Week 13, Day 1
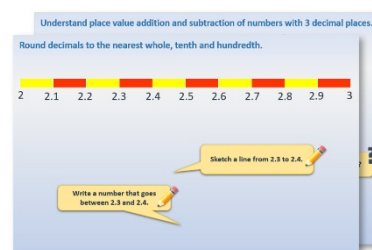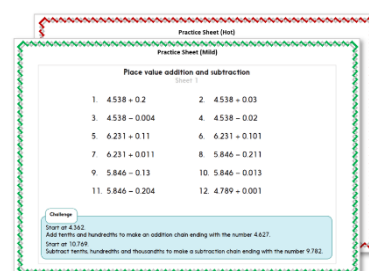## Reflections, rotations and translations

Each day covers one maths topic. It should take you about 1 hour or just a little more.
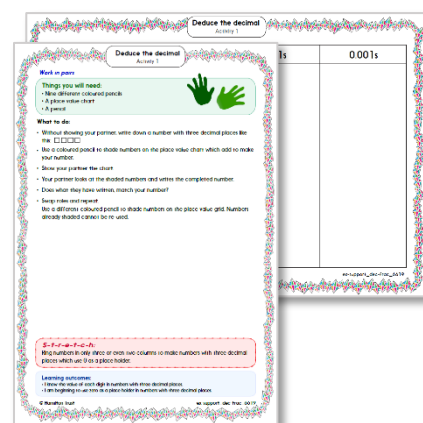
1. Start by reading through the **Learning Reminders**.
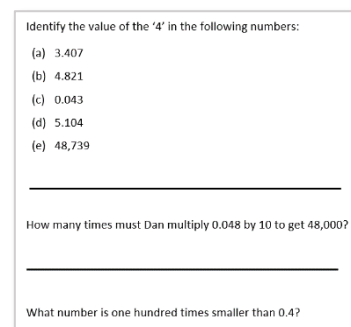   They come from our *PowerPoint* slides.

2. Tackle the questions on the **Practice Sheet**.
   There might be a choice of either Mild (easier) or Hot (harder)!
   Check the answers.

3. Finding it tricky? That's OK… have a go with a grown-up at **A Bit Stuck?**

4. Have I mastered the topic? A few questions to **Check your understanding**.
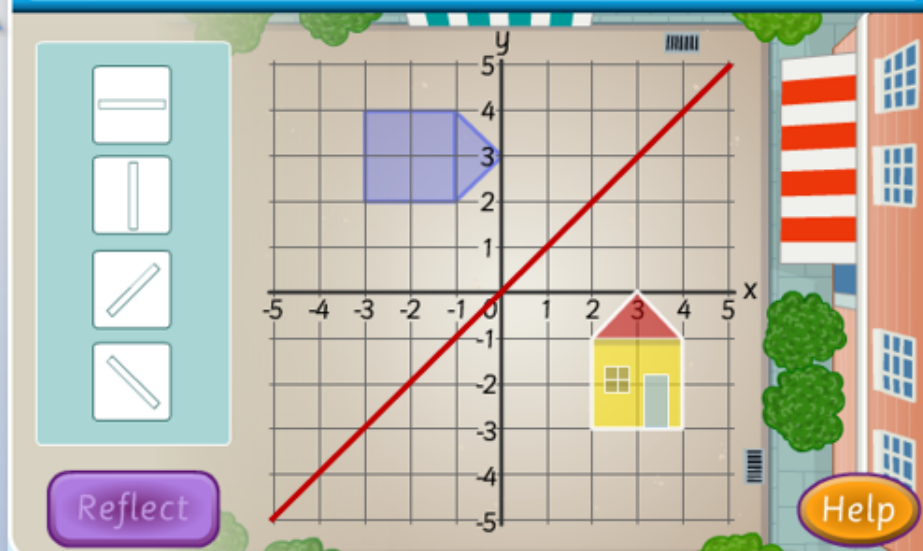   Fold the page to hide the answers!

Learning Reminders
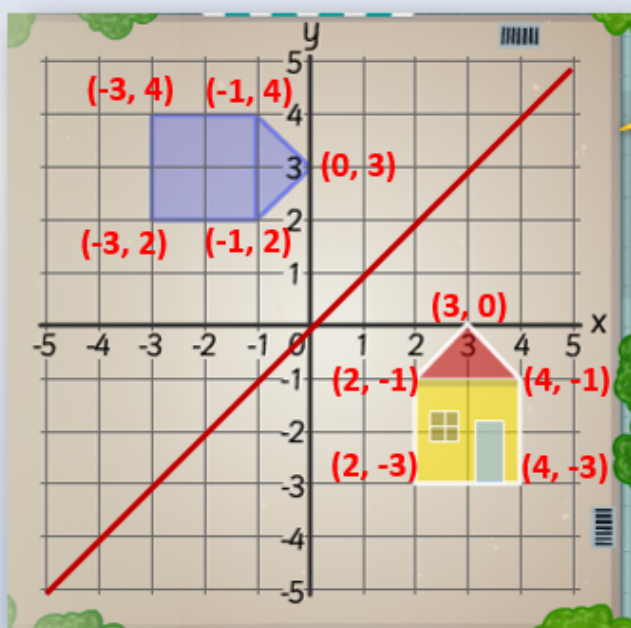
Make and describe reflections.

Which mirror line is correct, and where does it needs to go on the grid?

Try to reflect the house onto its shadow by choosing a mirror line and dropping it onto the right place on the grid.

Reflect

Help

Make and describe reflections.

(-3, 4) (-1, 4)

(0, 3)

(-3, 2) (-1, 2)

(3, 0)

(2, -1) (4, -1)

(2, -3) (4, -3)

Write the co-ordinates of the corners of the house.

Write the co-ordinates of its shadow.

Can you see a pattern in the way the x and y co-ordinates changed?

(3, 0) → (0, 3)
(2, -1) → (-1, 2)
(2, -3) → (-3, 2)
(4, -1) → (-1, 4)
(4, -3) → (-3, 4)
The co-ordinates have been reversed.

Here are some ways of remembering how to read or plot co-ordinates in the correct order.
Along the corridor (x) then up the stairs (y).
x is across, y is in the ˢᵏʸ.

Learning Reminders

Make and describe rotations.

Rotate the house about the blue point so it covers its shadow.
Choose an angle and a direction and click the Rotate button.
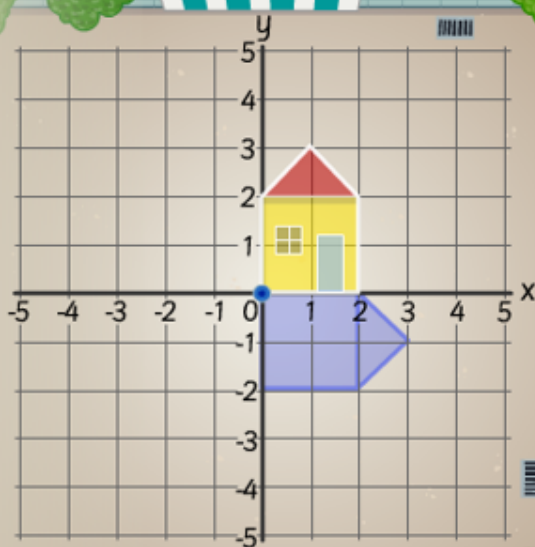
Clockwise

Anticlockwise

Angle

90° 180°

Rotate

What angle is the house turning through? In which direction?

90˚ clockwise.

Help

Make and describe rotations.

Rotate the house about the blue point so it covers its shadow.
Choose an angle and a direction and click the Rotate button.

Clockwise

Anticlockwise

Angle

90° 180°

Rotate

(1, 3)
(0, 2)   (2, 2)
(0, 0)   (2, 0)
(3, -1)
(0, -2) (2, -2)

Write the co-ordinates of the house before and after rotation.

Can you see a pattern in the way the x and y co-ordinates changed?

(0, 0) → (0, 0)
(0, 2) → (2, 0)
(1, 3) → (3, -1)
(2, 2) → (2, -2)
(2, 0) → (0, -2)
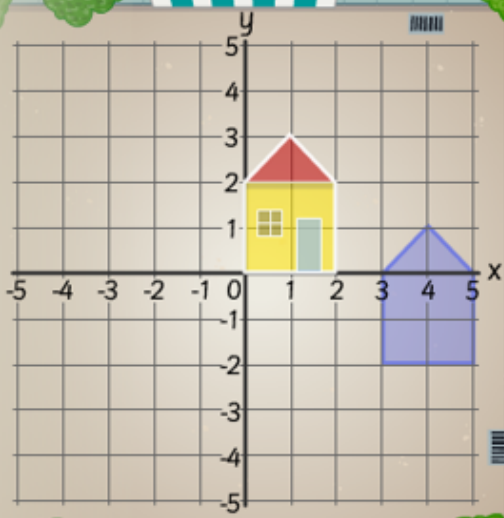The values have swapped and y co-ordinates have become negative.
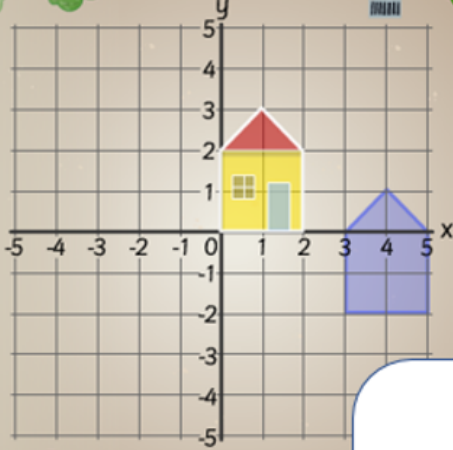
Help

Learning Reminders

Make and describe translations.

Translate the house so it covers its shadow. Use the red arrows to choose numbers and directions and click Translate.

Translate the

house ☐ unit(s)

to the ☐ and

☐ unit(s) ☐ .

Translate

Decide how many squares to the left/right the house needs to move, then how many squares up/down it needs to move.

Help

**3 squares to the right.
2 squares down.**

Make and describe translations.

Translate the house so it covers its shadow. Use the red arrows to choose numbers and directions and click Translate.

Translate the

house ☐ unit(s)

to the ☐ and

☐ unit(s) ☐ .

Translate

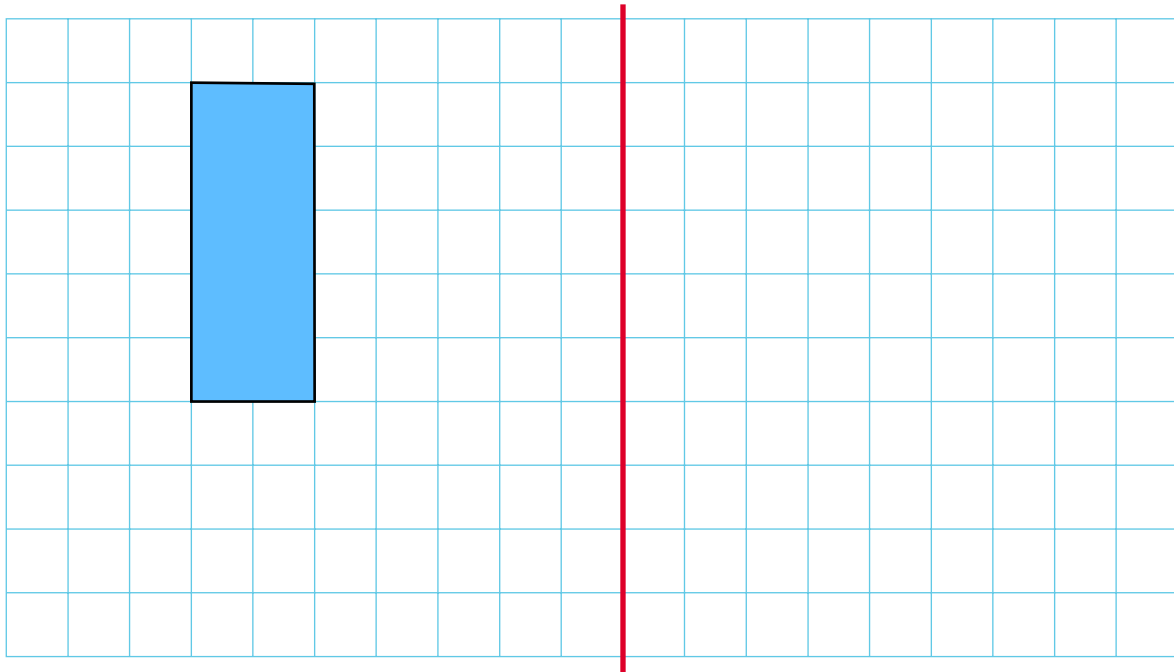Write the co-ordinates of the house before and after translation.

Can you see a pattern in the way the x and y co-ordinates changed?

(1, 3) → (4, 1)
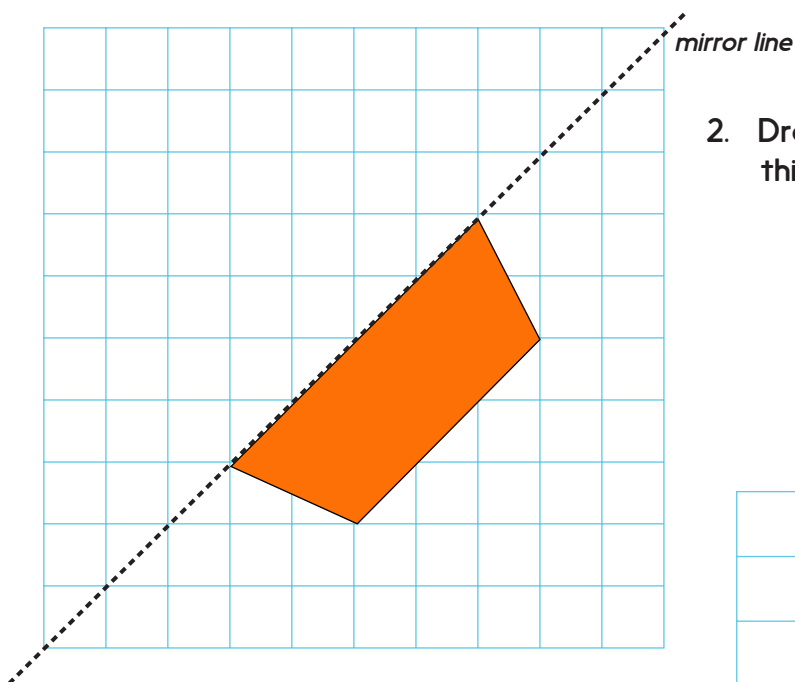(0, 2) → (3, 0)
(0, 0) → (3, -2)
(2, 0) → (5, -2)
(2, 2) → (5, 0)
**3 has been added to the x co-ordinates.
2 has been subtracted from the y co-ordinates.
This is because the house has moved 3 squares
to the right and 2 squares down.**

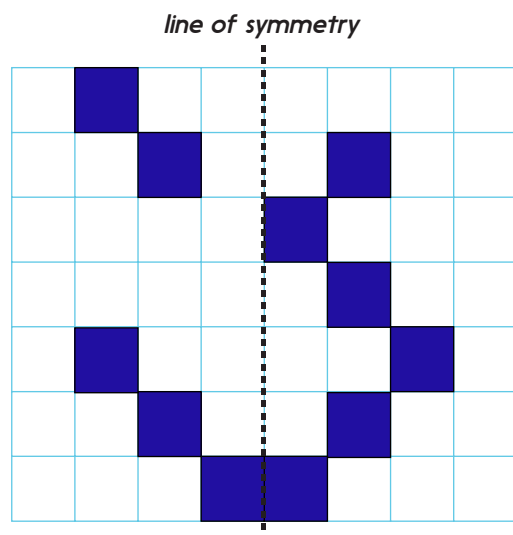# Practice Sheet Mild
Reflections and translations

1. Reflect this shape in the line of symmetry.
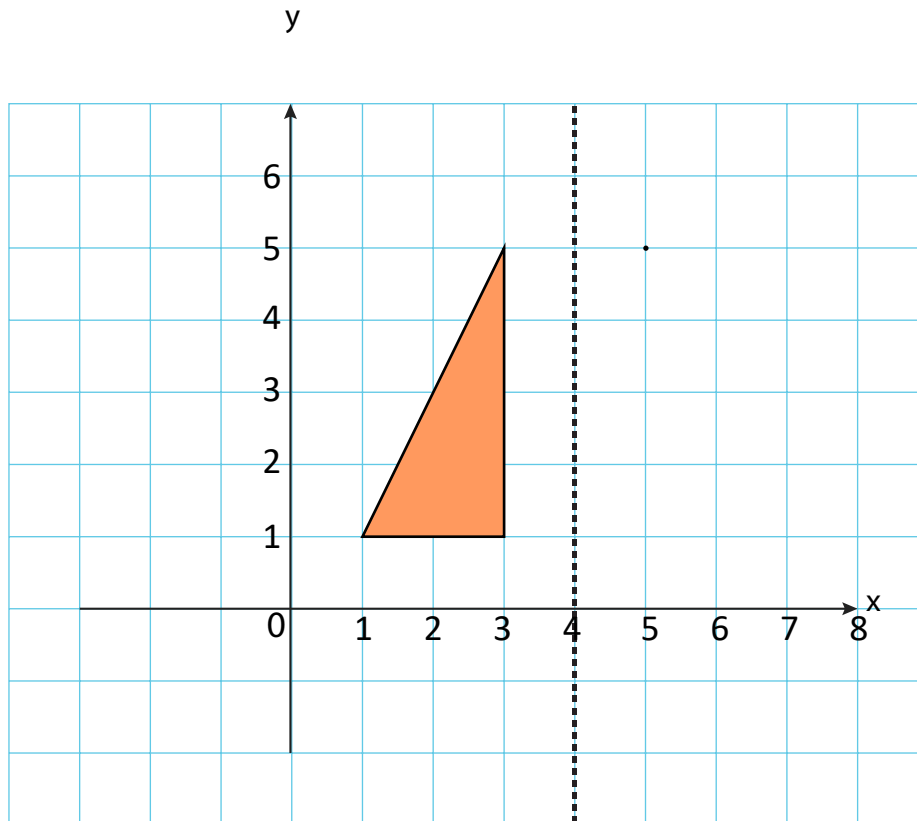
mirror line

2. Draw the reflection of this shape.

line of symmetry

3. Colour three more squares in this pattern to make a symmetrical design.

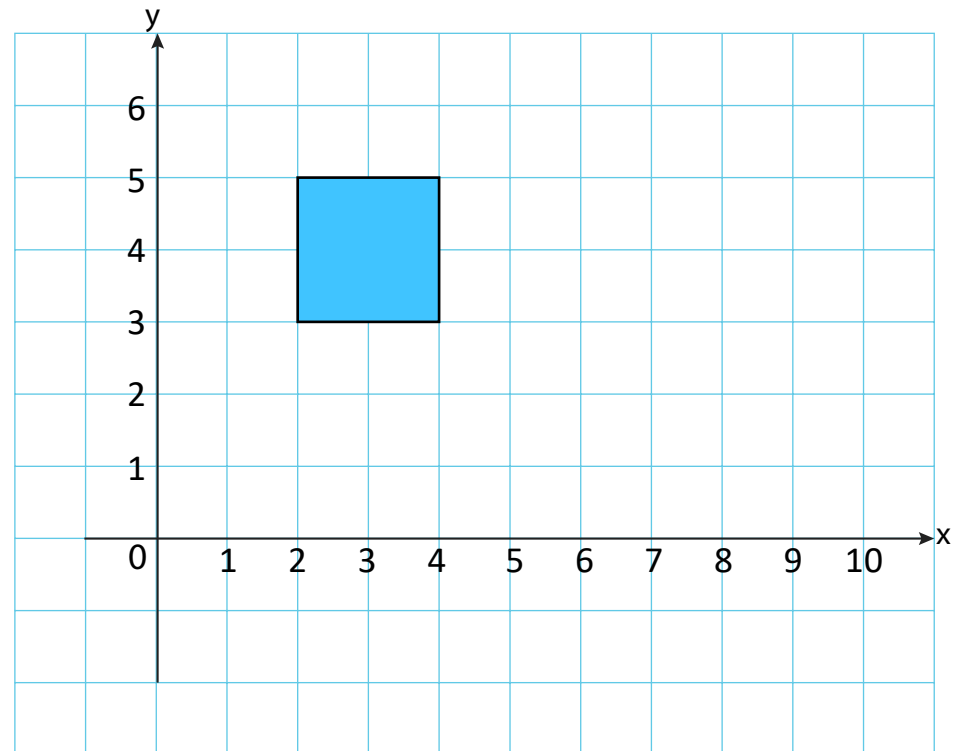Explore more Hamilton Trust Learning Materials at https://wrht.org.uk/hamilton

Practice Sheet Mild
Reflections and translations

4. Reflect this shape in the mirror line and label the co-ordinates of its vertices.

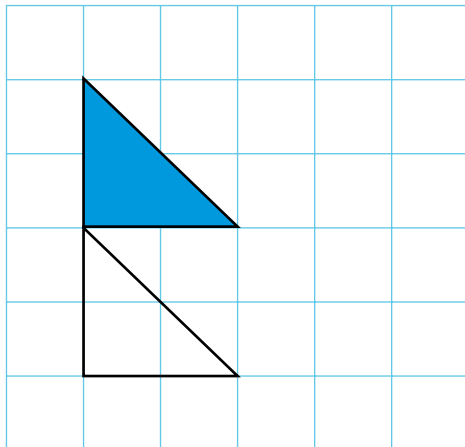5. Move this shape four squares to the right and down two squares. Write the new co-ordinates of its vertices.

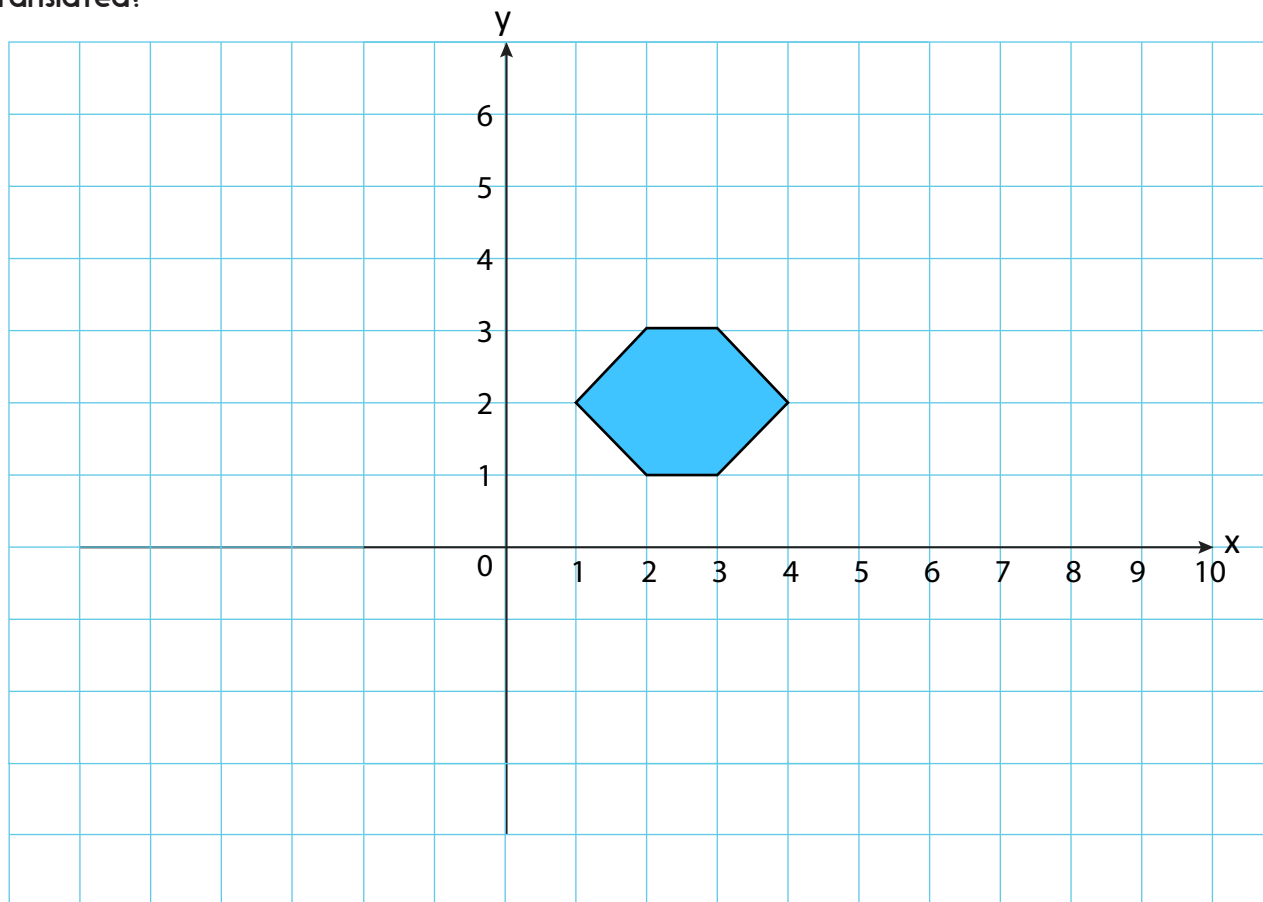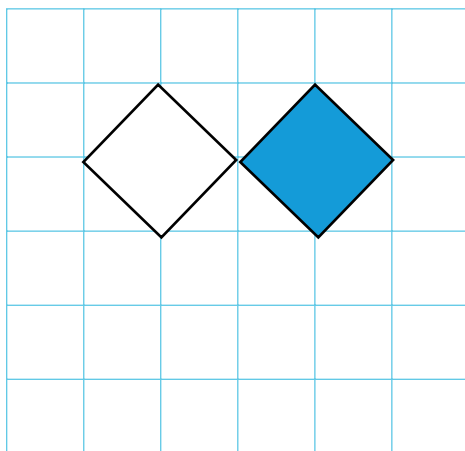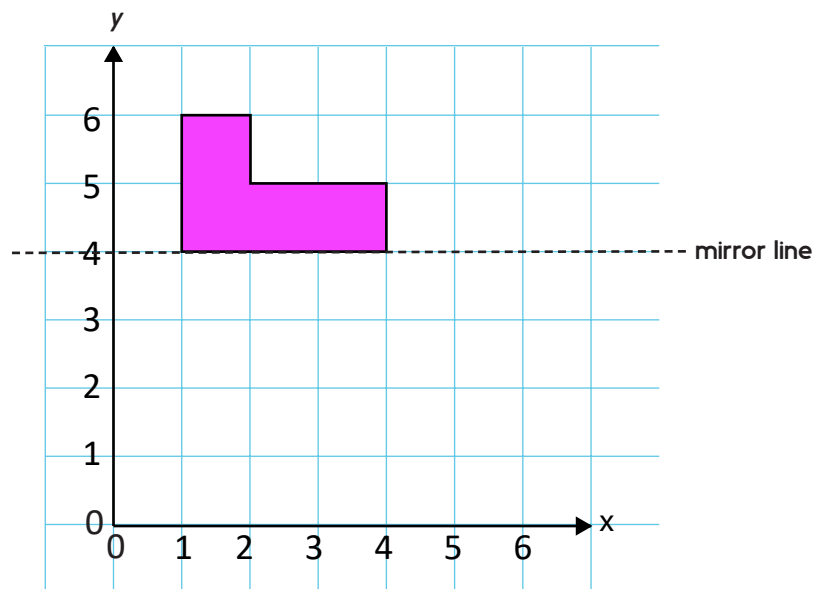# Reflections and translations

6. How have these blue shapes been translated?

a)

b)

7. Move this shape three squares to the right and up two squares.
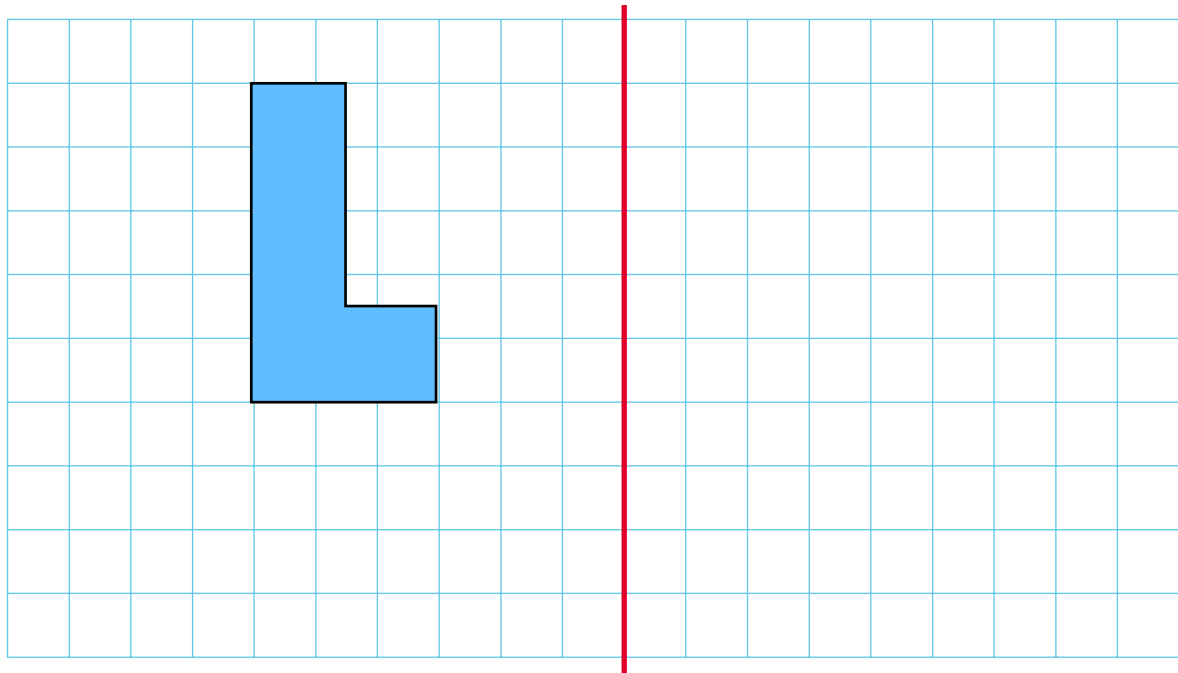
Reflections and translations

8. Reflect this shape in the mirror line.
   Label the co-ordinates of the new vertices.

Practice Sheet Hot
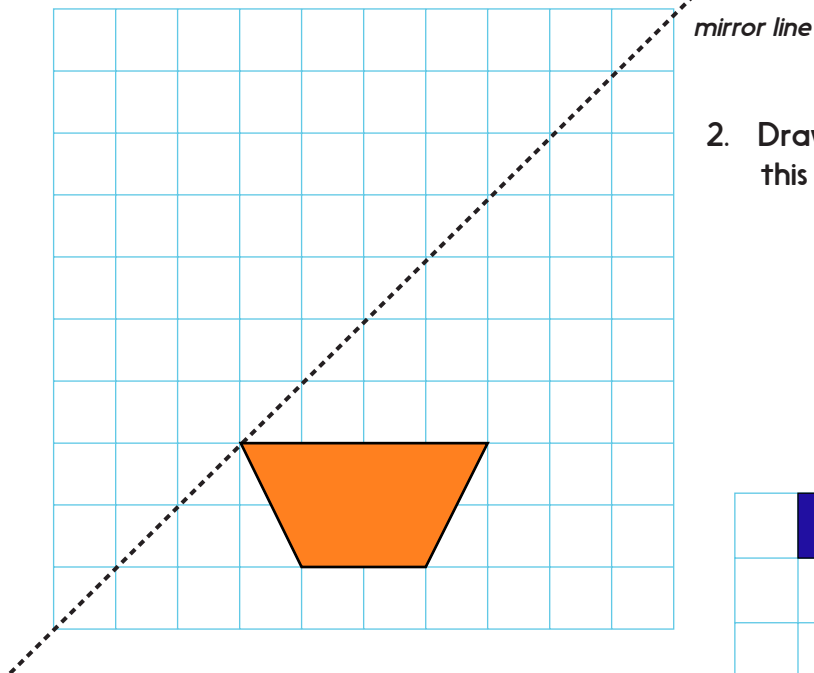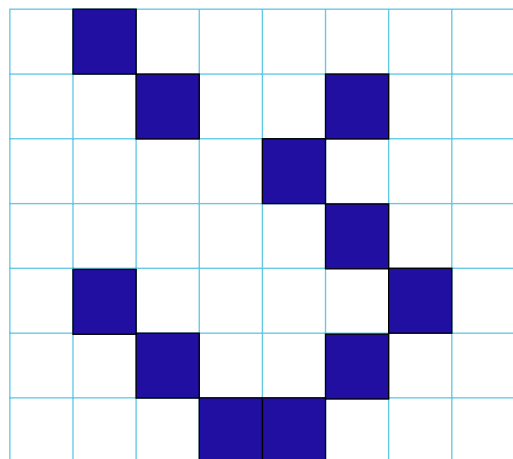## Reflections and translations

1. Reflect this shape in the line of symmetry.

mirror line
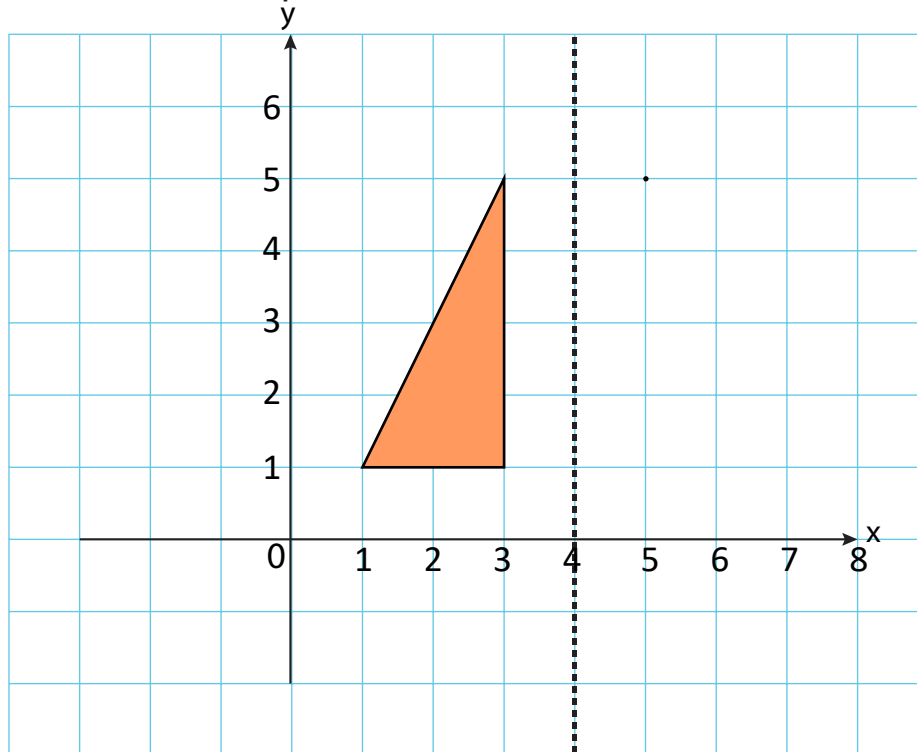
2. Draw the reflection of this shape.

3. Colour three more squares in this pattern to make a symmetrical design. Draw a line of symmetry.

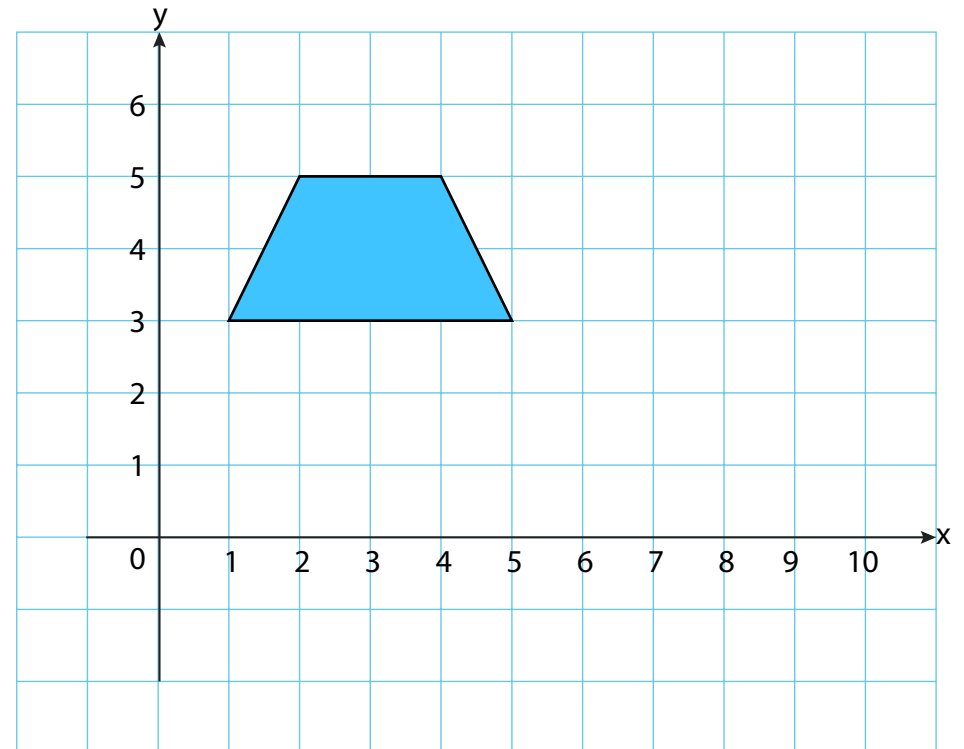Explore more Hamilton Trust Learning Materials at https://wrht.org.uk/hamilton

Reflections and translations

4. Reflect this shape in the mirror line and label the co-ordinates of its vertices.

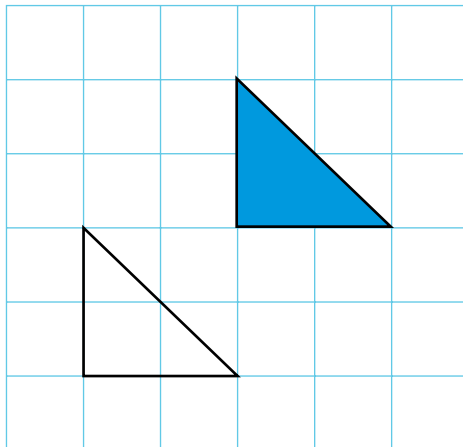5. Move this shape four squares to the right and down two squares. Write the new co-ordinates of its vertices.
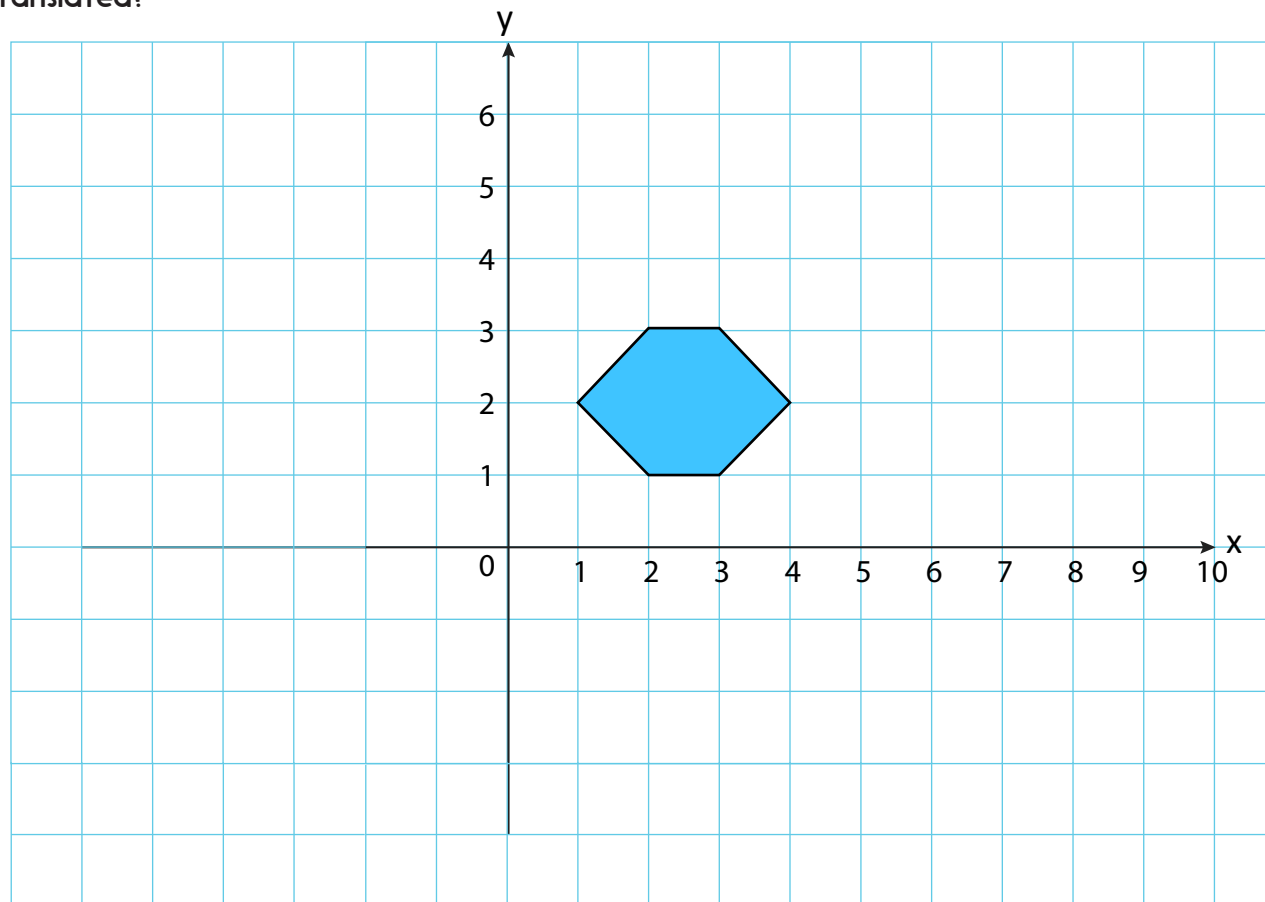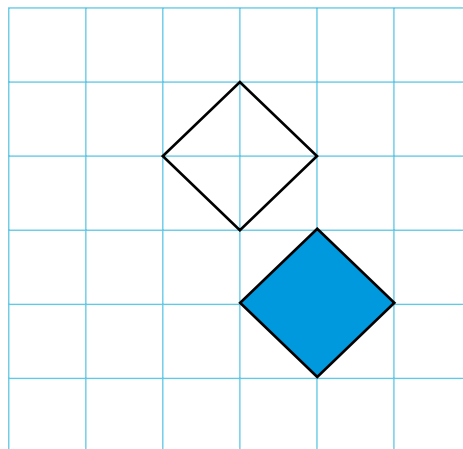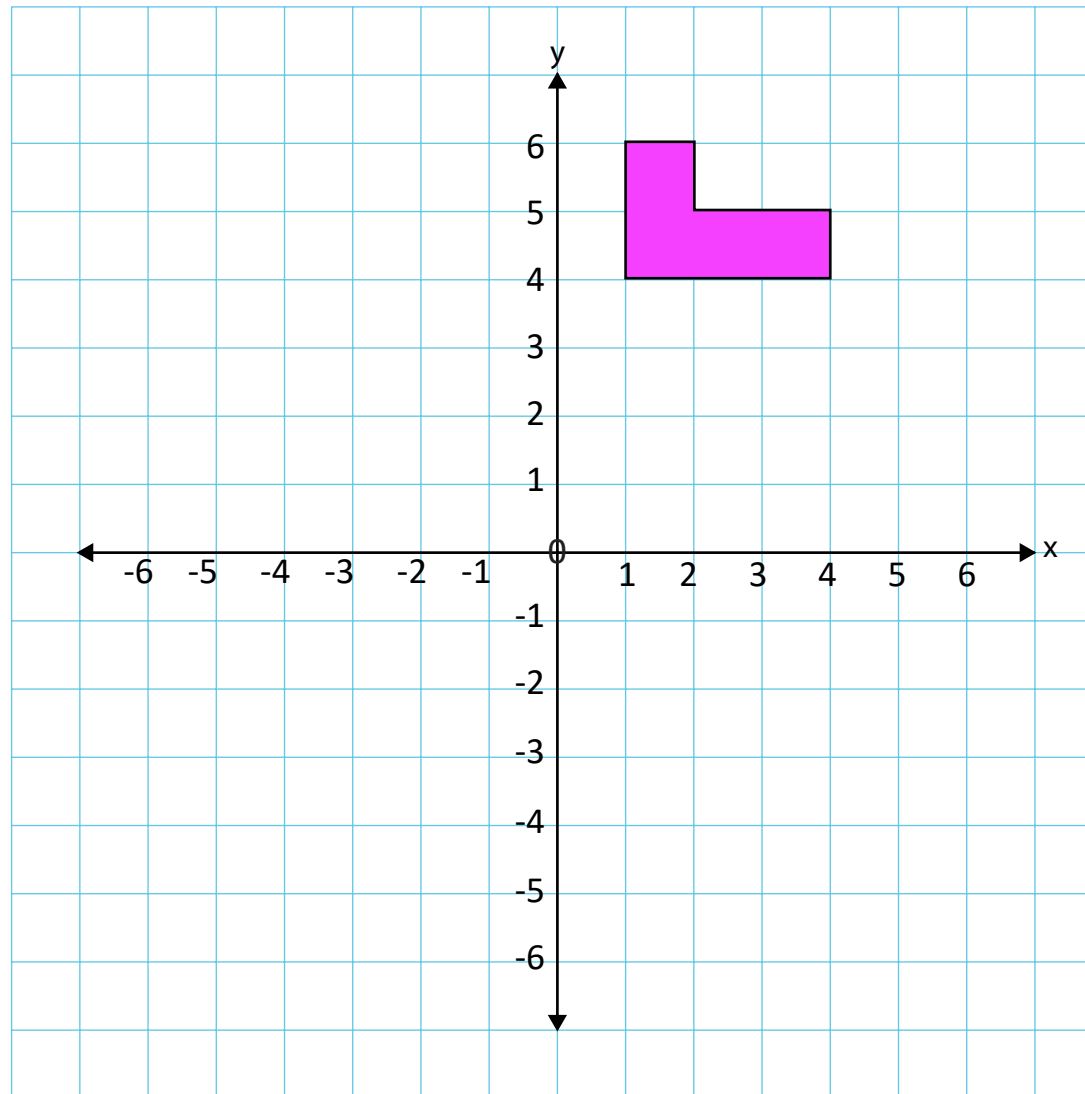
6. How have these blue shapes been translated?

a)

b)

7. Translate this shape down 4 squares, then reflect in the y-axis. Label the co-ordinates of the vertices each time.
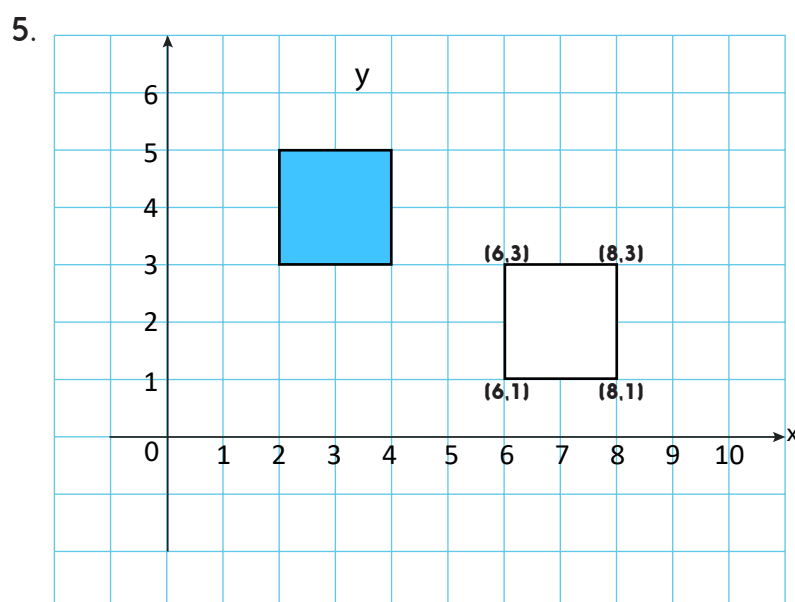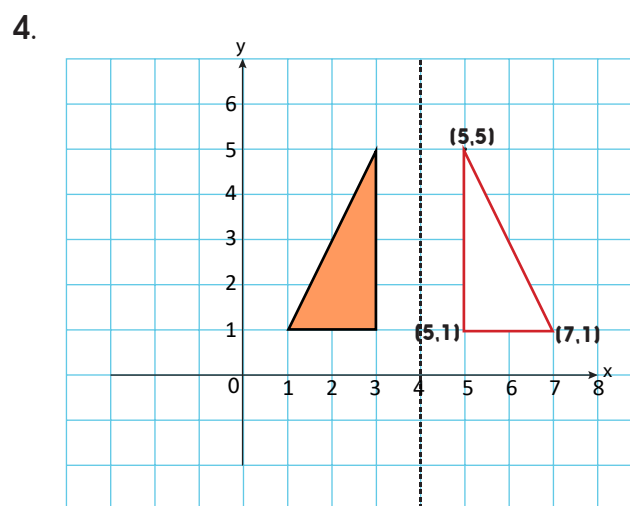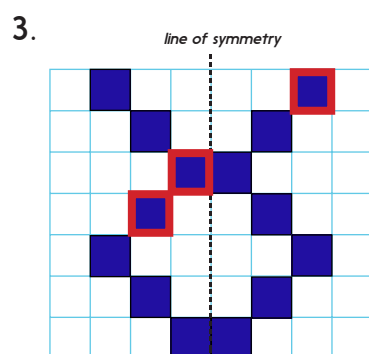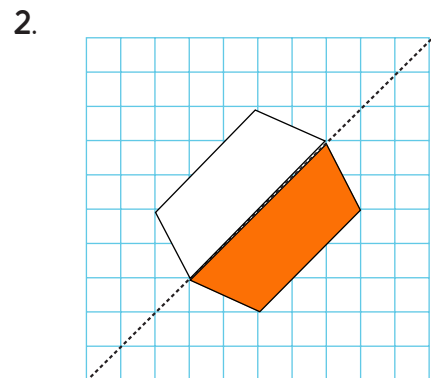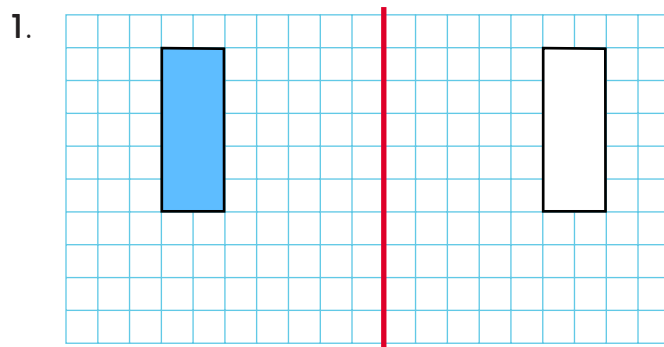
8. Reflect this shape in the x axis. Label the co-ordinates of the new vertices.

Practice Sheets Answers

Reflections and translations (mild)

1.

2.

3.

line of symmetry

4.

(5,5)

(5,1)   (7,1)

5.

y

(6,3)   (8,3)

(6,1)   (8,1)

x

6. a)   Down 2 squares

b)   Left 2 squares

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Practice Sheets Answers

Reflections and translations (mild) continued

7.
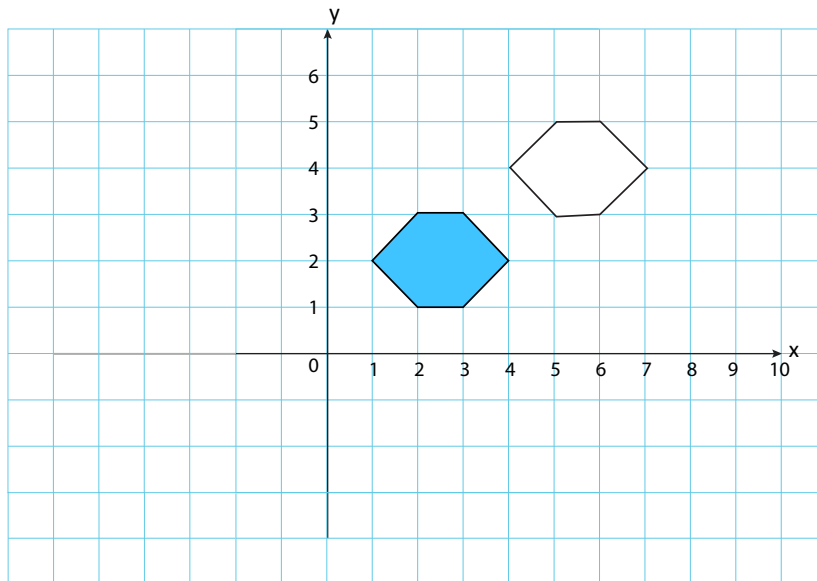
8.

Reflections and translations (hot)

1.

2.

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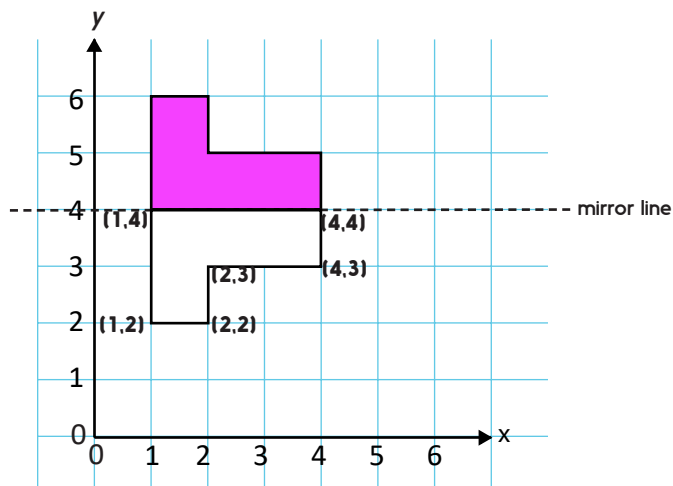
Practice Sheets Answers

Reflections and translations (hot) continued

3.

4.

Coordinates: (5,5), (5,1), (7,1)

5.

Coordinates: (6,3), (8,3), (5,1), (9,1)
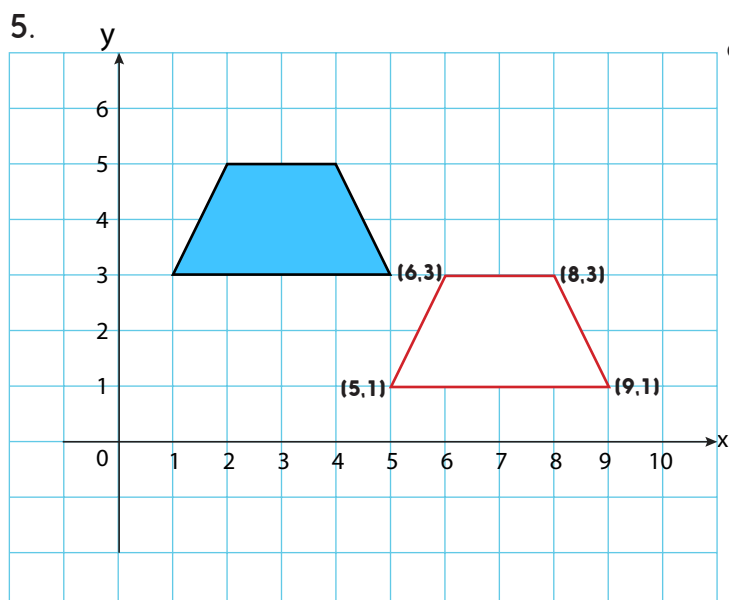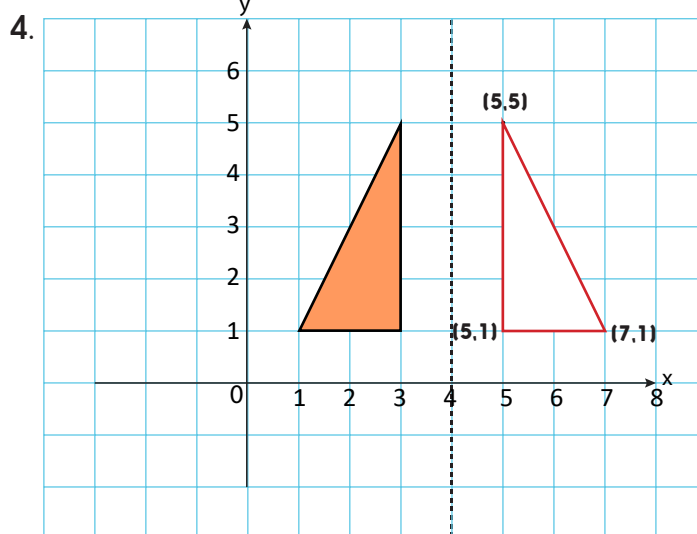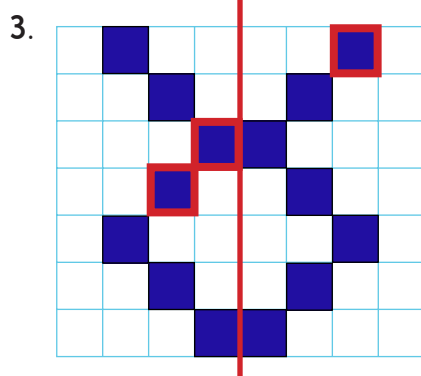
6. a)   Left 2 squares and down 2 squares

b)   Left 1 square and up 2 squares

7.

Coordinates: (-3,-1), (-2,-1), (2,-1), (3,-1), (-4,-2), (1,-2), (-1,-2), (4,-2), (-3,-3), (-2,-3), (2,-3), (3,-3)
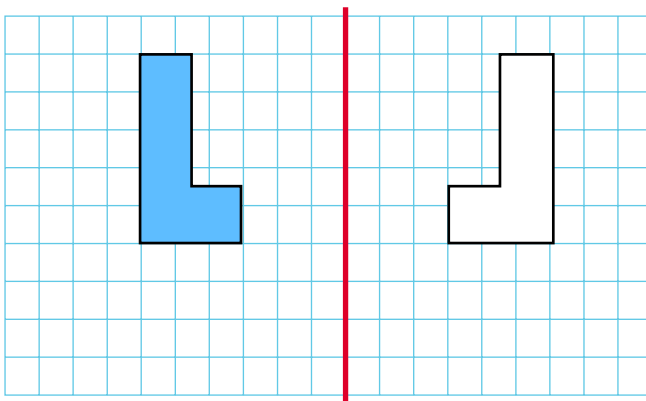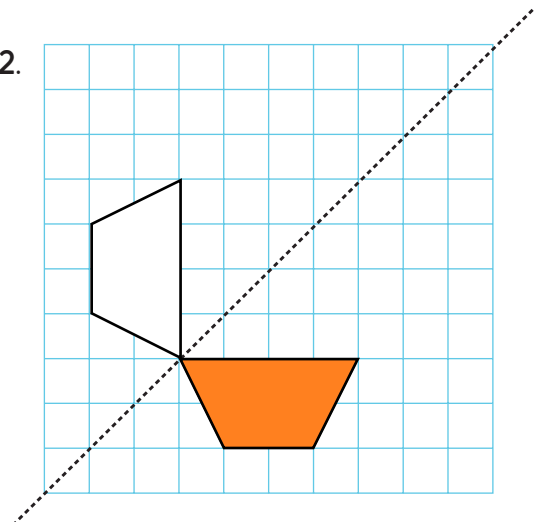
Explore more Hamilton Trust Learning Materials at https://wrht.org.uk/hamilton
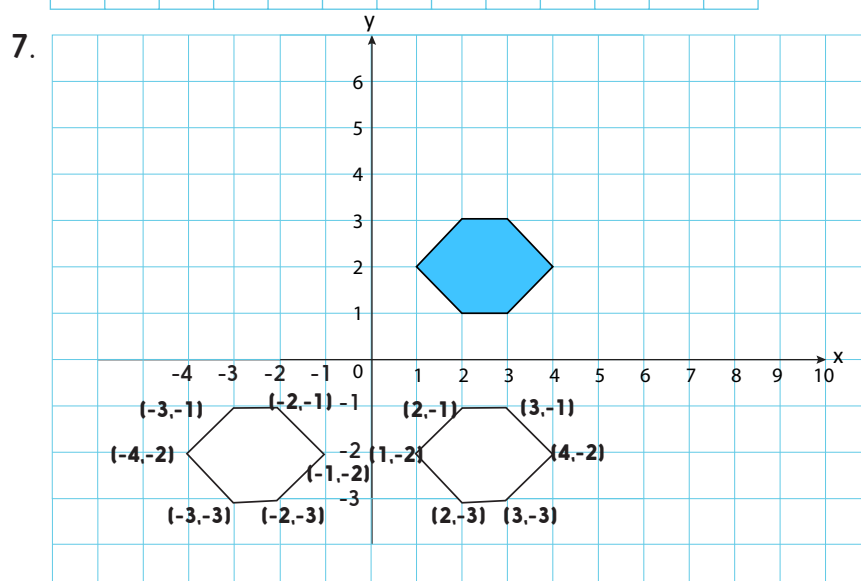
Reflections and translations (hot) continued

8.
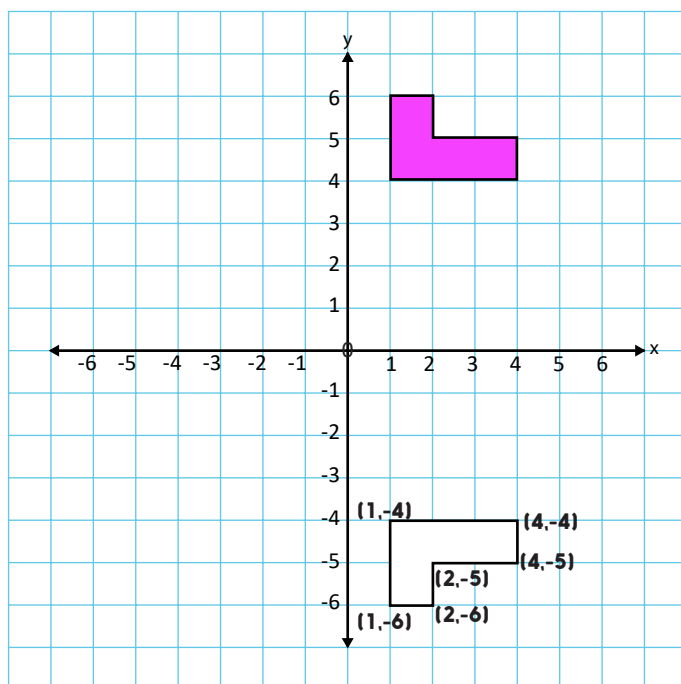
A Bit Stuck?
Match the moves

You will need:

o 'Reflections and Translations' grids *(Resource Sheets 1-4)*

o Two 'L-shaped' pieces of card, which measure three squares up and two across, the size of the squares matching the squares on the co-ordinate grid.

o Coloured pencils

What to do:

- In pairs, each person has a copy of Sheet 1 and an 'L' shape.

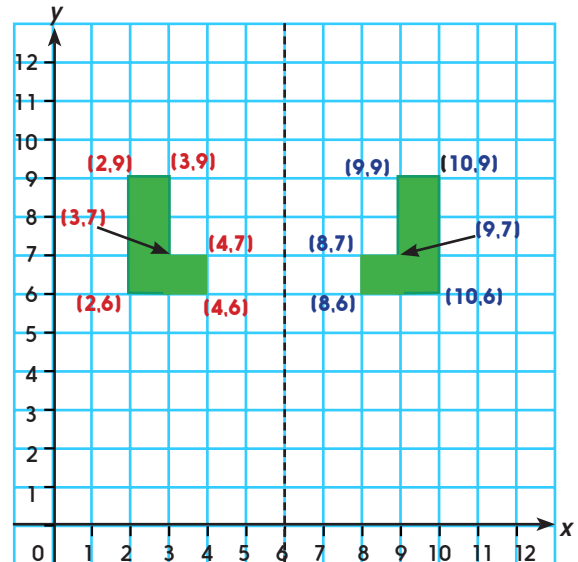- Place the L-shape anywhere on the first grid, such that its reflection in the mirror line <u>will fit on the grid</u>.

- Draw around the L and label the co-ordinates.

- **Reflect** the shape in the mirror line and, on the same grid, draw round the shape in a different colour.

- Label the co-ordinates of the new shape.

WHEW! Now go on... You are going to draw each other's shapes without looking at their grid!

- Take turns to tell your partner the co-ordinates of the first position of your shape.

- Place the L at these co-ordinates on the second grid.

- Now **reflect** that L and draw round the shape.

- Share grids. Both should have drawn each other's grids!

WHEW! Now repeat this using Sheet 2 and Sheet 3

- Repeat for the next two sheets of co-ordinate grids with mirror lines.

WHEW! Now, each take a copy of Sheet 4, which has no mirror lines.

- Mark the following co-ordinates: (1,2), (3,2), (3,3), (2,3), (2,5) and (1,5) and place your L-shape there.

- Now move your L-shape somewhere else on the grid, draw round it and record the **translation**, e.g. 3 squares to the left and 2 squares up.

- Each person takes it in turns to describe their translation.

- The other person moves their shape according to the instructions.

- The person giving the instructions shows their translated drawn shape.

- Are the translated shapes in the same position?

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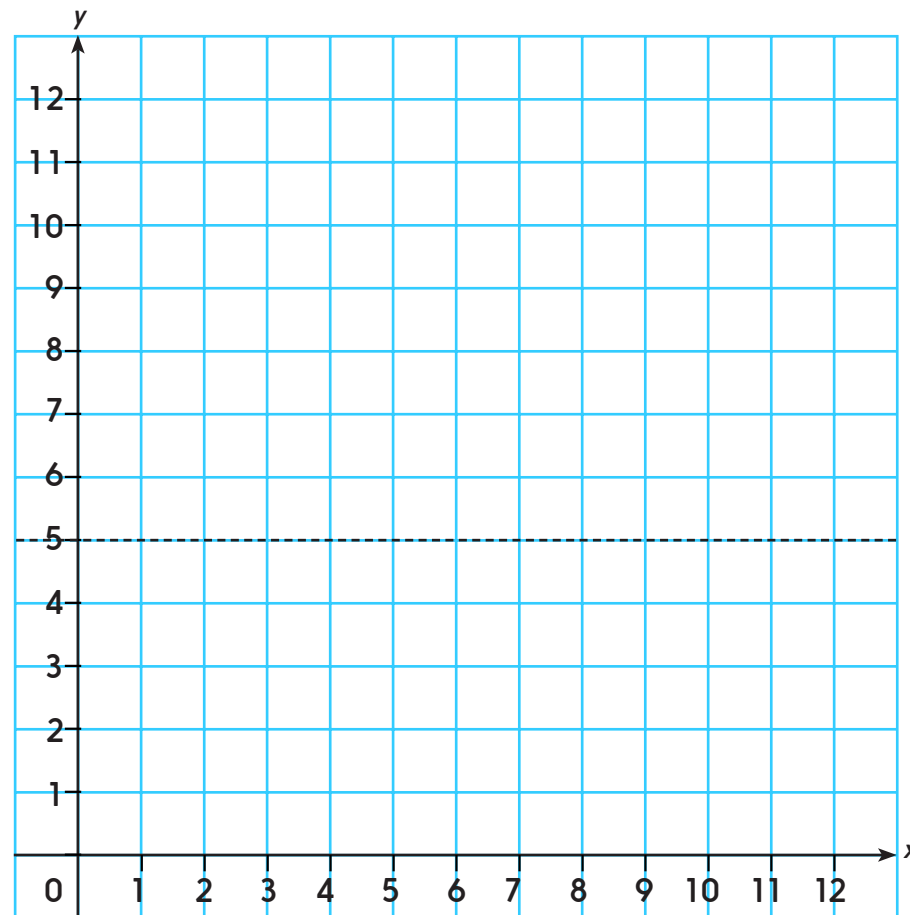# A Bit Stuck?
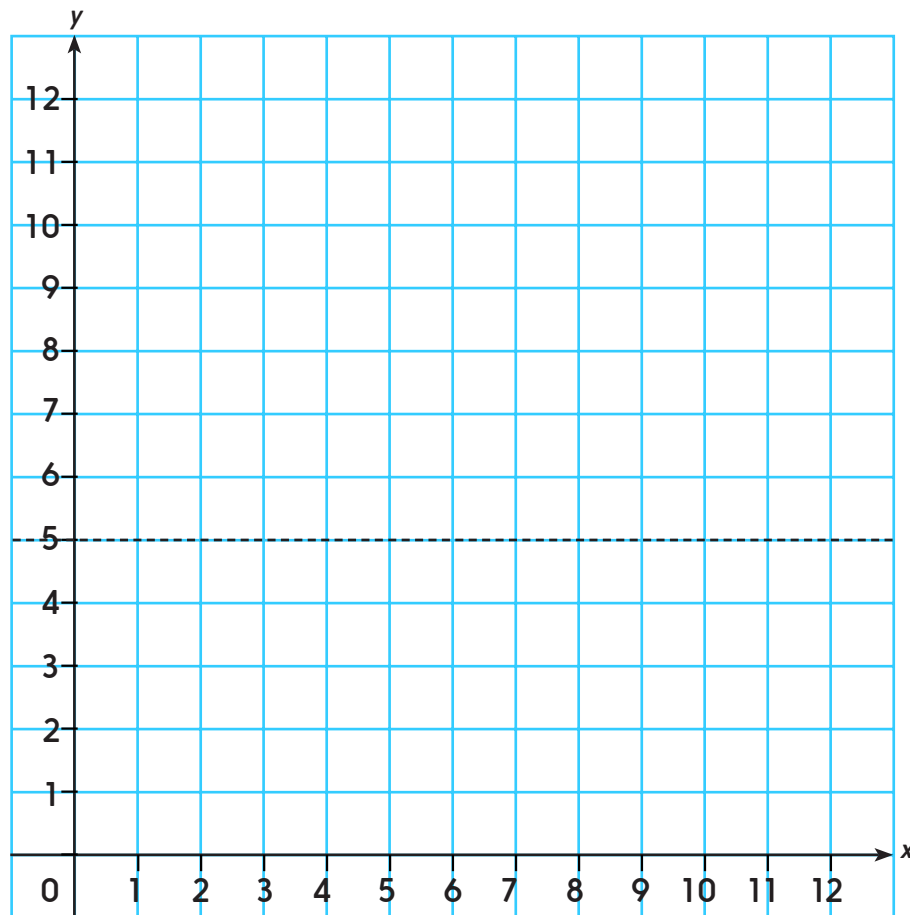## Reflections and translations grids
Resource Sheet 1
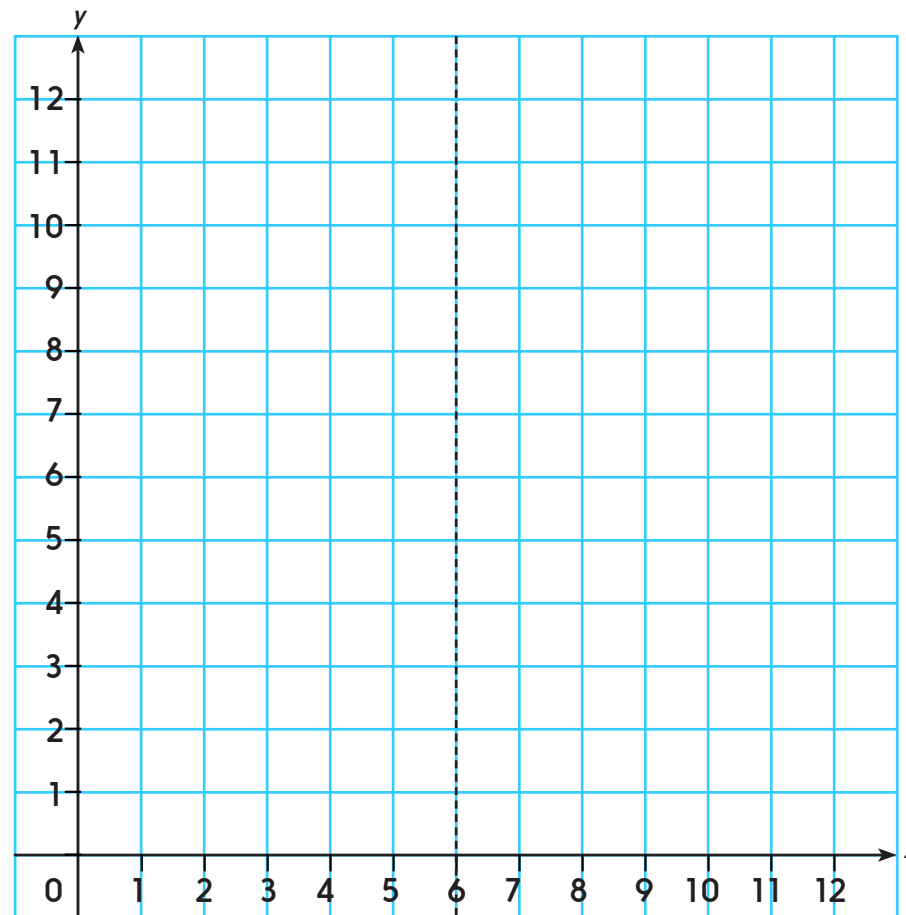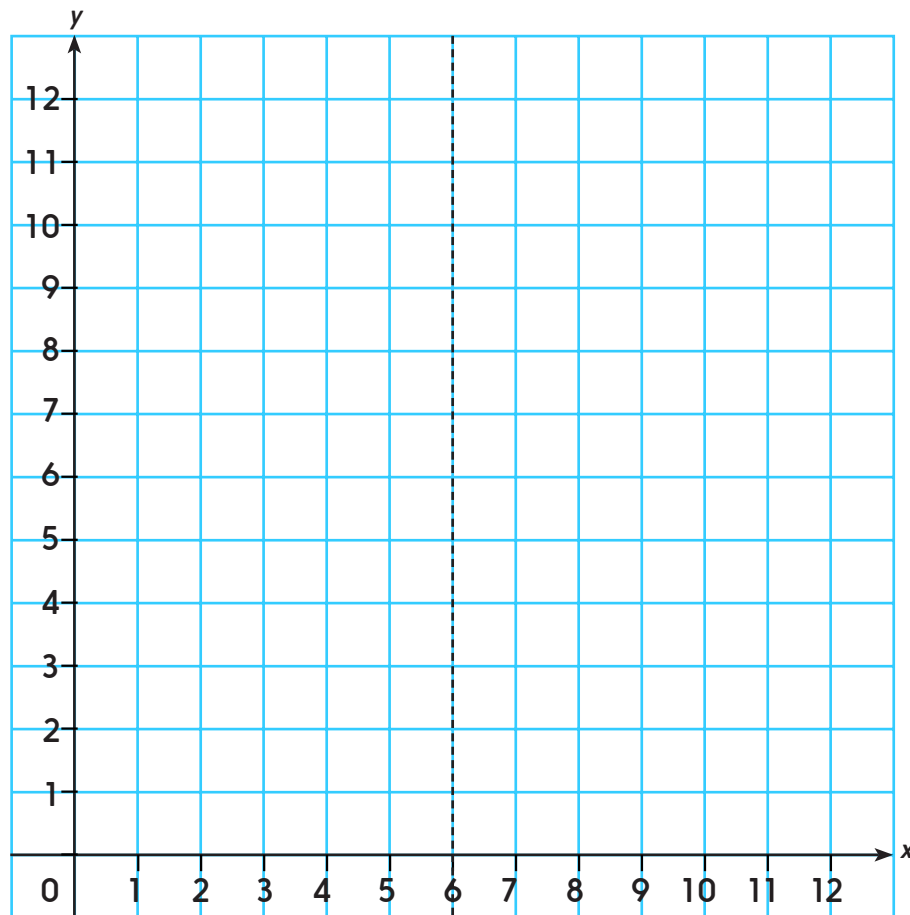
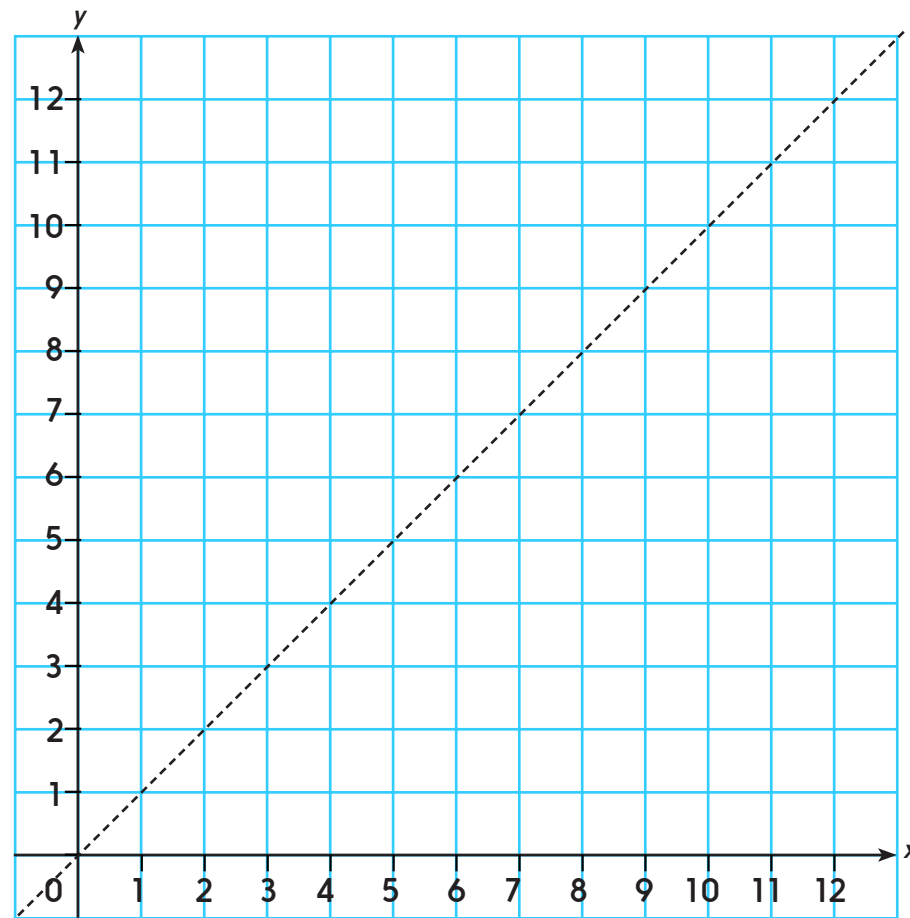# A Bit Stuck?
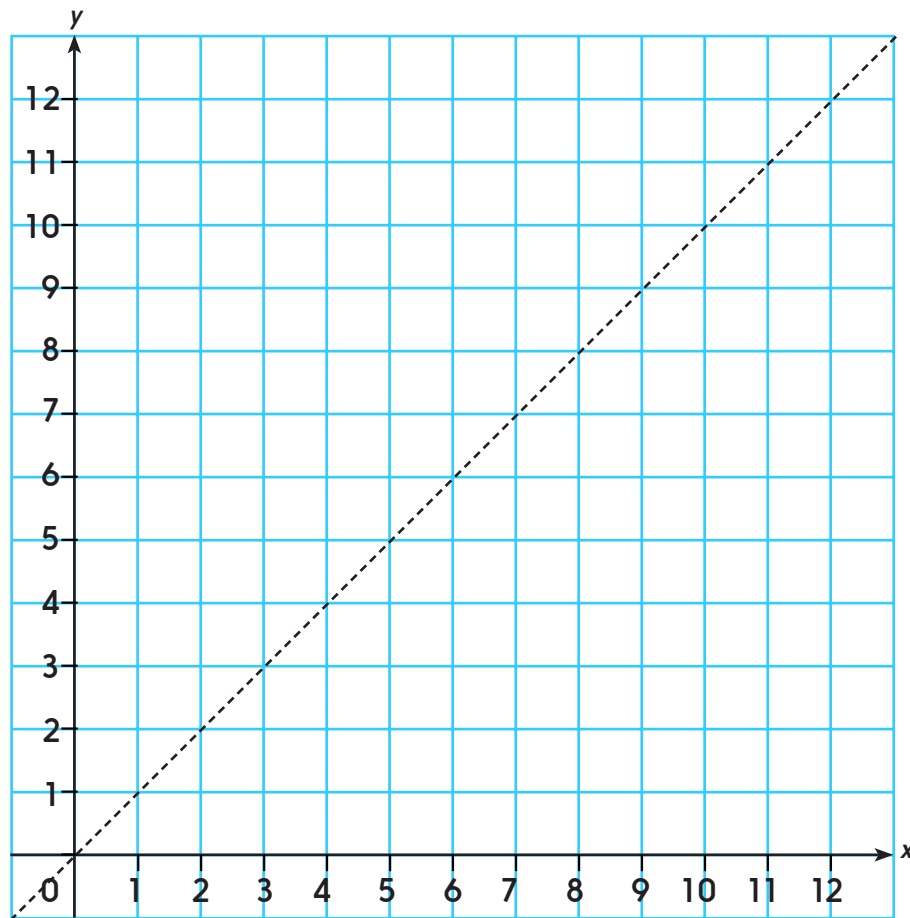## Reflections and translations grids
Resource Sheet 2

A Bit Stuck?
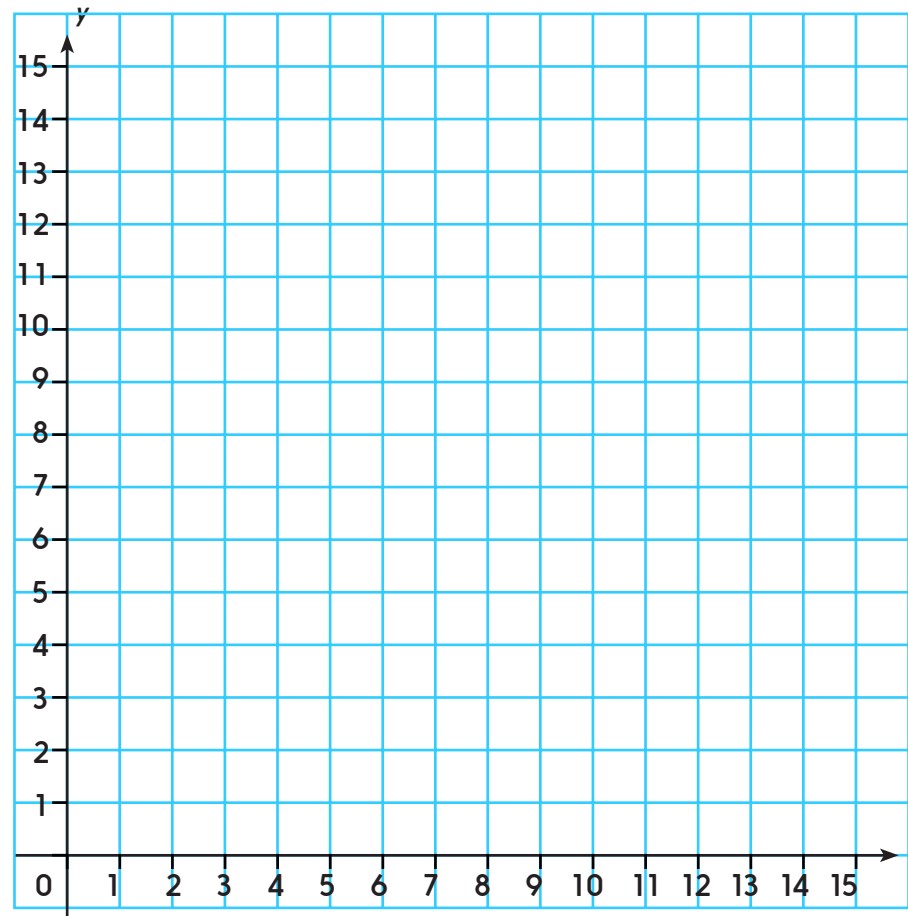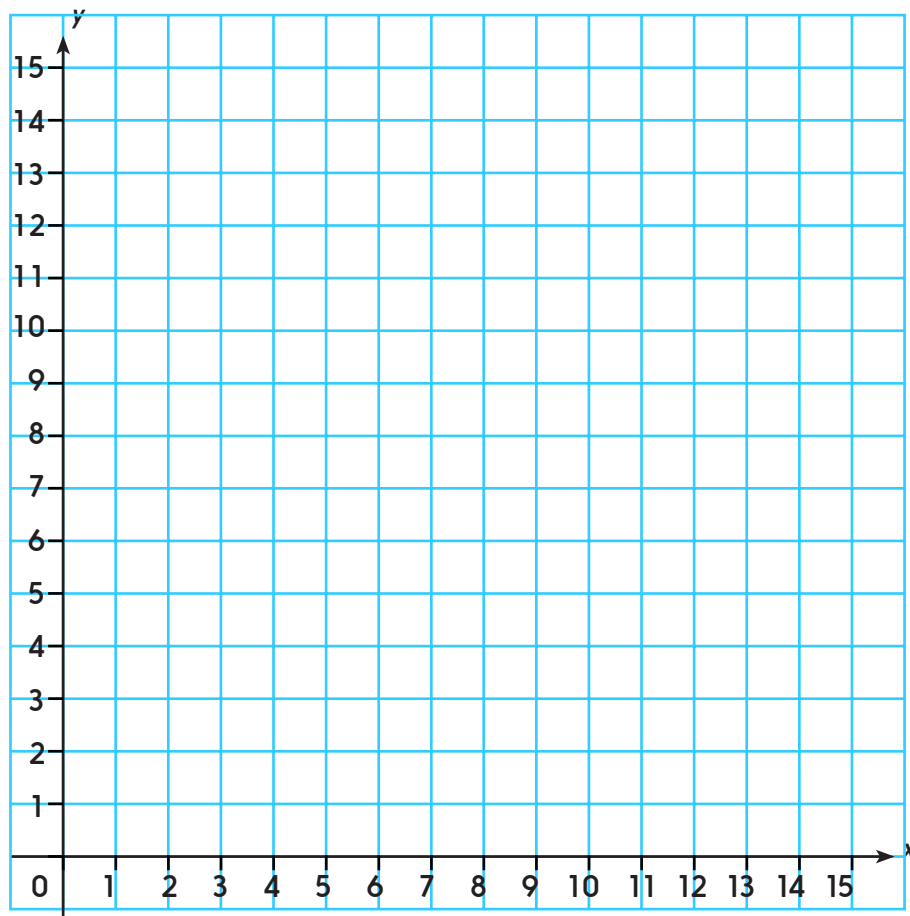## Reflections and translations grids
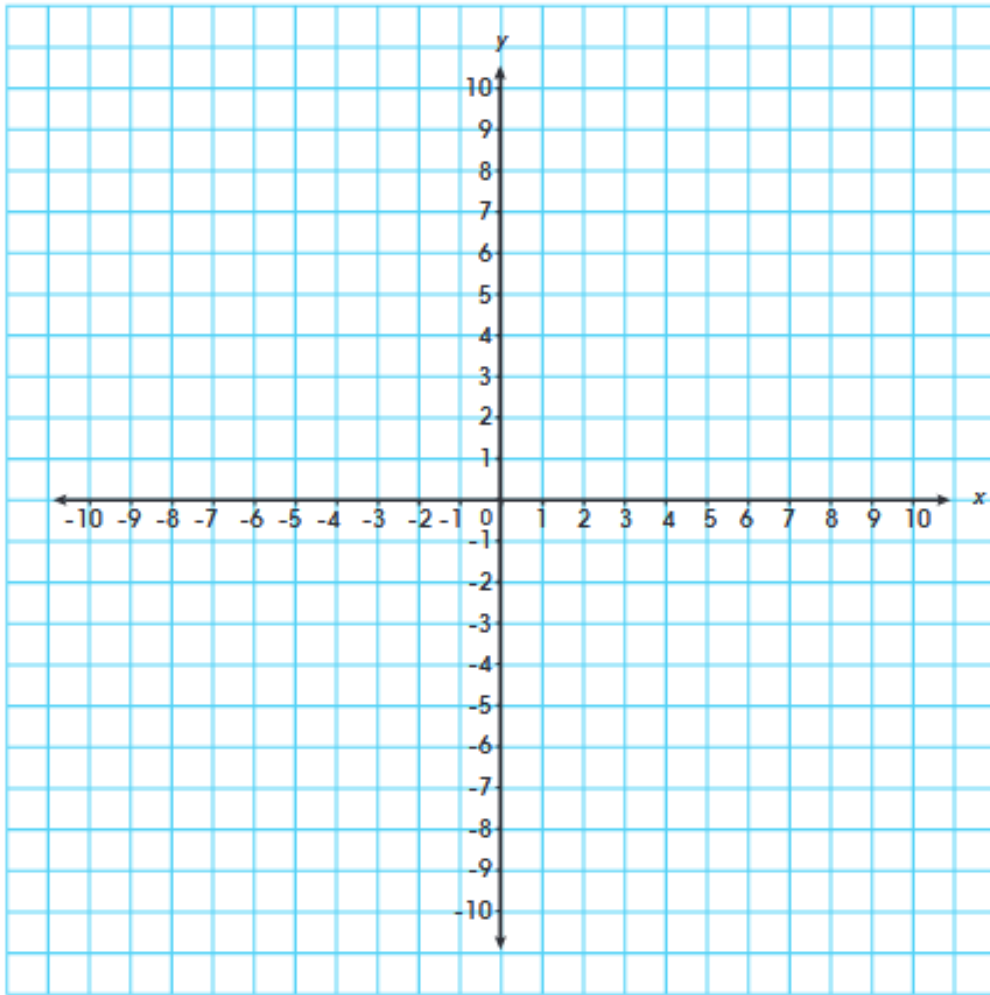### Resource Sheet 3

A Bit Stuck?
Reflections and translations grids
Resource Sheet 4

Check your understanding
Questions

The centre of a square has co-ordinates (3, 1) and one vertex at (-1, 5).

What are the co-ordinates of its other three vertices?

_____

A triangle with co-ordinates (-2, -2), (-2, 3) and (1, -2) is translated 6 grid squares to the right and 5 up.

What are the co-ordinates of its new position?

_____

A pentagon with vertices at (4, 7), (6, 2), (2, 2), (2, 6) and (6, 6) is reflected in the y axis. Write the co-ordinates of its new position.

_____

The centre of a square has co-ordinates (3, 1) and one vertex at (-1, 5).

What are the co-ordinates of its other three vertices?

(-1, -3) (7, 5) and (7, -3). The vertices are equidistant from the centre, so each *x*-and *y* co-ordinate is, like the one given, 4 away from the centre.

A triangle with co-ordinates (-2, -2), (-2, 3) and (1, -2) is translated 6 grid squares to the right and 5 up.

What are the co-ordinates of its new position?

(4, 3), (4, 8) and (7, 3). Mistakes can arise when adding onto negative co-ordinates – sketching the original triangle can help counter this.

A pentagon with vertices at (4, 7), (6, 2), (2, 2), (2, 6) and (6, 6) is reflected in the y axis. Write the co-ordinates of its new position.

(-4, 7), (-6, 2), (-2, 2), (-2, 6) and (-6, 6)