Question			Answer	Mark	AO	Guidance
2	(a)	(i)	$\overrightarrow{AB} = \begin{pmatrix}-3\\6\end{pmatrix} - \begin{pmatrix}-4\\3\end{pmatrix}$ or $\begin{pmatrix}1\\3\end{pmatrix}$ $\overrightarrow{BC} = \begin{pmatrix}-1\\12\end{pmatrix} - \begin{pmatrix}-3\\6\end{pmatrix}$ or $\begin{pmatrix}2\\6\end{pmatrix}$	M1	1.1	One of these. Attempt **b** − **a** or **c** − **b** or similar
			$\overrightarrow{BC} = 2\ \overrightarrow{AB}$ or $\overrightarrow{BC}$ is a multiple of $\overrightarrow{AB}$ Hence B lies on AC	A1	2.1	Dep correct $\overrightarrow{AB}$ and $\overrightarrow{BC}$ Multiple (2) not required, but if given must be correct.
			Alternative method 1: $\overrightarrow{AB} = \begin{pmatrix}-3\\6\end{pmatrix} - \begin{pmatrix}-4\\3\end{pmatrix}$ or $\begin{pmatrix}1\\3\end{pmatrix}$	M1		One of these. Attempt **b** − **a** and **c** − **a** or similar

			$\overrightarrow{AC} = \begin{pmatrix}-1\\12\end{pmatrix} - \begin{pmatrix}-4\\3\end{pmatrix}$ or $\begin{pmatrix}3\\9\end{pmatrix}$ $\overrightarrow{AC} = 3\overrightarrow{AB}$ or $\overrightarrow{AC}$ is a multiple of $\overrightarrow{AB}$ Hence *B* lies on *AC*	**A1**		Dep correct $\overrightarrow{AB}$ and $\overrightarrow{AC}$ Multiple (3) not required, but if given must be correct.
			Alternative method 2: Gradient of line *AC* is $m = 3$ Equation of line *AC* is $y - (3) = 3(x - (-4))$ $(y = 3x + 15)$ At $x = -3,\ y = 3(-3) + 15 = 6$ (i.e. *B*) Hence *B* lies on *AC*	**M1** **A1**		Find (gradient and) equation of line *AC* – need not be simplified Substituting in *x*-coordinate of *B* (or both *x*,*y*) to show consistent Dep on correct equation
			Alternative method 3: Gradient of line *AB* is 3 AND Gradient of line *BC* is 3 As *B* lies on both *AB* and *BC*, and *AB* and *BC* have the same gradient, *B* lies on *AC*. (OR therefore *A*,*B*,*C* are colinear)	**M1** **A1**		Must both be explicitly stated for this method. Must make a convincing argument (not just conclude directly from two gradients) www.
				[2]		
2	**(a)**	**(ii)**	*AB* : *BC* = 1 : 2	**B1** **[1]**	**1.1**	Must be a ratio (but may be equivalent e.g. 2 : 4)
2	**(b)**		*Q* marked at (4, 2) or (4, 2) stated Magnitude = $2\sqrt{2}$ or $\sqrt{8}$ or 2.83 (3 sf) Direction = −45° or 315°	**B1** **B1** **B1** **[3]**	**3.1a** **1.1** **1.1**	May be implied by correct magnitude or direction Accept any unambiguous indication of the direction of $\overrightarrow{PQ}$ e.g. "towards the x-axis along $x + y = 6$" OR an arrow on diagram OR stating direction together with the column vector $\overrightarrow{PQ} = \begin{pmatrix}2\\-2\end{pmatrix}$ Condone 135° as a bearing (but must state "bearing")

2	**(c)**		$\begin{pmatrix}4\\3\end{pmatrix}$ and $\begin{pmatrix}0\\5\end{pmatrix}$	**B1** **B1** **[2]**	**3.1a** **1.1**	SC. Either or both "correct" but coordinates: max **SCB1**