

Vallis First School

Calculation Policy

Adopted from White Rose Maths



Approved by the Governing Body of Vallis First School

Date: October 2024

Proposed Review Date: October 2025

This policy will be reviewed at least annually, and following any concerns and/or updates to national/local guidance or procedure

Aims of the policy

At Vallis First School, the aim of our calculation policy is to ensure all children receive a consistent approach. Calculation procedures are taught according to this document so they can be seamlessly built upon year after year, as the child moves through school.

The policy has been taken and adapted from White Rose Maths Scheme which we use to plan our sequences of learning.

The use of concrete resources and visuals underpins this calculation policy.

The policy goes through all four operations: Addition, Subtraction, Multiplication and Division. Each operation is broken down into skills for the year group and shows recommended models and visuals to support the teaching of the corresponding concepts alongside.

Concrete, Pictorial and Abstract Methods of support

Concrete representation— a pupil is first introduced to an idea or skill by acting it out with real objects. This is a ‘hands-on’ component using real objects and is a foundation for conceptual understanding.

Pictorial representation – a pupil has sufficiently understood the ‘hands on’ experiences performed and can now relate them to representations, such as a diagram or picture of the problem.

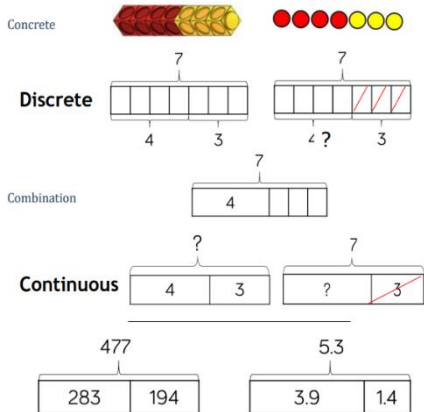
Abstract representation—a pupil is now capable of representing problems by using mathematical notation, for example $12 \times 2 = 24$.

It is important that conceptual understanding, supported by the use of representation, is secure for all procedures. Reinforcement is achieved by going back and forth between these representations.

Method of support	How it benefits our children
<p>Part-Whole Model</p> <p>$7 = 4 + 3$ $7 = 3 + 4$</p> <p>$7 - 3 = 4$ $7 - 4 = 3$</p> <p>$15 = 3 + 5 + 7$</p> <p>$26 = 20 + 6$</p> <p>$\frac{4}{7} = \frac{3}{7} + \frac{1}{7}$</p>	<p>This part-whole model supports children in their understanding of aggregation and partitioning. Due to its shape, it can be referred to as a cherry part-whole model.</p> <p>When the parts are complete and the whole is empty, children use aggregation to add the parts together to find the total.</p> <p>When the whole is complete and at least one of the parts is empty, children use partitioning (a form of subtraction) to find the missing part.</p> <p>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.</p> <p>In KS2, children can apply their understanding of the part-whole model to add and subtract fractions, decimals and percentages.</p>

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Bar Model (single)



The single bar model is another type of a part-whole model that can support children in representing calculations to help them unpick the structure.

Cubes and 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.

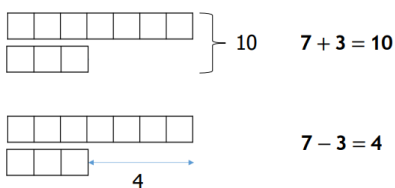
The combination bar model can support children to calculate by counting on from the larger number. It is a good stepping stone towards the continuous bar model.

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



The multiple bar model is a good way to compare quantities whilst still unpicking the structure.

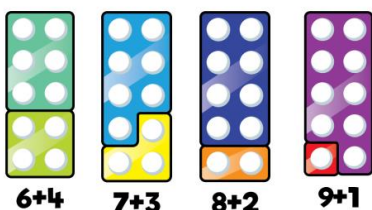
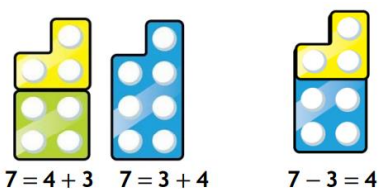
Two or more bars can be drawn, with a bracket labelling the whole positioned on the right hand side of the bars.

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.

Number Shapes



Number shapes can be useful to support children to subitise numbers as well as explore aggregation, partitioning and number bonds.

When adding numbers, children can see how the parts come together making a whole. As children use number shapes 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

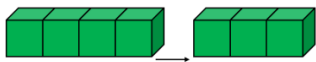
Cubes can be useful to support children with the addition and subtraction of one-digit numbers.



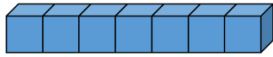
$7 = 4 + 3$



$7 = 3 + 4$



$7 - 3 = 4$



$7 - 3 = 4$

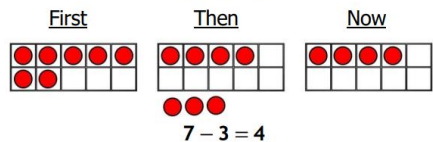
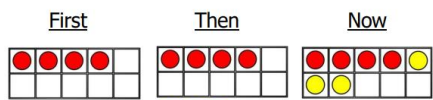
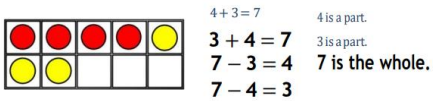
When adding numbers, children can see how the parts come together to make a whole. Children could use two different colours of cubes to represent the numbers before putting them together to create the whole.

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. This model of subtraction is reduction, or take away.

Cubes can also be useful to look at subtraction as difference. Here, both numbers are made and then lined up to find the difference between the numbers.

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



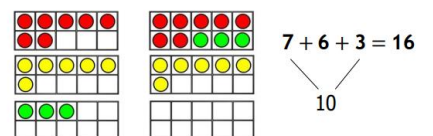
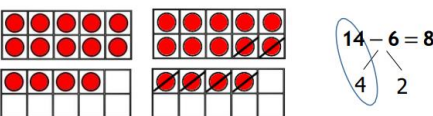
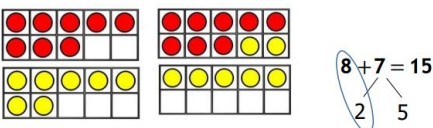
When adding and subtracting within 10, the ten frame can support children to understand the different structures of addition and subtraction.

Using the language of parts and wholes represented by $4 + 3 = 7$ First Then Now $7 - 3 = 4$ 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



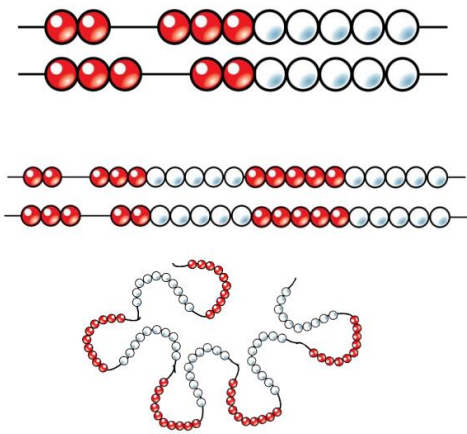
When adding two single digits, children can make each number on separate ten frames before moving part of one number to make 10 on one of the ten frames. This supports children to see how they have partitioned one of the numbers to make 10, and makes links to effective mental methods of addition.

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.

Bead Strings



Different sizes of bead strings can support children at different stages of addition and subtraction.

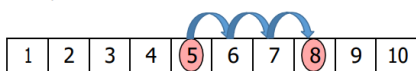
Bead strings to 10 are very effective at helping children to investigate number bonds up to 10. They can help children to systematically find all the number bonds to 10 by moving one bead at a time to see the different numbers they have partitioned the 10 beads into e.g. $2 + 8 = 10$, move one bead, $3 + 7 = 10$.

Bead strings to 20 work in a similar way but they also group the beads in fives. Children can apply their knowledge of number bonds to 10 and see the links to number bonds to 20.

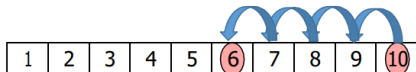
Bead strings to 100 are grouped in tens and can support children in number bonds to 100 as well as helping when adding by making ten. Bead strings can show a link to adding to the next 10 on number lines which supports a mental method of addition.

Number Tracks

$$5 + 3 = 8$$



$$10 - 4 = 6$$



$$8 + 7 = 15$$



Number tracks are useful to support children in their understanding of augmentation and reduction.

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. They start at the minuend and then take away the subtrahend to find the difference between the numbers.

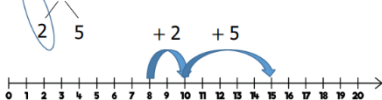
Number tracks can work well alongside ten frames and bead strings which can also model counting on or counting back. Playing board games can help children to become familiar with the idea of counting on using a number track before they move on to number lines.

Number Lines labelled

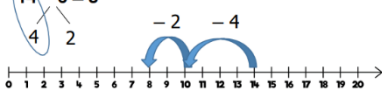
$$5 + 3 = 8$$



$$8 + 7 = 15$$



$$14 - 6 = 8$$



Labelled number lines support children in their understanding of addition and subtraction as augmentation and reduction.

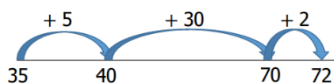
Children can start by counting on or back in ones, up or down the number line. This skill links directly to the use of the number track. Progressing further, children can add numbers by jumping to the nearest 10 and then jumping to the total.

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.

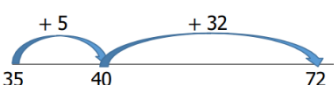
Children can subtract numbers by firstly jumping to the nearest 10. Again, this can be supported by ten frames so children can see how they partition the smaller number into the two separate jumps.

Blank Number Lines

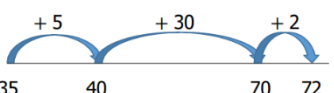
$$35 + 37 = 72$$



$$35 + 37 = 72$$



$$72 - 35 = 37$$



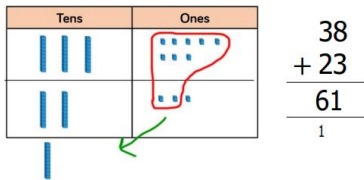
Blank number lines provide children with a structure to add and subtract numbers in smaller parts.

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.

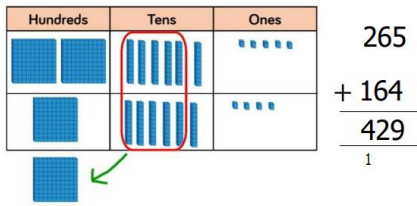
Children may also count back on a number line to subtract, again by jumping to the nearest 10 and then subtracting the rest of the number. Blank number lines can also be used effectively to help children subtract by finding the difference between numbers.

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 Ten – Addition



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



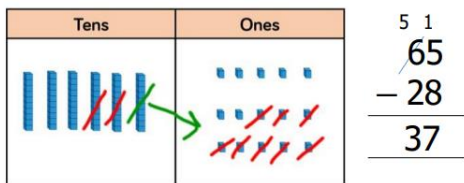
$$\begin{array}{r} 265 \\ + 164 \\ \hline 429 \\ 1 \end{array}$$

Using Base 10 or Dienes 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 Base 10 so they can see the clear links between the written method and the model.

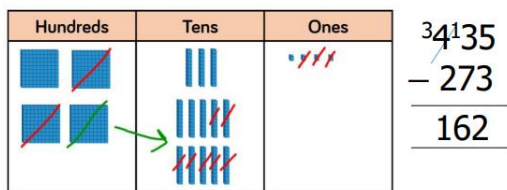
Children should first add without an exchange before moving on to addition with exchange. The representation becomes less efficient with larger numbers due to the size of Base 10. In this case, place value counters may be the better model to use.

When adding, always start with the smallest place value column. Here are some questions to support children. How many ones are there altogether? Can we make an exchange? (Yes or No) How many do we exchange? (10 ones for 1 ten, show exchanged 10 in tens column by writing 1 in column) How many ones do we have left? (Write in ones column) Repeat for each column.

Base Ten – Subtraction



$$\begin{array}{r} 5 \ 1 \\ 65 \\ - 28 \\ \hline 37 \end{array}$$



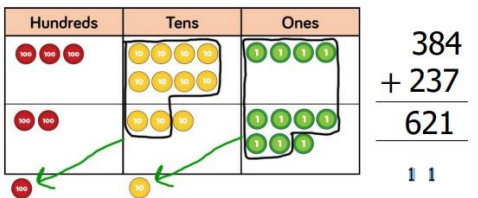
$$\begin{array}{r} 34 \ 135 \\ - 273 \\ \hline 162 \end{array}$$

Using Base 10 or Dienes is 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.

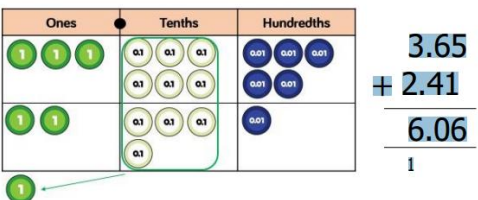
Children should first subtract without an exchange before moving on to subtraction with exchange. When building the model, children should just make the minuend using Base 10, they then subtract the subtrahend. Highlight this difference to addition to avoid errors by making both numbers.

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 - Addition



$$\begin{array}{r} 384 \\ + 237 \\ \hline 621 \\ 1 \ 1 \end{array}$$



$$\begin{array}{r} 3.65 \\ + 2.41 \\ \hline 6.06 \\ 1 \end{array}$$

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. 1 1 Children should first add without an exchange before moving on to addition with exchange.

Different place value counters can be used to represent larger numbers or decimals. If you don't have place value counters, use normal counters on a place value grid to enable children 3.65 + 2.41 6.06 1 to experience the exchange between columns. When adding money, children can also use coins to support their understanding. It is important that children consider how the coins link to the written calculation especially when adding decimal amounts.

Place Value Counters – Subtraction

Hundreds	Tens	Ones

$$\begin{array}{r} 4 \quad 1 \\ 652 \\ - 207 \\ \hline 445 \end{array}$$

Thousands	Hundreds	Tens	Ones








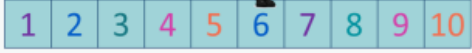


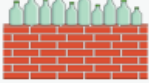





$$\begin{array}{r} 3 \quad 4 \quad 1 \quad 3 \quad 5 \quad 7 \\ 34357 \\ - 2735 \\ \hline 1622 \end{array}$$





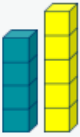







Using place value counters is an effective way to support children's understanding of column subtraction. It is important that children write out their calculations alongside using or drawing counters so they can see the clear links between the written method and the model.

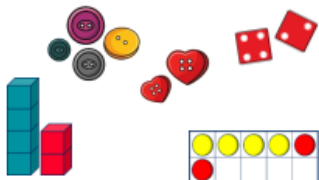
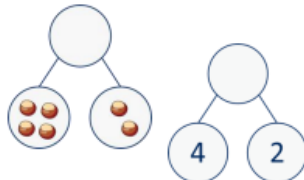
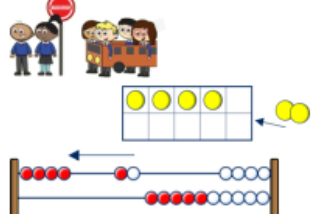
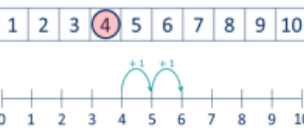
Children should first subtract without an exchange before moving on to subtraction with exchange. If you don't have place value counters, use normal counters on a place value grid to enable children to experience the exchange between columns.

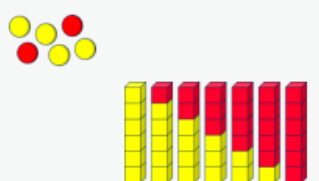
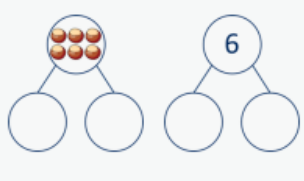

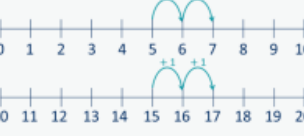
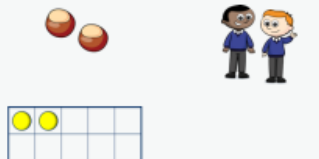
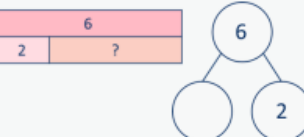

When building the model, children should just make the minuend using counters, they then subtract the subtrahend. Children start with the smallest place value column. When there are not enough ones/tens/hundreds to subtract in a column, children need to move to the column to the left and exchange e.g.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

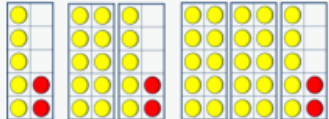
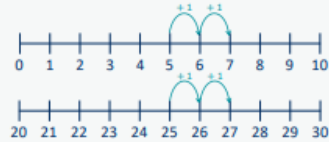
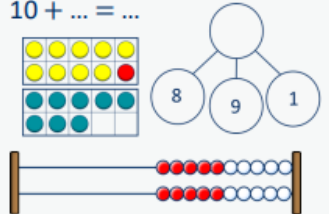
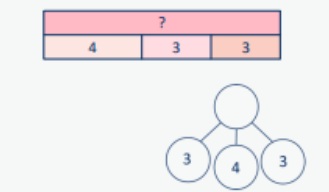
Addition

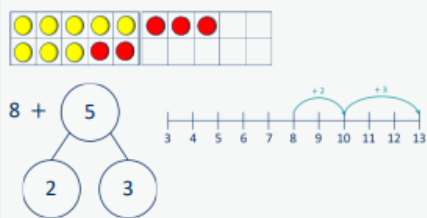
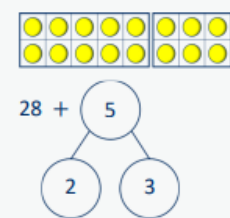
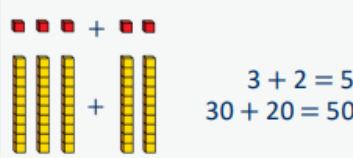
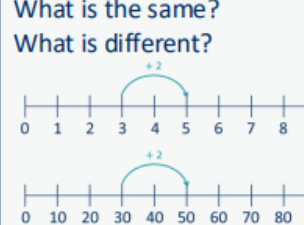
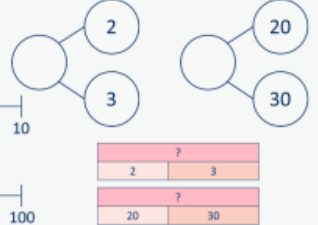


<p>Reception</p>	<ul style="list-style-type: none"> Have a deep understanding of numbers to 10, including the composition of each number. Subitise (recognise quantities without counting) up to 5 Automatically recall (without reference to rhymes, counting or other aids) number bonds up to 5 and some number bonds to 10, including double facts. 	
<p>Progression of skills</p>	<p>Key representations</p>	
<p>Conceptually subitise to 5</p> <p>Notice the parts that make up the whole.</p>	<p>What do you see? How do you see it?</p>     	
<p>1 more</p> <p>Continue to link to stories, songs and rhymes.</p>	<p>1 more than ... is ...</p>   	
<p>Notice the composition of numbers within 10</p> <p>Link to stories, songs and rhymes.</p>	<p>How many...? How many...? How many altogether?</p>    	<p>How many ways can you make...?</p>    

<p>Progression of skills</p>	<p>Key representations</p>	
<p>Combine 2 groups</p> <p>2 groups are combined to find the total.</p>	<p>There are There are There are altogether.</p>   	<p>.... and make</p>   
<p>Add more</p> <p>A quantity is increased.</p>	<p>First... Then.... Now....</p>   	<p>I have I add more. Now I have....</p>   

Year 1	
	<ul style="list-style-type: none"> Read, write and interpret mathematical statements involving addition (+) and equals (=) signs. Represent and use number bonds within 20 Add 1-digit and 2-digit numbers to 20, including zero. Solve one-step problems that involve addition, using concrete objects and pictorial representations, and missing number problems such as $7 = \square + 2$
Progression of skills	Key representations
Add together (aggregation) 2 quantities are combined to find the total.	<p>There are ... There are ... There are ... altogether.</p>  <p>... is a part. ... is a part. ... is the whole.</p>  <p>... plus ... is equal to is equal to ... + ...</p> $4 + 2 = 6$ $2 + 4 = 6$ $6 = 4 + 2$ $6 = 2 + 4$
Add more (augmentation) A quantity is increased.	<p>First... Then... Now...</p>  <p>I start at ... I jump on ... I land on ...</p>  <p>... plus ... is equal to is equal to ... + ...</p> $4 + 2 = 6$ $2 + 4 = 6$ $6 = 4 + 2$ $6 = 2 + 4$

Progression of skills	Key representations
Bonds within 10 Include bonds for each number within 10 Encourage children to notice patterns.	<p>... is made of ... and and ... make ...</p>  <p>... can be partitioned into ... and ...</p>  <p>... plus ... is equal to ...</p> $6 + 0 = 6$ $5 + 1 = 6$ $4 + 2 = 6$ $3 + 3 = 6$ $2 + 4 = 6$ $1 + 5 = 6$ $0 + 6 = 6$
Related facts within 20 Make links to known facts.	<p>I know that ... and ... = ... so ... and ... = ...</p>  <p>... more than ... is ... so ... more than ... is ...</p>  <p>What patterns do you notice?</p> $5 + 2 = 7$ $15 + 2 = 17$ $7 = 5 + 2$ $17 = 15 + 2$
Missing numbers Make links to known facts.	<p>How many more do you need to make ...?</p>  <p>If ... is the whole and ... is a part, the other part must be...</p>  <p>... plus ... is equal to ...</p> $2 + \square = 6$ $6 = 2 + \square$ 

Year 2	<ul style="list-style-type: none"> Recall and use addition facts to 20 fluently, and derive and use related facts up to 100 Add numbers using concrete objects, pictorial representations, and mentally, including: <ul style="list-style-type: none"> a two-digit number and 1s a two-digit number and 10s 2 two-digit numbers adding 3 one-digit numbers Recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems. 		
Progression of skills	Key representations		
Add ones to any number (related facts) Make links to known facts.	I know that ... and ... = ... so ... and ... = ... 	... more than ... is ... so ... more than ... is ... 	What do you notice? Can you continue the pattern? $5 + 2 = 7$ $15 + 2 = 17$ $25 + 2 = 27...$
Add three 1-digit numbers Prompt children to understand that addition can be done in any order and to make links to known facts.	... and ... are a bond to 10 $10 + ... = ...$ 	Double ... + ... = ... 	What do you notice? Which addition is the easiest to calculate? $8 + 9 + 1 =$ $8 + 1 + 9 =$ $9 + 1 + 8 =$


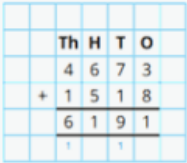
Progression of skills	Key representations		
Add across a 10 Partition the number being added to make a full ten.	... can be partitioned into ... and ... 	I add ... to get to ... then I add ... $8 + 5 = 13$ $28 + 5 = 33$ 	
Add multiples of 10 Make links to known facts within ten.	... ones + ... ones = ... ones so ... tens + ... tens = ... tens 	What is the same? What is different? 	
Add 10s to any number Make links to known facts.	... tens + ... tens = ... tens ... tens and ... ones = ... 	To add ... I need to add 10 ... times. 	I know that ... and ... = ... so ... and ... = ... $30 + 20 = 50$ $34 + 20 = 54$


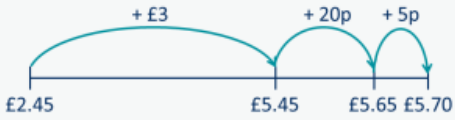

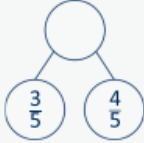
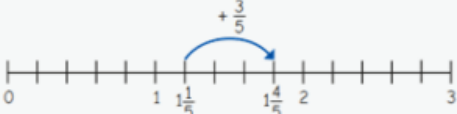
Progression of skills	Key representations	
<p>Add 2-digit numbers (not across a ten)</p> <p>Lining up ones and tens in columns will support with later written methods.</p>	<p>... ones + ... ones = ... ones ... tens + ... tens = ... tens</p>	<p>3 ones + 1 one = 4 ones 4 tens + 2 tens = 6 tens 6 tens + 4 ones = 64</p>
<p>Add 2-digit numbers (across a ten)</p> <p>Begin to exchange 10 ones for 1 ten.</p>	<p>There are ones, so I do/do not need to make an exchange.</p> <p>... ones = ... ten and ... ones</p>	<p>5 ones + 7 ones = 12 ones 12 ones = 1 ten and 2 ones 4 tens + 3 tens + 1 ten = 8 tens 8 tens and 2 ones = 82</p>
<p>Missing numbers</p> <p>Solve missing number problems and use the inverse to check.</p>	<p>How many more do you need to make ...?</p>	<p>If ... is a whole and ... is a part, then ... is the other part.</p>

Year 3	
<ul style="list-style-type: none"> Add numbers mentally, including: a three-digit number and ones, a three-digit number and tens, a three-digit number and hundreds. Add numbers with up to three digits, using formal written methods of columnar addition. Add fractions with the same denominator within 1 whole. Calculate the time taken by particular events or tasks. 	
Progression of skills	Key representations
<p>Add 1s, 10s or 100s to a 3-digit number</p> <p>Emphasis on mental strategies including number bonds and related facts. Prompt children to notice which digit changes.</p>	<p>The ones/tens/hundreds column will increase by ...</p> <p>444 + 5 = 777 + 2 = 444 + 50 = 777 + 20 = 444 + 500 = 777 + 200 =</p> <p>What patterns do you notice?</p> <p>235 + 3 = 235 + 30 = 235 + 300 =</p> <p>111 + □ = 118 111 + □ = 181 111 + □ = 811</p>
<p>Add two numbers (no exchange)</p> <p>Mental strategies and introduction of formal written method.</p>	<p>... ones + ... ones = ... ones ... tens + ... tens = ... tens ... hundreds + ... hundreds = ... hundreds</p>


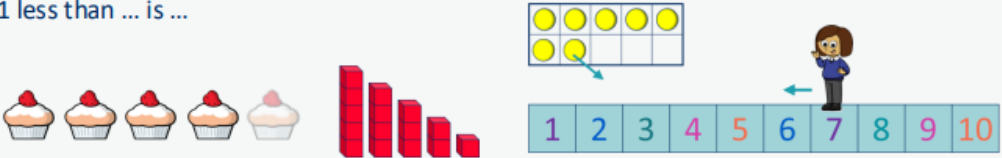


Progression of skills	Key representations
<p>Add two numbers across a 10 or 100</p> <p>Formal written method involving up to 2 exchanges including 3-digit plus 2-digit numbers.</p>	<p>There are ... ones, so I do/do not need to make an exchange. There are ... tens, so I do/do not need to make an exchange. ... ones = ... ten and ... ones. ... tens = ... hundred and ... tens.</p> <p>255 + 54</p> <p>466 + 353</p>
<p>Complements to 100</p> <p>Pairs of numbers which total 100</p>	<p>... plus ... is equal to 100</p> <p>38 + ? = 100</p> <p>I add ... to get to the next 10, then ... to get to 100</p> <p>38 + 62 = 100 62 + 38 = 100 100 = 38 + 62 100 = 62 + 38</p>


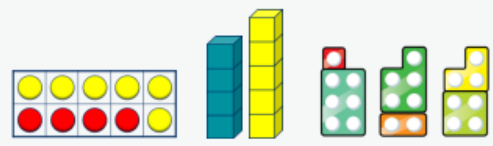

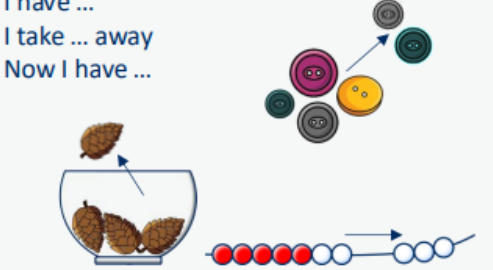
Progression of skills	Key representations
<p>Add fractions with the same denominator within 1 whole</p> <p>Make links with known facts.</p>	<p>When adding fractions with the same denominator, I only add the numerator. ... fifths + ... fifths = ... fifths</p> <p>$\frac{1}{5} + \frac{1}{5}$ $\frac{1}{5} + \frac{2}{5}$ $\frac{1}{5} + \frac{3}{5}$</p>
<p>Calculate the duration of events</p> <p>Find durations of time between a given start and end point. Children will need to calculate complements to 60</p>	<p>From ... to ... o'clock is ... minutes. From ... o'clock to ... is ... minutes. The total time taken is ... minutes.</p> <p>start finish</p> <p>4:25 4:55</p> <p>start finish</p> <p>2:25 3:00 3:18</p>

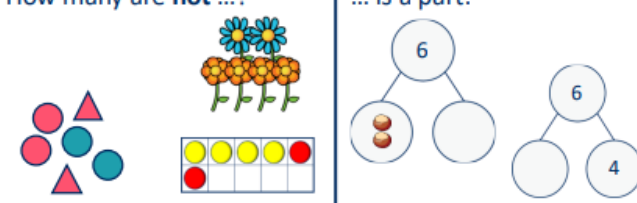
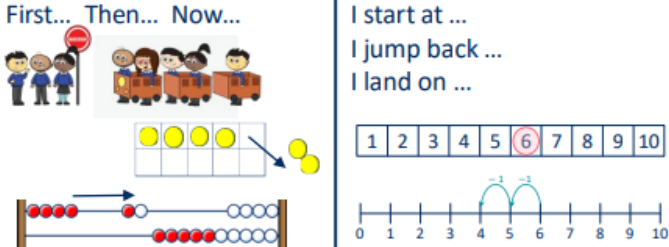
Year 4	<ul style="list-style-type: none"> Add numbers with up to 4 digits using a formal written method. Solve simple measure and money problems involving fractions and decimals to 2 decimal places. Add fractions with the same denominator. 																	
Progression of skills	Key representations																	
<p>Add 1s, 10s and 100s to a 4-digit number</p> <p>Emphasis on mental strategies including number bonds and related facts. Prompt children to notice which digit changes.</p>	<p>The ones/tens/hundreds/thousands column will increase by ...</p> <table border="1" data-bbox="467 421 807 562"> <thead> <tr> <th>Thousands</th> <th>Hundreds</th> <th>Tens</th> <th>Ones</th> </tr> </thead> <tbody> <tr> <td>1,000 1,000</td> <td>100 100</td> <td>10 10</td> <td>1 1</td> </tr> <tr> <td>1,000</td> <td>100 100</td> <td></td> <td>1 1</td> </tr> <tr> <td></td> <td></td> <td></td> <td>1</td> </tr> </tbody> </table> <p> $3,425 + 3 =$ $3,425 + 300 =$ $3,425 + 30 =$ $3,425 + 3,000 =$ </p>	Thousands	Hundreds	Tens	Ones	1,000 1,000	100 100	10 10	1 1	1,000	100 100		1 1				1	<p>What patterns do you notice?</p> <p> $2,350 + 3 =$ $2,350 + 30 =$ $2,350 + 300 =$ $2,350 + 3,000 =$ </p> <p> $6,040 + 200 =$ $2,211 + \square = 2,251$ $6,040 + 500 =$ $2,211 + \square = 2,215$ $6,040 + 900 =$ $2,211 + \square = 2,511$ </p>
Thousands	Hundreds	Tens	Ones															
1,000 1,000	100 100	10 10	1 1															
1,000	100 100		1 1															
			1															
<p>Add up to two 4-digit numbers</p> <p>Formal written method with up to 3 exchanges. Encourage children to estimate and use inverse operations to check answers to calculations.</p>	<p>There are ... ones/tens/hundreds so I do/do not need to make an exchange.</p> <p>I can exchange 10 ... for 1 ...</p> <div style="display: flex; justify-content: space-around;">   </div>																	

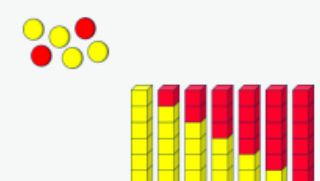
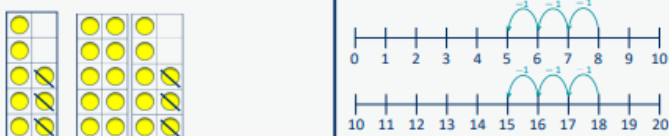

Progression of skills	Key representations	
<p>Add decimal numbers in the context of money</p> <p>Emphasis on partitioning and use of number lines rather than formal written calculations.</p>	<p>... pence + ... pence = ... pence ... pounds + ... pounds = ... pounds</p> <div style="display: flex; justify-content: center; gap: 20px;">  </div> <p> $45p + 25p = 70p$ $£2 + £3 = £5$ $£5 + 70p = £5.70$ </p>	<p>£3.25 can be partitioned into £3 + 20p + 5p</p> 
<p>Add fractions and mixed numbers with the same denominator beyond 1 whole</p>	<p>When adding fractions with the same denominator, I only add the numerator.</p> <p>... fifths + ... fifths = ... fifths</p> <div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;"> <p>$\frac{3}{5} + \frac{4}{5} = \frac{7}{5} = 1\frac{2}{5}$</p>  </div> <div style="text-align: center;">  </div> <div style="text-align: center;">  </div> </div>	

Subtraction

<p>Reception</p>	<ul style="list-style-type: none"> Have a deep understanding of number to 10, including the composition of each number. Subitise (recognise quantities without counting) up to 5 Automatically recall (without reference to rhymes, counting or other aids) number bonds up to 5 (and some subtraction facts) and some number bonds to 10, including double facts. 	
<p>Progression of skills</p>	<p>Key representations</p>	
<p>Conceptually subitise to 5</p> <p>Notice the parts that make up the whole.</p>	<p>What do you see? How do you see it?</p> 	
<p>1 less</p> <p>Continue to link to stories, songs and rhymes.</p>	<p>1 less than ... is ...</p> 	
<p>Notice the composition of numbers within 10</p> <p>Link to stories, songs and rhymes.</p>	<p>How many...? How many...? How many altogether?</p> 	<p>How many ways can you make...?</p> 

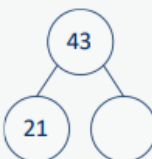
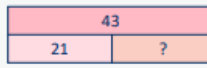
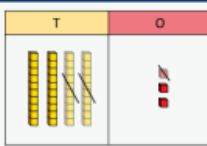
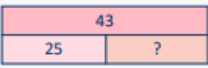
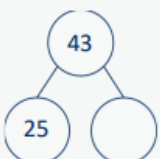
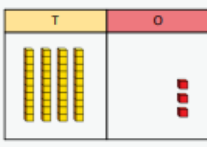
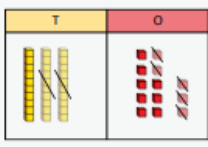
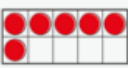
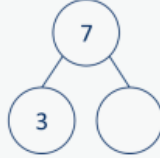
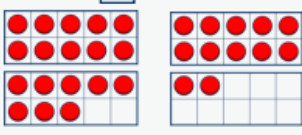
<p>Progression of skills</p>	<p>Key representations</p>	
<p>Partition</p> <p>Using objects, explore different ways to partition a number into 2 or more parts.</p>	<p>There are ... altogether. I can see ... here and ... there.</p>  <p>... and ... make ...</p> 	
<p>Take away</p> <p>A quantity is reduced.</p>	<p>First... Then... Now...</p>  <p>I have ... I take ... away Now I have ...</p> 	

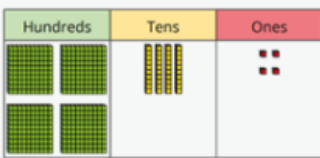
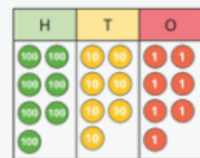
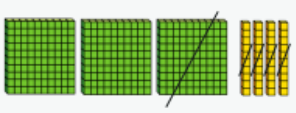
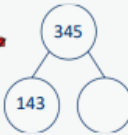
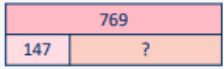


Year 1	
	<ul style="list-style-type: none"> Read, write and interpret mathematical statements involving subtraction (−) and equals (=) signs. Represent and use number bonds and related subtraction facts within 20 Subtract one-digit and two-digit numbers to 20, including zero. Solve one-step problems that involve subtraction, using concrete objects and pictorial representations, and missing number problems such as $7 = \square - 9$
Progression of skills	Key representations
Find a part Link to number bonds and known facts. E.g. $2 + 4 = 6$ so if 6 is the whole and 4 is a part, the other part must be 2	There are ... in total. ... are ... How many are not ...? 
Take away A quantity is decreased.	First... Then... Now... 
	... subtract ... is equal to is equal to ... − ... $6 - 2 = 4$ $6 - 4 = 2$ $4 = 6 - 2$ $2 = 6 - 4$

Progression of skills	Key representations
Bonds within 10 Focus on subtraction facts. Encourage children to notice patterns.	... is made of ... and and ... make ... 
Related facts within 20 Make links to known facts.	I know that ... minus ... = ... so ... minus ... = ... 
Missing numbers Make links to known facts.	How many do you need to subtract to make ...? 
	... can be partitioned into ... and minus ... is equal to ... $6 - 0 = 6$ $6 - 1 = 5$ $6 - 2 = 4$ $6 - 3 = 3$ $6 - 4 = 2$ $6 - 5 = 1$ $6 - 6 = 0$
	... less than ... is ... so ... less than ... is ... What patterns do you notice? $8 - 3 = 5$ $18 - 3 = 15$ $5 = 8 - 3$ $15 = 18 - 3$
	... minus ... is equal to ... $6 - \square = 2$ $2 = 6 - \square$

	<ul style="list-style-type: none"> Recall and use subtraction facts to 20 fluently, and derive and use related facts up to 100 Subtract numbers using concrete objects, pictorial representations, and mentally, including: <ul style="list-style-type: none"> a two-digit number and 1s a two-digit number and 10s 2 two-digit numbers Recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems. 		
Progression of skills	Key representations		
Subtract ones from any number (related facts) Make links to known facts.	I know that ... minus ... = ... so ... minus ... = less than ... is ... so ... less than ... is ... 	What do you notice? Can you continue the pattern? $8 - 3 = 5$ $18 - 3 = 15$ $28 - 3 = 25...$
Subtract across a 10 Partition the number being subtracted to bridge through a ten.	... can be partitioned into ... and ... 	Make links with related facts. 	

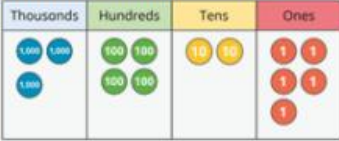
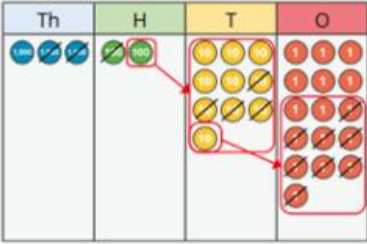

Progression of skills	Key representations																																																														
Subtract multiples of 10 Make links to known facts within ten.	... ones - ... ones = ... ones so ... tens - ... tens = ... tens 	What is the same? What is different? 	 <table border="1" style="margin-left: auto; margin-right: auto;"> <tr><td colspan="2" style="text-align: center;">5</td></tr> <tr><td style="text-align: center;">2</td><td style="text-align: center;">?</td></tr> </table> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr><td colspan="2" style="text-align: center;">50</td></tr> <tr><td style="text-align: center;">20</td><td style="text-align: center;">?</td></tr> </table>	5		2	?	50		20	?																																																				
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Subtract 10s from any number Make links to known facts.	... tens - ... tens = ... tens ... tens and ... ones = ... 	To subtract ... I need to subtract 10 ... times. <table border="1" style="margin-left: auto; margin-right: auto;"> <tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>10</td></tr> <tr><td>11</td><td>12</td><td>13</td><td>14</td><td>15</td><td>16</td><td>17</td><td>18</td><td>19</td><td>20</td></tr> <tr><td>21</td><td>22</td><td>23</td><td>24</td><td>25</td><td>26</td><td>27</td><td>28</td><td>29</td><td>30</td></tr> <tr><td>31</td><td>32</td><td>33</td><td>34</td><td>35</td><td>36</td><td>37</td><td>38</td><td>39</td><td>40</td></tr> <tr><td>41</td><td>42</td><td>43</td><td>44</td><td>45</td><td>46</td><td>47</td><td>48</td><td>49</td><td>50</td></tr> <tr><td>51</td><td>52</td><td>53</td><td>54</td><td>55</td><td>56</td><td>57</td><td>58</td><td>59</td><td>60</td></tr> </table>	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	I know that ... minus ... = ... so ... minus ... = ... $50 - 20 = 30$ $54 - 20 = 34$
1	2	3	4	5	6	7	8	9	10																																																						
11	12	13	14	15	16	17	18	19	20																																																						
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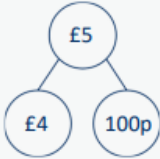

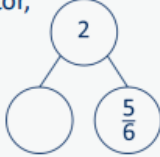
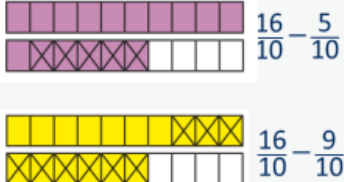

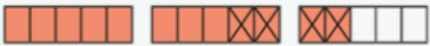
Progression of skills	Key representations		
Subtract two 2-digit numbers (not across a ten)	\dots ones $- \dots$ ones = \dots ones \dots tens $- \dots$ tens = \dots tens  	 <p>3 ones $-$ 1 one = 2 ones 4 tens $-$ 2 tens = 2 tens 2 tens and 2 ones = 22</p>	
Subtract two 2-digit numbers (across a ten) Begin to exchange 1 ten for 10 ones.	I need to make an exchange because I do not have enough ones to subtract \dots ones.  	 <p>3 ones $-$ 5 ones (I need to exchange 1 ten for 10 ones)</p>	 <p>13 ones $-$ 5 ones = 8 ones 3 tens $-$ 2 tens = 1 ten 1 ten and 8 ones = 18</p>
Missing numbers Solve missing number problems and use the inverse to check.	How many do you need to subtract to make \dots ?  $10 - \square = 6$ $6 + \square = 10$	If \dots is a whole and \dots is a part, then \dots is the other part. $7 - 3 = \square$ $\square + 3 = 7$ 	\dots can be partitioned into \dots and \dots $18 - \square = 12 + 2$ 

Year 3	<ul style="list-style-type: none"> Subtract numbers mentally, including: a three-digit number and ones, a three-digit number and tens, a three-digit number and hundreds. Subtract numbers with up to three digits, using formal written methods. Subtract fractions with the same denominator within 1 whole. 		
Progression of skills	Key representations		
Subtract 1s, 10s and 100s from a 3-digit number Emphasis on mental strategies including number bonds and related facts. Prompt children to notice which digit changes.	The ones/tens/hundreds column will decrease by ...  $444 - 2 =$ $444 - 20 =$ $444 - 200 =$	 $777 - 4 =$ $777 - 40 =$ $777 - 400 =$	What patterns do you notice? $235 - 3 =$ $235 - 30 =$ $235 - 300 =$ $118 - \square = 111$ $624 - 20 =$ $654 - 50 =$ $694 - 90 =$ $181 - \square = 111$ $811 - \square = 111$
Subtract two numbers (no exchange) Mental strategies and introduction of formal written method.	\dots ones $- \dots$ ones = \dots ones \dots tens $- \dots$ tens = \dots tens \dots hundreds $- \dots$ hundreds = \dots hundreds  	  	

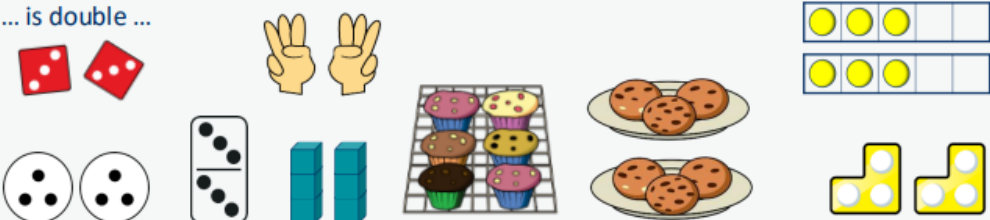
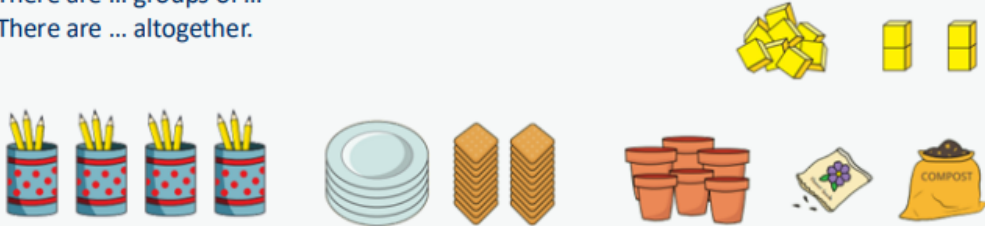
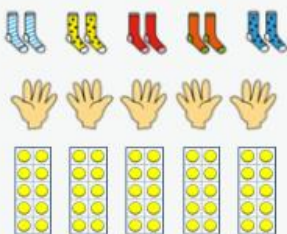

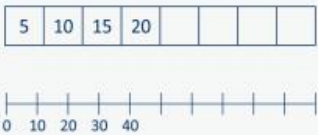

Progression of skills	Key representations	
<p>Subtract two numbers across a 10 or 100</p> <p>Formal written method involving up to 2 exchanges including 3-digit subtract 2-digit numbers.</p>	<p>I need to subtract ... ones. I do/do not need to make an exchange. I need to subtract ... tens. I do/do not need to make an exchange. I can exchange 1 ... for 10 ...</p>	
<p>Complements to 100</p> <p>Focus on subtraction facts.</p> <p>Encourage children to notice patterns.</p>	<p>100 minus ... is equal to ...</p>	<p>I subtract ... tens, then I subtract ... ones.</p> $100 - 38 = 62$ $100 - 62 = 38$ $62 = 100 - 38$ $38 = 100 - 62$

Progression of skills	Key representations	
<p>Subtract fractions with the same denominator within 1 whole</p> <p>Make links with known facts.</p>	<p>When subtracting fractions with the same denominator, I only subtract the numerator. ... fifths - ... fifths = ... fifths</p>	

Year 4	<ul style="list-style-type: none"> Subtract numbers with up to 4 digits using a formal written method. Solve simple measure and money problems involving fractions and decimals to 2 decimal places. Subtract fractions with the same denominator. 	
Progression of skills	Key representations	
Subtract 1s, 10s, 100s and 1,000s from a 4-digit number Emphasis on mental strategies including number bonds and related facts. Prompt children to notice which digit changes.	The ones/tens/hundreds/thousands column will decrease by ...  $3,425 - 2 =$ $3,425 - 200 =$ $3,425 - 20 =$ $3,425 - 2,000 =$	What patterns do you notice? $4,356 - 3 =$ $4,356 - 30 =$ $4,356 - 300 =$ $4,356 - 3,000 =$ $4,433 - \square = 4,430$ $6,940 - 200 =$ $4,433 - \square = 4,033$ $6,940 - 300 =$ $4,433 - \square = 4,403$ $6,940 - 400 =$
Subtract up to two 4-digit numbers Formal written method with up to 3 exchanges. Encourage children to estimate and use inverse operations to check answers to calculations.	I need to subtract... ones/tens/hundreds. I do/do not need to make an exchange. I can exchange 1... for 10...  	

Progression of skills	Key representations	
Subtract decimal numbers in the context of money Emphasis here is on partitioning and use of number lines rather than formal written calculations.	I can partition £... into £... and 100p $\pounds... - \pounds... = \pounds...$ $100\text{p} - \dots\text{p} = \dots\text{p}$ $\pounds 5 - \pounds 3.26$ $\pounds 4 - \pounds 3 = \pounds 1$ $100\text{p} - 26\text{p} = 74\text{p}$ $\pounds 5 - \pounds 3.26 = \pounds 1.74$ 	$\pounds 3.26$ can be partitioned into $\pounds 3 + 20\text{p} + 6\text{p}$ 
Subtract fractions and mixed numbers with the same denominator Include subtracting fractions from wholes.	When subtracting fractions with the same denominator, I only subtract the numerator. $\dots \text{tenths} - \dots \text{tenths} = \dots \text{tenths}$   $\frac{16}{10} - \frac{5}{10}$ $\frac{16}{10} - \frac{9}{10}$  	

Multiplication



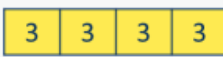





<p>Reception</p>	<ul style="list-style-type: none"> • Have a deep understanding of number to 10, including the composition of each number. • Subitise (recognise quantities without counting) up to 5 • Automatically recall (without reference to rhymes, counting or other aids) number bonds up to 5 and some number bonds to 10, including double facts. • Explore and represent patterns within numbers up to 10, including evens and odds, double facts and how quantities can be distributed equally. 		
<p>Progression of skills</p>	<p>Key representations</p>		
<p>Double to 10</p> <p>Prompt children to notice that double means twice as many and to notice that there are two equal groups.</p>	<p>Double ... is is double ...</p> 		
<p>Make equal groups</p> <p>Provide opportunities to make equal groups when tidying up or during snack time. Encourage children to check that each group has the same amount.</p>	<p>There are ... groups of ... There are ... altogether.</p> 		
<p>Year 1</p>	<ul style="list-style-type: none"> • Count in multiples of twos, fives and tens. • Solve one-step problems involving multiplication, using concrete objects, pictorial representations and arrays with the support of the teacher. 		
<p>Progression of skills</p>	<p>Key representations</p>		
<p>Count in 2s, 5s and 10s</p> <p>Begin by counting objects that naturally come in 2s, 5s and 10s, for example pairs of socks or fingers.</p>	<p>There are ... equal groups of ... There are ... altogether.</p> 	<p>Continue to colour in ...s What do you notice?</p> 	<p>Complete the number track/number line by counting in ...s.</p> 
<p>Add equal groups (repeated addition)</p> <p>Children should be able to write a repeated addition to represent equal groups and to draw pictures or use objects to represent a repeated addition.</p>	<p>There are ... groups of ... There are ... altogether.</p>  <p>$10 + 10 + 10 = 30$</p> <p>$5 + 5 + 5 + 5 = 20$</p>		<p>What is the same? What is different?</p> <p>$2 + 2 + 2 =$</p> <p>$5 + 5 + 5 =$</p> <p>$10 + 10 + 10 =$</p> <p>Use objects or a drawing to represent the equal groups and find how many in total.</p>


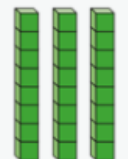
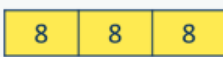




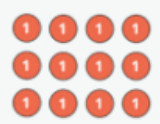
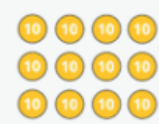
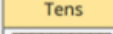







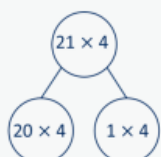








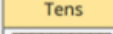















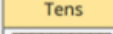















Progression of skills	Key representations
<p>Make arrays</p> <p>Children use their knowledge of adding equal groups to arrange objects in columns and rows.</p>	<p>There are ... rows of ... There are ... altogether. There are ... columns of ... There are ... altogether.</p>
<p>Make doubles</p> <p>Children understand that doubles are two equal groups. Children may begin to explore doubles beyond 20 using base 10</p>	<p>Double ... is + ... = ...</p>

Year 2	<ul style="list-style-type: none"> Recall and use multiplication facts for the 2, 5 and 10 multiplication tables. Calculate mathematical statements for multiplication within the multiplication tables and write them using the multiplication (\times) and equals ($=$) signs. Show that multiplication of two numbers can be done in any order (commutative).
Progression of skills	Key representations
<p>Link repeated addition and multiplication</p> <p>Encourage children to make the link between repeated addition and multiplication.</p>	<p>There are ... equal groups with ... in each group. There are ... altogether.</p>
<p>Use arrays</p> <p>Encourage children to see that multiplication is commutative.</p>	<p>There are ... rows with ... in each row. There are ... columns with ... in each column.</p> <p>I can see ... \times ... and ... \times ...</p> <p>$3 \times 5 = 15$ $5 \times 3 = 15$ $3 \times 5 = 5 \times 3$</p>
<p>Double</p> <p>Encourage children to make links with related facts.</p>	<p>Double ... is ...</p> <p>Double 4 = 4 + 4 Double 4 is 8</p> <p>Double ... is ... so double ... is ...</p> <p>Double 4 is 8 Double 40 is 80</p>

Progression of skills	Key representations																																									
<p>The 2 times-table</p> <p>Encourage daily counting in multiples both forwards and back. Notice that all multiples of 2 are even numbers.</p>	<p>... lots of 2 = ... $\times 2 =$</p>	<p>... times 2 is equal to ...</p> <table border="1"> <tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>10</td></tr> <tr><td>11</td><td>12</td><td>13</td><td>14</td><td>15</td><td>16</td><td>17</td><td>18</td><td>19</td><td>20</td></tr> <tr><td>21</td><td>22</td><td>23</td><td>24</td><td>25</td><td>26</td><td>27</td><td>28</td><td>29</td><td>30</td></tr> </table> <p> $1 \times 2 = 2$ $2 = 1 \times 2$ $2 \times 2 = 4$ $4 = 2 \times 2$ $3 \times 2 = 6$ $6 = 3 \times 2$ </p>	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30										
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<p>The 10 times-table</p> <p>Encourage daily counting in multiples both forwards and back. Notice the pattern in the numbers.</p>	<p>... lots of 10 = ... $\times 10 =$</p>	<p>... times 10 is equal to ...</p> <table border="1"> <tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>10</td></tr> <tr><td>11</td><td>12</td><td>13</td><td>14</td><td>15</td><td>16</td><td>17</td><td>18</td><td>19</td><td>20</td></tr> <tr><td>21</td><td>22</td><td>23</td><td>24</td><td>25</td><td>26</td><td>27</td><td>28</td><td>29</td><td>30</td></tr> <tr><td>31</td><td>32</td><td>33</td><td>34</td><td>35</td><td>36</td><td>37</td><td>38</td><td>39</td><td>40</td></tr> </table> <p> $1 \times 10 = 10$ $10 = 1 \times 10$ $2 \times 10 = 20$ $20 = 2 \times 10$ $3 \times 10 = 30$ $30 = 3 \times 10$ </p>	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
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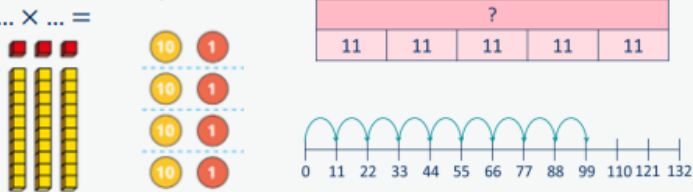
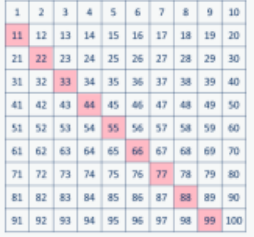

Progression of skills	Key representations																																									
<p>The 5 times-table</p> <p>Encourage daily counting in multiples both forwards and back. Notice the pattern in the numbers.</p>	<p>... lots of 5 = ... $\times 5 =$</p>	<p>... times 5 is equal to ...</p> <table border="1"> <tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>10</td></tr> <tr><td>11</td><td>12</td><td>13</td><td>14</td><td>15</td><td>16</td><td>17</td><td>18</td><td>19</td><td>20</td></tr> <tr><td>21</td><td>22</td><td>23</td><td>24</td><td>25</td><td>26</td><td>27</td><td>28</td><td>29</td><td>30</td></tr> <tr><td>31</td><td>32</td><td>33</td><td>34</td><td>35</td><td>36</td><td>37</td><td>38</td><td>39</td><td>40</td></tr> </table> <p> $1 \times 5 = 5$ $5 = 1 \times 5$ $2 \times 5 = 10$ $10 = 2 \times 5$ $3 \times 5 = 15$ $15 = 3 \times 5$ </p>	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
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<p>Missing numbers</p> <p>Make links to known facts.</p>	<p>... is equal to ... groups of ...</p> <p>18 socks, how many pairs? </p>	<p>... times ... is equal to ...</p> <p>$\square \times 2 = 18$</p> <p>$18 = 2 \times \square$</p>																																								


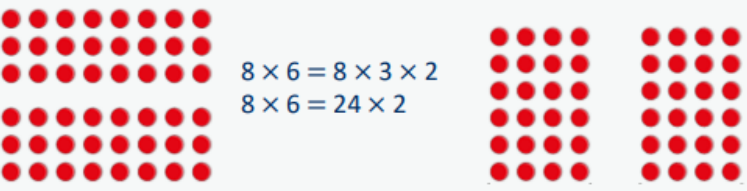
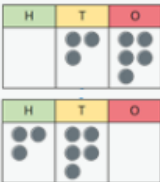
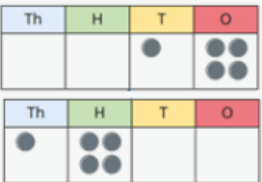
Year 3	<ul style="list-style-type: none"> Recall and use multiplication facts for the 3, 4 and 8 multiplication tables. Write and calculate mathematical statements for multiplication using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods. Solve problems, including missing number problems, involving multiplication, including positive integer scaling problems and correspondence problems in which n objects are connected to m objects. 																															
Progression of skills	Key representations																															
The 3 times-table Encourage daily counting in multiples both forwards and back.	... groups of 3 = ... $\times 3 =$ 3, ... times =  $3 \times \dots =$  	... times 3 is equal to ... <table border="1" data-bbox="1029 459 1396 571"> <tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>10</td></tr> <tr><td>11</td><td>12</td><td>13</td><td>14</td><td>15</td><td>16</td><td>17</td><td>18</td><td>19</td><td>20</td></tr> <tr><td>21</td><td>22</td><td>23</td><td>24</td><td>25</td><td>26</td><td>27</td><td>28</td><td>29</td><td>30</td></tr> </table> $4 \times 3 = 12$ $12 = 4 \times 3$ 	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
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The 4 times-table Encourage daily counting in multiples both forwards and back. Encourage children to notice links between the 2 and 4 times-tables.	... groups of 4 = ... $\times 4 =$ 4, ... times =  $4 \times \dots =$  	... times 4 is equal to ... <table border="1" data-bbox="1029 728 1396 840"> <tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>10</td></tr> <tr><td>11</td><td>12</td><td>13</td><td>14</td><td>15</td><td>16</td><td>17</td><td>18</td><td>19</td><td>20</td></tr> <tr><td>21</td><td>22</td><td>23</td><td>24</td><td>25</td><td>26</td><td>27</td><td>28</td><td>29</td><td>30</td></tr> </table> $3 \times 4 = 12$ $12 = 3 \times 4$ 	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
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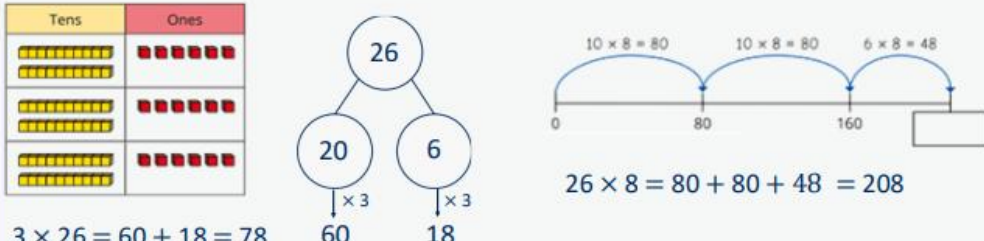
Progression of skills	Key representations																															
The 8 times-table Encourage daily counting in multiples both forwards and back. Encourage children to notice links between the 2, 4 and 8 times-tables.	... lots of 8 = $\times 8 =$ 8, ... times =  $8 \times \dots =$   	... times 8 is equal to ... <table border="1" data-bbox="1021 1176 1412 1288"> <tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>10</td></tr> <tr><td>11</td><td>12</td><td>13</td><td>14</td><td>15</td><td>16</td><td>17</td><td>18</td><td>19</td><td>20</td></tr> <tr><td>21</td><td>22</td><td>23</td><td>24</td><td>25</td><td>26</td><td>27</td><td>28</td><td>29</td><td>30</td></tr> </table> $3 \times 8 = 24$ $24 = 3 \times 8$ 	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
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21	22	23	24	25	26	27	28	29	30																							
Related facts Use knowledge of multiplying by 10 to scale times-table facts.	... \times ... ones is equal to ... ones so ... \times ... tens is equal to ... tens.     $3 \times 4 = 12$ $3 \times 40 = 120$																															
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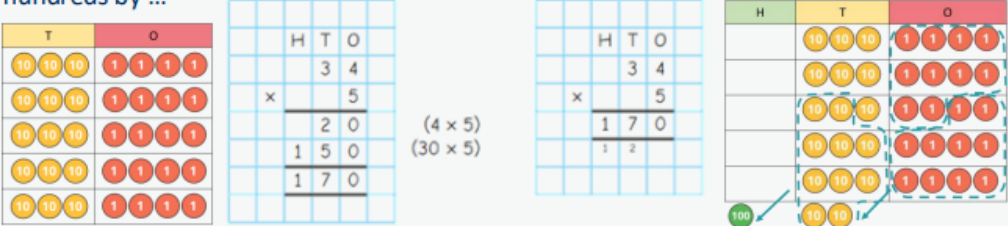
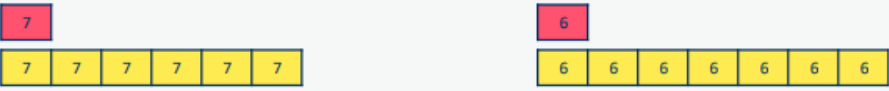
Progression of skills	Key representations																					
<p>Multiply a 2-digit number by a 1-digit number - with exchange</p> <p>Children apply their understanding of partitioning to represent and solve calculations using the expanded method.</p>	<p>... tens multiplied by ... is equal to ... tens. ... ones multiplied by ... is equal to ... ones.</p> <table border="1"> <thead> <tr> <th>Tens</th> <th>Ones</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> </tr> <tr> <td></td> <td></td> </tr> <tr> <td></td> <td></td> </tr> <tr> <td></td> <td></td> </tr> <tr> <td></td> <td></td> </tr> </tbody> </table> <p>$20 \times 4 = 80$ $4 \times 4 = 16$ $24 \times 4 = 96$</p>	Tens	Ones											<p>45×3</p> <p>40×3 5×3</p> <table border="1"> <thead> <tr> <th>Tens</th> <th>Ones</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> </tr> <tr> <td></td> <td></td> </tr> <tr> <td></td> <td></td> </tr> </tbody> </table>	Tens	Ones						
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<p>Scaling</p> <p>Children focus on multiplication as scaling (... times the size) as opposed to repeated addition.</p>	<p>There are ... times as many ... as ...</p> <p> </p> <p> </p> <p>There are 3 times as many triangles as circles.</p>	<p>... is ... times the size of is ... times the length/height of ...</p> <p> 4 cm 16 cm</p> <p></p> <p>Miss Smith is twice the height of Jo.</p>																				

Progression of skills	Key representations													
<p>Correspondence problems (How many ways?)</p> <p>Encourage children to work systematically to find all the different possible combinations.</p>	<p>For every ... , there are ... possible ... There are ... \times ... possibilities altogether.</p> <table border="1"> <thead> <tr> <th></th> <th>hats</th> <th>scarves</th> </tr> </thead> <tbody> <tr> <td>blue</td> <td></td> <td></td> </tr> <tr> <td>orange</td> <td></td> <td></td> </tr> <tr> <td>purple</td> <td></td> <td></td> </tr> </tbody> </table> <p> </p>		hats	scarves	blue			orange			purple			<p>For every hat, there are two possible scarves. $3 \times 2 = 6$</p> <p>There are 6 possibilities altogether.</p>
	hats	scarves												
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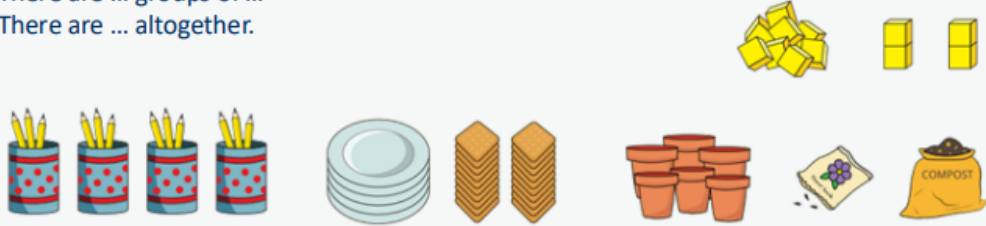
Year 4	<ul style="list-style-type: none"> Recall multiplication facts for multiplication tables up to 12×12 Use place value, known and derived facts to multiply mentally, including: multiplying by 0 and 1; multiplying together three numbers. Recognise and use factor pairs and commutativity in mental calculations. Multiply two-digit and three-digit numbers by a one-digit number using formal written layout. Solve problems involving multiplying and adding, including using the distributive law to multiply two-digit numbers by one digit, integer scaling problems and harder correspondence problems such as n objects are connected to m objects. 								
Progression of skills	Key representations								
Times-table facts to 12×12 Encourage daily counting in multiples both forwards and back. Encourage children to notice links between related times-tables.	<p>... groups of ... = ... times ... is equal to \times ... =</p>  								
Multiply by 1 and 0	<p>Any number multiplied by 1 is equal to ... Any number multiplied by 0 is equal to ...</p>  <p>... \times ... = ...</p> <table border="0"> <tr> <td>$1 \times 1 = 1$</td> <td>$1 \times 0 = 0$</td> </tr> <tr> <td>$2 \times 1 = 2$</td> <td>$2 \times 0 = 0$</td> </tr> <tr> <td>$3 \times 1 = 3$</td> <td>$3 \times 0 = 0$</td> </tr> <tr> <td>$4 \times 1 = 4$</td> <td>$4 \times 0 = 0$</td> </tr> </table>	$1 \times 1 = 1$	$1 \times 0 = 0$	$2 \times 1 = 2$	$2 \times 0 = 0$	$3 \times 1 = 3$	$3 \times 0 = 0$	$4 \times 1 = 4$	$4 \times 0 = 0$
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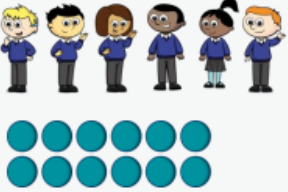


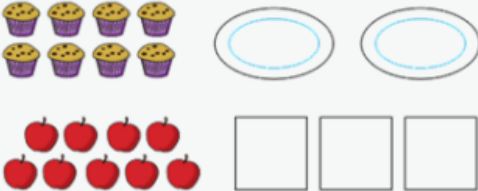

Progression of skills	Key representations	
Multiply 3 numbers Children use their understanding of commutativity to multiply more efficiently.	<p>To work out $\dots \times \dots \times \dots$, I can first calculate $\dots \times \dots$ and then multiply the answer by ...</p>  <p> $4 \times 2 \times 3 = 8 \times 3 = 24$ $2 \times 3 \times 4 = 6 \times 4 = 24$ $3 \times 4 \times 2 = 12 \times 2 = 24$ </p>	
Factor pairs Children explore equivalent calculations using different factors pairs.	<p>$12 = \dots \times \dots$, so $\dots \times 12 = \dots \times \dots \times \dots$</p>  <p> $8 \times 6 = 8 \times 3 \times 2$ $8 \times 6 = 24 \times 2$ </p> <p> $6 \times 8 = 6 \times 4 \times 2$ $6 \times 8 = 24 \times 2$ </p>	
Multiply by 10 and 100 Some children may over-generalise that multiplying by 10 or 100 always results in adding zeros. This will cause issues later when multiplying decimals.	<p>When I multiply by 10, the digits move ... place value column to the left. ... is 10 times the size of ...</p>  <p>$35 \times 10 = 350$</p>	<p>When I multiply by 100, the digits move ... place value columns to the left. ... is 100 times the size of ...</p>  <p>$14 \times 100 = 1,400$</p>


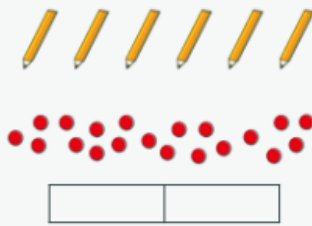
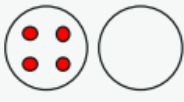
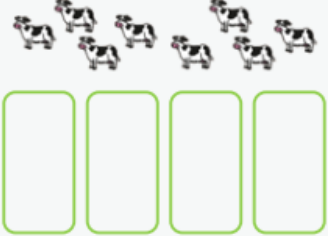
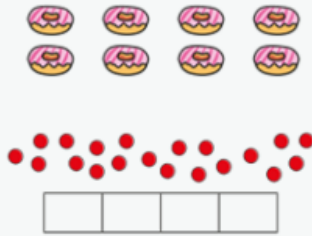
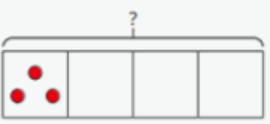
Progression of skills	Key representations
<p>Related facts</p> <p>Use knowledge of multiplying by 10 and 100 to scale times-table facts.</p>	<p>... × ... ones is equal to ... ones so ... × ... tens is equal to ... tens and ... × ... hundreds is equal to ... hundreds.</p>  <p> $3 \times 7 = 21$ $7 \times 3 = 21$ $3 \times 70 = 210$ $7 \times 30 = 210$ $3 \times 700 = 2,100$ $7 \times 300 = 2,100$ </p>
<p>Mental strategies</p> <p>Partition 2 or 3-digit numbers to multiply using informal methods.</p>	<p>... tens multiplied by ... is equal to ... tens. ...ones multiplied by ... is equal to ... ones.</p>  <p> $3 \times 26 = 60 + 18 = 78$ $26 \times 8 = 80 + 80 + 48 = 208$ </p>

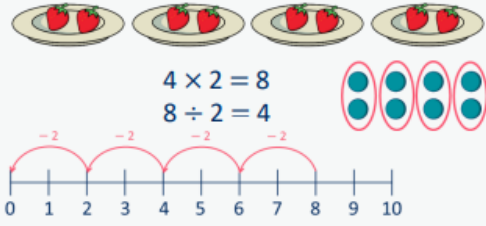
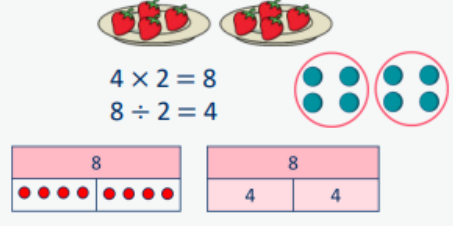
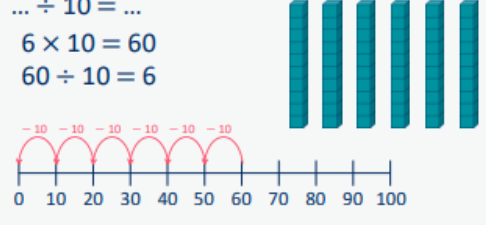
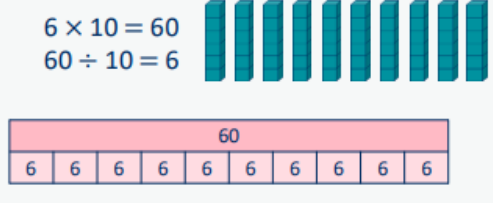
Progression of skills	Key representations																								
<p>Multiply a 2 or 3-digit number by a 1-digit number</p> <p>The short multiplication method is introduced for the first time, initially in an expanded form.</p>	<p>To multiply a 2-digit number by ... , I multiply the ones by ... and the tens by ... To multiply a 3-digit number by ... , I multiply the ones by ... , the tens by ... and the hundreds by ...</p> 																								
<p>Scaling</p> <p>Children focus on multiplication as scaling (... times the size).</p>	<p>... is ... times the size of ...</p>  <p> A computer mouse costs £7 A keyboard costs 6 times as much. </p> <p> A red ribbon is 6 cm. A yellow ribbon is 7 times as long. </p>																								
<p>Correspondence problems</p> <p>Encourage children to use tables to show all the different possible combinations.</p>	<p>For every ... , there are ... possibilities. There are ... × ... possibilities altogether.</p> <p>A pizza company offers a choice of 5 toppings and 3 bases.</p> <p>$5 \times 3 = 15$</p> <table border="1" data-bbox="922 1585 1476 1769"> <thead> <tr> <th></th> <th>Deep pan</th> <th>Italian</th> <th>Thin</th> </tr> </thead> <tbody> <tr> <th>Cheese</th> <td>C DP</td> <td>C I</td> <td>C Th</td> </tr> <tr> <th>Mushroom</th> <td>M DP</td> <td>M I</td> <td>M Th</td> </tr> <tr> <th>Vegetable</th> <td>V DP</td> <td>V I</td> <td>V Th</td> </tr> <tr> <th>Chicken</th> <td>C DP</td> <td>C I</td> <td>C Th</td> </tr> <tr> <th>Tuna</th> <td>T DP</td> <td>T I</td> <td>T Th</td> </tr> </tbody> </table>		Deep pan	Italian	Thin	Cheese	C DP	C I	C Th	Mushroom	M DP	M I	M Th	Vegetable	V DP	V I	V Th	Chicken	C DP	C I	C Th	Tuna	T DP	T I	T Th
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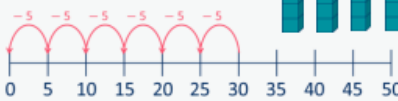


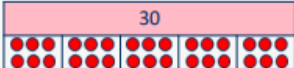
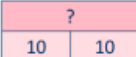
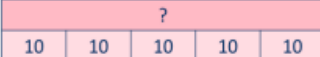
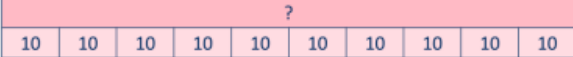
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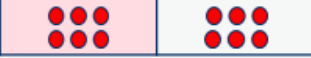




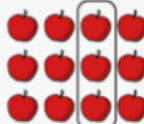



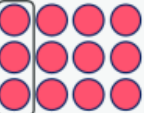


<p>Reception</p>	<ul style="list-style-type: none"> • Have a deep understanding of number to 10, including the composition of each number. • Subitise (recognise quantities without counting) up to 5 • Automatically recall (without reference to rhymes, counting or other aids) number bonds up to 5 and some number bonds to 10, including double facts. • Explore and represent patterns within numbers up to 10, including evens and odds, double facts and how quantities can be distributed equally.
<p>Progression of skills</p>	<p>Key representations</p>
<p>Sharing</p> <p>Provide practical activities such as sharing items during snack time. Encourage children to check whether items have been shared fairly (equally).</p>	<p>There are ... altogether. They are shared equally between ... groups.</p> 
<p>Grouping</p> <p>Provide opportunities to make equal groups when tidying up or during snack time. Encourage children to check that each group has the same amount.</p>	<p>There are ... groups of ... There are ... altogether.</p> 




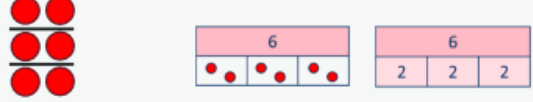



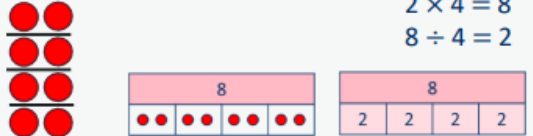
<p>Year 1</p>	<ul style="list-style-type: none"> • Solve simple one-step problems involving division, using concrete objects, pictorial representations and arrays with the support of the teacher. • Recognise, find and name a half as one of two equal parts of a quantity. • Recognise, find and name a quarter as one of four equal parts of an object, shape or quantity. 		
<p>Progression of skills</p>	<p>Key representations</p>		
<p>Make equal groups - grouping</p> <p>Encourage children to physically move objects into equal groups. They can also circle equal groups when using pictures.</p>	<p>There are ... altogether. How many groups of ... can you make?</p> 	<p>Circle groups of 2 There are ... groups of 2</p> 	<p>Take ... cubes. Make equal groups.</p>  <p>There are ... groups of ...</p>
<p>Make equal groups - sharing</p> <p>Encourage children to check that the objects have been shared fairly and each group is the same.</p>	<p>... have been shared equally between... There are ... on/in each ...</p> 		<p>Take ... cubes. Share them between ...</p>  <p>12 shared between ... is ...</p>

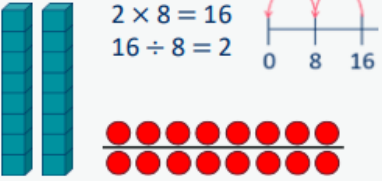



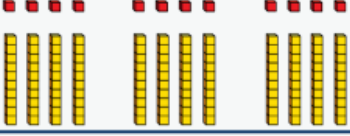


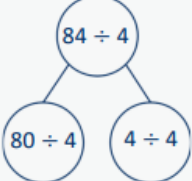
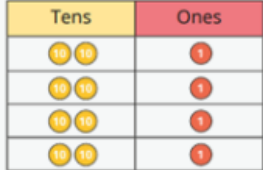
Progression of skills	Key representations		
<p>Find a half</p> <p>Start with practical opportunities to share a quantity into 2 groups. Progress to circling half of the objects in a picture and then to finding the whole from a given half.</p>	<p>To find half, I need to share into 2 equal groups.</p>  <p>There are ... in each group.</p>	<p>Half of ... is ...</p> 	<p>If ... is half, what is the whole?</p>  <p>4 is half of ...</p>
<p>Find a quarter</p> <p>Start with practical opportunities to share a quantity into 4 groups. Progress to using pictures or bar models to find a quarter and then to finding the whole from a given quarter.</p>	<p>To find a quarter, I need to share into 4 equal groups.</p>  <p>There are ... in each group.</p>	<p>A quarter of ... is ...</p> 	<p>If ... is one quarter, what is the whole?</p>  <p>3 is one quarter of ...</p>

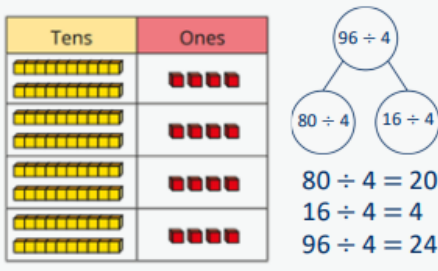

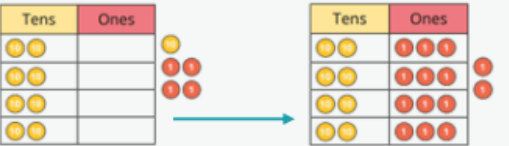
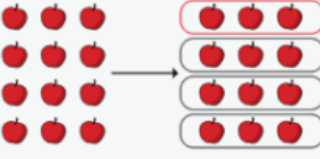
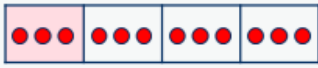

Year 2	<ul style="list-style-type: none"> Recall and use division facts for the 2, 5 and 10 multiplication tables. Calculate mathematical statements for division within the multiplication tables and write them using the division (\div) and equals (=) signs. Recognise, find, name and write fractions $\frac{1}{3}$, $\frac{1}{4}$, $\frac{2}{4}$ and $\frac{3}{4}$ of a quantity. 		
Progression of skills	Key representations		
<p>Divide by 2</p> <p>Encourage children to compare the grouping and sharing structures of division and to make links with times-table facts and halving.</p>	<p>There are ... equal groups of 2</p> <p>$\dots \div 2 = \dots$</p>  <p>$4 \times 2 = 8$ $8 \div 2 = 4$</p>	<p>... shared equally between 2 is ...</p> <p>Half of ... is ...</p> <p>$\dots \div 2 = \dots$</p>  <p>$4 \times 2 = 8$ $8 \div 2 = 4$</p>	
<p>Divide by 10</p> <p>Encourage children to compare the grouping and sharing structures of division and to make links with times-table facts.</p>	<p>There are ... equal groups of 10</p> <p>$\dots \div 10 = \dots$</p> <p>$6 \times 10 = 60$ $60 \div 10 = 6$</p> 	<p>... shared equally between 10 is ...</p> <p>$\dots \div 10 = \dots$</p> <p>$6 \times 10 = 60$ $60 \div 10 = 6$</p> 	

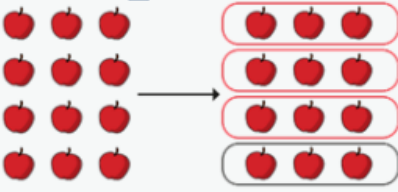
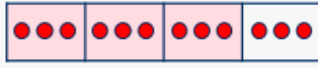

Progression of skills	Key representations	
<p>Divide by 5</p> <p>Encourage children to compare the grouping and sharing structures of division and to make links with times-table facts.</p>	<p>There are ... equal groups of 5</p> <p>$\dots \div 5 = \dots$</p>  <p>$6 \times 5 = 30$ $30 \div 5 = 6$</p>  	<p>... shared equally between 5 is ...</p> <p>$\dots \div 5 = \dots$</p>  <p>$6 \times 5 = 30$ $30 \div 5 = 6$</p>  
<p>Missing numbers</p> <p>Bar models are useful to show the link between multiplication and division.</p>	<p>... divided by 2/5/10 is equal to ...</p>  <p>$\square \div 2 = 10$</p>  <p>$\square \div 5 = 10$</p>  <p>$\square \div 10 = 10$</p>	

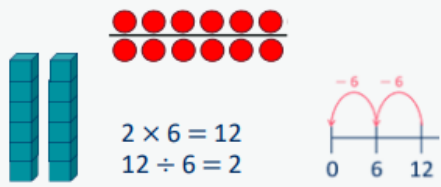
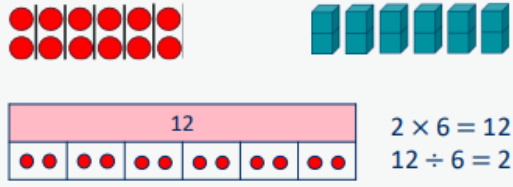


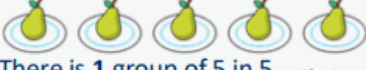

Progression of skills	Key representations	
<p>Unit fractions</p> <p>In Y2 the focus is on finding $\frac{1}{2}$, $\frac{1}{4}$ and $\frac{1}{3}$</p> <p>Bar models are useful to show the link between division and finding a fraction.</p>	<p>The objects have been shared fairly into ... groups.</p> <p>$\frac{1}{\square}$ of ... is ...</p>   	<p>There are ... equal parts.</p> <p>There is ... part circled.</p> <p>$\frac{1}{\square}$ is circled.</p>   
<p>Non-unit fractions</p> <p>In Y2 the focus is on finding $\frac{2}{4}$ and $\frac{3}{4}$</p> <p>Prompt children to notice that $\frac{2}{4}$ is equivalent to $\frac{1}{2}$</p>	<p>The objects have been shared fairly into ... groups.</p> <p>$\frac{\square}{\square}$ of ... is ...</p>   	<p>There are ... equal parts.</p> <p>There are ... parts circled.</p> <p>$\frac{\square}{\square}$ is circled.</p>   


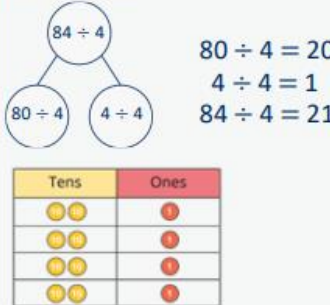
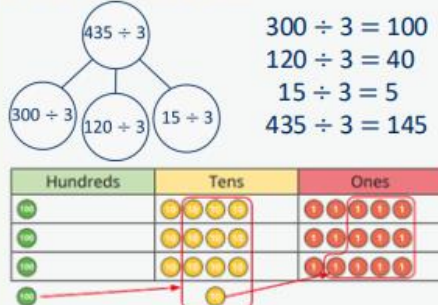
Year 3	
	<ul style="list-style-type: none"> Recall and use division facts for the 3, 4 and 8 multiplication tables. Write and calculate mathematical statements for division using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods. Recognise, find and write fractions of a discrete set of objects: unit fractions and non-unit fractions with small denominators.
Progression of skills	Key representations
Divide by 3 Encourage children to compare the grouping and sharing structures of division and to make links with times-table facts.	There are ... groups of 3 in ... $\dots \div 3 =$  $2 \times 3 = 6$ $6 \div 3 = 2$  ... has been shared equally into 3 equal groups. $\dots \div 3 =$  $2 \times 3 = 6$ $6 \div 3 = 2$ 
Divide by 4 Encourage children to compare the grouping and sharing structures of division and to make links with times-table facts.	There are ... groups of 4 in ... $\dots \div 4 =$  $2 \times 4 = 8$ $8 \div 4 = 2$  ... has been shared equally into 4 equal groups. $\dots \div 4 =$  $2 \times 4 = 8$ $8 \div 4 = 2$ 


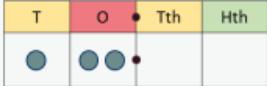
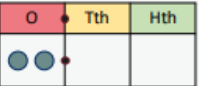
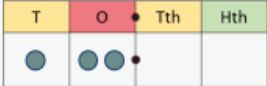
Progression of skills	Key representations
Divide by 8 Encourage children to compare the grouping and sharing structures of division and to make links with times-table facts.	There are ... groups of 8 in ... $\dots \div 8 =$  $2 \times 8 = 16$ $16 \div 8 = 2$  ... has been shared equally into 8 equal groups. $\dots \div 8 =$  $2 \times 8 = 16$ $16 \div 8 = 2$ 
Related facts Link to known times-table facts.	$\dots \div \dots$ is equal to \dots , so ... tens \div ... is equal to ... tens.  $12 \div 3 = 4$ $120 \div 3 = 40$ 
Divide a 2-digit number by a 1-digit number - no exchange Partition into tens and ones to divide and then recombine.	\dots tens divided by ... is equal to ... tens. \dots ones divided by ... is equal to ... ones.  $60 \div 2 = 30$ $4 \div 2 = 2$ $64 \div 2 = 32$  

Progression of skills	Key representations	
<p>Divide a 2-digit number by a 1-digit number - with remainders</p> <p>Encourage children to partition numbers flexibly to help them to divide more efficiently.</p>	<p>... tens divided by ... is equal to ... tens. ... ones divided by ... is equal to ... ones.</p> 	<p>There are ... groups of ... There are ... remaining.</p> <p>$31 \div 4 = 7 \text{ r}3$</p>  <p>$94 \div 4 = 23 \text{ r}2$</p> 
<p>Unit fractions of a set of objects</p> <p>Bar models are useful to show the link between division and fractions, for example, dividing by 3 and finding a third.</p>	<p>The whole is divided into ... equal parts. Each part is $\frac{1}{\square}$ of the whole.</p>  <p>$\frac{1}{4}$ of 12 apples is 3 apples.</p>	<p>One ... of ... is ...</p> <p>$\frac{1}{4}$ of 12 is 3</p>  <p>$\frac{1}{3}$ of 36 is 12</p> 

Progression of skills	Key representations	
<p>Non-unit fractions of a set of objects</p> <p>Bar models are a useful representation and show the links with division and multiplication.</p>	<p>The whole is divided into ... equal parts. Each part is $\frac{1}{\square}$ of the whole.</p>  <p>$\frac{3}{4}$ of 12 apples is 9 apples.</p>	<p>$\frac{1}{\square}$ of ... is ..., so $\frac{\square}{\square}$ of ... is ...</p> <p>$\frac{3}{4}$ of 12 is 9</p>  <p>$\frac{2}{3}$ of 36 is 24</p> 

Year 4	<ul style="list-style-type: none"> Recall division facts for multiplication tables up to 12×12 Use place value, known and derived facts to divide mentally, including: dividing by 1 Find the effect of dividing a one- or two-digit number by 10 and 100, identifying the value of the digits in the answer as ones, tenths and hundredths. 	
Progression of skills	Key representations	
<p>Division facts to 12×12</p> <p>Encourage children to compare the grouping and sharing structures of division and to make links with times-table facts.</p>	<p>There are ... groups of ... in ... $\dots \div \dots =$</p>  <p>$2 \times 6 = 12$ $12 \div 6 = 2$</p>	<p>... has been shared equally into ... equal groups. $\dots \div \dots =$</p>  <p>$2 \times 6 = 12$ $12 \div 6 = 2$</p>
<p>Divide a number by 1 and itself</p> <p>Children may try to divide a number by zero and it should be highlighted that this is not possible.</p>	<p>When I divide a number by 1, the number remains the same.</p> <p>5 shared between 1 is 5 </p> <p>There are 5 groups of 1 in 5 </p>	<p>When I divide a number by itself, the answer is 1</p> <p>5 shared between 5 is 1 </p> <p>There is 1 group of 5 in 5 </p>

Progression of skills	Key representations																
<p>Related facts</p> <p>Link to known times-table facts.</p>	<p>... \div ... is equal to ... so ... tens \div ... is equal to ... tens and ... hundreds \div ... is equal to ... hundreds.</p>  <p>$21 \div 7 = 3$ $21 \div 3 = 7$ $210 \div 7 = 30$ $210 \div 3 = 70$ $2,100 \div 7 = 300$ $2,100 \div 3 = 700$</p>																
<p>Divide a 2 or 3-digit number by a 1-digit number</p> <p>Progress from divisions with no exchange, to divisions with exchange and then divisions with remainders.</p>	<p>I can partition ... into ... tens and ... ones.</p>  <p>$84 \div 4 = 21$</p> <table border="1" data-bbox="470 1668 678 1803"> <thead> <tr> <th>Tens</th> <th>Ones</th> </tr> </thead> <tbody> <tr> <td>8</td> <td>4</td> </tr> <tr> <td>2</td> <td>1</td> </tr> </tbody> </table>	Tens	Ones	8	4	2	1	<p>I cannot share the hundreds/tens equally, so I need to exchange 1 ... for 10 ...</p>  <p>$435 \div 3 = 145$</p> <table border="1" data-bbox="853 1668 1284 1803"> <thead> <tr> <th>Hundreds</th> <th>Tens</th> <th>Ones</th> </tr> </thead> <tbody> <tr> <td>4</td> <td>3</td> <td>5</td> </tr> <tr> <td>1</td> <td>14</td> <td>5</td> </tr> </tbody> </table>	Hundreds	Tens	Ones	4	3	5	1	14	5
Tens	Ones																
8	4																
2	1																
Hundreds	Tens	Ones															
4	3	5															
1	14	5															

Progression of skills	Key representations			
<p>Divide by 10 and 100</p> <p>Encourage children to notice that dividing by 100 is the same as dividing by 10 twice.</p>	<p>When I divide by 10, the digits move 1 place value column to the right. ... is one-tenth the size of ...</p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">  <p>$2 \div 10 = 0.2$</p> </div> <div style="text-align: center;">  <p>$12 \div 10 = 1.2$</p> </div> </div>	<p>When I divide by 100, the digits move 2 place value columns to the right. ... is one-hundredth the size of ...</p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">  <p>$2 \div 100 = 0.02$</p> </div> <div style="text-align: center;">  <p>$12 \div 100 = 0.12$</p> </div> </div>		