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.

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**

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>
<th>Week 9</th>
<th>Week 10</th>
<th>Week 11</th>
<th>Week 12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Autumn</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Measurement: Length, Perimeter and Area</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Number: Place Value</td>
<td>Number: Addition and Subtraction</td>
<td>Number: Multiplication and Division</td>
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</tr>
<tr>
<td>Spring</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>Number: Decimals (including Y5 Percentages)</td>
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<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Number: Multiplication and Division</td>
<td>Number: Fractions</td>
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<td></td>
<td></td>
</tr>
</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.
Year 4/5 | Spring Term | Week 9 – 12 – Decimals and Percentages

Decimals and Percentages

Common Content

Decimals up to 2 d.p.
Year 4 (Spr B4, Sum B1)
- Hundredths
- Hundredths as decimals
- Hundredths on a place value grid
- Write decimals
- Halves and quarters

Year 5 (Spr B3)
- Decimals up to 2 d.p.
- Decimals as fractions (1)
- Decimals as fractions (2)

Multiply & Divide by Powers of 10
Year 4 (Spr B4)
- Divide 1-digit by 10
- Divide 2-digits by 10
- Divide 1 or 2-digits by 100

Year 5 (Sum B1)
- Multiplying decimals by 10, 100 and 1,000
- Dividing decimals by 10, 100 and 1,000

Adding & Subtracting Decimals Within 1
Year 4 (Sum B1)
- Make a whole

Year 5 (Sum B1)
- Adding decimals within 1
- Subtracting decimals within 1
- Complements to 1

Tenths
Year 4 (Spr B4)
- Recognise tenths and hundredths
- Tenths as decimals
- Tenths on a place value grid
- Tenths on a number line

Year 5 (Spr B3)
- Understand tenths
- Tenths as decimals

Percentages
Year 5 (Spr B3)
- Understand percentages
- Percentages as fractions and decimals
- Equivalent F.D.P

Thousandths
Year 5 (Spr B3)
- Understand thousandths
- Thousandths as decimals

Teachers may decide to start this block by recapping tenths with both year groups. They can then move on to decimals with up to 2 decimal places. Whilst Year 4 focus on converting between fractions and decimals, Year 5 are introduced to percentages. Year 5 then move on to thousandths before both year groups multiply and divide decimals by powers of 10.

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Children recognise tenths and hundredths using a hundred square.

When first introducing tenths and hundredths, concrete manipulatives such as Base 10 can be used to support children’s understanding.

They see that ten hundredths are equivalent to one tenth and can use a part-whole model to partition a fraction into tenths and hundredths.

**Mathematical Talk**

If each row is one row out of ten equal rows, what fraction does this represent?

If each square is one square out of one hundred equal squares, what fraction does this represent?

How many squares are in one row? How many squares are in one column? How many hundredths are in one tenth?

How else could you partition these numbers?

---

**Varied Fluency**

If the hundred square represents one whole:

Each square is ___ out of ___ equal squares.
Each square represents __________.
Each row is ___ out of ___ equal rows.
Each row represents __________.

**Complete the table.**

<table>
<thead>
<tr>
<th>Shaded</th>
<th>Tenths</th>
<th>Hundredths</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 squares</td>
<td>( \frac{2}{10} )</td>
<td>( \frac{20}{100} )</td>
</tr>
<tr>
<td>4 columns</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 rows</td>
<td>( \frac{7}{10} )</td>
<td></td>
</tr>
</tbody>
</table>

We can use a part-whole model to partition 56 hundredths into tenths and hundredths.

Partition into tenths and hundredths:
- 65 hundredths
- \( \frac{31}{100} \)
- 80 hundredths
Who is correct?

- Dora: 5 hundredths is equivalent to 50 tenths.
- Amir: 50 hundredths is equivalent to 5 tenths.

Amir is correct.

\[
\frac{50}{100} = \frac{5}{10}
\]

This can be demonstrated with Base 10 or a hundred square.

50 squares is \(\frac{50}{100}\)

5 rows is \(\frac{5}{10}\)

Ron says he can partition tenths and hundredths in more than one way.

Children may partition 42 hundredths as:
- 4 tenths and 2 hundredths
- 3 tenths and 12 hundredths
- 2 tenths and 22 hundredths
- 1 tenth and 32 hundredths
- 0 tenths and 42 hundredths

Other methods of partitioning are possible.

Use Ron's method to partition 42 hundredths in more than one way.
Using the hundred square and Base 10, children can recognise the relationship between $\frac{1}{10}$ and 0.1. Children write tenths as decimals and as fractions. They write any number of tenths as a decimal and represent them using concrete and pictorial representations. Children understand that a tenth is a part of a whole split into 10 equal parts. In this small step children stay within one whole.

**Mathematical Talk**

What is a tenth?

How many different ways can we write a tenth?

When do we use tenths in real life?

Which representation do you think is clearest? Why?

How else could you represent the decimal/fraction?

**Varied Fluency**

Complete the table.

<table>
<thead>
<tr>
<th>Image</th>
<th>Words</th>
<th>Fraction</th>
<th>Decimal</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="Image" /></td>
<td>five tenths</td>
<td></td>
<td>0.9</td>
</tr>
</tbody>
</table>

What fractions and decimals are represented in these diagrams?

What's the same? What's different?
Who is correct?

Annie: 1.2 is equivalent to 1 whole and 2 tenths.

Dexter: 1.2 is equivalent to 12 tenths.

Explain why.

Six tens  Six tenths

What is the same? What’s different? Show me.

Both children are correct. 1 whole is equal to 10 tenths so 1.2 is equal to 12 tenths.

Children use concrete and pictorial representations to show the difference.

Which ten frame is the odd one out?

Explain your answer.

Three of the ten frames represent 0.5

This ten frame is the odd one out because it represents 6 tenths not 5 tenths.
Children read and represent tenths on a place value grid. They see that the tenths column is to the right of the decimal point. Children use concrete representations to make tenths on a place value grid and write the number they have made as a decimal. In this small step children will be introduced to decimals greater than 1.

**Mathematical Talk**

- How many ones are there?
- How many tenths are there?
- What’s the same/different between 0.2, 1.2 and 0.8?
- How many different ways can you make a whole using the three decimals?
- Why do we need to use the decimal point?
- How many tenths are equivalent to one whole?
Tenths on a Place Value Grid

Reasoning and Problem Solving

Use five counters and a place value grid. Place all five counters in either the ones or the tenths column.

How many different numbers can you make?

Describe the numbers you have made by completing the stem sentences.

There are ___ ones and ___ tenths.

___ ones + ___ tenths = ___

Children can make:
- 0.5
- 1.4
- 2.3
- 3.2
- 4.1
- 5.0

Two children are making eleven tenths.

Amir and Rosie have both made eleven tenths correctly. Amir has seen that 10 tenths is equivalent to 1 one.

Who has made it correctly? Explain your answer.
Children read and represent tenths on a number line.

They link the number line to measurement, looking at measuring in centimetres and millimetres.

Children use number lines to explore relative scale.

How many equal parts are between 0 and 1?

What are the intervals between each number?

How many tenths are in one whole?

What is 0.1 metres in millimetres?

How long is the ribbon?

The ribbon is ___ metres long.
What could the start and end numbers on the number line be?

The start and end numbers could be 6 and 6.9 respectively, or 5.6 and 7.4.

Children can find different start and end numbers by adjusting the increments that the number line is going up in.

Place the decimals on the number line.

Which order did you place your numbers on the number line?

Some children will draw on 20 intervals first. This method will allow them to identify where the numbers are placed but can be considered inefficient. Encourage children to think about the numbers first and consider which numbers are easiest to place e.g. 2.5 is probably easiest, followed by 1.9 or 2.9 etc.
Theme 2 - Decimals up to 2 d.p.
Children recognise that hundredths arise from dividing one whole into one hundred equal parts.

Linked to this, they see that one tenth is ten hundredths.

Children count in hundredths and represent tenths and hundredths on a place value grid and a number line.

One hundredth is one whole split into how many equal parts?

How many hundredths can I exchange one tenth for?

How many hundredths are equivalent to 5 tenths? How does this help me complete the sequence?

How does Base 10 help you represent the difference between tenths and hundredths?
Hundredths

Reasoning and Problem Solving

Here is a Rekenrek made from 100 beads.

If the Rekenrek represents one whole, what fractions have been made on the left and on the right?

On the left, there are 46 hundredths, this is equivalent to 4 tenths and 6 hundredths. On the right, there are 54 hundredths, this is equivalent to 5 tenths and 4 hundredths.

Children could also explore hundredths using a 100 bead string.

Can you partition both of the fractions into tenths and hundredths?

Complete the statements.

3 tenths and 2 hundredths = 2 tenths and □ hundredths

14 hundredths and 3 tenths = 4 tenths and □ hundredths

5 tenths and 1 hundredth < 5 tenths and □ hundredths

5 tenths and 1 hundredth > □ tenths and 5 hundredths

Can you list all the possibilities?

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Using the hundred square and Base 10, children can recognise the relationship between $\frac{1}{100}$ and 0.01.

Children write hundredths as decimals and as fractions. They write any number of hundredths as a decimal and represent the decimals using concrete and pictorial representations.

Children understand that a hundredth is a part of a whole split into 100 equal parts.

In this small step children stay within one whole.

### Mathematical Talk

One hundredth is one whole split into ____ equal parts.

What is the same and what is different about a number written as a fraction and a number written as a decimal?

What is the same and different between 0.3 and 4 hundredths?

### Varied Fluency

Complete the table.

<table>
<thead>
<tr>
<th>Image</th>
<th>Words</th>
<th>Fraction</th>
<th>Decimals</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="Image" /></td>
<td>56 hundredths</td>
<td>$\frac{17}{100}$</td>
<td>0.2</td>
</tr>
</tbody>
</table>

Write the number as a fraction and as a decimal.

How else could you represent this number?
Hundredths as Decimals

Reasoning and Problem Solving

Dora says, 17 hundredths is the same as 1,700.

Is she correct? Explain your answer.

Dora is wrong as she has mistaken hundredths for hundreds.

Alex and Eva have been asked to write the decimal shaded on the 100 grid.

Alex says the grid shows 0.70.

Eva says the grid shows 0.7.

Who do you agree with? Explain your answer.

They are both correct. The grid shows 70 hundredths or 7 tenths and this is what Alex and Eva have given as their answers. In Alex's answer the 0 in the hundredths column isn't needed as it is not a place holder and doesn't change the value of the number.
Children read and represent hundredths on a place value grid. They see that the hundredths column is to the right of the decimal point and the tenths column.

Children use concrete representations to make numbers with tenths and hundredths on a place value grid and write the number they have made as a decimal.

What is a hundredth?

How many hundredths are equivalent to one tenth?

Look at the decimals you have represented on the place value grid and in the part whole models. What’s the same about the numbers? What’s different?
Use four counters and a place value grid. Place all four counters in either the ones, tenths or hundredths column.

How many different numbers can you make?

Describe the numbers you have made by completing the sentences.

There are □ ones, □ tenths and □ hundredths.

□ ones + □ tenths + □ hundredths = □

Children can either make:
4, 3.1, 3.01, 2.2, 2.11, 2.02, 1.3, 1.21, 1.12, 1.03, 0.4, 0.31, 0.22, 0.13, 0.04

e.g. There are 2 ones, 0 tenths and 2 hundredths.

2 ones + 0 tenths + 2 hundredths = 2.02

Ron says he can partition 0.34 in more than one way.

Use Ron’s method to partition 0.45 in more than one way.

Children may partition 0.45 into:
0 tenths and 45 hundredths
1 tenth and 35 hundredths
2 tenths and 25 hundredths
3 tenths and 15 hundredths
4 tenths and 5 hundredths

Other ways of partitioning are possible.
Write Decimals

Notes and Guidance

Children use place value counters and a place value grid to make numbers with up to two decimal places. They read and write numbers with decimals and understand the value of each digit. They show their understanding of place value by partitioning numbers with decimals in different ways.

Mathematical Talk

How many ones/tenths/hundredths are in the number? How do we write this as a decimal? Why? What is the value of the ____ in the number ______? When do we need to use zero as a place holder? How can we partition decimal numbers in different ways?

Varied Fluency

What number is represented on the place value grid?

<table>
<thead>
<tr>
<th>Ones</th>
<th>Tenths</th>
<th>Hundredths</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
<td>3</td>
</tr>
</tbody>
</table>

There are ____ ones, ____ tenths and ____ hundredths. The number is ____

Make the numbers on a place value chart and write down the value of the underlined digit.

3.47  2.15  0.6  25.03

Complete the part-whole model in two different ways and write a number sentence to go with each.

0.83

0.83 = ____ + 0.03

0.83 = 0.7 + ____
Mo is told that this bead string represents one whole. He thinks that each individual bead represents one tenth. Do you agree with Mo? Explain your answer.

No because Mo has not included the place holder. The number shown is 2.02.

Annie thinks the number shown is 2.2. Do you agree with Annie? Explain your answer.

Teddy: 40.46
Amir: 46.2
Rosie: 46.02
Eva: 2.64

Match each description to the correct number.

Teddy: My number has the same amount of tens as tenths.
Amir: My number has one decimal place.
Rosie: My number has two hundredths.
Eva: My number has six tenths.
Children write \( \frac{1}{2}, \frac{1}{4}, \text{ and } \frac{3}{4} \) as decimals. They use concrete and pictorial representations to support the conversion. Children use their knowledge of equivalent fractions to write fractions as hundredths and then write the fractions as halves or quarters.

**Notes and Guidance**

**Halves and Quarters**

**Mathematical Talk**

How would you write your answer as a decimal and a fraction?

Can you represent one quarter using decimal place value counters?

Can you represent three quarters using counters on a place value grid?

**Varied Fluency**

Here is a rekenrek with 100 beads.

\[ \frac{1}{2} = \frac{50}{100} = \frac{5}{10}, \text{ so } \frac{1}{2} \text{ is } \text{____ } \text{as a decimal.} \]

Half of the beads are red, and half of the beads are white.

\[ \frac{1}{2} = \frac{50}{100} = \frac{5}{10}, \text{ so } \frac{1}{2} \text{ is } \text{____ } \text{as a decimal.} \]

The beads are split equally on each side of the rekenrek.

There are 4 equal groups.

1 out of 4 equal groups = \( \text{____ } \) beads.

1 out of 4 equal groups = \( \text{____ } \) beads.

\[ \frac{1}{4} = \frac{25}{100} = \text{____ } \]

What fraction is represented by 3 out of the 4 groups?

Can you write this as a decimal?

\[ \frac{3}{4} = \frac{75}{100} = \text{____ } \]
Alex says:

If I know \( \frac{1}{2} \) is 0.5 as a decimal, I also know \( \frac{3}{6}, \frac{4}{8} \) and \( \frac{6}{12} \) are equivalent to 0.5 as a decimal.

Explain Alex’s thinking.

Alex has used her knowledge of equivalent fractions to find other fractions that are equivalent to 0.5.

Dexter has made a mistake when converting his fractions to decimals.

\[
\frac{1}{2} = 1.2, \quad \frac{1}{4} = 1.4 \quad \text{and} \quad \frac{3}{4} = 3.4
\]

What mistake has Dexter made?

Dexter has incorrectly placed the numerator in the ones column and the denominator in the tenths column. He should have used equivalent fractions with tenths and or hundredths to convert the fractions to decimals.
Children use place value counters and a place value grid to make numbers with up to two decimal places.

They read and write decimal numbers and understand the value of each digit.

They show their understanding of place value by partitioning decimal numbers in different ways.

How many ones/tenths/hundredths are in the number? How do we write this as a decimal? Why?

What is the value of the ____ in the number ______?

When do we need to use zero as a place holder?

How can we partition decimal numbers in different ways?

Which number is represented on the place value chart?

There are ____ ones, ____ tenths and ____ hundredths.

The number is ____

Represent the numbers on a place value chart and complete the stem sentences.

0.28 = 0.2 + 0.08

0.65 = 0.6 + 0.05

0.07 = 0.0 + 0.07

1.26 = 1.2 + 0.06

Make the numbers with place value counters and write down the value of the underlined digit.

2.45 = 2 + 0.45

3.04 = 3 + 0.04

4.44 = 4 + 0.44

43.34 = 43 + 0.34

0.76 = 0.7 + 0.06 = 7 tenths and 6 hundredths.

Fill in the missing numbers.

0.83 = ____ + 0.03 = ___________ and 3 hundredths.

0.83 = 0.7 + ____ = 7 tenths and ___________

How many other ways can you partition 0.83?
Decimals up to 2 d.p.

Reasoning and Problem Solving

Dexter says there is only one way to partition 0.62

Prove Dexter is incorrect by finding at least three different ways of partitioning 0.62

- \(0.62 = 0.12 + 0.5\)
- \(0.62 = 0.4 + 0.22\)
- \(0.62 = 0.3 + 0.32\)
- \(0.62 = 0.42 + 0.2\)
- \(0.62 = 0.1 + 0.52\)
- \(0.62 = 0.03 + 0.59\)

Match each description to the correct number.

- **Teddy** – 40.46
- **Amir** – 46.2
- **Rosie** – 46.02
- **Eva** – 2.64

- My number has the same amount of tens and tenths.
- My number has one decimal place.
- My number has two hundredths.
- My number has six tenths.
Children explore the relationship between decimals and fractions. They start with a fraction (including concrete and pictorial representations of fractions) convert it into a decimal and as they progress, children will see the direct link between fractions and decimals.

Children use their previous knowledge of fractions to aid this process.

What fraction is shown in both representations? Can you convert this in to a decimal?

The fraction is the same as the decimal __________

What does the whole grid represent?

What can we use to describe the equal parts of the grid (fractions and decimals)?

How would you convert a fraction to a decimal?

What does the decimal point mean?

Can the fraction be simplified?

How can you prove that the decimal ____ and the fraction ____ are the same?
Odd one out

Which of the images below is the odd one out?

Possible answer:
B is the odd one out because it shows $\frac{2}{5}$, which is $\frac{4}{10}$ or 0.4
The other images show $\frac{2}{10}$ or 0.2

Explain why.

How many different ways can you complete the part-whole model using fractions and decimals?

Possible answers:
50
100
1
2
0.5

There are various possible answers when completing the part-whole models. Ensure both fractions and decimals are represented.
Decimals as Fractions (2)

Notes and Guidance

Children concentrate on more complex decimals numbers (e.g. 0.96, 0.03, 0.27) and numbers greater than 1 (e.g. 1.2, 2.7, 4.01).

They represent them as fractions and as decimals.

Children record the number in multiple representations, including expanded form and in words.

Mathematical Talk

In the number 1.34 what does the 1 represent, what does the 3 represent, what does the 4 represent?
Can we represent this number in a different way, and another, and another?
On the number line, where can we see tenths? Where can we see hundredths?
On the number line, tell me another number that is between c and d. Now give your answer as a fraction. Tell me a number that is not between c and d.

Varied Fluency

Use the models to record equivalent decimals and fractions.

\[ 0.3 = \frac{3}{10} = \frac{30}{100} \]

Write down the value of a, b, c and d as a decimal and a fraction.

Complete the table.

<table>
<thead>
<tr>
<th>Concrete</th>
<th>Decimal</th>
<th>Decimal - expanded form</th>
<th>Fraction</th>
<th>Fraction - expanded form</th>
<th>In words</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3.24</td>
<td>3 + 0.2 + 0.04</td>
<td>3 + \frac{24}{100}</td>
<td>3 + \frac{2}{10} + \frac{4}{100}</td>
<td>Three ones, two tenths and four hundredths.</td>
</tr>
<tr>
<td></td>
<td>3.01</td>
<td>3 \frac{1}{10}</td>
<td></td>
<td>3 + \frac{1}{10} + \frac{2}{100}</td>
<td>Two ones, three tenths and two hundredths.</td>
</tr>
</tbody>
</table>
### Decimals as Fractions (2)

#### Reasoning and Problem Solving

2.25 = 2 ones, 2 tenths and 5 hundredths.

Can you write the following numbers in at least three different ways?

<table>
<thead>
<tr>
<th>Number</th>
<th>Words</th>
<th>Decimals</th>
<th>Fractions</th>
<th>Expanded Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>23.7</td>
<td>23 and 7/10</td>
<td>23.7</td>
<td>23 0.7</td>
<td>23 + 0.7</td>
</tr>
<tr>
<td>2.37</td>
<td>2 and 37/100</td>
<td>2.37</td>
<td>2 37/100</td>
<td>2.37</td>
</tr>
<tr>
<td>9.08</td>
<td>9 and 8/10</td>
<td>9.08</td>
<td>9 0.8</td>
<td>9 + 0.08</td>
</tr>
<tr>
<td>0.98</td>
<td>98/100</td>
<td>0.98</td>
<td>98/100</td>
<td>0.98</td>
</tr>
</tbody>
</table>

Amir says,

To convert a fraction to a decimal, take the numerator and put it after the decimal point.

E.g. \( \frac{21}{100} = 0.21 \)

Write two examples of converting fractions to decimals to prove this does not always work.

Possible answer: Children may represent it in words, decimals, fractions, expanded form but also by partitioning the number in different ways.

Use the digits 3, 4 and 5 to complete the decimal number.

```
0.
```

List all the possible numbers you can make.

Write these decimals as mixed numbers.

Choose three of the numbers and write them in words.

<table>
<thead>
<tr>
<th>Number</th>
<th>Words</th>
<th>Decimals</th>
<th>Fractions</th>
<th>Expanded Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>30.45</td>
<td>30 and 45/100</td>
<td>30.45</td>
<td>30 45/100</td>
<td>30 + 0.45</td>
</tr>
<tr>
<td>30.54</td>
<td>30 and 54/100</td>
<td>30.54</td>
<td>30 54/100</td>
<td>30 + 0.54</td>
</tr>
<tr>
<td>40.35</td>
<td>40 and 35/100</td>
<td>40.35</td>
<td>40 35/100</td>
<td>40 + 0.35</td>
</tr>
<tr>
<td>40.53</td>
<td>40 and 53/100</td>
<td>40.53</td>
<td>40 53/100</td>
<td>40 + 0.53</td>
</tr>
<tr>
<td>50.43</td>
<td>50 and 43/100</td>
<td>50.43</td>
<td>50 43/100</td>
<td>50 + 0.43</td>
</tr>
<tr>
<td>50.34</td>
<td>50 and 34/100</td>
<td>50.34</td>
<td>50 34/100</td>
<td>50 + 0.34</td>
</tr>
</tbody>
</table>

To convert a fraction to a decimal, take the numerator and put it after the decimal point.

E.g. \( \frac{21}{100} = 0.21 \)
Theme 3 - Percentages
**Understand Percentages**

Children are introduced to ‘per cent’ for the first time and will understand that ‘per cent’ relates to ‘number of parts per hundred’.

They will explore this through different representations which show different parts of a hundred. Children will use ‘number of parts per hundred’ alongside the % symbol.

**Notes and Guidance**

**Varied Fluency**

Complete the sentence stem for each diagram.

There are ____ parts per hundred shaded. This is ____%

Complete the table.

<table>
<thead>
<tr>
<th>Pictorial</th>
<th>Parts per hundred</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>There are 51 parts per hundred.</td>
<td>75%</td>
</tr>
</tbody>
</table>

Complete the bar models.

- 100%
- 100%
- 100%

**Mathematical Talk**

How many parts is the square split in to?

How many parts per hundred are shaded/not shaded?

Can we represent this percentage differently?

Look at the bar model, how many parts is it split into?

If the bar is worth 100%, what is each part worth?
Oh no! Dexter has spilt ink on his hundred square.

Complete the sentence stems to describe what percentage is shaded.

- It could be...
- It must be...
- It can't be...

Some possible answers:
- It could be 25%
- It must be less than 70%
- It can't be 100%

Mo, Annie and Tommy all did a test with 100 questions. Tommy got 6 fewer questions correct than Mo.

<table>
<thead>
<tr>
<th>Name</th>
<th>Score</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mo</td>
<td>56 out of 100</td>
<td>56%</td>
</tr>
<tr>
<td>Annie</td>
<td></td>
<td>65%</td>
</tr>
<tr>
<td>Tommy</td>
<td></td>
<td>50%</td>
</tr>
</tbody>
</table>

Complete the table. How many more marks did each child need to score 100%?

- Dora and Amir each have 100 sweets. Dora eats 65% of hers. Amir has 35 sweets left. Who has more sweets left?
- Mo needs 44
- Annie needs 35
- Tommy needs 50

Neither. They both have an equal number of sweets remaining.
Percentages as Fractions & Decimals

Notes and Guidance

Children represent percentages as fractions using the denominator 100 and make the connection to decimals and hundredths.

Children will recognise percentages, decimals and fractions are different ways of expressing proportions.

Mathematical Talk

What do you notice about the percentages and the decimals?

What’s the same and what’s different about percentages, decimals and fractions?

How can we record the proportion of pages Alex has read as a fraction? How can we turn it into a percentage?

Can you convert any percentage into a decimal and a fraction?

Varied Fluency

Complete the table.

<table>
<thead>
<tr>
<th>Pictorial</th>
<th>Percentage</th>
<th>Fraction</th>
<th>Decimal</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>41%</td>
<td>41/100</td>
<td>0.41</td>
</tr>
<tr>
<td></td>
<td>7%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Alex has read 93 pages of her book. Her book has 300 pages.

What proportion of her book has she read? Give your answer as a percentage and a decimal.

\[
\frac{93}{300} = \frac{?}{100} = \underline{\text{%}} = \underline{\text{______}}
\]

Record the fractions as decimals and percentages.

<table>
<thead>
<tr>
<th>Fraction</th>
<th>Percentage</th>
<th>Decimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>120/300</td>
<td>4/5</td>
<td>0.8</td>
</tr>
<tr>
<td>320/400</td>
<td>4/5</td>
<td>0.8</td>
</tr>
<tr>
<td>20/200</td>
<td>1/10</td>
<td>0.1</td>
</tr>
<tr>
<td>12/50</td>
<td>0.24</td>
<td></td>
</tr>
</tbody>
</table>
## Percentages as Fractions & Decimals

### Reasoning and Problem Solving

Teddy says,

> Teddy is incorrect, this only works when the denominator is 100 because percent means parts per hundred.

<table>
<thead>
<tr>
<th>Teddy says,</th>
<th>Teddy is incorrect, this only works when the denominator is 100 because percent means parts per hundred.</th>
<th>Three children have each read 360 pages of their own book.</th>
<th>Ron has read (\frac{360}{500}), 72% or 0.72</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is Teddy correct? Explain your answer.</td>
<td>60% are children, so 40% are girls and 20% boys. Children may use a bar model to represent this problem.</td>
<td>Ron's book has 500 pages. Dora's book has 400 pages. Eva's book has 600 pages.</td>
<td>Dora has read (\frac{360}{400}), 90% or 0.9</td>
</tr>
<tr>
<td>At a cinema, (\frac{4}{10}) of the audience are adults. The rest of the audience is made up of boys and girls. There are twice as many girls as boys.</td>
<td>What percentage of the audience are girls?</td>
<td>What fraction of their books have they each read?</td>
<td>Eva has read (\frac{360}{600}), 60% or 0.6</td>
</tr>
<tr>
<td>What percentage of the audience are girls?</td>
<td>What percentage of their books have they read?</td>
<td>How much of their books have they each read as a decimal?</td>
<td>Dora has read the most of her book.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Who has read the most of their book?</td>
<td></td>
</tr>
</tbody>
</table>

To convert a fraction to a percentage, you just need to put a percent sign next to the numerator.
Children recognise simple equivalent fractions and represent them as decimals and percentages. When children are secure with the percentage and decimal equivalents of \( \frac{1}{2}, \frac{1}{4}, \frac{1}{5}, \frac{2}{5}, \frac{4}{5} \), they then consider denominators of a multiple of 10 or 25.

Use bar models and hundred squares to support understanding and show equivalence.

Use a bead string to show me:

- 0.25
- 0.3
- 0.2
- 0.5

What are these decimals as a percentage?
What are they as a fraction? Can you simplify the fraction?

Use the bar model to convert the fractions into percentages and decimals.

\[
\begin{array}{cccc}
\frac{1}{2} & \frac{1}{4} & \frac{3}{10} & \frac{1}{5} \\
10\% & 10\% & 10\% & 10\%
\end{array}
\]

Draw arrows to show the position of each representation on the number line.

Which is closer to 100%, \( \frac{4}{5} \), or 50%? How do you know?
Sort the fractions, decimals and percentages into the correct column.

<table>
<thead>
<tr>
<th>Less than $\frac{1}{2}$</th>
<th>Equal to $\frac{1}{2}$</th>
<th>Greater than $\frac{1}{2}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\frac{1}{4}$, 0.25, 7%</td>
<td>$\frac{30}{60}$, 50% and $\frac{30}{60}$</td>
<td>70 hundredths, 60% and 100%</td>
</tr>
</tbody>
</table>

Jack has £55. He spends $\frac{3}{5}$ of his money on a coat and 30% on shoes. How much does he have left?

Tommy is playing a maths game. Here are his scores at three different levels:

- **Level A** – 440 points out of 550
- **Level B** – 210 points out of 300
- **Level C** – 45 points out of 90

At which level did he have a higher success rate?

Tommy had a higher success rate on level A.

Children may wish to compare using decimals instead.
Block 3 – Decimals and Percentages

Theme 4 - Thousandths
Understand Thousandths

Notes and Guidance

Children build on previous learning of tenths and hundredths and apply this to understanding thousandths. Opportunities to develop understanding of thousandths through the use of concrete and pictorial representations need to be incorporated. When exploring the relationships between tenths, hundredths and thousandths, consider decimal and mixed number equivalences.

Mathematical Talk

If 4 tenths = 0.4, 4 hundredths = 0.04, what is 4 thousandths equal to?

Using the place value charts:

• How many tenths are in a whole?
• How many hundredths are there in 1 tenth?
• Using place value counters complete the final chart.
• How many thousandths in 1 hundredth?

Varied Fluency

Eva is using Base 10 to represent decimals.

= 1 whole  = 1 tenth  = 1 hundredth  = 1 thousandth

Use Base 10 to build:
• 4 wholes, 4 tenths, 4 hundredths, 4 thousandths
• 5 tenths, 7 hundredths and 5 thousandths
• 2.357

Use the place value counters to help you fill in the final chart.

What has this hundred square been divided up into?
How many thousandths are there in one hundredth?
How many thousandths are in one tenth?
Rosie thinks the 2 values are equal.

Agree.

We can exchange ten hundredth counters for one tenth counter.

0.135 = \frac{135}{1000}

Do you agree?

Explain your thinking.

Can you write this amount as a decimal and as a fraction?

0.394

= 3 tenths, 9 hundredths and 4 thousandths

= \frac{3}{10} + \frac{9}{100} + \frac{4}{1000}

= 0.3 + 0.09 + 0.004

Write these numbers in three different ways:

0.472 = 4 tenths, seven hundredths and 2 thousandths

= \frac{4}{10} + \frac{7}{100} + \frac{2}{1000}

= 0.4 + 0.07 + 0.002

0.529 = 5 tenths, two hundredths and 9 thousandths

= \frac{5}{10} + \frac{2}{100} + \frac{9}{1000}

= 0.5 + 0.02 + 0.009

0.307 = 3 tenths and 7 thousandths

= \frac{3}{10} + \frac{7}{1000}

= 0.3 + 0.007
Children build on their understanding of decimals and further explore the link between tenths, hundredths and thousandths.

They represent decimals in different ways and also explore deeper connections such as \( \frac{100}{1000} \) is the same as \( \frac{1}{10} \).

### Varied Fluency

Use the place value chart and counters to represent these numbers.

Write down the numbers as a decimal.

a) Use the place value chart and counters to represent these numbers.

Write down the numbers as a decimal.

a) $\frac{1}{10}$

b) 4 ones, 6 tenths, 0 hundredths and 2 thousandths

c) $3 \frac{34}{1000}$

The arrows are pointing to different numbers.

Write each number as a decimal and then as a mixed number.

Where would 2.015 be positioned on the number line? How many thousandths do I have? How do I record this as a mixed number?
Ron has 8 counters. He makes numbers using the place value chart. At least 3 columns have counters in. What is the largest and the smallest number he can make with 8 counters?

<table>
<thead>
<tr>
<th>1</th>
<th>(\frac{1}{10})</th>
<th>(\frac{1}{100})</th>
<th>(\frac{1}{1000})</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Can you record the numbers in different ways?

Smallest: 0.116
Largest: 6.11

Three children are representing the number 0.504

- **Annie**: 0.504 = \(\frac{504}{1000}\)
- **Alex**: 0.504 = \(\frac{3}{10} + \frac{2}{10} + \frac{4}{1000}\)
- **Teddy**: 0.504 = \(\frac{5}{10} + \frac{4}{1000}\)

Possible answer: They are all correct. Annie has recorded it as a fraction. Alex and Teddy have partitioned it differently.

In this problem symbols have been used to represent two different numbers. Write down the value of each, as a mixed number and as a decimal.

- \(\bigcirc\) = 1
- \(\star\) = \(\frac{1}{10}\)
- \(\triangle\) = \(\frac{1}{100}\)
- \(\Box\) = \(\frac{1}{1000}\)
Children need to understand when dividing by 10 the number is being split into 10 equal parts and is 10 times smaller.

Children use counters on a place value chart to see how the digits move when dividing by 10. Children should make links between the understanding of dividing by 10 and this more efficient method.

Emphasise the importance of 0 as a place holder.

**Mathematical Talk**

What number is represented on the place value chart?

What links can you see between the 2 methods?

Which method is more efficient?

What is the same and what is different when dividing by 10 on a Gattegno chart compared to a place value chart?
Choose a digit card from 1 – 9 and place a counter over the top of that number on the Gattegno chart.

Ron is incorrect. Children will see that you move down one row to divide by 10 on a Gattegno chart whereas on a place value chart you move on column to the right.

Complete the number sentences.

\[ 4 \div 10 = 8 \div \square \div 10 \]

\[ 15 \div 3 \div 10 = \square \div 10 \]

\[ 64 \div \square \div 10 = 32 \div 4 \div 10 \]
Divide 2-digits by 10

Notes and Guidance
As in the previous step, it is important for children to recognise the similarities and differences between the understanding of dividing by 10 and the more efficient method of moving digits. Children use a place value chart to see how 2 digit-numbers move when dividing by 10. They use counters to represent the digits before using actual digits within the place value chart.

Mathematical Talk

What number is represented on the place value chart?

Do I need to use 0 as a place holder when dividing a 2-digit number by 10?

What is the same and what is different when dividing by 10 on a Gattegno chart compared to a place value chart?

Varied Fluency

Teddy uses counters to make a 2-digit number.

To divide the number by 10, we move the counters one column to the right.

What is the value of the counters now?

Use this method to solve:

42 ÷ 10 = 
35 ÷ 10 = 
26 ÷ 10 = 

Here is a 2-digit number on a place value chart.

When dividing by 10, we move the digits 1 place to the ______.

Use this method to solve:

55 ÷ 10 = 
90 ÷ 10 = 
3.2 ÷ 10 = 

Year 4 | Spring Term | Week 9 to 12 – Number: Decimals and Percentages

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Jack has used a Gattegno chart to divide a 2-digit number by 10. He has placed counters over the numbers in his answer.

Jack’s original number was 26.
You can move each counter up one to multiply them by 10, which is the inverse to division.

What was Jack’s original number?
How can you use the chart to help you?

Dexter says,
When I divide a 2-digit number by 10, my answer will always have digits in the ones and tenths columns.

Show that Dexter is incorrect.

Children should give an example of when Dexter is incorrect. For example, when you divide 80 by 10, the answer is 8 so there does not need to be anything in the tenths column.
Divide 1 or 2-digits by 100

Notes and Guidance

Children need to understand when dividing by 100 the number is being split into 100 equal parts and is 100 times smaller. Children use counters on a place value chart to see how the digits move when dividing by 100. Children should make links between the understanding of dividing by 100 and this more efficient method. Emphasise the importance of 0 as a place holder.

Mathematical Talk

What number is represented on the place value chart? Why is 0 important when dividing a one or two-digit number by 100? What is the same and what is different when dividing by 100 on a Gattegno chart compared to a place value chart? What happens to the value of each digit when you divide by 10 and 100?

Varied Fluency

Dexter uses counters to make a 1-digit number.

<table>
<thead>
<tr>
<th>Tens</th>
<th>Ones</th>
<th>Tenths</th>
<th>Hundredths</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

To divide the number by 100, we move the counters two columns to the right. What is the value of the counters now?

Use this method to solve:

\[ 4 \div 100 = \square \]
\[ 5 \div 100 = \square \]
\[ \square = 6 \div 100 \]

Here is a two-digit number on a place value chart.

<table>
<thead>
<tr>
<th>Tens</th>
<th>Ones</th>
<th>Tenths</th>
<th>Hundredths</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

When dividing by 100, we move the digits 2 places to the _____.

\[ 72 \div 100 = \square \]

Use this method to solve:

\[ 82 \div 100 = \square \]
\[ \square = 93 \div 100 \]
\[ 0.23 = \square \div 100 \]
Describe the pattern.

7,000 ÷ 100 = 70
700 ÷ 100 = 7
70 ÷ 100 = 0.7
7 ÷ 100 = 0.07

Can you complete the pattern starting with 5,300 divided by 100?

Children will describe the pattern they see e.g. 7,000 is 10 times bigger than 700, therefore the answer has to be 10 times bigger as the divisor has remained the same.

For 5,300:
5,300 ÷ 100 = 53
530 ÷ 100 = 5.3
53 ÷ 100 = 0.53
5.3 ÷ 100 = 0.053

Teddy says,

45 divided by 100 is 0.45 so I know 0.45 is 100 times smaller than 45

Mo says,

45 divided by 100 is 0.45 so I know 45 is 100 times bigger than 0.45

Teddy and Mo are both correct. Children may use a place value chart to help them explain their answer.

Who is correct?
Explain your answer.
Multiply by 10, 100 and 1,000

Notes and Guidance

Children learn how to multiply numbers with decimals by 10, 100 and 1,000. They look at moving the counters in a place value grid to the left in order to multiply by multiples of 10. Children may have previously made the generalisation that when a number is ten times greater they put a zero on the end of the original number. This small step highlights the importance of understanding the effect of multiplying both integers and decimal numbers by multiples of 10.

Mathematical Talk

What is the value of each digit? Where would these digits move to if I multiplied the number by 10?

Why is the zero important in this number? Could we just take it out to make it easier for ourselves? Why/why not?

What do you notice about the numbers you are multiplying in the table?

Varied Fluency

Use the place value grid to multiply 3.24 by 10, 100 and 1,000

<table>
<thead>
<tr>
<th>Thousands</th>
<th>Hundreds</th>
<th>Tens</th>
<th>Ones</th>
<th>Tenths</th>
<th>Hundredths</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

When you multiply by ____, you move the counters ____ places to the left.

Use a place value grid to multiply these decimals by 10, 100 and 1,000

4.24  2.401  42.1

Complete the table below.

<table>
<thead>
<tr>
<th></th>
<th>×10</th>
<th>×100</th>
<th>×1,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.14</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.233</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Mo is correct, as you move the digits 3 places to the left in both cases.

Do you agree with Mo? Explain your answer.

Using the digits 0-9 create a number with up to 3 decimal places, for example, 3.451

Cover the number using counters on your Gattegno chart.

<table>
<thead>
<tr>
<th>10,000</th>
<th>20,000</th>
<th>30,000</th>
<th>40,000</th>
<th>50,000</th>
<th>60,000</th>
<th>70,000</th>
<th>80,000</th>
<th>90,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,000</td>
<td>2,000</td>
<td>3,000</td>
<td>4,000</td>
<td>5,000</td>
<td>6,000</td>
<td>7,000</td>
<td>8,000</td>
<td>9,000</td>
</tr>
<tr>
<td>100</td>
<td>200</td>
<td>300</td>
<td>400</td>
<td>500</td>
<td>600</td>
<td>700</td>
<td>800</td>
<td>900</td>
</tr>
<tr>
<td>10</td>
<td>20</td>
<td>30</td>
<td>40</td>
<td>50</td>
<td>60</td>
<td>70</td>
<td>80</td>
<td>90</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>0.1</td>
<td>0.2</td>
<td>0.3</td>
<td>0.4</td>
<td>0.5</td>
<td>0.6</td>
<td>0.7</td>
<td>0.8</td>
<td>0.9</td>
</tr>
<tr>
<td>0.01</td>
<td>0.02</td>
<td>0.03</td>
<td>0.04</td>
<td>0.05</td>
<td>0.06</td>
<td>0.07</td>
<td>0.08</td>
<td>0.09</td>
</tr>
<tr>
<td>0.001</td>
<td>0.002</td>
<td>0.003</td>
<td>0.004</td>
<td>0.005</td>
<td>0.006</td>
<td>0.007</td>
<td>0.008</td>
<td>0.009</td>
</tr>
</tbody>
</table>

Explore what happens when you multiply your number by 10, then 100, then 1,000. What patterns do you notice?

Children will be able to see how the counter will move up a row for multiplying by 10, two rows for 100 and three rows for 1,000. They can see that this happens to each digit regardless of the value.

For example, 3.451 \times 10 becomes 34.51

Each counter moves up a row but stays in the same column.
Children learn how to divide numbers with decimals by 10, 100 and 1,000.

Children use the place value chart to support the understanding of moving digits to the right.

Following on from the previous step, the importance of the place holder is highlighted.

### Mathematical Talk

What is the value of each digit? Where would these digits move to if I divided the number by 10?

Which direction do I move the digits of the number when dividing by 10, 100 and 1,000?

Use the place value grid to divide 14.4 by 10, 100 and 1,000.

When you divide by ____, you move the counters _____ places to the right.

Fill in the missing numbers in the diagram.

Fill in the missing numbers in these calculations.

34.2 ÷ ____ = 0.342

____ ÷ 10 = 54.1

____ ÷ 10 = 1.93 ÷ 100
Divide by 10, 100 and 1,000

Reasoning and Problem Solving

If you multiply a number by 1,000, you can just divide the answer by 1,000 to get back to your original number.

Whitney

That’s not true, you would need to divide the answer by ten three times.

Eva

Who do you agree with? Explain your thinking.

Both girls are correct, as dividing by 1,000 is the same as dividing by 10 three times.

Here are three rectangles.

The lengths of rectangle B are 10 times larger than rectangle A.
The lengths of rectangle C are 100 times smaller than rectangle B.

Mo is incorrect.

He has multiplied 10 and 100 to get 1,000 times greater.
The perimeter of rectangle A is only 10 times greater than rectangle C.
Children may calculate the perimeters of each rectangle or may just notice the relationship between each.

The perimeter of rectangle A is 1,000 times greater than the perimeter of rectangle C.

Do you agree with Mo? Explain your thinking.

Whitney

If you multiply a number by 1,000, you can just divide the answer by 1,000 to get back to your original number.

That’s not true, you would need to divide the answer by ten three times.

Eva

Who do you agree with? Explain your thinking.

Mo is incorrect.

He has multiplied 10 and 100 to get 1,000 times greater.
The perimeter of rectangle A is only 10 times greater than rectangle C.
Children may calculate the perimeters of each rectangle or may just notice the relationship between each.

The perimeter of rectangle A is 1,000 times greater than the perimeter of rectangle C.

Do you agree with Mo? Explain your thinking.
Block 3 – Decimals and Percentages

Theme 6 - Adding & Subtracting Decimals
Make a Whole

Notes and Guidance

Children make a whole from any number of tenths and hundredths. They use their number bonds to ten and one hundred to support their calculations. Children use pictorial and concrete representations to support their understanding.

Mathematical Talk

How many tenths make one whole?

How many hundredths make one tenth?

How many hundredths make one whole?

If I have ___ hundredths, how many more do I need to make one whole?

Varied Fluency

Here is a hundred square.
How many hundredths are shaded?
How many more hundredths do you need to shade so the whole hundred square is shaded?
___ hundredths + ___ hundredths = 1 whole

Here is a rekenrek with 100 beads.
Each bead is one hundredth of the whole.
___ hundredths are on the left.
___ hundredths are on the right.
0.___ + 0.___ = 1

Complete the part-whole models.
Which part-whole model does not match the hundred square?

0.03 + 0.07 does not equal one whole so this one does not match.

Three bead strings are 0.84 m long altogether.

Would four bead strings be longer or shorter than a metre?

Explain how you know.

Longer because each bead string is 28 cm (0.28 m) long, and 0.84 + 0.28 = 1.12 which is greater than 1 metre.
Adding Decimals within 1

Notes and Guidance

Children add decimals within one whole. They use place value counters and place value charts to support adding decimals and understand what happens when we exchange between columns.

Children build on their understanding that 0.45 is 45 hundredths, children can use a hundred square to add decimals.

Mathematical Talk

What is the number represented on the place value chart?
What digit changes when I add a hundredth?

How many hundredths can I add before the tenths place changes? Explain why.

How can the children shade in the hundred square to support their calculations?
Why does using column addition support adding decimals?
What is the same and what is different?

Varied Fluency

Use this place value chart to help answer the questions.

<table>
<thead>
<tr>
<th>Ones</th>
<th>Tenths</th>
<th>Hundredths</th>
<th>Thousandths</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.1</td>
<td>0.1</td>
<td></td>
</tr>
<tr>
<td>0.1</td>
<td>0.1</td>
<td>0.01</td>
<td>0.001</td>
</tr>
</tbody>
</table>

- What number is one hundredth more?
- Add 0.3, what number do you have now?
- How many more thousandths can I add before the hundredths digit changes?

Each box in this hundred square represents one hundredth of the whole. Use this to answer:

\[0.07 + 0.78\]  \[0.87 + 0.07\]

Use the column method to complete the additions.

\[0.45 + 0.5\]  \[0.45 + 0.05\]  \[0.45 + 0.005\]
### Adding Decimals within 1

#### Reasoning and Problem Solving

**What mistake has Dora made?**

Dora has put the 3 tenths in the thousandths place. The correct answer is 0.71.

Use at least 2 representations to show why she is incorrect.

**Compare the numbers sentences using <, > or =**

<table>
<thead>
<tr>
<th>Expression 1</th>
<th>Expression 2</th>
<th>Comparison</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.7 + 0.03 + 0.001</td>
<td>0.07 + 0.3 + 0.1</td>
<td>&gt;</td>
</tr>
<tr>
<td>0.4 + 0.1 + 0.05</td>
<td>0.3 + 0.2 + 0.05</td>
<td>=</td>
</tr>
</tbody>
</table>

**Rosie has some digit cards.**

She uses each card once to make a number sentence.

Largest: 0.951
Smallest: 0.159

**What is the largest number she can make? What is the smallest?**

Largest: 0.951
Smallest: 0.159
Children subtract decimals using a variety of different methods. They look at subtracting using place value counters on a place value grid. Children also explore subtraction as difference by using a number line to count on from the smaller decimal to the larger decimal.

Children use their knowledge of exchange within whole numbers to subtract decimals efficiently.

**Notes and Guidance**

**Mathematical Talk**

What is the number represented on the place value chart?

What is one tenth less than one?

What is one hundredth less than one?

Show me how you know.

If I’m taking away tenths, which digit will be affected? Is this always the case?

How many hundredths can I take away before the tenths place is affected?

**Varied Fluency**

Here is a number.

<table>
<thead>
<tr>
<th>Ones</th>
<th>Tenths</th>
<th>Hundredths</th>
<th>Thousandths</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.1</td>
<td>0.01</td>
<td>0.001</td>
</tr>
<tr>
<td></td>
<td>0.1</td>
<td>0.01</td>
<td>0.001</td>
</tr>
</tbody>
</table>

• What is three tenths less than the number?
• Take away 0.02, what is your number now?
• Subtract 5 thousandths. What is the final number?

Find the difference between the two numbers using the number line.

\[
0.424 - 0.618
\]

Calculate.

\[
egin{align*}
0.584 - 0.154 &= 0.430 \\
0.684 - 0.254 &= 0.430 \\
0.685 - 0.255 &= 0.430
\end{align*}
\]

\[
egin{align*}
0.44 - 0.1 &= 0.34 \\
0.44 - 0.09 &= 0.35 \\
0.44 - 0.11 &= 0.33
\end{align*}
\]
Here are four calculations. Which one is the easiest to answer? Which one is the trickiest to answer? Explain your choice of order.

\[
\begin{align*}
0.45 - 0.3 &= \quad \text{(no exchange)} \\
0.45 - 0.15 &= \quad 0.3 \\
0.45 - 0.23 &= \quad 0.22 \\
0.45 - 0.18 &= \quad 0.27 \\
\end{align*}
\]

Possible order:

- 0.45 - 0.23 = 0.22 (no exchange)
- 0.45 - 0.15 = 0.3 (no exchange with 0)
- 0.45 - 0.3 = 0.15 (no exchange, different dp)
- 0.45 - 0.18 = 0.27 (exchange)

Children justify the order they have given.

The strip of paper is 0.8 m long. It is cut into two unequal parts. The difference in lengths between the two strips of paper is 0.1 m.

Strip 1: 0.45 m
Strip 2: 0.35 m

How long are the two strips of paper?
Complements to 1

Notes and Guidance

Children find the complements which sum to make 1

It is important for children to see the links with number bonds to 10, 100 and 1000

This will support them when finding complements to 1, up to three decimal places.

Children can use a hundred square, part-whole models and number lines to support finding complements to one.

Mathematical Talk

What number bonds can you use to help you?

How can shading the hundred square help you find the complement to 1?

How many different ways can you make 1? How many ways do you think there are?

If I add _____, which place will change? How many can I add to change the tenths/hundredths place?

Varied Fluency

Using a blank hundred square, where each square represents one hundredth, find the complements to 1 for these numbers.

- \(0.55 + \square = 1\)
- \(1 = 0.32 + \square\)
- \(0.11 + 0.5 + \square = 1\)

Complete the part-whole models.

- \(1\)
- \(0.4\)
- \(0.44\)
- \(0.444\)

Use the number line to find the complements to 1

- \(0.324\)
- \(0.459\)
Tommy has forgotten that when you have ten in a place value column you need to use your rules of exchanging.

e.g.
10 tenths = 1 one
10 hundredths = 1 tenth
10 thousandths = 1 hundredth

The correct answer is 0.667

Do you agree with Tommy? Can you explain what his mistake was?

How many different ways can you find a path through the maze, adding each number at a time, to make a total of one?

Once you have found a way, can you design your own smaller maze for others to solve?