Christleton Primary School

KS2 Maths Evening

Calculations at Christleton Primary School

Addition

Year 3	Year 4	Year 5	Year 6
Add numbers with 3 digits using column method	Add numbers with 4 digits using column method. Adding numbers to 2 decimal places.	Add numbers within 1,000,000 using column method. Adding numbers to 2 decimal places.	Add numbers within 10,000,000 using column method. Adding numbers to 3 decimal places.
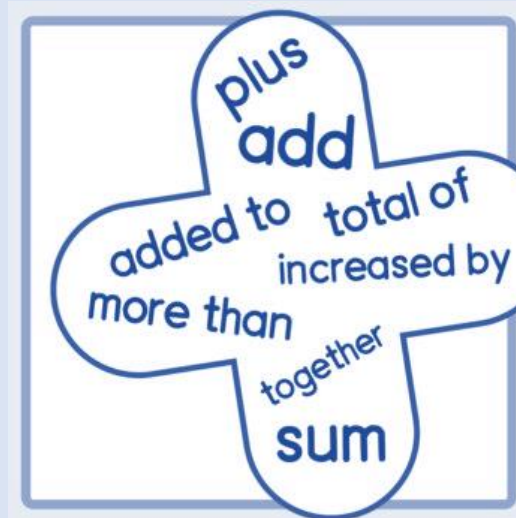
Written Methods:
Written methods are taught alongside the use of concrete resources.

Carrying in the ones column only

```
  4 3 7
+ 2 2 5
  6 6 2
    1
```

Add the ones first.

Carry numbers underneath the bottom line.

Carrying in the tens column only

```
  2 3 7
+   8 2
  3 1 9
    1
```

Ensure correct use of vocabulary throughout. E.g. we are adding 3 tens and 8 tens (30 and 80) to make 11 tens or 110, as opposed to 3 and 8 equals 11.

Carrying in the ones and the tens column

```
  2 3 8
+   8 7
  3 2 5
    1 1
```

Written Methods:

Recap the children's understanding of Year 3 calculation strategy, moving to the compact column method adding the ones first and carrying numbers underneath the calculation.

```
  3 7 2 1
+   4 9 8
  4 2 1 9
    1 1
```

Ensure correct use of vocabulary throughout. E.g. we are adding 7 hundreds and 4 hundreds, not 7 add 4 for example.

Teach children to apply their use of the column methods to decimal numbers.

```
£ 2 4 . 3 2
£ 1 2 . 8 4
£ 3 7 . 1 6
      1
```

The decimal point should be aligned in the same way as the other place value columns and must be in the same column in the answer.

Year 5

Written Methods:

To include money, measures and decimals with different numbers of decimal places.

The decimal point should be aligned in the same way as their other place value columns and must be in the same column in the answer.

$$\begin{array}{r} £\ 2\ 4\ \cdot\ 3\ 2 \\ £\ 1\ 2\ \cdot\ 8\ 4 \\ \hline £\ 3\ 7\ \cdot\ 1\ 6 \end{array}$$

Numbers should exceed 4 digits.

$$\begin{array}{r} 2\ 3\ 4\ 3\ 8 \\ +\ \ \ 2\ 7\ 2\ 5 \\ \hline 2\ 6\ 1\ 6\ 3 \end{array}$$

Pupils should be able to add more than two values, carefully aligning place value columns.

Children should understand the place value of tenths and hundredths and use this to align numbers with different numbers of decimal places.

$$\begin{array}{r} 1\ 9\ \cdot\ 0\ 1 \\ 3\ \cdot\ 8\ 2 \\ +\quad 0\ \cdot\ 6\ 0 \\ \hline 2\ 3\ \cdot\ 4\ 3 \end{array}$$

Empty decimal places could be filled with zero to show the place value of the column.

Ensure correct vocabulary is used throughout. E.g. 6 tenths and 7 tenths equals 13 tenths.

Year 6

Written Methods:

Written method of column addition should be used in a variety of contexts and with numbers of increasing size and complexity.

This should include addition several numbers with different numbers of decimal places (including in the context of measures and money).

Tenths, hundredths and thousandths should be correctly aligned, with the decimal place lined up vertically, including in the answer row.

Zeros should be added into empty decimals places to show there is no value to add.

$$\begin{array}{r} 2\ 3\ \cdot\ 3\ 6\ 1 \\ 9\ \cdot\ 0\ 8\ 0 \\ +\quad 5\ 2\ \cdot\ 3\ 0\ 0 \\ \hline 8\ 4\ \cdot\ 7\ 4\ 1 \end{array}$$

Adding several numbers with more than four-digits.

$$\begin{array}{r} 8\ 2\ 6\ 3\ 1 \\ 3\ 4\ 2\ 5 \\ +\quad 2\ 1\ 3\ 6\ 2\ 5 \\ \hline 2\ 9\ 9\ 6\ 8\ 1 \end{array}$$

4563 + 457 =

Calculations at Christleton Primary School

subtraction

Year 3	Year 4	Year 5	Year 6
Subtract numbers with 3 digits using column method	Subtract numbers with 4 digits using column method. Subtracting numbers to 2 decimal places.	Subtract numbers within 1,000,000 using column method. Subtracting numbers to 2 decimal places.	Subtract numbers within 10,000,000 using column method. Subtracting numbers to 3 decimal places.

Leave Subtract

Minus

Less

Take away

Difference
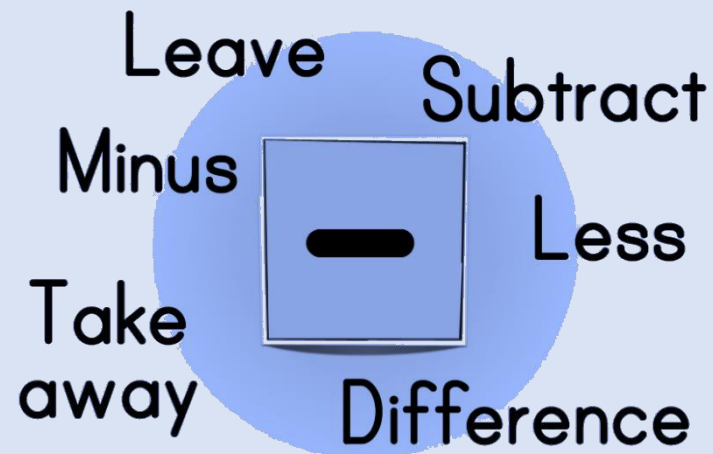
Year 3

Written Methods:

Step 1: No exchange

Introduce this method with examples where no exchanging is required. Use this as an opportunity to reinforce place value and check children's understanding before moving on.

$$87 - 33 = 54$$

$$\begin{array}{r} 80 + 7 \\ - 30 + 3 \\ \hline 50 + 4 = 54 \end{array}$$

Step 2: With exchange

Using Place Value counters and Dienes, introduce children to exchanging. Make the larger number with Dienes and physically exchange a row of 10 for ten ones. Use the resources alongside the written methods until children have developed in confidence.

$$\begin{array}{r} ^{5}\cancel{6}\,^{1}\cancel{5}\,^{1}2 \\ - 3\ 6\ 5 \\ \hline 2\ 8\ 7 \end{array}$$

Year 4

Written Methods:

Compact column subtraction. Ensure children have the opportunity to apply this method to a variety of different contexts, including money and measures.

$$\begin{array}{r} 3\ 6\ ^{4}\cancel{8}\,^{1}2 \\ - 1\ 5\ 4\ 3 \\ \hline 2\ 1\ 0\ 9 \end{array}$$

$$\begin{array}{r} 3\ ^{5}\cancel{6}\,^{1}5\ 2 \\ - 1\ 5\ 6\ 2 \\ \hline 2\ 0\ 9\ 0 \end{array}$$

$$\begin{array}{r} 3\ ^{5}\cancel{6}\,^{1}\cancel{5}\,^{1}2 \\ - 1\ 5\ 6\ 3 \\ \hline 2\ 0\ 8\ 9 \end{array}$$

Ensure children have experience of using this method for subtraction where there is a 0 in the column they need to exchange from, and that they understand, through clear modelling (using practical resources) how to move to the next column and exchange then 'move' the value along.

$$\begin{array}{r} ^{2}\cancel{3}\,^{9}\cancel{0}\,^{1}4\ 7 \\ - 1\ 2\ 6\ 5 \\ \hline 1\ 7\ 8\ 2 \end{array}$$

Written Methods: Compact Column Subtraction

Children use this method to subtract increasingly large and complex numbers, in a range of contexts.

Those children who are not ready for this, should become confident with the expanded column method first.

>

$$\begin{array}{r} 2 \quad 7 \\ 6\,\overset{3}{8}\,\overset{1}{2}\,\overset{1}{8}\,1 \\ -\quad 2\,3\,7\,6 \\ \hline 6\,0\,9\,0\,5 \end{array}$$

Children should be taught to use this method to subtract decimals, including mixtures of whole numbers and decimals, ensuring they align the decimal point correctly.

Children should be taught to add a zero in any empty decimal places to aid understanding of what to subtract in that column.

>

$$\begin{array}{r} 7 \quad 2 \\ \overset{7}{8}\,1\,\overset{2}{6}\,\overset{1}{3}\,.\,\overset{1}{0} \\ -\quad 4\,5\,1\,.\,5 \\ \hline 7\,7\,1\,1\,.\,5 \end{array}$$

Ensure children have experience of using this method for subtraction where there is a 0 in the column they need to exchange from, and that they understand, through clear modelling (using practical resources) how to move to the next column and exchange then 'move' the value along.

>

2	9	5		
3	0	6	0	4
− 2	6	8	3	2
0	3	7	7	2

Written Methods:

Step 1: Using the compact column method to subtract more complex numbers.

>

$$\begin{array}{r} \overset{0}{} \overset{1}{} \quad \overset{2}{} \\ \overset{0}{\cancel{1}}\,\overset{1}{2}\,6\,\overset{2}{8}\,2\,1 \\ -\quad 3\,9\,1\,5\,1 \\ \hline 8\,7\,1\,7\,0 \end{array}$$

Step 2: Use the compact column method to subtract money and measures, including decimals with different numbers of decimal places. Children can fill empty decimal places with zeros to show the place value in each column.

>

$$\begin{array}{r} 0 \quad 9 \qquad 3 \\ \overset{0}{\cancel{1}}\,\overset{9}{0}\,5\,.\,\overset{3}{\cancel{4}}\,\overset{1}{1}\,9 \\ -\quad 3\,7\,.\,0\,8\,0 \\ \hline 6\,8\,.\,3\,3\,9 \end{array}$$

Ensure children have experience of using this method for subtraction where there is a 0 in the column they need to exchange from, and that they understand, through clear modelling (using practical resources) how to move to the next column and exchange then 'move' the value along.

>

		1		5	9	
3	2	7	6	0	0
− 1	4	8	5	3	2
1	7	9	0	6	8

3000 − 1978 =

Calculations at Christleton Primary School

multiplication

| Year 3	Year 4	Year 5	Year 6
Multiply a 2 digit number by a 1 digit number e.g. 65 x 3	Multiply a 3 digit number by a 4 digit number e.g. 134 x 8	Multiply a 4 digit number by a 1 digit number e.g. 2365 x 4 Multiply up to 4 digit numbers by a 2 digit number e.g. 3465 x 56	Multiply up to 4 digit numbers by a 2 digit number e.g. 3465 x 56 Multiply decimals up to 2 DP by a single digit
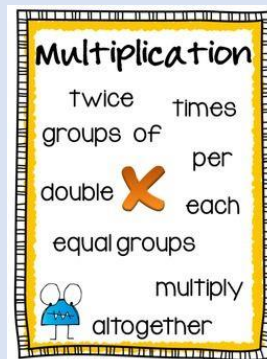
Written Methods for multiplying a two-digit number by a one-digit number.

Step 1: Arrays

Reinforce Year 2 work on arrays, ensuring children have a secure understanding and can apply these to calculate facts for the 3, 4 and 8 times tables.

4 + 4 + 4 = 12

4 x 3 = 12
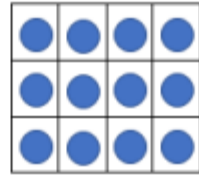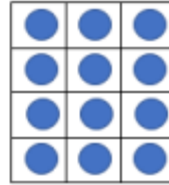
3 + 3 + 3 + 3 = 12

3 x 4 = 12

Step 2: Introducing the grid method using arrays

Introduce the grid method to the children by making the arrays to represent the multiplication statement. E.g. "We need 4 rows of 10 and 4 rows of 3".
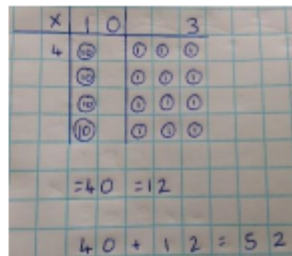
Then move onto using dienes, as a progression towards a more compact method.

Children can then represent the work they have done with the practical resources, in a way in which they understand, after modelling by the teacher.

x	10	3
4	OOOOOOOOOO	OOO
	OOOOOOOOOO	OOO
	OOOOOOOOOO	OOO
	OOOOOOOOOO	OOO

x	Tens	Ones

=40 =12

40 + 12 = 52

93		
90	3	270
x3	x3	+ 9
270	9	279

72		
60	12	180
x3	x3	+ 36
180	36	216
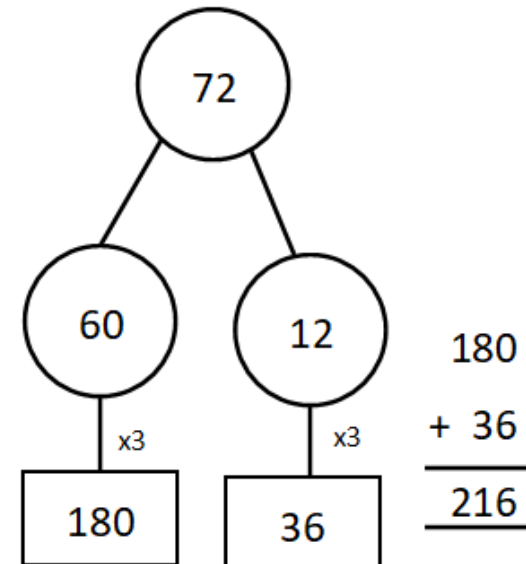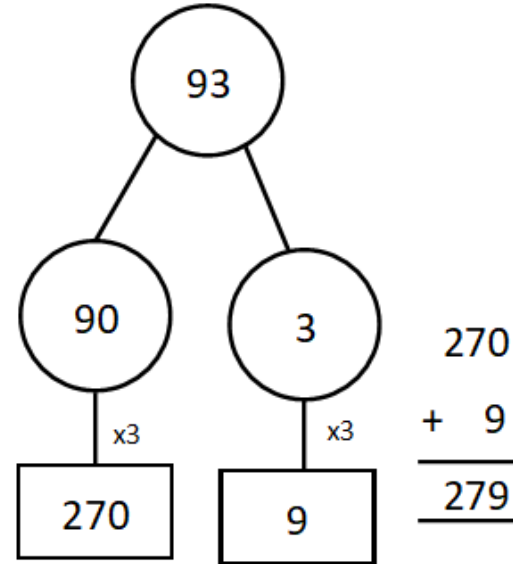
Step 3: Grid method

Once the children have a secure understanding of the above steps, the grid method can be introduced, alongside a pictorial representation to start with, then the children practise and use this in a variety of different contexts.

x	10	3
4	40	12

40 + 12 = 52
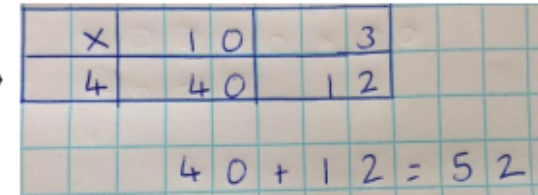
Step 4: Short multiplication

For those children who show a secure understanding of the previous steps and can use these in a variety of contexts, they may be shown how to record this as a short multiplication method. This should be done alongside the grid method so that children are clear on the link between the two.

	1	3
x		4
	1 2	3x4
	4 0	10x4
	5	2

	1	3
x		4
	5	2
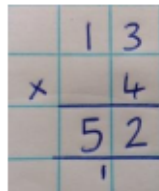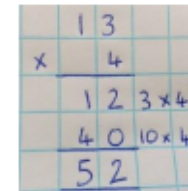
Written Methods:

(For progression on multiplying a two-digit number by a one-digit number see Year 3)
(You may need to back track to arrays and using arrays in the grid method for multiplying a 3-digit number by a one-digit number- See Year 3)
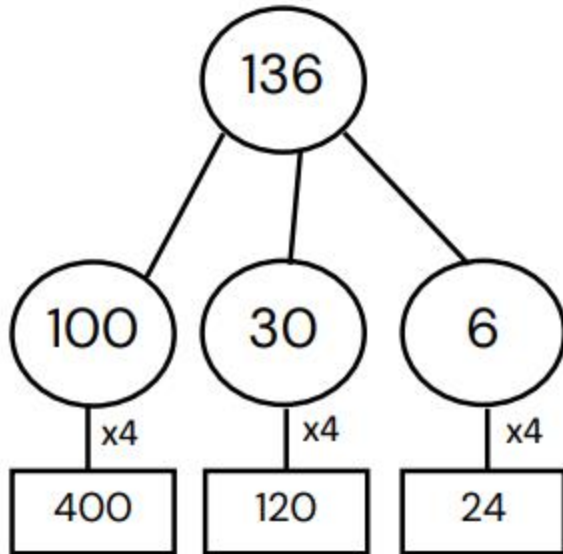
Step 1: Grid method for multiplying three-digit numbers by a one-digit number.

Recap previous multiplication using the grid method and extend this to multiplying two-digit and three-digit numbers by a one-digit number. Track back for any children who are not confident.

Step 3: Short multiplication for multiplying by a one-digit number.

Step 2: Part Whole Model

Pupils can be asked to work out a calculation using the grid method, and then compare to 'your' column method. What are the similarities and differences? Unpick the steps together and show how it reduces the steps.

```
  400
+ 120
   24
____
  544
```


Children start by completing a short multiplication method alongside the grid method until they are secure and able to see and understand the links between the two.

Written Methods:

Step 1: Short multiplication for multiplying by a one-digit number

Children use this method to multiply four-digit numbers by a one-digit number, in a range of contexts and units. You may need to back track to grid method or use concrete and pictorial for those children not yet secure.

Step 2: Introduce long multiplication for multiplying up to four-digit numbers by two-digit numbers.

The grid method can be used to introduce long multiplication as this method not only shows each row clearly but will be a familiar method to the children.

Children when multiplying by the tens number, children can be taught to put the '0' in the ones column then think '1 times 8, 1 times 1' etc., as long as they understand the place value involved.

x	10	9
10	100	90
4	40	36

Written Methods: Short and long multiplication

Children will use short multiplication to multiply numbers with more than 4 digits by a 1-digit number, to multiply money and measures and to multiply decimals with up to 2 decimal places by a single digit.

Children will use long multiplication to multiply numbers with up to 4-digits by 2-digit numbers.

345 x 6 =

Calculations at Christleton Primary School

division

Year 3	Year 4	Year 5	Year 6
Divide a 2 digit number by a 1 digit number e.g. 72 ÷ 3	Divide a 3 digit number by a 4 digit number e.g. 856 ÷ 4	Divide a 4 digit number by a 1 digit number, including with remainders e.g. 2365 ÷ 4	Divide 4 digit numbers by 2 digit numbers, including with remainders e.g. 1212 ÷ 11

goes into

divided by

out of   ◯   quotient

fraction   division   average

half   share   ◯   equally

separate

parts

Written Methods:

Step 1: Developing understanding of grouping, using a number line and introducing remainders.

Children explore, through the continued use of practical equipment, pictures and number lines, the concept of remainders, how many are left etc. This is preparation for carry remainders across within short division.

Children also continue to develop their understanding of using grouping on a number line to divide, and also to find remainders.

Step 2: Part Whole Model

$48 \div 2$

$48 \div 3$
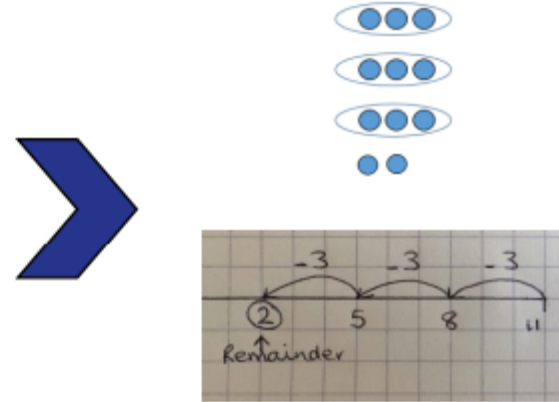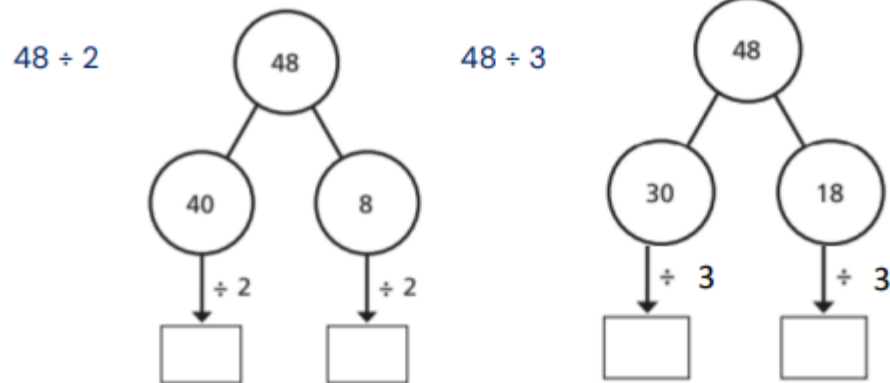
Step 3: Introducing short division (no remainders and no numbers carried)

Once children are secure with division as grouping and sharing, using number lines, arrays etc. short division for larger two-digit numbers can be introduced. To start with, this should be introduced with numbers that have no remainders within, or at the end of the calculation.
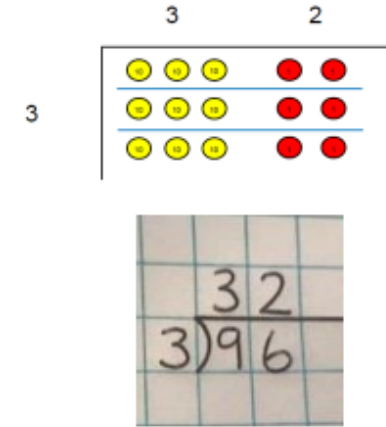
Step 4: Short division, with no remainders in the final answer

Once children have shown a secure understanding of the above 2 steps, they should be taught how to use short division when remainders occur within the calculation and be shown how to carry the remainder onto the next digit.
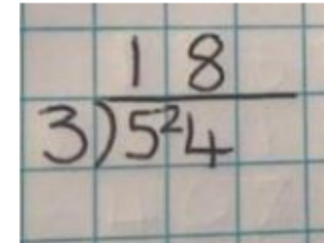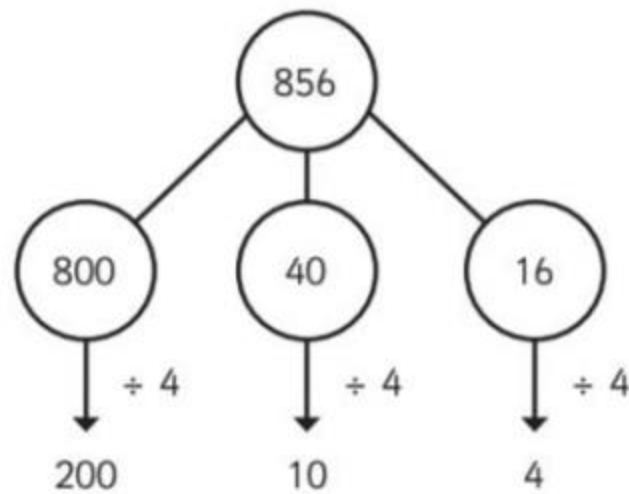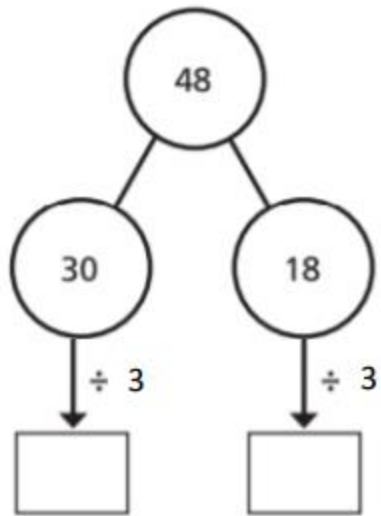
Written Methods:

Written methods of division are not included as a National Curriculum objective in Year 4, however we have included opportunity for children to consolidate their learning from Year 3 and extend to dividing 3 digit numbers by a 1 digit number.
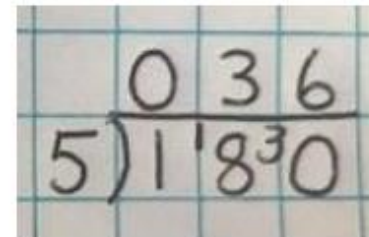
Step 1: Part Whole Model

Recap 2-digit from Y3 and then extend to 3-digit for Y4

Children move into dividing numbers with up to 3 digits by a one-digit number in a wide range of contexts.
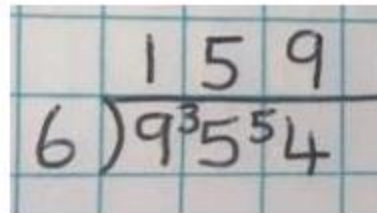
Where the answer to the first column is 0, children should initially write 0 above to acknowledge this, then carry to number over to the next digit as a remainder.

Within problem solving, children are encouraged to consider when to use a written method and when a mental method would be more efficient.

Written Methods:

Step 1: Dividing numbers with up to 4-digits by a one-digit number with no remainders in the final answer

Children move into dividing numbers with up to 3 digits by a one-digit number in a wide range of contexts. At this stage this will not include calculations which result in a final answer with a remainder. However, this could be taught as an extension for children who have exceeded this objective.

Where the answer to the first column is 0, children should initially write 0 above to acknowledge this, then carry to number over to the next digit as a remainder.

Step 2: Short division with remainders

Children are introduced to examples that have remainders within the final answer. Children should be given the opportunity, through specific teaching and modelling, to consider the meaning of the remainder and how it should be expressed (i.e. as a fraction, a decimal, or as a rounded number, depending on the context of the problem).

Written Methods:

Step 1: Extend use of short division for dividing by one-digit numbers.

Children continue to develop their use of short division and how to express remainders as whole numbers, fractions, rounded numbers and decimals. Specific teaching to take place to support children in understanding each of these and when they should be used.

Step 2: Dividing by two-digit numbers

Using Short Division to divide by two-digit numbers

When children are fully secure with long division for dividing by a two-digit number, they may progress to a short division method. Be aware that there are multiple parts to each step and therefore children may make errors if they rush or if their understanding is not yet secure enough.

367 ÷ 5 =