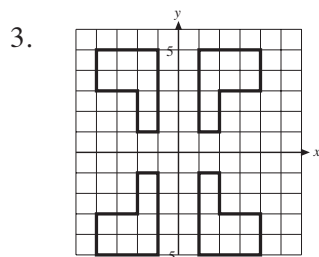
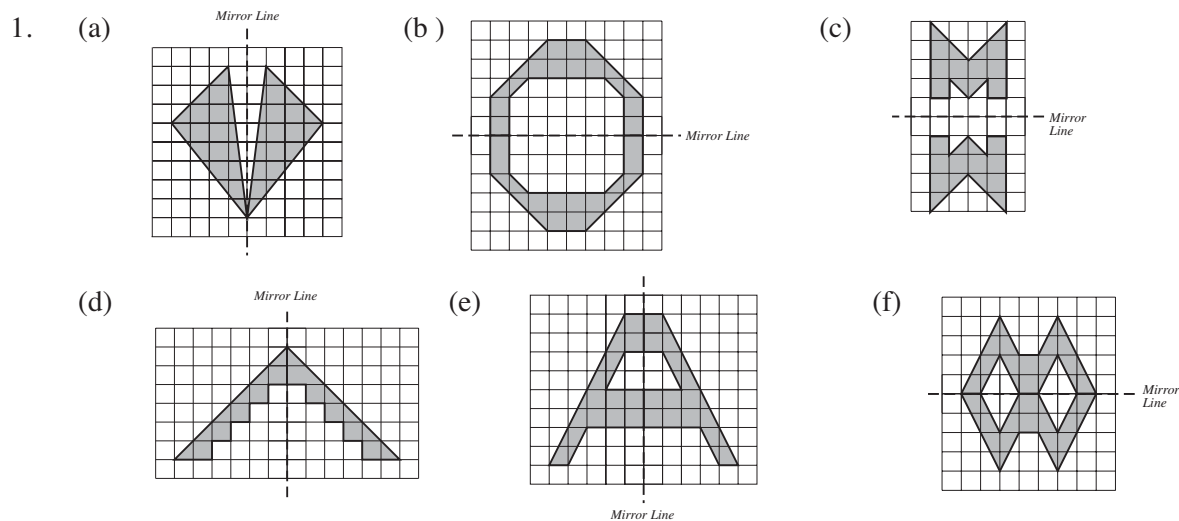


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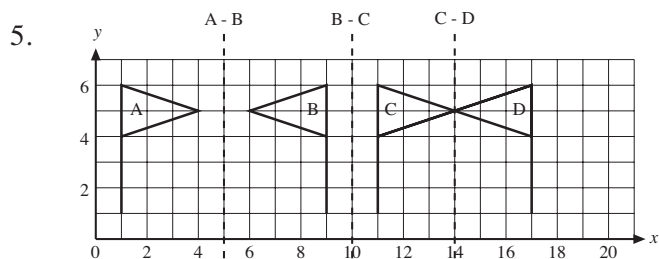
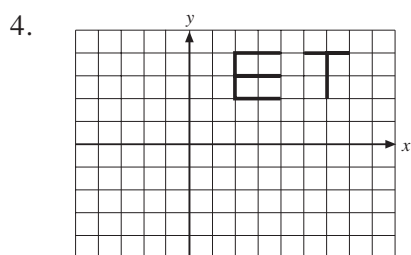
37.1 Reflections



(c) $(-1, 1)$, $(-1, 5)$, $(-4, 5)$, $(-4, 3)$, $(-2, 3)$, $(-2, 1)$

(d) $(-1, -1)$, $(-1, -5)$, $(-4, -5)$, $(-4, -3)$, $(-2, -3)$, $(-2, -1)$

(e) Reflect original shape in x -axis



6. (b) (iii) x coordinates become negative, y coordinates stay the same.

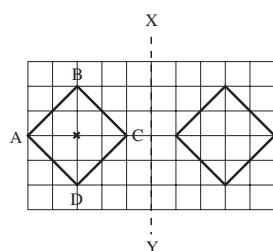
(c) (iii) y coordinates become negative, x coordinates stay the same.

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Answers

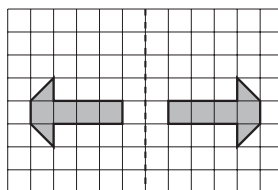
37.1

7.



8. (a) 5 square units

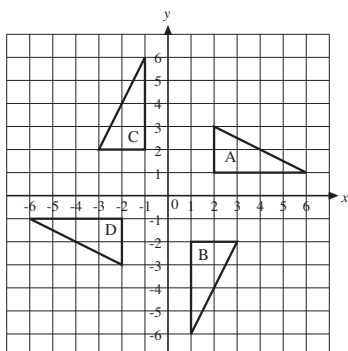
(b)



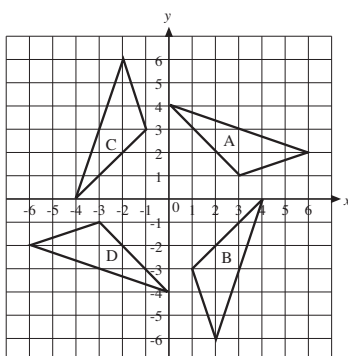
Mirror Line

37.2 Rotations

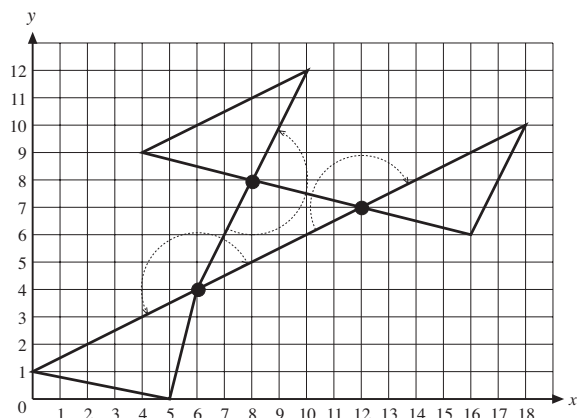
1.



2.



3.

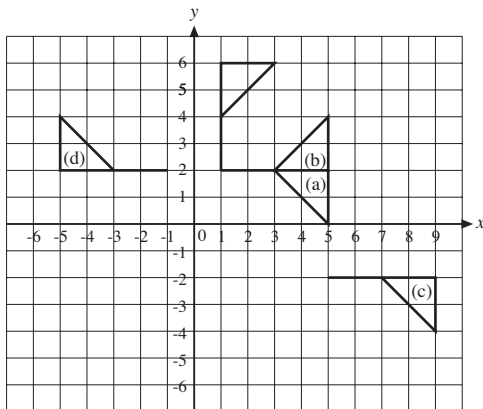


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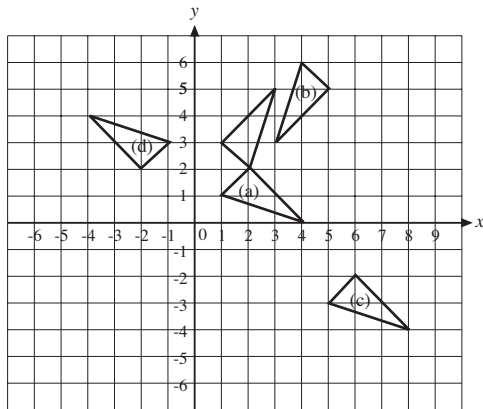
Answers

37.2

4.



5.

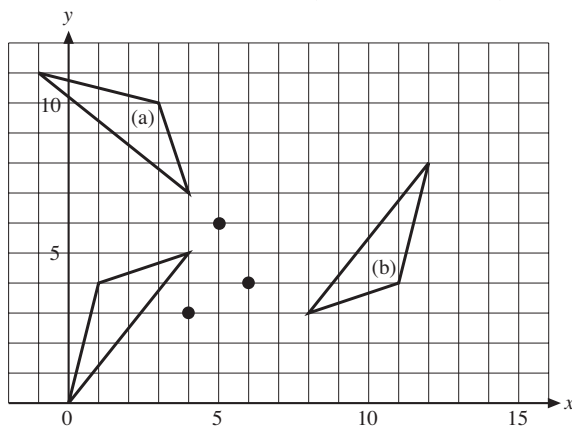


6. (a) A to B: 90° rotation, clockwise, centre $(0, 0)$ (b) A, B and D
 A to C: 180° rotation, centre $(0, 0)$
 A to D: 90° rotation, anticlockwise, centre $(0, 0)$
 A to E: 180° rotation, centre $(5, 3)$

7. A to B: $(9, 9)$ A to C: $(8, 5)$ A to D: $(10, 7)$ A to E: $(7, 11)$

8. (a) A to B: 180° rotation, centre $(5, 7)$ (b) E and B
 A to C: 180° rotation, centre $(0, 4.5)$
 A to D: 90° rotation, clockwise, centre $(0.5, 3.5)$
 A to E: 90° rotation, anticlockwise, centre $(-1, 5)$

9.



- (c) 180° rotation, centre $(6, 4)$

10. 180° rotation, centre $(13, 5)$, followed by 180° rotation, centre $(7, 3)$

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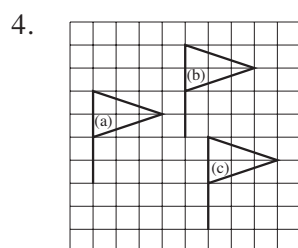
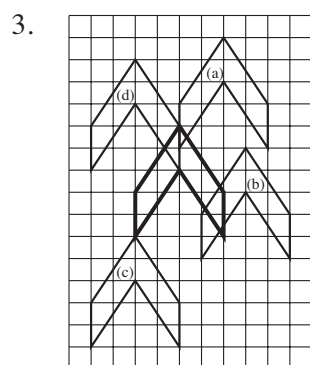
37.3 Translations

1. A: $\begin{pmatrix} 1 \\ 6 \end{pmatrix}$ B: $\begin{pmatrix} 5 \\ 4 \end{pmatrix}$ C: $\begin{pmatrix} 5 \\ -6 \end{pmatrix}$ D: $\begin{pmatrix} 0 \\ -6 \end{pmatrix}$ E: $\begin{pmatrix} -5 \\ -5 \end{pmatrix}$

F: $\begin{pmatrix} -4 \\ 2 \end{pmatrix}$ G: $\begin{pmatrix} -8 \\ 5 \end{pmatrix}$

2. (a) $\begin{pmatrix} 9 \\ 3 \end{pmatrix}$ (b) $\begin{pmatrix} -5 \\ -1 \end{pmatrix}$ (c) $\begin{pmatrix} -4 \\ -2 \end{pmatrix}$ (d) $\begin{pmatrix} -4 \\ -7 \end{pmatrix}$ (e) $\begin{pmatrix} 4 \\ 7 \end{pmatrix}$

(f) $\begin{pmatrix} 5 \\ 8 \end{pmatrix}$ (g) $\begin{pmatrix} -9 \\ -8 \end{pmatrix}$ (h) $\begin{pmatrix} 8 \\ -3 \end{pmatrix}$



(d) $\begin{pmatrix} -5 \\ 2 \end{pmatrix}$

5. (a) $\begin{pmatrix} 8 \\ 0 \end{pmatrix}$ (b) e.g. $\begin{pmatrix} 14 \\ 0 \end{pmatrix}$ for one T to another T, $\begin{pmatrix} 13 \\ 0 \end{pmatrix}$ for one N to another N

6. 4: $A \rightarrow \begin{pmatrix} 2 \\ -2 \end{pmatrix}$ and $\begin{pmatrix} 3 \\ -2 \end{pmatrix}$ and $\begin{pmatrix} 3 \\ -3 \end{pmatrix}$; $B \rightarrow \begin{pmatrix} 1 \\ -2 \end{pmatrix}$

5: $A \rightarrow \begin{pmatrix} 4 \\ -2 \end{pmatrix}$ and $\begin{pmatrix} 5 \\ -3 \end{pmatrix}$; $B \rightarrow \begin{pmatrix} 3 \\ -1 \end{pmatrix}$ and $\begin{pmatrix} 3 \\ -2 \end{pmatrix}$ and $\begin{pmatrix} 3 \\ -3 \end{pmatrix}$

8. (b) $\begin{pmatrix} 6 \\ 6 \end{pmatrix}$ (c) $\begin{pmatrix} 0 \\ 3 \end{pmatrix}$ (d) $\begin{pmatrix} -2 \\ -6 \end{pmatrix}$

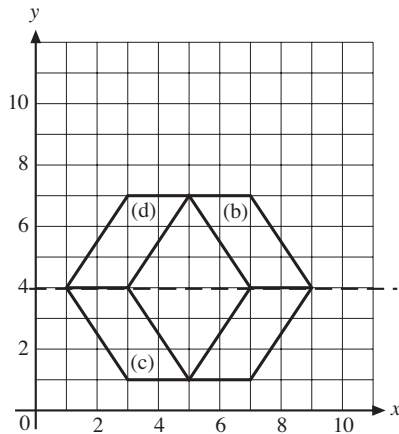
9. (a) $\begin{pmatrix} -2 \\ -13 \end{pmatrix}$ (b) $\begin{pmatrix} 3 \\ 13 \end{pmatrix}$ (c) $\begin{pmatrix} 4 \\ 0 \end{pmatrix}$ (d) $\begin{pmatrix} -4 \\ 0 \end{pmatrix}$

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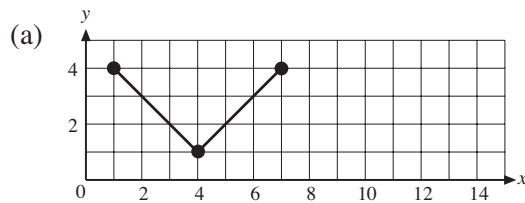
Answers

37.4 Combined Transformations

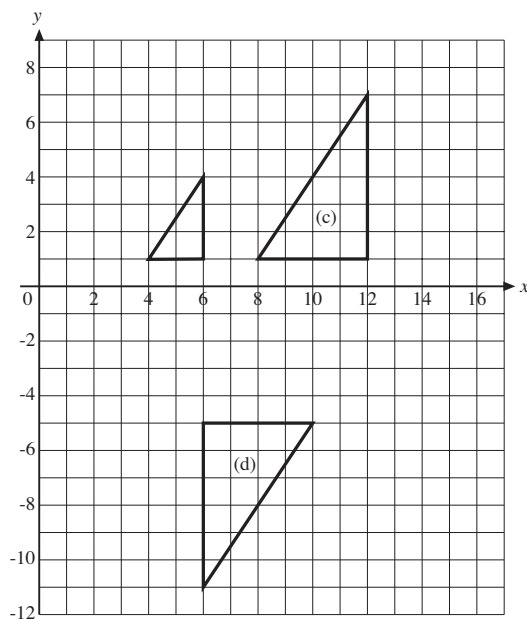
1.



2.

(b) Reflect in line $x = 7$.Rotate 180° about $(7, 4)$ and then reflect in line $y = 4$.3. (a) Rotations through 90° , 180° and 270° about centre $(2.5, 5.5)$ and rotation of 180° about centre $(1, 4)$.(b) Reflection in $y = 4$, $x = 2.5$, $y = x + 3$, $y = 8 - x$.

4.

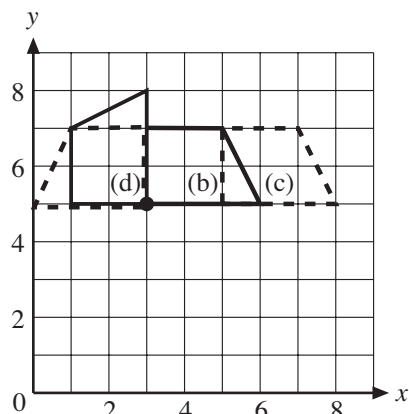
(e) Rotation of 180° about $(7, -2)$ and enlargement of scale factor $\frac{1}{2}$ about $(6, 1)$

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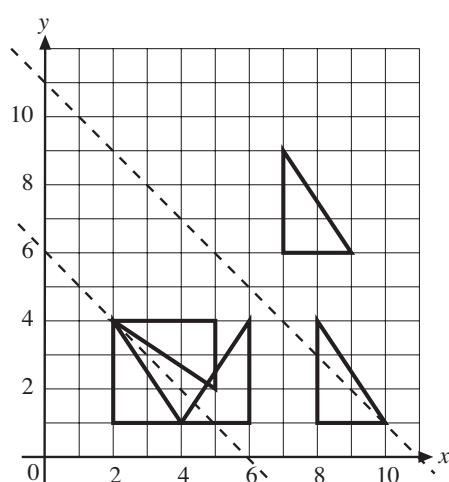
Answers

37.4

5.

(e) Reflect in line $y = 8 - x$

6.

(c) Translation $\begin{pmatrix} 6 \\ 0 \end{pmatrix}$ (d) Translation $\begin{pmatrix} 5 \\ 5 \end{pmatrix}$

7.

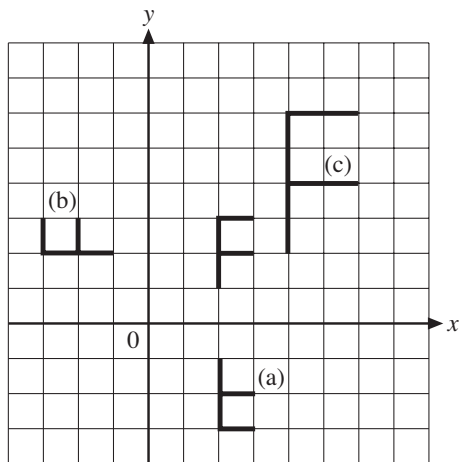
(a) A to B: reflection in $y = x$ A to C: rotation of 90° clockwise about $(0, 0)$ A to D: reflection in $y = 0$ (b) A to E: rotation of 180° about $(0, 0)$, followed by translation $\begin{pmatrix} 0 \\ 1 \end{pmatrix}$ A to F: reflection in $y = 0$, followed by translation $\begin{pmatrix} -7 \\ 0 \end{pmatrix}$ A to G: rotation of 90° anticlockwise about $(0, 0)$, followed bytranslation $\begin{pmatrix} -1 \\ 0 \end{pmatrix}$ A to H: reflection in $x = 0$, followed by translation $\begin{pmatrix} 0 \\ -1 \end{pmatrix}$

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Answers

37.4

9.



10. (a) (i) 90° (ii) $\begin{pmatrix} 0 \\ -4 \end{pmatrix}$ (b) $(2, -2)$
 (c) reflection in line $y = -x$