

**White**

**Rose  
Maths**

Autumn - Block 4

**Position and Direction**

# Overview

## Small Steps

- ▶ The first quadrant
- ▶ Four quadrants
- ▶ Translations
- ▶ Reflections

## NC Objectives

Describe positions on the full coordinate grid (all four quadrants)

Draw and translate simple shapes on the coordinate plane, and reflect them in the axes.

# The First Quadrant

## Notes and Guidance

Children recap work from Year 4 and Year 5 by reading and plotting coordinates in the first quadrant (the quadrant where both  $x$  and  $y$  coordinates are positive.).

Children draw shapes on a 2-D grid from given coordinates and may use their increasing understanding to write coordinates for shapes without plotting the points.

## Mathematical Talk

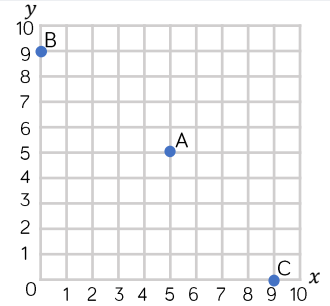
Which axis do we look at first?

Does joining up the vertices already given help you to draw the shape?

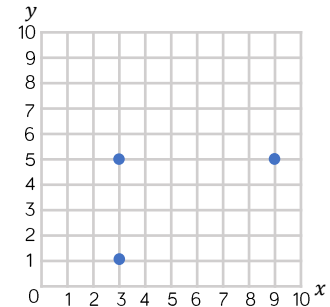
Can you draw a shape in the first quadrant and describe the coordinates of the vertices to a friend?

## Varied Fluency

- Whitney plots three coordinates. Write down the coordinates of points A, B and C.



- Tommy is drawing a rectangle on a grid. Plot the final vertex of the rectangle. Write the coordinate of the final vertex.

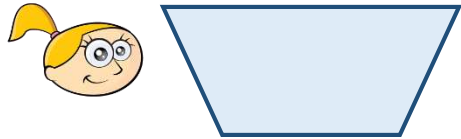


- Draw the vertices of the polygon with the coordinates  $(7, 1)$ ,  $(7, 4)$  and  $(10, 1)$   
What type of polygon is the shape?

# The First Quadrant

## Reasoning and Problem Solving

Eva is drawing a trapezium.  
She wants her final shape to look like this:



Eva uses the coordinates (2, 4), (4, 5), (1, 6) and (5, 6).

Will she draw the shape that she wants to?

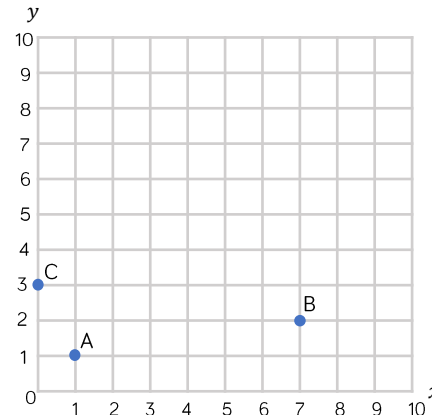
If not, can you correct her coordinates?

Eva has plotted the coordinate (4, 5) incorrectly. This should be plotted at (4, 4) to make the trapezium that she wanted to draw (an isosceles trapezium).

Mo has written the coordinates of points A, B and C.

A (1, 1)    B (2, 7)    C (3, 0)

Mark Mo's work and correct his mistakes.



Explain why Mo could not make the same mistake for point A as he made for points B and C.

A is correct.

B and C have been plotted incorrectly because Mo has plotted the  $x$  and  $y$  coordinates the wrong way round.

Because the coordinates for point A are both the same number it does not matter if Mo incorrectly reads the  $y$  coordinate as the first and the  $x$  coordinate as the second.

# Four Quadrants

## Notes and Guidance

Children extend their knowledge of the first quadrant to read and plot coordinates in all four quadrants.  
They draw shapes from coordinates given.  
Children need to become fluent in deciding which part of the axis is positive or negative.  
Children need to develop understanding of how to find the length of a line by using the coordinates of its two endpoints.


## Mathematical Talk

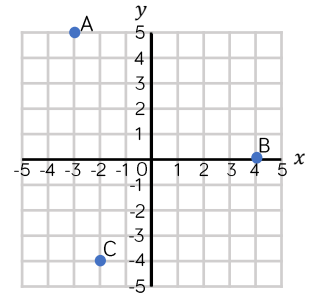
Which axis do we look at first?


If (0, 0) is the centre of the axis (the origin), which way do you move along the  $x$ -axis to find negative coordinates?

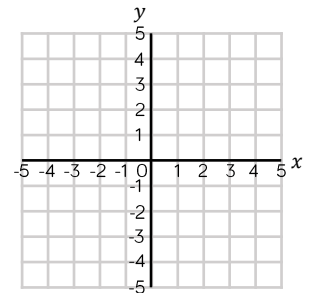
Which way do you move along the  $y$ -axis to find negative coordinates?

## Varied Fluency

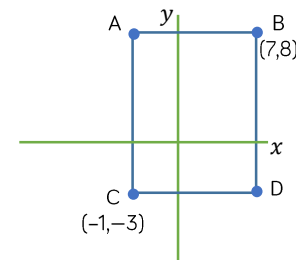
-  Dora plotted three coordinates. Write down the coordinates of points A, B and C.



-  Draw a shape using the coordinates  $(-2, 2)$ ,  $(-4, 2)$ ,  $(-2, -3)$  and  $(-4, -2)$ . What is the name of shape?



-  Work out the missing coordinates of the rectangle.



What is the length of side AB?

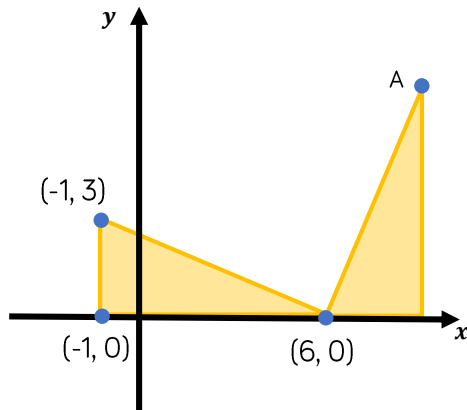
# Four Quadrants

## Reasoning and Problem Solving

The diagram shows two identical triangles.

The coordinates of three points are shown.

Find the coordinates of point A.



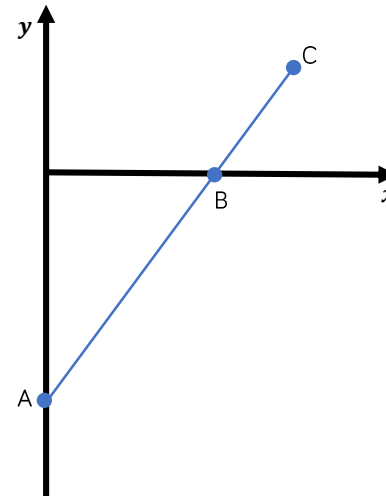
$(9, 7)$

A is the point  $(0, -10)$

B is the point  $(8, 0)$

The distance from A to B is two thirds of the distance from A to C.

Find the coordinates of C.



$(12, 5)$

# Translations

## Notes and Guidance

Children use knowledge of coordinates and positional language to translate shapes in all four quadrants.

They describe translations using directional language, and use instructions to draw translated shapes.

## Mathematical Talk

What does translation mean?

Which point are you going to look at when describing the translation?

Does each vertex translate in the same way?

## Varied Fluency

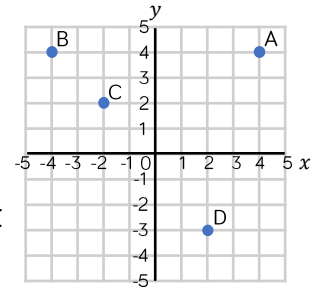


Use the graph to describe the translations.

One has been done for you.

From **A** to **B** translate **8** units to the **left**.

From **C** to **D** translate \_\_\_ units to the **right**  
and \_\_\_ units **down**.



From **D** to **B** translate **6** units to the \_\_\_\_ and **7** units \_\_\_\_.

From **A** to **C** translate \_\_\_ units to the \_\_\_\_ and \_\_\_ units \_\_\_\_.

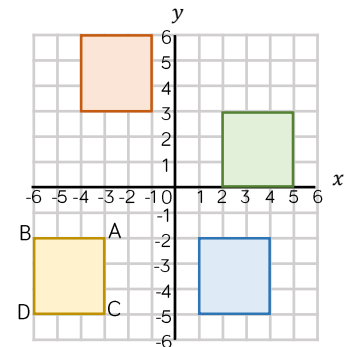


Write the coordinates for vertices A, B, C and D.

Describe the translation of ABCD to the blue square.

ABCD is moved 2 units to the right and 8 units up. Which colour square is it translated to?

Write the coordinates of the vertices of the translated shape.

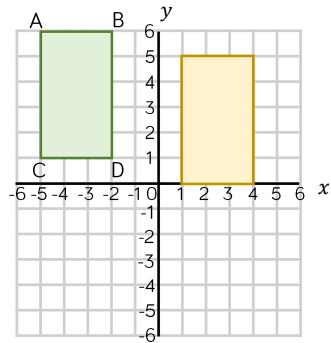


# Translations

## Reasoning and Problem Solving

### True or False?

Dexter has translated the rectangle ABCD 6 units down and 1 unit to the right to get to the yellow rectangle.

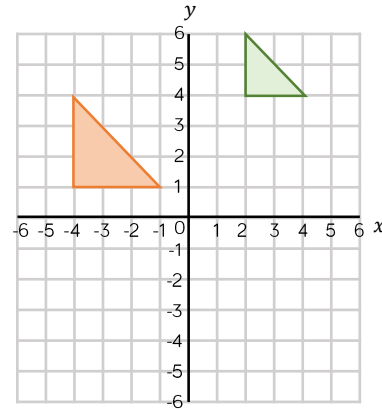


Explain your reasoning.

False.  
The translation is 6 units to the right and 1 unit down.

### Spot the Mistake.

The green triangle has been translated 6 units to the left and 3 units down.



The triangle has changed size.  
When a shape is translated its size does not change.



# Reflections

## Notes and Guidance

Children extend their knowledge of reflection by reflecting shapes in four quadrants. They will reflect in both the  $x$ -axis and the  $y$ -axis.

Children should use their knowledge of coordinates to ensure that shapes are correctly reflected.

## Mathematical Talk

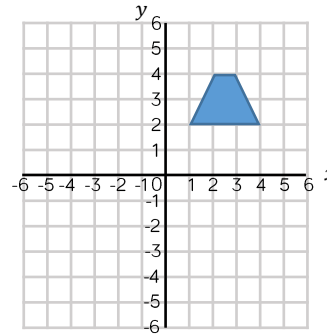
How is reflecting different to translating?

Can you reflect one vertex at a time? Does this make it easier to reflect the shape?

Which axis are you going to use as the mirror line?

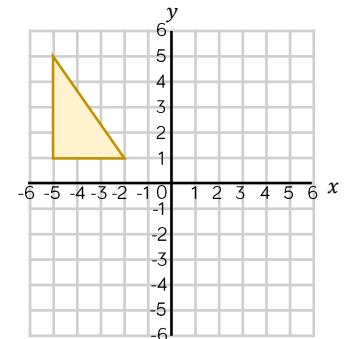
## Varied Fluency

- Reflect the trapezium in the  $x$ -axis and then the  $y$ -axis. Complete the table with the new coordinates of the shape.



	Reflected in the $x$ -axis	Reflected in the $y$ -axis
(1, 2)		
(4, 2)		
(2, 4)		
(3, 4)		

- Translate the shape 4 units to the right. Then reflect the translated shape in the  $y$ -axis.

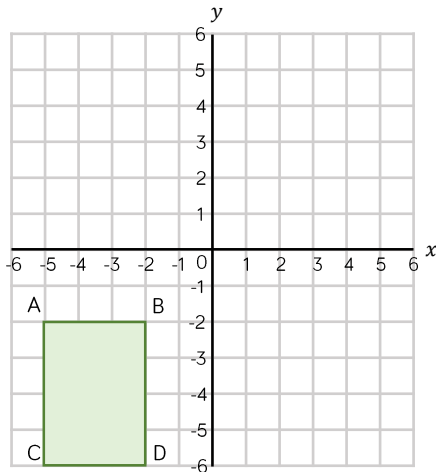


# Reflections

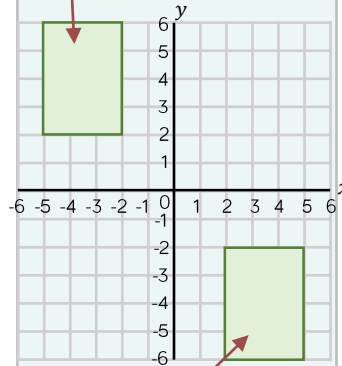
## Reasoning and Problem Solving

Rectangle ABCD is the result of a rectangle being reflected in either the  $x$ - or the  $y$ -axis.

Where could the original rectangle have been? Draw the possible original rectangles on the coordinate grid, and label the coordinates of each vertex.



The two original rectangles are:  
Reflected in  $x$ -axis

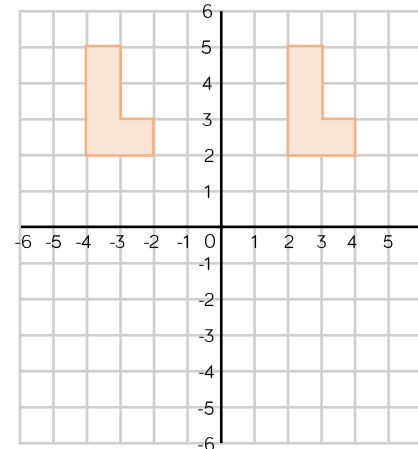


Reflected in  $y$ -axis  
 $x$ -axis reflection  
original coordinates:  
(-5, 6), (-2, 6), (-5, 2),  
(-2, 2)

$y$ -axis reflection  
original coordinates:  
(2, -2), (5, -2),  
(2, -6), (5, -6)

Annie has reflected the shape in the  $y$ -axis.

Is her drawing correct?  
If not explain why.



Annie has used the correct axis, but her shape has not been reflected. She has just drawn the shape again on the other side of the axis.