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.
## WRM – Year 5/6 – Scheme of Learning 2.0s

<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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<tr>
<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>
<tr>
<td>Y5: Number: Fractions</td>
<td>Y5: Number: Decimals</td>
<td>Measurement: Converting Units</td>
<td>Measurement: Perimeter, Area and Volume</td>
<td>Statistics</td>
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<td>Y6: Number: Ratio</td>
<td>Number: Decimals</td>
<td>Y6: Number: Algebra</td>
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<td>Y6: Number: Percentages</td>
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<td>Y6: SATS</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Investigations</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.
Both year groups start by looking at decimals with up to 3 decimal places. Teachers may decide to recap rounding, ordering and comparing with both year groups before moving on to multiplying and dividing. Whilst Year 6 deepen their understanding of decimals and percentages, ensure Year 5 have plenty of opportunity to link their learning back to fractions.
Block 2 - Decimals and Percentages

Theme 1 - Decimals up to 3 d.p.
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?
Dexter says there is only one way to partition 0.62

0.62

0.6
0.02

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.
Teddy

My number has one decimal place.
Amir

My number has two hundredths.
Rosie

My number has six tenths.
Eva

46.2  2.64  46.02  40.46
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.

Mathematical Talk

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?

What fraction is shown in both representations?

Can you convert this in to a decimal?

The fraction \( \frac{1}{100} \) is the same as the decimal \( \square \).

If the whole bead string represents one whole, what decimal is represented by the highlighted part? Can you represent this on a 100 square?
Odd one out

Which of the images below is the odd one out?

A

\[ \frac{1}{2} \]

\[ \frac{1}{3} \]

B

\[ \frac{2}{5} \]

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

C

\[ \frac{1}{10} \]

\[ \frac{1}{10} \]

D

Explain why.

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

Possible answers:

\[ \frac{50}{100} \]

\[ \frac{1}{2} \]

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></td>
<td>3 \frac{1}{10}</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3 + \frac{4}{10} + \frac{2}{100}</td>
<td></td>
<td>Two ones, three tenths and two hundredths.</td>
</tr>
</tbody>
</table>
2.25 = 2 ones, 2 tenths and 5 hundredths.

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

23.7 2.37 9.08 0.98

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 answers could include \( \frac{1}{100} \) is not equal to 0.1

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.

List all the possible numbers you can make.

Write these decimals as mixed numbers.

Choose three of the numbers and write them in words.

30\( \frac{45}{100} \), 30\( \frac{54}{100} \), 40\( \frac{35}{100} \), 40\( \frac{53}{100} \), 50\( \frac{43}{100} \), 50\( \frac{34}{100} \)
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.

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?
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 \( \frac{1}{10} \).

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

Write down the numbers as a decimal.

a) 

\[
\begin{array}{c|c|c|c|c}
\text{ones} & \frac{1}{10} & \frac{1}{100} & \frac{1}{1000} \\
1 & 1 & 1 & 1
\end{array}
\]

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>1/10</th>
<th>1/100</th>
<th>1/1000</th>
</tr>
</thead>
</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: $0.504 = \frac{5}{10} + \frac{4}{1000}$

Who is correct?

Possible answer: They are all correct. Annie has recorded it as a fraction. Alex and Teddy have partitioned it differently.
Children recap their understanding of numbers with up to 3 decimal places. They look at the value of each place value column and describe its value in words and digits.

Children use concrete resources to investigate exchanging between columns e.g. 3 tenths is the same as 30 hundredths.

How many tenths are there in the number? How many hundredths? How many thousandths?

Can you make the number on the place value chart?

How many hundredths are the same as 5 tenths?

What is the value of the zero in this number?

Complete the sentences.

There are ____ ones, ____ tenths, ____ hundredths and ____ thousandths.

The number in digits is _______________

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

Write down the value of the 3 in the following numbers.

0.53  362.44  739.8  0.013  3,420.98
Three Decimal Places

Reasoning and Problem Solving

Tommy says, 

The more decimal places a number has, the smaller the number is.

Do you agree? Explain why.

Alex says that 3.24 can be written as 2 ones, 13 tenths and 4 hundredths.

Do you agree?

How can you partition 3.24 starting with 2 ones?
How can you partition 3.24 starting with 1 one?
Think about exchanging between columns.

Possible answer:

I do not agree with this as the number 4.39 is smaller than the number 4.465, which has more decimal places.

Possible answer:

I disagree; Alex’s numbers would total 3.34. I could make 3.24 by having 2 ones, 12 tenths and 4 hundredths or 1 one, 22 tenths and 4 hundredths.

Four children are thinking of four different numbers.

Teddy: “My number has four hundredths.”

Alex: “My number has the same amount of ones, tenths and hundredths.”

Dora: “My number has less ones that tenths and hundredths.”

Jack: “My number has 2 decimal places.”

Match each number to the correct child.

Teddy: 4.345
Alex: 4.445
Dora: 3.454
Jack: 3.54
Decimals as Fractions

Notes and Guidance

Children explore the relationship between decimals and fractions. They start with a decimal and use their place value knowledge to help them convert it into a fraction. Children will use their previous knowledge of exchanging between columns, for example, 3 tenths is the same as 30 hundredths.

Once children convert from a decimal to a fraction, they simplify the fraction to help to show patterns.

Mathematical Talk

How would you record your answer as a decimal and a fraction? Can you simplify your answer?

How would you convert the tenths to hundredths?

What do you notice about the numbers that can be simplified in the table?

Can you have a unit fraction that is larger than 0.5? Why?

Varied Fluency

What decimal is shaded?
Can you write this as a fraction?

0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1

Complete the table.

<table>
<thead>
<tr>
<th>Decimal</th>
<th>Fraction in tenths or hundredths</th>
<th>Simplified fraction</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.6</td>
<td>6/10</td>
<td>3/5</td>
</tr>
<tr>
<td>0.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Three friends share a pizza. Sam ate 0.25 of the pizza, Mark ate 0.3 of the pizza and Jill ate 0.35 of the pizza.

• Can you write the amount each child ate as a fraction?
• What fraction of the pizza is left?
Which is the odd one out and why?

Possible response:
D is the odd one out because it shows 0.3
Explore how the rest represent 0.6

Alex says,

0.84 is equivalent to \( \frac{84}{10} \)

Do you agree?
Explain why.

Possible response:
Alex is wrong because 0.84 is 8 tenths and 4 hundredths and \( \frac{84}{10} \) is 84 tenths.
Block 2 - Decimals and Percentages

Theme 2 - Round, Order & Compare
Rounding Decimals

Notes and Guidance

Children develop their understanding of rounding to the nearest whole number and to the nearest tenth.

Number lines support children to understand where numbers appear in relation to other numbers and are important in developing conceptual understanding of rounding.

Mathematical Talk

What number do the ones and tenths counters represent?
How many decimal places does it have?
When rounding to the nearest one decimal place, how many digits will there be after the decimal point?
Where would 3.25 appear on both number lines?
What is the same and what is different about the two number lines?

Varied Fluency

Complete the number lines and round the representations to the nearest whole number:

Use the number lines to round 3.24 to the nearest tenth and the nearest whole number.

Round each number to the nearest tenth and nearest whole number. Use number lines to help you.
Round Decimals

Reasoning and Problem Solving

Dexter is measuring a box of chocolates with a ruler that measures in centimetres and millimetres. He measures it to the nearest cm and writes the answer 28 cm. What is the smallest length the box of chocolates could be?

Smallest: 27.5 cm

A number between 11 and 20 with 2 decimal places rounds to the same number when rounded to one decimal place and when rounded to the nearest whole number?

What could this be?
Is there more than one option?
Explain why.

Whitney is thinking of a number.

Rounded to the nearest whole her number is 4
Rounded to the nearest tenth her number is 3.8
Write down at least 4 different numbers that she could be thinking of.

Possible answers:
3.84
3.83
3.82 etc.

Some children might include answers such as 3.845

The whole number can range from 11 to 19 and the decimal places can range from ___ .95 to ___ .99

Can children explain why this works?
Children order and compare numbers with up to three decimal places.

They use place value counters to represent the numbers they are comparing.

Number lines support children to understand where numbers appear in relation to other numbers.

**Mathematical Talk**

What number is represented by the place value counters?

______ is greater/less than ______ because...

Explain how you know.

Can you build the numbers using place value counters? How can you use these concrete representations to compare sizes?

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**Varied Fluency**

- Use <, > or = to make the statements correct.

- Place the numbers in ascending order on the number line.

- Place in descending order.

- Check your answers using place value chart.

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Order & Compare Decimals

Reasoning and Problem Solving

Alex says,

3.105 is greater than 3.2 because 105 is greater than 2

Do you agree?
Explain your answer.

Alex is wrong because 2 tenths is larger than 105 thousandths.

Tommy says,

I have put some numbers into ascending order:

3.015
\[3.\overset{\frac{51}{1000}}{\overline{1000}}\]
3.105
\[3.\overset{\frac{51}{100}}{\overline{100}}\]

Tommy has missed one number out.
It should go in the middle of this list.
What could his number be?
What can't his number be?

Could be:
3.052
3.053
3.054
3.104 etc.

It can't be a number below 3.051 or above 3.105
Block 2 - Decimals and Percentages

Theme 3 - Multiply & Divide by Powers of 10
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?

<table>
<thead>
<tr>
<th>x10</th>
<th>x100</th>
<th>x1,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.14</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.233</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Do you agree with Mo? Explain your answer.

Mo is correct, as you move the digits 3 places to the left in both cases.

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>
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<td>10</td>
<td>20</td>
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<td>50</td>
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<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 × 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?

**Varied Fluency**

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

<table>
<thead>
<tr>
<th>T</th>
<th>O</th>
<th>Tth</th>
<th>Hth</th>
<th>Thth</th>
<th>TTth</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>7</td>
<td>7</td>
<td>7</td>
<td></td>
</tr>
</tbody>
</table>

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

Fill in the missing numbers in the diagram.

24.3 \( \div 10 \) \( \div 10 \) \( \div 10 \)

Fill in the missing numbers in these calculations.

34.2 \( \div \) = 0.342 \( \div 10 = 54.1 \)

\( \boxed{} \) \( \div 10 = 1.93 \div 100 \)
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.

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

Here are three rectangles.

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.

If you multiply a number by 1,000, you can just divide the answer by 10 three times.

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

Here are three rectangles.

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.

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.

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.

Who do you agree with? Explain your thinking.
Children multiply numbers with up to three decimal places by 10, 100 and 1,000. They discover that digits move to the left when they are multiplying and use zero as a place value holder. The decimal point does not move. Once children are confident in multiplying by 10, 100 and 1,000, they use these skills to investigate multiplying by multiples of these numbers e.g. $2.4 \times 20$.

What number is represented on the place value chart?

Why is 0 important when multiplying by 10, 100 and 1,000?

What patterns do you notice?

What is the same and what is different when multiplying by 10, 100, 1,000 on the place value chart compared with the Gattegno chart?
Using the digit cards 0-9 create a number with up to 3 decimal places e.g. 3.451
Cover the number using counters on your Gattegno chart.

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 \text{ becomes } 34.51
Each counter moves up a row but stays in the same column.

Dora says,

When you multiply by 100, you should add two zeros.

Do you agree?
Explain your thinking.

Children should explain that when you multiply by 100 the digits move two places to the left.

For example:
0.34 \times 100 = 0.3400 is incorrect as 0.34 is the same as 0.3400
Also:
0.34 + 0 + 0 = 0.34
Children show \(0.34 \times 100 = 34\)
Divide by 10, 100 and 1,000

Notes and Guidance

Once children understand how to multiply decimals by 10, 100 and 1,000, they can apply this knowledge to division, which leads to converting between units of measure.

It is important that children continue to understand the importance of 0 as a place holder. Children also need to be aware that 2.4 and 2.40 are the same. Similarly, 12 and 12.0 are equivalent.

Mathematical Talk

What happens to the counters/digits when you divide by 10, 100 or 1,000?

Why is zero important when dividing by 10, 100 and 1,000?

What is happening to the value of the digit each time it moves one column to the right?

What are the relationships between tenths, hundredths and thousandths?

Varied Fluency

Use the place value chart to divide the following numbers by 10, 100 and 1,000

<table>
<thead>
<tr>
<th>Hundreds</th>
<th>Tens</th>
<th>Ones</th>
<th>Tenths</th>
<th>Hundredths</th>
<th>Thousandths</th>
</tr>
</thead>
<tbody>
<tr>
<td>44</td>
<td>1.36</td>
<td>107</td>
<td>5</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

Tick the correct answers. Can you explain the mistakes with the incorrect answers?

Complete the table:

<table>
<thead>
<tr>
<th></th>
<th>÷10</th>
<th>÷100</th>
<th>÷1,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 kg</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.9</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9.09</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Using the following rules, how many ways can you make 70?

- Use a number from column A
- Use an operation from column B.
- Use number from column C.

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.7</td>
<td>×</td>
<td>0.1</td>
</tr>
<tr>
<td>7</td>
<td>÷</td>
<td>1</td>
</tr>
<tr>
<td>70</td>
<td></td>
<td>10</td>
</tr>
<tr>
<td>700</td>
<td></td>
<td>100</td>
</tr>
<tr>
<td>7,000</td>
<td>×</td>
<td>1,000</td>
</tr>
</tbody>
</table>

Possible answers:
- $0.7 \times 100$
- $7 \times 10$
- $70 \times 1$
- $700 \div 10$
- $7,000 \div 100$
- $70 \div 1$

Eva says,

When you divide by 10, 100 or 1,000 you just take away the zeros or move the decimal point.

Eva is wrong, the decimal point never moves. When dividing, the digits move right along the place value columns.

Possible examples to prove Eva wrong:
- $24 \div 10 = 2.4$
- $107 \div 10 = 17$

This shows that you cannot just remove a zero from the number.

Can you find a path from 6 to 0.06?
You cannot make diagonal moves.

<table>
<thead>
<tr>
<th>6</th>
<th>× 10</th>
<th>× 10</th>
<th>÷ 100</th>
</tr>
</thead>
<tbody>
<tr>
<td>÷ 10</td>
<td>× 100</td>
<td>× 100</td>
<td>÷ 10</td>
</tr>
<tr>
<td>× 10</td>
<td>÷ 10</td>
<td>÷ 1,000</td>
<td>÷ 100</td>
</tr>
<tr>
<td>÷ 1,000</td>
<td>× 1,000</td>
<td>× 100</td>
<td>0.06</td>
</tr>
</tbody>
</table>

Is there more than one way?

Do you agree? Explain why.
Block 2 - Decimals and Percentages

Theme 4 - Multiply & Divide
Multiply Decimals by Integers

Notes and Guidance

Children use concrete resources to multiply decimals and explore what happens when you exchange with decimals.

Children use their skills in context and make links to money and measures.

Mathematical Talk

Which is bigger, 0.1, 0.01 or 0.001? Why?

How many 0.1s do you need to exchange for a whole one?

Can you draw a bar model to represent the problem?

Can you think of another way to multiply by 5? (e.g. multiply by 10 and divide by 2).

Varied Fluency

Use the place value counters to multiply 1.212 by 3

Complete the calculation alongside the concrete representation.

<table>
<thead>
<tr>
<th>Tens</th>
<th>Ones</th>
<th>Tenths</th>
<th>Hundredths</th>
<th>Thousandths</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td>0.1</td>
<td>0.01</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
<td>0.1</td>
<td>0.01</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
<td>0.1</td>
<td>0.01</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

A jar of sweets weighs 1.213 kg. How much would 4 jars weigh?

Rosie is saving her pocket money. Her mum says, “Whatever you save, I will give you five times the amount.”

If Rosie saves £2.23, how much will her mum give her?
If Rosie saves £7.76, how much will her mum give her? How much will she have altogether?
Whitney says, When you multiply a number with 2 decimal places by an integer, the answer will always have more than 2 decimal places.

Do you agree? Explain why.

Possible answer: I do not agree because there are examples such as $2.23 \times 2$ that gives an answer with only two decimal places.

Chocolate eggs can be bought in packs of 1, 6 or 8.

What is the cheapest way for Dexter to buy 25 chocolate eggs?

- £11.92
- He should buy four packs of 6 plus an individual egg.

Fill in the blanks

<table>
<thead>
<tr>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>×</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>×</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>1</td>
<td>8</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>0</td>
<td>7</td>
</tr>
</tbody>
</table>

1 chocolate egg 52p

6 chocolate eggs £2.85

8 chocolate eggs £4
Divide Decimals by Integers

Notes and Guidance

Children continue to use concrete resources to divide decimals and explore what happens when exchanges take place.

Children build on their prior knowledge of sharing and grouping when dividing and apply this skill in context.

Mathematical Talk

Are we grouping or sharing?

How else could we partition the number 3.69? (For example, 2 ones, 16 tenths and 9 hundredths.)

How could we check that our answer is correct?

Varied Fluency

Divide 3.69 by 3

Use the diagrams to show the difference between grouping and by sharing?

Use these methods to complete the sentences.

3 ones divided by 3 is __________ ones.
6 tenths divided by 3 is __________ tenths.
9 hundredths divided by 3 is _________ hundredths.
Therefore, 3.69 divided by 3 is ______________

Decide whether you will use grouping or sharing and use the place value chart and counters to solve:

7.55 ÷ 5   8.16 ÷ 3   3.3 ÷ 6

Amir solves 6.39 ÷ 3 using a part whole method.

Use this method to solve

8.48 ÷ 2   6.9 ÷ 3   6.12 ÷ 3
When using the counters to answer 3.27 divided by 3, this is what Tommy did:

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

![Counters diagram]

Tommy says,

I only had 2 counters in the tenths column, so I moved one of the hundredths so each column could be grouped in 3s.

Possible answer:

Tommy is incorrect because he cannot move a hundredth to the tenths. He should have exchanged the 2 tenths for hundredths to get an answer of 1.09.

Do you agree with what Tommy has done? Explain why.

---

Children may try A as 8 and C as 2 but will realise that this cannot complete the whole division.

Therefore A is 4, B is 3 and C is 1.

Use the clues to complete the division.

\[
C \text{ is } \frac{1}{4} \text{ of } A
\]

\[
B = C + 2
\]
Mrs Forbes has saved £4,960. She shares the money between her 15 grandchildren. How much do they each receive?

Modelling clay is sold in two different shops. Shop A sells four pots of clay for £7.68. Shop B sells three pots of clay for £5.79. Which shop has the better deal? Explain your answer.

A box of chocolates costs 4 times as much as a chocolate bar. Together they cost £7.55.

How can we represent this problem using a bar model?
How will we calculate what this item costs?
How will we use division to solve this?
How will we label our bar model to represent this?
Each division sentence can be completed using the digits below.

1. $\square \cdot 3 \div \square = 0.26$
2. $12 \cdot \square \div \square = 4.2$
3. $4 \cdot \square 8 \div \square = 1.07$

1.3 ÷ 5 = 0.26
12.6 ÷ 3 = 4.2
4.28 ÷ 4 = 1.07

Jack and Rosie are both calculating the answer to $147 \div 4$

Jack says,

Rosie says,

Who do you agree with?

The answer is 36 remainder 3

The answer is 36.75

They are both correct.

Rosie has divided her remainder of 3 by 4 to get 0.75 whereas Jack has recorded his as a remainder.
Block 2 - Decimals and Percentages

Theme 5 - Fractions to Decimals
Fractions to Decimals (1)

Notes and Guidance

At this point children should know common fractions, such as thirds, quarters, fifths and eighths, as decimals.

Children explore how finding an equivalent fraction where the denominator is 10, 100 or 1,000 makes it easier to convert from a fraction to a decimal.

They investigate efficient methods to convert fractions to decimals.

Mathematical Talk

How many hundredths are equivalent to one tenth?

How could you convert a fraction to a decimal?

Which is the most efficient method? Why?

Which equivalent fraction would be useful?

Varied Fluency

Match the fractions to the equivalent decimals.

\[
\begin{align*}
\frac{2}{5} & \quad 0.04 \\
\frac{1}{25} & \quad 0.4 \\
\frac{1}{4} & \quad 0.25 \\
\end{align*}
\]

Use your knowledge of known fractions to convert the fractions to decimals. Show your method for each one.

\[
\begin{align*}
\frac{7}{20} & \quad \frac{3}{4} & \quad \frac{2}{5} & \quad \frac{6}{200} \\
\end{align*}
\]

Mo says that \(\frac{63}{100}\) is less than 0.65

Do you agree with Mo? Explain your answer.
Amir says,

The decimal 0.42 can be read as ‘four tenths and two hundredths’.

Teddy says,

The decimal 0.42 can be read as ‘forty-two hundredths’.

Who do you agree with? Explain your answer.

**True or False?**

0.3 is bigger than \( \frac{1}{4} \)

Explain your reasoning.

**Dora and Whitney are converting \( \frac{30}{500} \) into a decimal.**

- Dora doubles the numerator and denominator, then divides by 10
- Whitney divides both the numerator and the denominator by 5
- Both get the answer \( \frac{6}{100} = 0.06 \)

Which method would you use to work out each of the following?

Possible response:

- \( \frac{25}{500} \) - divide by 5, known division fact.
- \( \frac{125}{500} \) - double, easier than dividing 125 by 5
- \( \frac{40}{500} \) - divide by 5, known division fact.
- \( \frac{350}{500} \) - double, easier than dividing 350 by 5

The decimal 0.42 can be read as ‘forty-two hundredths’.

The decimal 0.42 can be read as ‘four tenths and two hundredths’.

True because \( \frac{1}{4} \) is 25 hundredths and 0.3 is 30 hundredths. Therefore, 0.3 is bigger.

Explain why you have used a certain method.
Fractions to Decimals (2)

Notes and Guidance

It is important that children recognise that \( \frac{3}{4} \) is the same as 3 ÷ 4. They can use this understanding to find fractions as decimals by then dividing the numerator by the denominator.

In the example provided, we cannot make any equal groups of 5 in the ones column so we have exchanged the 2 ones for 20 tenths. Then we can divide 20 into groups of 5.

Mathematical Talk

Do we divide the numerator by the denominator or divide the denominator by the numerator? Explain why.

When do we need to exchange?

Are we grouping or are we sharing? Explain why.

Why is it useful to write 2 as 2.0 when dividing by 5?

Why is it not useful to write 5 as 5.0 when dividing by 8?

Varied Fluency

Deena has used place value counters to write \( \frac{2}{5} \) as a decimal. She has divided the numerator by the denominator.

Use this method to convert the fractions to decimals. Give your answers to 2 decimal places.

Use the short division method to convert the fractions to decimals. Write the decimals to three decimal places.

8 friends share 7 pizzas. How much pizza does each person get? Give your answer as a decimal and as a fraction.
Rosie and Tommy have both attempted to convert \(\frac{2}{8}\) into a decimal.

Rosie is correct and Tommy is incorrect.

Tommy has divided 8 by 2 rather than 2 divided by 8 to find the answer.

Mo shares 6 bananas between some friends.

Each friend gets 0.75 of a banana.

How many friends does he share the bananas with?
Show your method.

Mo shares his 6 bananas between 8 friends because 6 divided by 8 equals 0.75

Children may show different methods:

Method 1: Children add 0.75 until they reach 6. This may involve spotting that 4 lots of 0.75 equals 3 and then they double this to find 8 lots of 0.75 equals 6

Method 2: Children use their knowledge that 0.75 is equivalent to \(\frac{3}{4}\) to find the equivalent fraction of \(\frac{6}{8}\)
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.

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.

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?

Dora needs 44
Annie needs 35
Tommy needs 50

Neither. They both have an equal number of sweets remaining.
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?

### Complete the table.

<table>
<thead>
<tr>
<th>Pictorial</th>
<th>Percentage</th>
<th>Fraction</th>
<th>Decimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>41 parts per hundred</td>
<td>41%</td>
<td>41 out of 100</td>
<td>41 hundredths</td>
</tr>
<tr>
<td>7 parts per hundred</td>
<td>7%</td>
<td></td>
<td>0.07</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.

\[
\frac{93}{300} = \frac{?}{100} = \_\% = \_
\]

Record the fractions as decimals and percentages.

\[
\frac{120}{300} \quad \frac{320}{400} \quad \frac{20}{200} \quad \frac{12}{50}
\]
### Teddy says,

Teddy says, 

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

To convert a fraction to a percentage, you just need to put a percent sign next to the numerator.

Is Teddy correct? Explain your answer.

### At a cinema,

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.

What percentage of the audience are girls?

60% are children, so 40% are girls and 20% boys.

Children may use a bar model to represent this problem.

### Three children have each read 360 pages of their own book.

Three children have each read 360 pages of their own book.

- Ron's book has 500 pages.
- Dora's book has 400 pages.
- Eva's book has 600 pages.

What fraction of their books have they each read?

- Ron has read \( \frac{360}{500} \), 72% or 0.72
- Dora has read \( \frac{360}{400} \), 90% or 0.9
- Eva has read \( \frac{360}{600} \), 60% or 0.6

What percentage of their books have they read?

What percentage of their books have they each read as a decimal?

- Ron has read 0.72
- Dora has read 0.9
- Eva has read 0.6

Who has read the most of their book?

Dora has read the most of her book.

### Reasoning and Problem Solving

- Children may use a bar model to represent this problem.
- 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.

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

How many hundredths is each bead worth? How does this help you convert the decimals to fractions and percentages?

How many hundredths is the same as 0.1?

What fractions does the bar model show? How does this help to convert them to percentages?

Which is closer to 100%, $\frac{4}{5}$ or 50%? How do you know?
Equivalent F.D.P.

Reasoning and Problem Solving

Sort the fractions, decimals and percentages into the correct column.

Less than $\frac{1}{2}$:
$\frac{1}{4}$, 0.25, 7%

Equal to $\frac{1}{2}$:
50% and $\frac{30}{60}$

Greater than $\frac{1}{2}$:
Seven tenths, 70 hundredths, 60% and 100%

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

£5.50

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.
Fractions to Percentages

Notes and Guidance

It is important that children understand that ‘percent’ means ‘out of 100’.
Children will be familiar with converting some common fractions from their work in Year 5.
They learn to convert fractions to equivalent fractions where the denominator is 100 in order to find the percentage equivalent.

Mathematical Talk

What does the word ‘percent’ mean?

How can you convert tenths to hundredths?

Why is it easy to convert fiftieths to hundredths?

What other fractions are easy to convert to percentages?

Varied Fluency

What fraction of each hundred square is shaded?
Write the fractions as percentages.

Complete the table.

<table>
<thead>
<tr>
<th>Fraction</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/2</td>
<td></td>
</tr>
<tr>
<td>1/4</td>
<td></td>
</tr>
<tr>
<td>1/10</td>
<td></td>
</tr>
<tr>
<td>1/5</td>
<td></td>
</tr>
</tbody>
</table>

Fill in the missing numbers.

\[
\frac{12}{100} = \_\_\_\% \quad \frac{\_\_\_}{100} = 35\%
\]

\[
\frac{12}{50} = \_\_\% \quad \frac{44}{\_\_\_} = \frac{22}{100} = 22\%
\]
In a Maths test, Tommy answered 62% of the questions correctly.

Rosie answered \(\frac{3}{5}\) of the questions correctly.

Who answered more questions correctly?

Explain your answer.

Tommy answered more questions correctly because \(\frac{3}{5}\) as a percentage is 60% and this is less than 62%.

Amir thinks that 18% of the grid has been shaded.

Dora thinks that 36% of the grid has been shaded.

Who do you agree with?

Explain your reasoning.

Dora is correct because \(\frac{18}{50} = \frac{36}{100}\)
Children use their knowledge of common equivalent fractions and decimals to find the equivalent percentage.

A common misconception is that 0.1 is equivalent to 1%. Diagrams may be useful to support understanding the difference between tenths and hundredths and their equivalent percentages.

**Mathematical Talk**

How does converting a decimal to a fraction help us to convert it to a percentage?

How do you convert a percentage to a decimal?

Can you use a hundred square to represent your conversions?

<table>
<thead>
<tr>
<th>Decimal</th>
<th>Fraction</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.35</td>
<td>$\frac{35}{100}$</td>
<td>35%</td>
</tr>
<tr>
<td>0.27</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.06</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Use $<$, $>$ or $=$ to complete the statements.

- $0.36 \square 40\%$
- $\frac{7}{10} \square 0.07$
- $0.4 \square 25\%$
- $0.4 \square \frac{1}{4}$

Which of these are equivalent to 60%?

- $\frac{60}{100}$
- $\frac{6}{100}$
- 0.06
- $\frac{3}{5}$
- $\frac{3}{50}$
- 0.6
### Equivalent FDP

#### Reasoning and Problem Solving

| Amir says 0.3 is less than 12% because 3 is less than 12 | Amir is wrong because 0.3 is equivalent to 30% | How many different fractions can you make using the digit cards? | Possible answers:
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Amir is wrong because 0.3 is equivalent to 30%</td>
<td>How many of the fractions can you convert into decimals and percentages?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **Possible answers:**
  - Children make a range of fractions.
  - They should be able to convert $\frac{1}{2}, \frac{1}{4}, \frac{3}{4}, \frac{1}{5}, \frac{2}{5}$, and $\frac{4}{5}$ into decimals and percentages.

---

Complete the part-whole model. How many different ways can you complete it?

- **A** = 0.3, 30% or $\frac{3}{10}$
- **B** = 0.2, 20%, $\frac{2}{10}$ or $\frac{1}{5}$
- **C** = 0.1, 10% or $\frac{1}{10}$

Can you create your own version with different values?

---

### Year 6 | Spring Term | Week 3 to 5 – Number: Decimals & Percentages

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Order FDP

Notes and Guidance

Children convert between fractions, decimals and percentages to enable them to order and compare them.

Encourage them to convert each number to the same form so that they can be more easily ordered and compared. Once the children have compared the numbers, they will need to put them back into the original form to answer the question.

Mathematical Talk

What do you notice about the fractions, decimals or percentages? Can you compare any straight away?

What is the most efficient way to order them?

Do you prefer to convert your numbers to decimals, fractions or percentages? Why?

If you put them in ascending order, what will it look like? If you put them in descending order, what will it look like?

Varied Fluency

Use <, > or = to complete the statements:

- 60% 0.6 \(\frac{3}{5}\)
- 0.23 24% \(\frac{1}{4}\)
- 37.6% \(\frac{3}{8}\) 0.27

Order from smallest to largest:

50% \(\frac{2}{5}\) 0.45 \(\frac{3}{10}\) 54% 0.05

Four friends share a pizza. Whitney eats 35% of the pizza, Teddy eats 0.4 of the pizza, Dora eats 12.5% of the pizza and Alex eats 0.125 of the pizza.

Write the amount each child eats as a fraction. Who eats the most? Who eats the least? Is there any left?
In his first Geography test, Mo scored 38%.

In the next test he scored \(\frac{16}{40}\) or 40%.

Did Mo improve his score?

Mo improved his score. \(\frac{16}{40}\) is equivalent to 40% which is greater than his previous score of 38%.

Which month did Eva save the most money?

Estimate your answer using your knowledge of fractions, decimals and percentages.

Explain why you have chosen that month.

- In January, Eva saves \(\frac{3}{5}\) of her £20 pocket money.
- In February, she saves 0.4 of her £10 pocket money.
- In March, she saves 45% of her £40 pocket money.

She saved the most money in March. Estimates:

Over £10 in January because \(\frac{3}{5}\) is more than half.

Under £10 in February because she only had £10 to start with and 0.4 is less than half.

Nearly £20 in March because 45% is close to a half.
Children use known fractional equivalences to find percentages of amounts. Bar models and other visual representations may be useful in supporting this e.g. $25\% = \frac{1}{4}$ so we divide into 4 equal parts. In this step, we focus on 50%, 25%, 10% and 1% only.

**Notes and Guidance**

**Mathematical Talk**

Why do we divide a quantity by 2 in order to find 50%?

How do you calculate 10% of a number mentally?

What's the same and what's different about 10% of 300 and 10% of 30?

**Varied Fluency**

Eva says,

To find 50% of an amount, I can divide by 2.

50% is equivalent to $\frac{1}{2}$

Complete the sentences.

25% is equivalent to $\frac{1}{4}$ To find 25% of an amount, divide by ____

10% is equivalent to $\frac{1}{10}$ To find 10% of an amount, divide by ____

1% is equivalent to $\frac{1}{100}$ To find 1% of an amount, divide by ____

Use the bar models to help you complete the calculations.

Find:

50% of 300 25% of 300 10% of 300 1% of 300

50% of 30 25% of 30 10% of 30 1% of 30

50% of 60 25% of 60 10% of 60 1% of 60
Mo says,
To find 10% you divide by 10, so to find 50% you divide by 50
Do you agree? Explain why.

Possible answer:
Mo is wrong because 50% is equivalent to a half so to find 50% you divide by 2

Eva says to find 1% of a number, you divide by 100
Whitney says to find 1% of a number, you divide by 10 and then by 10 again.

Who do you agree with?
Explain your answer.

They are both correct.
Whitney has divided by 100 in two smaller steps.

Complete the missing numbers.

50% of 40 = ____% of 80
___% of 40 = 1% of 400
10% of 500 = ____% of 100

25
10
50
**Percentage of an Amount (2)**

**Notes and Guidance**
Children build on the last step by finding multiples of 10% and other known percentages. They explore different methods of finding certain percentages e.g. Finding 20% by dividing by 10 and multiplying by 2 or by dividing by 5. They also explore finding 5% by finding half of 10%. Using these methods, children build up to find percentages such as 35%.

**Mathematical Talk**

Is dividing by 10 and multiplying by 5 the most efficient way to find 50%? Explain why.

Is dividing by 10 and multiplying by 9 the most efficient way to find 90%? Explain why.

How many ways can you think of to calculate 60% of a number?

**Varied Fluency**

Mo uses a bar model to find 30% of 220

10% of 220 = 22, so 30% of 220 = 3 × 22 = 66

Use Mo’s method to calculate:

- 40% of 220
- 20% of 110
- 30% of 440
- 90% of 460

To find 5% of a number, divide by 10 and then divide by 2

Use this method to work out:

(a) 5% of 140  
(b) 5% of 260  
(c) 5% of 1 m 80 cm

How else could we work out 5%?

Calculate:

- 15% of 60 m
- 35% of 300 g
- 65% of £20
Four children in a class were asked to find 20% of an amount, this is what they did:

- **Whitney**: I divided by 5 because 20% is the same as one fifth.
- **Amir**: I found one percent by dividing by 100, then I multiplied my answer by 20.
- **Alex**: I did 10% add 10%.
- **Jack**: I found ten percent by dividing by 10, then I multiplied my answer by 2.

Who do you think has the most efficient method? Explain why.
Who do you think will end up getting the answer incorrect?

All methods are acceptable ways of finding 20% because they may find different methods easier. Discussion could be had around whether or not their preferred method is always the most efficient.

How many ways can you find 45% of 60?

Use similar strategies to find 60% of 45

What do you notice?

Does this always happen?
Can you find more examples?

**Possible methods** include:
- 10% × 4 + 5%
- 25% + 20%
- 25% + 10% + 10%
- 50% − 5%
- To find 60% of 45
- 10% × 6
- 50% + 10%
- 10% × 3

Children will notice that 45% of 60 = 60% of 45
This always happens.
Children use their understanding of percentages to find the missing whole or a missing percentage when the other values are given. They may find it useful to draw a bar model to help them see the relationship between the given percentage or amount and the whole.

It is important that children see that there may be more than one way to solve a problem and that some methods are more efficient than others.

**Mathematical Talk**

If we know a percentage, can we work out the whole?

If we know the whole and the amount, can we find what percentage has been calculated?

What diagrams could help you visualise this problem?

Is there more than one way to solve the problem?

What is the most efficient way to find a missing value?

---

**Varied Fluency**

350,000 people visited the Natural History Museum last week. 15% of the people visited on Monday. 40% of the people visited on Saturday. How many people visited the Natural History Museum during the rest of the week?

If 7 is 10% of a number, what is the number?

Use the bar model to help you.

Complete:

10% of 150 = 15
30% of 150 = 45

30% of 300 = 90
30% of 300 = 900

Can you see a link between the questions?
## Percentages – Missing Values

### Reasoning and Problem Solving

<table>
<thead>
<tr>
<th>What percentage questions can you ask about this bar model?</th>
<th>Possible answer: If 20% of a number is 3.5, what is the whole? What is 60%? What is 10%?</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.5</td>
<td>Possible answers:</td>
</tr>
<tr>
<td></td>
<td>25% of 60 = 25% of 60</td>
</tr>
<tr>
<td></td>
<td>25% of 120 = 50% of 60</td>
</tr>
<tr>
<td></td>
<td>25% of 24 = 10% of 60</td>
</tr>
<tr>
<td></td>
<td>25% of 2.4 = 1% of 60</td>
</tr>
<tr>
<td></td>
<td>25% of 180 = 75% of 60</td>
</tr>
</tbody>
</table>

### A golf club has 200 members.
58% of the members are male.
50% of the female members are children.

(a) How many male members are in the golf club?
(b) How many female children are in the golf club?

(a) 116 male members
(b) 42 female children