\left(\frac{2}{5} - 8\right)^2 + \left(2\left(\frac{2}{5}\right) + 3\right)^2 + \left(5\left(\frac{2}{5}\right) - 2\right)^2}$	dM1	1.1b
	$\left\lvert\overrightarrow{AB}\right\rvert = \frac{19\sqrt{5}}{5}$	A1	1.1b
		(4)	
(c)	$\overrightarrow{OC} = \overrightarrow{OA} + \frac{5}{8}\overrightarrow{AB} = \begin{pmatrix} 8 \\ -3 \\ 2 \end{pmatrix} + \frac{5}{8}\begin{pmatrix} \frac{2}{5} - 8 \\ \frac{4}{5} + 3 \\ 0 \end{pmatrix}$ or $\overrightarrow{OC} = \overrightarrow{OB} + \frac{3}{8}\overrightarrow{BA} = \begin{pmatrix} \frac{2}{5} \\ \frac{4}{5} \\ 2 \end{pmatrix} + \frac{3}{8}\begin{pmatrix} 8 - \frac{2}{5} \\ -3 - \frac{4}{5} \\ 0 \end{pmatrix}$	M1	3.1a
	$\left(\frac{13}{4}, -\frac{5}{8}, 2\right)$	A1	1.1b
		(2)	
			(9 marks)

Notes

(a)
M1: Subtracts the 2 vectors either way round
M1: Applies Pythagoras to their vector and attempts to expand brackets
A1*: Obtains the printed answer with no errors.
(b)(i)
M1: Correct strategy for finding the value for *t* e.g. calculus or completing the square

A1: Correct value
(ii)
dM1: Substitutes their value for t and attempts the minimum distance
A1: Cao
(c)
M1: Fully correct strategy to find the coordinates of C
A1: Correct coordinates (condone if given as a vector)