Question	Answer	Mark	Mark scheme	Additional guidance
23	$\frac{15}{4}$	P1	for process to find $\overrightarrow{BC}$ or $\overrightarrow{CB}$, eg $\overrightarrow{BC} = -3\mathbf{b} + \mathbf{a} + 2\mathbf{b}$ oe $(= \mathbf{a} - \mathbf{b})$ **or** $\overrightarrow{CB} = -2\mathbf{b} - \mathbf{a} + 3\mathbf{b}$ oe $(= -\mathbf{a} + \mathbf{b})$	Vectors must be unambiguously identified Accept BC for $\overrightarrow{BC}$ etc throughout Allow a for **a** and b for **b** throughout Vectors could be written on the diagram and may be in either direction.
		P1	for process that uses the ratio 5 : 3, eg $\overrightarrow{BN} = \frac{5}{8}(-3\mathbf{b} + \mathbf{a} + 2\mathbf{b})$ $(= \frac{5}{8}\mathbf{a} - \frac{5}{8}\mathbf{b})$ or $\overrightarrow{NB} = -\frac{5}{8}\mathbf{a} + \frac{5}{8}\mathbf{b}$ oe **or** $\overrightarrow{CN} = \frac{3}{8}(-2\mathbf{b} - \mathbf{a} + 3\mathbf{b})$ $(= -\frac{3}{8}\mathbf{a} + \frac{3}{8}\mathbf{b})$ or $\overrightarrow{NC} = \frac{3}{8}\mathbf{a} - \frac{3}{8}\mathbf{b}$ oe	Throughout, do not condone missing brackets unless recovered Follow through candidates $\overrightarrow{BC}$ or $\overrightarrow{CB}$ provided full method to find subsequent vectors is clearly shown A correct expression for $\overrightarrow{BN}$ or $\overrightarrow{NB}$ or $\overrightarrow{CN}$ or $\overrightarrow{NC}$ implies the previous P mark
		P1	for a process to find an expression, in terms of **a** and **b**, for $\overrightarrow{MN}$ **or** $\overrightarrow{MP}$ **or** $\overrightarrow{NP}$ eg $\overrightarrow{MN} = -\frac{1}{2}\mathbf{a} + 3\mathbf{b} + \frac{5}{8}(\mathbf{a} - \mathbf{b})$ oe $(= \frac{1}{8}\mathbf{a} + \frac{19}{8}\mathbf{b})$ **or** $\overrightarrow{MN} = \frac{1}{2}\mathbf{a} + 2\mathbf{b} + \frac{3}{8}(-\mathbf{a} + \mathbf{b})$ oe $(= \frac{1}{8}\mathbf{a} + \frac{19}{8}\mathbf{b})$ **or** $\overrightarrow{MP} = \frac{1}{2}\mathbf{a} + 2\mathbf{b} + k(2\mathbf{b})$ oe **or** $\overrightarrow{NP} = \frac{3}{8}\mathbf{a} - \frac{3}{8}\mathbf{b} + k(2\mathbf{b})$ oe	Follow through candidates $\overrightarrow{BN}$ or $\overrightarrow{NB}$ or $\overrightarrow{CN}$ or $\overrightarrow{NC}$ provided full method to find subsequent vectors is clearly shown May use $\overrightarrow{NM}$ or $\overrightarrow{PM}$ or $\overrightarrow{PN}$ Allow equivalent vectors throughout eg $\overrightarrow{MP} = \frac{1}{2}\mathbf{a} + 2\mathbf{b} + \mu(\mathbf{b})$ This mark may be awarded without the previous mark being awarded

Question	Answer	Mark	Mark scheme	Additional guidance
		P1	for a process to find a **correct** expression, in terms of **a** and **b** for the same vector eg $\overrightarrow{MP}$ or $\overrightarrow{NP}$ **or** parallel vectors eg $\overrightarrow{MP}$ and $\overrightarrow{MN}$ or $\overrightarrow{NP}$ and $\overrightarrow{MN}$ **eg** $\overrightarrow{MP}=\frac{1}{2}\mathbf{a}+2\mathbf{b}+k(2\mathbf{b})$ oe **and** $\overrightarrow{MP}=\lambda\left(\frac{1}{8}\mathbf{a}+\frac{19}{8}\mathbf{b}\right)$ oe **or** $\overrightarrow{NP}=\frac{3}{8}\mathbf{a}-\frac{3}{8}\mathbf{b}+k(2\mathbf{b})$ oe **and** $\overrightarrow{NP}=\lambda\left(\frac{1}{8}\mathbf{a}+\frac{19}{8}\mathbf{b}\right)$ oe **or** $\overrightarrow{MP}=\frac{1}{2}\mathbf{a}+2\mathbf{b}+k(2\mathbf{b})$ oe **and** $\overrightarrow{MN}=\frac{1}{8}\mathbf{a}+\frac{19}{8}\mathbf{b}$ oe **or** $\overrightarrow{NP}=\frac{3}{8}\mathbf{a}-\frac{3}{8}\mathbf{b}+k(2\mathbf{b})$ oe **and** $\overrightarrow{MN}=\frac{1}{8}\mathbf{a}+\frac{19}{8}\mathbf{b}$ oe	Vectors do not have to be simplified May use $\overrightarrow{NM}$ or $\overrightarrow{PM}$ or $\overrightarrow{PN}$ Condone use of same variable for equivalent vector journeys Condone lack of labelling if vector journeys are correctly equated
			OR for a process to find a **correct** expression in terms of **a** and **b**, for $\overrightarrow{AP}$ or $\overrightarrow{CP}$ using $\overrightarrow{MN}$ $\overrightarrow{AP}=-\frac{1}{2}\mathbf{a}+\mu\left(\frac{1}{8}\mathbf{a}+\frac{19}{8}\mathbf{b}\right)$ oe **or** $\overrightarrow{CP}=-\frac{3}{8}\mathbf{a}+\frac{3}{8}\mathbf{b}+\mu\left(\frac{1}{8}\mathbf{a}+\frac{19}{8}\mathbf{b}\right)$ oe	May use $\overrightarrow{PA}$ or $\overrightarrow{PC}$ NB: $\overrightarrow{CP}=-\frac{1}{2}\mathbf{a}-2\mathbf{b}+\mu\left(\frac{1}{8}\mathbf{a}+\frac{19}{8}\mathbf{b}\right)$
			OR for a process to find a **correct** expression in terms of **a** and **b** for the same vector $\overrightarrow{BP}$ or $\overrightarrow{OP}$ $\overrightarrow{BP}=\mathbf{a}-\mathbf{b}+k(2\mathbf{b})$ oe **and** $\overrightarrow{BP}=\frac{5}{8}\mathbf{a}-\frac{5}{8}\mathbf{b}+\mu\left(\frac{1}{8}\mathbf{a}+\frac{19}{8}\mathbf{b}\right)$ oe $\overrightarrow{OP}=\mathbf{a}+2\mathbf{b}+k(2\mathbf{b})$ oe **and** $\overrightarrow{OP}=\frac{1}{2}\mathbf{a}+\mu\left(\frac{1}{8}\mathbf{a}+\frac{19}{8}\mathbf{b}\right)$ oe	May use $\overrightarrow{PB}$ or $\overrightarrow{PO}$
		A1	for $\frac{15}{4}$ oe	Award 0 marks for a correct answer with no supportive working