

White

**Rose
Maths**

Summer - Block 3

Position & Direction

Year 5

Overview

Small Steps

NC Objectives

- ▶ Position in the first quadrant
- ▶ Reflection
- ▶ Reflection with coordinates
- ▶ Translation
- ▶ Translation with coordinates

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.

Position in the 1st Quadrant

Notes and Guidance

Children recap their use of coordinates from Year 4.

They start with an understanding of the origin (0, 0), before moving onto reading other coordinates. They understand that the first number represents the x -coordinate and the second number represents the y -coordinate. Teachers might explain how a coordinate is fixed (does not move) whereas a point can be plotted at different coordinates, so it can be moved.

Mathematical Talk

Which of the numbers represents the movement in the direction of the x -axis (from the origin)? Which of the numbers represents the movement on the y -axis (from the origin)? Does it matter which way around coordinates are written? Look at the point I have marked, what are the coordinates of this point? If I moved the point one place to the left, what would be different about the coordinates? If I moved the point down one, what would be different about the coordinates?

Varied Fluency

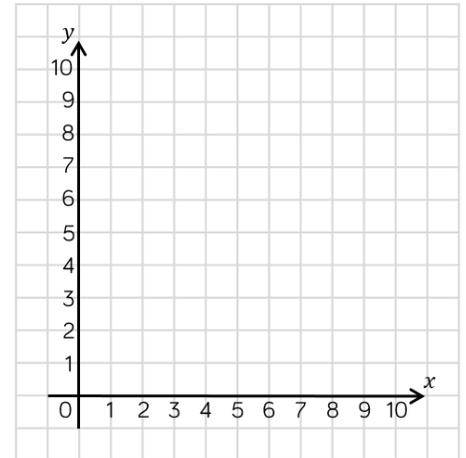
Plot the following points on the grid.

(3, 5)

(4, 4)

(0, 2)

(4, 0)



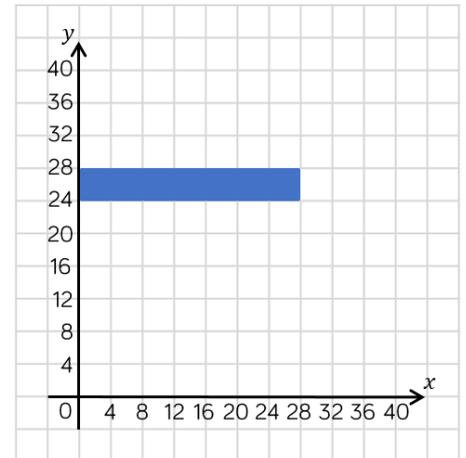
What are the coordinates of the vertices of the rectangle?

(,)

(,)

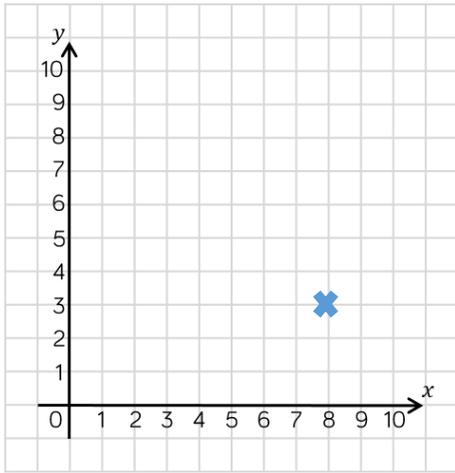
(,)

(,)



Position in the 1st Quadrant

Reasoning and Problem Solving



Mo is correct. Alex has made a mistake by thinking the first number is the y -coordinate.

The point is at (8, 3)



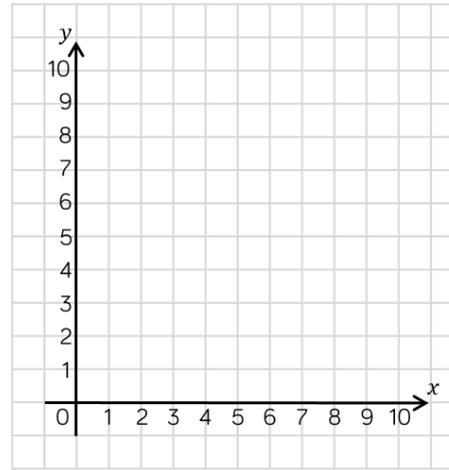
Mo



Alex

The point is at (3, 8)

Who do you agree with? Can you spot the mistake the other child has made?



Annie's coordinates form a diagonal line (8, 0) to (0, 8)

Annie is finding co-ordinates where the x -coordinate and the y -coordinate add up to 8.

For example: (3, 5) $3 + 5 = 8$

Find all of Annie's coordinates and plot them on the grid. What do you notice?

Now do the same for a different total.

Reflection

Notes and Guidance

Children reflect objects using lines that are parallel to the axes. Children continue to use a 2-D grid and coordinates in the first quadrant. Teachers might want to encourage children to use mirrors, or to count how far the point is away from the mirror line, so that they can work out where the reflected point will be located. Children should be introduced to the language object (name of shape before reflection) and image (name of shape after reflection).

Mathematical Talk

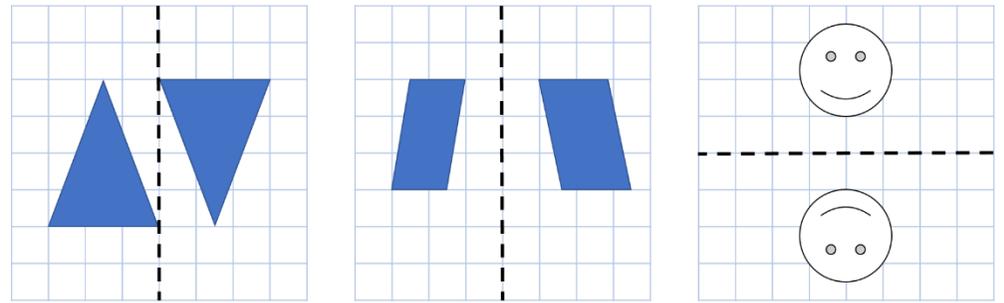
When I reflect something, what changes about the object? Is it exactly the same?

What are the coordinates of this point? If I reflect it in the mirror line, what are the new coordinates?

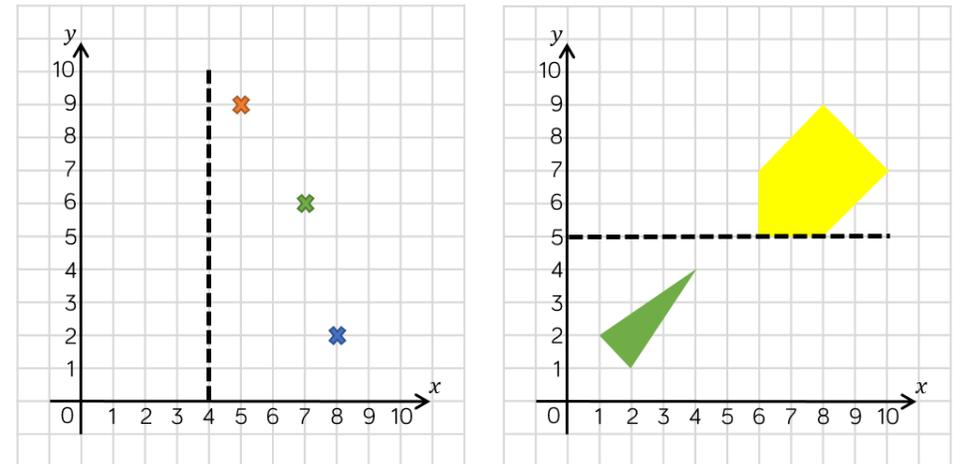
If I reflect this point/shape in a vertical/horizontal mirror line, what will happen to the x -coordinate/ y -coordinate?

Varied Fluency

Which of the diagrams show reflections in the given mirror line?



Reflect the coordinates and the shapes in the mirror line.



Reflection

Reasoning and Problem Solving

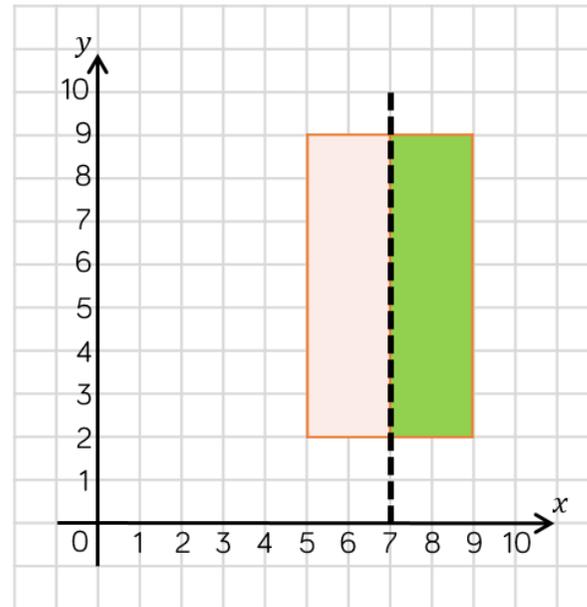


Dora

When you reflect a shape, its dimensions change.

Do you agree with Dora?
Explain your thinking.

Dora is incorrect, the shape's dimensions do not change, only its position is changed.



The rectangle is pink and green.
The rectangle is reflected in the mirror line.
What would its reflection look like?

The shape would remain in the same position, although the colours would be swapped – green on the left and pink on the right.

Reflection with Coordinates

Notes and Guidance

Teachers should explore what happens to points when they are reflected in lines parallel to the axes.

Children might use mirrors to do this. This might be done through investigation where children record coordinates of vertices of the object and coordinates of vertices of the image in a table.

Mathematical Talk

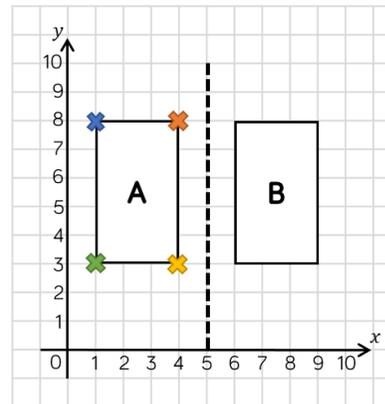
What is the x -coordinate for this vertex? What is the y -coordinate for this vertex?

If we look at this point, where will its new position be on the image, when it is reflected? What's different about the coordinates of the object compared to the coordinates of the image?

Do you always need to use a mirror? How else could you work out the coordinates of each vertex?

Varied Fluency

Object A is reflected in the mirror line to give image B. Write the coordinates of the vertices for each shape.



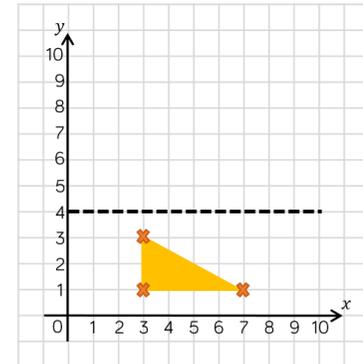
	Original Coordinate	Reflected Coordinate

Write the coordinates of the image after the object (triangle) has been reflected in the mirror line.

(,)

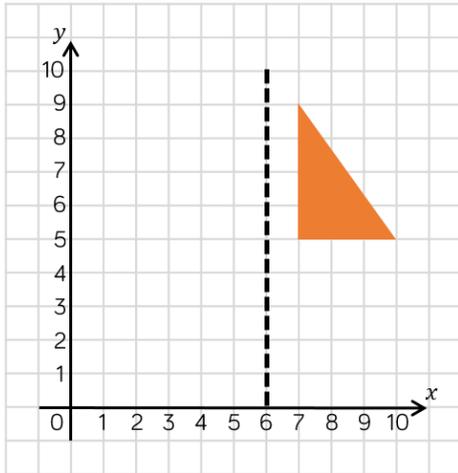
(,)

(,)



Reflection with Coordinates

Reasoning and Problem Solving

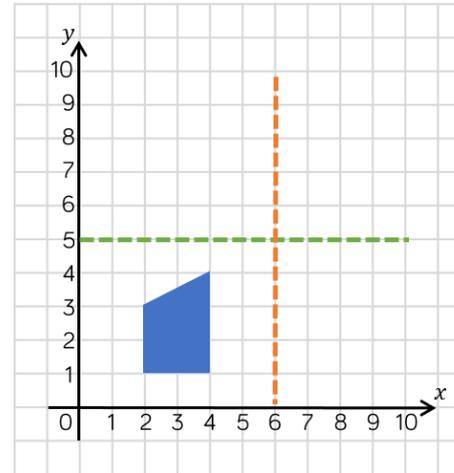


The (2, 9) coordinate is incorrect, it should be (5, 9).

Eva reflects the shape in the mirror line. She thinks that the coordinates of the vertices for the reflected shape are:

- (5, 5)
- (2, 5)
- (2, 9)

Is Eva correct?
Explain why.



There are two possibilities for the object.

This is a shape after it has been reflected. This is called the image.

Use the grid and the marked mirror lines to show where the original object was positioned.

Is there more than one possibility?

Translation

Notes and Guidance

Children learn to translate shapes on a grid.

Children could focus on one vertex at a time when translating.

Attention should be drawn to the fact that the shape itself does not change size nor orientation when translated.

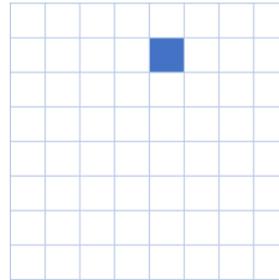
Mathematical Talk

What does translate mean?

Look what happens when I translate this shape. What has happened to the shape? Have the dimensions of the shape changed? Does it still face the same way?

Are there any other ways I can get the shape to this position?

Varied Fluency

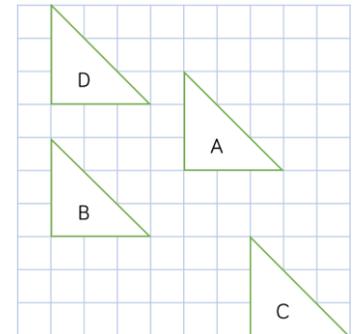


A square is translated two squares to the right and three down. Draw the new position of this square.

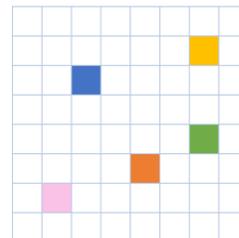


Describe the translation of shape A to shape B, C and then D. Use the stem sentence to help you.

Shape A has been translated _____ left/right and _____ up/down.



Match the translations.



- to
- to
- to

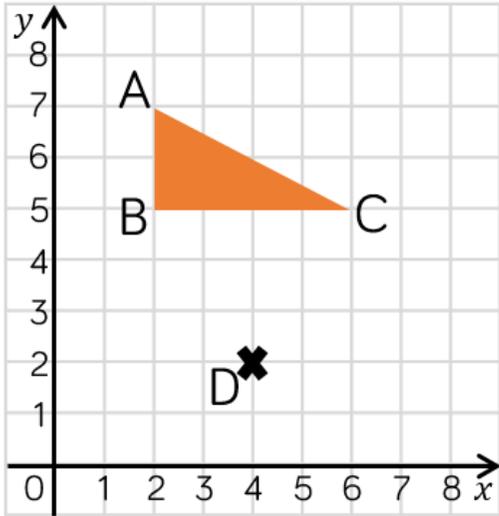
4 right, 2 down

2 left, 3 up

5 left, 5 down

Translation

Reasoning and Problem Solving



Amir is incorrect, the shape is translated two to the right and three down. It will fit on this grid.

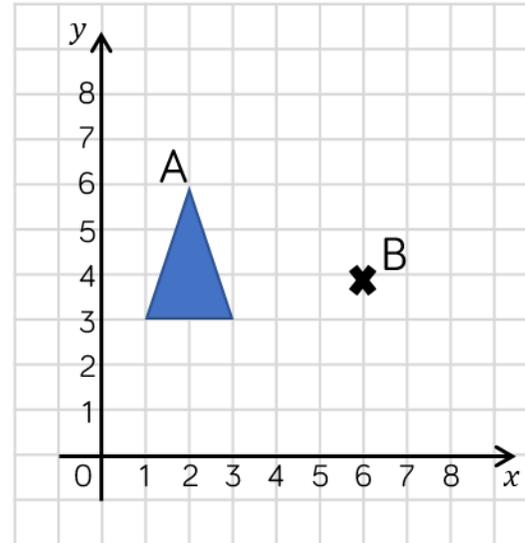
Triangle ABC is translated so that point B translates to point D

It won't fit on this grid!



Amir

Do you agree with Amir?
Explain your thinking.



(7, 1)
(5, 1)

A triangle is drawn on the grid.
It is translated so that point A translates to point B.

What would be the coordinates of the other vertices of the translated triangle?

Translation with Coordinates

Notes and Guidance

Children translate coordinates and also describe translations of coordinates.

Attention should be drawn to the effect of the translation on the x -coordinate and the y -coordinate. For example, how does a translation of 3 up affect the x and y -coordinate?

Mathematical Talk

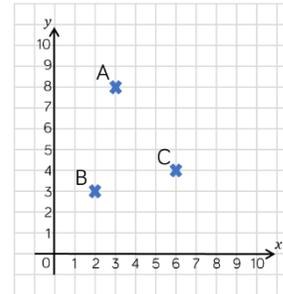
If we move this point down, what will happen to its coordinates? What if it moves up?

If I move the point two right, what will happen to the coordinates?

If these are the translated coordinates, what were the original coordinates?

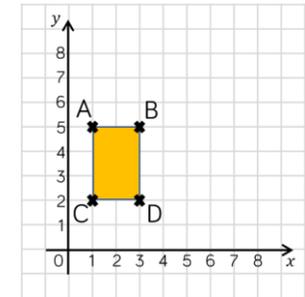
Varied Fluency

Translate each coordinate 2 down, 1 right. Record the coordinates of its new position.



	Before translation	After translation
A	(3, 8)	
B		
C		

Rectangle ABCD is translated so vertex C is translated to (3, 5). Describe the translation. What are the coordinates of the other vertices of the translated rectangle?



Translate the coordinates below.

(3, 6)	→	(,)	→	(,)
	3 left		1 up	
(5, 7)	→	(,)	→	(,)
	2 right		4 down	

Translation with Coordinates

Reasoning and Problem Solving

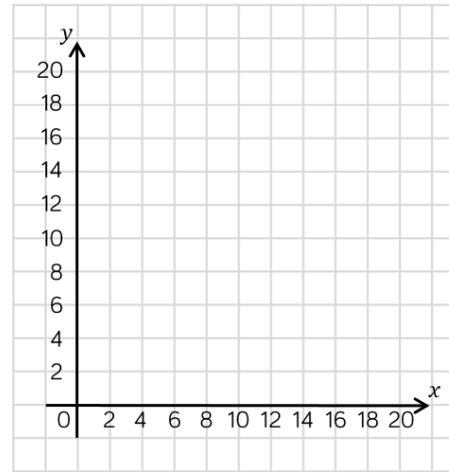
These three coordinates have all been translated in the same way.



Can you work out the missing coordinates?

Describe the translation.

Translation 2 right
2 down.



A rectangle is translated two to the left and 4 up.

Three of the coordinates of the translated rectangle are: $(6, 8)$ $(10, 14)$ and $(10, 8)$.

What are the coordinates of the original rectangle?

$(8, 10)$ $(12, 10)$

$(8, 4)$ $(12, 4)$