LYTCHETT MATRAVERS PRIMARY SCHOOL

At Lytchett Matravers Primary School, we are using a range of resources to support our planning and teaching of mathematics. We use White Rose as a format for the basis of our planning through the 'loopy' teaching of skills. We are using the Loopy and White Rose Hub philosophy of:

- ◊ **Fluency** (Practise) - using Learning Objectives from the National Curriculum
- ◊ **Reasoning** (Evidence)
- ◊ **Problem-solving** (Greater Depth/ Mastery)

Each of the four operations build on a solid understanding of place value; the connections between the four number operation. Within our maths lessons, we are using a CPA approach, in addition to NCETM Mastery documents, NRICH problems and other mastery problems sourced from elsewhere. 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.

- ◊ **Concrete representation** - 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** – once they have sufficiently understood the 'hands on' experiences, they can now relate them to representations, such as a diagram or picture of the problem (either throw drawing it or it already being represented)
- ◊ **Abstract representation** - they are now capable of representing problems by using mathematical notation, for example 12 x 2 = 24.

The National Curriculum Aims

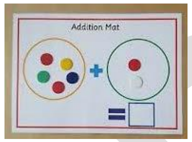
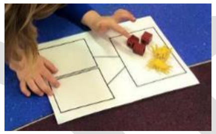
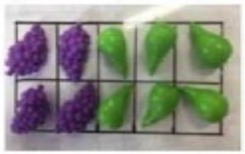
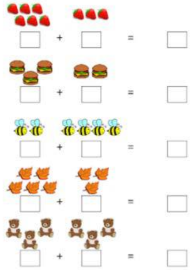
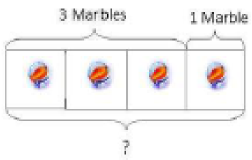
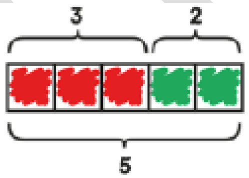
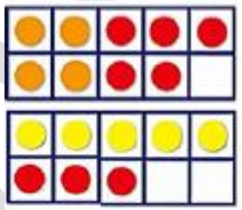
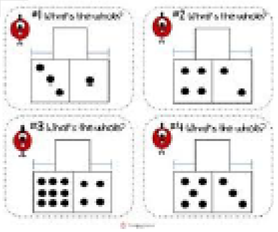
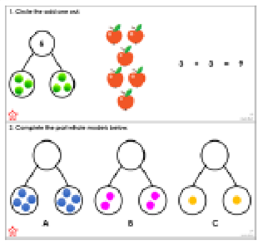
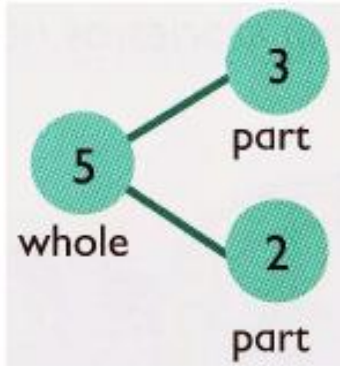
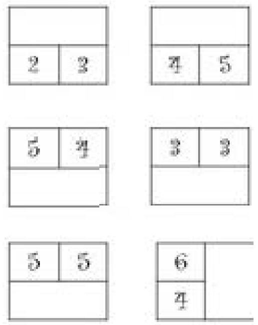
The national curriculum for mathematics aims to ensure that all pupils:

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

Progression within each area of calculation is in line with the programme of study in the 2014 National Curriculum (see Progression document). This calculation policy should be used to support children to develop a deep understanding of number and calculation by using CPA through fluency, reasoning and problem solving.

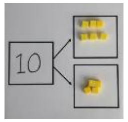
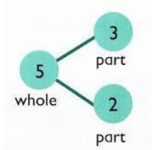
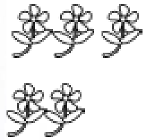
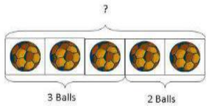
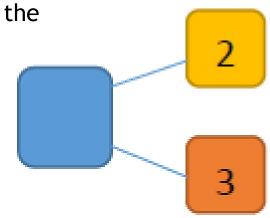
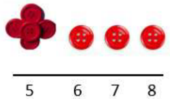
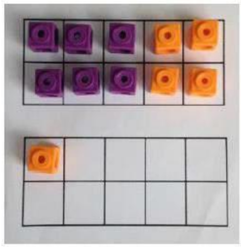
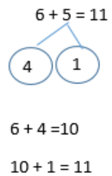
Calculation Outline

	EYFS/ Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Addition	◊Combining two parts to make a whole: part whole model ◊Starting at the bigger number and counting on - using cubes ◊Regrouping to make 10 using ten frame	◊Adding three single digits ◊Use of base 10 to combine two numbers	◊Column method- regrouping ◊Using place value counters (up to 3 digits)	◊Column method - regrouping (up to 4 digits)	◊Column method- regrouping ◊Use of place value counters for adding decimals	◊Column method- regrouping ◊Abstract methods ◊Place value counters to be used for adding decimal numbers
Subtraction	◊Taking away ones ◊Counting back ◊Find the difference ◊Part whole model ◊Make 10 using the ten frame	◊Counting back ◊Find the difference ◊Part whole model ◊Make 10 ◊Use of base 10	◊Column method with regrouping (up to 3 digits using place value counters)	◊Column method with regrouping (up to 4 digits)	◊Column method with regrouping ◊Abstract for whole numbers ◊Start with place value counters for decimals- with the same amount of decimal places	◊Column method with regrouping ◊Abstract methods ◊Place value counters for decimals- with different amounts of decimal places
Multiplication	◊Recognising and making equal groups ◊Doubling ◊Counting in multiples ◊Use cubes, Numicon and other objects in the classroom	◊Arrays- showing commutative multiplication	◊Arrays ◊2-d × 1-d using base 10	◊Column multiplication- introduced with place value counters. (2 and 3 digit multiplied by 1 digit)	◊Column multiplication ◊Abstract only but might need a repeat of year 4 first (up to 4-digit numbers multiplied by 1 or 2 digits)	◊Column multiplication ◊Abstract methods (multi-digit up to 4 digits by a 2 digit number)
Division	◊Sharing objects into groups ◊Division as grouping e.g. I have 12 sweets and put them in groups of 3, how many groups? ◊Use cubes and draw round 3 cubes at a time	◊Division as grouping ◊Division within arrays- linking to multiplication ◊Repeated subtraction	◊Division with a remainder-using lollipop sticks, times tables facts and repeated subtraction. ◊2-d divided by 1-d using base 10 or place value counters	◊Division with a remainder ◊Short division (up to 3 digits by 1 digit- concrete and pictorial)	◊Short division (up to 4 digits by a 1 digit number including remainders)	◊Short division ◊Long division with place value counters (up to 4 digits by a 2 digit number) *Children should exchange into the tenths and hundredths column too*

Addition				
	Objective/ Strategies	**Concrete**	**Pictorial**	**Abstract**
EYFS	Knows that a group of things change in quantity when something is added Find the total number of items in two groups by counting all of them Says the number that is one more than a given number Finds one more from a group of up to five objects, then ten objects In practical activities and discussion, beginning to use the vocabulary involved in adding Using quantities and objects, they add two single digit numbers and count on to find the answer Solve problems including doubling	   Use toys and general classroom resources for children to physically manipulate, group/ regroup Use specific maths resources such as counters, multi-link, Numicon etc.  Use visual supports such as ten frames, part whole models and addition mats, with the physical objects and resources that can be manipulated.   	  Two groups of pictures so children are able to count the total   Bar model using visuals, pictures/ icons or colours  Use visual supports Such as ten frames, part part whole models and addition mats, with pictures/ icons  	A focus on symbols and numbers to form a calculation $3 + 2 = 5$   *There is no expectation for children to be able to record a number sentence/ addition calculation*

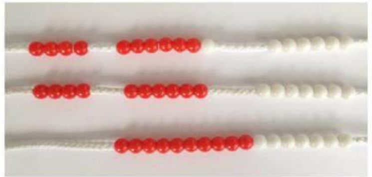
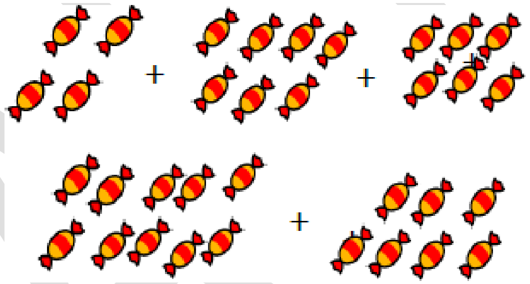
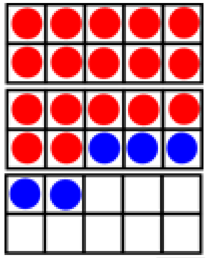
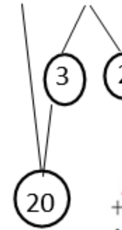
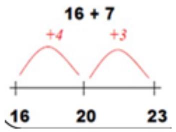
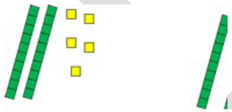
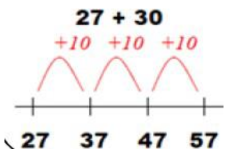
Addition

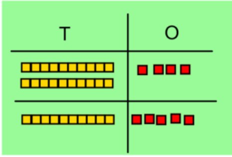
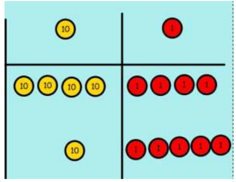
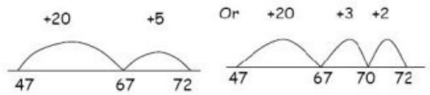
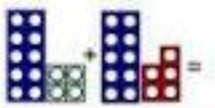
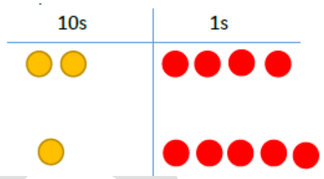
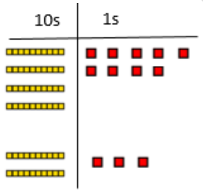
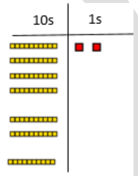
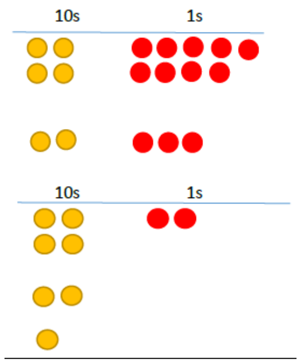
Key Vocabulary: add, more, plus, and, make, altogether, total, equal to, equals, double, most, count on, number line, balancing, part, part, whole

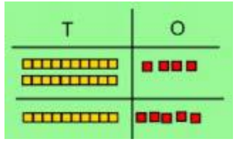
	Objective/ Strategies	Concrete	Pictorial	Abstract
Year 1	**Combining two parts to make a whole: part- whole model**	   Use cubes to add two numbers together as a group or in a bar *Some children may still need to use real objects*  Use a part-part whole model	   The Bar Model will be continued from EYFS as a method to support problem solving involving addition, continuing with the concrete representations and moving onto using pictorial representations of objects *Some children will also move onto the abstract* 	Use the part-part-whole diagram to move into the abstract 2 + 3 = 5 3 + 2 = 5 5 = 3 + 2 5 = 2 + 3 
	Starting at the bigger number and counting on	Start with the larger number on the bead string and then count of to the smaller number 1 by 1 to find the answer  	Start at the larger number on the number line and count on in ones or in one jump to find the answer 	Place the larger number in your head and count on the smaller number to find your answer 5 + 3 = 8
	Regrouping to make 10 using ten frame *This is an essential skill for column addition later*	 Start with the bigger number and use the smaller number to make 10 Use 10 frames to support	Use pictures or a number line. Regroup or partition the smaller number to make 10  	6 + 5 = 11 If I am at six, how many more do I need to make 10? How many more do I add on now?

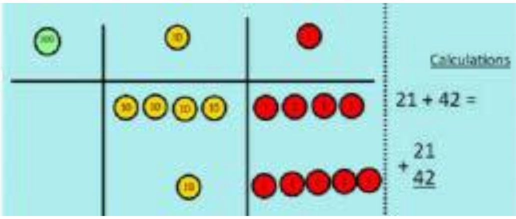
Addition

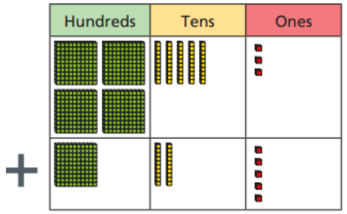
Key Vocabulary: add, more, plus, and, make, altogether, total, equal to, equals, double, most, count on, number line, sum, tens, units, partition, addition, column, tens boundary

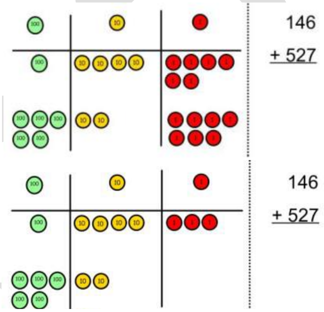
	Objective/ Strategies	Concrete	Pictorial	Abstract
Year 2	**Adding three single digits**	Make 10 with 2 of the digits (if possible) then add on the third digit 4 + 7 + 6= 17 Put 4 and 6 together to make 10. Add on 7 	Add together three groups of objects. Draw a picture to recombine the groups to make 10. 	$4 + 7 + 6 = \boxed{10} + \boxed{7}$ 10 $= \boxed{17}$ Combine the two numbers that make 10 and then add on the remainder.
	Adding a 2-digit number and ones	 17 + 5 = 22 Use ten frame to make 'Magic Ten' Explore the pattern 17 + 5 = 22 27 + 5 = 32	Use part-part whole and number line to model 17 + 5 = 22  **Bar Model**  	Explore related facts 17 + 5 = 22 5 = 17 = 22 22 - 17 = 5 22 - 5 = 17
	Adding a 2-digit number and multiples of 10	 25 + 10 = 35 Explore that the ones digit does not change	 Base 10 may be used above the number line initially. The calculation will be shown alongside the number line to see the connection	27 + 10 = 37 27 + 20 = 47 27 + □ = 57

Year 2	**Adding two 2-digit numbers** *No re-grouping*	Add together the ones first, then add the tens Use the Base 10 blocks first before moving onto place value counters 24 + 15 =  44 + 15 = 	Use number line and bridge ten using part whole if necessary.  Base 10 may be used above the number line. *The calculation will be shown alongside the number line to see the connection*	**Partitioning** Recording addition in columns supports place value and prepares for formal written methods with larger numbers 25 + 47 20 + 5 40 + 7 20 + 40 = 60 5+ 7 =12 60 + 12 = 72 40 + 7 30 + 5 70 + 12 *Toward the end of the year, children will move to more formal recording (column method)*
	Column method without regrouping	*Some children may not be ready for place value counters in Y2* Numicon may also be used 	After physically using the base 10 blocks and place value counters, draw the counters to help to solve additions 24 + 15 = 	24 + 15 = 39 24 + 15 39
	Column method with regrouping	Make both numbers on a place value grid 49 + 23 =  Add up the ones and regroup 10 ones for 1 ten 	Using place value counters, draw the counters to help to solve additions 	49 + 23 = 72 40 + 9 20 + 3 60 + 12 = 72

<table>
<tr><th colspan="5">Addition</th></tr>
<tr><td colspan="5">Key Vocabulary: add, more, plus, and, make, altogether, total, equal to, equals, double, most, count on, number line, sum, tens, units, partition, addition, column, tens boundary, regroup, exchange</td></tr>
<tr><th></th><th>Objective/ Strategies</th><th>Concrete</th><th>Pictorial</th><th>Abstract</th></tr>
<tr><td rowspan="2">Year 3</td><td>Add numbers with up to 3-digits using formal written
Column addition (no regrouping)</td><td>

Using manipulatives (base-10, numicon, counters), line up hundreds, tens and ones
They should be secure with using PV counters before moving onto pictorial


The calculation will be shown alongside the model used to see the connection</td><td>Draw, in a PV frame, the manipulatives, that they are using


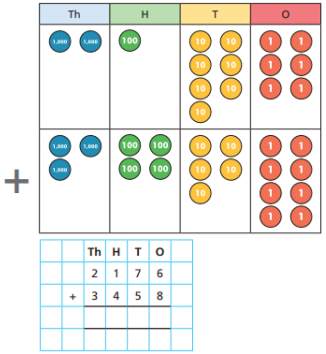
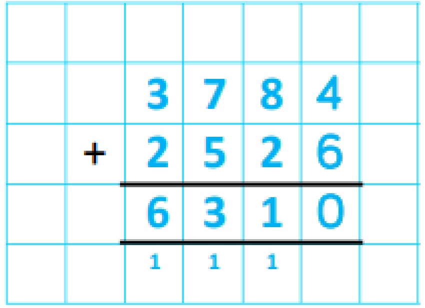
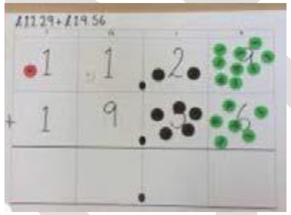
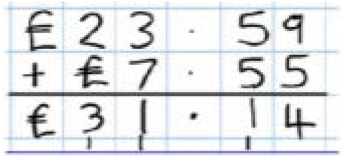
H T O
4 5 3
+ 1 2 5
Secure knowledge of representation with the PV columns
The calculation will be shown alongside the model to see the connection</td><td>Move onto recording more formally.
H T O
4 5 3
+ 1 2 5
5 7 8
Some children may need to use the expanded method
Expanded Method
100 + 40 + 6
500 + 20 + 7
600 + 70 + 3 = 673</td></tr>
<tr><td>Add numbers with up to 3-digits, using formal written methods
Column addition (regrouping)</td><td>Make both numbers on a place value grid
Add up the ones, regroup and exchange 10 ones for 1 ten


Can use base-10, counters, mulitilink</td><td>Draw a pictorial representation of the columns and place value counters to further support their learning and understanding.

</td><td>146
+ 527
673
1</td></tr>
</table>

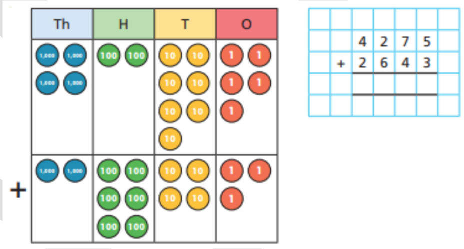
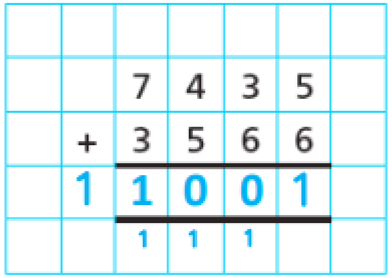
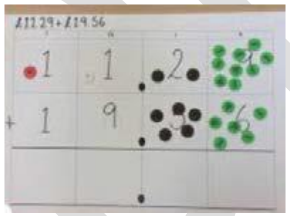
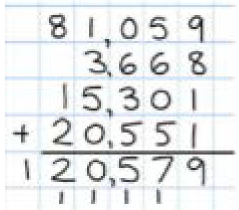
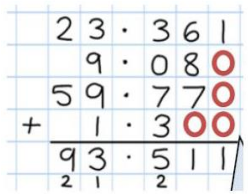
Addition

Key Vocabulary: addition, add, more, and make, sum, total, altogether, double, near double, half, halve, tens boundary, hundreds boundary, regrouping, exchanging, decimal, decimal point

	Objective/ Strategies	Concrete	Pictorial	Abstract
Year 4	**Using formal written methods of columnar addition where appropriate** **add numbers with up to 4-digits** *(with regrouping/ exchange)*	 Continue to use base-10 or place value counters to add, exchanging ten ones for a ten and ten tens for a hundred and ten hundreds for a thousand *The calculation will be shown alongside the manipulative used to see the connection*	 Draw a pictorial representation of the columns and place value counters to further support their learning and understanding *The calculation will be shown alongside the model to see the connection*	Continue from previous work to carry hundreds, as well as tens 
	Add decimals with 2 decimal places, including money	*As children move on to decimals, money and decimal place value counters can be used to support learning* Introduce decimal place value counters and model exchange for addition 	EXAMPLE OF COUNTER/ MONEY DECIMLAS Written method example	Introduce decimals with the same number of decimal places and different Money can be used here; *place value needs to be secure with the setting up of digits* 

Addition

Key Vocabulary: addition, add, more, and make, sum, total, altogether, double, near double, half, halve, tens boundary, hundreds boundary, thousand boundary, regrouping, exchanging, decimals, decimal point

	Objective/ Strategies	Concrete	Pictorial	Abstract
Year 5	**Column method - regrouping** *Use of place value counters for adding decimals*	Continue to use base-10 or place value counters to add, exchanging ten ones for a ten and ten tens for a hundred and ten hundreds for a thousand, ten thousands for 100,000 etc Introduce decimals with the same number of decimal places and different Money can be used here; *place value needs to be secure with the setting up of digits* *The calculation will be shown alongside the manipulative used to see the connection*	Draw a pictorial representation of the columns and place value counters to further support their learning and understanding  *The calculation will be shown alongside the model to see the connection*	
Year 6	**Add several numbers of increasing complexity, including adding money, measure and decimals with different numbers of decimal points.**	*As children move on to decimals, money and decimal place value counters can be used to support learning* Introduce decimal place value counters and model exchange for addition 	EXAMPLE OF COUNTER/ MONEY DECIMLAS Written method example	 

<table>
<tr><th colspan="5">Subtraction</th></tr>
<tr><th></th><th>Objective/ Strategies</th><th>Concrete</th><th>Pictorial</th><th>Abstract</th></tr>
<tr>
<td>EYFS</td>
<td>Knows that a group of things change in quantity when something is taken away

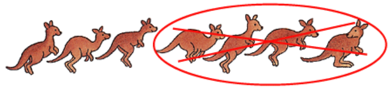
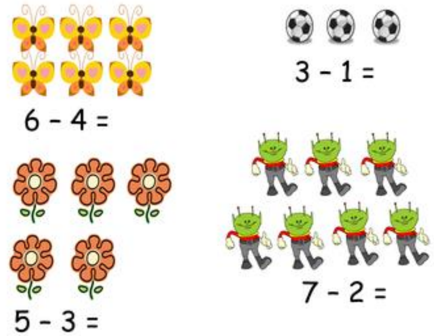
Find one less from a group of five objects, then ten objects

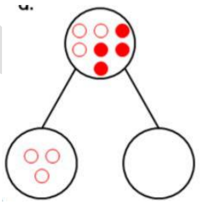
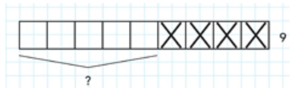
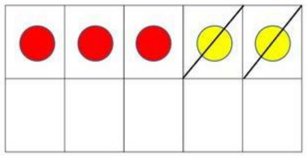
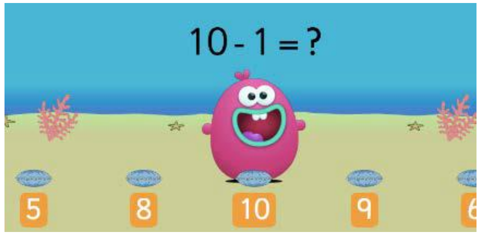
In practical activities and discussion, beginning to use the vocabulary involved in subtracting

Using quantities and objects, they subtract two single digit numbers and count back to find the answer</td>
<td>
Use toys and general classroom resources for children to physically manipulate, group/ regroup

Use specific maths resources such as counters, bead-strings, multi-link, Numicon etc.

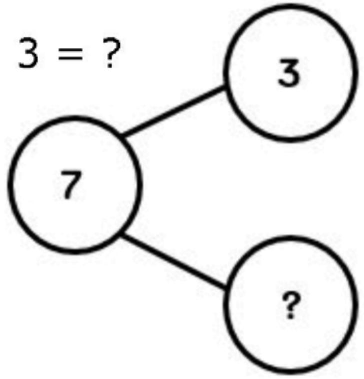
Use visual supports such as ten frames, part part whole and subtraction mats, with the physical objects and resources that can be manipulated


</td>
<td>A group of pictures for children to cross out or cover quantities to support subtraction



Use visual supports such as ten frames, part part whole and bar model with pictures/icons


</td>
<td>A focus on symbols and numbers to form a calculation


7 - 3 = 4

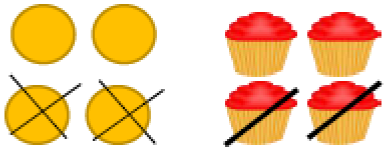
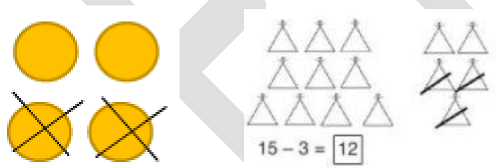
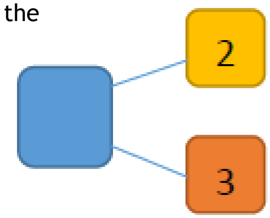
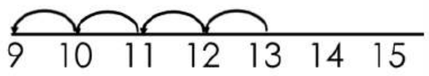
3 | ?
7

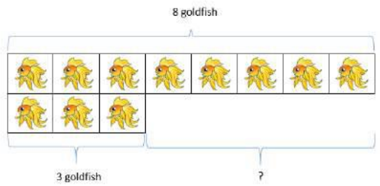
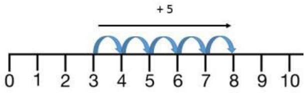
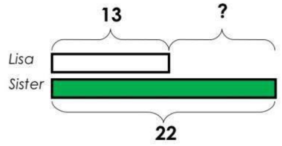
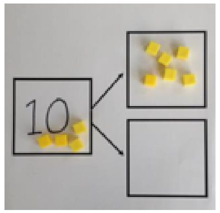
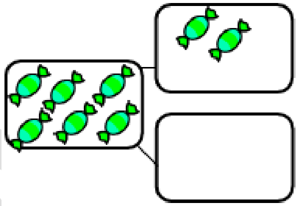
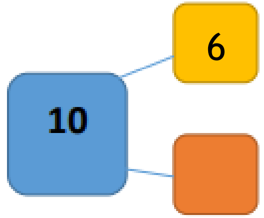
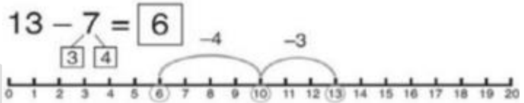
7 - 3 = ?


There is no expectation for children to be able to record a number sentence/ addition calculation</td>
</tr>
</table>

Subtraction

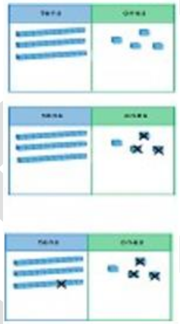
Key Vocabulary: equal to, take, take-away, less, minus, subtract, leaves, distance between, how many more, how many fewer/less than, most, least count back, how many left, how much less is…

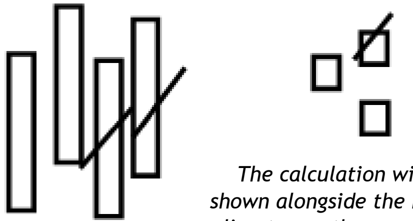
	Objective/ Strategies	Concrete	Pictorial	Abstract
Year 1	**Subtract one-digit and two-digit numbers to 20, including 0** *Taking away ones*	Use physical objects, counters, cubes, etc to show how objects can be taken away *Some children may still need to use real objects* 4 - 2 = 2 	Cross out drawn objects to show what has been taken away 	Use the part-part-whole diagram to move into the abstract 2 + 3 = 5 3 + 2 = 5 5 = 3 + 2 5 = 2 + 3 
	Counting back	Make the larger number in your subtraction with the beads or counters. Move the beads along your bead string, or remove counters as you count backwards in ones 13 - 4 = 9  	Count back on a number line or number track. Start at the bigger number and count back the smaller number, showing the jumps on the number line 13 - 4 = 9 	13 - 4 = 9 Put 13 in your head, count back 4. What number are you at? Use your fingers to help

	Find the difference	Compare amounts and objects to find the difference  Use cubes to build towers or make bars to find the difference. Use basic bar models with items to find the difference	Count on to find the difference  *Lisa is 13 years old. Her sister is 22 years old. Find the difference in age between them.*  Draw bars to find the difference between 2 numbers	Hannah has 8 goldfish. Helen has 3 goldfish. Find the **difference** between the number of goldfish the girls have
	Represent and use number bonds and related subtraction facts within 20 *Part-part whole model*	 Link to addition. Use Part Whole Model to show the inverse If 10 is the whole and 6 is one of the parts, what is the other part? 10 – 6 = 4	 Use a pictorial representation of objects to show the Part-Whole model 8 – 2 = 6	 Move to using numbers within the part whole model 10 – 6 = 4
	Make 10	14 – 5 =  Make 14 on the ten frame. Take away the four first to make 10 and then take away one more so you have taken away 5 You are then left with the answer of 9	13 – 7 =  Start at 13. Take away 3 to reach 10. Then, take away the remaining 4 so you have taken away 7 altogether. You have reached your answer	13 – 7 = How many do we take off to reach the next 10? How many do we have left to take off?

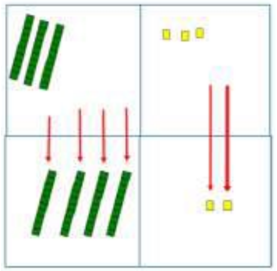
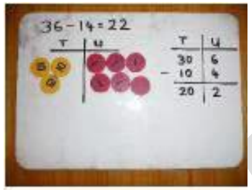
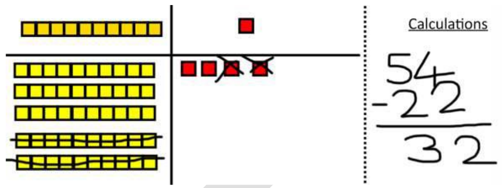
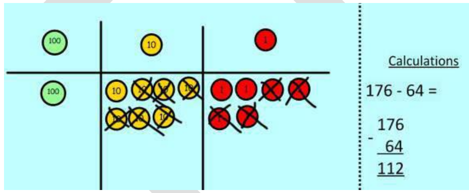
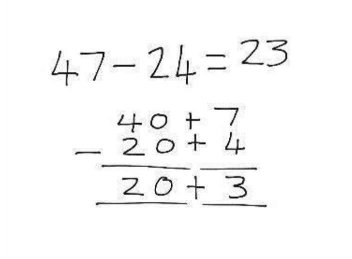
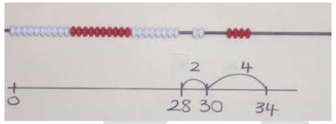
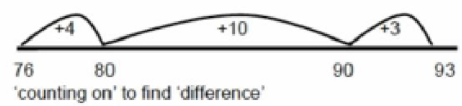
<table>
<tr><th colspan="5">Subtraction</th></tr>
<tr><td colspan="5">Key Vocabulary: add, more, plus, and, make, altogether, total, equal to, equals, double, most, count on, number line, sum, tens, units, partition, addition, column, tens boundary</td></tr>
<tr><th></th><th>Objective/ Strategies</th><th>Concrete</th><th>Pictorial</th><th>Abstract</th></tr>
<tr>
<td>Year 2</td>
<td>Subtract a two-digit number and ones, a two-digit number and tens, two two-digit numbers
Partitioning to subtract without re-Grouping: ‘Friendly numbers’</td>
<td>34 – 13 = 21

Use Base-10 to show how to partition the number when subtracting without regrouping

The calculation will be shown alongside the number line to see the connection
</td>
<td>Draw representations of Base-10 and cross off

43 – 21 = 22

The calculation will be shown alongside the number line to see the connection</td>
<td>43 – 21 = 22
Recording subtraction in columns supports place value and prepares for formal written method with larger numbers

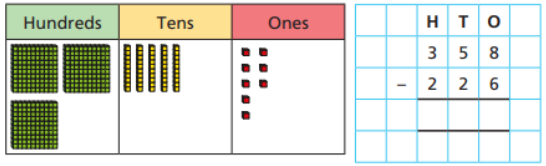
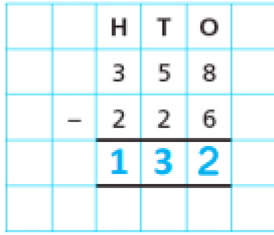
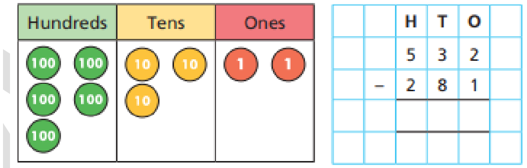
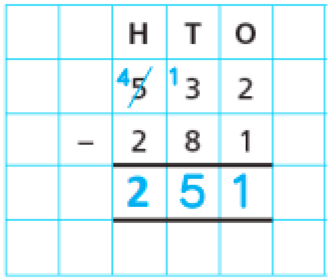
Towards the end of the year, move onto more formal recording using partitioning method
<table>
<tr><td></td><td>40</td><td>3</td></tr>
<tr><td>-</td><td>20</td><td>1</td></tr>
<tr><td></td><td>20</td><td>2</td></tr>
</table>
</td>
</tr>
</table>

	Column Method without regrouping	75 - 42 = 33  Use Base-10 to make the bigger number then take the smaller number away Show how to partition numbers to subtract 	 Draw the Base 10 or place value counters alongside the written calculation to help to show working 	 This will lead to a clear set up, leading to written column method 
	Make ten strategy *Progression should be crossing one ten, crossing more than one ten, crossing the hundreds.*	34 - 28 =  Use a bead bar or bead strings to model counting to next ten and the rest	Use a number line to count on to next ten and then the rest  93 - 76 = 17 *The calculation will be shown alongside the number line to see the connection*	93 - 76 = 17

Subtraction

Key Vocabulary: equal to, take, take-away, less, minus, subtract, leaves, distance between, how many more, how many fewer/ less than, most, least count back, how many left, how much less is…difference, count on, strategy, partition, tens, ones, hundreds, regrouping, exchanging

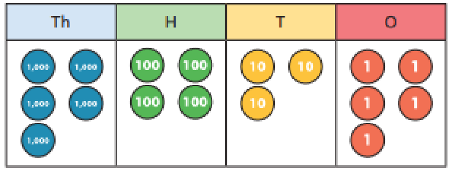
	Objective/ Strategies	Concrete	Pictorial	Abstract

Year 3	**Subtract numbers with up to 3-digits, using formal written methods** *Column subtraction (without exchanging)*	Use Base-10 to start with before moving on to place value counters Make the larger number, then take away from each column; starting with the ones	Draw in a PV frame the manipulatives that they are using  Secure knowledge of representation with the PV columns is needed *The calculation will be shown alongside the model to see the connection*	Move onto recording more formally. 
	Subtract numbers with up to 3-digits, using formal written methods *Column subtraction (exchanging)*	Use Base-10 to start with before moving on to place value counters. Start with one exchange before moving onto subtractions with 2 exchanges Make the larger number with the place value counters Start with the ones, can I take away 8 from 4 easily? I need to exchange 1 of my tens for 10 ones Now I can subtract my ones *Can use base-10, counters, mulitilink* *Show children how the concrete method links to the written method alongside your working. Cross out the numbers when exchanging and show where we write our new amount*	 Draw a pictorial representation of the columns and place value counters to further support their learning and understanding Starting with the ones, then tens; if exchange needed, cross out the counters as well as clearly showing the exchanges made SHOW CALCULATION	

Subtraction

Key Vocabulary: equal to, take, take-away, less, minus, subtract, leaves, distance between, how many more, how many fewer/ less than, most, least count back, how many left, how much less is…difference, count on, strategy, partition, tens, ones, hundreds, regrouping, exchanging

<table>
<tr><th></th><th>Objective/ Strategies</th><th>Concrete</th><th>Pictorial</th><th>Abstract</th></tr>
<tr>
<td>Year 4</td>
<td>Subtract numbers with up to 4-digits, using formal written methods
With exchanging</td>
<td>5,435 – 3,217 =

Make the larger number, then take away from each column; starting with the ones, exchange the counters</td>
<td>5,435 – 3,217 =

Draw a pictorial representation of the columns and place value counters/ Base-10 (which ever learner is more confident with)

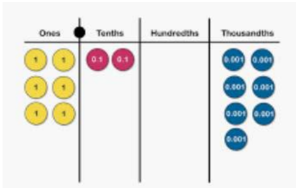
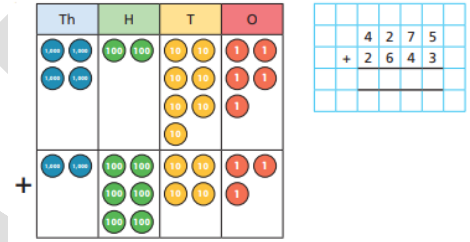
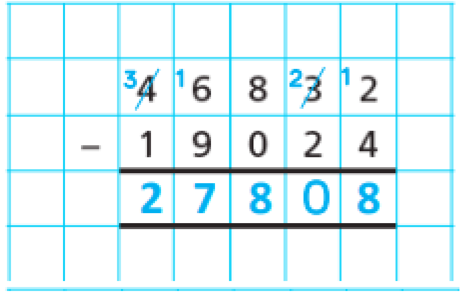
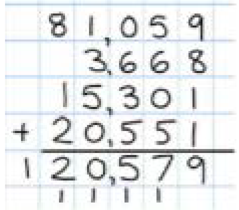
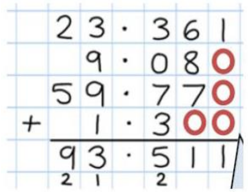
Starting with the ones, then tens; if exchange needed, cross the counters out as well as clearly showing the exchanges made

SHOW CALCULATION</td>
<td>Move onto recording more formally.
<table>
<tr><td></td><td>Th</td><td>H</td><td>T</td><td>O</td></tr>
<tr><td></td><td>9</td><td>8</td><td>³<s>4</s></td><td>¹5</td></tr>
<tr><td>–</td><td>6</td><td>2</td><td>1</td><td>6</td></tr>
<tr><td></td><td>3</td><td>6</td><td>2</td><td>9</td></tr>
</table>
</td>
</tr>
</table>

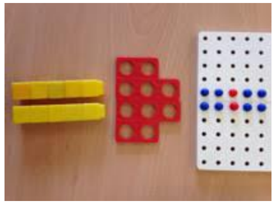
	Introduce decimal subtraction through context of money	Use Base-10 to start with before moving on to place value counters. Start with one exchange before moving onto subtractions with 2 exchanges Make the larger number with the place value counters Start with the ones, can I take away 8 from 4 easily? I need to exchange 1 of my tens for 10 ones Now I can subtract my ones *Can use base-10, counters, mulitilink* *Show children how the concrete method links to the written method alongside your working. Cross out the numbers when exchanging and show where we write our new amount*		

Subtraction

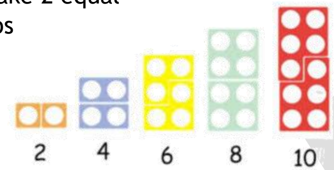
Key Vocabulary: equal to, take, take-away, less, minus, subtract, leaves, distance between, how many more, how many fewer/less than, most, least count back, how many left, how much less is…difference, count on, strategy, partition, hundred thousands, ten thousands, thousands, hundreds, tens, ones, regroup, exchange, decimal points, place value

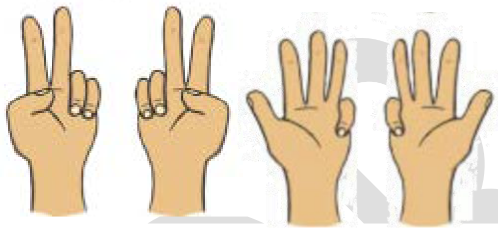
	Objective/ Strategies	Concrete	Pictorial	Abstract
Year 5	**Column method - regrouping** *Introduce decimal subtraction through context of money*	Continue to use base-10 or place value counters to subtract, exchanging tens for ten ones, and ten tens for a hundred and ten hundreds for a thousand, ten thousands for 100,000 etc Introduce decimals with the same number of decimal places and different Money can be used here; *place value needs to be secure with the setting up of digits*  *The calculation will be shown alongside the manipulative used to see the connection*	Draw a pictorial representation of the columns and place value counters to further support their learning and understanding  *The calculation will be shown alongside the model to see the connection*	
Year 6	**Add several numbers of increasing complexity, including adding money, measure and decimals with different numbers of decimal points.**	*As children move on to decimals, money and decimal place value counters can be used to support learning* Introduce decimal place value counters and model exchange for addition 	EXAMPLE OF COUNTER/ MONEY DECIMLAS Written method example	

<table>
<tr><th colspan="5">Multiplication</th></tr>
<tr><th></th><th>Objective/ Strategies</th><th>Concrete</th><th>Pictorial</th><th>Abstract</th></tr>
<tr>
<td>EYFS</td>
<td>Solve problems including doubling</td>
<td>



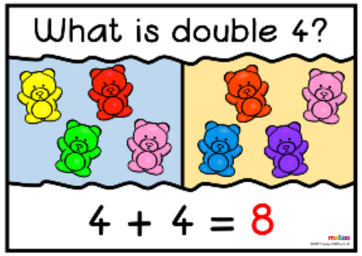
Counting and other maths resources to make 2 equal groups

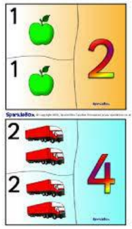


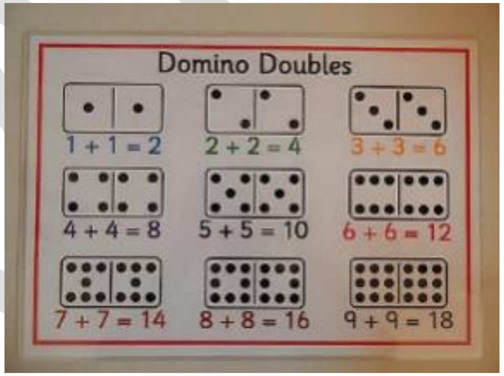


Physical and real life examples that encourage children to see concept of doubling as adding two equal groups


</td>
<td>
Pictures and icons that encourage children to see concept of doubling as adding two equal groups







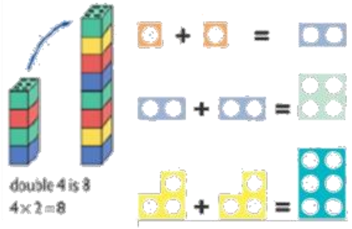
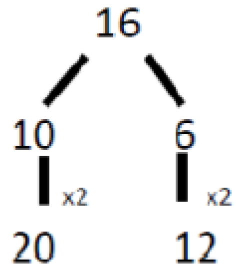
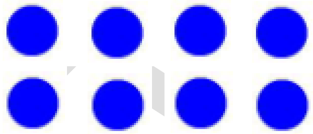
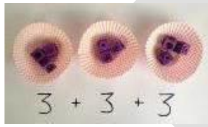
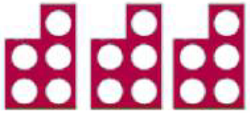
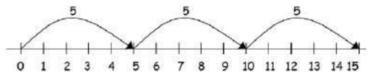
</td>
<td>
Addition calculations to model adding two equal groups

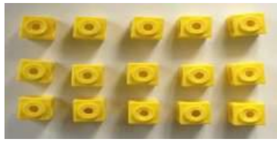
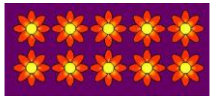
<table>
<tr><td>1+1=</td><td>7+7=</td></tr>
<tr><td>2+2=</td><td>8+8=</td></tr>
<tr><td>3+3=</td><td>9+9=</td></tr>
<tr><td>4+4=</td><td>10+10=</td></tr>
<tr><td>5+5=</td><td>11+11=</td></tr>
<tr><td>6+6=</td><td>12+12=</td></tr>
</table>

There is no expectation for children to be able to record a number sentence/ addition calculation
</td>
</tr>
</table>

Multiplication

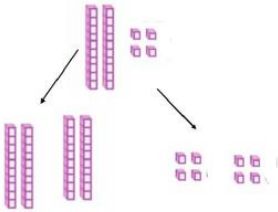
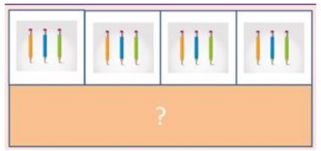
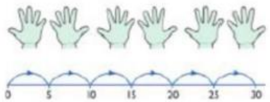
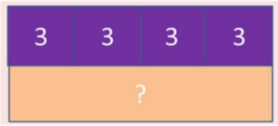
Key Vocabulary: Groups of, lots of, times, array, altogether, multiply, multiplied by, repeated addition, sets of, equal groups, times as big as, commutative, product, multiples of, scale up, inverse

	Objective/ Strategies	Concrete	Pictorial	Abstract
Year 1	**Doubling**	Use practical activities using manipulatives including cubes and Numicon 	Draw pictures to show how to double numbers Double 4 is 8 	 Partition a number and then double each part before recombining it back together to demonstrate doubling
	Counting in Multiples	Count the groups as skip counting; may use their fingers  	Make representations to show counting in multiples 	Count in multiples of a number aloud Write sequences with multiples of numbers 2, 4, 6, 8, 10 5, 10, 15, 20, 25, 30
	Repeated Addition	Use different objects to add equal groups   	There are 3 plates. Each plate has 2 star biscuits  5 + 5 + 5 = 15 	Write addition sentences to describe objects and pictures 2 + 2 + 2 = 6 

	Understand Arrays	Use objects laid out in arrays to find the answers to 2 lots 5, 3 lots of 2 etc   	Draw arrays in different rotations to find **commutative** multiplication sentences 	Use an array to write multiplication sentences and reinforce repeated addition  5 + 5 + 5 = 15 3 + 3 + 3 + 3 + 3 = 15 5 x 3 = 15 3 x 5 = 15

Multiplication

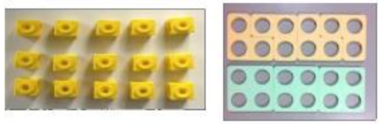
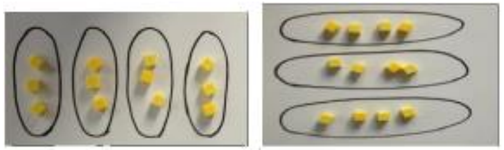
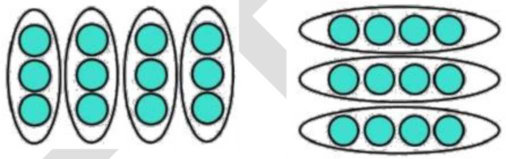
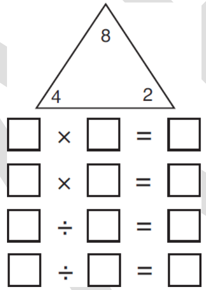
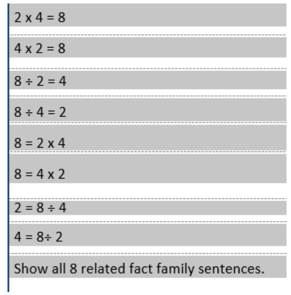
Key Vocabulary: Groups of, lots of, times, array, altogether, multiply, multiplied by, repeated addition, sets of, equal groups, times as big as, commutative, product, multiples of, inverse, derive

	Objective/ Strategies	Concrete	Pictorial	Abstract
	Doubling	Model doubling using Base-10 and PV counters  24 x 2 = 48	Draw pictures and representations to show double numbers	16 10 6 x2 x2 20 + 12 = 32 Partition a number and then double each part before recombining it back together to demonstrate doubling
	Counting in multiples of 2, 3, 4, 5, 10 from 0 *(repeated addition)*	   Count the groups as children are skip counting, children may use their fingers as they are skip counting. Use bar model	Number lines, counting sticks and bar models should be used to show repre sentation of counting in multiples  	Count in multiples of a number aloud Write sequences with multiples of numbers 0, 2, 4, 6, 8, 10 0, 3, 6, 9, 12, 15 0, 5, 10, 15, 20, 25, 30

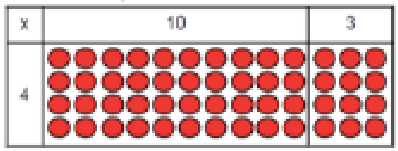
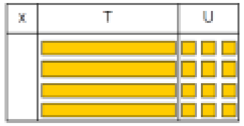
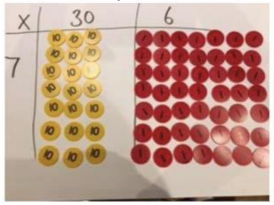
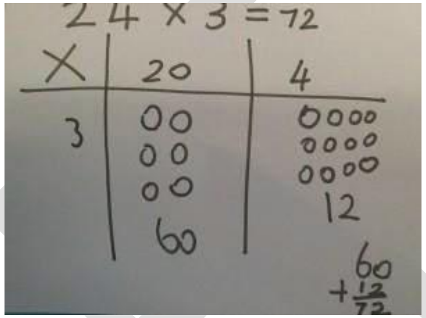
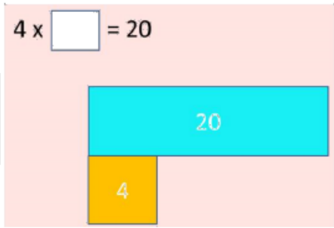
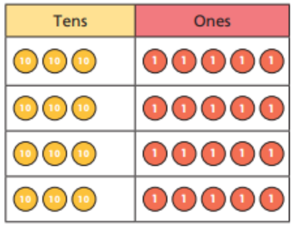
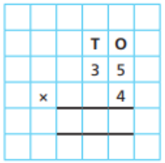
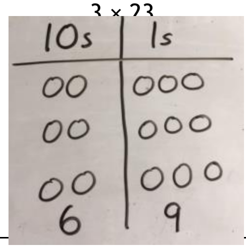
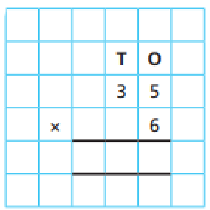
Use representations of arrays to show different calculations and explore commutativity

3 x 4 = 12

4 x 3 = 12

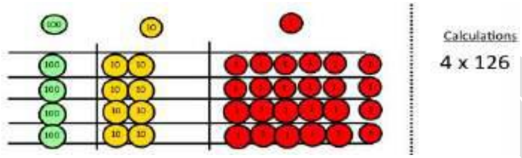
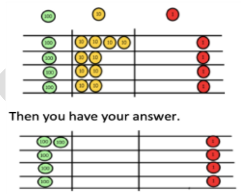
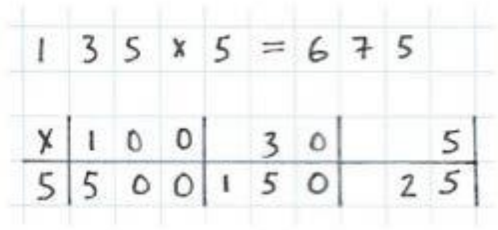
	Multiplication is commutative	Create arrays using counters and cubes and calculations and explore commutativity  Pupils should understand that an array can represent different equations and that, as multiplication is commutative, the order of the multiplication does not affect the answer 		3 x 4 = 12 4 x 3 = 12 12 = 3 x 4 12 = 4 x 3
	Using the Inverse *This should be taught alongside division, so pupils learn how they work alongside each other*		 	 2 x 4 = 8 4 x 2 = 8 8 ÷ 2 = 4 8 ÷ 4 = 2 8 = 2 x 4 8 = 4 x 2 2 = 8 ÷ 4 4 = 8÷ 2 Show all 8 related fact family sentences.

Multiplication				
Key Vocabulary: Groups of, lots of, times, array, altogether, multiply, multiplied by, repeated addition, sets of, equal groups, times as big as, commutative, product, multiples of, scale up, inverse				
	Objective/ Strategies	**Concrete**	**Pictorial**	**Abstract**

Year 3	**Multiplying 2-digit number by a 1-digit number** *Grid method progressing to the formal method.* *Solving problems including missing number problems, integer scaling problems.*	 4 rows of 10 4 rows of 3  4 rows of 13 Move onto base-10 to move towards a more compact method Move on to place value counters to show how we are finding groups of a number 	Represent their work with place value counters in a way that they understand They can draw the counters using colours to show different amounts or just use the circles in the different columns to show their thinking  Bar models can be used to explore missing numbers 	<table><tr><td>×</td><td>30</td><td>5</td></tr><tr><td>7</td><td>210</td><td>35</td></tr></table> 210 + 35 = 245 Start multiplying by one digit numbers and showing the clear addition alongside the grid to find the answer
	Formal written mehtod *2-digit by a 1-digit number*	 	Children to represent the counters pictorially 3 × 23  35 × 6 	**Children to record what it is they are doing to show understanding.** 3 × 23 20 3 3 × 20 = 60 3 × 3 = 9 60 + 9 = 69 23 × 3 69

Multiplication

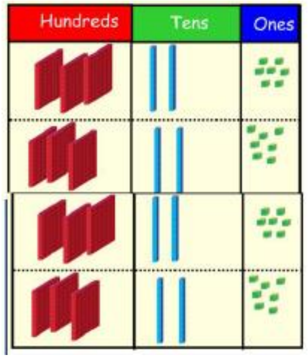
Key Vocabulary: Groups of, lots of, times, array, altogether, multiply, multiplied by, repeated addition, sets of, equal groups, times as big as, commutative, product, multiples of, scale up, inverse, derive

	Objective/ Strategies	Concrete	Pictorial	Abstract
Year 4	**Multiplying 3-digit number by a 1-digit number** *Grid method progressing to the formal method.*	Place value counters to show how we are finding groups of a number. We are multiplying by 4 so we need 4 rows Fill each row with 126  Add up each column, starting with the ones making any exchanges needed 	Represent their work with place value counters in a way that they understand They can draw the counters using colours to show different amounts or just use the circles in the different columns to show their thinking	HTO x O Start multiplying by one digit numbers and showing the clear addition alongside the grid to find the answer 

Multiplying 3-digit number by a 1-digit number using a formal written method

Continue to be supported by place value counters at the stage of multiplication

321 x 4 =



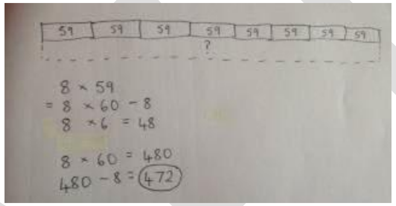
It is important that they always multiply the ones first

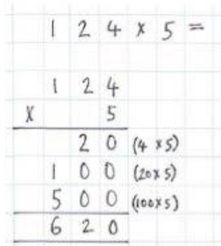
The corresponding long multiplication is modelled alongside

The grid method may be used to show how this relates to a formal written method

x	300	20	7
4	1200	80	28

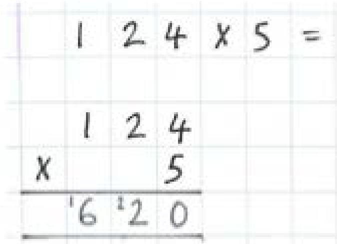
Bar modelling and number lines can support learners when solving problems with multiplication alongside the formal written methods





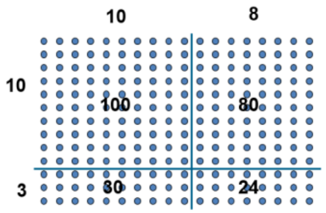
Expanded written method, where they start with the ones, then tens, hundreds; add up them up to get the answer

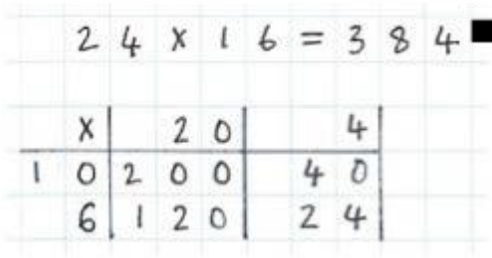
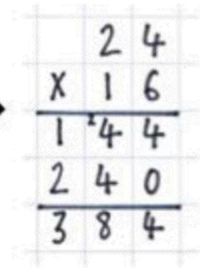
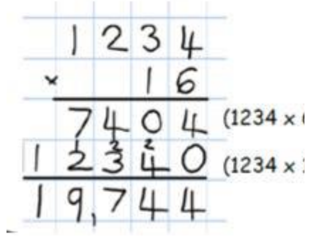
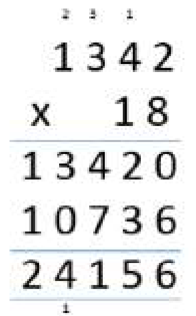
Which will then lead to compact method



Multiplication

Key Vocabulary: Groups of, lots of, times, array, altogether, multiply, multiplied by, repeated addition, sets of, equal groups, times as big as, commutative, product, multiples of, scale up, inverse, derive, factor pairs, composite numbers, prime number, factors, squared, cubed

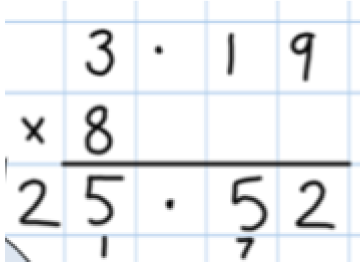
	Objective/ Strategies	Concrete	Pictorial	Abstract
Year 5	**Expanded method**	Show the link with arrays to first introduce the expanded method 	Represent their work with place value counters in a way that they understand They can draw the counters using colours to show different amounts or just use the circles in the different columns to show their thinking	TO x TO 18 x 13 24 (3 x 8) 30 (3 x 10)) 80 (10 x 8) 100 (10 x 10) 234 Start with long multiplication, reminding them about lining up their numbers clearly in columns

	Formal written method for multiplying by a 2-digit number	Children can continue to be supported by place value counters at the stage of multiplication = It is important at this stage that they always multiply the ones first and note down their answer followed by the tens which they note below The corresponding long multiplication is modelled alongside	Moving forward multiply a 2-digit number showing different rows within the grid method 	 24 x 6 on the first row. (6 x 4 = 24, carrying the 2 for the 20, then 6 x 2) 24 x 10 on the second row. Show multiplying by 10 by putting zero in the ones first Then, add the 2 numbers to get the answer  

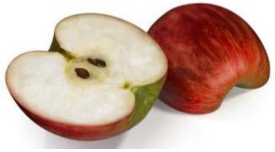
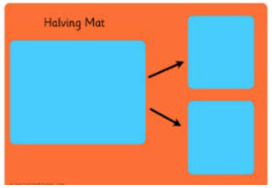
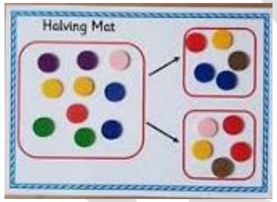
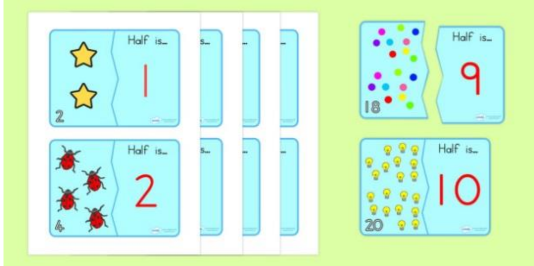
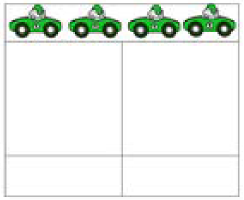
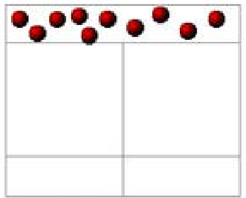
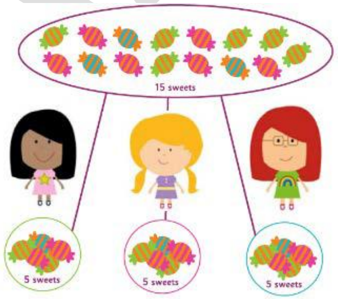
Multiplication

Key Vocabulary: Groups of, lots of, times, array, altogether, multiply, multiplied by, repeated addition, sets of, equal groups, times as big as, commutative, product, multiples of, scale up, inverse, derive, factor pairs, composite numbers, prime number, factors, squared, cubed

	Objective/ Strategies	Concrete	Pictorial	Abstract

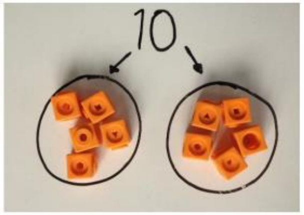
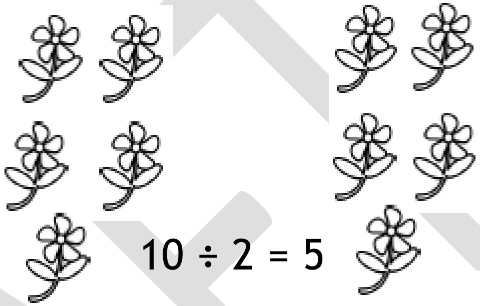
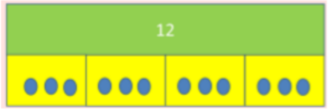
Year 6	**Multiply decimals up to 2 decimal place by a single digit.**	Show the link with arrays to first introduce the expanded method	Represent their work with place value counters in a way that they understand They can draw the counters using colours to show different amounts or just use the circles in the different columns to show their thinking	The single digit belongs in the ones column Line up the decimal points in the question e answer 

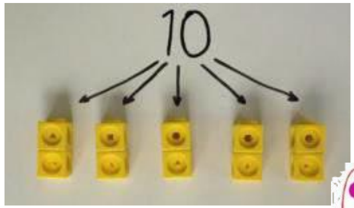
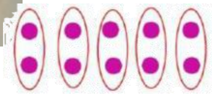
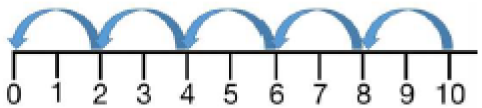
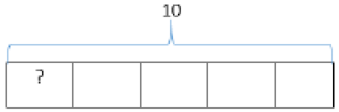
Division				
	Objective/ Strategies	**Concrete**	**Pictorial**	**Abstract**

EYFS	Solve problems including halving and sharing ◊Halving a whole, halving a quantity of objects ◊Sharing a quantity of objects	  Have the opportunity to physically cut objects, food or shapes in half   Counting and other maths resources for children to share into two equal groups   Use visual supports (such as halving mats and part part whole models) with physical objects and resources that can be manipulated  Counting and other maths resources to explore sharing between 3 or more	 Pictures and icons that encourage children to see concept of halving in relation to subitising, addition and subtraction knowledge. i.e. Knowing 4 is made of 2 groups of 2, so half of 4 is 2   Bar model with pictures or icons to support understanding of finding 2 equal parts of a number, to further understand how two halves make a whole  Pictures to create and visualise 3 or more equal groups	

Division

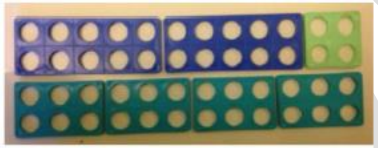
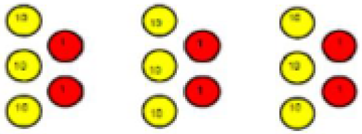
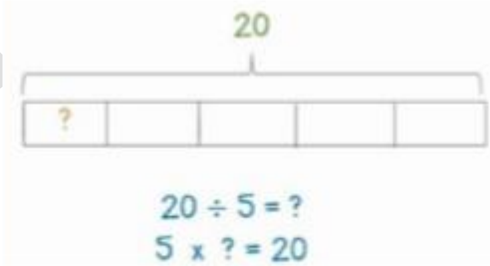
Key Vocabulary: Share, share equally, one each, two each…, group, groups of, lots of, arrays, divide, divided by, divided into, division, grouping, number line, left, left over

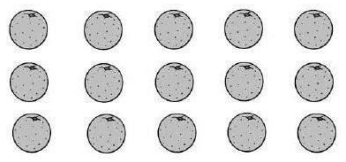
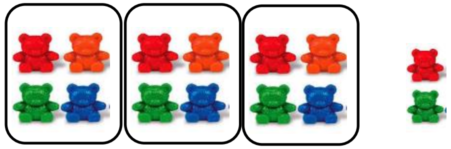
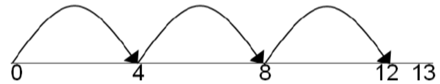
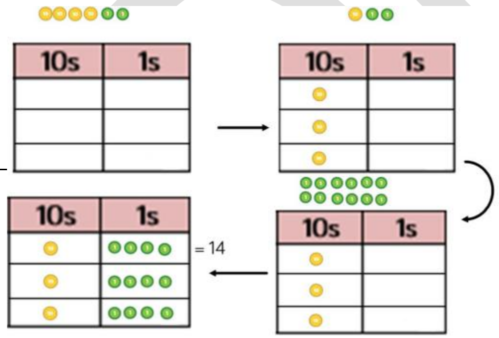
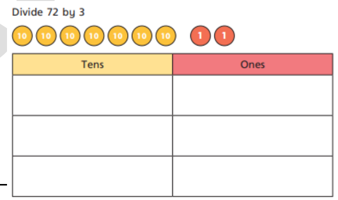
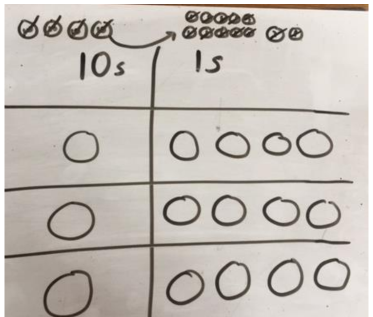
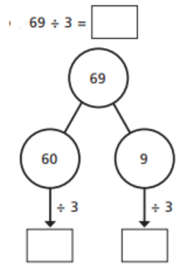
	Objective/ Strategies	Concrete	Pictorial	Abstract
Year 1	**Division as sharing** *(sharing objects into groups)*	I have 10 cubes, can you share them equally in 2 groups?  	Use pictures or shapes to share quantities  $10 \div 2 = 5$ Use bar modelling to show and support understanding $12 \div 4 = 3$ 	Share 10 sweets between 2 children $10 \div 2 = 5$ Divide 10 into 2 groups How many are in each group?

Year 2	**Grouping**	Divide quantities into equal groups. Use cubes, counters, objects or place value counters to aid understanding  	Use a number line to show jumps in groups The number of jumps equals the number of groups  Think of the bar as a whole. Split it into the number of groups you are dividing by and work out how many would be within each groups  10 ÷ 5 = ? 5 x ? = 10	28 ÷ 7 = 4 Divide 28 into 7 groups. How many are in each group?

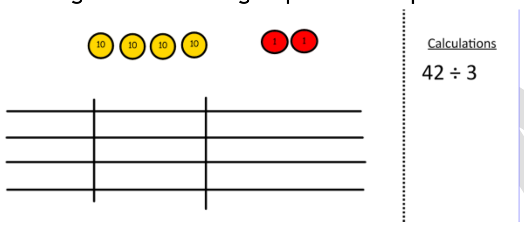
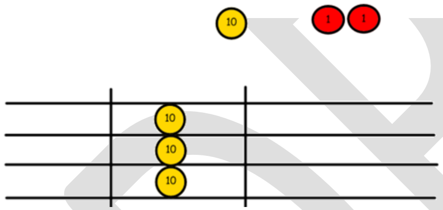
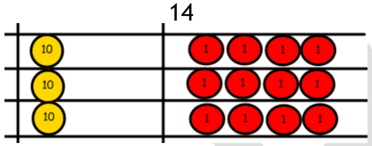
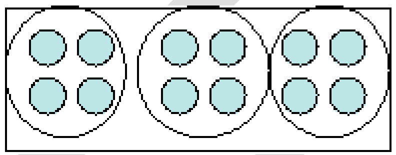
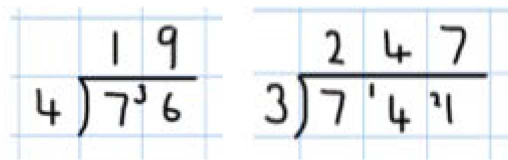
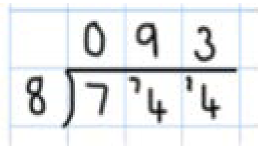
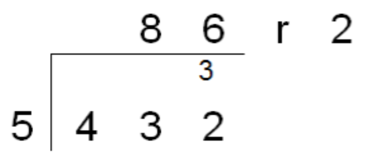
Division

Key Vocabulary: Share, share equally, one each, two each…, group, groups of, lots of, arrays, divide, divided by, divided into, division, grouping, number line, left, left over

	Objective/ Strategies	Concrete	Pictorial	Abstract
Year 3	**Division as grouping**	Use cubes, counters, objects or place value counters to aid understanding 24 divided into groups of 6 = 4  96 ÷ 3 = 32 	Continue to use bar modelling to aid solving division problems 10 ÷ 2 =  	How many groups of 6 in 24 24 ÷ 6 = 4

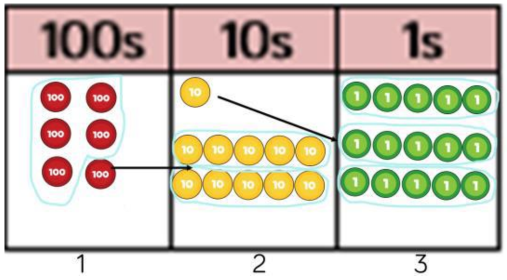
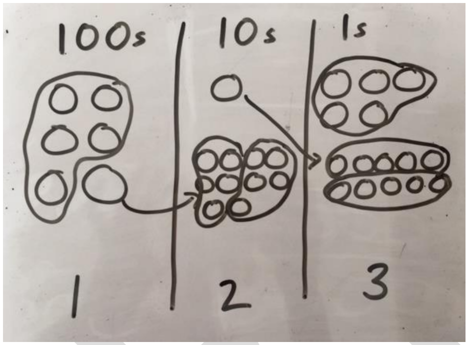
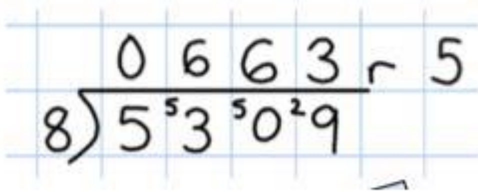
	Division with arrays	Link division to multiplication by creating an array and thinking about the number sentences that can be created e.g. 15 ÷ 3 = 5 15 ÷ 5 = 3 5 x 3 = 15 3 x 5 = 15 	Draw an array and use lines to split the array into groups to make multiplication and division sentences 	Find the inverse of multiplication and division sentences by creating eight linking number sentences 18 ÷ 3 = 6 6 = 18 ÷ 3 18 ÷ 6 = 3 3 = 18 ÷ 6 6 x 3 = 18 18 = 6 x 3 3 x 6 = 18 18 = 3 x 6
	Division with a remainder	14 ÷ 3 = Divide objects between groups and see how much is left over 	Jump forward in equal jumps on a number line then see how many more you need to jump to find a remainder  Draw dots and group them to divide an amount and clearly show a remainder 	Complete written divisions and show the remainder using *r* 29 ÷ 8 = 3 REMAINDER 5 ↑ ↑ ↑ ↑ dividend divisor quotient remainder
	Divide 2-digits by 1-digit	Sharing using place value counters. 42 ÷ 3 = 14 	Children to represent the place value counters pictorially.  	Children to be able to make sense of the place value counters and write calculations to show the process. 42 ÷ 3 42 = 30 + 12 30 ÷ 3 = 10 12 ÷ 3 = 4 10 + 4 = 14 

Division				
Key Vocabulary: Share, share equally, one each, two each…, group, groups of, lots of, arrays, divide, divided by, divided into, division, grouping, number line, left, left over				
	Objective/ Strategies	**Concrete**	**Pictorial**	**Abstract**

Year 4	**Divide at least 3-digit with numbers by 1 digit** *Short Division*	96 ÷ 3 Use place value counters to divide using the bus stop method alongside  42 ÷ 3= Start with the biggest place value, we are sharing 40 into three groups. We can put 1 ten  We exchange this ten for ten ones and then share the ones equally among the groups  We look how much in 1 group so the answer is 14 	Continue to use drawn diagrams with dots or circles to help them divide numbers into equal groups 10 ÷ 2 =  Encourage them to move towards counting in multiples to divide more efficiently	Begin with divisions that divide equally with no remainder 872 ÷ 4 = 218  A 0 is used to keep place value, if the number is not divisible  Move onto division with remainders 

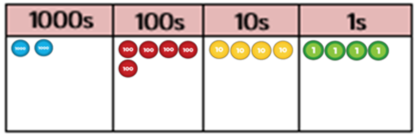
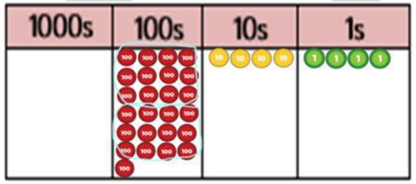
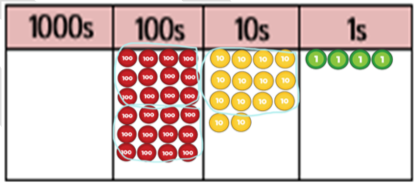
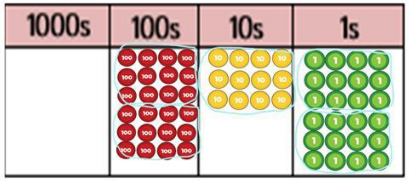
Division

Key Vocabulary: share, share equally, one each, two each…, group, groups of, lots of, array, divide, divided by, divided into, division, grouping, number line, left, left over, product, division facts, inverse, derive, formal written method

	Objective/ Strategies	Concrete	Pictorial	Abstract
Year 5	**Divide at least 4 digit numbers by 1 digit.** *Interpret remainders appropriately for the context*	Short division using place value counters to group. 615 ÷ 5  1. Make 615 with place value counters. 2. How many groups of 5 hundreds can you make with 6 hundred counters? 3. Exchange 1 hundred for 10 tens. 4. How many groups of 5 tens can you make with 11 ten counters? 5. Exchange 1 ten for 10 ones. 6. How many groups of 5 ones can you make with 15 ones?	Represent the place value counters pictorially 	Children to the calculation using the short division scaffold. 

Division

Key Vocabulary: share, share equally, one each, two each…, group, groups of, lots of, array, divide, divided by, divided into, division, grouping, number line, left, left over, product, division facts, inverse, derive, formal written method

	Objective/ Strategies	Concrete	Pictorial	Abstract
Year 6	**Long Division**	42 ÷ 3= Start with the biggest place value, we are sharing 40 into three groups. We can put 1 ten We exchange this ten for ten ones and then share the ones equally among the groups We look how much in 1 group so the answer is 14	Long division using place value counters 2544 ÷ 12 $10 \div 2 =$  We can't group 2 thousands into groups of 12 so will exchange them.  We can group 24 hundreds into groups of 12 which leaves with 1 hundred.  After exchanging the hundred, we have 14 tens. We can group 12 tens into a group of 12, which leaves 2 tens.  After exchanging the 2 tens, we have 24 ones. We can group 24 ones into 2 group of 12, which leaves no remainder.	Begin with divisions that divide equally with no remainder $872 \div 4 = 218$ $\begin{array}{r} 02 \\ 12 \overline{)2544} \\ 24 \\ \hline 1 \end{array}$ $\begin{array}{r} 021 \\ 12 \overline{)2544} \\ 24 \\ \hline 14 \\ 12 \\ \hline 2 \end{array}$ $\begin{array}{r} 0212 \\ 12 \overline{)2544} \\ 24 \\ \hline 14 \\ 12 \\ \hline 24 \\ 24 \\ \hline 0 \end{array}$

Long Division
Step 1 – a remainder in the ones

h t o

0 4 1 R1

4) 1 6 5

4 does not go into 1 (hundred). So combine the 1 hundred with the 6 tens (160).

4 goes into 16 four times.

4 goes into 5 once, leaving a remainder of 1.

th h t o

0 4 0 0 R7

8) 3 2 0 7

8 does not go into 3 of the thousands. So combine the 3 thousands with the 2 hundreds (3,200).

8 goes into 32 four times (3,200 ÷ 8 = 400)
8 goes into 0 zero times (tens).
8 goes into 7 zero times, and leaves a remainder of 7.

```
      h t o
      0 6 1
    ------
4 )   2 4 7
        - 4
          3
```

When dividing the ones, 4 goes into 7 one time. Multiply 1 × 4 = 4, write that four under the 7, and subract. This finds us the remainder of 3.

Check: 4 × 61 + 3 = 247

```
     th h t o
      0 4 0 2
    --------
4 )   1 6 0 9
          - 8
            1
```

When dividing the ones, 4 goes into 9 two times. Multiply 2 × 4 = 8, write that eight under the 9, and subract. This finds us the remainder of 1.

Check: 4 × 402 + 1 = 1,609

1. Divide.	2. Multiply & subtract.	3. Drop down the next digit.
t o 2 2) 5 8 Two goes into 5 two times, or 5 tens ÷ 2 = 2 whole tens -- but there is a remainder!	t o 2 2) 5 8 - 4 1 To find it, multiply 2 × 2 = 4, write that 4 under the five, and subtract to find the remainder of 1 ten.	t o 2 9 2) 5 8 - 4 ↓ 1 8 Next, drop down the 8 of the ones next to the leftover 1 ten. You combine the remainder ten with 8 ones, and get 18.

1. Divide.	2. Multiply & subtract.	3. Drop down the next digit.
t o 2 9 2) 5 8 - 4 1 8 Divide 2 into 18. Place 9 into the quotient.	t o 2 9 2) 5 8 - 4 1 8 - 1 8 0 Multiply 9 × 2 = 18, write that 18 under the 18, and subtract.	t o 2 9 2) 5 8 - 4 1 8 - 1 8 0 The division is over since there are no more digits in the dividend. The quotient is 29.

1. Divide.	2. Multiply & subtract.	3. Drop down the next digit.
h t o 1 2) 2 7 8 Two goes into 2 one time, or 2 hundreds ÷ 2 = 1 hundred.	h t o 1 2) 2 7 8 - 2 0 Multiply 1 × 2 = 2, write that 2 under the two, and subtract to find the remainder of zero.	h t o 1 8 2) 2 7 8 - 2 ↓ 0 7 Next, drop down the 7 of the tens next to the zero.
Divide.	**Multiply & subtract.**	**Drop down the next digit.**
h t o 1 3 2) 2 7 8 - 2 0 7 Divide 2 into 7. Place 3 into the quotient.	h t o 1 3 2) 2 7 8 - 2 0 7 - 6 1 Multiply 3 × 2 = 6, write that 6 under the 7, and subtract to find the remainder of 1 ten.	h t o 1 3 2) 2 7 8 - 2 0 7 - 6 1 8 Next, drop down the 8 of the ones next to the 1 leftover ten.
1. Divide.	**2. Multiply & subtract.**	**3. Drop down the next digit.**
h t o 1 3 9 2) 2 7 8 - 2 0 7 - 6 1 8	h t o 1 3 9 2) 2 7 8 - 2 0 7 - 6 1 8	h t o 1 3 9 2) 2 7 8 - 2 0 7 - 6 1 8