Year ⑤

Small Steps Guidance and Examples

Block 3 – Position and Direction

White Rose Maths

Year 5 – Yearly Overview

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12
Autumn	Number – Place Value			Number – Addition and Subtraction		Statistics		Number – Multiplication and Division		Perimeter and Area		Consolidation
Spring	Number – Multiplication and Division			Number – Fractions						Number – Decimals & Percentages		Consolidation
Summer	Number – Decimals			Geometry- Properties of Shapes			Geometry- Position and Direction	Measurement- Converting Units		Measures Volume		Consolidation

Overview

Small Steps

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

NC Objectives

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 understand to read co-ordinates they need to start at the origin (0,0) and firstly read along the x–axis and they up the y axis. For example, (3,5) – 3 along the x–axis and 5 up the y axis.

Children mark co-ordinates on a grid and use co-ordinates to draw the vertices of shapes.

Mathematical Talk

Which of the numbers represents the coordinate on the x-axis?
Which of the numbers represents the coordinate on the y-axis?
Does it matter which way around they are written?
Look at the coordinate I have marked, what is its value on the x /y-axis?
If I moved the coordinate one place to the left, which digit would change? If I moved the coordinate down one, which digit would change?

Varied Fluency
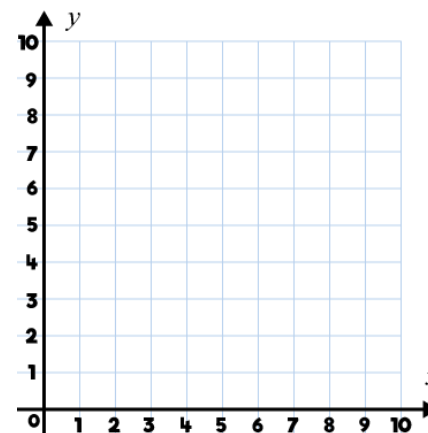
1 Plot the following points on the grid.

(3, 5)   (5, 3)
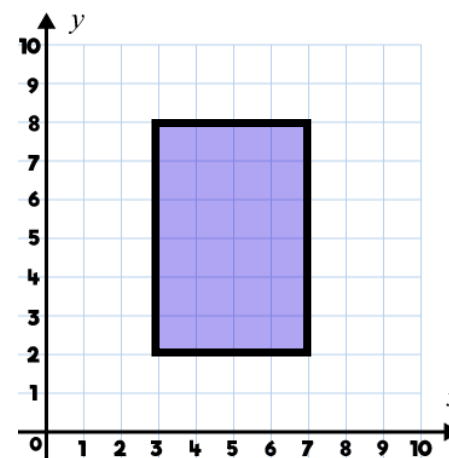
(4, 4)   (6, 5)

(0, 2)   (2, 0)

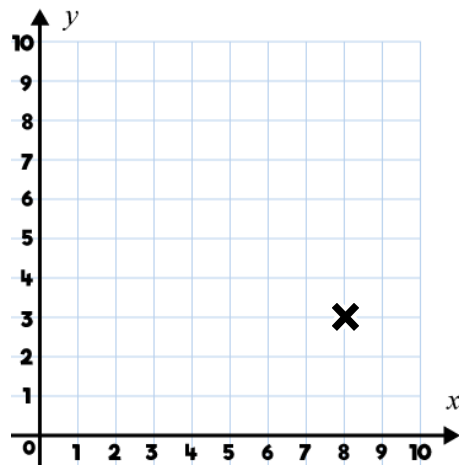2 What are the coordinates of the vertices of the rectangle?

(,)   (,)

(,)   (,)

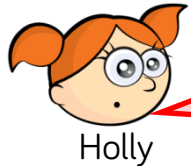## Position in the 1st Quadrant

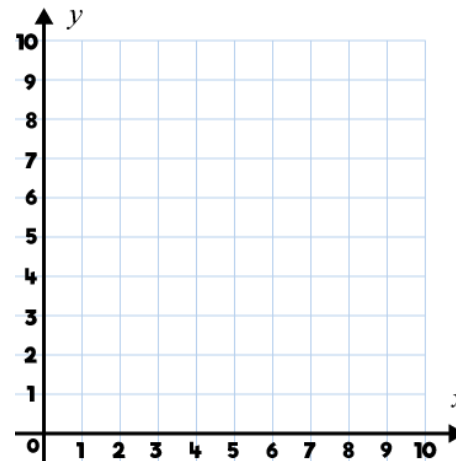### Reasoning and Problem Solving

The point is at (8, 3)

Sam

The point is at (3, 8)

Holly

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

Sam is correct. Holly has made a mistake by thinking the first digit is on the y-axis.

Tanya is finding co-ordinates whose digits add up to 8.
For example: $(3, 5) \longrightarrow 3 + 5 = 8$

Find all of Tanya's co-ordinates and plot them on the grid.
What do you notice?
What would happen if the digits summed to other numbers?

Tanya's co-ordinates form a diagonal line (8, 0) to (0, 8)

Reflection

Notes and Guidance

Children use a mirror line to reflect shapes in the first quadrant horizontally and vertically.

Children use mirrors for them to understand how an image changes when it is mirrored. Children could explore this practically, for example: if your partner's right hand is raised, which hand will you need to raise?
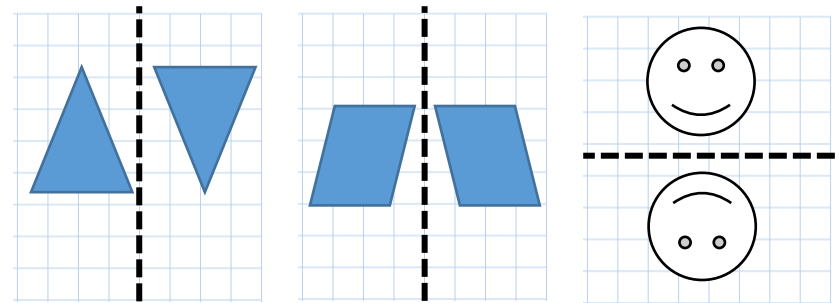
Mathematical Talk

When I mirror something, what changes about the image? Is it exactly the same?

What is the coordinate of this point? If I reflect it in the mirror line, where will it move to?
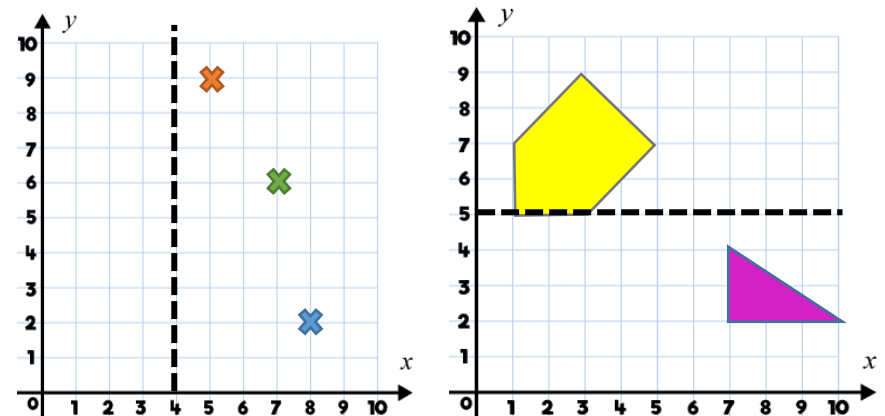
If I reflect this point/shape in a vertical/horizontal mirror line, will the x or y coordinates change?

Varied Fluency

1 Which of the images have been reflected in the mirror line?

2 Reflect the shapes and coordinates in the mirror line.
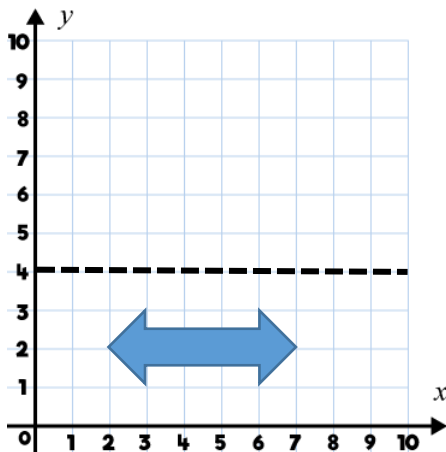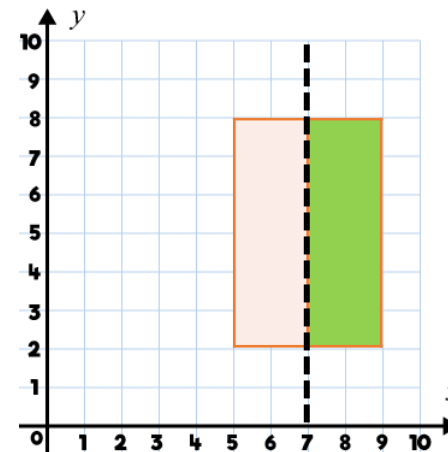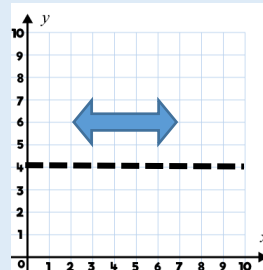
Reflection

Reasoning and Problem Solving

Amina: When you reflect a shape, its dimensions change.

Do you agree with Amina?
Explain your thinking.

Amina is incorrect, the shape's dimensions do not change.

Reflect the shape in the mirror line.

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 orange on the right.

Reflection with Co-ordinates

Notes and Guidance

Children build on their understanding of reflection by describing the effect of reflection with coordinates.

Children should explore different methods or strategies for reflecting shapes and be encouraged to recognise what happens to the coordinates of the reflected shape. They then can predict coordinates after a reflection.
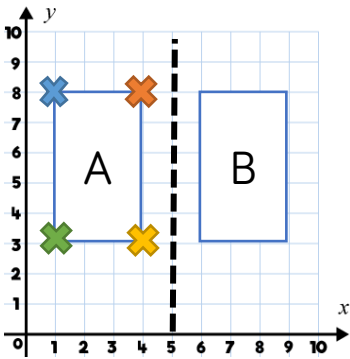
Mathematical Talk

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

If we look at this coordinate, where will its new position be when it is reflected? Which digit has changed? Have any stayed the same?

Do you always need to use a mirror? How else could you plot each vertex accurately?

Varied Fluency

1. Shape A is reflected in the mirror line to position B. Write the coordinates of the vertices for each shape.
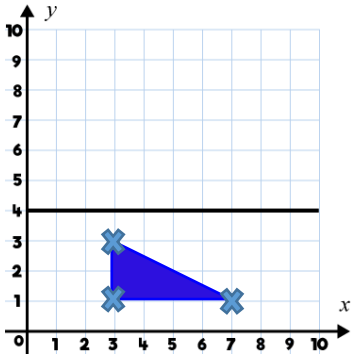
	Original Coordinate	Reflected Coordinate
✖		
✖		
✖		
✖		

2. Write the coordinates of the shape after it has been reflected in the mirror line.
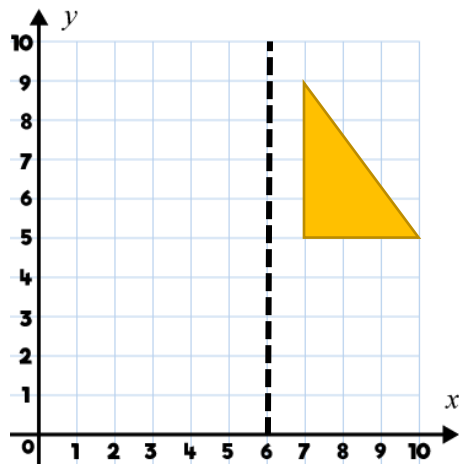
(,)

(,)

(,)

Reflection with Co-ordinates

Reasoning and Problem Solving

Maggie reflects the shape in the mirror line.
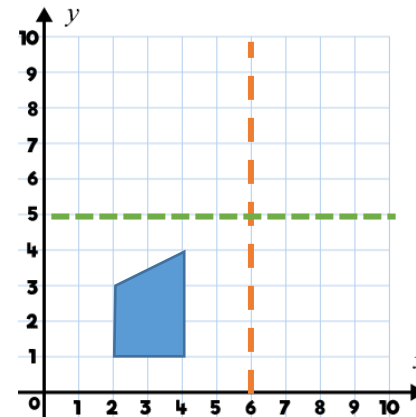She calculates the coordinates for the vertices of the reflected shape as:

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

Is Maggie is correct?
Explain why.

The (2, 9) coordinate is incorrect, it should be (5, 9). She may have translated the shape rather than reflecting it.

This is a shape after it has been reflected.

The green mirror line is correct.

Kate

The orange mirror line is correct.

Xander

Who is correct? Explain and prove it.
What would the coordinates be of the original shape?

Both could be correct, as you could have reflected the shape in either mirror line.

Translation

Notes and Guidance

Children learn to translate shapes on a grid. They do not need to move individual coordinates at this point.

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 dimensions when translated.

When writing coordinates, the left and right direction comes before the up and down, for example: (3 right, 2 down)
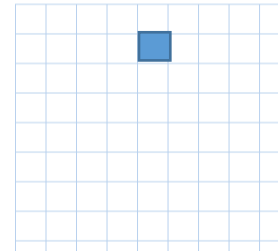
Mathematical Talk

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?

Are there any other ways I can get the shape to this point?
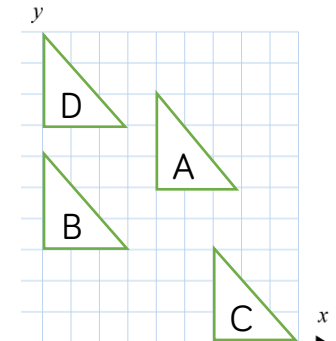
Varied Fluency

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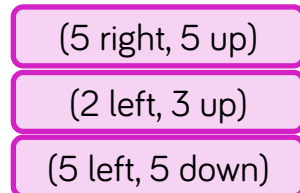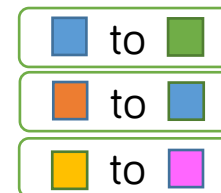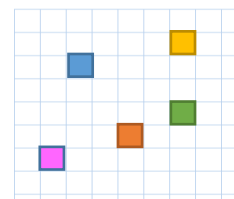Draw the new position of the square.

2 Describe the translation of shape A to the different positions.

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

3 Match the translations.
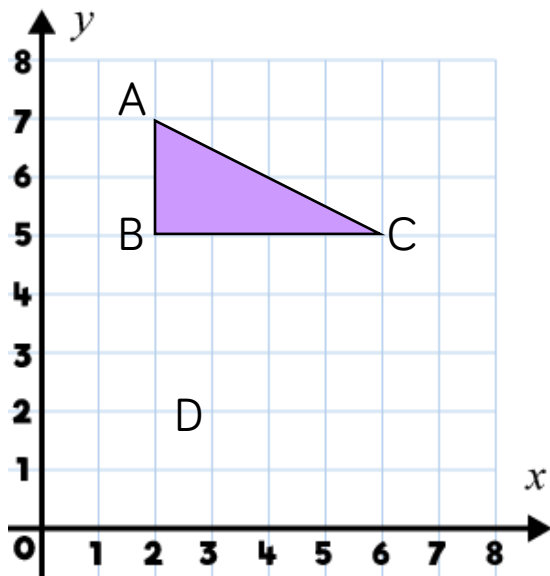
🟦 to 🟩		(5 right, 5 up)
🟧 to 🟦		(2 left, 3 up)
🟨 to 🟪		(5 left, 5 down)

Translation

Reasoning and Problem Solving

Triangle ABC is translated so that point B becomes point D
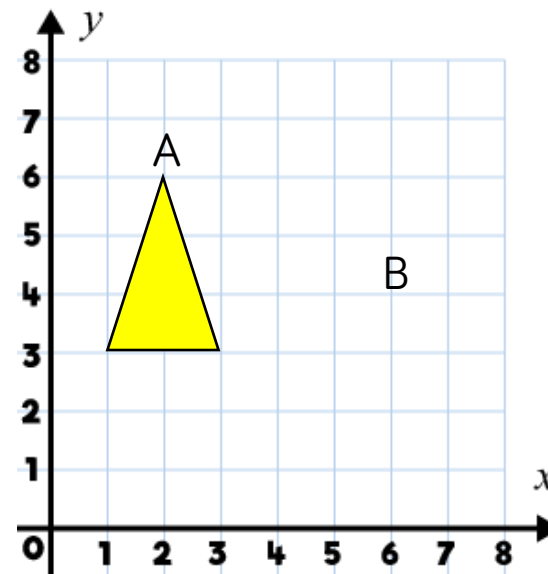
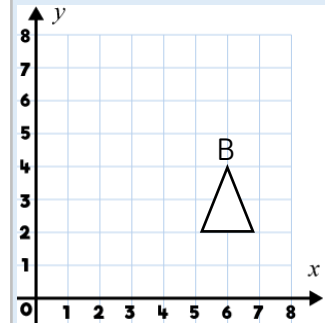It won't fit on the quadrant!

Will

Do you agree with Will?
Explain your thinking.

Will is incorrect, the shape is translated one right and three down. It will fit on the quadrant.

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

Draw the new triangle.

Translation with Co-ordinates

Notes and Guidance

Children translate using coordinates in the first quadrant and describe the effect that translation has on coordinates. Children continue to translate using the first quadrant to help visualise the movements before recording the coordinates.

Attention should be drawn to the effect on the digits in the coordinates and the relationship that left and right has on the x coordinate and up and down has on the y coordinate.
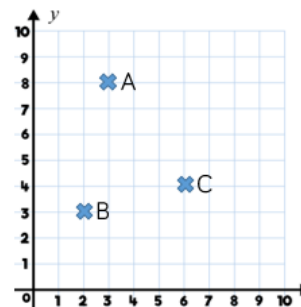
Mathematical Talk

If we move this coordinate down, which digit changes? What if it moves up?

If I move the coordinate two places to the right, which digit will change and by how much?

If this is the translated coordinate, what was the original coordinate?
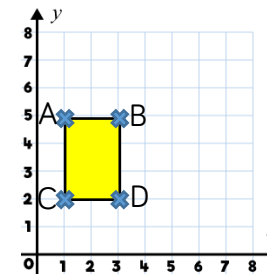
Varied Fluency

1. Translate each coordinate 2 places down, 1 place to the right. Record the coordinate of its new position.

(3, 8) → [ ]

[ ] → [ ]

[ ] → [ ]

[ ] → (3, 8)

2. Rectangle ABCD is translated so vertex C moves to vertex B. What is the translation and what are the coordinates of the translated rectangle?

3. Translate the coordinates below.

(3, 6) → 3 left → (,) → 1 up → (,)

(5, 7) → 2 right → (,) → 4 down → (,)

Translation with Co-ordinates

Reasoning and Problem Solving

Some coordinates have all been translated in the same way.
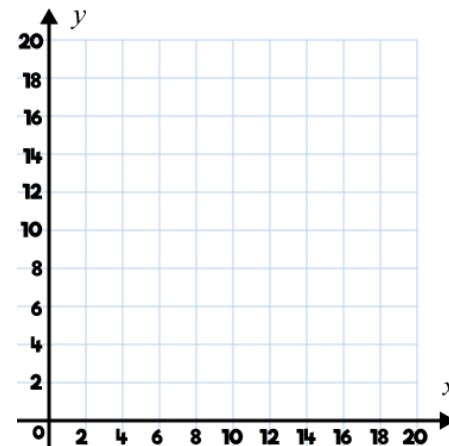
(_ , _) → (3 , 1)

(_ , 5) → (4 , 3)

(4 , _) → (6 , 1)

Can you work out the translation and the missing coordinates?

Translation 2 right 2 down.

(5 , 3) → (3 , 1)

(2 , 5) → (4 , 3)

(4 , 3) → (6 , 1)

A rectangle is translated 3 squares up and two squares to the left.

Three of the coordinates of the translated rectangle are: (5, 7) (10, 14) (10, 7).

What are the coordinates of the original rectangle?

(7, 4) (12, 4)

(7, 11) (12, 11)