

Ridgeway Primary School
Maths Calculation & Expectation Policy
September 2025

The National Curriculum 2014 outlines that:

“Mathematics is a creative and highly interconnected discipline that has been developed over centuries, providing the solution to some of history’s most intriguing problems. It is essential to everyday life, critical to science, technology and engineering, and necessary for financial literacy and most forms of employment. A high-quality mathematics education therefore provides a foundation for understanding the world, the ability to reason mathematically, an appreciation of the beauty and power of mathematics, and a sense of enjoyment and curiosity about the subject.”

Maths at Ridgeway

Our Maths Curriculum will nurture enquiring and confident mathematicians who have a fluent grasp of number and mathematical concepts; appreciate the myriad of ways Maths can be found in the world around them; relish opportunities to solve complex problems, finding increasingly elegant solutions for them; apply logical reasoning to challenges; and accurately communicate their mathematical thinking.

In line with this, one of the National Curriculum aims is that all pupils:

- become fluent in the fundamentals of mathematics, including through varied and frequent practice with increasingly complex problems over time, so that pupils develop conceptual understanding and the ability to recall and apply knowledge rapidly and accurately

The expectation is that:

“The majority of pupils will move through the programmes of study at broadly the same pace. However, decisions about when to progress should always be based on the security of pupils’ understanding and their readiness to progress to the next stage. Pupils who grasp concepts rapidly should be challenged through being offered rich and sophisticated problems before any acceleration through new content. Those who are not sufficiently fluent with earlier material should consolidate their understanding, including through additional practice, before moving on.”

Progression through the Key Stages

Key Stage 1

Principal focus:

- Pupils **develop confidence** and mental fluency with **whole numbers**, **counting** and **place value**
- Pupils should work with **numerals**, **words** and the **4 operations**
- Teaching and Learning should include **practical resources (for example, concrete objects and measuring tools)**

By the end of Year 2 pupils should:

- Know the **number bonds to 20**
- Be precise in **using** and **understanding place value**

An emphasis on **practise** at this early stage will aid fluency.

Lower Key Stage 2 (Years 3 and 4)

Principal focus:

- Pupils become **increasingly fluent** with **whole numbers** and the **4 operations**, including **number facts** and **place value**
- Ensure that pupils develop **efficient written** and **mental methods**
- Ensure that pupils perform **calculations accurately** with **increasingly large whole numbers**

Pupils should:

- Develop their ability to **solve a range of problems**, including with simple **fractions** and **decimal place value**

By the end of Year 4 pupils should:

- Have memorised their **multiplication tables up to and including the 12 times table**
- Show **precision** and **fluency** in their learning

Upper Key Stage 2 (Years 5 and 6)

Principal focus:

- Ensure that pupils **extend** their **understanding of the number system** and **place value to include larger integers**
- Develop the **connections** between **multiplication** and **division** with **fractions, decimals, percentages** and **ratio**
- Pupils are introduced to the **language of algebra** as a **means for solving a variety of problems**

Pupils should:

- Develop their ability to **solve a wider range of problems**, including **increasingly complex properties of numbers** and **arithmetic**
- **Solve problems** demanding **efficient written** and **mental methods** of calculation

By the end of Year 6 pupils should:

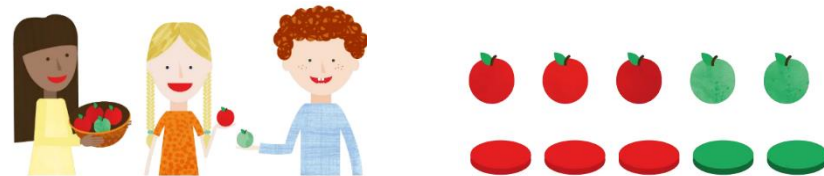
- Be fluent in **written methods** for **all 4 operations** (including long multiplication and division)
- Be fluent in working with **fractions, decimals** and **percentages**

Concrete, Pictorial, Abstract (CPA)

The Concrete, Pictorial, Abstract approach (CPA) is a highly effective approach to teaching that develops a deep and sustainable understanding of mathematical concepts. Children (and adults!) can find maths difficult because it is abstract. The CPA approach builds on children's existing knowledge by introducing abstract concepts in a concrete and tangible way. It involves concrete, pictorial and abstract representations being used alongside each other to teach mathematical concepts.

Concrete

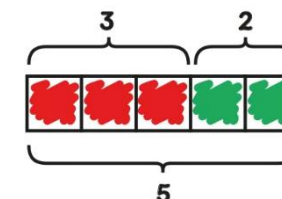
The "doing" stage – pupils use concrete objects to model problems.



Pictorial

The "seeing" stage – pupils use visual representations of concrete objects (alongside concrete resources) to model problems. This stage encourages children to make a mental connection between the physical object they just handled and the abstract pictures, diagrams or models that represent the objects from the problem.

Building or drawing a model makes it easier for children to grasp difficult abstract concepts (for example, fractions). It helps students visualise abstract problems and make them more accessible. It is important that the pictorial representation is linked to or resembles the concrete resource as close as possible.



Abstract

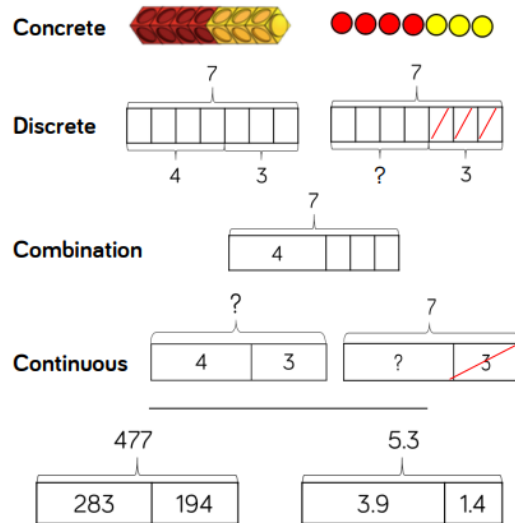
The "symbolic" stage – pupils use abstract symbols to model problems, using only numbers, notation, and mathematical symbols to indicate addition (+), subtraction (-), multiplication (x) or division (÷).

$$3 + 2 = \boxed{5}$$

Models to support teaching

Model	Why?
Part-whole model	<u>Supports children with their understanding of partitioning.</u> When the parts are complete, children add these together to make the whole. When the whole is complete, children take away the given part from the whole to find the other missing part. Part-whole models can be used to partition a number into two or more parts, or to help children to partition a number into tens and ones or other place value columns. In KS2, children can apply their understanding of the part-whole model to add and subtract fractions, decimals and percentages.

Bar model (single)



A type of a part-whole model that can support children in representing calculations to help them unpick the structure.

Cubes and double-sided counters can be used in a line as a concrete representation of the bar model.

Discrete bar models are a good starting point with smaller numbers. Each box represents one whole.

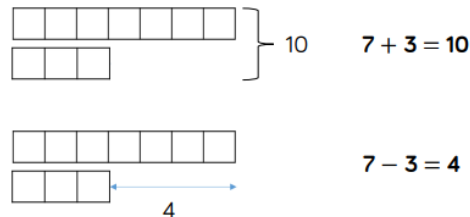
The **combination** bar model can support children to calculate by counting on from the larger number. It is a good stepping stone towards the continuous bar model.

Continuous bar models are useful for a range of values. Each rectangle represents a number. The question mark indicates the value to be found.

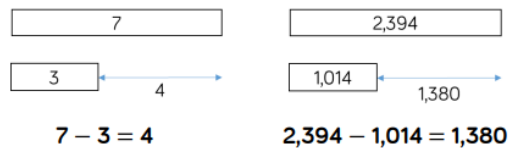
In KS2, children can use bar models to represent larger numbers, decimals and fractions.

Bar model (multiple)

Discrete



Continuous

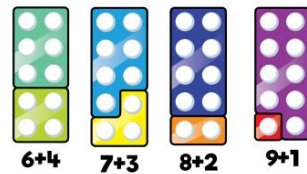
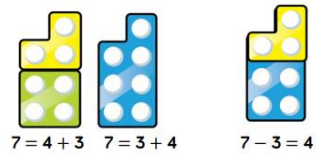


Two or more bars can be drawn, with a bracket labelling the whole positioned on the right hand side of the bars. Smaller numbers can be represented with a **discrete** bar model whilst **continuous** bar models are more effective for larger numbers.

Multiple bar models can also be used to represent the difference in subtraction. An arrow can be used to model the difference.

When working with smaller numbers, children can use cubes and a discrete model to find the difference. This supports children to see how counting on can help when finding the difference.

Numicon



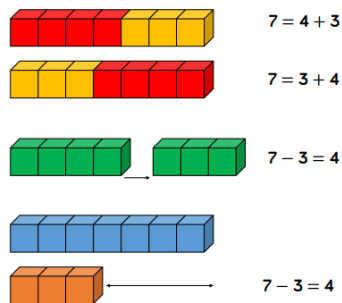
To support children to subitise numbers as well as explore number sense, partitioning and number bonds.

When adding numbers, children can see how the parts come together making a whole. As children use Numicon more often, they can start to subitise the total due to their familiarity with the shape of each number.

When subtracting numbers, children can start with the whole and then place one of the parts on top of the whole to see what part is missing. Again, children will start to be able to subitise the part that is missing due to their familiarity with the shapes.

Children can also work systematically to find number bonds. As they increase one number by 1, they can see that the other number decreases by 1 to find all the possible number bonds for a number.

Cubes



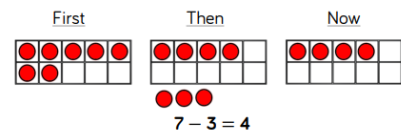
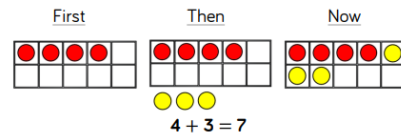
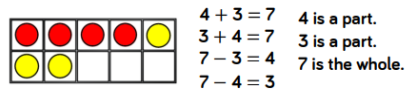
When adding numbers, children can see how the parts come together to make a whole. Children could use two different colours of cubes to represent the numbers before putting them together to create the whole.

When subtracting numbers, children can start with the whole and then remove the number of cubes that they are subtracting in order to find the answer.

Cubes can also be useful to look at subtraction as difference.

Cubes are useful when working with smaller numbers but are less efficient with larger numbers as they are difficult to subitise and children may miscount them.

Ten frames (within 10)

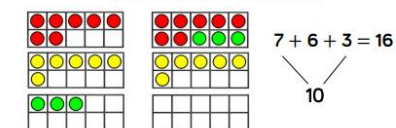
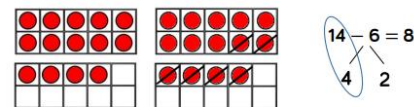
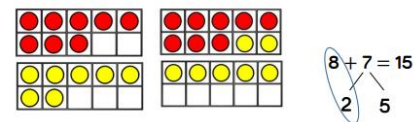


Supports children to understand the different structures of addition and subtraction.

Using the language of parts and wholes represented by objects on the ten frame introduces children to aggregation and partitioning. Aggregation is a form of addition where parts are combined together to make a whole. Partitioning is a form of subtraction where the whole is split into parts. Using these structures, the ten frame can enable children to find all the number bonds for a number.

Children can also use ten frames to look at augmentation (increasing a number) and take-away (decreasing a number). This can be introduced through a first, then, now structure which shows the change in the number in the 'then' stage. This can be put into a story structure to help children understand the change e.g. First, there were 7 cars. Then, 3 cars left. Now, there are 4 cars.

Ten frames (within 20)



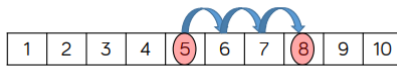
When adding two single digits, children can make each number on separate ten frames before moving part of one number to make 10 on one of the ten frames. This supports children to see how they have partitioned one of the numbers to make 10, and makes links to effective mental methods of addition.

When subtracting a one-digit number from a two-digit number, firstly make the larger number on 2 ten frames. Remove the smaller number, thinking carefully about how you have partitioned the number to make 10, this supports mental methods of subtraction.

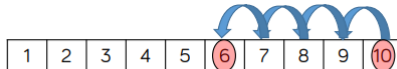
When adding three single-digit numbers, children can make each number on 3 separate 10 frames before considering which order to add the numbers in. They may be able to find a number bond to 10 which makes the calculation easier. Once again, the ten frames support the link to effective mental methods of addition as well as the importance of commutativity.

Number tracks

$$5 + 3 = 8$$



$$10 - 4 = 6$$



$$8 + 7 = 15$$



Supports children in their understanding of addition and subtraction.

When adding, children count on to find the total of the numbers. On a number track, children can place a counter on the starting number and then count on to find the total.

When subtracting, children count back to find their answer.

Number tracks can work well alongside ten frames.

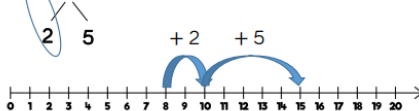
Playing board games can help children to become familiar with the idea of counting on using a number track before they move on to number lines.

Labelled number lines

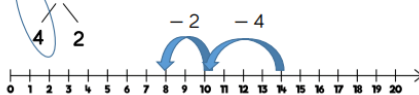
$$5 + 3 = 8$$



$$8 + 7 = 15$$



$$14 - 6 = 8$$



Supports children in their understanding of addition and subtraction.

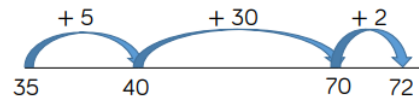
Children can start by counting on or back in ones, up or down the number line. This skill links directly to the use of the number track.

Children can add numbers by jumping to the nearest 10 and then jumping to the total. This links to the making 10 method which can also be supported by ten frames. The smaller number is partitioned to support children to make a number bond to 10 and to then add on the remaining part.

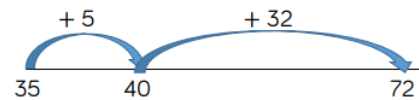
Children can subtract numbers by firstly jumping to the nearest 10. Again, this can be supported by ten frames so children can see how they partition the smaller number into the two separate jumps.

Blank number lines

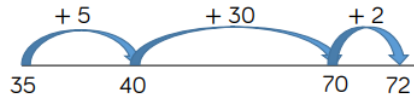
$$35 + 37 = 72$$



$$35 + 37 = 72$$



$$72 - 35 = 37$$



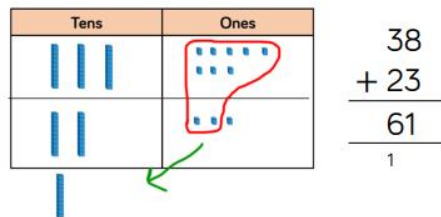
Blank number lines provide children with a structure to add and subtract numbers in smaller parts.

Developing from labelled number lines, children can add by jumping to the nearest 10 and then adding the rest of the number either as a whole or by adding the tens and ones separately.

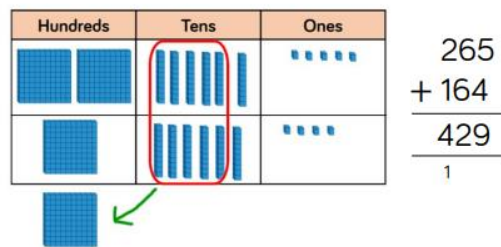
Children may also count back on a number line to subtract, again by jumping to the nearest 10 and then subtracting the rest of the number.

Blank number lines can also be used effectively to help children subtract by finding the difference between numbers. This can be done by starting with the smaller number and then counting on to the larger number. They then add up the parts they have counted on to find the difference between the numbers.

Base 10 (addition)



$$\begin{array}{r} 38 \\ + 23 \\ \hline 61 \\ 1 \end{array}$$



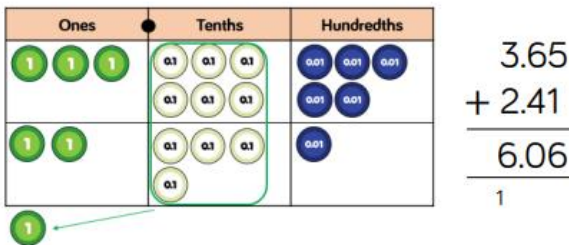
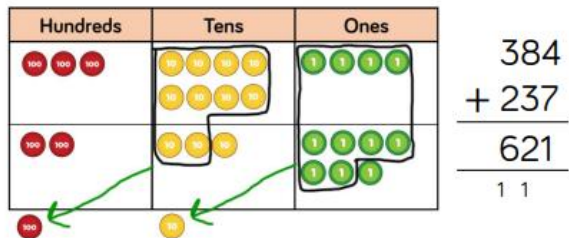
$$\begin{array}{r} 265 \\ + 164 \\ \hline 429 \\ 1 \end{array}$$

An effective way to support children's understanding of column addition. It is important that children write out their calculations alongside using or drawing Base 10 so they can see the clear links between the written method and the model. When drawing out ones and tens, children should do so in a systematic way that mirrors the layout of the frames e.g. in the image on the left, the 8 ones are drawn as a line of 5, equally spaced, with 3 more ones directly underneath, so it is easy to visually see why the 2 from the second number has been included to make the 10.

Children should first add without an exchange before moving on to addition with exchange. The representation becomes less efficient with larger numbers due to the size of Base 10. In this case, place value counters may be the better model to use.

When adding, always start with the smallest place value column.

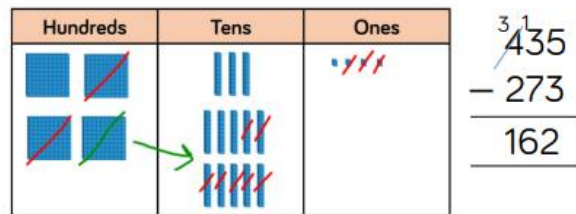
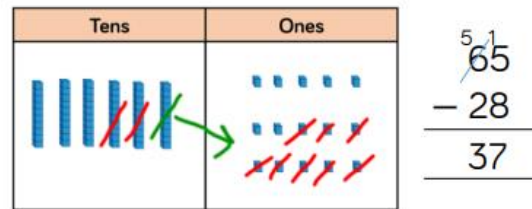
Place value counters (addition)



Using place value counters is an effective way to support children's understanding of column addition. It is important that children write out their calculations alongside using or drawing counters so they can see the clear links between the written method and the model. When drawing place value counters, children should do so in a systematic way like with base 10 (see above).

If you do not have place value counters, use normal counters on a place value grid to enable children to experience the exchange between columns.

Base 10 (subtraction)



An effective way to support children's understanding of column subtraction. It is important that children write out their calculations alongside using or drawing Base 10 so they can see the clear links between the written method and the model.

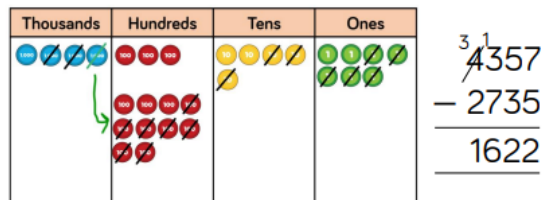
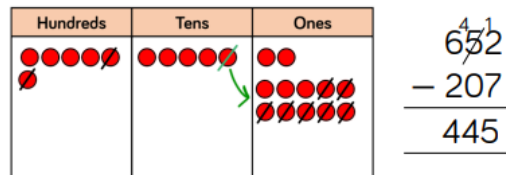
Children should first subtract without an exchange before moving on to subtraction with exchange.

When building the model, children should only make the whole using Base 10, and then subtract the part. Highlight this difference to addition to avoid errors by making both numbers.

Children start with the smallest place value column. When there are not enough ones/tens/hundreds to subtract in a column, children need to move to the column to the left and exchange e.g. exchange 1 ten for 10 ones. They can then subtract efficiently.

This model is efficient with up to 4-digit numbers. Place value counters are more efficient with larger numbers and decimals.

Place value counters (subtraction)



It is important that children write out their calculations alongside using or drawing counters so they can see the clear links between the written method and the model.

If you do not have place value counters, use normal counters on a place value grid to enable children to experience the exchange between columns.

When building the model, children should only make the whole using counters, and then subtract the part. Children start with the smallest place value column. When there are not enough ones/tens/hundreds to subtract in a column, children need to move to the column to the left and exchange e.g. exchange 1 ten for 10 ones. They can then subtract efficiently.

Planning Expectations

Maths objectives should be clear on weekly plans, starting with 'To know...' or 'To know how to...'. Objectives covered should be highlighted on your curriculum document in your curriculum folders.

Medium term plans should be accessible on the system, or on MyUSO.

Planning conversations should involve discussing the following questions:

- What is the learning? NC objective broken down to what you want the children to achieve that lesson and worded as 'to know... or to know how to...'
- What learning have they covered already that might act as a useful bridge into this new learning? Could we use a retrieval task? What about children that are working out of band?
- What resources do we need? Why are we using these resources? Do we know how to use them? How are we going to model to the children? CPA - what representations are we using? Why? What value do they add?
- What mathematical language are we going to use? What language do we expect the children to use? Do we understand what the language means? How will we ensure that all children access and use this language?
- What stem sentences will we use to support the children's verbal and written reasoning?
- What are our key questions? How and when will these key questions be used?
- What misconceptions might arise? How are we going to address them?
- How is learning being recorded? Does it need recording? Is there enough fluency being completed?
- How can we extend and challenge?

Teaching Expectations

- Minimum 2 pieces of learning recorded in books per week. Children must only use pencil in their books when writing; they may use a colour pencil or pen (not felt tip) to mark their work. There should be a clear short date, underlined; for years 4 – 6, the Roman numeral date should also be present and underlined; title should be clear and relate to the learning and maths skill of the lesson (e.g. adding two 2-digit numbers, no exchange); pupils should be writing one digit per square; when explaining thinking, pupils should write as they would in their Writing books
- If sheets with questions are being used, they must be printed with the learning clear at the top
- Evidence of children marking a minimum of 5 questions (e.g. using answer sheets) and correcting any mistakes in a different colour pencil

- If a pupil has been supported, this should be evident by the adult's initials next to where the support was given (e.g. KS). Where initial support has been given to a pupil, 'IS' should be used; where a child has continued to work independently after adult support, an 'I' should be used; where support was given for all the learning, an 'S' should be used
- Mixed Maths should happen once per week and should be completed in Maths books with the sheet stuck on one page and space for workings on the next page. Mixed Maths should not be differentiated with various different sheets. Where children are not accessing the year group curriculum, they should be supported to address their gaps or consolidate concepts, either with the class teacher or a teaching assistant

Book expectations

Short date, underlined

Y4 – Y6 Roman numeral date alongside short date, underlined

Clear title, showing the learning, underlined

Clear question numbers

One digit per square when writing digits in books.

Handwritten work in the book:

26.06.24 XXV.VLMMXXIV

Adding two 2-digit numbers (no exchange)

1.
$$\begin{array}{r} \text{T O} \\ 23 \\ + 32 \\ \hline 55 \end{array}$$

Questions worked out from sheets must be numbered with the relevant question number.

Types of Quadrilateral

parallelogram 2 pairs of equal sides Diagonally opposite angles are equal	trapezium 1 pair of sides are parallel 360°	rhombus All sides are equal Diagonally opposite angles are equal
rectangle 2 pairs of equal parallel sides 4 right angles (90°)	kite 2 pairs of sides of equal length 1 pair of opposite angles is equal	square 4 equal parallel sides 4 right angles (90°)

interior angles add up to 360°

180° + 180° = 360°

Handwritten calculations:

$$\begin{array}{r}
 120 \checkmark \\
 \times 2 \\
 \hline
 240 \\
 + 168 \\
 \hline
 408
 \end{array}$$

$$\begin{array}{r}
 190 \\
 + 272 \\
 \hline
 462
 \end{array}$$

6. He cannot be correct because in this shape, the opposite angles are equal. $136^\circ + 136^\circ = 272^\circ$ and $95^\circ + 95^\circ = 190^\circ$. $190^\circ + 272^\circ = 462^\circ$, which is more than 360°. The angles in this shape add up to 360°.

1. Find one difference and two similarities between the rhombus and the square.

4. Leyla says, "I know the opposite angles in an isosceles trapezium are equal. I know angle A equals 77° and angle B equals 103° ." Is Leyla correct? Prove it.

5. The shape below is a parallelogram. Follow the clues and find the possible measurements for angles A, B, C and D.

6. Jack says that two of the angles in his rhombus are 136° and 95° . Explain why Jack cannot be correct.

Handwritten calculations:

$$\begin{array}{r}
 118 \\
 + 62 \\
 \hline
 180 \\
 117 \\
 + 82 \\
 \hline
 258 \\
 116 \\
 + 95 \\
 \hline
 327
 \end{array}$$

1. Not all of the angles are the same. The opposite angles are equal.

2. $A = 62^\circ$, $B = 118^\circ$. The opposite sides are the same.

3. 102° , 33°

4. No she is not, because if it is an isosceles trapezium, then the top angle(s) are the same and the bottom two are the same.

Working out for a question must be underneath where they have written the number that corresponds with the question on the sheet.

If there is key vocab for the lesson, or learning prompts to support the children, this should be stuck into their books securely.

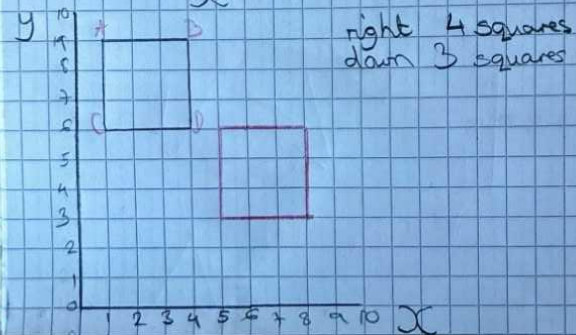
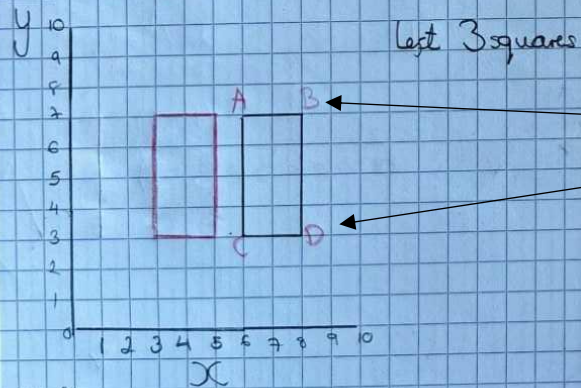
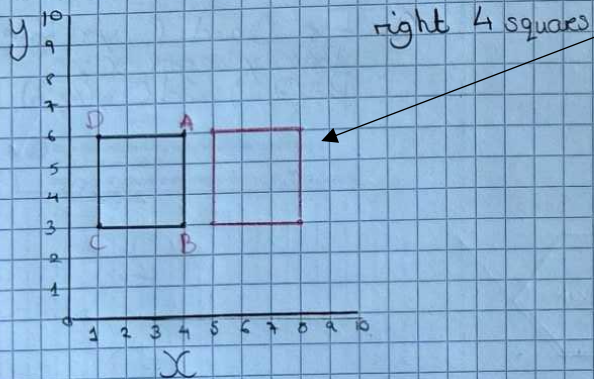
Evidence of self-marking and correction if an answer is incorrect.

If working from a sheet, this should be small enough to fit into their books and be glued down securely.

19.4.24
XIX.1V.MM.XXIV

Translation

Translation: Sliding an object into a new position without flipping or turning it.



Rulers must be used when drawing shapes in books

Diagrams clearly labelled

23.1.24

Algebra



Shape times shape

Each shape stands for one of the numbers from 0 to 12.

Can you work out what they are from the multiplications below?

4

Numbered counters (0-12)

Years 5 and 6

$\text{red square} \times \text{red square} = \text{red semi-circle}$ ✓	$\text{blue rectangle} \times \text{blue rectangle} = \text{yellow star}$ ✓
$\text{red square} \times \text{green oval} = \text{red semi-circle}$ ✓	$\text{red square} \times \text{yellow star} = \text{green hexagon}$ ✓
$\text{blue rectangle} \times \text{green oval} = \text{blue circle}$ ✓	$\text{blue rectangle} \times \text{red diamond} = \text{blue rectangle}$ ✓
$\text{blue rectangle} \times \text{red square} = \text{green triangle}$ ✓	$\text{red diamond} \times \text{green hexagon} = \text{green hexagon}$ ✓
$\text{green triangle} \times \text{red square} = \text{blue circle}$ ✓	$\text{red square} \times \text{red inverted triangle} = \text{red inverted triangle}$ ✓
$\text{red square} \times \text{red square} = \text{green oval}$ ✓	$\text{red inverted triangle} \times \text{blue rectangle} = \text{red inverted triangle}$ ✓

Take out 7 and use the remaining counters to work out the value of each shape.

$\text{yellow star} = 9$	$\text{blue circle} = 12$	$\text{green hexagon} = 10$
$\text{red square} = 2$	$\text{blue rectangle} = 3$	$\text{yellow star} = 5$
$\text{red diamond} = 1$	$\text{green oval} = 4$	$\text{green triangle} = 6$
$\text{red inverted triangle} = 0$	$\text{red semi-circle} = 8$	$\text{blue house} = 11$

I know the square is 2 because $1 \times 1 \times 1 = 1$ but the answer is a different shape so it can't be 1 and everything else $\times$ together = more than 12.

I know the semi-circle is 8 because if the square is 2 the $2 \times 2 \times 2$ or $2^3 = 8$

I know the oval is 4 because it says $2 \times \text{oval} = 8$ all you need to do is write the inverse to work out what $\text{oval} = 8 \div 2 = 4$

I know the rectangle = 3 because it's $\text{rectangle} \times 4 = 12$ and if you do 1×4 it = 4 but the circle can't be 4 and you can't do 2×4 because $2 = \text{rectangle}$ not a rectangle it's already over 12 so that won't work so it can only be 3

I know the triangle = 6 because if the rectangle = 3 and the square is 2 it = $3 \times 2 = 6$

I know the circle is 12 because if the triangle is 6 and the square = 2 it's just 6×2 which = 12

I know the sun = 9 because if the rectangle = 3 and $\text{rectangle} \times \text{sun} = 27$ then it = $3 \times 9 = 27$

I know the star = 5 because the only numbers left are 1, 5, 10, 11, 12 it can't be 10, 11, 12 because they all equal something above 12 and it can't be 1 because then equal itself but it's a different shape so it has to be 5

I know the diamond on its side = 1 because it's $3 \times \text{diamond} = 3$ and the only number when you times it by something = the same number is 1

I know the upsidedown triangle = 0 because the square is 2 and it says $2 \times \text{upsidedown triangle} = \text{upsidedown triangle}$ and we already used 1, 2, 3, 4, 5, 6, 8, 9, 12 and if you $\times$ 11, 10, then it won't = the same thing but with 0 it will.

I know the hexagon = 10 because of it's $2 \times 5 = 10$ the hexagon must = 10.

I know the pentagon is twelve because that's the last number left and $0 \times 12 = 0$.

Clear explanations, reasons backed up with evidence, clear layout

Problem solving sheet stuck in

26.06.24 XXVI.VI.MMXXIV

Long Multiplication

$$\begin{array}{r} 1. \quad 3954 \\ \times \quad 23 \\ \hline 11862 \end{array} \quad (3954 \times 3)$$

$$\begin{array}{r} 79080 \\ \hline 90942 \end{array} \quad (3954 \times 20)$$

I need to remember my
place holder when multiplying
by 10.

When practising fluency, children can write 'in the moment' reflections about what they have noticed or need to remember. This will support their retrieval and consolidation of mathematical topics.

Mixed Maths

5. 10.29 X 12 X MM X IV Mixed Maths

1. $49256 + 5426 =$	2. $4281 \times 23 =$	3. $18.6 + 1.007 =$
4. A length of timber is 2400mm long. It is divided into 8 equal pieces. How long is each piece in metres?	5. $8^2 - 3 \times 2$	6. $47 \overline{) 1269}$
6. Some children hold a bake sale to raise some money for a local charity. They start with a float of £7.65. The ingredients cost £29.86. At the end of the sale, they count the money and have £79.54. How much money have they raised to the nearest 10p?	7. $\frac{1}{4} + \frac{3}{12}$	8. $\frac{1}{4} + \frac{3}{12}$
8. $\frac{7}{9}$ of 360 =	9. There were 2,408 people on board a cruise ship. At the next port, it takes on 557 more passengers, but 379 people get off. How many passengers are on board the ship now?	10. $\frac{1}{4} + \frac{3}{12}$

Handwritten work on the reverse side of the sheet:

1. $49256 + 5426 = 54698$

2. $4281 \times 23 = 98463$

3. $18.6 + 1.007 = 19.607$

4. $2400 \div 8 = 300$

5. $8^2 - 3 \times 2 = 64 - 6 = 58$

6. $47 \overline{) 1269}$

7. $\frac{1}{4} + \frac{3}{12} = \frac{3}{12} + \frac{3}{12} = \frac{6}{12} = \frac{1}{2}$

8. $\frac{7}{9} \times 360 = 280$

9. $2408 + 557 = 2965$
 $2965 - 379 = 2586$

10. $\frac{1}{4} + \frac{3}{12} = \frac{3}{12} + \frac{3}{12} = \frac{6}{12} = \frac{1}{2}$

Short date - underlined

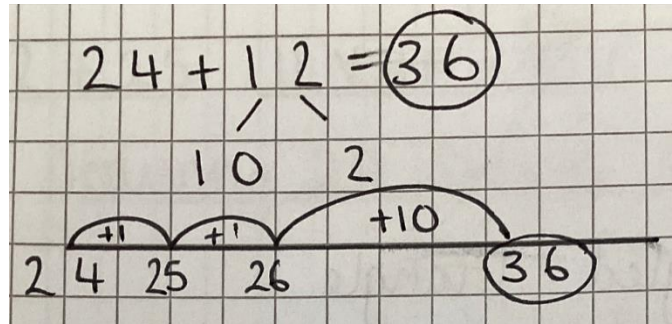
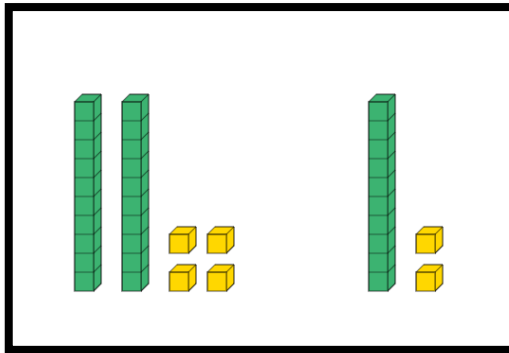
Roman numeral date (Years 4-6) - underlined

Title - underlined

Sheet stuck on one page, workings shown on the other

Marking and self-editing present

Addition on a blank number line:



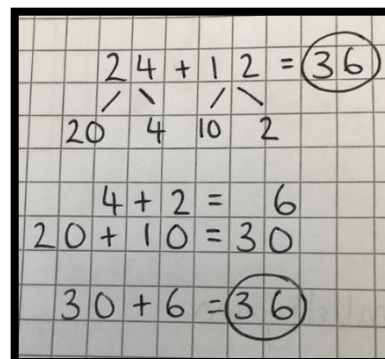
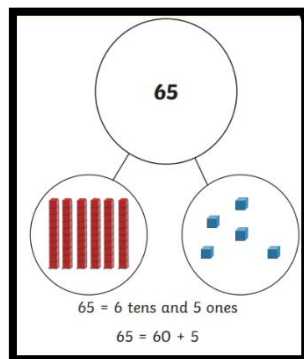
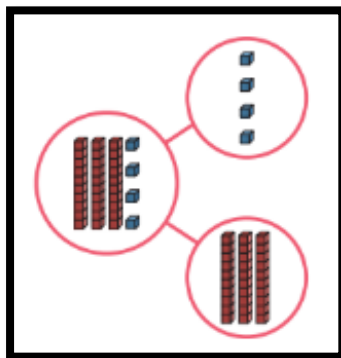
Initially children will be adding in steps of 1.

Then progress to ones being added first, followed by tens. This step will ensure that when children are ready to move onto column addition, they already have the knowledge of adding ones before tens.

Encourage children to use knowledge of number facts to support this.

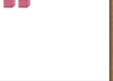
When using concrete resources, like a ten frame, children are encouraged to go to their next multiple of 10.

Addition as partitioning:



1. Partition the two numbers being added into tens and ones.
2. Add the ones.
3. Add the tens.
4. Add both totals.

Addition: compact column without exchanging

100s	10s	1s		H	T	O
				2	4	5
+				3	3	2
				5	7	7

Th	Th	H	T	O
5	6	4	3	2
+	4	3	2	5
9	9	6	8	6

Add each column starting with the ones. Children may need support with remembering the place value columns – these can be labelled above to support them.

Addition: compact column with exchanging

100s	10s	1s		H	T	O
				2	6	4
+					7	3
					3	7
				1		

5	6	4	3	2
+	6	2	7	2
1	1	9	1	5
				6
				1

Start with the ones, moving to the left to add each digit in each place value column. Label place value columns if support is needed.

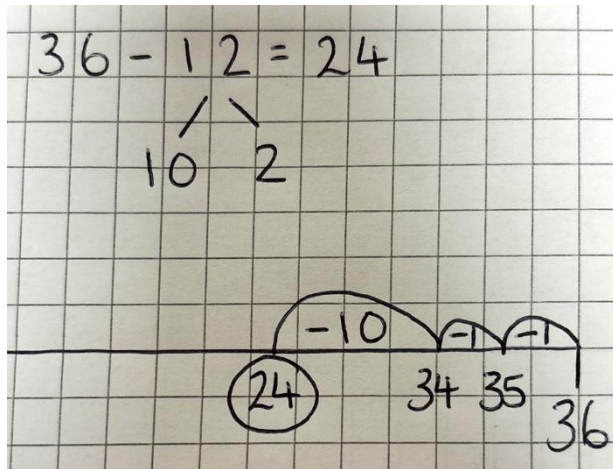
If a calculation adds to more than 9, the 'tens' digit is exchanged into the next column and added when calculating that column. In this example, 4 hundreds + 7 hundreds = 11 hundreds. The additional 10 hundreds are exchanged for an additional one thousand. This additional thousand is placed underneath the thousands column, underneath the calculation.

100s	10s	1s
		
		

100s	10s	1s
		
		

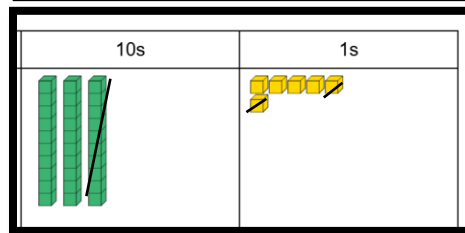
	H	T	O
	3	7	5
+		5	6
		3	1
	1	1	

Subtraction on a blank number line

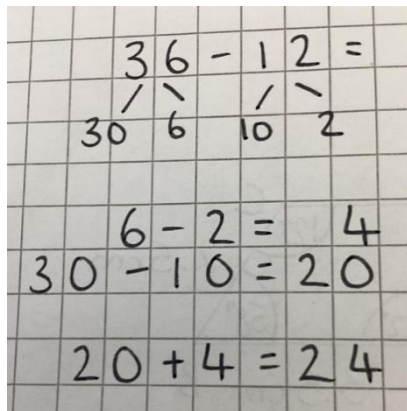


Children should have the greatest number on the right-hand side of the number line because on a number line, numbers with the greatest value appear on the right.

They should then count back in ones first, followed by tens. This supports the process of column subtraction later on.



Subtraction as partitioning



Children should partition each number into its tens and ones.

They should then take away the ones, followed by taking away the tens.

Finally, they need to add their answers together to get their final answer.

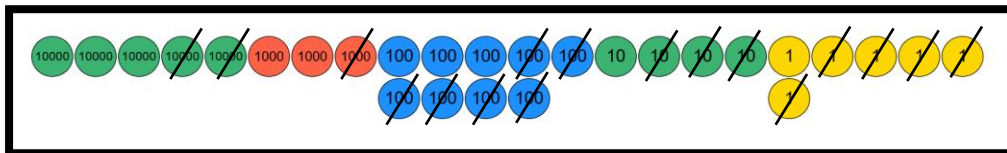
**only works with numbers where the ones being taken away are not greater than the starting number.

Subtraction: compact column with no exchanges

$$\begin{array}{r} 53946 \\ - 21635 \\ \hline 32311 \end{array}$$

Children should start by taking away the ones, then working their way to the left, subtracting each place value column until no more remain.

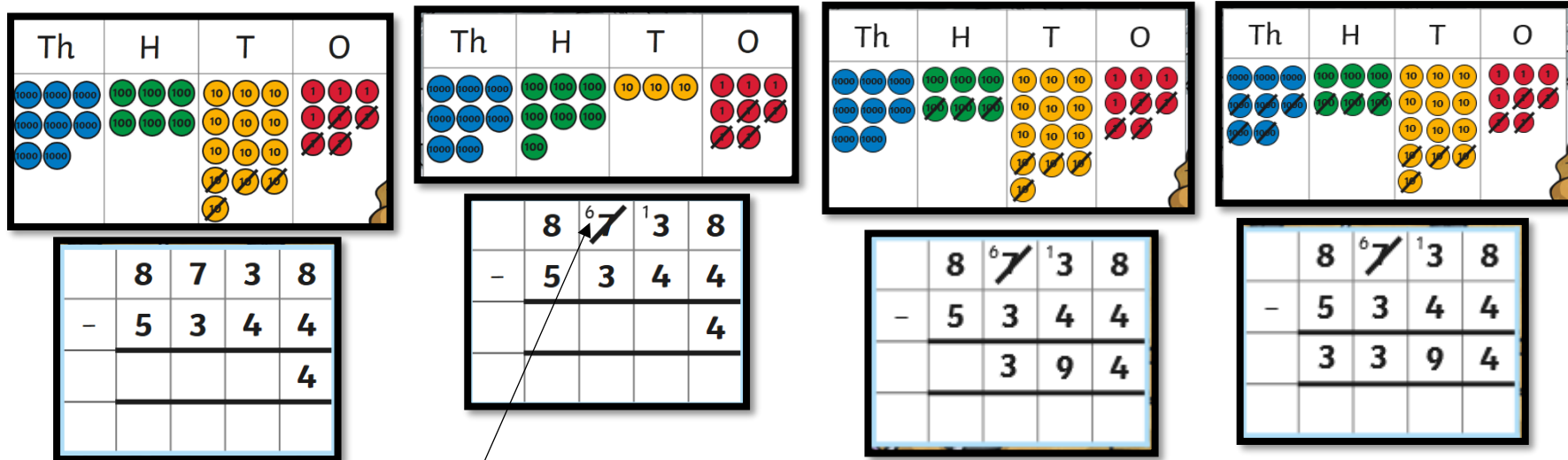
As with addition, if children need support remembering the place value columns, these can be labelled above.



Th	H	T	O

Th	H	T	O

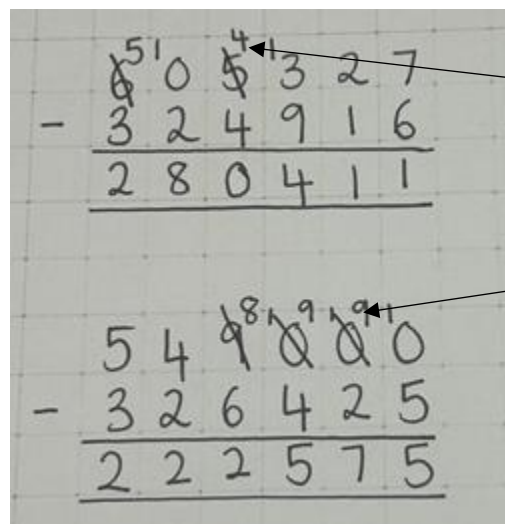
Subtraction: compact column with one exchange



When a digit that is being subtracted is greater than the digit it is being subtracted from, children need to exchange.

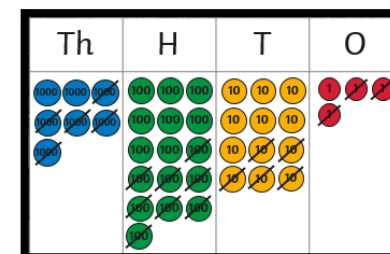
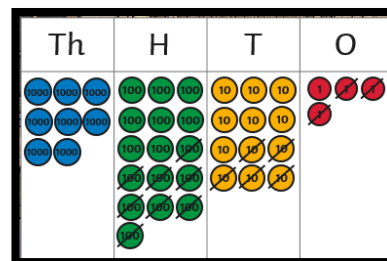
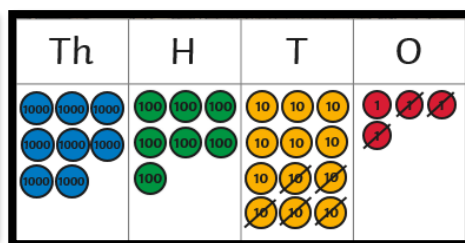
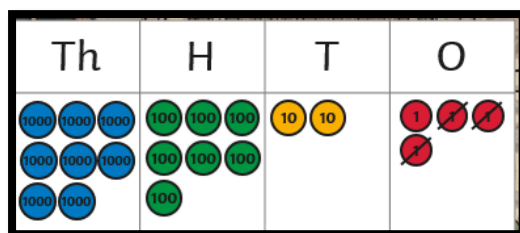
Exchange from the next column on the left.

Subtraction: compact column with multiple exchanges



When a digit that is being subtracted is greater than the digit it is being subtracted from, children need to exchange.

If the column closest is still less than the number being subtracted multiple exchanges will need to take place.



	8	7	2	4
-	5	8	5	3
				1

	8	7	¹ 2	4
-	5	8	5	3
			7	1

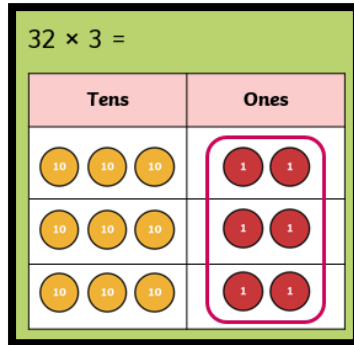
	8	7	¹ 2	4
-	5	8	5	3
			7	1

	8	7	¹ 2	4
-	5	8	5	3
	2	8	7	1

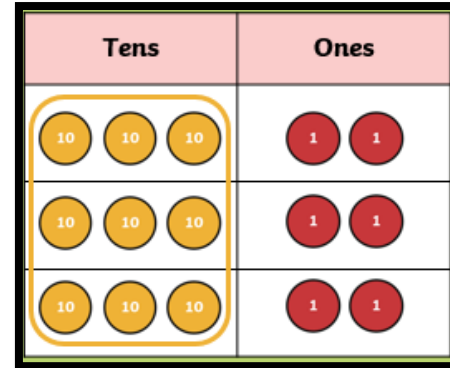
Multiplication: [Grid Method](#)

$$\begin{array}{r}
 26 \times 5 \\
 \hline
 \begin{array}{|c|c|c|}
 \hline
 \times & 20 & 6 \\
 \hline
 5 & 100 & 30 \\
 \hline
 \end{array}
 \end{array}
 = 100 + 30 = 130$$

1. Partition the 2-digit number into tens and ones.
2. Multiply the ones number by the ones
3. Multiply the tens number by the ones
4. Add the totals



	T	O
	3	2
x		3
		6



	T	O
	3	2
x		3
	9	6

26 x 15		
x	20	6
10	200	60
5	100	30

1. Partition the 2-digit number into tens and ones.
2. Multiply the ones number by the ones number
3. Multiply the ones number by the tens number
4. Multiply the ones number by the tens number
5. Multiply the tens number by the tens number
6. Add the totals

$$= 300 + 90 = 390$$

Long Multiplication: compact method

1. Multiply the 3-digit number by the ones
2. Multiply the 3-digit number by the tens (remember the place holder)
3. Add both answers together to get final answer

It is important to note that children should start with calculations where only one exchange is needed, before moving on to multiple exchanges.

			H	T	O	
			1	2	3	
	x			4	2	
					6	→ (123 × 2)
						→ (123 × 40)

			H	T	O	
			1	2	3	
	x			4	2	
				4	6	→ (123 × 2)
						→ (123 × 40)

			H	T	O	
			1	2	3	
	x			4	2	
			2	4	6	→ (123 × 2)
						→ (123 × 40)

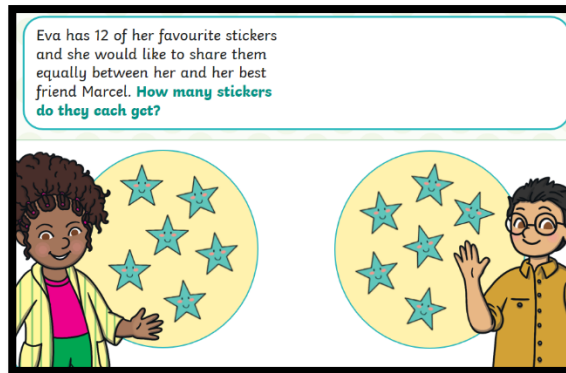
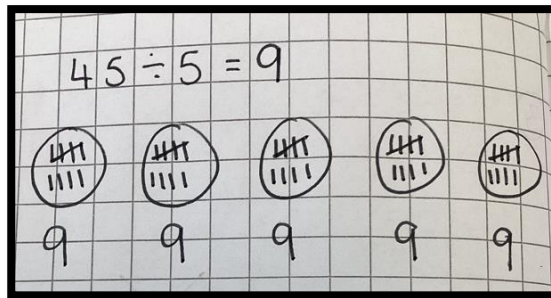
			H	T	O	
			1	2	3	
	x			4	2	
			2	4	6	→ (123 × 2)
			1	2	0	→ (123 × 40)

			H	T	O	
			1	2	3	
	x			4	2	
			2	4	6	→ (123 × 2)
			9	1	0	→ (123 × 40)

			H	T	O	
			1	2	3	
	x			4	2	
			2	4	6	→ (123 × 2)
		4	9 ₁	2	0	→ (123 × 40)

			H	T	O		
			1	2	3		
	x			4	2		
			2	4	6	→ (123 × 2)	
			4	9 ₁	2	0	→ (123 × 40)
			5	1	6	6	
			1				

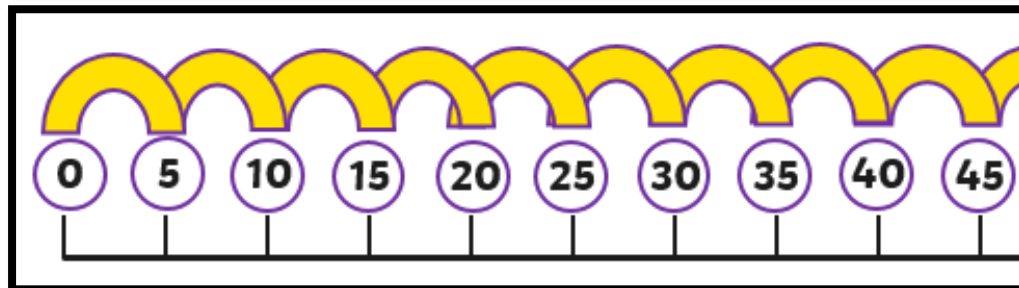
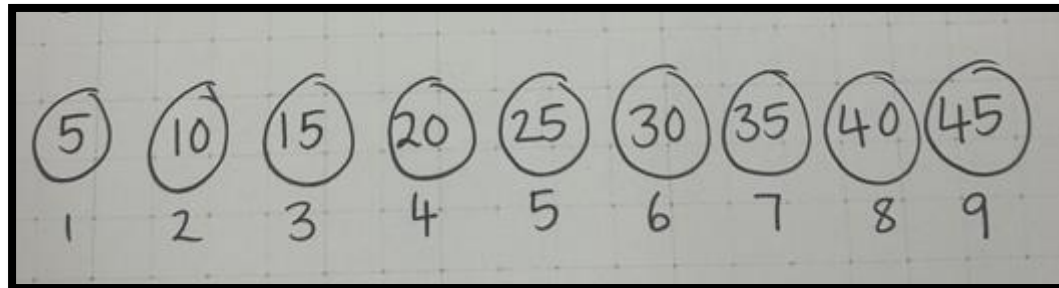
Division as sharing



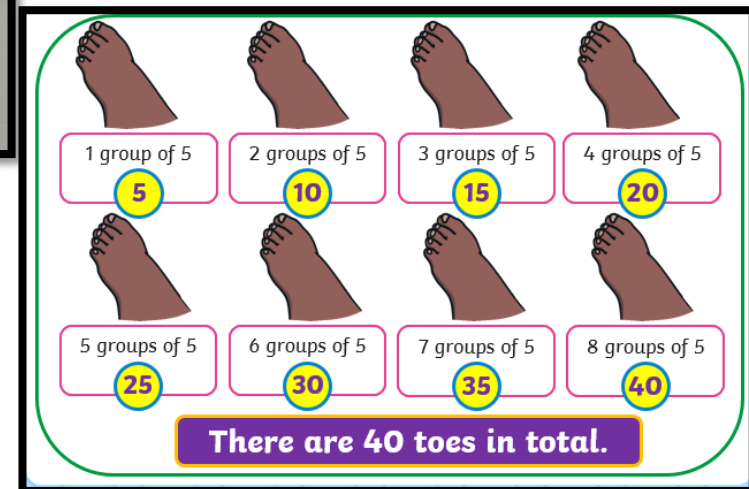
Children should be introduced to the concept of division as sharing systematically (one at a time) until there is no more left.

The use of 'dots' should be avoided as these can sometimes be miscounted.

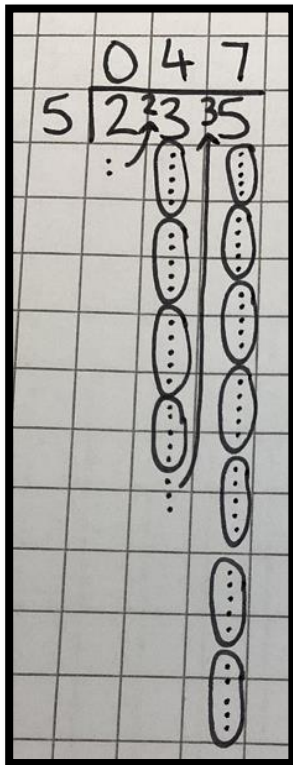
Division by counting multiples



Children can count or write the multiples of the divisor to support with dividing.



Short Division: no remainders



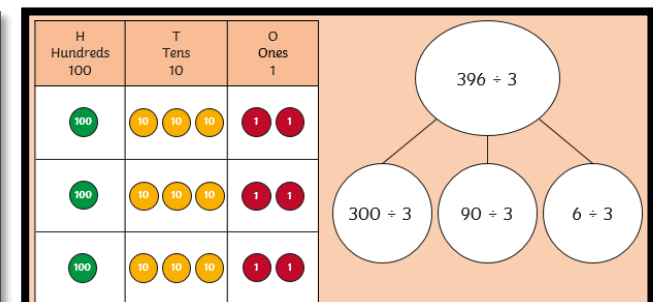
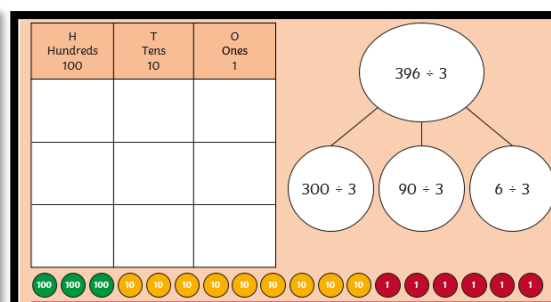
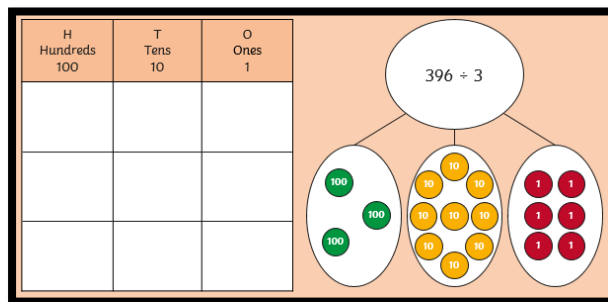
Start with seeing how many times the divisor goes into the greatest value column. In this example, 5 does not go into 2, so this is written as zero above, and exchanged for 2 tens.

If there is a remainder, this should be exchanged (for example, two hundreds left over need to be exchanged for twenty tens), and written small, in front of the number in the next place value column.

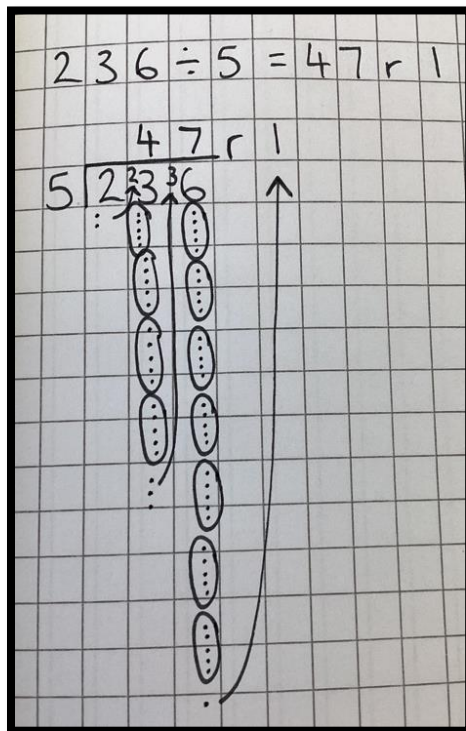
Continue doing this until the calculation is completed.

$$235 \div 5 = 47$$

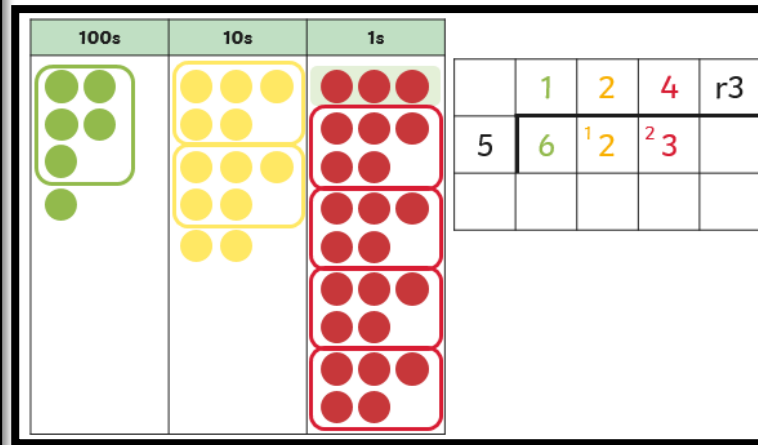
$$\begin{array}{r} 047 \\ 5 \overline{) 235} \end{array}$$



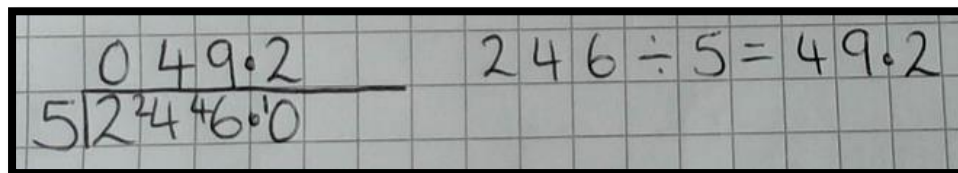
Short Division with remainders



If there is a remainder at the end of a short division calculation, children can express this using written notation of 'R', followed by the number that is remaining.



Short Division with remainders as decimals (to 2 decimal places)



Use this method, ensuring children align the decimal places. When expressing remainders as decimals, children should do so up to 2 dp.

Long Division without remainders

$$3855 \div 15 = 257$$

15	3855	
-	3000	(200)
	855	
-	750	(50)
	105	
-	105	(7)
	0	

Multiples

①	15	
②	30	(200) 3000
③	45	
④	60	
⑤	75	(50) 750

$$200 + 50 + 7 = 257$$

$$1106 \div 79 = 14$$

79	1106	
-	790	(10)
	316	
-	316	(4)
	0	

Multiples

①	79	
②	158	
③	237	
④	316	
⑤	395	

$$10 + 4 = 14$$

Children should start by writing the multiples of the divisor, up to 5 times.

They can then use derived facts to calculate larger multiples.

Children take away the greatest amount possible in chunks until there is nothing left.

Children then add together the 'chunks' they have taken away to get their answer.

Long Division with remainders:

$$3855 \div 16 = 240 \text{ r } 15$$

240 r 15		<u>Multiples</u>	
16	3855	①	16
-	3200 (200)	②	32
	655	③	48
-	640 (40)	④	64
	15	⑤	80

200 + 40 = 240

As with long division without remainders, children use the same method, but if they are taking away the 'final chunk' and there is a remainder, express this as 'r' followed by the number remaining.

Glossary

Aggregation: combining two or more parts to make a whole

Augmentation: a type of addition where a quantity is increased by adding more

Conceptual understanding: the ability to understand how maths works and how to apply it to new situations

Exchange: a technique used to regroup digits into higher or lower place values

Partitioning: the process of breaking a number into smaller parts to make it easier to work with

Subitise: the ability to recognise the number in a group without having to count them

Systematically: using a logical, organised, and methodical approach to solve problems