

Question		Answer	Marks	AO	Guidance
9	(a)	$\begin{pmatrix} 3 \\ 3 \\ -3 \end{pmatrix}$ or $3\mathbf{i} + 3\mathbf{j} - 3\mathbf{k}$	B1 [1]	1.1	do not allow $(3, 3, -3)$; mark the final answer
9	(b)	$[\overrightarrow{OC}] = \begin{pmatrix} -1 \\ -2 \\ 0 \end{pmatrix} + \frac{1}{3} \begin{pmatrix} 3 \\ 3 \\ -3 \end{pmatrix}$ oe $\begin{pmatrix} 0 \\ -1 \\ -1 \end{pmatrix}$ or $-\mathbf{j} - \mathbf{k}$	M1 A1	3.1a 1.1	FT their $\begin{pmatrix} 3 \\ 3 \\ -3 \end{pmatrix}$ allow B2 for correct answer unsupported; mark the final answer if M0 allow SC1 for $\left[\begin{pmatrix} -1 \\ -2 \\ 0 \end{pmatrix} + \frac{2}{3} \begin{pmatrix} 3 \\ 3 \\ -3 \end{pmatrix} = \right] \begin{pmatrix} 1 \\ 0 \\ -2 \end{pmatrix}$ do not allow $(0, -1, -1)$; only penalise coordinate form once
		Alternative method 1 $[\overrightarrow{AC}] = \begin{pmatrix} a-1 \\ b-2 \\ c-0 \end{pmatrix} [\overrightarrow{CB}] = \begin{pmatrix} 2-a \\ 1-b \\ -3-c \end{pmatrix}$ $2\overrightarrow{AC} = \overrightarrow{CB}$ equating coefficients: $2a + 2 = 2 - a$ $2b + 4 = 1 - b$ $2c = -3 - c$ $\begin{pmatrix} 0 \\ -1 \\ -1 \end{pmatrix}$ or $-\mathbf{j} - \mathbf{k}$	M1 A1		may work with i, j, k notation allow one sign error only do not allow $(0, -1, -1)$; only penalise coordinate form once

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	Alternative method 2 $2\overrightarrow{OC} - 2\begin{pmatrix} -1 \\ -2 \\ 0 \end{pmatrix} = \begin{pmatrix} 2 \\ 1 \\ -3 \end{pmatrix} - \overrightarrow{OC}$ $\begin{pmatrix} 0 \\ -1 \\ -1 \end{pmatrix}$ or $-\mathbf{j} - \mathbf{k}$	M1 A1		may see $3\overrightarrow{OC} = \begin{pmatrix} 0 \\ -3 \\ -3 \end{pmatrix}$; allow one sign error only; may work with i, j, k notation do not allow $(0, -1, -1)$; only penalise coordinate form once
	Alternative method 3 $[\overrightarrow{OC}] = \frac{2}{3}\begin{pmatrix} -1 \\ -2 \\ 0 \end{pmatrix} + \frac{1}{3}\begin{pmatrix} 2 \\ 1 \\ -3 \end{pmatrix}$ $\begin{pmatrix} 0 \\ -1 \\ -1 \end{pmatrix}$ or $-\mathbf{j} - \mathbf{k}$	M1 A1		ratio theorem; may work with i, j, k notation do not allow $(0, -1, -1)$; only penalise coordinate form once
		[2]		