



Westmorland Primary School

Mathematics Calculation Policy

Introduction

At Westmorland, we are dedicated to developing our children into confident mathematicians, where they are able to solve problems, reason about mathematical concepts and fluently apply mathematical skills in a variety of contexts, including real-life experiences across the curriculum and in the wider world. In order to achieve this, we are committed to developing all children by giving **MORE**. Our curriculum is based around **Memorable Learning**, **Oracy**, **Reading** and **Experiences**.

At the centre of the mastery approach to the teaching of mathematics is the belief that all children have the potential to succeed. They should have access to the same curriculum content and, rather than being extended with new learning, they should deepen their conceptual understanding by tackling challenging and varied problems.

Similarly with calculation strategies, children must not simply rote learn procedures but demonstrate their understanding of these procedures through the use of concrete materials and pictorial representations.

This policy outlines the different calculation strategies that should be taught and used in line with the requirements of the 2014 Primary National Curriculum to ensure that all children:

- become **fluent** in the fundamentals of mathematics, including through varied and frequent practice with increasingly complex problems over time, so that pupils develop conceptual understanding and the ability to recall and apply knowledge rapidly and accurately.
- **reason mathematically** by following a line of enquiry, conjecturing relationships and generalisations, and an argument, justification or proof using mathematical language
- can **solve problems** by applying their mathematics to a variety of routine and nonroutine problems with increasing sophistication, including breaking down problems into a series of simpler steps and persevering in seeking solutions.

INTENT:

At Westmorland, our Maths curriculum is designed to offer every child **MORE**. We are committed to providing Memorable learning opportunities, which are accessible to all, through a concrete, pictorial and abstract approach. All children are encouraged to discuss and share mathematical thinking using rich vocabulary and explore real-life problems both independently and in collaboration with their peers.

The principle of the concrete-pictorial-abstract (CPA) approach is that, for children to have a true understanding of a mathematical concept, they need to master all three phases

To support the CPA approach, Westmorland Primary School have 5 core representations in which the teaching of the four operations can be supported with. These are a combination of concrete and pictorial representations to support the children before they are able to work in the abstract.

These core representations are:

- Tens Frame
- Base 10 / Dienes
- Part, Part, Whole
- Bar Model
- Number Line

This is a system of learning that uses physical and visual aids to build a child's understanding of abstract topics. Pupils are introduced to a new mathematical concept through the use of concrete resources. When they are comfortable solving problems with physical aids, they are given problems with pictures - usually pictorial representations of the concrete objects they were using. Then they are asked to solve problems where they only have the abstract i.e. numbers or other symbols.

Reinforcement is achieved by going back and forth between these representations. For example, if a child has moved on from the concrete to the pictorial, it does not mean that the concrete cannot be used alongside the pictorial. Or if a child is working in the abstract, 'proving' something or 'working out' could involve use of the concrete or pictorial.

IMPLEMENTATION:

From Year 1 to Year 6, we adhere to our Progression of skills document which outlines the progression of strategies and methods to be taught. EYFS have a separate skills document and have daily Maths lessons and Maths continuous provision. We have created our long and medium-term plans breaking the curriculum down into smaller steps. If needed and in agreement with the Maths Lead, plans can be altered the order to suit and benefit the needs of our children so that connections between units of learning are easier to recognise.

Lessons are planned and sequenced so that new knowledge and skills build on what has been taught before. Teachers follow the school's Progression of skills document and refer to the Calculation Policy when teaching formal methods, understanding that sometimes children find their own efficient methods along the way. Teachers also have access to White rose Maths hub materials. Teachers understand that the small steps are not lessons, but are learning intentions that must be achieved before moving on to the next, and how to progress children who achieve this by using problems of greater complexity (i.e. where the approach is not immediately obvious), demonstrating creativity and imagination and independently exploring and investigating mathematical contexts and structures, communicating their results clearly and systematically. Reception to Year 2 have access to Numbots and Year 3 onwards have access to their own personal account of 'Times Tables Rockstar' where they can compete against other pupils and classes in school.

Mastering Number is also delivered as a whole class intervention from Reception to Year 4. The aims are to secure firm foundations in the development of good number sense for all children and over time that children will leave KS1 with fluency in calculation and a confidence and flexibility with number and continue to embed this in Year 3 and 4.

By using a variety of planning resources, delivering Mastering Number, and having our progression of skills and calculation policy at the heart of our Maths, we believe that we provide a bespoke teaching and learning experience that is designed to interest, inform and inspire our children. Using prior knowledge as a starting point for all future planning and teaching, we plan lessons which are required for all pupils to make good progress.

The two Year 6 classes benefit from splitting into three smaller class to help the ratio between pupils and teachers and thus having higher quality interactions with pupils.

At the end of each half term, the children complete a tailored Maths assessment on the blocks that they have covered. These are then assessed, monitored and the outcomes fed back into future planning to ensure any gaps are then closed through starters or extra lessons.

IMPACT:

The impact of our mathematics curriculum is that children understand the relevance and importance of what they are learning in relation to real world concepts. Children know that Maths is a vital life skill that they will rely on in many areas of their daily life. Children have a positive view of Maths due to learning in an environment where Maths is promoted as being an exciting and enjoyable subject in which they can investigate and ask questions; they know that it is reasonable to make mistakes because this can strengthen their learning through the journey to finding an answer. Children are confident to 'have a go' and choose the equipment they need to help them to learn along with the strategies they think are best suited to each problem. Our children have a good understanding of their strengths and targets for development in Maths and what they need to do to improve.

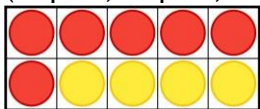
A mathematical concept or skill has been mastered when a child can show it in multiple ways, using the mathematical language to explain their ideas, and can independently apply the concept to new problems in unfamiliar situations. Children demonstrate quick recall of facts and procedures. This includes the recollection of the times tables. The flexibility and fluidity to move between different contexts and representations of mathematics. The ability to recognise relationships and make connections in mathematics. Children show confidence in believing that they will achieve. -Children show a high level of pride in the presentation and understanding of the work.

Tens Frame

A tens frame has a total of 10 spaces for counters/objects. This can be concrete by using the physical objects in the frame, or pictorial by using the images of the frame and counters. This is perfect for number bonds to 10, or 20 if you have 2 tens frames. It clearly shows two parts that combine together to make a whole. This can also be used to support addition and subtraction facts within 10 and 20. As the children move through the school, the tens frame can be used to support decimals in the tenths column.

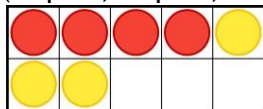
$$6 + 4 = 10$$

(6: part, 4: part, 10: whole)



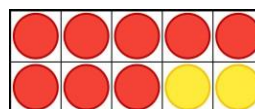
$$4 + 3 = 7 \text{ or } 7 - 3 = 4$$

(4: part, 3: part, 7: whole)



$$0.8 + 0.2 = 1$$

8 tenths + 2 tenths = 10 tenths



Base 10 / Dienes

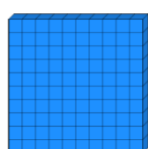
Using Base 10 or Dienes is an effective way to support children's understanding of column addition and subtraction. This can be concrete by using the physical objects, or pictorial by using the images of each quantity. The symbols below are entered into a place value chart so that the value of each column is clearly demonstrated. The children will first begin to add and subtract without any exchanging or carrying. They must start in the column with the smallest place value and work across to the left.



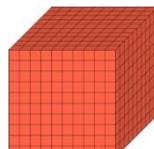
= 1



= 10



= 100

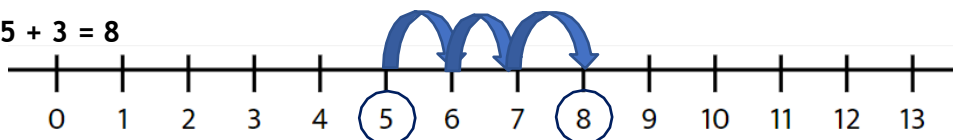


= 1,000

Number Line

Labelled number lines support children in their addition and subtraction as they can practise counting on or back up and down the line. This can be made concrete by using beads or a physical number line. As they become more confident, they may make jumps to the nearest 10 to begin bridging and partition their jumps into more manageable numbers. As children get older, these number lines may be blank for them to label their own numbers. The child must count the **jumps** made not the numbers under the line.

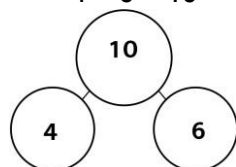
$$5 + 3 = 8$$



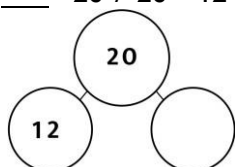
Part, Part, Whole

The model supports children with partitioning the whole. When the parts are complete and the whole is empty, the children can add the parts together to find the total. When the whole is complete and at least 1 part is empty, the children can use partitioning to subtract and find the missing part. As children get older, they will apply this method to add and subtract fractions, decimals and percentages.

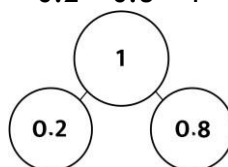
$$4 + 6 = 10$$



$$12 + \underline{\quad} = 20 \text{ / } 20 - 12 = \underline{8}$$

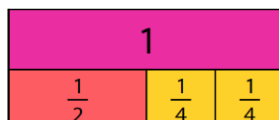
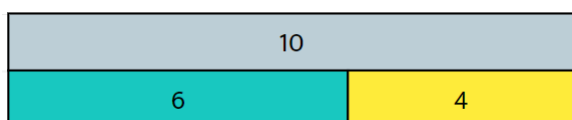


$$0.2 + 0.8 = 1$$



Bar Model

The bar model is another type of part-whole model that can support children in representing calculations that show the parts and the whole. The whole is the number on top and below are the parts which add together to create the whole. This can be a concrete method by using cubes to represent the parts. To begin with, it can support number bonds and missing number problems. As children get older, bar models are used to represent larger numbers, decimals and fractions.



Mathematical Terminology Glossary

Addend: A number to be added to another.

Array: A pictorial representation of a calculation, using rows of dots, to help children understand multiplication and times tables.

Bridging: Bridging through 10 is a way of adding numbers greater than 10 in your head. For example, to add $8 + 7$, you add 2 (from the 7) to get 10, then add the remaining 5 to get 15.

Bus Stop: The formal method for short division. It is a way of dividing numbers with two or more digits by one-digit numbers.

Column Method: The formal written method for completing addition and subtraction calculations. It can involve regrouping amounts from one column to the next (see regrouping).

Commutativity: When 2 numbers can be added or multiplied and the same answer will be found, regardless of which order they are in. E.g. $3 \times 2 = 6$ and $2 \times 3 = 6$.

Difference: The numerical difference between 2 numbers found by comparing the quantity in each group.

Divisor: The number you are dividing by: the number outside the bus stop (dividend \div divisor = quotient).

Inverse Operation: Another way of saying an opposite operation, which is used to check calculations are correct. Addition and subtraction are inverse operations, as are multiplication and division.

Long Division: The formal written method showing how to divide larger numbers (such as three or four-digit numbers) by other large numbers. Children will move onto long division in KS2, once they have mastered short division (see bus stop).

Long Multiplication: The formal written method for multiplying larger numbers together. The numbers are put in columns according to their place value.

Minuend: A quantity or number from which another is to be subtracted

Multiplier: The number you are multiplying by. How many 'groups of'.

Number Bonds: Pairs of numbers that add together to make a given number. For example, $2 + 8$ and $4 + 6$ are number bonds to 10, whereas $43 + 57$ and $81 + 19$ are number bonds to 100.

Partition: Splitting a number into separate parts based on place value (ones, tens, hundreds, thousands etc). 5,246 can be partitioned into 5 thousands, 2 hundreds, 4 tens and 6 ones or $5000 + 200 + 40 + 6$.

Place Value: How much each digit in a number represents. 157 is: 1 hundred, 5 tens and 7 ones.

Product: The name for the answer to a multiplication calculation. The product of 5×7 is 35.

Quotient: The answer for division calculations. The amount each divisor receives (see divisor).

Regrouping: To regroup means to rearrange groups in place value to carry out an operation. For example, we can regroup 1 ten into 10 ones. Or we can regroup 1 thousand into 10 hundreds.

Repeated Addition: A technique used to teach multiplication in Key Stage 1, where children add 'lots' of numbers together. For example, 3 'lots' of 5 is $5 + 5 + 5$ as well as 3×5 .

Subitise: Instantly recognise the number of objects in a small group without needing to count.

Subtrahend: A number to be subtracted from another.

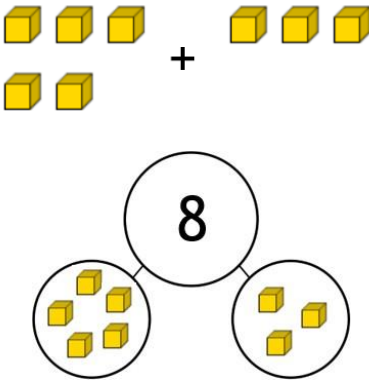
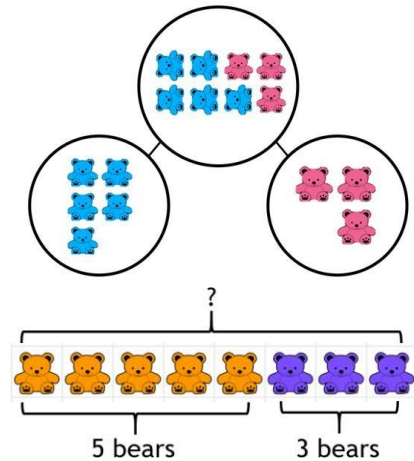
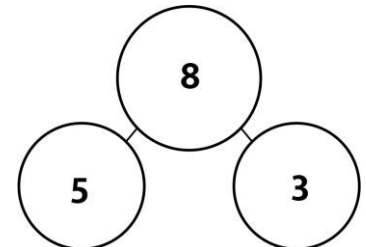
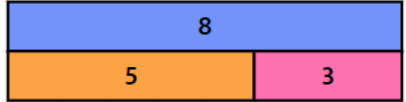
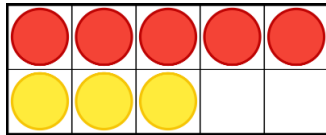
Sum: The result of an addition. The sum of $6 + 4$ is 10.

Addition

Objective: Combining two parts to make a whole - EYFS

Vocabulary:

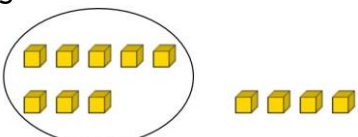
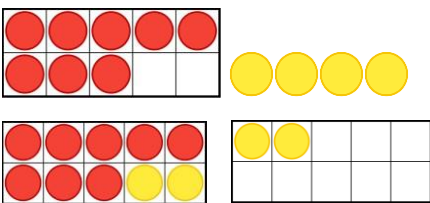

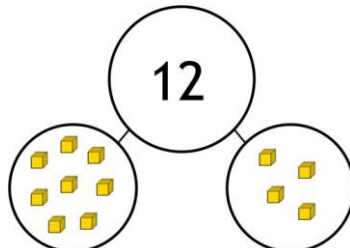
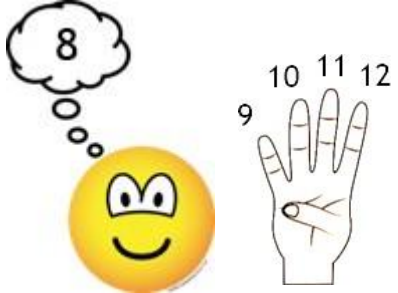
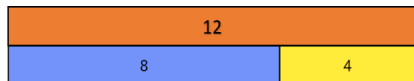
- Part, whole, add, put together, altogether, total, sum, equals, combine
- Tens / Ones

Concrete	Pictorial	Abstract
<p>Children to use a range of concrete objects which they can combine to create the whole.</p> 	<p>Children to use pictures to represent the numbers in a group which they combine to create the whole.</p> 	<p>Children to show each group on their fingers and count these to find the total of the two groups.</p> <p style="text-align: center;">$5 + 3 = 8$</p> <p style="text-align: center;">$8 = 5 + 3$</p>  
<p>Children can use physical objects to put inside the tens frame or use this as a pictorial representation.</p> 		

Objective: Count beyond 10 - EYFS

Vocabulary:


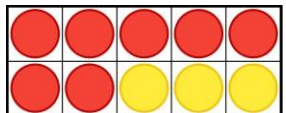
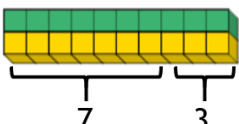
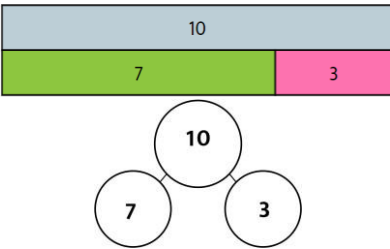

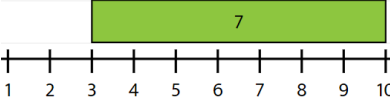
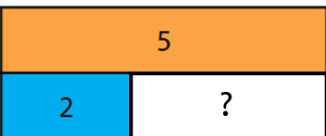
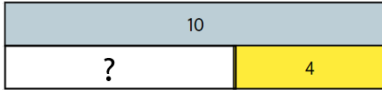
- More than, how many more, count on, add, altogether, total, sum, equals, same as
- Tens / Ones

Concrete	Pictorial	Abstract
<p>Find a group of 8 objects and add another 4 objects into the group. Start with the number 8 and count on, 9, 10, 11, 12.</p> <p>How many objects are there altogether?</p>  <p>Use physical objects to put inside the tens frame. Children start with 8 in the tens frame and add in 4 more.</p> 	<p style="text-align: center;">$8 + 4 = 12$</p> <p>Start at 8 (the larger number) on the number line and count on in ones (making 4 jumps) to find the answer. Children could have physical number line if needed.</p>  	<p style="text-align: center;">$8 + 4 = 12$</p> <p>Place the larger number in your head and count on the smaller number on your fingers to find your answer.</p>  

Objective: Addition facts to 5 - EYFS
 Number bonds to 10 and 20 - EYFS/Year 1

Vocabulary:

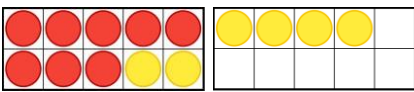



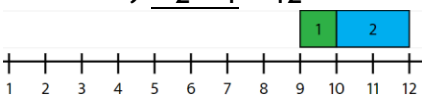
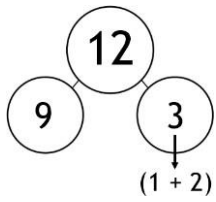
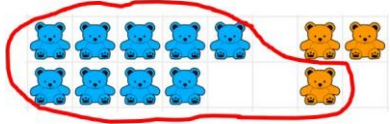
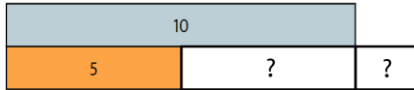
- More than, how many more, add, increase, altogether, total, sum, equal to, same as
- Tens/Ones

Concrete	Pictorial	Abstract
<p>Children to use the tens frame to explore the combinations of numbers that add together to make 5 and 10 in total.</p> <p style="text-align: center;">$3 + 2 = 5$ $2 + 3 = 5$</p>  <p style="text-align: center;">$7 + 3 = 10$ $3 + 7 = 10$</p>  <p>Children to use the Base 10 'ones' blocks to find all combinations of making 10 the same size as the 'tens' block.</p> 	<p style="text-align: center;">$7 + 3 = 10$ $3 + 7 = 10$</p>  <p>Using the number line, children should make the block of jumps at once to reinforce the connections between numbers. This could be a physical number line if required.</p>  	<p>Children to use their number bonds to find the missing numbers to 5, 10 or 20.</p> <p>EYFS: "There are 5 of us but only 2 clipboards. How many more do we need?"</p>  <p style="text-align: center;">Year 1:</p>  <p>Children then to use the number bonds to find related facts:</p> <p>If $7 + 3 = 10$, then $17 + 3 = 20$ If $6 + 4 = 10$, then $14 + 6 = 20$</p>

Objective: Regrouping to make 10 - Year 1/2

Vocabulary:

- More than, how many more, add, increase, altogether, total, sum, equal to, same as
- Tens/Ones
- Regroup, partition, addend

Concrete	Pictorial	Abstract
<p style="text-align: center;">$8 + 6 = 14$ would become: $8 + 2 + 4 = 14$</p> <p>We partition 6 into 2+4 because we know $8 + 2 = 10$ and we can then easily add 4 more.</p>  <p style="text-align: center;">$6 + 7 = 13$</p>  <p>would become: $6 + 4 + 3$</p>  <p>which is the same as: $10 + 3 = 13$</p> 	<p style="text-align: center;">$9 + 3 = 12$ would become: $9 + 2 + 1 = 12$</p>  <p>For more support, children could be given a physical number line.</p>  	<p style="text-align: center;">$5 + 7 = 12$</p> <p>If I am at five, how many more do I need to make 10?</p> <p>How many more do I add on now?</p>  <p>Children should ultimately be able to use mental maths by visualising a number line and make these jumps in their head.</p>

Objective: Add 3 single digits - Year 1/2

Vocabulary:

- More than, how many more, add, increase, altogether, total, sum
- Tens/Ones
- Combine, remainder, addend

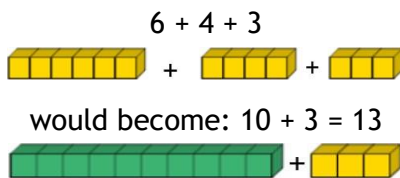
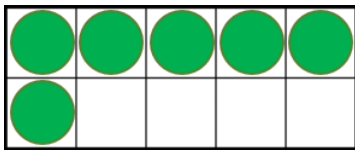
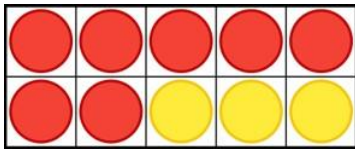
Concrete

Pictorial

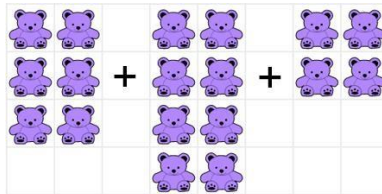
Abstract

Children to look for number bonds within the 3 single digits which they can combine together to make 10 (or 20 etc) and then add on the remainder of the addend.

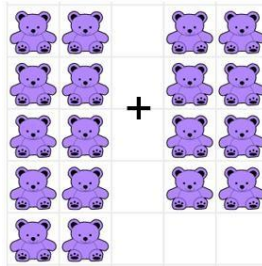
7 + 6 + 3 will become:
7+3 (=10) + 6 = 16



6 + 8 + 4 = 18



Combine the 6 + 4 groups to create a group of 10.
Then 10 + 8 = 18



9 + 7 + 1:

Combine the two numbers that make 10 and then add on the remainder of the addend.



Children to use this strategy when adding larger numbers:

12 + 14 + 8 would become:
(12 + 8) + 14
20 + 14 = 34

Objective: Add up to 2 + 2-digit numbers without regrouping - Year 2

Vocabulary:

- More than, how many more, add, altogether, total, sum, equals, same as
- Hundreds/Tens/Ones
- Partition, regroup, combine, addend

Concrete

Pictorial

Abstract

34 + 53 = 87

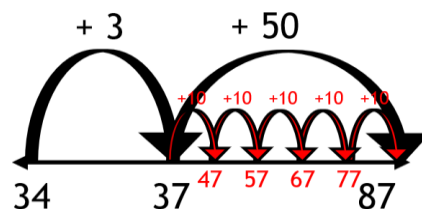
1. Create numbers using Base 10 in a place value chart.
2. Start in the column with the smallest value: the ones.
3. Add the ones together.
4. Add together the tens.
5. Combine the value in each column to find the total.

Tens	Ones
8	7

Children to interpret word problems and create their own bar to model the calculation.

?	
34	53

Children could begin to use a blank number line to create their own jumps by partitioning the addend. Then using mental strategies to label this (3 + 5 = 8 so 30 + 50 must be 80). Or make smaller jumps they can do more easily mentally.



Introducing the **column method** to record addition calculations.

Katie picked 34 daisies in her garden and her sister picked another 53 daisies. How many daisies did they pick altogether?

$$\begin{array}{r} 34 \\ + 53 \\ \hline 87 \end{array}$$

Missing number problems:

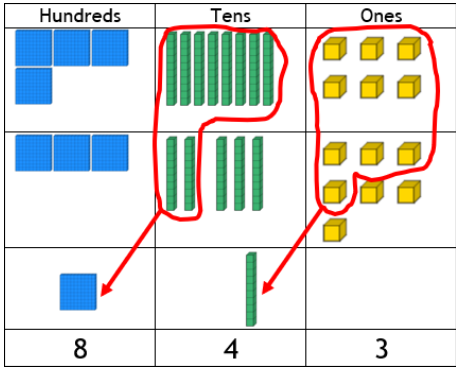
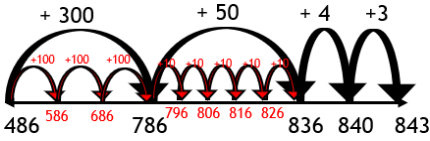
$$\begin{array}{r} 3 \quad _ \\ + \quad 3 \\ \hline 8 \quad 7 \end{array}$$

Children to use the inverse operation to find the missing numbers.
(7-3 = 4) (80-30 = 50)

Objective: Add up to 2 + 2-digit numbers with regrouping - Year 2
 Add up to 3 + 3-digit numbers with regrouping - Year 3

Vocabulary:

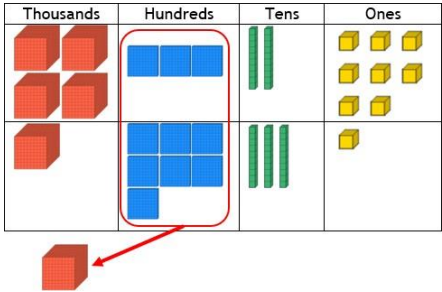
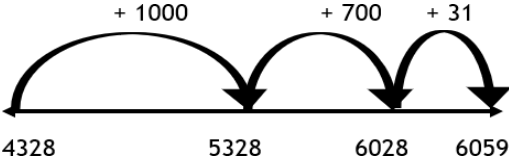
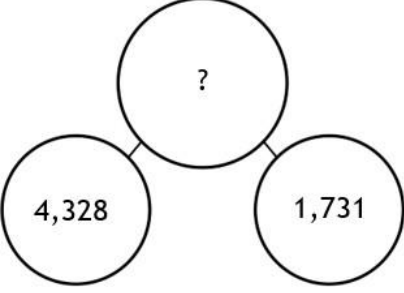
- More than, how many more, add, altogether, total, sum, equals, same as
- Hundreds/Tens/Ones
- Partition, regroup, combine, addend

Concrete	Pictorial	Abstract				
<p>$486 + 357 = 843$</p> <ol style="list-style-type: none"> 1. Create numbers using Base 10 in a place value chart. 2. Start in the column with the smallest value: the ones. 3. Add the ones together: $6 + 7 = 13$ so regroup 10 'ones' into a 'ten'. 4. Add together the tens: $80 + 50 = 130$ so regroup 10 'tens' into 1 'hundred'. 5. Combine the value in each column to find the total. 	<p>Children to interpret word problems and create their own bar model of the calculation.</p> <table border="1" data-bbox="651 495 986 600"> <tr><td colspan="2">?</td></tr> <tr><td>486</td><td>357</td></tr> </table> <p>Children use a blank number line to partition the addend. Use mental strategies to label this by creating appropriate jumps they can do mentally.</p> <p>(+ 300 or +100, +100 + 100) (+50 or +10, +10, +10, +10, +10) (Use of number bonds to create the next 10)</p> 	?		486	357	<p>Use the column method to record addition calculations.</p> <p>A shop has 486 toys inside. The shop gets a delivery of 357 more toys. How many toys does the shop now have altogether?</p> $\begin{array}{r} 486 \\ + 357 \\ \hline 843 \\ 11 \end{array}$ <p>Partition mentally:</p> <ul style="list-style-type: none"> • $400 + 300 = 700$ • $80 + 60 = 140$ • $6 + 7 = 13$ • $700 + 140 + 13 = 843$ <p>Missing number problems:</p> <p>Children to use the inverse operation to find the missing numbers.</p> $\begin{array}{r} - 86 \\ + 3 \\ \hline 843 \\ 11 \end{array}$ <p>($140 - 80 - 10 = 50$) ($80 - 30 - 10 = 40$)</p>
?						
486	357					

Objective: Add numbers with up to and greater than 4 digits - Year 4/5/6

Vocabulary:

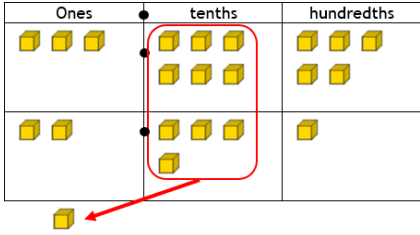
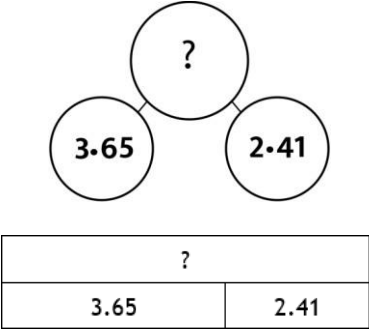
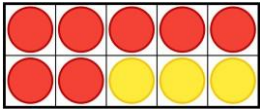

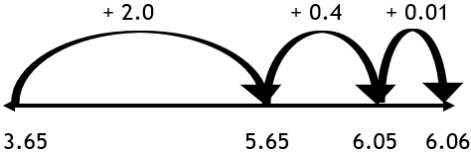
- More than, how many more, add, increase, altogether, total, sum
- Thousands/Hundreds/Tens/Ones
- Partition, regrouping, combine, addend

Concrete	Pictorial	Abstract				
<p>$4,328 + 1,731 = 6,059$</p> <p>Children to use a physical place value mat with Base 10 (or place value counters) to regroup the 10 'hundreds' into 1 'thousand' and then combine the value in each column to find the total.</p>  <p>Children to use a blank number line to create their own scale and draw their own jumps to add the total amount of 1,731.</p> 	<p>Children to interpret word problems and create their own pictorial model of the calculation.</p>  <table border="1" data-bbox="625 1809 1015 1910"> <tr><td colspan="2">?</td></tr> <tr><td>4,328</td><td>1,731</td></tr> </table>	?		4,328	1,731	<p>Use the column method to record addition calculations. Or use mental partitioning.</p> <p>Tom has 4,328 stickers in his collection. He was then given 1,731 more from his friend. How many stickers does Tom have in total?</p> $\begin{array}{r} 4328 \\ + 1731 \\ \hline 6059 \\ 1 \end{array}$ <p>Missing number problems:</p> <p>Children to use the inverse operation to find the missing numbers.</p> $\begin{array}{r} - 3 \\ + 1 \\ \hline 6059 \\ 1 \end{array}$ <p>($50 - 30 = 20$) ($1000 - 300 = 700$) ($6000 - 100 - 100 = 400$)</p>
?						
4,328	1,731					

Objective: Solve problems involving number up to three decimal places - Year 4/5/6

Vocabulary:

- More than, how many more, add, increase, altogether, total, sum
- Thousands/Hundreds/Tens/Ones/Tenths/Hundredths
- Decimal point, decimal place
- Partition, regrouping, combine, addend

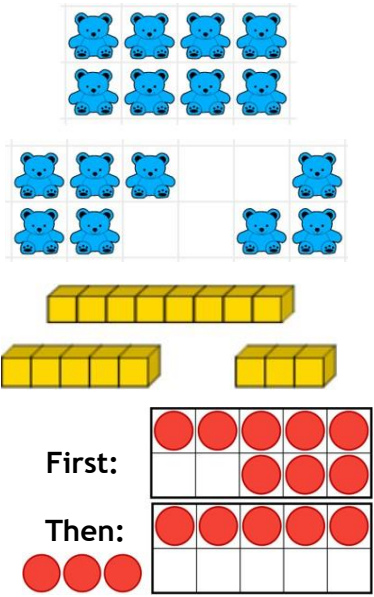
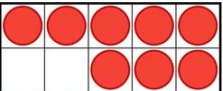
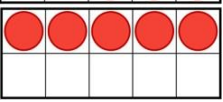
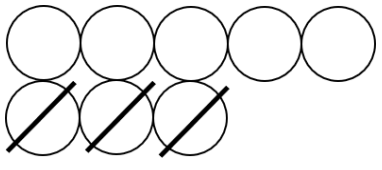

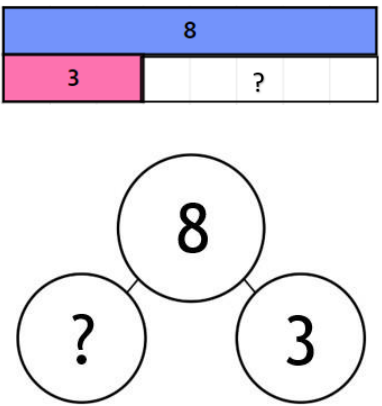
Concrete	Pictorial	Abstract
<p>$3.65 + 2.41 = 6.06$</p> <p>Children to use a physical place value mat with physical to regroup the 10 tenths into 1 one and then combine the value in each column to find the total of the calculation.</p> 	 <p>$0.7 + 0.3 = 1$ 7 tenths + 3 tenths = 10 tenths</p> 	<p>Sam has £3.65 in his pocket wallet. He is then given an extra £2.41 to spend. How much money does he have in total?</p>  <p style="text-align: center;">+</p> $\begin{array}{r} 3.65 \\ + 2.41 \\ \hline 6.06 \\ \hline 1 \end{array}$
<p>Children to use a blank number line to create their own scale and draw their own jumps to add the total amount of 2.41.</p>		

Subtraction

Objective: Subtract 1-digit numbers - EYFS/Year 1

Vocabulary:



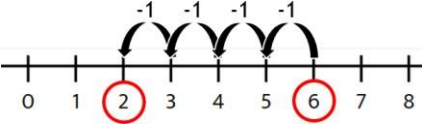
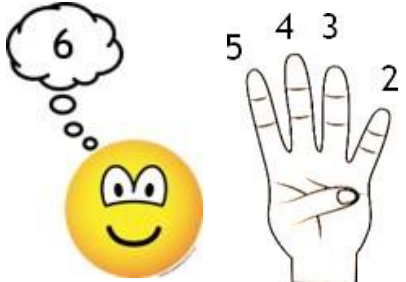
- Less, less than, fewer, fewer than, take away, minus, subtract, subtraction, equals
- Tens/Ones

Concrete	Pictorial	Abstract
<p style="text-align: center;">$8 - 3 = 5$</p> <p>Group of 8 objects and then take away 3 objects. How many are left?</p>  <p>First: </p> <p>Then: </p>	<p>Children can draw the concrete resources they are using and cross out the correct amount that is being subtracted. Count how many are left.</p>  <p>This can also be represented as a bar model:</p> 	<p style="text-align: center;">$8 - 3 = ?$</p> <p style="text-align: center;">$8 - 3 = 5$</p>  <p>Children could use the inverse of counting on (5) from the smallest number (3) until they reach the whole (8).</p>

Objective: Counting back - EYFS/Year 1

Vocabulary:

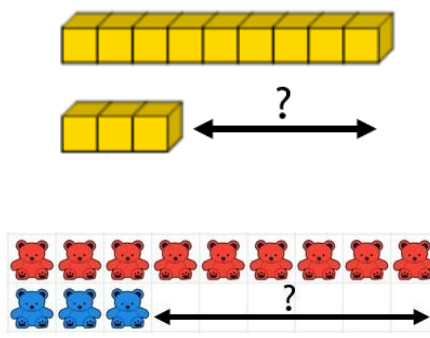
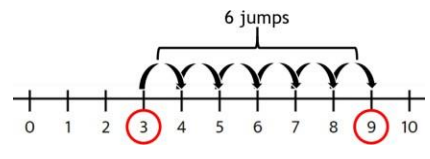
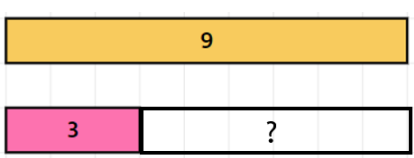
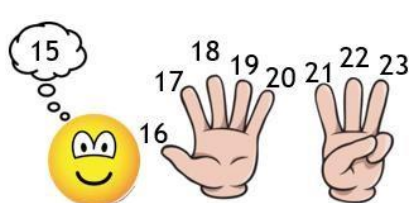
- Less, less than, fewer, fewer than, take away, minus, subtract, subtraction, equals
- Tens/Ones

Concrete	Pictorial	Abstract
<p style="text-align: center;">$6 - 4 = 2$</p> <p>Children can use a physical number line to make jumps back by moving objects. Start on 6 and move the counter 4 jumps back. Which number do they land on?</p>  <p>Or they can even physically jump along a number line themselves! Start on 6 and make 4 jumps onto the preceding numbers 1 at a time. Which number do they land on?</p> 	<p>Start at the bigger number and count back the smaller number showing the jumps on the number line.</p>  <p>Remember to count the jumps made on top of the number line (4 jumps) rather than count the numbers below.</p>	<p>Put the larger number (6) in your head, count back 4. What number are you at? Use your fingers to help.</p> 

Objective: Find the difference - EYFS/Year 1

Vocabulary:

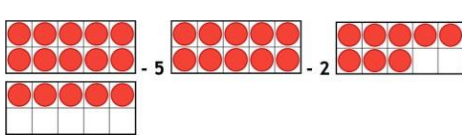
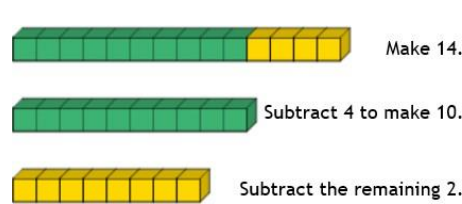
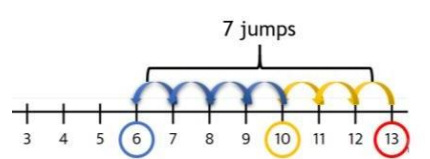
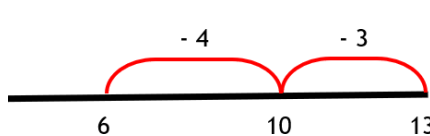
- Less than, fewer than, how many less, how many fewer, difference between, take away, minus, subtract, subtraction, equals, compare
- Tens/Ones

Concrete	Pictorial	Abstract
<p>What is the difference between 9 and 3?</p> <p>Use cubes to create bars or objects to make groups to find the difference between them.</p> 	<p>Children can count on from the smallest number (3) up to the largest number (9) using a using number line to find the difference.</p>  <p>Children can draw their own bars using squares in books to find the difference.</p> 	<p>Mentally apply the same strategies using larger numbers. Can the children now count on in their heads?</p> <p>Jack has 15 toys and Tom has 23 toys. Find the difference between the number of toys.</p>  <p>Holding up 8 fingers, so 8 is the difference between 15 and 23.</p> <p>15 is 8 fewer than 23. 23 is 8 more than 15. Tom has 8 more toys than Jack.</p>

Objective: Bridging to 10 / Making 10 - Year 1/Year 2

Vocabulary:

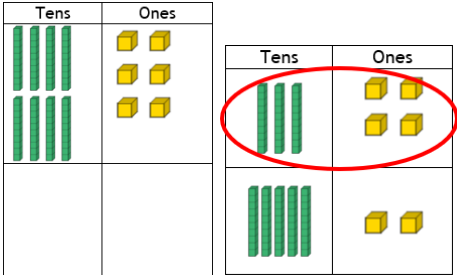
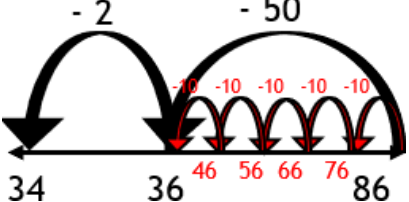
- Less than, fewer, subtract, decrease, take away, minus, subtract, subtraction, equals
- Tens/Ones
- Partition, subtrahend

Concrete	Pictorial	Abstract
<p>$15 - 7 = 8$</p> <p>Make 15 on the tens frame. Take-away five first to make 10. Then take-away the remaining 2 of the subtrahend so you have taken away 7 altogether.</p>  <p>$14 - 6 = 8$</p> 	<p>$13 - 7 = 6$</p> <p>Start at 13. Make 3 jumps back to reach 10. Then make the remaining 4 jumps back so you have taken away 7 altogether.</p>  <p>Children should progress to a blank number line, making just two jumps. One jump to 10, one jump to the answer.</p> 	<p>Children to show how they can make 10 by partitioning the subtrahend. Use their knowledge of number bonds.</p> $\begin{array}{r} 12 - 8 \\ \swarrow \searrow \\ 2 \quad 6 \end{array}$ <p>$12 - 2 = 10$ $10 - 6 = 4$</p> <p>Children to mentally visualise the number line and count back in their heads.</p> <p>How many do we take away to reach the next 10? How many do we have left to take away of the subtrahend?</p>

Objective: Subtract up to 2 - 2-digit numbers without regrouping - Year 2

Vocabulary:

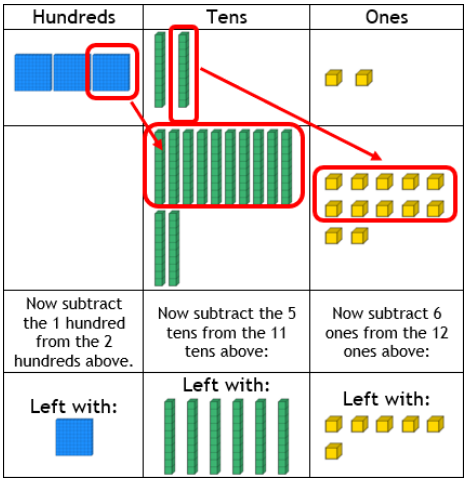
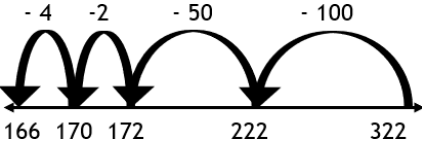
- Less than, fewer, subtract, decrease, take away, minus, subtract, subtraction, equals
- Tens/Ones
- Partition, regrouping, subtrahend

Concrete	Pictorial	Abstract										
<p style="text-align: center;">$86 - 52 = 34$</p> <ol style="list-style-type: none"> 1. Create numbers using Base 10 in a place value chart. 2. Start in the column with the smallest value: the ones. 3. Subtract 2 ones and put this in the box below. 4. Subtract the 40 in tens column and move this into the box below. 5. The numbers left in the top box is the answer, with the subtrahend removed in the box below. 	<p>Children to interpret word problems and create their own bar to model the calculation.</p> <table border="1" style="margin: auto;"> <tr><td colspan="2" style="text-align: center;">86</td></tr> <tr><td style="text-align: center;">52</td><td style="text-align: center;">?</td></tr> </table> <p>Children could use a blank number line to create their own jumps by partitioning the subtrahend. Then using mental strategies to label this.</p> 	86		52	?	<p>Introducing the column method to record subtraction calculations.</p> <p>There are 86 daisies in the garden. Katie picked 52 daisies. How many daisies are left in the garden?</p> $\begin{array}{r} 86 \\ - 52 \\ \hline 34 \end{array}$ <p>Missing number problems:</p> <table style="margin-left: 20px;"> <tr><td style="text-align: right;">- 6</td><td>Children to use what they know to find what they do not know.</td></tr> <tr><td style="text-align: right;">- 5</td><td></td></tr> <tr><td style="text-align: right;">3 4</td><td>(6-4=2) (50+30=80)</td></tr> </table>	- 6	Children to use what they know to find what they do not know.	- 5		3 4	(6-4=2) (50+30=80)
86												
52	?											
- 6	Children to use what they know to find what they do not know.											
- 5												
3 4	(6-4=2) (50+30=80)											

Objective: Subtract up to 2 - 2-digit numbers with regrouping - Year 2
 Subtract up to 3 - 3-digit numbers with regrouping - Year 3

Vocabulary:

- Less than, fewer, subtract, decrease, take away, minus, subtract, subtraction, equals
- Hundreds/Tens/Ones
- Partition, regrouping, subtrahend

Concrete	Pictorial	Abstract										
<p style="text-align: center;">$322 - 156 = 166$</p> <ol style="list-style-type: none"> 1. Regroup a ten for 10 ones. 2. Subtract 6 ones. 3. Regroup one hundred for 10 tens so we can subtract 5 tens. 4. Subtract 5 tens. 5. Subtract 100. The answer is 166. 	<p>Children to interpret word problems and create their own bar model of the calculation.</p> <table border="1" style="margin: auto;"> <tr><td colspan="2" style="text-align: center;">322</td></tr> <tr><td style="text-align: center;">156</td><td style="text-align: center;">?</td></tr> </table> <p>Children use a blank number line to partition the subtrahend. Use mental strategies to label this by creating appropriate jumps they can do mentally.</p> 	322		156	?	<p>Use the column method to record subtraction calculations.</p> <p>A shop has 322 toys inside. The shop sells 156 toys. How many toys does the shop have now?</p> $\begin{array}{r} 2\cancel{3}1\cancel{2} \\ - 156 \\ \hline 166 \end{array}$ <p>Missing number problems:</p> <table style="margin-left: 20px;"> <tr><td style="text-align: right;">- 2 2</td><td>Children to use what they know to find what they do not know.</td></tr> <tr><td style="text-align: right;">- 1 5</td><td>(12 - 6 = 6)</td></tr> <tr><td style="text-align: right;">1 6 6</td><td>(300 - 100 - 100 = 100)</td></tr> </table> <p>Children will need to show regrouping.</p>	- 2 2	Children to use what they know to find what they do not know.	- 1 5	(12 - 6 = 6)	1 6 6	(300 - 100 - 100 = 100)
322												
156	?											
- 2 2	Children to use what they know to find what they do not know.											
- 1 5	(12 - 6 = 6)											
1 6 6	(300 - 100 - 100 = 100)											

Objective: Subtract numbers with up to and greater than 4 digits - Year 4/5/6

Vocabulary:

- Less than, fewer, subtract, decrease, take away, minus, subtract, subtraction, equals
- Thousands/Hundreds/Tens/Ones
- Partition, regrouping, subtrahend

Concrete	Pictorial	Abstract																												
<p style="text-align: center;">$6,324 - 2,456 = 3,868$</p> <ol style="list-style-type: none"> 1. Create the larger number using Base 10 (or place value counters). 2. Regroup 1 ten into 10 ones then subtract 6 ones. 3. Regroup 1 hundred for 10 tens then subtract 5 tens. 4. Regroup 1 thousand for 10 hundreds then subtract 4 hundreds. 5. Subtract 2 thousands. <table border="1" style="width:100%; border-collapse: collapse; text-align: center;"> <tr> <th>Thousands</th> <th>Hundreds</th> <th>Tens</th> <th>Ones</th> </tr> <tr> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td colspan="4">No regrouping needed.</td> </tr> <tr> <td>Now subtract 2 thousands from the 5 thousands.</td> <td>Now subtract 4 hundreds.</td> <td>Now subtract 5 tens after regrouping.</td> <td>Now subtract 6 ones after regrouping.</td> </tr> <tr> <td>Left with: </td> <td>Left with: </td> <td>Left with: </td> <td>Left with: </td> </tr> </table>	Thousands	Hundreds	Tens	Ones					No regrouping needed.				Now subtract 2 thousands from the 5 thousands.	Now subtract 4 hundreds.	Now subtract 5 tens after regrouping.	Now subtract 6 ones after regrouping.	Left with:	Left with:	Left with:	Left with:	<table border="1" style="width:100%; border-collapse: collapse; text-align: center;"> <tr><td colspan="2">6,324</td></tr> <tr><td>2,456</td><td>?</td></tr> </table> <div style="text-align: center;"> <p>Children could use a blank number line to make their own jumps to subtract the subtrahend and jump back by 2,456.</p> </div>	6,324		2,456	?	<p>Use the <u>column method</u> to record subtraction calculations.</p> <p>Tom has 6,324 stickers in his collection. He gave 2,456 stickers to his friend. How many stickers does Tom have left in total?</p> $\begin{array}{r} 5 \quad 1 \quad 2 \quad 1 \quad 1 \\ 6 \quad 3 \quad 2 \quad 1 \quad 4 \\ - 2 \quad 4 \quad 5 \quad 6 \\ \hline 3 \quad 8 \quad 6 \quad 8 \end{array}$ <p>Missing number problems:</p> <table style="display: inline-table; vertical-align: middle;"> <tr><td style="text-align: right;">_ 3 2 4</td><td rowspan="3" style="padding-left: 10px;">Children to use what they know to find what they do not know. (12 - 4 = 8) (6000 - 1000 - 2000 = 3000) Children will need to show regrouping.</td></tr> <tr><td style="text-align: right;">- 2 4 5 _</td></tr> <tr><td style="text-align: right;">3 8 6 8</td></tr> </table>	_ 3 2 4	Children to use what they know to find what they do not know. (12 - 4 = 8) (6000 - 1000 - 2000 = 3000) Children will need to show regrouping.	- 2 4 5 _	3 8 6 8
Thousands	Hundreds	Tens	Ones																											
No regrouping needed.																														
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Left with:	Left with:	Left with:	Left with:																											
6,324																														
2,456	?																													
_ 3 2 4	Children to use what they know to find what they do not know. (12 - 4 = 8) (6000 - 1000 - 2000 = 3000) Children will need to show regrouping.																													
- 2 4 5 _																														
3 8 6 8																														

Objective: Subtract numbers with up to three decimal places - Year 4/5/6

Vocabulary:

- Less than, fewer, subtract, decrease, take away, minus, subtract, subtraction, equals
- Thousands/Hundreds/Tens/Ones/Tenths/Hundredths
- Decimal point, decimal place
- Partition, regrouping, subtrahend



Concrete	Pictorial	Abstract																
<p style="text-align: center;">$3.65 - 2.41 = 1.24$</p> <table border="1" style="width:100%; border-collapse: collapse; text-align: center;"> <tr> <th>Ones</th> <th>tenths</th> <th>hundredths</th> </tr> <tr> <td></td> <td></td> <td></td> </tr> </table> <p>Move the subtrahend into the boxes below. Your answer is the number left in the top boxes.</p> <table border="1" style="width:100%; border-collapse: collapse; text-align: center;"> <tr> <th>Ones</th> <th>tenths</th> <th>hundredths</th> </tr> <tr> <td></td> <td></td> <td></td> </tr> </table>	Ones	tenths	hundredths				Ones	tenths	hundredths				<table border="1" style="width:100%; border-collapse: collapse; text-align: center;"> <tr><td colspan="2">3.65</td></tr> <tr><td>2.41</td><td>?</td></tr> </table> <div style="text-align: center;"> <p>$0.9 - 0.4 = 0.5 \quad (\frac{1}{2})$</p> <p>9 tenths - 4 tenths = 5 tenths</p> </div>	3.65		2.41	?	<p>Sam has £3.65 in his wallet. He spends £2.41. How much money does he have left?</p> <div style="text-align: center;"> <p>+</p> </div> $\begin{array}{r} 3.65 \\ - 2.41 \\ \hline 1.24 \end{array}$
Ones	tenths	hundredths																
Ones	tenths	hundredths																
3.65																		
2.41	?																	
<p>Children to use a blank number line to draw their own jumps to subtract the subtrahend of 2.41.</p>																		

Multiplication

Objective: Multiplication in real life - EYFS/Year 1

Vocabulary:

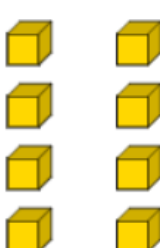

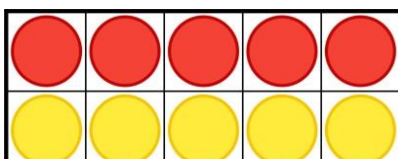
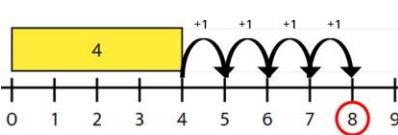
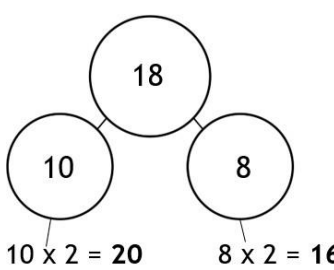
- Pair, group, double, equal, same as

Concrete	Pictorial	Abstract
<p>Real, practical experiences of handling equal groups of objects.</p> <p>Count in 2s, 10s and 5s. Link to real life objects such as socks (pairs), fingers (5s or 10s).</p>	<p>Instead of real-life objects, use images of pairs of socks or hands instead to count.</p>	<p>Begin counting up in the 2, 5 and 10 times tables without referring to objects or images.</p> <p style="text-align: center;">“2, 4, 6, 8, 10”</p> <p style="text-align: center;">“5, 10, 15, 20, 25, 30”</p> <p style="text-align: center;">“10, 20, 30, 40, 50”</p>
		

Objective: Doubling (and halving) - EYFS/Year 1/Year 2/Year 3

Vocabulary:



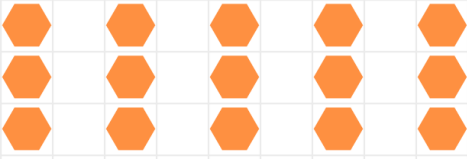
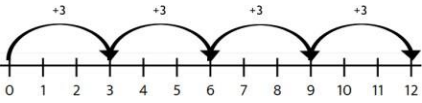
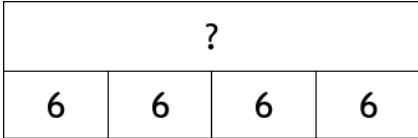
- Double, twice, times by 2, multiplied by 2, 2 groups of, 2 lots of, equal, same as

Concrete	Pictorial	Abstract
<p>2 lots of 4 is equal to 8. Double 4 is the same as 8.</p>  <p>2 groups of 3 is equal to 6. Double 3 = 6.</p>   <p>2 lots of 5 is equal to 10. Double 5 is the same as 10.</p> <p>Chn to use ‘counting on’ skill rather than counting all objects.</p>	<p>Start at one of the numbers and count on the same number by showing the jumps on the number line.</p> <p>2 lots of 4 is the same as 4 + 4:</p>  <p>Use of a bar model to show the two equal parts / two groups:</p> <div style="border: 1px solid black; width: 100px; height: 40px; margin: 10px auto; text-align: center; padding: 5px;">?</div> <div style="display: flex; justify-content: space-around; width: 100%; border: 1px solid black; margin: 10px auto;"> <div style="width: 45%; border: 1px solid black; height: 30px; text-align: center; padding: 5px;">3</div> <div style="width: 45%; border: 1px solid black; height: 30px; text-align: center; padding: 5px;">3</div> </div>	<p>Y1: Record as repeated addition number sentence. E.g: 4 + 4 = 8</p> <p>Y2 and Y3: Record as a multiplication sentence. E.g: 4 x 2 = 8</p> <p>Also to partition a number and then double each part before recombining it back together.</p> <div style="text-align: center; margin: 20px 0;">  </div> <p style="text-align: center;">20 + 16 = 36 18 x 2 = 36</p>

Objective: Repeated Addition - Year 1/Year 2

Vocabulary:

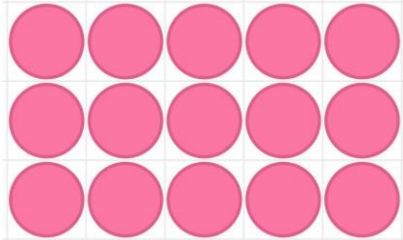
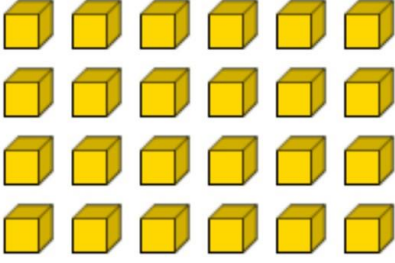
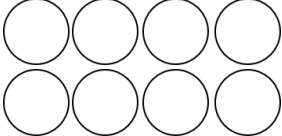
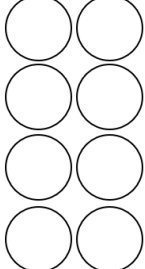
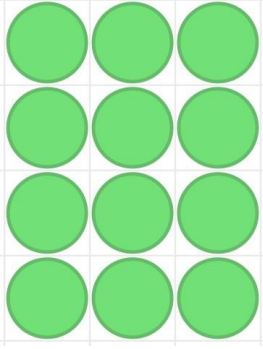
- Repeated addition, multiples, groups of, lots of, multiply, same as, equal to

Concrete	Pictorial	Abstract
<p>Use concrete objects to show the equal groups and add the objects together - repeated addition.</p> <p>3 x 2 is the same as $2 + 2 + 2 = 6$</p>  <p>3 x 4 is the same as $4 + 4 + 4 = 12$</p>  <p>5 x 3 is same as $3 + 3 + 3 + 3 + 3 = 15$</p> 	<p>Use a number line to show repeated addition / multiples:</p>  <p>$3 + 3 + 3 + 3 = 12$ $4 \times 3 = 12$</p> <p>Use of a bar model to show the equal parts being used for repeated addition:</p>  <p>$6 + 6 + 6 + 6 = 24$ $4 \times 6 = 24$</p>	<p>By the end of Year 2, children should know their 2, 5 and 10 times tables and be able to recall these by counting aloud.</p> <p>Write sequences with multiples of numbers both forwards and backwards:</p> <ul style="list-style-type: none"> • 2, 4, 6, 8, 10 • 5, 10, 15, 20, 25, 30 • 100, 90, 80, 70, 60 <p>Record as a number sentence both as repeated addition and multiplication:</p> <ul style="list-style-type: none"> • $5 + 5 + 5 + 5 + 5 = 30$ • $5 \times 6 = 30$ • 5 multiplied by 6 is 30 • 6 groups of 5 is 30 • 5 six times is 30

Objective: Commutativity using Arrays - Year 1/Year 2

Vocabulary:

- Arrays, commutativity, groups of, lots of, multiply, times, multiples, repeated addition, same as, equal to, part, whole
- Once, twice, three times, four times etc

Concrete	Pictorial	Abstract
<p>Create arrays using counters or Base 10 to show the multiplication sentences:</p> <p>5 lots of 3 / $5 \times 3 = 15$ 3 lots of 5 / $3 \times 5 = 15$</p>  <p>6 lots of 4 / $6 \times 4 = 24$ 4 lots of 6 / $4 \times 6 = 24$</p> 	<p>Children to now draw their own arrays based on the questions that they are given.</p> <p>The same multiplication sentence can be shown in two different rotations:</p> <p>$4 \times 2 = 8$ / $2 \times 4 = 8$</p>  <p>$2 \times 4 = 8$ / $4 \times 2 = 8$</p> 	<p>Use an array to write multiplication sentences and reinforce repeated addition.</p> <p>3 lots of 4 = 12 $4 + 4 + 4 = 12$</p>  <p>4 lots of 3 = 12 $3 + 3 + 3 + 3 = 12$</p> <p>Use to solve word problems: "One bag holds 3 apples. How many apples will 4 bags hold?"</p>

Objective: Grid Method for 2 x 1 digit - Year 3

Vocabulary:

- Arrays, commutativity, groups of, lots of, multiply, times, multiples, repeated addition, same as, equal to, partitioning, part, whole
- Tens, Ones

Concrete	Pictorial	Abstract																														
<p><u>14 x 3</u></p> <p>Start to introduce written methods by using the grid method: partitioning 14 into 10 and 4.</p> <table border="1"> <tr> <td style="text-align: center;">X</td> <td style="text-align: center;">10</td> <td style="text-align: center;">4</td> </tr> <tr> <td style="text-align: center;">3</td> <td></td> <td></td> </tr> <tr> <td></td> <td style="text-align: center;">30</td> <td style="text-align: center;">12</td> </tr> </table> <p>$10 \times 3 = 30$ $4 \times 3 = 12$</p> <p>$30 + 12 = 42$ so $14 \times 3 = 42$</p> <p>Can also use Base 10 to condense manipulatives down like so:</p> <table border="1"> <tr> <td style="text-align: center;">X</td> <td style="text-align: center;">10</td> <td style="text-align: center;">4</td> </tr> <tr> <td style="text-align: center;">3</td> <td></td> <td></td> </tr> <tr> <td></td> <td style="text-align: center;">30</td> <td style="text-align: center;">12</td> </tr> </table>	X	10	4	3				30	12	X	10	4	3				30	12	<p>Children can represent this question using a bar model:</p> <table border="1" style="margin: 10px auto;"> <tr> <td colspan="3" style="text-align: center;">?</td> </tr> <tr> <td style="text-align: center;">14</td> <td style="text-align: center;">14</td> <td style="text-align: center;">14</td> </tr> </table>	?			14	14	14	<p>Children to partition 14 into: 10 and 4. Then multiply each part by 3 mentally.</p> <p>Start with the ones first: $4 \times 3 = 12$ $10 \times 3 = 30$</p> <p>They should be able to demonstrate this in the abstract grid method like this:</p> <table border="1" style="margin: 10px auto;"> <tr> <td style="text-align: center;">X</td> <td style="text-align: center;">10</td> <td style="text-align: center;">4</td> </tr> <tr> <td style="text-align: center;">3</td> <td style="text-align: center;">30</td> <td style="text-align: center;">12</td> </tr> </table> <p style="text-align: center;">$30 + 12 = 42$</p> <p>Therefore, $14 \times 3 = 42$</p>	X	10	4	3	30	12
X	10	4																														
3																																
	30	12																														
X	10	4																														
3																																
	30	12																														
?																																
14	14	14																														
X	10	4																														
3	30	12																														

Objective:- Grid Method / Expanded Column Method for 3 x 1 digit - Year 4

Vocabulary:

- Groups of, lots of, multiply, times, multiples, repeated addition, same as, equal to, partitioning, part, whole
- Hundreds, Tens, Ones

Concrete	Pictorial	Abstract																																								
<p><u>136 x 4</u></p> <p>Partition 136 into 100, 30, 6 For each of these numbers, we need four lots as we are x 4.</p> <table border="1"> <tr> <td style="text-align: center;">X</td> <td style="text-align: center;">100</td> <td style="text-align: center;">30</td> <td style="text-align: center;">6</td> </tr> <tr> <td style="text-align: center;">4</td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td style="text-align: center;">400</td> <td style="text-align: center;">120</td> <td style="text-align: center;">24</td> </tr> </table> <p>$400 + 120 + 24 = 544$</p> <p>So: $136 \times 4 = 544$</p> <p>This example uses the Base 10 however, place value counters could also be used instead.</p>	X	100	30	6	4					400	120	24	<p>Children can represent this question using a bar model:</p> <table border="1" style="margin: 10px auto;"> <tr> <td colspan="4" style="text-align: center;">?</td> </tr> <tr> <td style="text-align: center;">136</td> <td style="text-align: center;">136</td> <td style="text-align: center;">136</td> <td style="text-align: center;">136</td> </tr> </table>	?				136	136	136	136	<p>Partition 136 into: 100, 30, 6. Then multiply each part by 4.</p> <p>$6 \times 4 = 24$, $30 \times 4 = 120$ and $100 \times 4 = 400$</p> <p>Record this in the grid method:</p> <table border="1" style="margin: 10px auto;"> <tr> <td style="text-align: center;">X</td> <td style="text-align: center;">100</td> <td style="text-align: center;">30</td> <td style="text-align: center;">6</td> </tr> <tr> <td style="text-align: center;">4</td> <td style="text-align: center;">400</td> <td style="text-align: center;">120</td> <td style="text-align: center;">24</td> </tr> </table> <p>$400 + 120 + 24 = 544$</p> <hr style="border-top: 1px dashed black;"/> <p>Once secure, children to move onto expanded column method:</p> <table style="margin: 10px auto;"> <tr> <td style="text-align: right;">136</td> <td></td> </tr> <tr> <td style="text-align: right;">x 4</td> <td></td> </tr> <tr> <td style="text-align: right;">24 (6x4)</td> <td></td> </tr> <tr> <td style="text-align: right;">120 (30x4)</td> <td></td> </tr> <tr> <td style="text-align: right;">+400 (100x4)</td> <td></td> </tr> <tr> <td style="text-align: right;">544</td> <td></td> </tr> </table>	X	100	30	6	4	400	120	24	136		x 4		24 (6x4)		120 (30x4)		+400 (100x4)		544	
X	100	30	6																																							
4																																										
	400	120	24																																							
?																																										
136	136	136	136																																							
X	100	30	6																																							
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x 4																																										
24 (6x4)																																										
120 (30x4)																																										
+400 (100x4)																																										
544																																										

Objective: Long Multiplication Formal Method for: 2 x 2 digit / 2 x 3 digit / 2 x 4 digit - Year 5/6

Vocabulary:

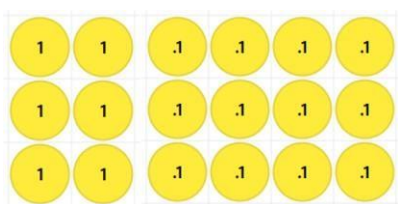
- Groups of, lots of, multiply, times, multiples, repeated addition, same as, equal to, partitioning, part, whole
- Ten Thousands, Thousands, Hundreds, Tens, Ones

Concrete	Pictorial	Abstract																																																						
<p>Children can continue to be supported by Base 10/ PV counters using the grid method (see previous steps).</p> <p style="text-align: center;"><u>25 x 13</u></p> <table border="1" style="width: 100%;"> <tr> <td>X</td> <td>20</td> <td>5</td> </tr> <tr> <td>10</td> <td></td> <td></td> </tr> <tr> <td>3</td> <td></td> <td></td> </tr> <tr> <td></td> <td>200 + 60</td> <td>+ 50 + 15</td> </tr> </table> <p style="text-align: center;">200 + 60 + 50 + 15 = 325 So 25 x 13 = 325</p>	X	20	5	10			3				200 + 60	+ 50 + 15	<p>Bar modelling and number lines can support the children when solving problems with multiplication alongside the formal written methods.</p> <p style="text-align: center;"><u>34 x 11</u></p> <table border="1" style="width: 100%; text-align: center;"> <tr> <td colspan="12">?</td> </tr> <tr> <td>34</td><td>34</td><td>34</td><td>34</td><td>34</td><td>34</td><td>34</td><td>34</td><td>34</td><td>34</td><td>34</td><td>34</td> </tr> </table> <p>Children can also use known facts to help them when partitioning into numbers they can do mentally:</p> <p style="text-align: center;">34 x 10 = 340 34 x 1 = 34 34 x 11 = 340 + 34 34 x 11 = 374</p>	?												34	34	34	34	34	34	34	34	34	34	34	34	<p>Children must be secure before moving onto the next method.</p> <p style="text-align: center;"><u>Grid Method: 252 x 43</u></p> <table border="1" style="width: 100%;"> <tr> <td>X</td> <td>200</td> <td>50</td> <td>2</td> </tr> <tr> <td>40</td> <td>8,000</td> <td>2,000</td> <td>80</td> </tr> <tr> <td>3</td> <td>600</td> <td>150</td> <td>6</td> </tr> <tr> <td></td> <td>8,600</td> <td>2,150</td> <td>86</td> </tr> </table> <p style="text-align: center;">8,600 + 2,150 + 86 = <u>10,836</u></p> <hr/> <table style="width: 100%;"> <tr> <td style="width: 50%; vertical-align: top;"> <p><u>Expanded Column Method: 25 x 13</u></p> $\begin{array}{r} 25 \\ \times 13 \\ \hline 75 \\ 200 \\ \hline 325 \end{array}$ </td> <td style="width: 50%; vertical-align: top;"> <p><u>Long Multiplication Method: 25 x 13:</u></p> $\begin{array}{r} 25 \\ \times 13 \\ \hline 75 \\ + 250 \\ \hline 325 \end{array}$ </td> </tr> </table>	X	200	50	2	40	8,000	2,000	80	3	600	150	6		8,600	2,150	86	<p><u>Expanded Column Method: 25 x 13</u></p> $\begin{array}{r} 25 \\ \times 13 \\ \hline 75 \\ 200 \\ \hline 325 \end{array}$	<p><u>Long Multiplication Method: 25 x 13:</u></p> $\begin{array}{r} 25 \\ \times 13 \\ \hline 75 \\ + 250 \\ \hline 325 \end{array}$
X	20	5																																																						
10																																																								
3																																																								
	200 + 60	+ 50 + 15																																																						
?																																																								
34	34	34	34	34	34	34	34	34	34	34	34																																													
X	200	50	2																																																					
40	8,000	2,000	80																																																					
3	600	150	6																																																					
	8,600	2,150	86																																																					
<p><u>Expanded Column Method: 25 x 13</u></p> $\begin{array}{r} 25 \\ \times 13 \\ \hline 75 \\ 200 \\ \hline 325 \end{array}$	<p><u>Long Multiplication Method: 25 x 13:</u></p> $\begin{array}{r} 25 \\ \times 13 \\ \hline 75 \\ + 250 \\ \hline 325 \end{array}$																																																							

Objective: Multiplying Decimals for: 1 decimal place and 2 decimal places - Year 6

Vocabulary:

- Groups of, lots of, multiply, times, multiples, repeated addition, same as, equal to, partitioning, part, whole, decimal point, decimal place
- Tens, Ones, Tenths, Hundredths

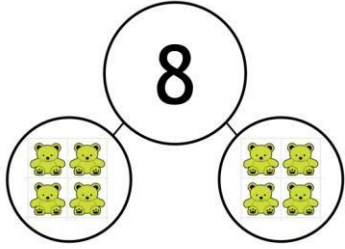
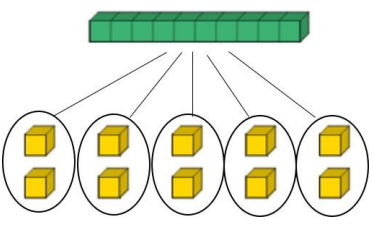
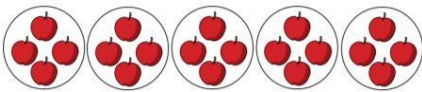
Concrete	Pictorial	Abstract																																						
<p>Children to use place value counters using the grid method:</p> <p><u>2.4 x 3 = 6 ones and 12 tenths.</u> 12 tenths regroups into 1 one and 2 tenths So 2.4 x 3 = 7 ones and 2 tenths = 7.2</p>  <p><u>5.42 x 3 = 15 + 1.2 + 0.06 = 16.26</u></p> <table border="1" style="width: 100%;"> <tr> <td>X</td> <td>5</td> <td>0.4</td> <td>0.02</td> </tr> <tr> <td>3</td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td>15</td> <td>1.2</td> <td>0.06</td> </tr> </table>	X	5	0.4	0.02	3					15	1.2	0.06	<p>Children can represent this question using a bar model:</p> <table border="1" style="width: 100%; text-align: center;"> <tr> <td colspan="3">?</td> </tr> <tr> <td>2.4</td> <td>2.4</td> <td>2.4</td> </tr> </table> <table border="1" style="width: 100%; text-align: center;"> <tr> <td colspan="3">?</td> </tr> <tr> <td>5.42</td> <td>5.42</td> <td>5.42</td> </tr> </table>	?			2.4	2.4	2.4	?			5.42	5.42	5.42	<p>Children to use their known multiplication facts to use the grid method without manipulatives:</p> <table border="1" style="width: 100%;"> <tr> <td>X</td> <td>2</td> <td>0.4</td> </tr> <tr> <td>3</td> <td>6</td> <td>1.2</td> </tr> </table> <p style="text-align: center;">2.4 x 3 = 6 + 1.2 = 7.2</p> <table border="1" style="width: 100%;"> <tr> <td>X</td> <td>5</td> <td>0.4</td> <td>0.02</td> </tr> <tr> <td>3</td> <td>15</td> <td>1.2</td> <td>0.06</td> </tr> </table> <p style="text-align: center;">5.42 x 3 = 15 + 1.2 + 0.06 = 16.26</p> <p>Once confident, the children can move onto column method:</p> $\begin{array}{r} 5.42 \\ \times 3 \\ \hline 16.26 \\ 11 \end{array}$	X	2	0.4	3	6	1.2	X	5	0.4	0.02	3	15	1.2	0.06
X	5	0.4	0.02																																					
3																																								
	15	1.2	0.06																																					
?																																								
2.4	2.4	2.4																																						
?																																								
5.42	5.42	5.42																																						
X	2	0.4																																						
3	6	1.2																																						
X	5	0.4	0.02																																					
3	15	1.2	0.06																																					

Division

Objective: Share objects into groups - EYFS/Year 1/Year 2

Vocabulary:

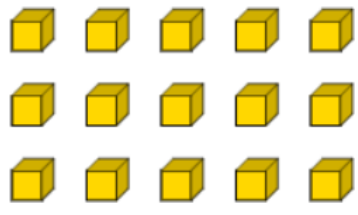
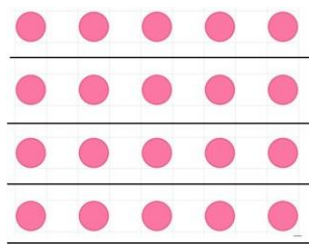
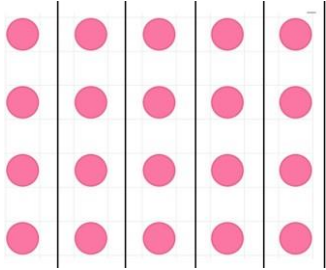
- Groups, share, equal, same as, halving, half, part, whole, how many?

Concrete	Pictorial	Abstract										
<p>Children to use objects which they can share equally into groups, depending on the divisor.</p> <div style="text-align: center;">  </div> <p>8 shared between 2 groups = 4 $\frac{1}{2}$ of 8 = 4 $8 \div 2 = 4$</p> <div style="text-align: center;">  </div> <p>10 shared between 5 equal groups = 2 $10 \div 5 = 2$</p>	<p>Once secure, children to then use pictures to share into equal groups.</p> <p>There are 20 apples altogether. The apples are shared equally between 5 children. How many apples do they get each?</p> <div style="text-align: center;">  </div> <p>This problem can also be shown as a bar model.</p> <table border="1" style="margin: auto; border-collapse: collapse; text-align: center;"> <tr> <td colspan="5">20</td> </tr> <tr> <td>?</td> <td>?</td> <td>?</td> <td>?</td> <td>?</td> </tr> </table> <p>Chn to use the inverse of $4 \times 5 = 20$ to know that 20 split into 5 equal groups is 4.</p>	20					?	?	?	?	?	<p>In Year 2, children will be expected to use the division symbol: \div</p> <p>There are 20 apples altogether. The apples are shared equally between 5 children. How many apples do they get each?</p> <p>20 shared between 5 equal groups = 4 $20 \div 4 = 5$</p> <p>Share 9 cupcakes between 3 people = $9 \div 3 = 3$</p> <p>Pens are sold in packs of 6. How many packs can be made if you have 24 pens? $24 \div 6 = 4$</p>
20												
?	?	?	?	?								

Objective: Division using known facts - Year 2 to Year 6

Vocabulary:

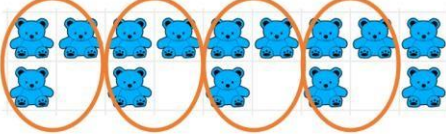
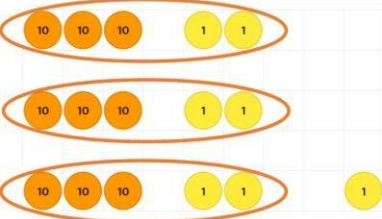
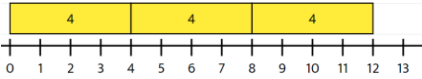
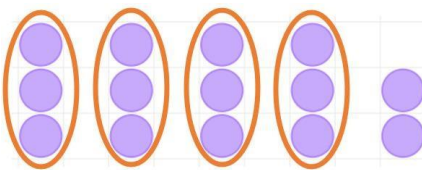
- Groups, share, equal, same as, halving, half, how many?

Concrete	Pictorial	Abstract
<p>Link division to multiplication by creating an array and thinking about the number sentences that can be created.</p> <div style="text-align: center;">  </div> <p>$15 \div 3 = 5$ $5 \times 3 = 15$ $15 \div 5 = 3$ $3 \times 5 = 15$</p> <p>Remind the children that using the opposite operation is called using the inverse. The inverse of multiplication is division.</p>	<p>Chn to draw their own arrays link to their known facts. Then drawn lines to show the division sentence they are calculating.</p> <p>$20 \div 4 = 5$ $5 \times 4 = 20$</p> <div style="text-align: center;">  </div> <p>$20 \div 5 = 4$ $4 \times 5 = 20$</p> <div style="text-align: center;">  </div>	<p>Children should now be able to make connections between fact families by writing related facts:</p> <p>$7 \times 4 = 28$ $4 \times 7 = 28$ $28 \div 7 = 4$ $28 \div 4 = 7$</p> <p>This will help them to solve missing number problems:</p> <p>____ \times 5 = 20 $15 \div$ ____ = 5 ____ \div 10 = 8</p> <p>I am thinking of a number. I divide it by 5. My answer is 6. What was my number?</p>

Objective: Dividing with remainders - Year 4

Vocabulary:

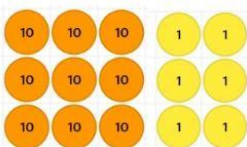
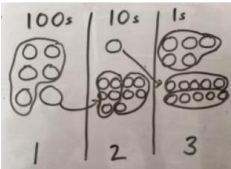
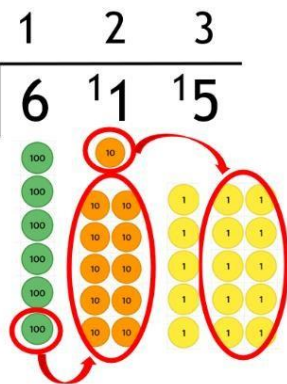
- Grouping, groups of, divide, divisor, dividend, equal, same as, remainder, multiples, how many more/how many left?

Concrete	Pictorial	Abstract
<p>Using the grouping skill that the chn already know, share objects into the correct groups to see how many are left (the remainder).</p> <p>$14 \div 3 =$</p>  <p>4 groups of 3 with 2 left over so $14 \div 3 = 4$ remainder 2</p> <p>Base 10 / Place Value counters to group $97 \div 3$:</p>  <p>Group the tens into 3 groups and the ones into 3 groups. How many are left over? $97 \div 3 = 32$ r 1</p>	<p>Use a number line to jump along in quantities of divisor. Then see how many more you need to jump for the remainder</p> <p>$14 \div 3 =$</p>  <p>Or chn can draw their own representations of grouping:</p> <p>$14 \div 3 =$</p> 	<p>Chn should now use their known facts mentally. $14 \div 3$:</p> <ul style="list-style-type: none"> How many 3s go into 14? Chn to count in threes to reach 12. How many are left over? Chn count on to reach 14. 4 lots of 3 go into 14 with 2 left over = 4 r 2. <p>Use word problems to put the remainder into real context:</p> <p><i>A teacher has 29 pens. The teacher gives 8 chn pens. How many pens does each child get? How many are left over?</i></p> <p>3 lots of 8 go into 29. Each child gets 3 pens. There are 5 pens left over. $29 \div 8 = 3$ remainder 5.</p>

Objective: Short Division without remainders - Year 4/Year 5/Year 6

Vocabulary:

- Groups, divide, divisor, dividend, regroup, equal, same as, multiples

Concrete	Pictorial	Abstract
<p>Without regrouping: $96 \div 3$</p> <ul style="list-style-type: none"> How many groups of 3 tens are in 9 tens? 3 groups. How many groups of 3 are in 6? 2 groups. 	<p>Chn to repeat the concrete process but by drawing their own place value counters rather than using the manipulatives.</p> 	<p>Chn to use the short division abstract method of Bus Stop:</p> $\begin{array}{r} 32 \\ 3 \overline{) 96} \end{array}$ <p>How many 3s go into 90? 30 How many 3s go into 6? 2 $96 \div 3 = 32$</p>
<p>With regrouping: $615 \div 5$</p> <ul style="list-style-type: none"> How many groups of 5 hundreds can you make with 6 hundred counters? 1 group. Regroup 1 hundred for 10 tens. How many groups of 5 tens can you make with 11 ten counters? 2 groups. Regroup 1 ten for 10 ones. How many groups of 5 ones can you make with 15 ones? 3 groups 		$\begin{array}{r} 123 \\ 5 \overline{) 615} \end{array}$ <p>How many groups of 5 hundreds can you make with 6 hundred counters? 1 How many groups of 5 tens can you make with 11 ten counters? 2 How many groups of 5 ones can you make with 15 ones? 3</p>

Objective: Short Division with remainders - Year 4/Year 5/Year 6

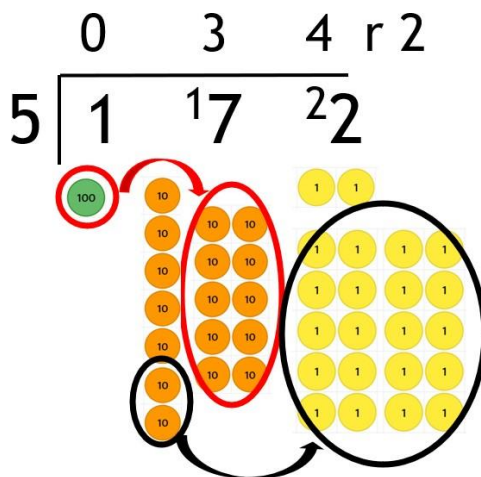
Vocabulary:

- Groups, divide, divisor, dividend, equal, same as, regroup, remainder, multiples

Concrete

With regrouping and remainders: $172 \div 5$

- How many groups of 5 hundreds are in 1 hundred? **Zero** - we need to regroup.
- Regroup 1 hundred into 10 tens. Now we have 17 tens.
- How many groups of 5 tens are in 17 tens? **3 groups**. How many tens are left over? 2 tens. We need to regroup.
- Regroup the 2 left over tens into 20 ones. Now we have 22 ones.
- How many groups of 5 ones are in 22? **4 groups**.
- How many ones are left over? This is the remainder: **r 2**.



Abstract

Remainders should be given as whole numbers so chn can decide what to do after division: round up or down.

I have 162p.
How many 8p sweets can I buy?
(Round down = 20 sweets)

$$\begin{array}{r} 0 \quad 2 \quad 0 \quad r \quad 2 \\ 8 \overline{) 1 \quad 6 \quad 2} \end{array}$$

Apples are packed in boxes of 8. There are 486 apples.
How many boxes are needed?
(Round up = 61 boxes)

$$\begin{array}{r} 0 \quad 6 \quad 0 \quad r \quad 6 \\ 8 \overline{) 4 \quad 8 \quad 6} \end{array}$$

Pictorial

Chn to repeat the concrete process but by drawing their own place value counters rather than using the manipulatives.

Objective: Long Division - Year 6

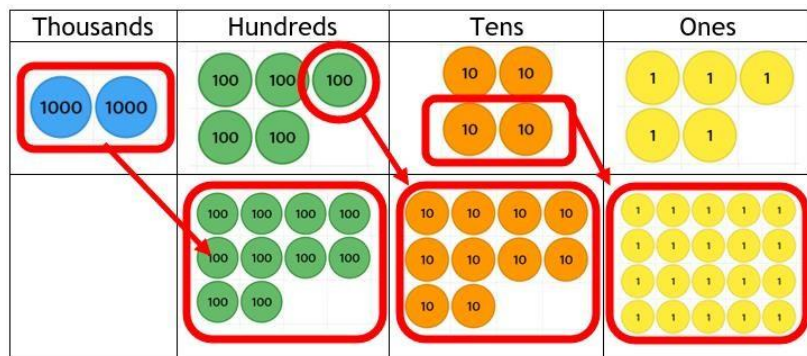
Vocabulary:

- Groups, divide, divisor, dividend, equal, same as, regroup, remainder, multiples, toolbox

Concrete

With regrouping: $2545 \div 12$

- How many groups of 12 hundreds are in 2 thousands? **Zero** - we need to regroup.
- Regroup 2 thousands into 20 hundreds. We now have 25 hundreds.
- How many groups of 12 go into 25 hundreds? **2 groups**.
- We have 1 hundred left to regroup into 10 tens. We have 14 tens.
- How many groups of 12 go into 14 tens? **1 group**.
- We have 2 tens left to regroup onto 20 ones. Now we have 25 ones.
- How many groups of 12 go into 25 ones? **2 groups**.
- There is 1 one left over. This is our remainder: **r 1**.



Therefore, $2545 \div 12 = 212$ remainder 1.

Abstract

$$2545 \div 12 =$$

Before beginning the division, chn should create a 'toolbox' which contains multiples of the divisor. 12 in this example:

Toolbox: 12, 24, 36, 48, 60, 72, 84, 96, 108, 120, 132, 144.

$$\begin{array}{r} 0 \quad 2 \quad 1 \quad 2 \quad r \quad 1 \\ 12 \overline{) 2 \quad 5 \quad 4 \quad 5} \\ \underline{-2 \quad 4} \\ 1 \quad 4 \\ \underline{-1 \quad 2} \\ 2 \quad 5 \\ \underline{-2 \quad 4} \\ 1 \end{array}$$

Pictorial

Chn to repeat the concrete process but by drawing their own place value counters rather than using the manipulatives.