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.

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

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

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

Points to consider

• Use the mixed-age schemes to see where similar skills from both year groups can be taught together. Learning can then be differentiated through the questions on the single-age small steps so both year groups are focusing on their year group content.
• When there is year group specific content, consider teaching in split inputs to classes. This will depend on support in class and may need to be done through focus groups.
• On each of the block overview pages, we have described the key learning in each block and have given suggestions as to how the themes could be approached for each year group.
• We are fully aware that every class is different and the logistics of mixed-age classes can be tricky. We hope that our mixed-age SOL can help teachers to start to draw learning together.
<table>
<thead>
<tr>
<th>Week 1</th>
<th>Week 2</th>
<th>Week 3</th>
<th>Week 4</th>
<th>Week 5</th>
<th>Week 6</th>
<th>Week 7</th>
<th>Week 8</th>
<th>Week 9</th>
<th>Week 10</th>
<th>Week 11</th>
<th>Week 12</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Autumn</strong></td>
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</tr>
<tr>
<td>Number: Place Value</td>
<td>Number: Addition and Subtraction</td>
<td>Number: Multiplication and Division</td>
<td>Measurement: Length, Perimeter and Area</td>
<td></td>
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<tr>
<td><strong>Spring</strong></td>
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<tr>
<td>Number: Multiplication and Division</td>
<td>Number: Fractions</td>
<td>Number: Decimals (including Y5 Percentages)</td>
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<td><strong>Summer</strong></td>
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</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 1 to 3 – Multiplication and Division

**Multiplication and Division**

**Common Content**

### Multiplication
- **Year 4 (Spr B1)**
  - Efficient multiplication
  - Written methods
  - Multiply 2-digits by 1-digit
  - Multiply 3-digits by 1-digit
- **Year 5 (Spr B1)**
  - Multiply 4-digits by 1-digit
  - Multiply 2-digits (area model)
  - Multiply 2-digits by 2-digits
  - Multiply 3-digits by 2-digits
  - Multiply 4-digits by 2-digits

### Division
- **Year 4 (Spr B1)**
  - Divide 2-digits by 1-digit
  - Divide 3-digits by 1-digit
- **Year 5 (Spr B1)**
  - Divide 4-digits by 1-digit
  - Divide with remainders

In this block, both year groups look at more formal methods of multiplication and division. They are supported in their understanding through the use of concrete manipulatives.

Teachers may decide to recap correspondence problems with Year 5 as well as building on Year 4’s understanding of correspondence from Year 3.

**Year Specific**
Block 1 – Multiplication and Division

Theme 1 – Multiplication
Children develop their mental multiplication by exploring different ways to calculate. They partition two-digit numbers into tens and ones or into factor pairs in order to multiply one and two-digit numbers. By sharing mental methods, children can learn to be more flexible and efficient.

Class 4 are calculating $25 \times 8$ mentally. Can you complete the calculations in each of the methods?

**Method 1**

$25 \times 8 = 20 \times 8 + 5 \times 8$

$= 160 + \square = \square$

**Method 2**

$25 \times 8 = 5 \times 5 \times 8$

$= 5 \times \square = \square$

**Method 3**

$25 \times 8 = 25 \times 10 - 25 \times 2$

$= \square - \square = \square$

**Method 4**

$25 \times 8 = 50 \times 8 \div 2$

$= \square \div \square = \square$

Can you think of any other ways to mentally calculate $25 \times 8$? Which do you think is the most efficient? How would you calculate $228 \times 5$ mentally?
Teddy has calculated $19 \times 3$

20 $\times$ 3 = 60
60 $-$ 1 = 59
19 $\times$ 3 = 59

Can you explain his mistake and correct the diagram?

Teddy has subtracted one, rather than one group of 3
He should have calculated,
20 $\times$ 3 = 60
60 $-$ 1 $\times$ 3 = 57

Here are three number cards.

Dora, Annie and Eva choose one of the number cards each.
They multiply their number by 5

Dora says,
I did 40 $\times$ 5 and then subtracted 2 lots of five.

Annie says,
I multiplied my number by 10 and then divided 210 by 2

Eva says,
I halved my 2-digit number and doubled 5 so I calculated 21 $\times$ 10

Which number card did each child have?

Dora has 38
Annie has 21
Eva has 42

Children can then discuss the methods they would have used and why.

Would you have used a different method to multiply the numbers by 5?
Children use a variety of informal written methods to multiply a two-digit and a one-digit number. It is important to emphasise when it would be more efficient to use a mental method to multiply and when we need to represent our thinking by showing working.

### Varied Fluency

- There are 8 classes in a school. Each class has 26 children. How many children are there altogether? Complete the number line to solve the problem.

![Number Line](image)

Use this method to work out the multiplications.

- $16 \times 7$
- $34 \times 6$
- $27 \times 4$

- Rosie uses Base 10 and a part-whole model to calculate $26 \times 3$. Complete Rosie’s calculations.

- Use Rosie’s method to work out:
  - $36 \times 3$
  - $24 \times 6$
  - $45 \times 4$

### Mathematical Talk

- Why are there not 26 jumps of 8 on the number line?
- Could you find a more efficient method?
- Can you calculate the multiplication mentally or do you need to write down your method?
- Can you partition your number into more than two parts?
Here are 6 multiplications.

$$43 \times 5 \quad 54 \times 6 \quad 38 \times 6 \quad 33 \times 2 \quad 19 \times 7 \quad 84 \times 5$$

Which of the multiplications would you calculate mentally?

Which of the multiplications would you use a written method for?

Explain your choices to a partner. Did your partner choose the same methods as you?

Children will sort the multiplications in different ways.

It is important that teachers discuss with the children why they have made the choices and refer back to the efficient multiplication step to remind children of efficient ways to multiply mentally.

Ron is calculating 46 multiplied by 4 using the part-whole model.

$$46 \times 4 = 1624$$

Can you explain Ron’s mistake?

Ron has multiplied the parts correctly, but added them up incorrectly.

$$160 + 24 = 184$$
Children build on their understanding of formal multiplication from Year 3 to move to the formal short multiplication method. Children use their knowledge of exchanging ten ones for one ten in addition and apply this to multiplication, including exchanging multiple groups of tens. They use place value counters to support their understanding.

### Mathematical Talk

Which column should we start with, the ones or the tens?

How are Ron and Whitney’s methods the same? How are they different?

Can we write a list of key things to remember when multiplying using the column method?

### Varied Fluency

#### Whitney uses place value counters to calculate $5 \times 34$

<table>
<thead>
<tr>
<th>H</th>
<th>T</th>
<th>O</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

$\times \quad 5$

$\begin{array}{c}
20 \\
150 \\
\hline
170
\end{array}$

Use Whitney’s method to solve:

- $5 \times 42$
- $23 \times 6$
- $48 \times 3$

#### Ron also uses place value counters to calculate $5 \times 34$

<table>
<thead>
<tr>
<th>H</th>
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<th>O</th>
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</thead>
<tbody>
<tr>
<td>3</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

$\times \quad 5$

$\begin{array}{c}
170
\end{array}$

Use Ron’s method to complete:

<table>
<thead>
<tr>
<th>T</th>
<th>O</th>
<th>T</th>
<th>O</th>
<th>T</th>
<th>O</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>3</td>
<td>3</td>
<td>6</td>
<td>7</td>
<td>4</td>
</tr>
</tbody>
</table>

$\times \quad 3 \quad 4 \quad 5$
Always, sometimes, never

- When multiplying a two-digit number by a one-digit number, the product has 3 digits.
- When multiplying a two-digit number by 8 the product is odd.
- When multiplying a two-digit number by 7 you need to exchange. Prove it.

Sometimes: 12 × 2 has only two-digits; 23 × 5 has three digits.

Never: all multiples of 8 are even.

Sometimes: most two-digit numbers need exchanging, but not 10 or 11
Children build on previous steps to represent a three-digit number multiplied by a one-digit number with concrete manipulatives. Teachers should be aware of misconceptions arising from 0 in the tens or ones column. Children continue to exchange groups of ten ones for tens and record this in a written method.

How is multiplying a three-digit number by one-digit similar to multiplying a two-digit number by one-digit?

Would you use counters to represent 84 multiplied by 8? Why?

A school has 4 house teams. There are 245 children in each house team. How many children are there altogether?

Write the multiplication represented by the counters and calculate the answer using the formal written method.
Spot the mistake

Alex and Dexter have both completed the same multiplication. Alex has forgotten to add the two hundreds she exchanged from the tens column. Dexter has the correct answer.

<table>
<thead>
<tr>
<th>H</th>
<th>T</th>
<th>O</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>×</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td>0</td>
</tr>
</tbody>
</table>

Who has the correct answer? What mistake has been made by one of the children?

Teddy and his mum were having a reading competition. In one month, Teddy read 814 pages. His mum read 4 times as many pages as Teddy. How many pages did they read altogether? How many fewer pages did Teddy read? Use the bar model to help.

| Teddy | 814 |
| Mum | 814 | 814 | 814 | 814 |

814 × 5 = 4,070
They read 4,070 pages altogether.
814 × 3 = 2,442
Teddy read 2,442 fewer pages than his mum.
Multiply 4-digits by 1-digit

Notes and Guidance
Children build on previous steps to represent a 4-digit number multiplied by a 1-digit number using concrete manipulatives.
Teachers should be aware of misconceptions arising from using 0 as a place holder in the hundreds, tens or ones column.
Children then move on to explore multiplication with exchange in one, and then more than one column.

Mathematical Talk
Why is it important to set out multiplication using columns?
Explain the value of each digit in your calculation.
How do we show there is nothing in a place value column?
What do we do if there are ten or more counters in a place value column?
Which part of the multiplication is the product?

Varied Fluency

Complete the calculation.

Write the multiplication calculation represented and find the answer.

Remember if there are ten or more counters in a column, you need to make an exchange.

Annie earns £1,325 per week.
How much would he earn in 4 weeks?

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Alex calculated $1,432 \times 4$

Here is her answer.

<table>
<thead>
<tr>
<th>Th</th>
<th>H</th>
<th>T</th>
<th>O</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>4</td>
<td>3</td>
<td>2</td>
</tr>
</tbody>
</table>

$1,432 \times 4 = 416,128$

Can you explain what Alex has done wrong?

Alex has not exchanged when she has got 10 or more in the tens and hundreds columns.

Can you work out the missing numbers using the clues?

- The 4 digits being multiplied by 5 are consecutive numbers.
- The first 2 digits of the product are the same.
- The fourth and fifth digits of the answer add to make the third.

$2,345 \times 5 = 11,725$
Children use Base 10 to represent the area model of multiplication, which will enable them to see the size and scale linked to multiplying.

Children will then move on to representing multiplication more abstractly with place value counters and then numbers.

**Mathematical Talk**

- What are we multiplying?
- How can we partition these numbers?
- Where can we see $20 \times 20$?
- What does the 40 represent?
- What's the same and what's different between the three representations (Base 10, place value counters, grid)?

**Varied Fluency**

How could you adapt your Base 10 model to calculate these:

- $32 \times 24$
- $25 \times 32$
- $35 \times 32$

Rosie adapts the Base 10 method to calculate $44 \times 32$

Compare using place value counters and a grid to calculate:

- $45 \times 42$
- $52 \times 24$
- $34 \times 43$
Multiply 2-digits (Area Model)

Reasoning and Problem Solving

Eva says,

To multiply 23 by 57 I just need to calculate $20 \times 50$ and $3 \times 7$ and then add the totals.

What mistake has Eva made? Explain your answer.

Amir hasn’t finished his calculation. Complete the missing information and record the calculation with an answer.

<table>
<thead>
<tr>
<th>$\times$</th>
<th>40</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>40</td>
<td>![Green]</td>
<td>![Yellow]</td>
</tr>
<tr>
<td>6</td>
<td>![Green]</td>
<td>![Yellow]</td>
</tr>
</tbody>
</table>

Eva’s calculation does not include $20 \times 7$ and $50 \times 3$

Children can show this with concrete or pictorial representations.

Amir needs 8 more hundreds, $40 \times 40 = 1,600$ and he only has 800

His calculation is $42 \times 46 = 1,932$

Dora thinks that they will have the same area because the numbers have only changed by one digit each.

Do you agree? Prove it.

Farmer Ron has a field that measures 53 m long and 25 m wide.

Farmer Annie has a field that measures 52 m long and 26 m wide.

Dora is wrong. Children may prove this with concrete or pictorial representations.

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Children will move on from the area model and work towards more formal multiplication methods.

They will start by exploring the role of the zero in the column method and understand its importance.

Children should understand what is happening within each step of the calculation process.

**Mathematical Talk**

Why is the zero important?

What numbers are being multiplied in the first line and in the second line?

When do we need to make an exchange?

What can we exchange if the product is 42 ones?

If we know what $38 \times 12$ is equal to, how else could we work out $39 \times 12$?

**Varied Fluency**

- Complete the calculation to work out $23 \times 14$

- Use this method to calculate:
  - $34 \times 26$
  - $58 \times 15$
  - $72 \times 35$

- Complete to solve the calculation.

- Use this method to calculate:
  - $27 \times 39$
  - $46 \times 55$
  - $94 \times 49$

- Calculate:
  - $38 \times 12$
  - $39 \times 12$
  - $38 \times 11$

**What's the same? What's different?**

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Multiply 2-digits by 2-digits

Reasoning and Problem Solving

Tommy says,

It is not possible to make 999 by multiplying two 2-digit numbers.

Do you agree? Explain your answer.

Children may use a trial and error approach during which they'll further develop their multiplication skills. They will find that Tommy is wrong because $27 \times 37$ is equal to 999.

Amir has multiplied 47 by 36

<table>
<thead>
<tr>
<th></th>
<th>4</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>×</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>8</td>
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<tr>
<td></td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>2</td>
</tr>
</tbody>
</table>

Alex says,

Amir is wrong because the answer should be 1,692 not 323.

Who is correct? What mistake has been made?

Alex is correct. Amir has forgotten to use zero as a place holder when multiplying by 3 tens.
Children will extend their multiplication skills to multiplying 3-digit numbers by 2-digit numbers. They will use multiplication to find area and solve multi-step problems. Methods previously explored are still useful e.g. using an area model.

### Mathematical Talk

**Why is the zero important?**

**What numbers are being multiplied in the first line and the second line?**

**When do we need to make an exchange?**

**What happens if there is an exchange in the last step of the calculation?**

### Varied Fluency

#### Complete:

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>3</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>x</td>
<td></td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

Use this method to calculate:

- \((132 \times 4)\) 264 \(\times\) 14
- \((132 \times 10)\) 264 \(\times\) 28

What do you notice about your answers?

#### Calculate:

- 637 \(\times\) 24
- 573 \(\times\) 28
- 573 \(\times\) 82

### A playground is 128 yards by 73 yards.

Calculate the area of the playground.
### Multiply 3-digits by 2-digits

#### Reasoning and Problem Solving

<table>
<thead>
<tr>
<th>Calculation</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>22 × 111</td>
<td>2442</td>
</tr>
<tr>
<td>23 × 111</td>
<td>2553</td>
</tr>
<tr>
<td>24 × 111</td>
<td>2664</td>
</tr>
</tbody>
</table>

What do you think the answer to $25 \times 111$ will be?

What do you notice?

Does this always work?

Pencils come in boxes of 64
A school bought 270 boxes.
Rulers come in packs of 46
A school bought 720 packs.

How many more rulers were ordered than pencils?

---

The pattern stops at up to $28 \times 111$ because exchanges need to take place in the addition step.

Here are examples of Dexter's maths work.

\[
\begin{array}{ccc}
9 & 8 & 7 \\
\times & 7 & 6 \\
\hline
5 & 9 & 4 & 2 & 2 \\
6 & 9 & 4 & 0 & 9 \\
1 & 2 & 8 & 1 & 3 & 1 \\
\end{array}
\]

\[
\begin{array}{ccc}
3 & 2 & 4 \\
\times & 7 & 8 \\
\hline
2 & 5 & 9 & 2 \\
1 & 2 & 6 & 8 & 0 \\
3 & 2 & 7 & 2 \\
\end{array}
\]

In his first calculation, Dexter has forgotten to use a zero when multiplying by 7 tens.
It should have been $987 \times 76 = 75,012$

In the second calculation, Dexter has not included his final exchanges.
$324 \times 8 = 2,592$
$324 \times 70 = 22,680$
The final answer should have been $25,272$
Children will build on their understanding of multiplying a 3-digit number by a 2-digit number and apply this to multiplying 4-digit numbers by 2-digit numbers.

It is important that children understand the steps taken when using this multiplication method.

Methods previously explored are still useful e.g. grid.

**Mathematical Talk**

Explain the steps followed when using this multiplication method.

Look at the numbers in each question, can they help you estimate which answer will be the largest?

Explain why there is a 9 in the thousands column.

Why do we write the larger number above the smaller number?

What links can you see between these questions? How can you use these to support your answers?

**Varied Fluency**

Use the method shown to calculate $2,456 \times 34$

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<th>3</th>
<th>2</th>
<th>5</th>
<th>0</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\times$</td>
<td>2</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>4</td>
<td>5</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

(3,250 $\times$ 6)

(3,250 $\times$ 20)

Calculate

$3,282 \times 32$

$7,132 \times 21$

$9,708 \times 38$

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

$4,458 \times 56$

$4,523 \times 54$

$4,458 \times 55$

$4,523 \times 54$

$4,458 \times 55$

$4,522 \times 54$
Spot the Mistakes

Can you spot and correct the errors in the calculation?

<p>| | | | | |</p>
<table>
<thead>
<tr>
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<th></th>
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<tbody>
<tr>
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<td>2</td>
<td>5</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>x</td>
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<tr>
<td></td>
<td>7</td>
<td>5</td>
<td>1</td>
<td>9</td>
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<td>1</td>
<td>5</td>
<td>0</td>
<td>6</td>
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<td>2</td>
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<td></td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

There are 2 errors. In the first line of working, the exchanged ten has not been added. In the second line of working, the place holder is missing. The correct answer should be 58,282.

Teddy has spilt some paint on his calculation.

<table>
<thead>
<tr>
<th></th>
<th>2</th>
<th>6</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>6</td>
<td>9</td>
<td>?</td>
</tr>
<tr>
<td>1</td>
<td>5</td>
<td>7</td>
<td>1</td>
</tr>
<tr>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

What are the missing digits?

What do you notice?

The missing digits are all 8.
Block 1 – Multiplication and Division

Theme 2 - Division
Divide 2-digits by 1-digit (1)

Notes and Guidance

Children build on their knowledge of dividing a 2-digit number by a 1-digit number from Year 3 by sharing into equal groups.

Children use examples where the tens and the ones are divisible by the divisor, e.g. 96 divided by 3 and 84 divided by 4. They then move on to calculations where they exchange between tens and ones.

Mathematical Talk

How can we partition 84?

How many rows do we need to share equally between?

If I cannot share the tens equally, what do I need to do?

How many ones will I have after exchanging the tens?

If we know $96 \div 4 = 24$, what will $96 \div 8$ be?

What will $96 \div 2$ be? Can you spot a pattern?

Varied Fluency

Jack is dividing 84 by 4 using place value counters.

First, he divides the tens.

Then, he divides the ones.

Use Jack's method to calculate:

- $69 \div 3$
- $88 \div 4$
- $96 \div 3$

Rosie is calculating 96 divided by 4 using place value counters.

First, she divides the tens. She has one ten remaining so she exchanges one ten for ten ones. Then, she divides the ones.

Use Rosie's method to solve:

- $65 \div 5$
- $75 \div 5$
- $84 \div 6$
Dora is calculating $72 \div 3$
Before she starts, she says the calculation will involve an exchange.
Do you agree? Explain why.

Dora is correct because 70 is not a multiple of 3 so when you divide 7 tens between 3 groups there will be one remaining which will be exchanged.

Eva has 96 sweets. She shares them into equal groups. She has no sweets left over. How many groups could Eva have shared her sweets into?

Possible answers
$96 \div 1 = 96$
$96 \div 2 = 48$
$96 \div 3 = 32$
$96 \div 4 = 24$
$96 \div 6 = 16$
$96 \div 8 = 12$

<table>
<thead>
<tr>
<th>Use $&lt;$, $&gt;$ or $=$ to complete the statements.</th>
</tr>
</thead>
<tbody>
<tr>
<td>$69 \div 3$</td>
</tr>
<tr>
<td>$96 \div 4$</td>
</tr>
<tr>
<td>$91 \div 7$</td>
</tr>
</tbody>
</table>
Children explore dividing 2-digit numbers by 1-digit numbers involving remainders.

They continue to use the place value counters to divide in order to explore why there are remainders. Teachers should highlight, through questioning, that the remainder can never be greater than the number you are dividing by.

If we are dividing by 3, what is the highest remainder we can have?

If we are dividing by 4, what is the highest remainder we can have?

Can we make a general rule comparing our divisor (the number we are dividing by) to our remainder?

Varied Fluency

Teddy is dividing 85 by 4 using place value counters.

First, he divides the tens.

Then, he divides the ones.

Use Teddy's method to calculate:
86 ÷ 4  87 ÷ 4  88 ÷ 4  97 ÷ 3  98 ÷ 3  99 ÷ 3

Whitney uses the same method, but some of her calculations involve an exchange.

Use Whitney's method to solve
57 ÷ 4  58 ÷ 4  58 ÷ 3
## Divide 2-digits by 1-digit (2)

### Reasoning and Problem Solving

<table>
<thead>
<tr>
<th>Rosie writes, 85 ÷ 3 = 28 r 1</th>
<th>I agree, remainder 1 means there is 1 left over. 85 is one more than 84 which is a multiple of 3</th>
<th>Whitney is thinking of a 2-digit number that is less than 50</th>
</tr>
</thead>
<tbody>
<tr>
<td>She says 85 must be 1 away from a multiple of 3 Do you agree?</td>
<td></td>
<td>When it is divided by 2, there is no remainder.</td>
</tr>
<tr>
<td>37 sweets are shared between 4 friends. How many sweets are left over?</td>
<td>Alex is correct as there will be one remaining sweet. Mo has found how many sweets each friend will receive. Eva has written the answer to the calculation. Jack has found a remainder that is larger than the divisor so is incorrect.</td>
<td>When it is divided by 3, there is a remainder of 1</td>
</tr>
<tr>
<td>Four children attempt to solve this problem.</td>
<td></td>
<td>When it is divided by 5, there is a remainder of 3</td>
</tr>
<tr>
<td>• Alex says it’s 1 • Mo says it’s 9 • Eva says it’s 9 r 1 • Jack says it’s 8 r 5</td>
<td></td>
<td>What number is Whitney thinking of?</td>
</tr>
<tr>
<td>Can you explain who is correct and the mistakes other people have made?</td>
<td></td>
<td>Whitney is thinking of 28</td>
</tr>
</tbody>
</table>

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Divide 3-digits by 1-digit

Notes and Guidance

Children apply their previous knowledge of dividing 2-digit numbers to divide a 3-digit number by a 1-digit number.

They use place value counters and part-whole models to support their understanding.

Children divide numbers with and without remainders.

Mathematical Talk

What is the same and what’s different when we are dividing 3-digit number by a 1-digit number and a 2-digit number by a 1-digit number?

Do we need to partition 609 into three parts or could it just be partitioned into two parts?

Can we partition the number in more than one way to support dividing more efficiently?

Varied Fluency

Annie is dividing 609 by 3 using place value counters.

<table>
<thead>
<tr>
<th>Hundreds</th>
<th>Tens</th>
<th>Ones</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>100</td>
<td>111</td>
</tr>
<tr>
<td>100</td>
<td>100</td>
<td>111</td>
</tr>
<tr>
<td>100</td>
<td>100</td>
<td>111</td>
</tr>
</tbody>
</table>

609 ÷ 3 = 203

600 ÷ 3 = 200

0 ÷ 3 = 0

9 ÷ 3 = 3

Use Annie’s method to calculate the divisions.

906 ÷ 3

884 ÷ 4

884 ÷ 8

489 ÷ 2

Rosie is using flexible partitioning to divide 3-digit numbers. She uses her place value counters to support her.

Use Rosie’s method to solve:

726 ÷ 6

846 ÷ 6

846 ÷ 7
Dexter is calculating $184 \div 8$ using part-whole models. Can you complete each model?

$208 \div 8 = 26$
$80 \div 8 = 10$
$48 \div 8 = 6$
$160 \div 8 = 20$
$40 \div 8 = 5$
$8 \div 8 = 1$

Children can then make a range of part-whole models to calculate $132 \div 4$

e.g.
$100 \div 4 = 25$
$32 \div 4 = 8$

How many part-whole models can you make to calculate $132 \div 4$?

You have 12 counters and the place value grid. You must use all 12 counters to complete the following.

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

Create a 3-digit number divisible by 2
Create a 3-digit number divisible by 3
Create a 3-digit number divisible by 4
Create a 3-digit number divisible by 5
Can you find a 3-digit number divisible by 6, 7, 8 or 9?

2: Any even number
3: Any 3-digit number (as the digits add up to 12, a multiple of 3)
4: A number where the last two digits are a multiple of 4
5: Any number with 0 or 5 in the ones column.

Possible answers
6: Any even number
7: 714, 8: 840
9: impossible
Children use their knowledge from Year 4 of dividing 3-digit numbers by a 1-digit number to divide up to 4-digit numbers by a 1-digit number.

They use place value counters to partition their number and then group to develop their understanding of the short division method.

Here is a method to calculate 4,892 divided by 4 using place value counters and short division.

Use this method to calculate:
6,610 \div 5
2,472 \div 3
9,360 \div 4

Mr Porter has saved £8,934
He shares it equally between his three grandchildren.
How much do they each receive?

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

3,495 \div 5 \quad 3,495 \div 3
8,064 \div 7 \quad 9,198 \div 7
7,428 \div 4 \quad 5,685 \div 5
Jack is calculating $2,240 \div 7$

He says you can’t do it because 7 is larger than all of the digits in the number.

Do you agree with Jack? Explain your answer.

Jack is incorrect. You can exchange between columns. You can’t make a group of 7 thousands out of 2 thousand, but you can make groups of 7 hundreds out of 22 hundreds.

The answer is 320

Spot the Mistake

Explain and correct the working.

<table>
<thead>
<tr>
<th>Thousands</th>
<th>Hundreds</th>
<th>Tens</th>
<th>Ones</th>
</tr>
</thead>
<tbody>
<tr>
<td>2,000</td>
<td>100</td>
<td>10</td>
<td>1</td>
</tr>
<tr>
<td>100</td>
<td>10</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>1,000</td>
<td>100</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

There is no exchanging between columns within the calculation. The final answer should have been 3,138
Children continue to use place value counters to partition and then group their number to further develop their understanding of the short division method.

They start to focus on remainders and build on their learning from Year 4 to understand remainders in context. They do not represent their remainder as a fraction at this point.

Here is a method to solve 4,894 divided by 4 using place value counters and short division.

Use this method to calculate:

- 6,613 ÷ 5
- 2,471 ÷ 3
- 9,363 ÷ 4

Muffins are packed in trays of 6 in a factory. In one day, the factory makes 5,623 muffins. How many trays do they need? How many trays will be full? Why are your answers different?

For the calculation 8,035 ÷ 4
- Write a number story where you round the remainder up.
- Write a number story where you round the remainder down.
- Write a number story where you have to find the remainder.

If we can’t make a group in this column, what do we do?

What happens if we can’t group the ones equally?

In this number story, what does the remainder mean?

When would we round the remainder up or down?

In which context would we just focus on the remainder?
I am thinking of a 3-digit number. Possible answers:

| When it is divided by 9, the remainder is 3 | 129 | 219 |
| When it is divided by 2, the remainder is 1 | 309 | 399 |
| When it is divided by 5, the remainder is 4 | 489 | 579 |

What is my number?

Always, Sometimes, Never?

A three-digit number made of consecutive descending digits divided by the next descending digit always has a remainder of 1

765 ÷ 4 = 191 remainder 1

How many possible examples can you find?

Sometimes

Possible answers:

- 432 ÷ 1 = 432 r 0
- 543 ÷ 2 = 271 r 1
- 654 ÷ 3 = 218 r 0
- 765 ÷ 4 = 191 r 1
- 876 ÷ 5 = 175 r 1
- 987 ÷ 6 = 164 r 3

Encourage children to think about the properties of numbers that work for each individual statement. This will help decide the best starting point.
Children solve more complex problems building on their understanding from Year 3 of when \( n \) objects relate to \( m \) objects.

They find all solutions and notice how to use multiplication facts to solve problems.

**Mathematical Talk**

Can you use a table to support you to find all the combinations?

Can you use a code to help you find the combinations? e.g. VS meaning Vanilla and Sauce

Can you use coins to support you to make all the possible combinations?

**Correspondence Problems**

An ice-cream van has 4 flavours of ice-cream and 2 choices of toppings.

<table>
<thead>
<tr>
<th>Ice-cream flavour</th>
<th>Toppings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vanilla</td>
<td>Sauce</td>
</tr>
<tr>
<td>Chocolate</td>
<td>Flake</td>
</tr>
<tr>
<td>Strawberry</td>
<td></td>
</tr>
<tr>
<td>Banana</td>
<td></td>
</tr>
</tbody>
</table>

How many different combinations of ice-cream and toppings can be made?

Complete the multiplication to represent the combinations.

\[ \_ \times \_ = \_ \] There are \_ combinations.

Jack has two piles of coins.

He chooses one coin from each pile.

What are all the possible combinations of coins Jack can choose?

What are all the possible totals he can make?
Here are the meal choices in the school canteen.

<table>
<thead>
<tr>
<th>Starter</th>
<th>Main</th>
<th>Dessert</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soup</td>
<td>Pasta</td>
<td>Cake</td>
</tr>
<tr>
<td>Garlic</td>
<td>Chicken</td>
<td>Ice-cream</td>
</tr>
<tr>
<td>Bread</td>
<td>Beef</td>
<td>Fruit Salad</td>
</tr>
<tr>
<td></td>
<td>Salad</td>
<td></td>
</tr>
</tbody>
</table>

There are 2 choices of starter, 4 choices of main and 3 choices of dessert.

How many meal combinations can you find? Can you use a systematic approach? Can you represent the combinations in a multiplication?

If there were 20 meal combinations, how many starters, mains and desserts might there be?

There are 24 meal combinations altogether. 
$2 \times 4 \times 3 = 24$

20 combinations
1\times 1 \times 20
1 \times 2 \times 10
1 \times 4 \times 5
2 \times 2 \times 5
Accept all other variations of these four multiplications e.g. $1 \times 20 \times 1$

Alex has 6 T-shirts and 4 pairs of shorts. Dexter has 12 T-shirts and 2 pairs of shorts. Who has the most combinations of T-shirts and shorts? Explain your answer.

Alex and Dexter have the same number of combinations of T-shirts and shorts.