M1.(a)   Line $x = -2$ drawn

B1

Additional Guidance

Line does not need to be full length of grid.

Line can be solid or dashed.

(b)   Line $y = x$ drawn

B1

Additional Guidance

Line does not need to be full length of grid.

Line can be solid or dashed.

(c)   Translation

Accept Translate

B1

9 right and 8 down

or $\begin{pmatrix} 9 \\ -8 \end{pmatrix}$

Accept (9, −8)

B1

Additional Guidance

$(y = -8, x = 9)$ is   B0 B0

[4]

M2.(a)   **b − a** or **−a + b**

        B2 if answer unsimplified

        or

        *B2 for **b − 2a** or **2a − b***

        *or $\frac{1}{2}$(2**b** − 4**a**) or $\frac{1}{2}$ (4**a** − 2**b**)*

        *B1 for 2**b** − 4**a** or 4**a** − 2**b***

                                        B3

        Alternative Method

        b − a or **−a + b**

        Midpoint theorem

        B2 if answer unsimplified

        or

        *B2 for −3**a** + $\frac{1}{2}$(4**a** + 2**b**)*

        *B1 for $\frac{1}{2}$(4**a** + 2**b**)*

                                          B3

(b)   ($\overrightarrow{MC}$ =) **a** + 2**b** − 4**a** + **b**

        oe

                                          M1

        $\overrightarrow{MC}$ = 3(**b** − **a**) or 3**b** − 3**a**

                                          A1

        MC is parallel to MN **and** M is a common point

        or $\overrightarrow{MC}$ = 3 $\overrightarrow{MN}$ (must be vectors)

        strand (iii) for both facts stated or vector statement

                                          Q1

Alternative Method

$(\overrightarrow{NC}$ =) **b** − 2**a** + **b**

oe

M1

$\overrightarrow{NC}$ = 2(**b** − **a**) or 2**b** − 2**a**

A1

NC is parallel to MN **and** N is a common point

or $\overrightarrow{NC}$ = 2$\overrightarrow{MN}$ (must be vectors)

strand (iii) for both facts stated or vector statement

Q1

[6]

M3.(a) −**a** + **b** or **b** − **a**

B1

(b) (Vector AC =) 2.5(−**a** + **b**) *oe*

or (vector BC =) 1.5(−**a** + **b**)

*ft from their (a) provided it is a vector of the form m**a** + n**b***

M1

a + 2.5(−**a** + **b**)

oe

or **b** + 1.5(−**a** + **b**)

M1dep

−1.5**a** + 2.5**b** *oe*

Answer must be simplified

A1ft

[4]

M4.(a) $-\mathbf{p}$ (+) $2\mathbf{q} - \mathbf{p}$ (+) $5\mathbf{p}$

oe

B1

(b) $\mathbf{q} - \dfrac{1}{2}\,\mathbf{p}$ or $-\mathbf{q} + \dfrac{1}{2}\,\mathbf{p}$

or $2\mathbf{p}$ or $-2\mathbf{p}$

or $3\mathbf{p}$ or $-3\mathbf{p}$

oe

$\dfrac{1}{2}\,(2\mathbf{q} - \mathbf{p})$ or $\dfrac{1}{2}\,(\mathbf{p} - 2\mathbf{q})$

M1

$(\overrightarrow{MN} =)\ \ \mathbf{q} - \dfrac{1}{2}\,\mathbf{p} + 2\mathbf{p}$

or $(MN\ (\overrightarrow{MN} =)\ \ -2\mathbf{p} - \mathbf{q} + \dfrac{1}{2}\,\mathbf{p}$

oe

$(\overrightarrow{MN} =)\ \ -\mathbf{q} + \dfrac{1}{2}\,\mathbf{p} + \mathbf{p} + 3\mathbf{p} + 2\mathbf{q} - 3\mathbf{p}$

or $(\overrightarrow{NM} =)\ \ 3\mathbf{p} - 3\mathbf{p} - 2\mathbf{q} - \mathbf{p} + \mathbf{q} - \dfrac{1}{2}\,\mathbf{p}$

M1dep

$(\overrightarrow{MN} =)\ \ \mathbf{q} + \dfrac{3}{2}\,\mathbf{p}$

or $(\overrightarrow{NM} =)\ \ -(\mathbf{q} + \dfrac{3}{2}\,\mathbf{p})$

oe

Must be fully simplified

A1

$(\overrightarrow{MN} =)\ \ = \dfrac{1}{2}\,(2\mathbf{q} + 3\mathbf{p})$

or MN is a multiple / fraction of CB (therefore parallel)

oe

$$\overrightarrow{CB} = 2(q + \tfrac{3}{2}\,p)$$

or $\tfrac{1}{2}\,\overrightarrow{CB} = q + \tfrac{3}{2}\,p$

or $2(q + \tfrac{3}{2}\,p) = 2q + 3p$

or $q + \tfrac{3}{2}\,p = \tfrac{1}{2}(2q + 3p)$

$MN = \tfrac{1}{2}\,CB$ or $CB = 2MN$

or $CB : MN = 2 : 1$

A1

[5]