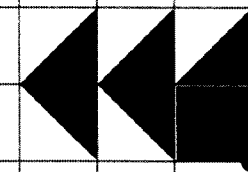
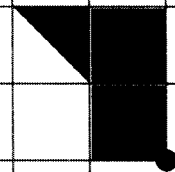
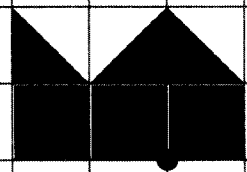
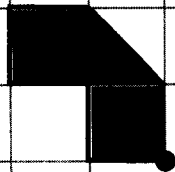
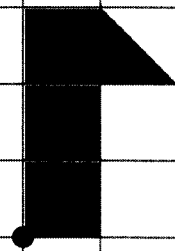
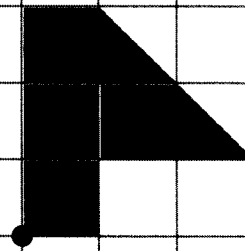
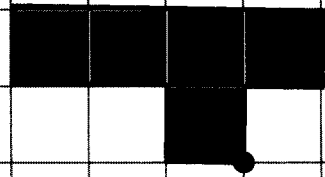
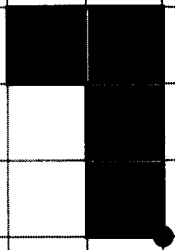


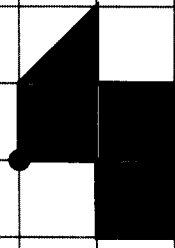
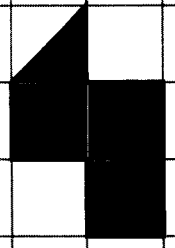
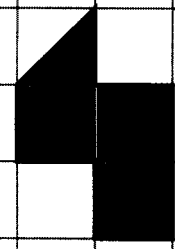
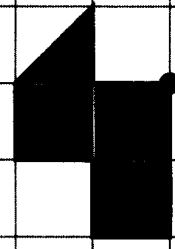
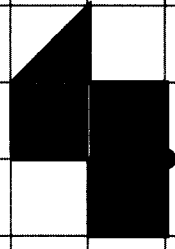
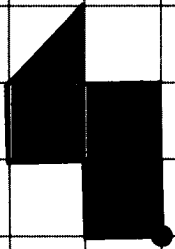
## TRANSFORMATIONS

Page	Description
1	Rotations through $180^\circ$
2	Rotations through $180^\circ$
3	Translations
4	Enlargements
5	Reflections
6	Reflections on a grid with a diagonal mirror line
7	Mixed reflection, rotation and translation on a grid
8	Number of lines of symmetry and order of rotational symmetry
9	Enlargements on a grid with a centre of enlargement and a positive whole number scale factor
10	Enlargements on a grid with a centre of enlargement and a negative and/or fractional scale factor
11	Mixed reflection, rotation, enlargement and translation on a grid

Rotate the shape half a turn about the black dot



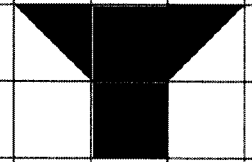
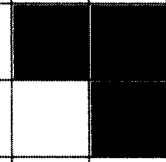
Rotate the shape half a turn about the black dot



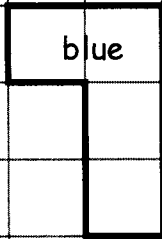
2

# Translation Worksheet

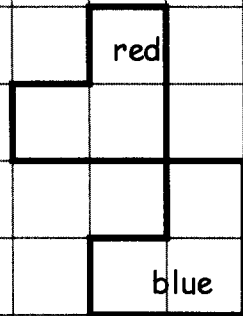
+ right, - left  
+ up, - down



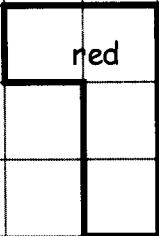
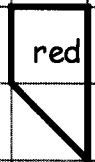
Translate this shape by  
the vector

$$\begin{bmatrix} 3 \\ 1 \end{bmatrix}$$


Translate this shape by  
the vector

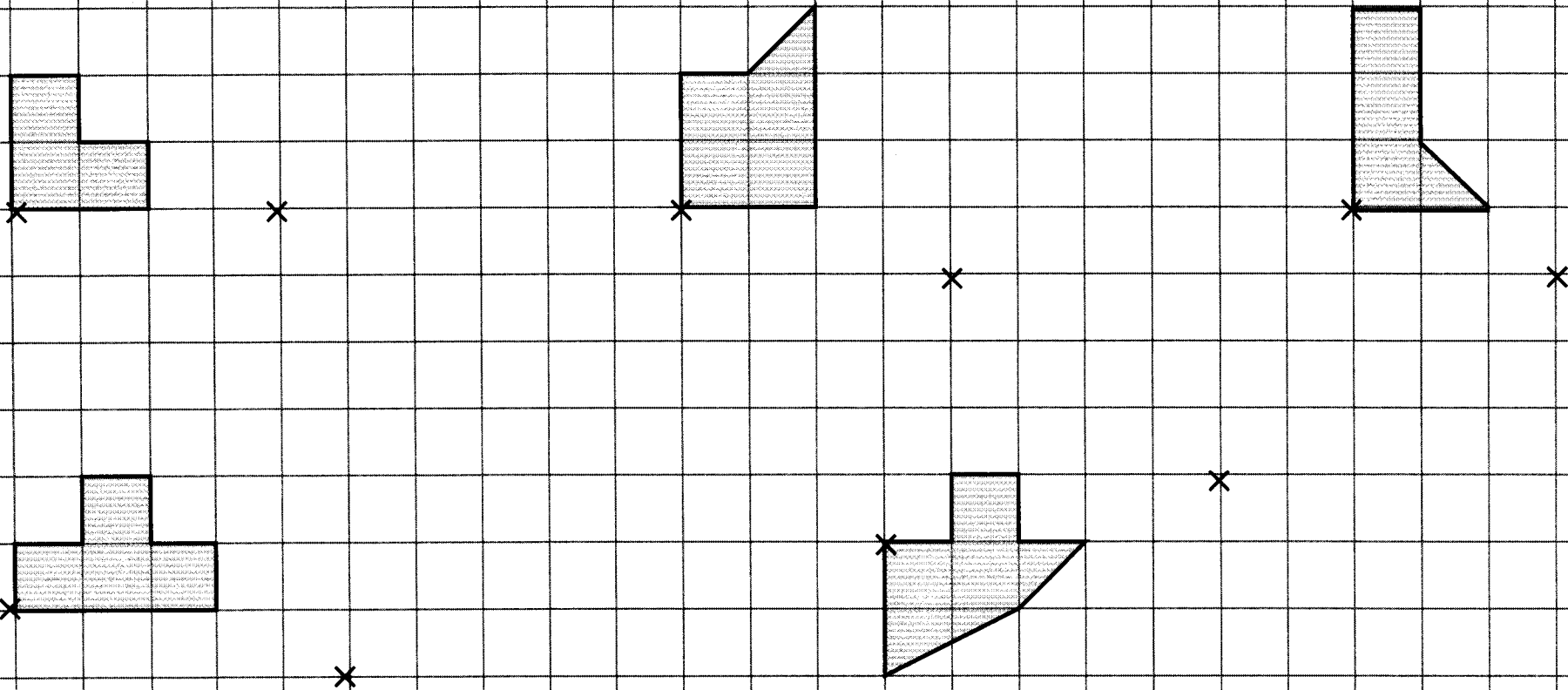
$$\begin{bmatrix} 0 \\ 3 \end{bmatrix}$$


Translate this shape by  
the vector

$$\begin{bmatrix} -3 \\ -2 \end{bmatrix}$$


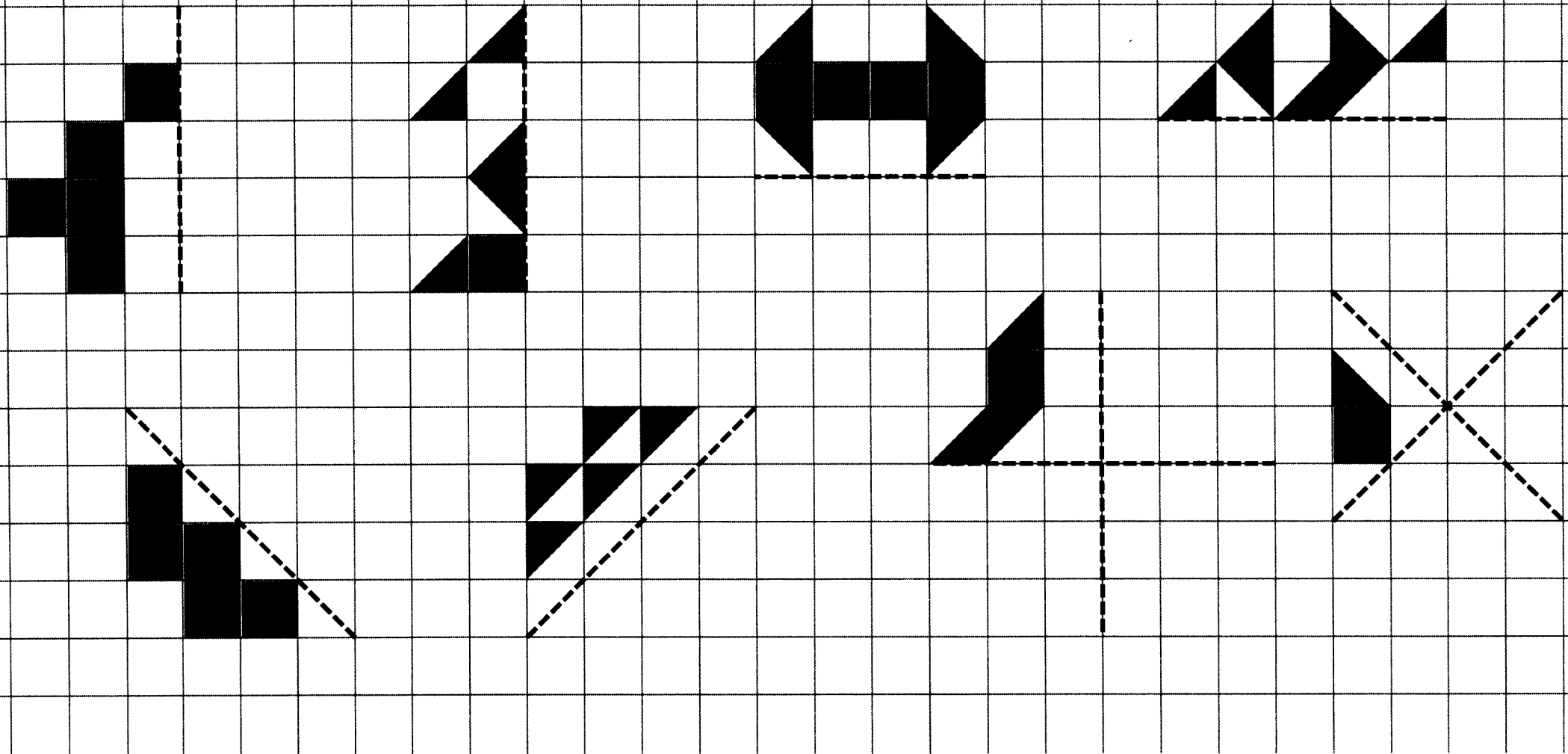
Colour the red shape red and the blue shape blue. Describe the translation, using a vector, moving from the red shape to the blue shape.

Draw an enlargement of each, scale factor 2. Start at the x

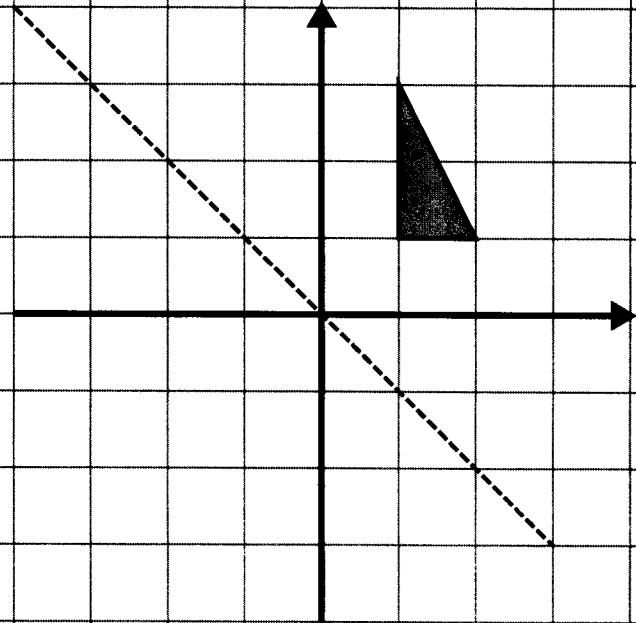
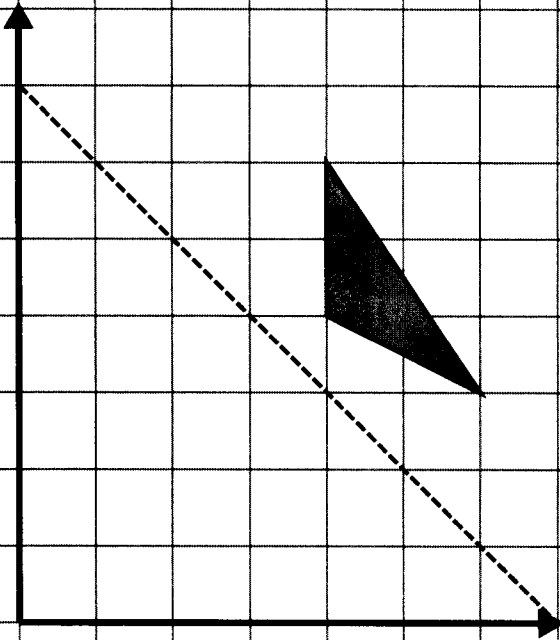
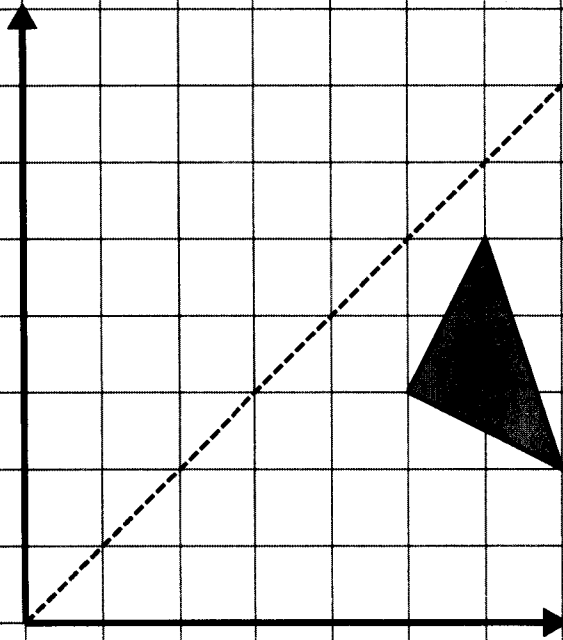


Enlargement - Enlarge each of these shapes by scale factor 2 Start at the "x"

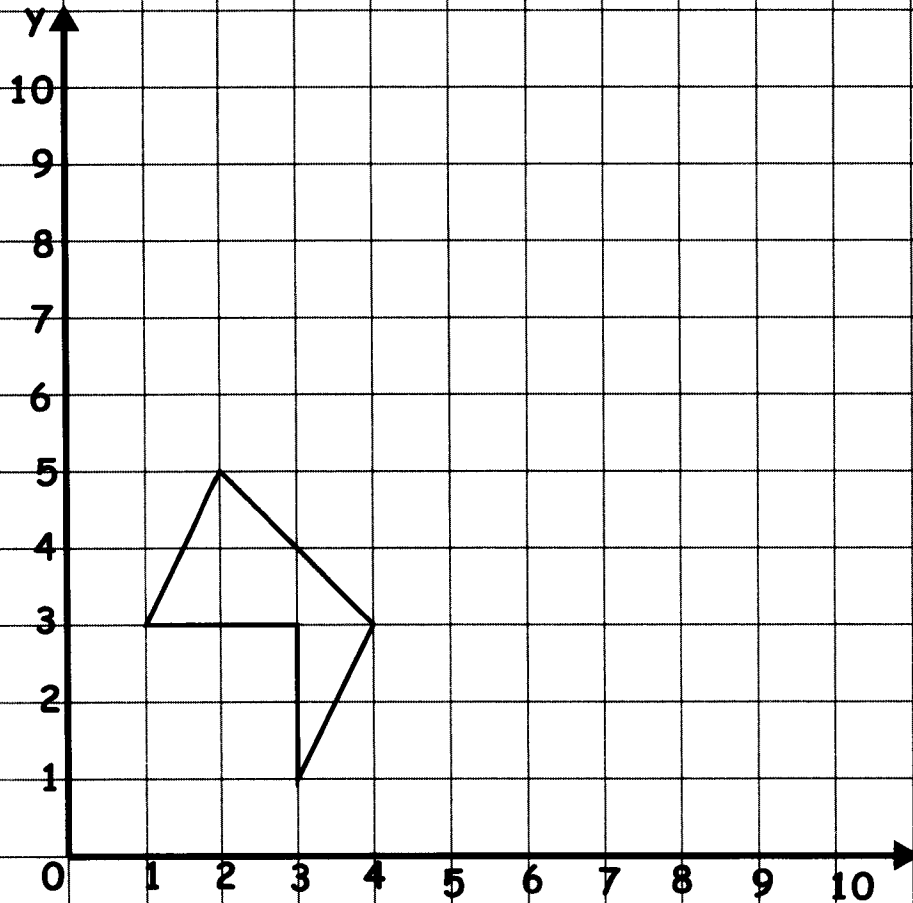
Reflect these shapes in the mirror line



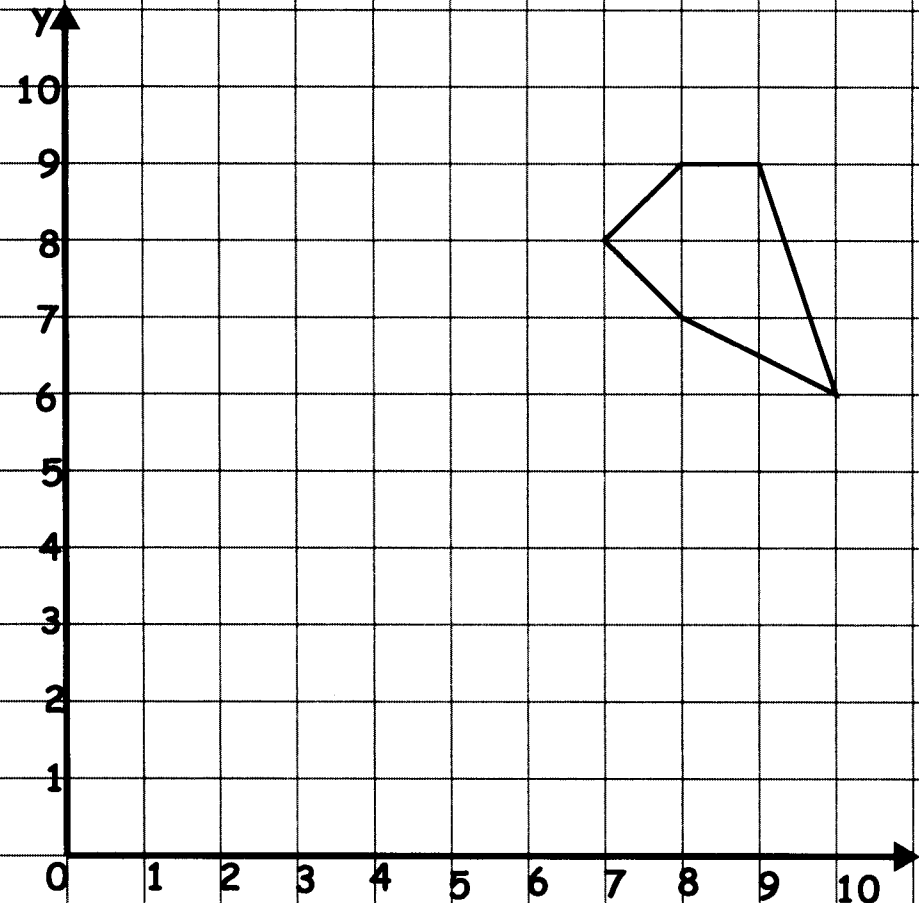
Reflect the triangles in the diagonal mirror lines



⑥

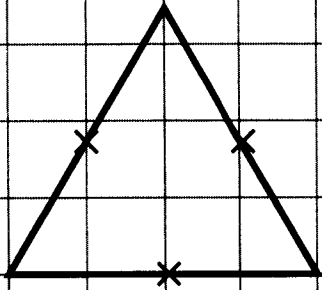


- 1) Reflect the original shape in  $x = 5$
- 2) Translate the original shape 6 right, 4 up.
- 3) Rotate the original shape 90 degrees clockwise about the point (5,5)



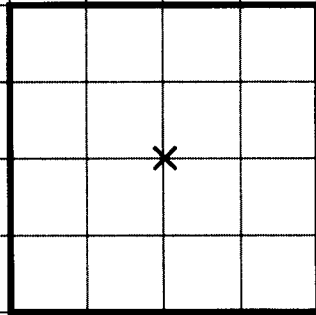
- 1) Reflect the original shape in  $y = 6$
- 2) Translate the original shape 4 left, 3 down.
- 3) Rotate the original shape 90 degrees anticlockwise about the point (6,6)





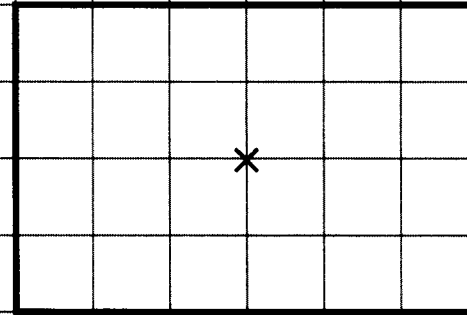
Lines of symmetry =

Order of rotational symmetry =



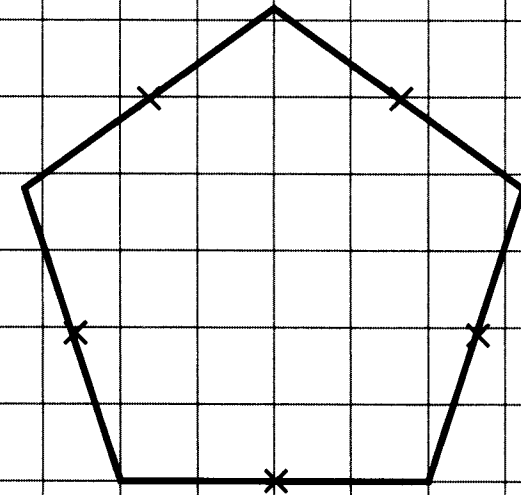
Lines of symmetry =

Order of rotational symmetry =



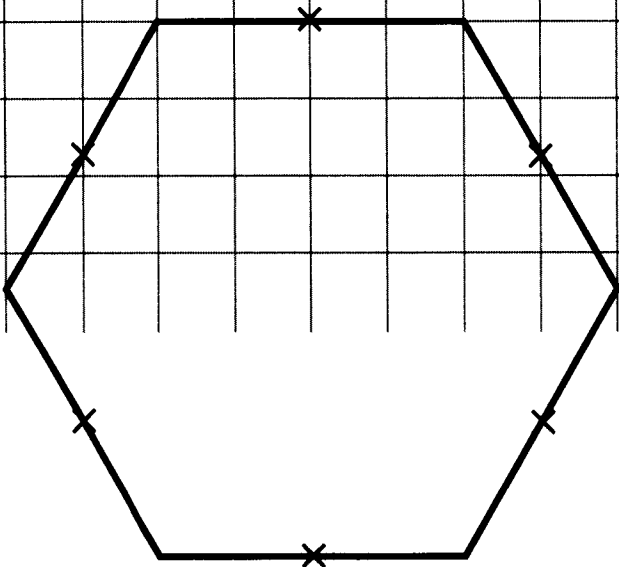
Lines of symmetry =

Order of rotational symmetry =



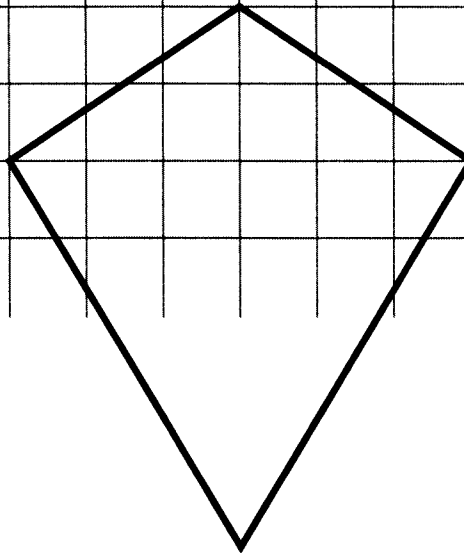
Lines of symmetry =

Order of rotational symmetry =



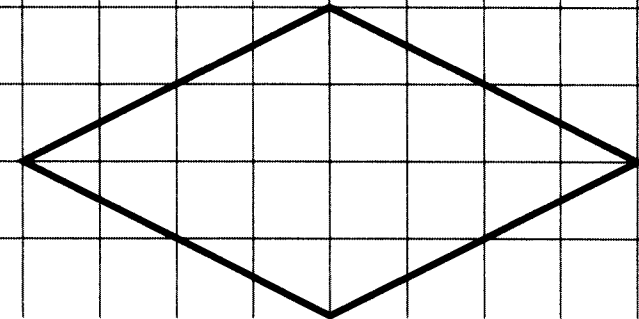
Lines of symmetry =

Order of rotational symmetry =



Lines of symmetry =

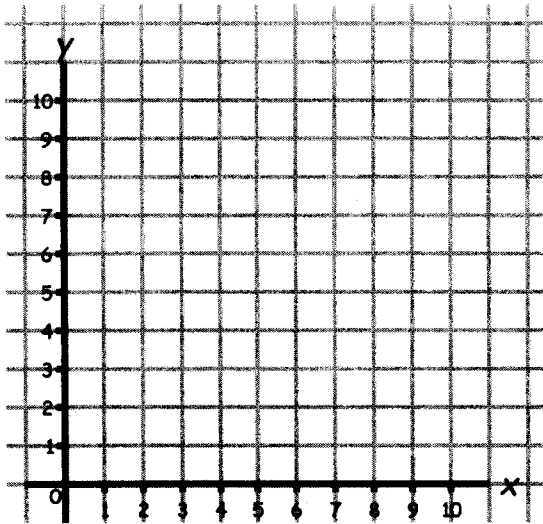
Order of rotational symmetry =



Lines of symmetry =

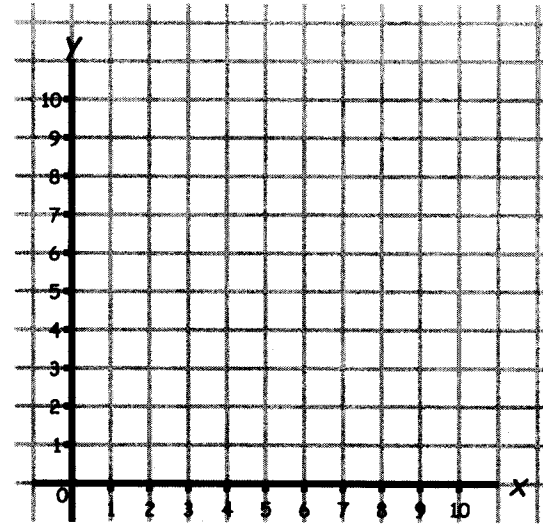
Order of rotational symmetry =

# Enlargement on a grid with a positive scale factor



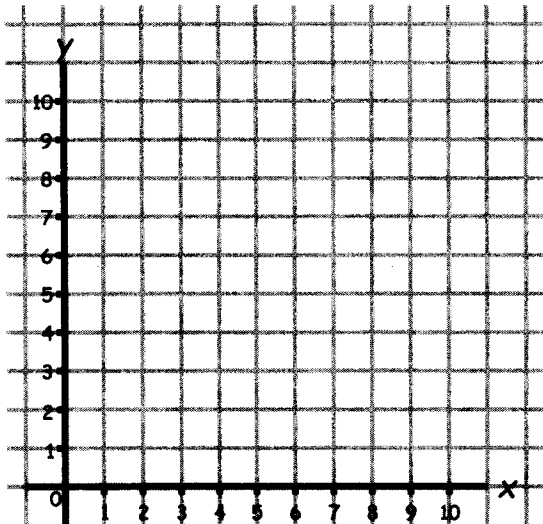
Plot the points  $(1,1)$   $(3,1)$   
and  $(1,3)$ . Join them to make  
a triangle.

Enlarge this triangle by  
a scale factor 3, centre of  
enlargement  $(0,0)$



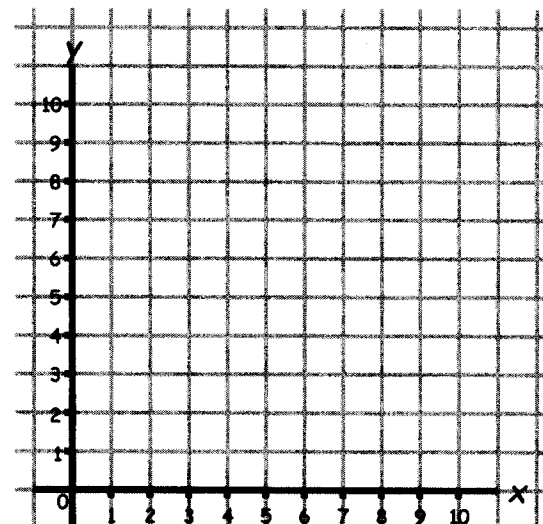
Plot the points  $(2,4)$   $(7,3)$   
and  $(4,7)$ . Join them to make  
a triangle.

Enlarge this triangle by  
a scale factor 2, centre of  
enlargement  $(4,4)$



Plot the points  $(6,10)$   $(9,7)$   
and  $(7,7)$ . Join them to make  
a triangle.

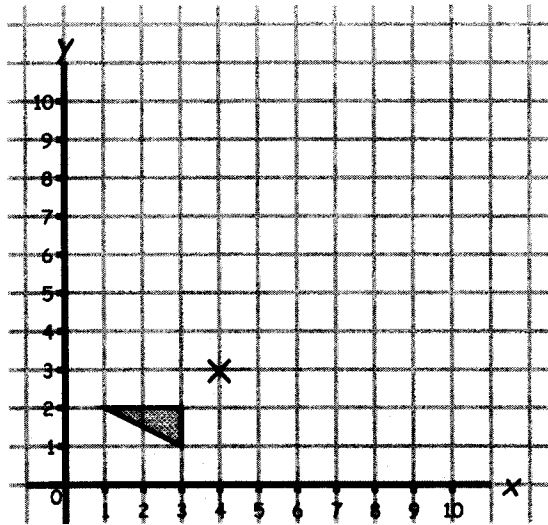
Enlarge this triangle by  
a scale factor 2, centre of  
enlargement  $(10,10)$



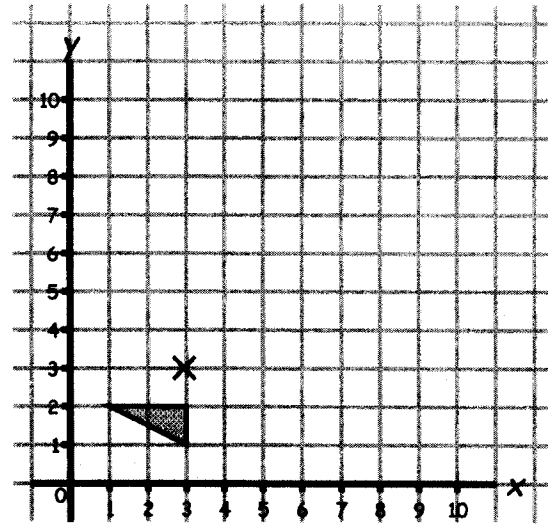
Plot the points  $(9,1)$   $(10,3)$   
and  $(8,3)$ . Join them to make  
a triangle.

Enlarge this triangle by  
a scale factor 4, centre of  
enlargement  $(10,1)$

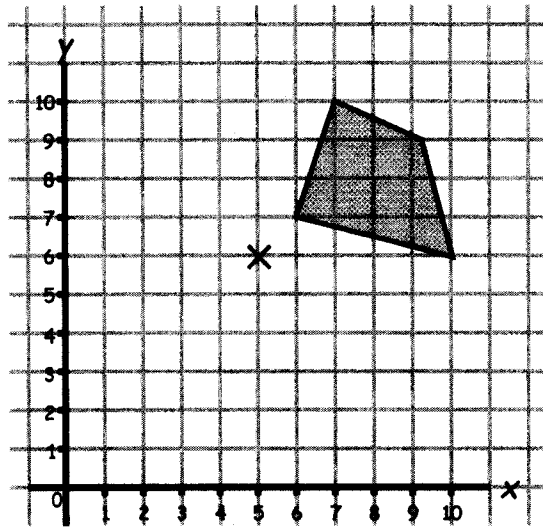
Enlarge by scale factor  $-2$ , centre of enlargement  $(4,3)$



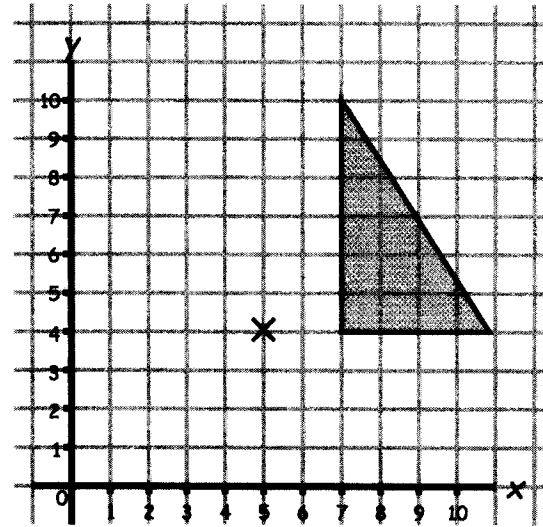
Enlarge by scale factor  $-3$ , centre of enlargement  $(3,3)$

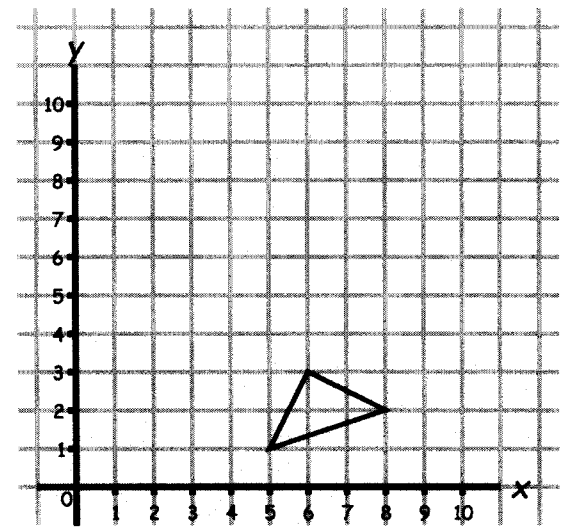
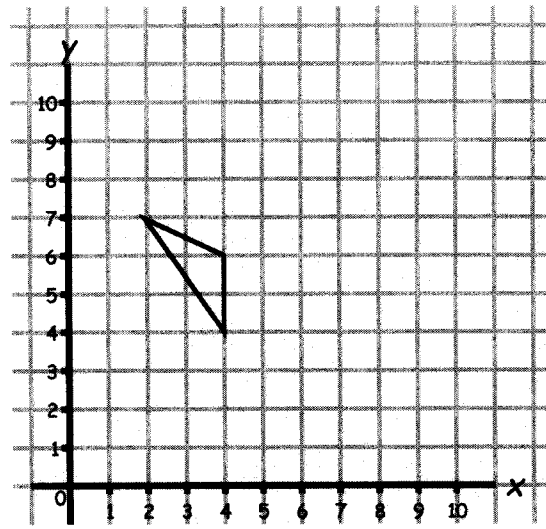
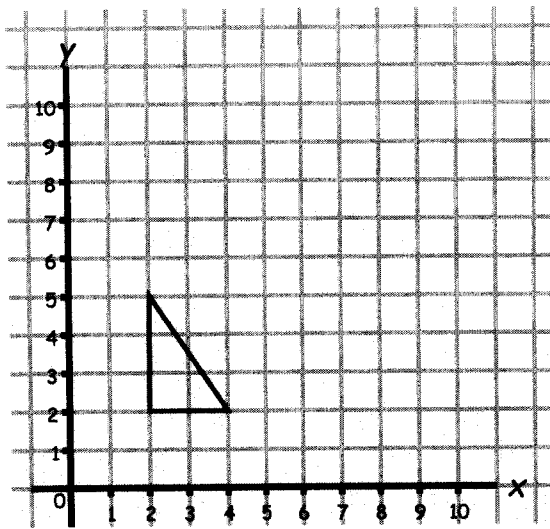


Enlarge by scale factor  $-1$ , centre of enlargement  $(5,6)$



Enlarge by scale factor  $-\frac{1}{2}$ , centre of enlargement  $(5,4)$





1) Carry out the following transformations on the ORIGINAL triangle.

- Rotation  $180^\circ$  about  $(2,5)$
- Reflection in  $x = 2$
- Translation  $\begin{bmatrix} 6 \\ 4 \end{bmatrix}$
- Enlargement scale factor 3, centre of enlargement  $(1,3)$

2) Carry out the following transformations on the ORIGINAL triangle.

- Rotation  $90^\circ$  clockwise about  $(6,5)$
- Reflection in  $y = 4$
- Translation  $\begin{bmatrix} 5 \\ -2 \end{bmatrix}$
- Enlargement scale factor 2, centre of enlargement  $(4,4)$

3) Carry out the following transformations on the ORIGINAL triangle.

- Rotation  $90^\circ$  anticlockwise about  $(5,4)$
- Reflection in  $y = x$
- Translation  $\begin{bmatrix} -4 \\ 1 \end{bmatrix}$
- Enlargement scale factor 2, centre of enlargement  $(6,2)$