Spring Scheme of Learning

Year 5/6

#MathsEveryoneCan

2019-20
Notes and Guidance

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.

<table>
<thead>
<tr>
<th>Autumn</th>
<th>Winter</th>
<th>Spring</th>
<th>Summer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week 1</td>
<td>Week 2</td>
<td>Week 3</td>
<td>Week 4</td>
</tr>
<tr>
<td>Number: Place Value</td>
<td>Number: Four Operations</td>
<td>Number: Fractions</td>
<td>Number: Fractions</td>
</tr>
<tr>
<td>Y6: Four Operations consolidation</td>
<td>Y6: FDP consolidation</td>
<td>Y6: Measure consolidation</td>
<td>Investigations</td>
</tr>
<tr>
<td>Y6: FDP consolidation</td>
<td>Y6: Measure consolidation</td>
<td>Y6: Measure consolidation</td>
<td>Investigations</td>
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<tr>
<td>Y6: Measure consolidation</td>
<td>Year 5 consolidation</td>
<td>Year 6 consolidation</td>
<td>Investigations</td>
</tr>
<tr>
<td>Consolidation</td>
<td>Consolidation</td>
<td>Consolidation</td>
<td>Consolidation</td>
</tr>
</tbody>
</table>

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.

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.
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**

<table>
<thead>
<tr>
<th>Year 1 (Aut B2, Spr B1)</th>
<th>Year 2 (Aut B2, B3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>How many left? (1)</td>
<td>Subtract 1-digit from 2-digits</td>
</tr>
<tr>
<td>How many left? (2)</td>
<td>Subtract with 2-digits (1)</td>
</tr>
<tr>
<td>Counting back</td>
<td>Subtract with 2-digits (2)</td>
</tr>
<tr>
<td>Subtraction - not crossing 10</td>
<td>Find change - money</td>
</tr>
<tr>
<td>Subtraction - crossing 10 (1)</td>
<td></td>
</tr>
<tr>
<td>Subtraction - crossing 10 (2)</td>
<td></td>
</tr>
</tbody>
</table>

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>
<th>Week 9</th>
<th>Week 10</th>
<th>Week 11</th>
<th>Week 12</th>
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</thead>
<tbody>
<tr>
<td>Autumn</td>
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<td>Number: Place Value</td>
<td>Number: Four Operations</td>
<td>Number: Fractions</td>
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<td>Spring</td>
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<tr>
<td>Y5: Number: Fractions</td>
<td>Number: Decimals and Percentages</td>
<td>Y5: Number: Decimals</td>
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<tr>
<td>Y6: Number: Ratio</td>
<td>Y6: Number: Algebra</td>
<td>Measurement: Converting Units</td>
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<td>Measurement: Perimeter, Area and Volume</td>
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<tr>
<td>Geometry: Properties of Shape</td>
<td>Geometry: Position and Direction</td>
<td>Y5: Four Operations consolidation</td>
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<td></td>
<td>Y6: SATS</td>
<td>Investigations</td>
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</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.
Fractions and Ratio

Common Content

Year 5 and 6 are studying different topics in this unit. Skills common to both topics (multiplication, division, simplifying) could be covered together in starter activities.

This is a chance for Year 5 to consolidate their learning in fractions. Teachers can decide where they feel they need to fill the gaps in learning from this unit as there was a great deal of content covered in the Autumn term.

Year 6 make the link from fractions to Ratio as they are introduced to this new concept.

Year Specific

Fractions
Using knowledge of the previous term's learning on fractions, consider which aspects children may need to spend longer on to deepen understanding.

Ratio
Year 6 (Spr B6)
• Using ratio language
• Ratio and fractions
• Introducing the ratio symbol
• Calculating ratio
• Using scale factors
• Calculating scale factors
• Ratio and proportion problems
Children will understand that a ratio shows the relationship between two values and can describe how one is related to another.

They will start by making simple comparisons between two different quantities. For example, they may compare the number of boys to girls in the class and write statements such as, “For every one girl, there are two boys”.

**Mathematical Talk**

How would your sentences change if there were 2 more blue flowers?

How would your sentences change if there were 10 more pink flowers?

Can you write a “For every...” sentence for the number of boys and girls in your class?

**Varied Fluency**

Complete the sentences.

For every two blue flowers there are ___ pink flowers.
For every blue flower there are ____ pink flowers.

Use cubes to help you complete the sentences.

For every ___ , there are ___
For every 8 , there are ___
For every 1 , there are ___

How many “For every...” sentences can you write to describe these counters?
Using Ratio Language

Reasoning and Problem Solving

Whitney lays tiles in the following pattern:

If she has 16 red tiles and 20 yellow tiles remaining, can she continue her pattern without there being any tiles left over? Explain why.

Possible responses:
For every two red tiles there are three yellow tiles. If Whitney continues the pattern she will need 16 red tiles and 24 yellow tiles. She cannot continue the pattern without there being tiles left over.

20 is not a multiple of 3

True or False?

- For every red cube there are 8 blue cubes.
- For every 4 blue cubes there is 1 red cube.
- For every 3 red cubes there would be 12 blue cubes.
- For every 16 cubes, 4 would be red and 12 would be blue.
- For every 20 cubes, 4 would be red and 16 would be blue.

False
True
True
False
True
Ratio and Fractions

Notes and Guidance

Children often think a ratio $1:2$ is the same as a fraction of $\frac{1}{2}$.
In this step, they use objects and diagrams to compare ratios and fractions.

Mathematical Talk

How many counters are there altogether?

How does this help you work out the fraction?

What does the denominator of the fraction tell you?

How can a bar model help you to show the mints and chocolates?

Varied Fluency

The ratio of red counters to blue counters is $1:2$

What fraction of the counters is blue? $\frac{1}{2}$ $\frac{1}{3}$ $\frac{2}{3}$

What fraction of the counters is red? $\frac{1}{2}$ $\frac{1}{3}$ $\frac{2}{3}$

This bar model shows the ratio $2:3:4$

What fraction of the bar is pink? $\frac{2}{3}$
What fraction of the bar is yellow? $\frac{1}{3}$
What fraction of the bar is blue? $\frac{1}{2}$

One third of the sweets in a box are mints.
The rest are chocolates.
What is the ratio of mints to chocolates in the box?
Ratio and Fractions

Reasoning and Problem Solving

Ron plants flowers in a flower bed. For every 2 red roses he plants 5 white roses.

He says,

\( \frac{2}{5} \) of the roses are red.

Is Ron correct?

Ron is incorrect because \( \frac{2}{7} \) of the roses are red. He has mistaken a part with the whole.

Which is the odd one out?

Explain your answer.

There are some red and green cubes in a bag. \( \frac{2}{5} \) of the cubes are red.

True or False?

- For every 2 red cubes there are 5 green cubes. \( \text{False} \)
- For every 2 red cubes there are 3 green cubes. \( \text{True} \)
- For every 3 green cubes there are 2 red cubes. \( \text{True} \)
- For every 3 green cubes there are 5 red cubes. \( \text{False} \)

Explain your answers.
Introducing the Ratio Symbol

Notes and Guidance

Children are introduced to the colon notation as the ratio symbol, and continue to link this with the language ‘for every…, there are…’
They need to read ratios e.g. 3 : 5 as “three to five”.
Children understand that the notation relates to the order of parts. For example, ‘For every 3 bananas there are 2 apples would be the same as 3 : 2 and for every 2 apples there are 3 bananas would be the same as 2 : 3

Mathematical Talk

What does the : symbol mean in the context of ratio?
Why is the order of the numbers important when we write ratios?
How do we write a ratio that compares three quantities?
How do we say the ratio “3 : 7”?

Varied Fluency

Complete:

The ratio of red counters to blue counters is 3 : 5
The ratio of blue counters to red counters is 5 : 3

Write down the ratio of:
- Bananas to strawberries
- Blackberries to strawberries
- Strawberries to bananas to blackberries
- Blackberries to strawberries to bananas

The ratio of red to green marbles is 3 : 7
Draw an image to represent the marbles.
What fraction of the marbles are red?
What fraction of the marbles are green?
**Introducing the Ratio Symbol**

**Reasoning and Problem Solving**

Tick the correct statements.

- There are two yellow tins for every three red tins.
- There are two red tins for every three yellow tins.
- The ratio of red tins to yellow tins is 2 : 3
- The ratio of yellow tins to red tins is 2 : 3

Explain which statements are incorrect and why.

The first and last statement are correct. The other statements have the ratios the wrong way round.

In a box there are some red, blue and green pens.

- The ratio of red pens to green pens is 3 : 5
- For every 1 red pen there are two blue pens.
- Write down the ratio of red pens to blue pens to green pens.

<table>
<thead>
<tr>
<th></th>
<th>R : G</th>
<th>3 : 5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>R : B</td>
<td>1 : 2 or 3 : 6</td>
</tr>
<tr>
<td></td>
<td>R : B : G</td>
<td>3 : 6 : 5</td>
</tr>
</tbody>
</table>
Calculating Ratio

Notes and Guidance

Children build on their knowledge of ratios and begin to calculate ratios. They answer worded questions in the form of ‘for every... there are...’ and need to be able to find both a part and a whole.

They should be encouraged to draw bar models to represent their problems, and clearly label the information they have been given and what they want to calculate.

Mathematical Talk

How can we represent this ratio using a bar model?

What does each part represent? What will each part be worth?

How many parts are there altogether? What is each part worth?

If we know what one part is worth, can we calculate the other parts?

Varied Fluency

- A farmer plants some crops in a field. For every 4 carrots he plants 2 leeks. He plants 48 carrots in total. How many leeks did he plant? How many vegetables did he plant in total?

- Jack mixes 2 parts of red paint with 3 parts blue paint to make purple paint. If he uses 12 parts blue paint, how many parts red paint does he use?

- Eva has a packet of sweets. For every 3 red sweets there are 5 green sweets. If there are 32 sweets in the packet in total, how many of each colour are there? You can use a bar model to help you.

```
Red
Green
```

32
Teddy has two packets of sweets.

In the first packet, for every one strawberry sweet there are two orange sweets.

In the second packet, for every three orange sweets there are two strawberry sweets.

Each packet contains 15 sweets in total.

Which packet has more strawberry sweets and by how many?

The first packet has 5 strawberry sweets and 10 orange sweets. The second packet has 6 strawberry sweets and 9 orange sweets. The second packet has 1 more strawberry sweet than the first packet.

Annie is making some necklaces to sell. For every one pink bead, she uses three purple beads.

Each necklace has 32 beads in total.

The cost of the string is £2.80
The cost of a pink bead is 72p.
The cost of a purple bead is 65p.

How much does it cost to make one necklace?

Each necklace has 8 pink beads and 24 purple beads.
The cost of the pink beads is £5.76
The cost of the purple beads is £15.60
The cost of a necklace is £24.16
Using Scale Factors

Notes and Guidance

In this step, children enlarge shapes to make them 2 or 3 times as big etc. They need to be introduced to the term “scale factor” as the name for this process.

Children should be able to draw 2-D shapes on a grid to a given scale factor and be able to use vocabulary, such as, “Shape A is three times as big as shape B”.

Mathematical Talk

What does enlargement mean?

What does scale factor mean?

Why do we have to double/triple all the sides of each shape?

Have the angles changed size?

Varied Fluency

Copy these rectangles onto squared paper then draw them double the size, triple the size and 5 times as big.

Copy these shapes onto squared paper then draw them twice as big and three times as big.

Enlarge these shapes by:
- Scale factor 2
- Scale factor 3
- Scale factor 4

5 cm
2 cm

6 cm
2 cm
## Using Scale Factors

### Reasoning and Problem Solving

<table>
<thead>
<tr>
<th>Draw a rectangle 3 cm by 4 cm.</th>
<th>The perimeter has doubled, the area is four times as large, the angles have stayed the same.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enlarge your rectangle by scale factor 2.</td>
<td>Jack says: The purple triangle is green triangle enlarged by scale factor 3</td>
</tr>
<tr>
<td>Compare the perimeter, area and angles of your two rectangles.</td>
<td>Possible answer I do not agree because Jack has increased the green shape by adding 3 cm to each side, not increasing it by a scale factor of 3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Here are two equilateral triangles. The blue triangle is three times larger than the green triangle.</th>
<th>The blue triangle has a perimeter of 15 cm.</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Not drawn to scale)</td>
<td>The green triangle has a perimeter of 5 cm.</td>
</tr>
</tbody>
</table>

Find the perimeter of both triangles.
Calculating Scale Factors

Notes and Guidance

Children find scale factors when given similar shapes. They need to be taught that ‘similar’ in mathematics means that one shape is an exact enlargement of the other, not just they have some common properties.

Children use multiplication and division facts to calculate missing information and scale factors.

Mathematical Talk

What does similar mean?

What do you notice about the length/width of each shape?

How would drawing the rectangles help you?

How much larger/smaller is shape A compared to shape B?

What does a scale factor of 2 mean? Can you have a scale factor of 2.5?

Varied Fluency

Complete the sentences.

Shape B is _______ as big as shape A.

Shape A has been enlarged by scale factor _____ to make shape B.

The rectangles described in the table are all similar to each other. Fill in the missing lengths and widths and complete the sentences.

<table>
<thead>
<tr>
<th>Rectangle</th>
<th>Length</th>
<th>Width</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>5 cm</td>
<td>2 cm</td>
</tr>
<tr>
<td>B</td>
<td></td>
<td>4 cm</td>
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<tr>
<td>C</td>
<td>25 cm</td>
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<tr>
<td>D</td>
<td></td>
<td>18 cm</td>
</tr>
</tbody>
</table>

From A to B, the scale factor of enlargement is ___
From A to C, the scale factor of enlargement is ___
From A to D, the scale factor of enlargement is ___
From B to D, the scale factor of enlargement is ___
Calculating Scale Factors

Reasoning and Problem Solving

A rectangle has a perimeter of 16 cm. An enlargement of this rectangle has a perimeter of 24 cm.

The length of the smaller rectangle is 6 cm.

Draw both rectangles.

Smaller rectangle: length – 6 cm width – 2 cm

Larger rectangle: length – 9 cm width – 3 cm

Scale factor: 1.5

Always, sometimes, or never true?

To enlarge a shape you just need to do the same thing to each of the sides.

Sometimes. This only works when we are multiplying or dividing the lengths of the sides. It does not work when adding or subtracting.

Ron says that these three rectangles are similar.

Ron is incorrect. The orange rectangle is an enlargement of the green rectangle with scale factor 3. The red rectangle, however, is not similar to the other two as the side lengths are not in the same ratio.

Do you agree? Explain your answer.


**Ratio and Proportion Problems**

**Notes and Guidance**

Children will apply the skills they have learnt in the previous steps to a wide range of problems in different contexts.

They may need support to see that different situations are in fact alternative uses of ratio.

Bar models will again provide valuable pictorial support.

**Mathematical Talk**

How does this problem relate to ratio?

Can we represent this ratio using a bar model?

What does each part represent? What is the whole?

What is the same about the ratios?

What is different about them?

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**Varied Fluency**

**How much of each ingredient is needed to make soup for:**
- 3 people
- 9 people
- 1 person

What else could you work out?

**Recipe for 6 people**
- 1 onion
- 60 g butter
- 180 g lentils
- 1.2 litres stock
- 480 ml tomato juice

**Two shops sell the same pens for these prices.**

**Safeway**
- 4 pens £2.88

**K-mart**
- 7 pens £4.83

Which shop is better value for money?

**The mass of strawberries in a smoothie is three times the mass of raspberries in the smoothie. The total mass of the fruit is 840 g. How much of each fruit is needed.**

Strawberries

Raspberries

\[840 \text{ g}\]
This recipe makes 10 flapjacks.

**Flapjacks**
- 120 g butter
- 100 g brown sugar
- 4 tablespoons golden syrup
- 250 g oats
- 40 g sultanas

Amir has 180 g butter.

What is the largest number of flapjacks he can make?

How much of the other ingredients will he need?

He has enough butter to make 15 flapjacks.
He will need 150 g brown soft sugar,
6 tablespoons golden syrup,
375 g oats and
60 g sultanas.

Alex has two packets of sweets.

In the first packet, for every 2 strawberry sweets there are 3 orange.
In the second packet, for one strawberry sweet, there are three orange.
Each packet has the same number of sweets.
The second packet contains 15 orange sweets.

Second packet:
- 15 orange
- 5 strawberry.

So there are 20 sweets in each packet.

First packet:
- 8 strawberry
- 12 orange

The first packet contains 8 strawberry sweets.

How many strawberry sweets are in the first packet?