Reflection and Translation

Key NC Statement

Identify, describe and represent the position of a shape following a reflection or translation, using the appropriate language, and know that the shape has not changed

Related NC Statements

- use the properties of rectangles to deduce related facts and find missing lengths and angles

Key Concepts

In this sequence, pupils will recognise and use reflection and translation to move shapes to new positions. They will also use appropriate language to describe how shapes have moved and their position in relation to each other.

Pupils will learn that when translating shapes to new positions, the shape does not change in any way and that each vertex moves in exactly the same way. When considering reflection, understanding will be developed further from focuses in 4LS15. In this sequence, pupils considered symmetry within shapes and built symmetrical patterns.

In addition, pupils will be provided with the opportunity to rehearse knowledge of coordinates (developed in 4LS32) to describe translations in the first quadrant and to reflect shapes in lines that are parallel to the axes.

Steps within the Learning Sequence

Step 1: Translate shapes

Step 2: Reflect patterns and shapes

Step 3: Translate and reflect in the first quadrant

Destination Questions

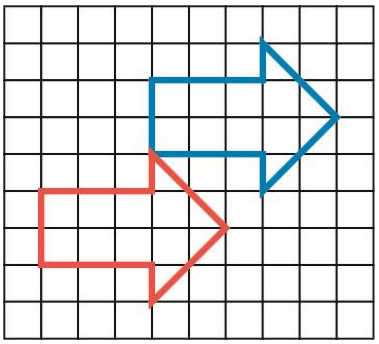
1

Draw a triangle on squared paper.

Translate the triangle 4 squares right and 6 squares up.

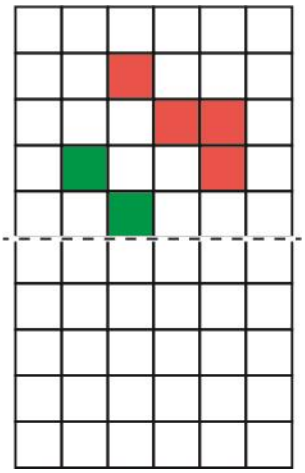
2

How has the blue shape been translated to the position of the red shape?



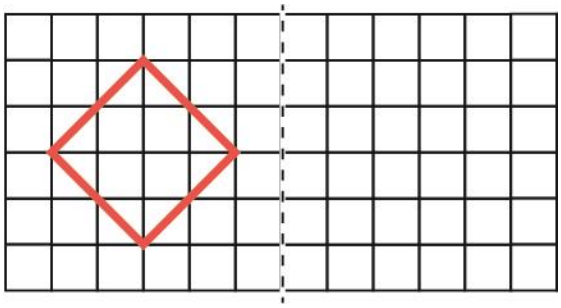
Which other translation could you describe?

3



Reflect the pattern in the mirror line.

4



Draw the square after it has been reflected.

5

A shape and a horizontal line of reflection are drawn on a page.

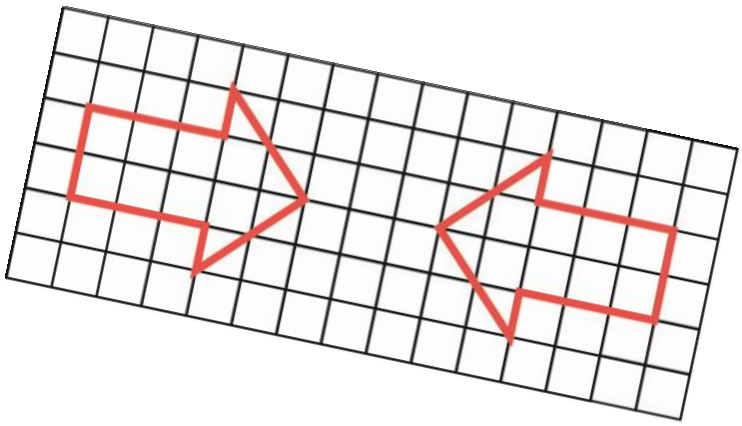
The shape is reflected.

The new shape will be directly below the original shape.

What do you think? Explain.

6

Draw in the line of reflection.



7

Draw a square with the following coordinates:

(5,2) (3,2) (3,4) (5,4)

Translate it 5 squares up.

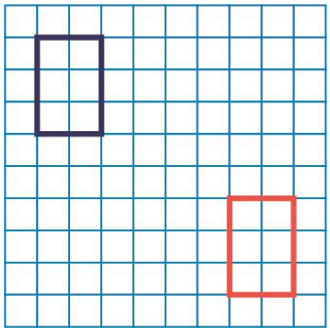
What are the coordinates of the new square?

Step one

Translate shapes

In this step, pupils will learn that translation means that shapes are moved to a new position. Every vertex of the shape moves in exactly the same way so that the shape itself stays the same. They will translate shapes to new positions and describe the translations.

Show an image of congruent shapes (identical in both shape and size) which have been translated and use precise vocabulary to describe their position in relation to each other. Vocabulary could be provided as appropriate including: below, above, left, right, across, up, down.



How are the red rectangle and the blue rectangle related?

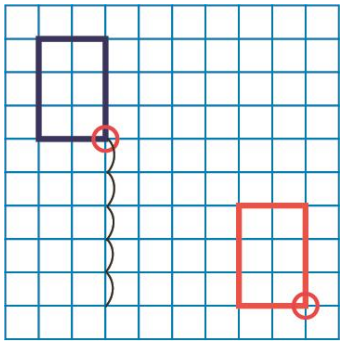
The red rectangle is below and to the right of the blue shape.

If you move the blue rectangle down and to the right it will fit on top of the red rectangle.

Clarify that the shape has not changed in any way, but that it has moved to a new position and this is known as a translation.

How can you be more precise about how far the shape has moved in each direction?

Model how to precisely describe the translation of the red shape to the blue shape by selecting the same point on each and counting the number of squares moved. Clarify that the identified point on the blue rectangle has moved 5 squares down to the same point on the red rectangle.



How can you describe how the blue rectangle has moved across the grid to the red rectangle?

The blue rectangle has moved 6 squares to the right.

The blue rectangle was translated 5 squares down and 6 squares right to the red rectangle.

Pupils commonly make the mistake of counting to a different point on the shape when thinking about how it has moved and so circling the points can be helpful.

Provide pupils with a variety of problems to rehearse translation. These should include:

- describing translations
- translating shapes using descriptions

Handout_5LS25_step1_translate provides examples which could be used to support variation.

1  2 

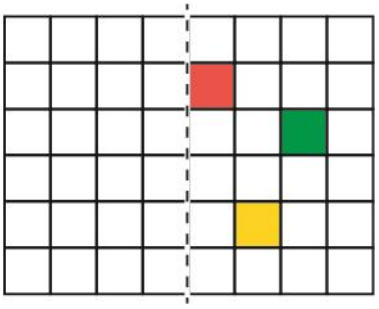
Step two

Reflect patterns and shapes

What is a reflection?
Where have you seen reflections before?
What do you notice about them?

Consider what pupils already know about reflections and where they have seen them before, such as in mirrors and reflections of images in water. Clarify that images, which are reflected, remain the same but appear to have been flipped over the line of reflection.

Present pupils with a pattern and a marked line of reflection (mirror line) and ask them to consider how they can reflect the pattern. Then model how to use a mirror to see what the reflection will look like.

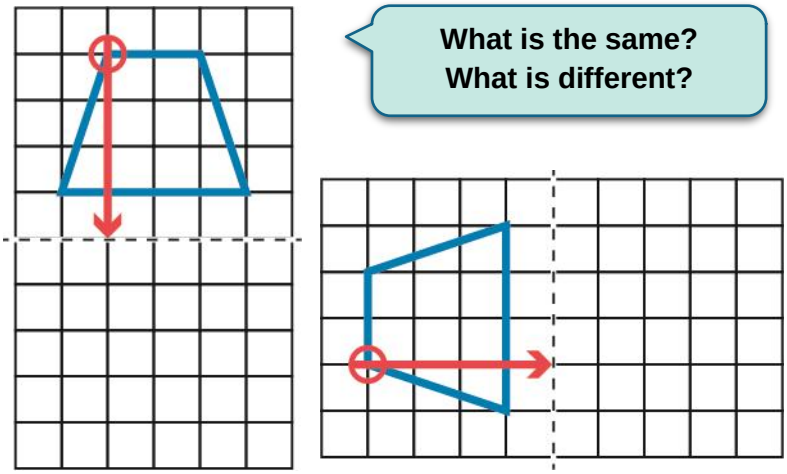


How can we accurately reflect the pattern?
What do you know about the reflected pattern?

The red square will not move up or down. It will be touching the line of reflection but on the other side of it.

The green shape is in the third box to the right of the line of reflection and when it is reflected it will be in the third box to the left of the line of reflection.

Establish that when the pattern is reflected, every point remains the same distance away from the line of reflection. Model how to reflect shapes, by counting the number of squares from each vertex to the line of reflection and then moving the same number of squares on the other side of the line of reflection to mark the reflected vertex. It is important to clarify that the line measuring the distance either side of the line of reflection should meet it at a right angle. Vary the line of reflection. Model checking before and after with a mirror, placing the mirror exactly along the mirror line.



What is the same?
What is different?

Both images show how to measure the distance from a vertex to the mirror line so that a reflection can be completed. The mirror line is in different positions – one is vertical and the other is horizontal.

Provide pupils with a variety of problems to rehearse reflection, including reflecting patterns and shapes in different mirror lines.

3 4 5 6

Step three

Translate and reflect in the first quadrant

In this step, pupils will use their understanding of coordinates (from Year 4) and apply it to translations and reflections in the first quadrant.

Ask pupils to draw a set of axes, from 0 to 5, labelled x and y. Ensure pupils mark the scale accurately, with consistent spacing and label the line rather than the square.

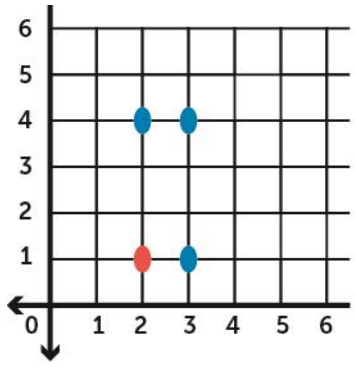
Ask pupils to plot the points: (3,1) (3,4) and (2,4) explain to a partner how they do this.

Clarify that the coordinates provide a reference so that points can be plotted exactly using the scale on the axes. Ensure that pupils are clear that the coordinates are written as (x, y) and that the first number identifies where to position on the x-axis (horizontal) and the second identifies where to position on the y-axis. Model this as needed. Especially with coordinates where x or y is equal to 0.

Another coordinate is added so that the points can be joined to make a rectangle. What are the coordinates of the final point? How do you know?

I know the opposite sides of a rectangle are equal in length and it has 4 right angles. The final point must be 1 square to the left of (3,1).

The coordinates are (2,1). I drew this to prove it.



Rehearse translation and reflection of points in the first quadrant by playing Flip and Slide in pairs using handout_5LS25_step3_flip_and_slide. Each player will need a different coloured pencil and one counter. To play the game.

- Each player chooses a starting coordinate marking it with a cross using their coloured pencil.
- Players take it in turns to select a card from the pack and translate (slide) or reflect (flip over the line of reflection) their point as indicated on the card.
- Players put a cross to show where their new point is and cover it with a counter to identify it as the most recent point.
- If the translation or reflection would be outside the range of the axes or is already marked with a cross, the player misses their turn.

The player with the greatest number of crosses at the end of the playing time is the winner.

7

Activities for exploring ideas at greater depth

Does the starting coordinate you choose make a difference to your chances of winning?

Would it make a difference if the horizontal or vertical lines of reflection were moved to another position?

BUFFER ZONE