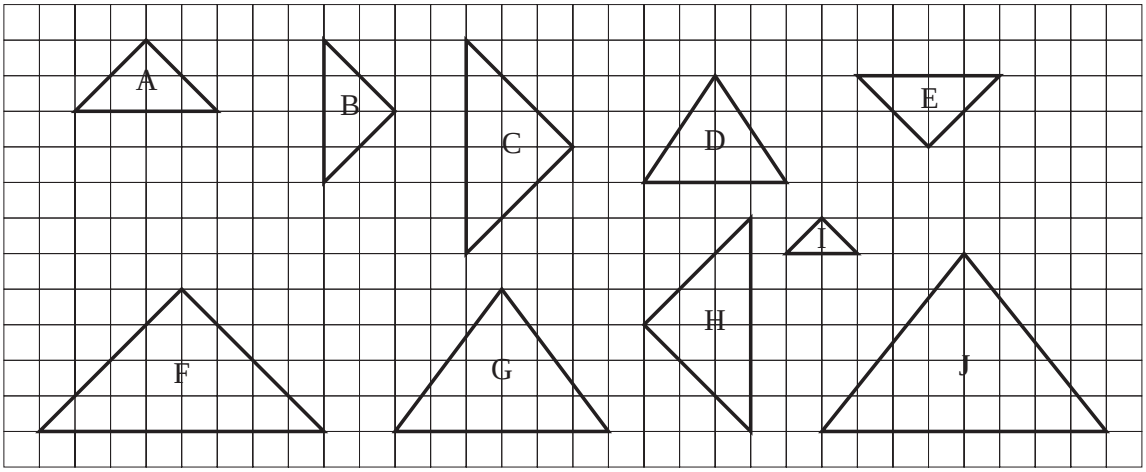
UNIT 7 *Transformations* Extra Exercises 7.1

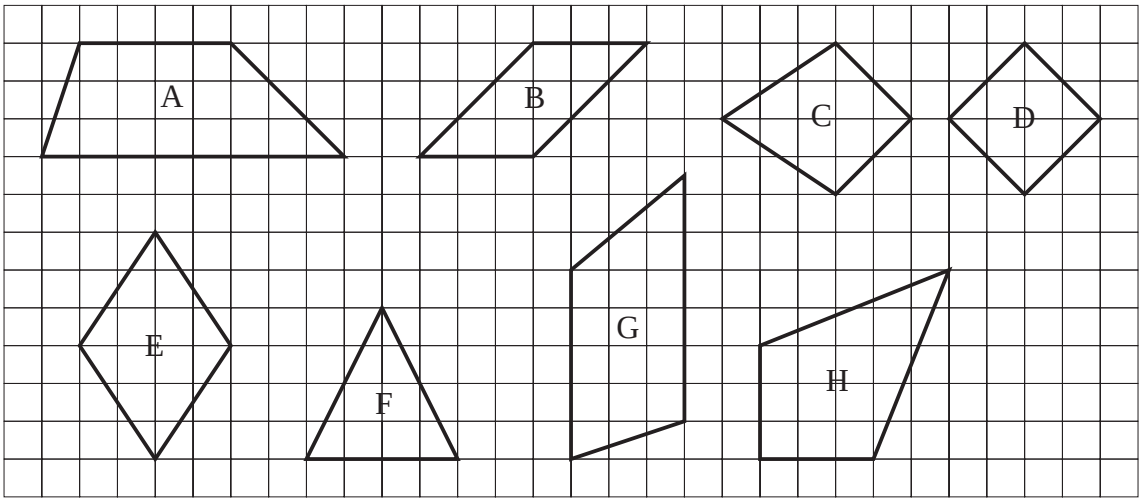
1. Which of the shapes in the following diagram are:

   (a) *similar* to A,

   (b) *congruent* to A ?



2. Write down the name of each of the following shapes:



3. The points A, B, C and D are the corners of a parallelogram. The coordinates of A, B and C are (2, 2), (7, 2) and (9, 6) respectively.

   What are the coordinates of D ?

UNIT 7 *Transformations* Extra Exercises 7.2

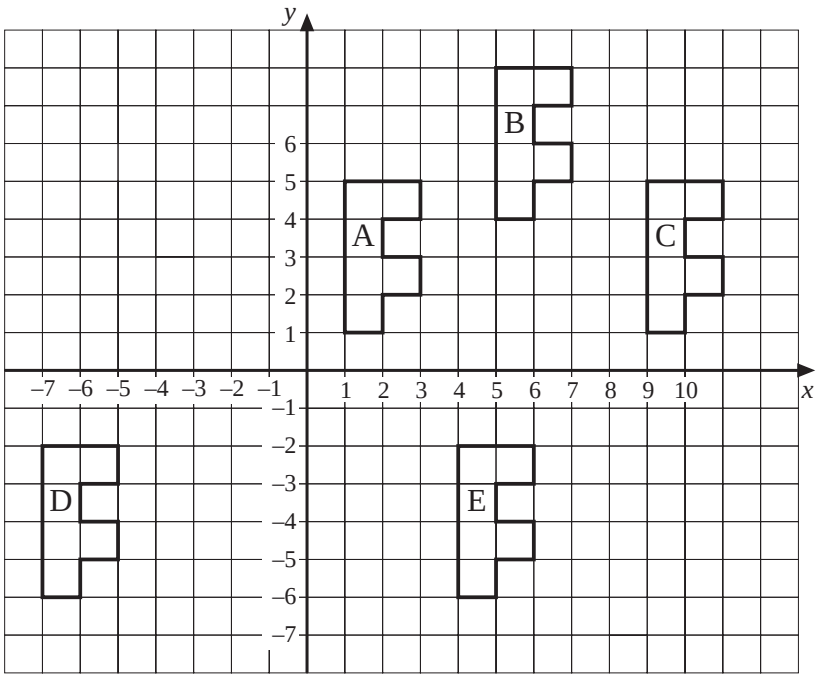
1. Write down the vector that you would use to translate:

   (a) A to B (b) B to C

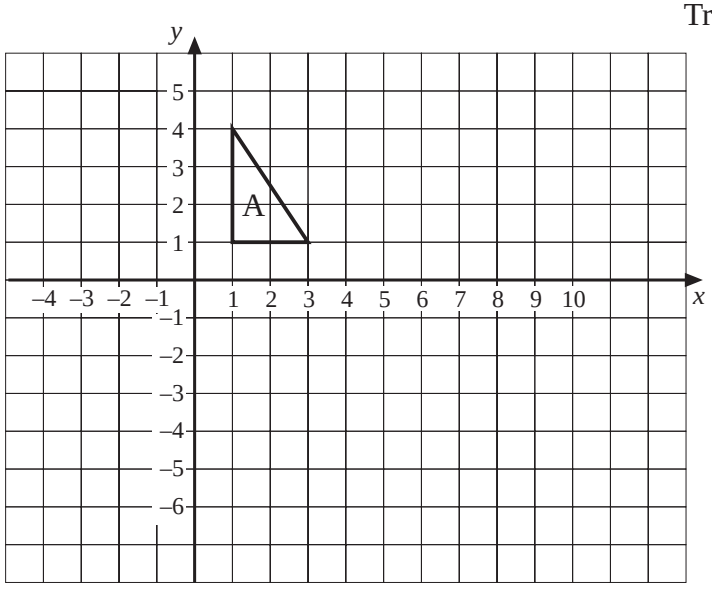
   (c) A to D, (d) C to D,

   (e) B to D, (f) E to A

   on the following diagram.



2. Copy the following diagram.



Translate triangle A by the vectors:

(a) $\begin{pmatrix} 7 \\ 2 \end{pmatrix}$ to obtain B,

(b) $\begin{pmatrix} 4 \\ -6 \end{pmatrix}$ to obtain C,

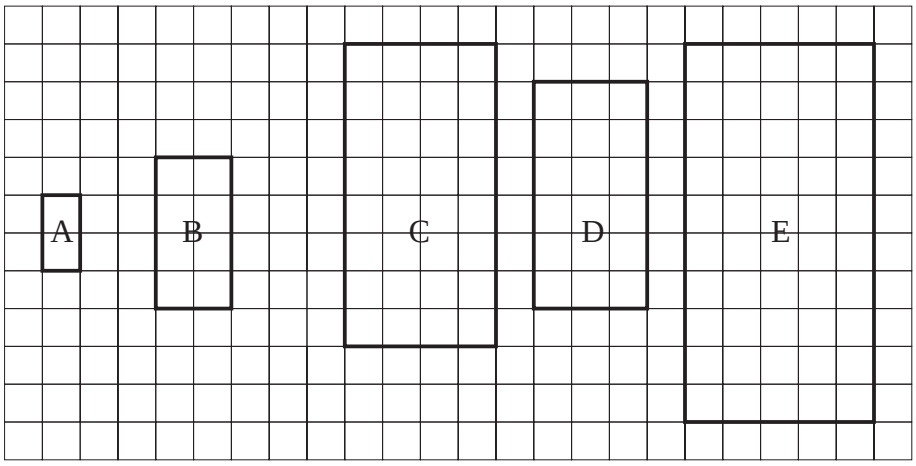
(c) $\begin{pmatrix} -4 \\ -1 \end{pmatrix}$ to obtain D,

(d) $\begin{pmatrix} -3 \\ 2 \end{pmatrix}$ to obtain E,

(e) $\begin{pmatrix} 8 \\ -5 \end{pmatrix}$ to obtain F.

UNIT 7 *Transformations* Extra Exercises 7.3

1. The diagram shows several shapes that are enlargements of each other.



What scale factor is used for each of the following enlargements:

(a) A to B, (b) A to C, (c) A to D,

(d) A to E, (e) C to B, (f) C to D ?

2. (a) Draw the triangle that has corners at the point with coordinates (3, 1), (2, 4) and (5, 3).

(b) Enlarge this triangle with scale factor 3 and centre of enlargement (0, 0).

(c) Write down the coordinates of the corners of the enlarged triangle.

3. A triangle has corners at the points with coordinates (2, 11), (2, 8) and (5, 7). It is enlarged to give a triangle with corners at the points with coordinates (4, 16), (4, 10) and (10, 8).

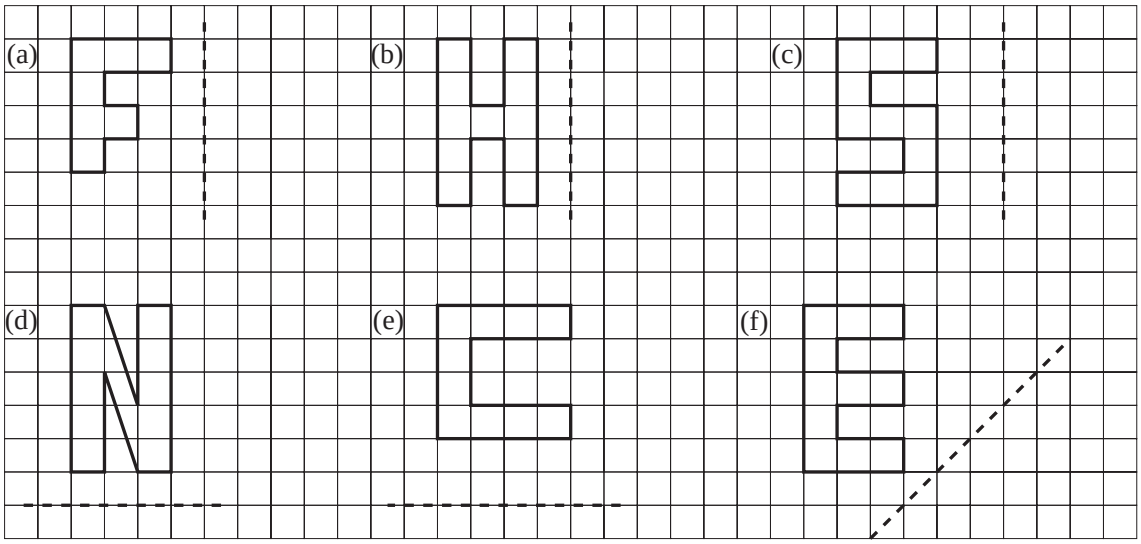
(a) Draw both triangles.

(b) Determine the position of the centre of enlargement.

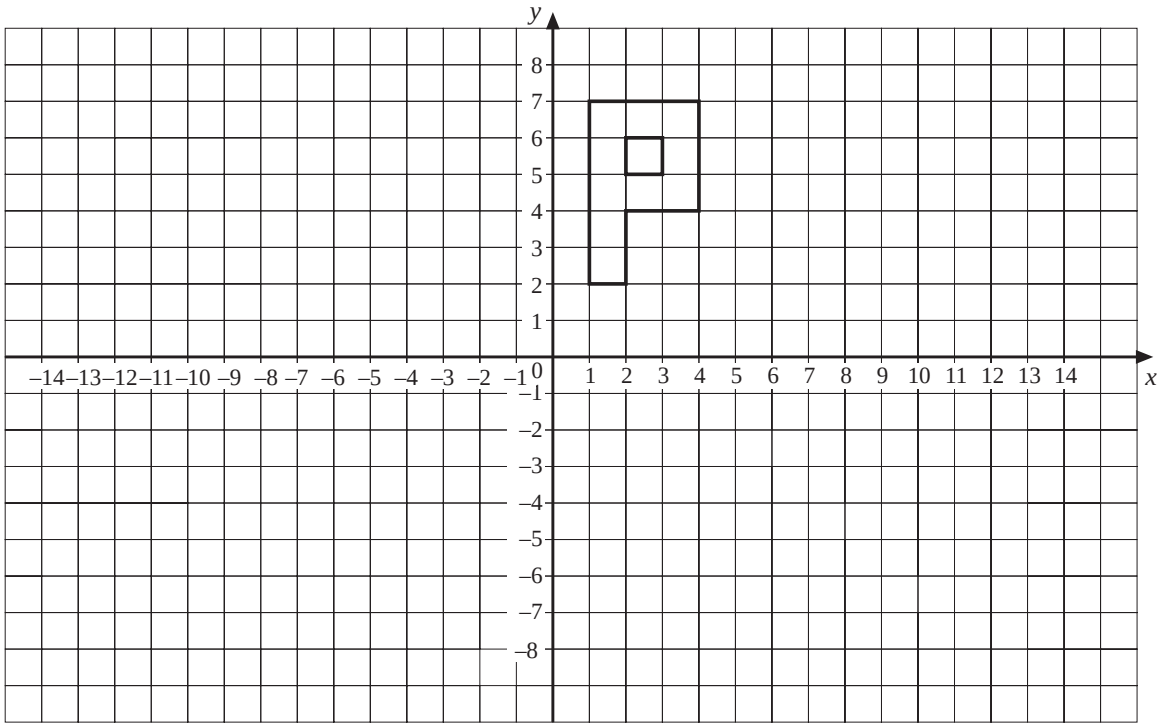
(c) State the scale factor of the enlargement.

UNIT 7 *Transformations* Extra Exercises 7.4

1. Copy each of the following diagrams and draw the reflection of each shape in the mirror line shown.



2. Copy the following diagram.



Reflect the shape in the following lines:

(a) y-axis, (b) x-axis, (c) $x = 7$,

(d) $x = -5$, (e) $y = x$ (f) $y = -x$

UNIT 7 *Transformations* Extra Exercises 7.5

1. (a) Draw the triangle that has corners at the points with coordinates (2, 3), (5, 3) and (2, 7). Label it A.

   (b) Rotate A through 90 ° clockwise around (0, 0) to obtain B.

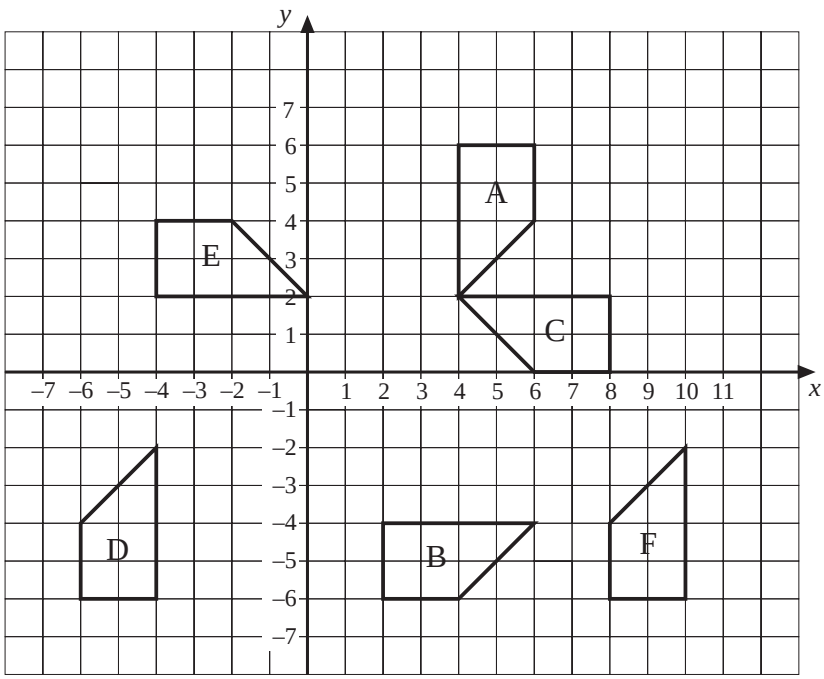
   (c) Rotate A through 180 ° around (0, 0) to obtain C.

   (d) Rotate A through 180 ° around (0, 4) to obtain D.

   (e) Rotate A through 90 ° clockwise around (6, 3) to obtain E.

   (f) Rotate A through 90 ° anticlockwise around (9, 2) to obtain F.

2. The following diagram shows the shapes A, B, C, D, E and F that have been obtained by rotating the shape A. Describe each rotation fully.



UNIT 7 *Transformations* Extra Exercises 7.6

1. (a) Draw the triangle with corners at the points with coordinates (1, 5), (3, 5) and (3, 2).

   (b) Reflect the triangle in the line $x = 3$.

   (c) Reflect the triangle in the line $y = 5$.

   (d) Rotate the shape through $180\,°$ around the point (3, 5).

   (e) What is the name of the shape you obtain?

2. (a) Draw the rectangle A that has corners at the points with coordinates (3, 1), (6, 4), (4, 6) and (1, 3).

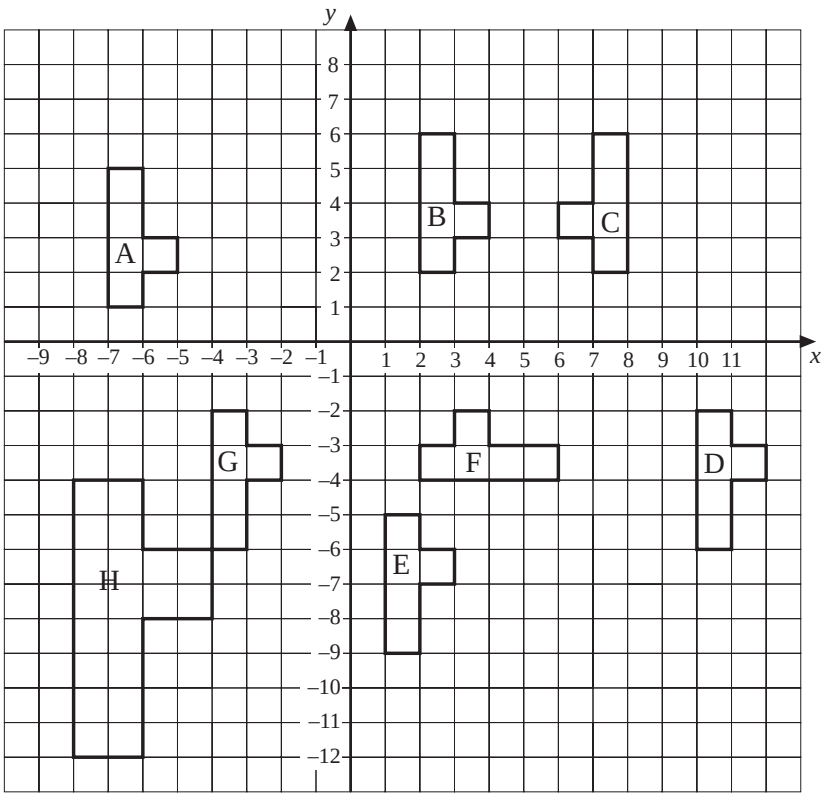
   (b) Reflect the rectangle A in the line $x = 6$ to obtain the rectangle B.

   (c) Reflect the rectangles A and B in the line $y = 6$ to obtain the rectangles C and D.

   (d) Translate all 4 rectangles using the vector $\begin{pmatrix} 10 \\ 0 \end{pmatrix}$.

   (e) Rotate all 8 rectangles through $180\,°$ about the point (11, 1).

3. The shape A is moved to the shape H by a series of transformations, in order, as shown on the diagram. Describe each transformation.



Extra Exercises 7.1 Answers

1. (a) C, F, H, I (b) B, E

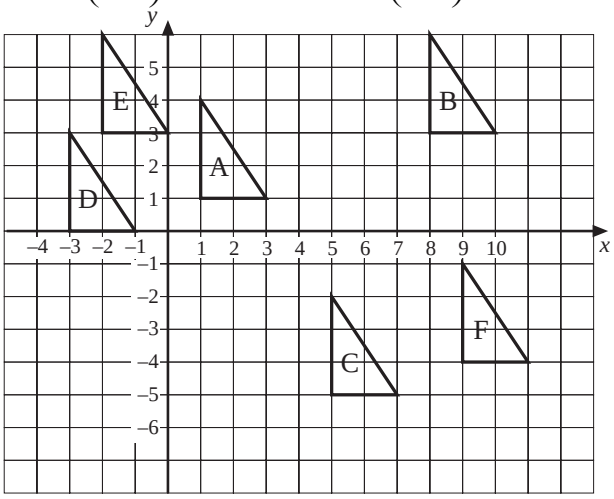
2. A - Trapezium; B - Parallelogram; C - Kite; D - Square; E - Rhombus; F - Isosceles triangle; G - Trapezium; H - Kite

3. (4, 6)

Extra Exercises 7.2 Answers

1. (a) $\begin{pmatrix} 4 \\ 3 \end{pmatrix}$ (b) $\begin{pmatrix} 4 \\ -3 \end{pmatrix}$ (c) $\begin{pmatrix} -8 \\ -7 \end{pmatrix}$

   (d) $\begin{pmatrix} -16 \\ -7 \end{pmatrix}$ (e) $\begin{pmatrix} -12 \\ -10 \end{pmatrix}$ (f) $\begin{pmatrix} -3 \\ 7 \end{pmatrix}$

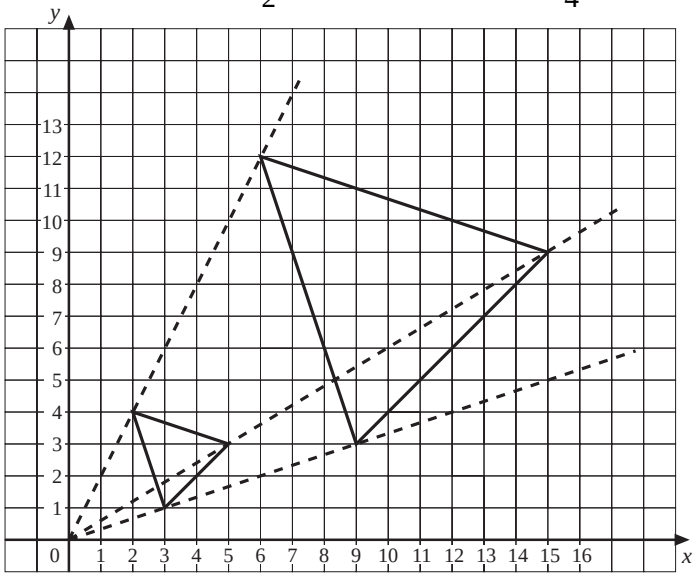
2. 

Extra Exercises 7.3, Questions 1-2 Answers

1. (a) 2 (b) 4 (c) 3

   (d) 5 (e) $\frac{1}{2}$ (f) $\frac{3}{4}$

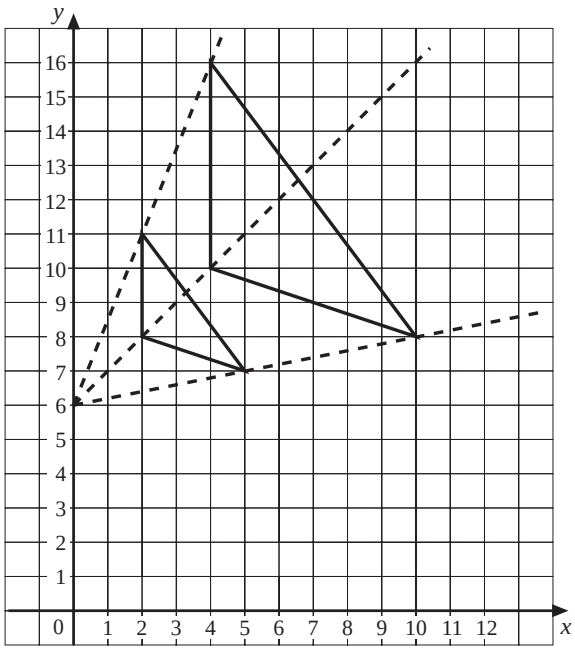
2. (a), (b)



(c) (9, 3), (6, 12) and (15, 9)

Extra Exercises 7.3 Question 3 Answers

3. (a)

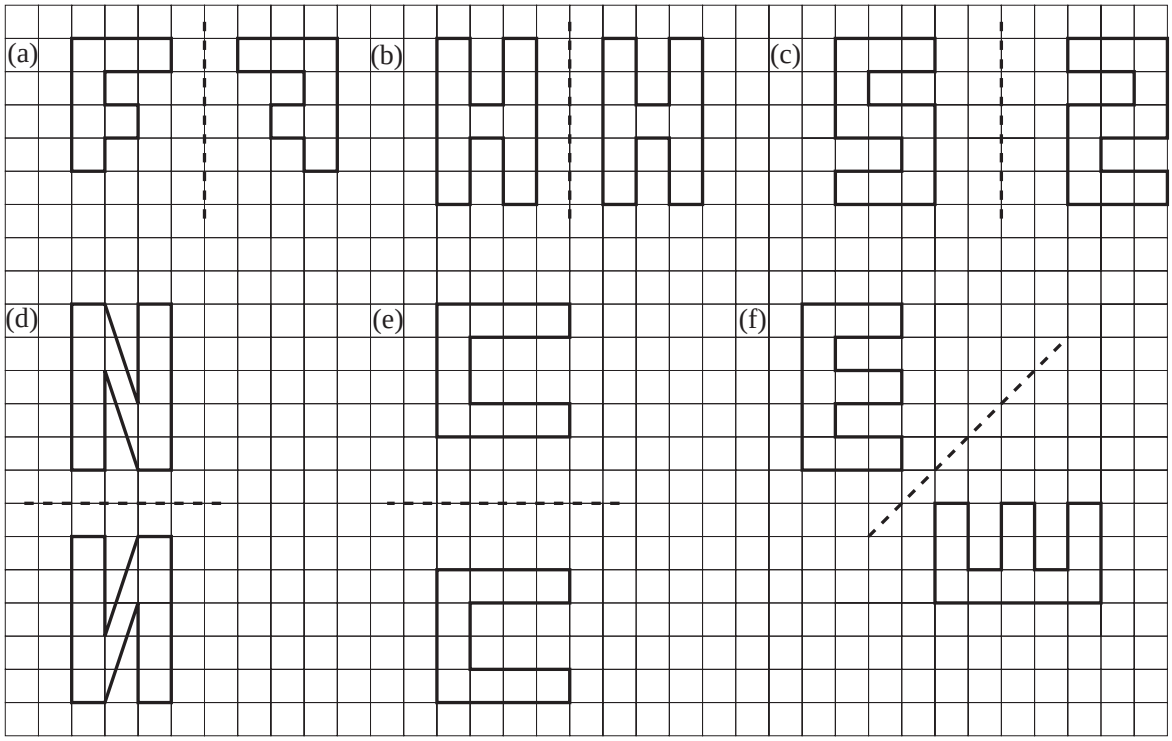


(b) (0, 6)

(c) 2

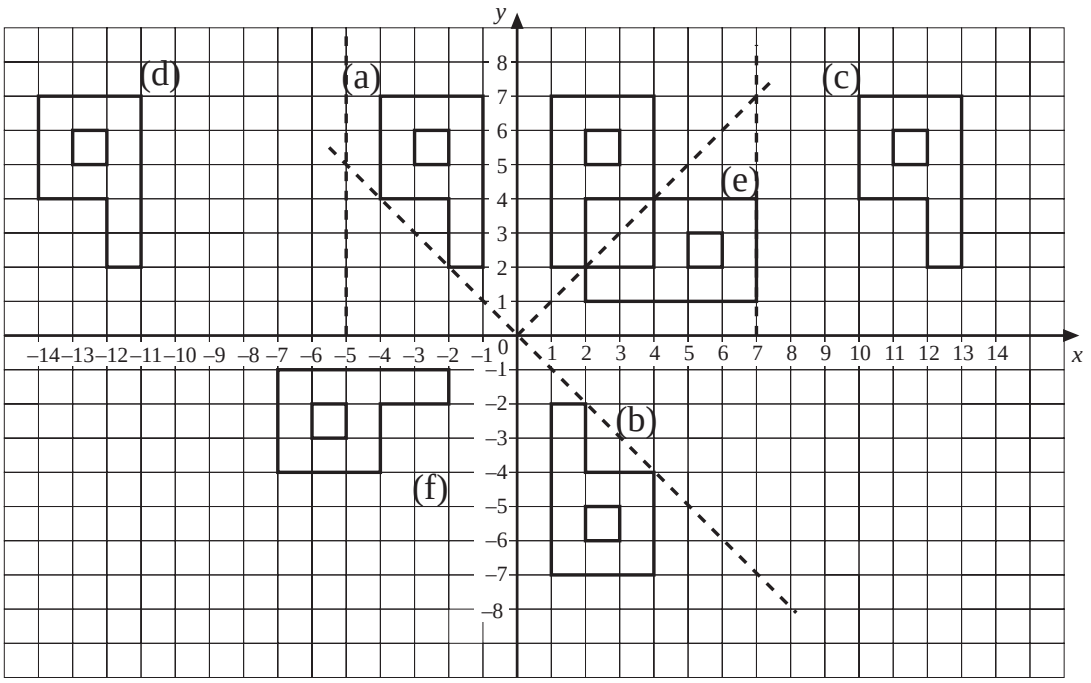
Extra Exercises 7.4 Question 1 Answers

1.



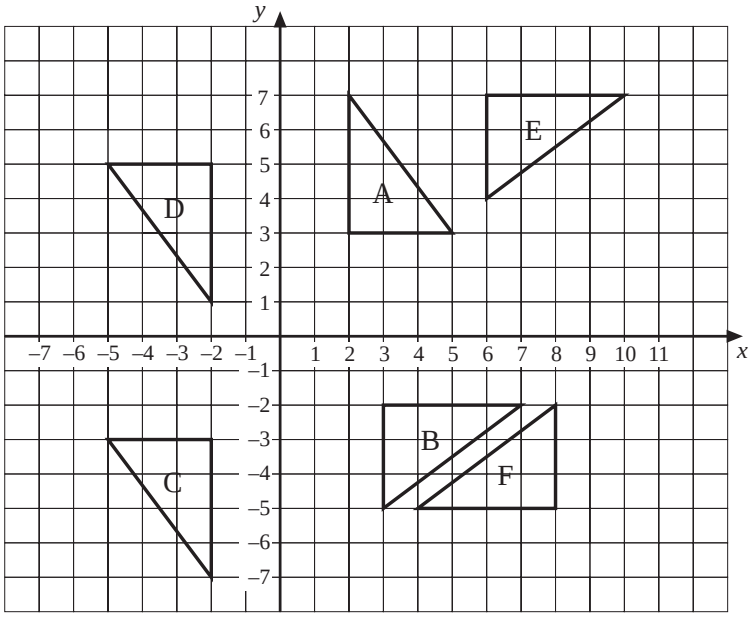
Extra Exercises 7.4 Question 2 Answers

2.



Extra Exercises 7.5 Answers

1.



2. A → B : 90 ° clockwise around (0, 0)

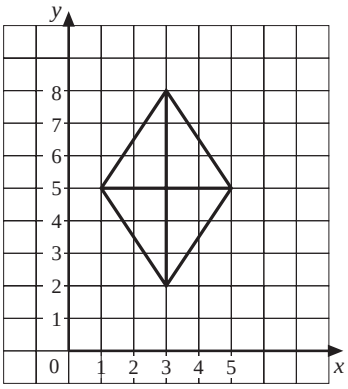
A → C : 90 ° clockwise around (4, 2)

A → D : 180 ° around (0, 0)

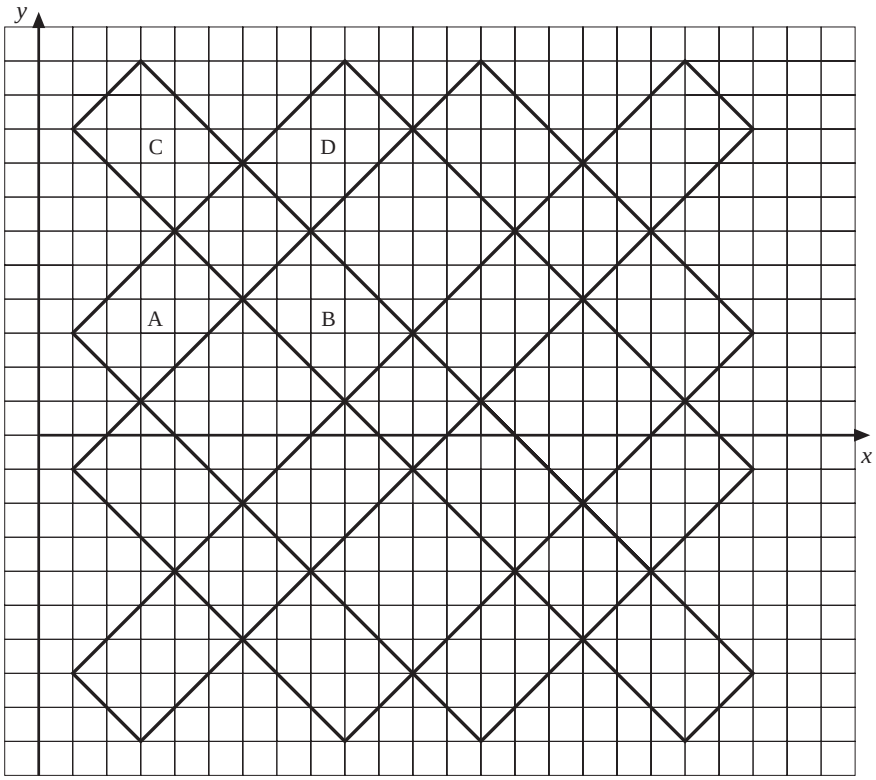
A → E : 90 ° anticlockwise around (2, 0)

A → F : 180 ° around (7, 0)

Extra Exercises 7.6 Answers

1. 

(e) a rhombus

2. 

3. A $\rightarrow$ B : translation $\begin{pmatrix} 9 \\ 1 \end{pmatrix}$

B $\rightarrow$ C : reflection in $x = 5$

C $\rightarrow$ D : rotation, 180 ° around (9, 0)

D $\rightarrow$ E : translation $\begin{pmatrix} -9 \\ -3 \end{pmatrix}$

E $\rightarrow$ F : rotation, 90 ° anticlockwise around (1, – 4)

F $\rightarrow$ G : rotation, 90 ° clockwise around (0, 0)

G $\rightarrow$ H : enlargement, scale factor 2, centre (0, 0)