White Rose Maths

Summer - Block 6

Position & Direction

Overview

Small Steps

- Describe position
- Draw on a grid
- Move on a grid
- Describe a movement on a grid

NC Objectives

Describe positions on a 2-D grid as coordinates in the first quadrant. Plot specified points and draw sides to complete a given polygon.

Describe movements between positions as translations of a given unit to the left/ right and up/ down.

Describe Position

Notes and Guidance

Children are introduced to coordinates for the first time and they describe positions in the first quadrant.

They read, write and use pairs of coordinates. Children need to be taught the order in which to read the axes, x-axis first, then y-axis next. They become familiar with notation within brackets.

Mathematical Talk

Which is the x-axis?

Which is the y-axis?

In which order do we read the axes?

Does it matter in which order we read the axes?

How do we know where to mark on the point?

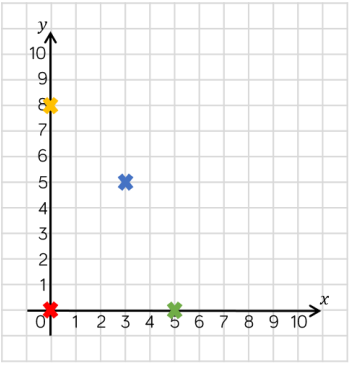
What are the coordinates for _____?

Where would (__ , __) be?

Varied Fluency

- Create a large grid using chalk or masking tape. Give the children coordinates to stand at. Encourage the children to move along the axis in the order they read them.

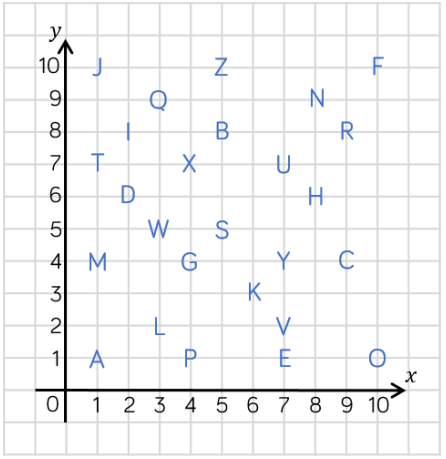
- Write the coordinates for the points shown.



✖ (__ , __) ✖ (__ , __)

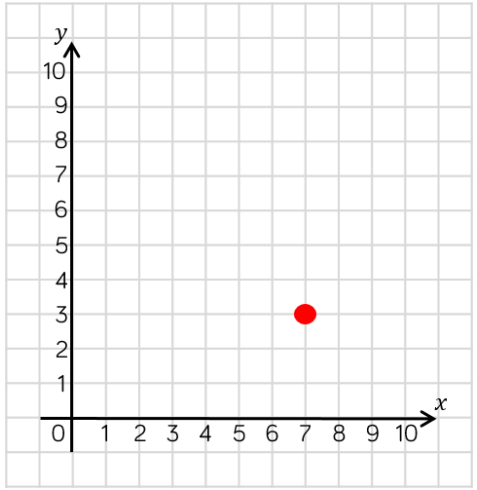
✖ (__ , __) ✖ (__ , __)

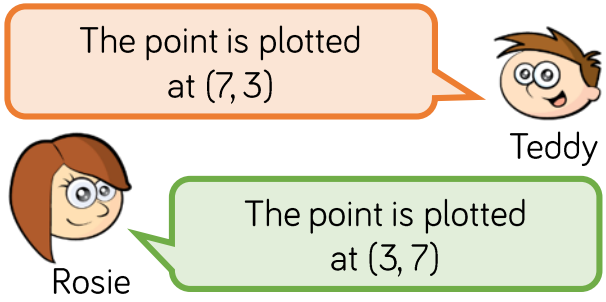
- Write out the coordinates that spell your name.



Describe Position

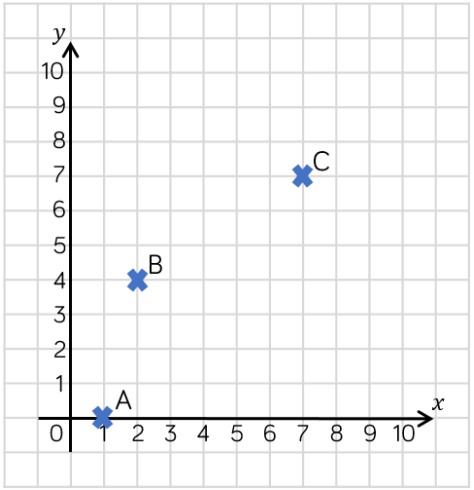
Reasoning and Problem Solving





Who is correct?
What mistake has one of the children made?

Teddy is correct. Rosie has read the y-axis before the x-axis.



Which clue matches which coordinate?

Clue 1	My x coordinate is half of my y coordinate.
Clue 2	My y coordinate is less than my x coordinate.
Clue 3	Both my coordinates are prime numbers.

Clue 1 - B
Clue 2 - A
Clue 3 - C

Draw on a Grid

Notes and Guidance

Children develop their understanding of coordinates by plotting given points on a 2-D grid.

Teachers should be aware that children need to accurately plot points on the grid lines (not between them).

They read, write and use pairs of coordinates.

Mathematical Talk

Do we plot our point on the line, or next to the line?

How could we use a ruler to help plot points?

In which order do we read and plot the coordinates?

Does it matter which way we plot the numbers on the axis?

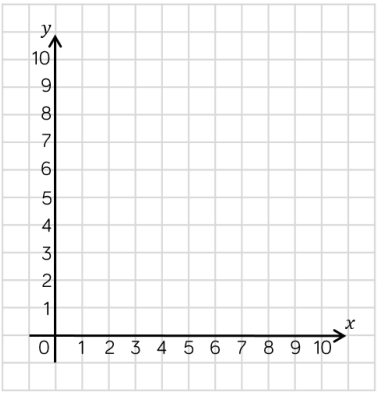
What are the coordinates of _____?

Where would (__, __) be?

Can you show _____ on the grid?

Varied Fluency

Draw the shapes at the correct points on the grid.



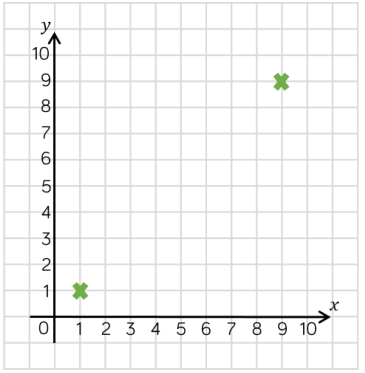
(7, 8)

(4, 6)

(9, 1)

(10, 0)

Plot two more points to create a square.



Plot these points on a grid.

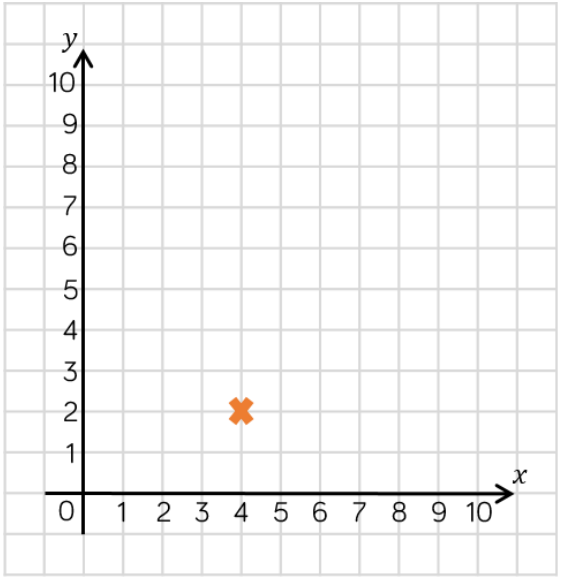
(2, 4) (4, 2) (5, 8) (7, 6)

What shape has been created?

Draw on a Grid

Reasoning and Problem Solving

What shapes could be made by plotting three more points?



The children could make a range of quadrilaterals dependent on where they plot the points.
If children plot some of the points in a line they could make a triangle.

When you are plotting a point on a grid it does not matter whether you go up or across first as long as you do one number on each axis.

Amir

Do you agree with Amir?
Convince me.

Amir is incorrect.
The x-axis must be plotted before the y-axis.
Children prove this by plotting a pair of coordinates both ways and showing the difference.

Always, Sometimes, Never.

The number of points is equal to the number of vertices when they are joined together.

Sometimes.
If points are plotted in a straight line they will not create a vertex.

Move on a Grid

Notes and Guidance

Children move shapes and points on a coordinate grid following specific directions using language such as: left/right and up/down.
Teachers might want to use a small 'object' (e.g. a small cube) to demonstrate the idea of moving a point on a grid.
They apply their understanding of coordinates when translating by starting with the left/right translation followed by up/down.

Mathematical Talk

Can you describe the translation?

Can you describe the translation in reverse?

Why do we go left and right first when describing translations.

What are the coordinates for point _____?

Write a translation for D for your partner to complete.

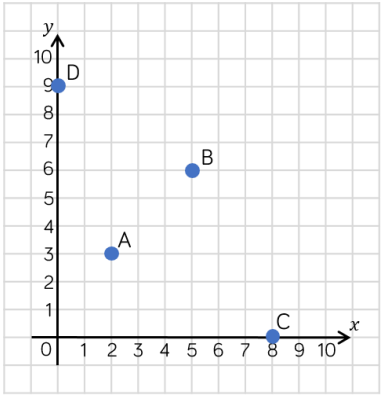
What do you notice about the new and original points?

What is the same and what is different about the new and original points?

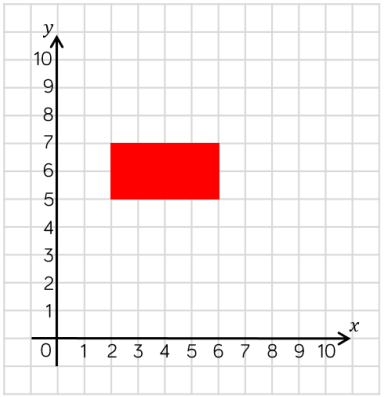
Varied Fluency

Place a small cube on the grid at coordinate (1, 1).
Move your cube 1 up. Move your cube 1 down. What do you notice?
Now move your cube 3 to the right. Move your cube 3 to the left.
What do you notice?

Translate A 6 right and 3 down.
Record the coordinates before (__ , __)
and after (__ , __)
Translate B and C 4 left and 3 up.
Record the coordinates before (__ , __)
and after (__ , __)

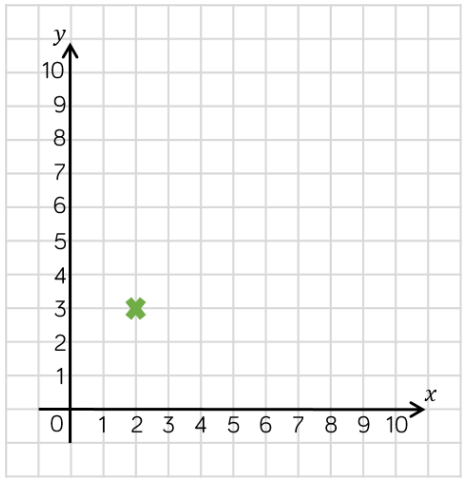


Translate the rectangle 2 left and 3 up.
Write down the coordinates of each vertex of the rectangle before and after the translation.



Move on a Grid

Reasoning and Problem Solving



Ron translates the point (2, 3), but realises that it has returned to the same position.

What translation did he do?

Is there more than one answer?

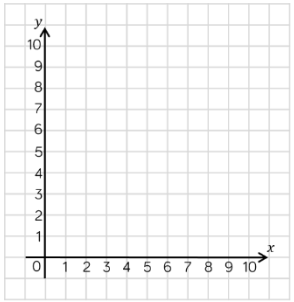
There could be a range of answers, for example:

Translate 1 left and 1 right

Translate 1 left, l right, 2 up and 2 down

Here is a game to play in pairs:

Each player needs:



1 small cube

One barrier (e.g. a mini whiteboard)

The first player places a cube on their grid. They describe the original position and perform a translation.

The second player listens to the instructions and performs the same translation.

They check to see if they have placed their cube at the same coordinate.

Swap roles and repeat several times.

The teacher could make this more competitive (points awarded when correct).

Describe Movement

Notes and Guidance

Children describe the movement of shapes and points on a coordinate grid using specific language such as: left/right and up/down. Sentence stems might be useful. They start with the left/right translation followed by up/down.

Teachers should check that children understand the idea of 'corresponding vertices' when describing translation of shapes (e.g. vertex A on the object translates to vertex A on the image).

Mathematical Talk

Can you describe the translation?

Can you describe the translation in reverse?

Can you complete the following stem sentence:

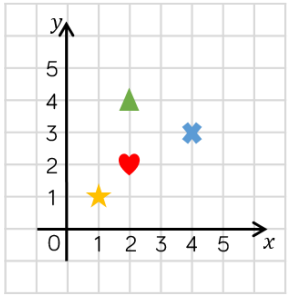
Shape A is translated ___ left/right and _____up/down to shape B

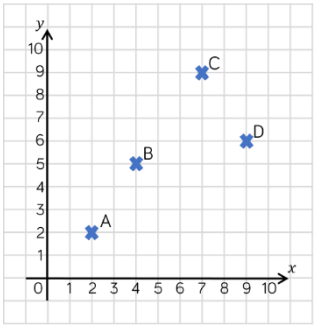
Varied Fluency

Describe the translation from:

▲ to ✖ ♥ to ★

▲ to ♥ ★ to ✖





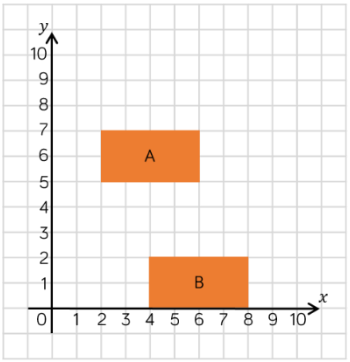
Describe the translation from:
A to B B to C C to D D to A

Plot two new points and describe the translations from A to your new points.

Describe the translation of shape A to shape B.

Describe the translation of shape B to shape A.

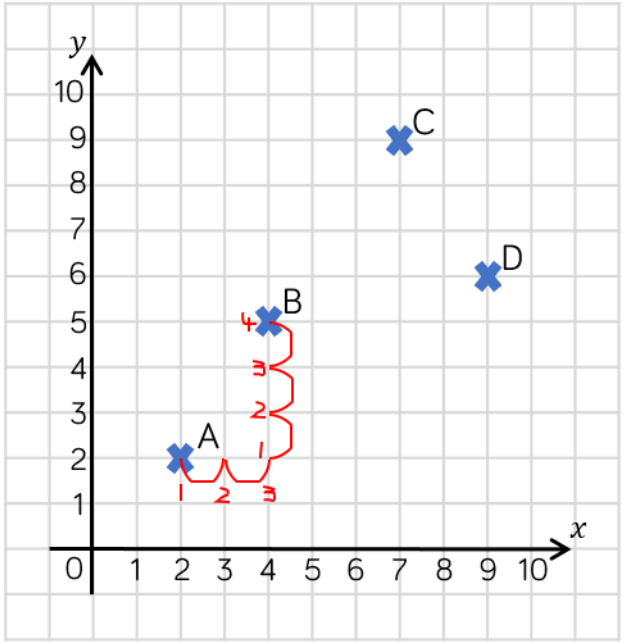
What do you notice?



Describe Movement

Reasoning and Problem Solving

Tommy has described the translation from A to B as 3 right and 4 up.

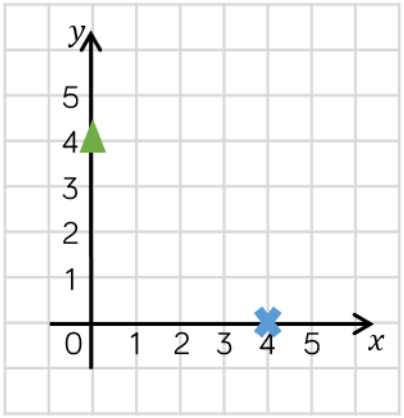


Can you explain his mistake?

Tommy has counted one move to the right when he has not moved anywhere yet. He has done the same for one move up when he has not moved up one space yet.

▲ to ✖ is 4 right and 4 down.

✖ to ▲ is 4 left and 4 up.



Can you plot other pairs of points where to move between them, you travel the same to left or right as you travel up or down?

What do you notice about the coordinates of these points?

Possible answers include:
(0,1) (1,0)
(0,2) (2,0)
(0,3) (3,0)
(0,5) (5,0)
(1,1) (3,3)
(0,0) (4,4)