Spring Scheme of Learning

Year 4/5

#MathsEveryoneCan

2019-20
How to use the mixed-age SOL

In this document, you will find suggestions of how you may structure a progression in learning for a mixed-age class.

Firstly, we have created a yearly overview.

For each block of learning, we have grouped the small steps into themes that have similar content. Within these themes, we list the corresponding small steps from one or both year groups. Teachers can then use the single-age schemes to access the guidance on each small step listed within each theme.

The themes are organised into common content (above the line) and year specific content (below the line). Moving from left to right, the arrows on the line suggest the order to teach the themes.

Each term has 12 weeks of learning. We are aware that some terms are longer and shorter than others, so teachers may adapt the overview to fit their term dates.

The overview shows how the content has been matched up over the year to support teachers in teaching similar concepts to both year groups. Where this is not possible, it is clearly indicated on the overview with 2 separate blocks.
How to use the mixed-age SOL

Here is an example of one of the themes from the Year 1/2 mixed-age guidance.

**Subtraction**

Year 1 (Aut B2, Spr B1)
- How many left? (1)
- How many left? (2)
- Counting back
- Subtraction - not crossing 10
- Subtraction - crossing 10 (1)
- Subtraction - crossing 10 (2)

Year 2 (Aut B2, B3)
- Subtract 1-digit from 2-digits
- Subtract with 2-digits (1)
- Subtract with 2-digits (2)
- Find change - money

In order to create a more coherent journey for mixed-age classes, we have re-ordered some of the single-age steps and combined some blocks of learning e.g. Money is covered within Addition and Subtraction.

The bullet points are the names of the small steps from the single-age SOL. We have referenced where the steps are from at the top of each theme e.g. Aut B2 means Autumn term, Block 2. Teachers will need to access both of the single-age SOLs from our website together with this mixed-age guidance in order to plan their learning.

**Points to consider**

- Use the mixed-age schemes to see where similar skills from both year groups can be taught together. Learning can then be differentiated through the questions on the single-age small steps so both year groups are focusing on their year group content.
- When there is year group specific content, consider teaching in split inputs to classes. This will depend on support in class and may need to be done through focus groups.
- On each of the block overview pages, we have described the key learning in each block and have given suggestions as to how the themes could be approached for each year group.
- We are fully aware that every class is different and the logistics of mixed-age classes can be tricky. We hope that our mixed-age SOL can help teachers to start to draw learning together.
<table>
<thead>
<tr>
<th>Week 1</th>
<th>Week 2</th>
<th>Week 3</th>
<th>Week 4</th>
<th>Week 5</th>
<th>Week 6</th>
<th>Week 7</th>
<th>Week 8</th>
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</tbody>
</table>
In this section, content from single-age blocks are matched together to show teachers where there are clear links across the year groups. Teachers may decide to teach the lower year’s content to the whole class before moving the higher year on to their age-related expectations. The lower year group is not expected to cover the higher year group’s content as they should focus on their own age-related expectations.

In this section, content that is discrete to one year group is outlined. Teachers may need to consider a split input with lessons or working with children in focus groups to ensure they have full coverage of their year’s curriculum. Guidance is given on each page to support the planning of each block.

The themes should be taught in order from left to right.
Position and Direction

Common Content

Both year groups start by looking at position in the first quadrant and movement in the first quadrant. As this is the first time Year 4 have been introduced to coordinates they may need longer to deepen understanding.

Year 5 look at reflection on a grid building on the Year 4 symmetry learning from the properties of shapes block.

Position on a grid
Year 4 (Sum B6)
- Describe position
- Draw on a grid
Year 5 (Sum B3)
- Position in the first quadrant

Movement on a grid
Year 4 (Sum B6)
- Move on a grid
- Describe movement on a grid
Year 5 (Sum B3)
- Translation
- Translation with coordinates

Reflection
Year 5 (Sum B3)
- Reflection
- Reflection with coordinates
Block 5 – Position and Direction

Theme 1- Position on a grid
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.

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?
Describe Position

Reasoning and Problem Solving

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

The point is plotted at (7, 3)
Teddy

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

The point is plotted at (3, 7)
Rosie

Which clue matches which coordinate?

<table>
<thead>
<tr>
<th>Clue 1</th>
<th>Clue 2</th>
<th>Clue 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>My x coordinate is half of my y coordinate.</td>
<td>My y coordinate is less than my x coordinate.</td>
<td>Both my coordinates are prime numbers.</td>
</tr>
</tbody>
</table>

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.

Plot two more points to create a square.

Plot these points on a grid.

What shape has been created?
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.

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.
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?

\[( , )\] \[( , )\]
\[( , )\] \[( , )\]
Who do you agree with? Can you spot the mistake the other child has made?

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

Annie is finding co-ordinates where the $x$-coordinate and the $y$-coordinate add up to 8.
For example: $(3, 5)$ \quad $3 + 5 = 8$
Find all of Annie's coordinates and plot them on the grid. What do you notice?

Now do the same for a different total.

Annie's coordinates form a diagonal line (8, 0) to (0, 8)
Block 5 – Position and Direction

Theme 2- Movement on a grid
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.
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, 1 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:

- Green triangle to X
- Heart to Star
- Green triangle to Heart
- Star to X

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?
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.

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)
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.

-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!

Do you agree with Amir? Explain your thinking.

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.

<table>
<thead>
<tr>
<th>Before translation</th>
<th>After translation</th>
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</thead>
<tbody>
<tr>
<td>A</td>
<td>(3, 8)</td>
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<tr>
<td>B</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td></td>
</tr>
</tbody>
</table>

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 $(\ , \ )$
- $(5, 7)$ 2 right $(\ , \ )$
- $1$ up $(\ , \ )$
- $4$ down $(\ , \ )$
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)
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?
Reflection

Reasoning and Problem Solving

Do you agree with Dora? Explain your thinking.

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

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

When you reflect a shape, its dimensions change.

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

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

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?

There are two possibilities for the object.