Numeracy and Calculation Policy

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Governor Responsibility:	Quality and Outcomes
Next Review Date:	November 2024

Numeracy & Mathematics
Calculation Policy

Policy Statement
Numeracy/ Mathematics should be an integral part of the day with focus on children building functional numeracy skills to become as independent as possible when leaving school.

Environment
Heltwate School provides a rich learning environment in which all children can learn and achieve, alongside enjoying their education and time spent here. Resources are well planned and used to support all levels of ability. Expectations are high to ensure behaviours in class allow for all children to learn.

Introduction
The following calculations policy has been written in line with the programmes of study taken from the National Curriculum for Mathematics. This policy provides guidance on the calculation strategies, methods and progression. It aims to help parents to help their children, as well as provide guidelines for teachers to provide consistency in the teaching of mathematics across the school. Although not exhaustive, it outlines the key strategies taught across our school.

Our Aims
Through the Mathematics National Curriculum, we aim to ensure that all pupils:
1. Develop the basic mathematical skills through varied and frequent practice with increasingly complex problems over time.
2. Reason mathematically by following a line of enquiry
3. Can solve problems by applying their mathematics to a variety of routine and non-routine problems including breaking down problems into a series of simpler steps and persevering in seeking solutions.
4. To be able to apply their learning to everyday life skills in order to promote independence.

This policy will ensure consistency and progression in our approach to the learning and teaching of calculations across the school. It will enable our children, teachers and parents to work in partnership, developing an efficient, reliable, formal written method of calculation for all operations and to use these methods accurately with confidence for understanding.

Early Mathematics
Early mathematical knowledge and skills are generally introduced through everyday experiences without knowing learning is actually taking place. Children have a natural interest in exploration and learning so good quality maths education should be fun based and offer opportunities to engage children in playful, purposeful learning. The more exposure children have to practise mathematical concepts throughout the day the better. Providing meaningful activities also supports the development of children's language and

vocabulary. Research has shown that when children frequently engage in everyday mathematical activities, they are more likely to flourish in mathematical development. Early concrete experiences with small numbers, simple patterns, basic shapes and non-standard measurement are the basic building blocks for mathematical achievement. The activities children engage in everyday such as play, stories, construction and modelling can be used to develop number work. Teachers should aim to design the environment so that children engage in interesting mathematics throughout the classroom/outdoor space throughout the day.

An introduction to number:

To ensure that children have a good concept of number, it is important for them to be able to subitise numbers to 10 +, and to be able to match numbers to sets of objects. At Heltwate we will teaching number through a variety of resources to support and develop the knowledge of number within the children in our school.

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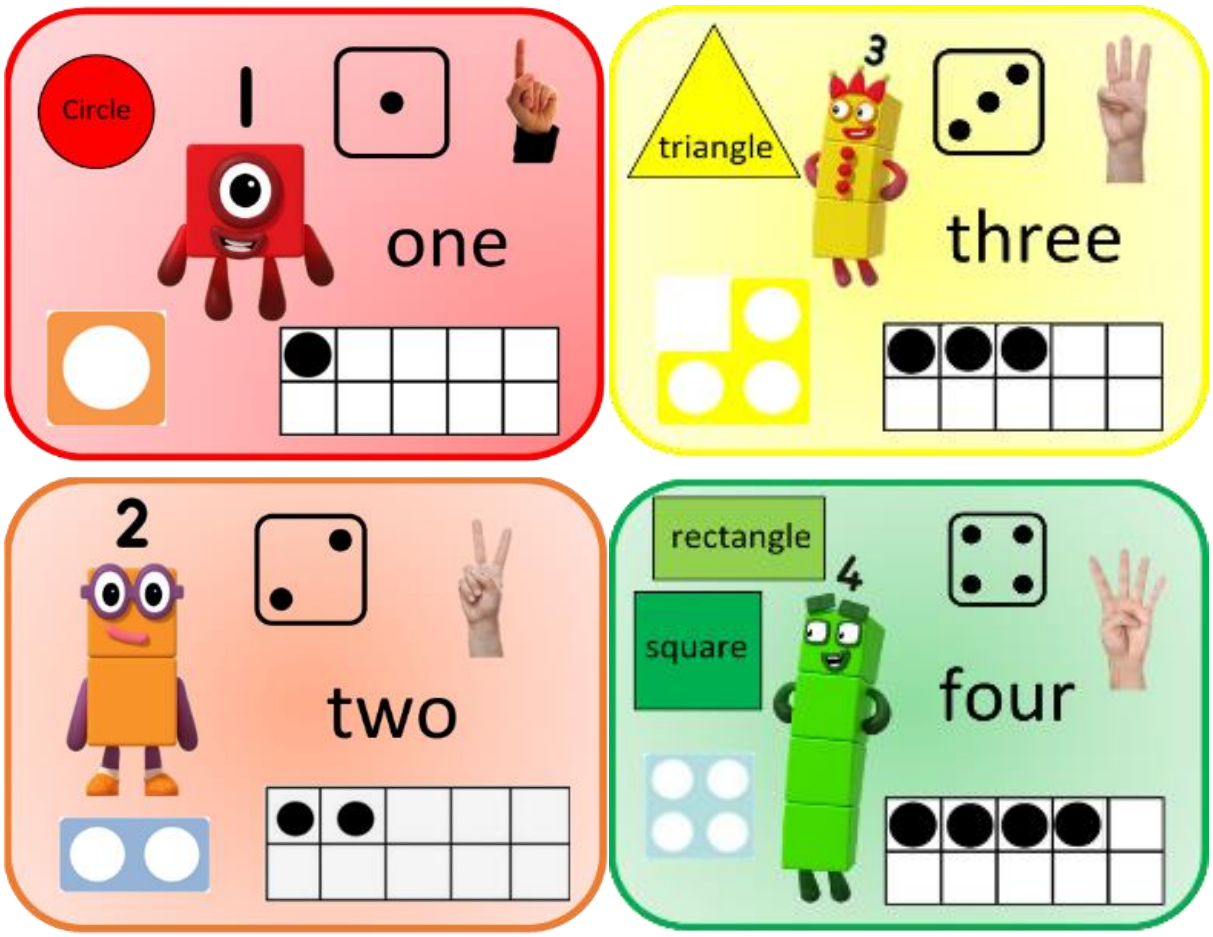


Written Calculations Stages of Development

Children should only progress to these stages if they are ready. In the same respect some children may be ready to move on quicker – although it is important that children are secure with the method they are working on before moving onto the next stage.

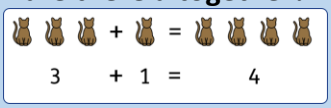
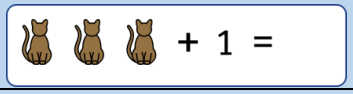
Addition +

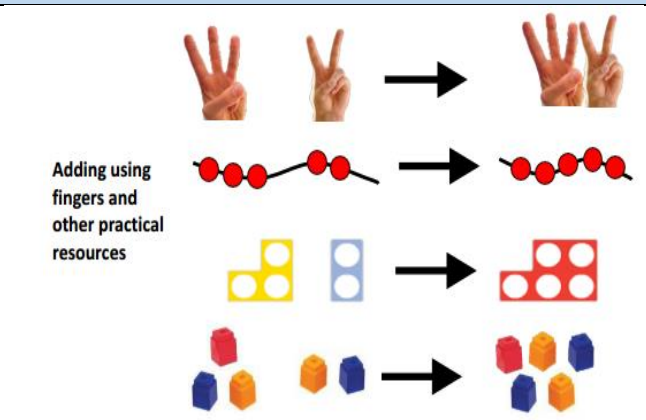
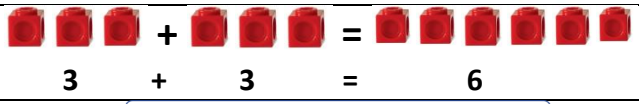
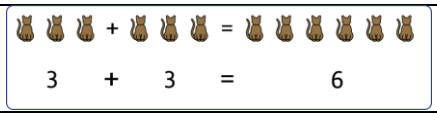
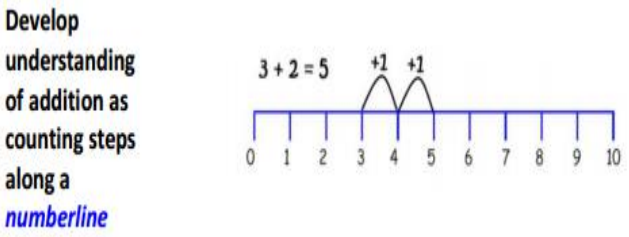
add
and
plus
sum

more than
addition
count on
total
increase

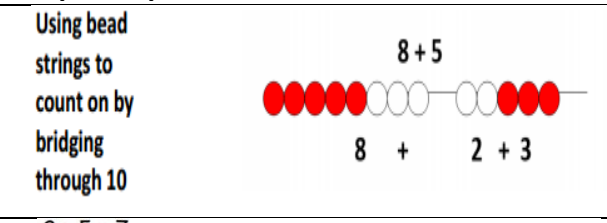
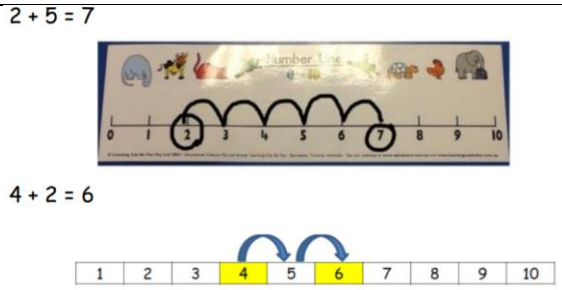
join
bigger
together
more

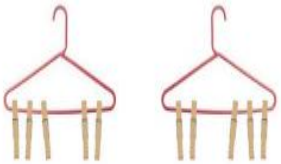
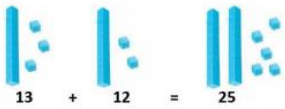
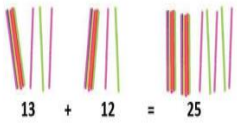
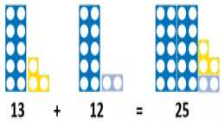
Stage 1

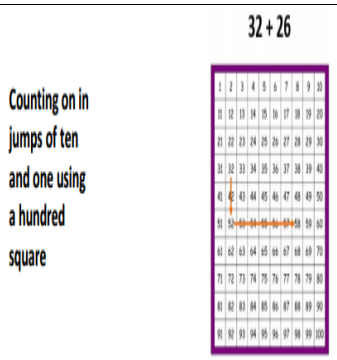
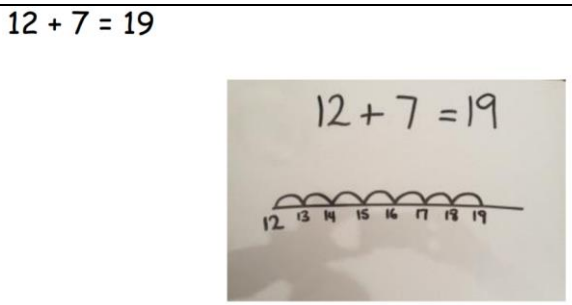
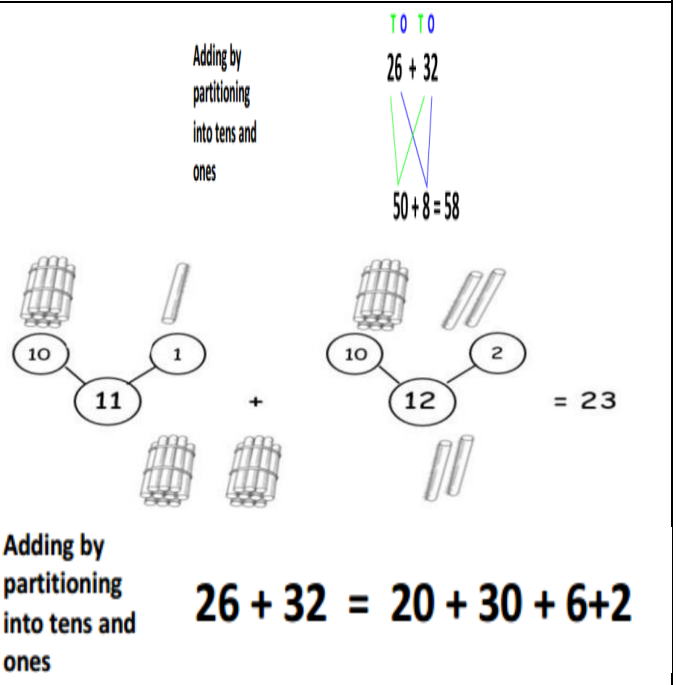
Vocabulary - add, more, and, make, sum, total, altogether, score, double, one more, two more, ten more…, how many more to make… ?, how many more is… than…?	
Method	**Example/Representation**
Practical resources and real life objects - **Adding sets of objects together** - **Finding one more** -	**How many cubes are there?**  **What if I give you one more? How many now?** 
One More	
One more using Numicon and 10 Frames - **Children to understand that one more than * will always be.** - **Children to be familiar with Numicon and 10 frames to support addition to 10.**	**Can you add one more? What is the answer?** 
One More with the introduction of the + symbol using visuals to support. - **Using one more with addition** - **Using numbers to support understanding.**	**There are 3 cats and I find one more, how many are there altogether?** 
One more with number and pictorial support.	**How many cat's are there? Can you add one more?** 
One more with the introduction of full number sums. - **Use of practical resources.**	**Find me 3 cubes, add one more.** **3+1=4**
Counting on from the larger number. - **Children encouraged to count on from the bigger number** - **Use of Numicon so children can start on the bigger number rather than counting from 0.**	**Can you get the correct number of objects for the sum? We have one set of 1 and one set of 3. Lets count on from the bigger number.** **1+3=4 4+1=4** 

Children continue this throughout their addition journey as the sums get larger.	
Adding sets of objects - **Children to practise adding larger sets of numbers together with resources.** - **Number sums available to support if this will support the child.**	
Introduction of number sums using practical resources/ real life objects	
Number sums using visual representations	
Introduction of number sums	**3+4=7**
Develop understanding of addition as counting along a number line.	

Stage 2

Vocabulary - number bonds, add, more, plus, make, sum, total, altogether, inverse, double, near double, equals, is the same as (including equals sign) ,score, one more, two more… ten more, how many more to make…?, how many more is… than…?, how much more is…?	
Method	**Example/Representation**
Using bead strings to count on through bridging to 10.	
Using a prepared number line or track to solve simple addition sums.	

Understand that addition is commutative and can be done in any order. **Support children to count on from the biggest number.**	Understand that addition is commutative (can be done in any order)  3 + 2 = 5 or 2 + 3 = 5
Developing knowledge and understanding of number bonds to 10.	Developing knowledge and understanding of number bonds to10 e.g.  7 + 3= 10 6 + 4= 10 9 + 1 =10
Vary position of missing numbers in a number sentence.	Vary position of missing numbers in a number sentence 2 + ☐ =5 ☐ + 4 =7
Counting on in jumps of one using a hundred square.	Counting on in jumps of one using a hundred square 
Addition of 2 digit numbers using practical resources.	Dienes' Apparatus  13 + 12 = 25 Counting Straws Addition of 2-digit numbers using practical resources  13 + 12 = 25 Numicon  13 + 12 = 25

Counting on in 10 using jumps on a hundred square.	
Children are taught how to use a blank number line for addition and then encouraged to draw their own number line to help solve problems, including those that cross the tens boundary.	
Adding by partition numbers into tens and ones when adding two 2-digit numbers that lie within the tens boundary.	

Stage 3

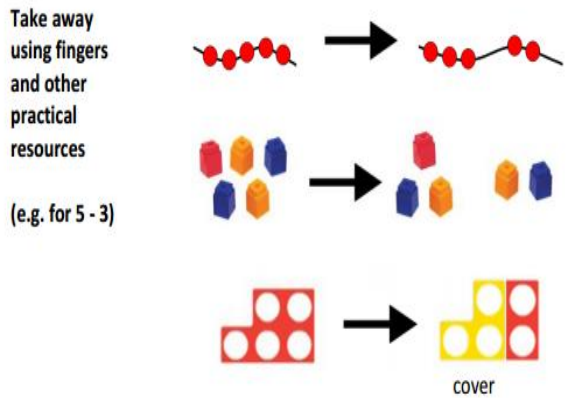
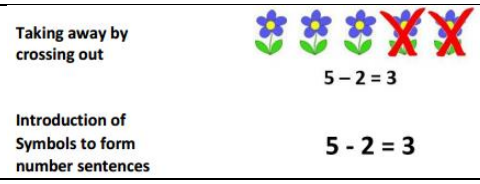
Vocabulary - add, increase, total, plus, sum, more, altogether, column addition, estimate, inverse, double, near double, one more, ten more… one hundred more, how many more to make …? how many more is… than …? how much more is…?, tens boundary, hundreds boundary, exchange.	
Method	**Example/Representation**
Begin to use expanded written methods.	
Progress to expanded written methods involving hundreds.	

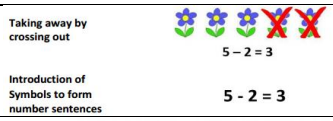
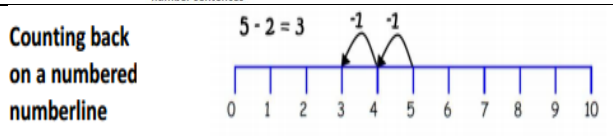
Reinforce understanding with use of arrow cards.	Reinforce understanding with use of arrow cards 

Subtraction -

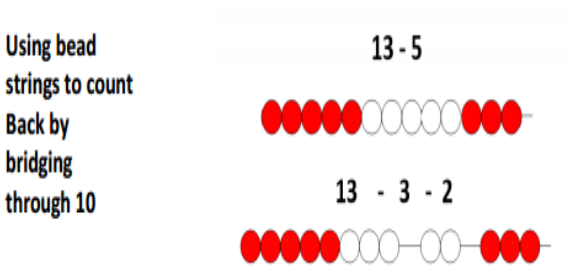
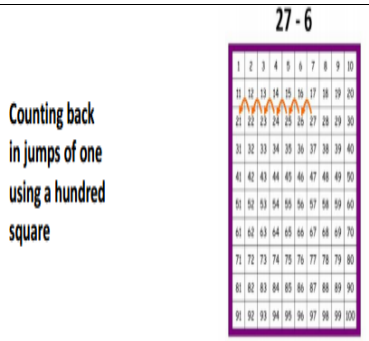
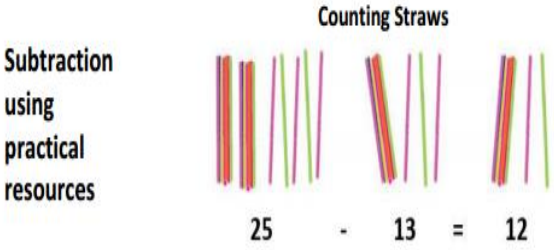
subtract	less	fewer
subtraction	less than	count back
take away	minus	difference
take	reduce	how many left

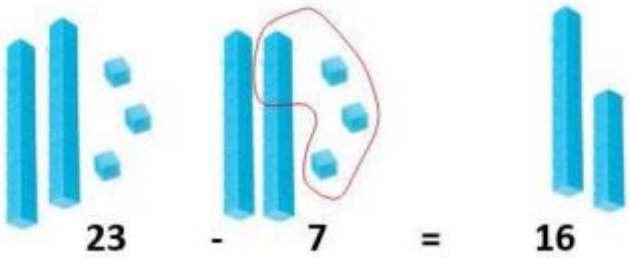
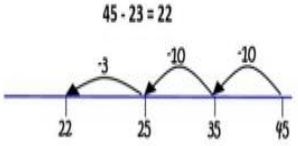
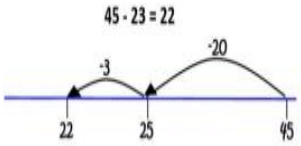
Stage 1

Vocabulary - take (away), leave, how many are left/left over?, how many have gone?, one less, two less… ten less…,how many fewer is… than…?, difference between, is the same as	
Method	**Example/Representation**
Practical resources and real life objects - **take away from sets of objects**	 **I had 5 dinosaurs and 2 moved out. How many have I got left?**
Find one less	
Takeaway using fingers and other practical resources.	 
Takeaway using pictorial support by crossing out.	

Introduction of symbols to form number sums.	
Counting back on a number line.	

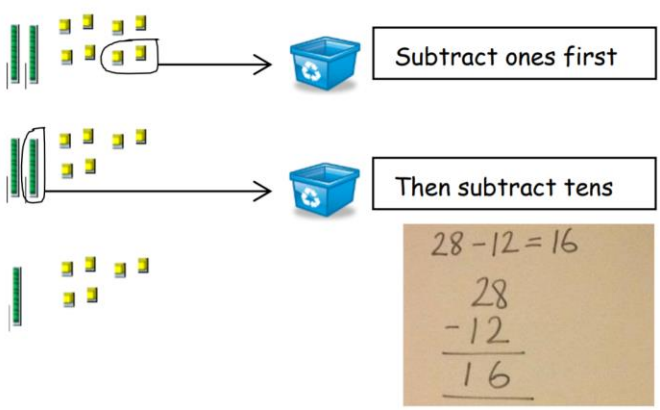
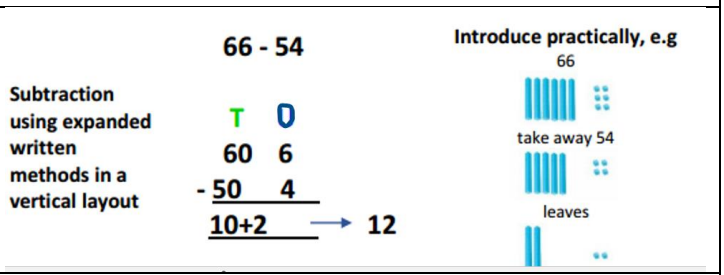
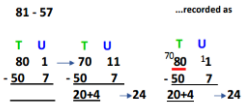
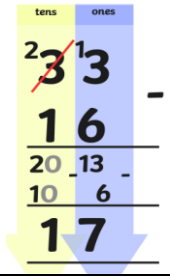
Stage 2

Vocabulary - subtract, take away, minus, leave, how many fewer is… than..?, how much less is..? half, halve, how many are left/left over?, how many are gone?, one less, two less, ten less…, how many fewer is… than…?, how much less is…? =, equals, sign, is the same as, count on, count back, difference between. How many more is…than..?, how much more is..?,	
Method	**Example/Representation**
Using bead strings to count back by bridging through 10.	
Counting back in jumps of 1 using a hundred square.	
Subtraction of two digit numbers using practical resources.	

	Dienes' Apparatus  23 - 7 = 16 **Numicon**  25 - 13 = 12
Counting backs in jumps of 10 using a hundred square.	**58 - 26** 
Using a numberline to count back, and find the difference.	Counting back on a number line  

Stage 3

Vocabulary - leave, subtract, less, minus, column subtraction, inverse, decomposition, exchange, how many are left/left over?, difference between, how many more/fewer is… than…?, how much more/less is…?, Is the same as, equals, sign, multiples of tens and hundreds

Method	Example/Representation
Subtraction using the column method using Dienes.	
Subtraction using expanded written method with exchange.	
Subtraction using compact written method.	 

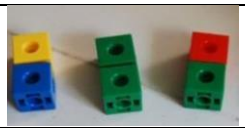
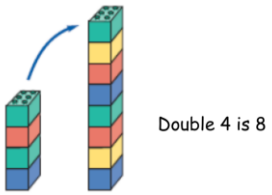
Multiplication x

times
multiply
multiplication

lots of
repeated addition

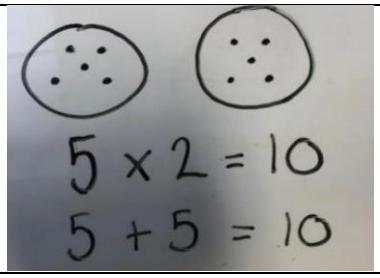
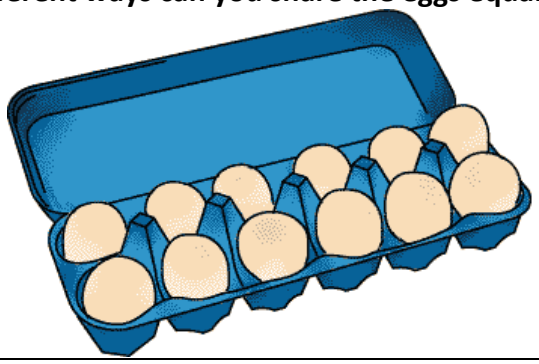
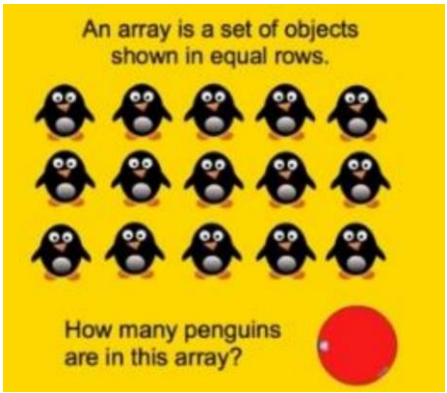
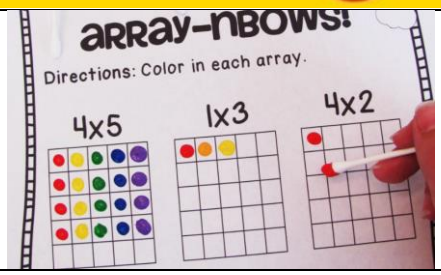
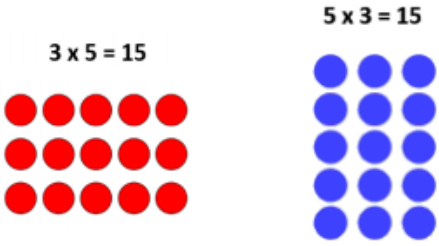
array
groups of
product

Stage 1

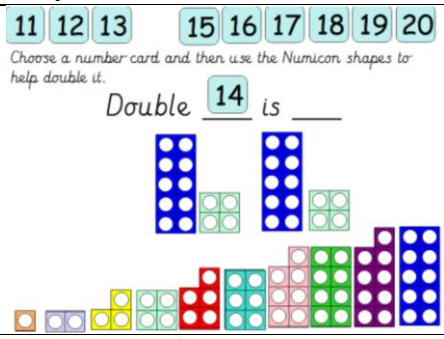
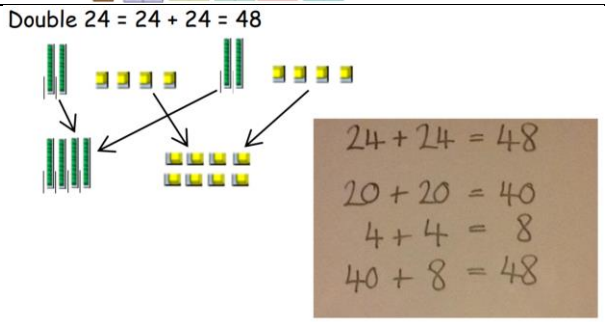
Vocabulary - group, lots of, double	
Method	**Example/Representation**
Grouping objects into equal groups	
Children to practise doubling a set of objects	
Children to count in their 2's, 5's and 10's using a variety of methods, including a hundred square.	**Counting songs, use of fingers and clapping.** 

Stage 2

Vocabulary - odd, even, count in twos, fives, count in tens (forwards from/backwards from), how many times? lots of, groups of, once, twice, five times, ten times , multiple of, times, multiply, multiply by, array, row, column, double	
Method	**Example/Representation**
Repeated addition using practical resources.	**5+5+5=**  **3x5 is the same as 5+5+5=**

Multiplication through grouping	
Introducing arrays in a practical method.	**How many eggs are there? Can you count in two's? Can you share the eggs into groups of 2's? How many different ways can you share the eggs equally?** 
Children to be introduced to pictorial arrays to support with layout and understanding.	**5+5+5 =** **5x3=** 
Drawing/finger painting arrays (ensure that dots are placed in rows)	
Ensure children understand the commutative property of multiplication	**3x5 and 5x3 are the same.** 

Stage 3

<table>
<tr><td colspan="2">Vocabulary - odd, even, twos, fives, tens, threes, lots of, groups of, once, twice, three times, five times, ten times, multiple of, times, multiply, multiply by, repeated addition, array, row, column, double.</td></tr>
<tr><td>Method</td><td>Example/Representation</td></tr>
<tr><td>Two figure doubling with practical resources.</td><td> 
</td></tr>
<tr><td>Two figure doubling through partitioning.</td><td> 
</td></tr>
<tr><td>Grid Method</td><td>Multiplying a 2-digit number by a 1-digit number:
<table>
<tr><td>x</td><td>20</td><td>3</td></tr>
<tr><td>8</td><td>160</td><td>24</td></tr>
</table>
160 + 24 = 184

Multiplying a 3-digit number by a 1-digit number:
<table>
<tr><td>x</td><td>100</td><td>20</td><td>3</td></tr>
<tr><td>6</td><td>600</td><td>120</td><td>18</td></tr>
</table>
= 738

Multiplying two 2-digit numbers:
<table>
<tr><td>x</td><td>20</td><td>3</td></tr>
<tr><td>40</td><td>800</td><td>120</td></tr>
<tr><td>2</td><td>40</td><td>6</td></tr>
</table>
→ 920
→ 46
966</td></tr>
</table>

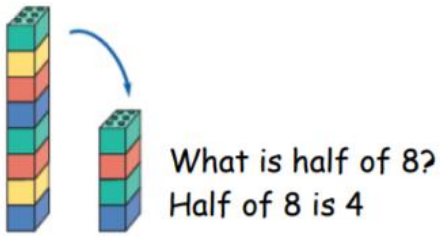
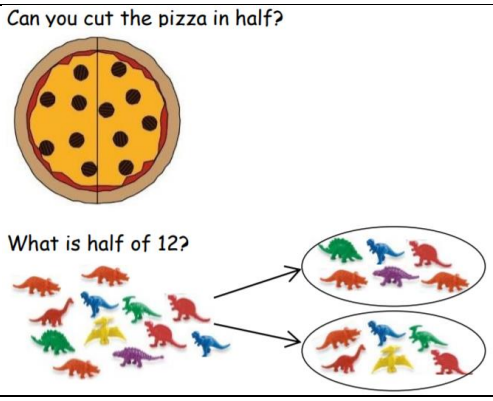
Division ÷

divide
division
share

group
sort
remainder
left over

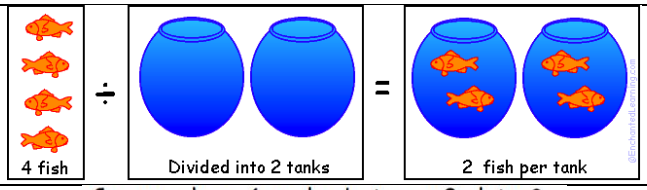
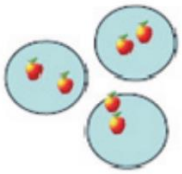
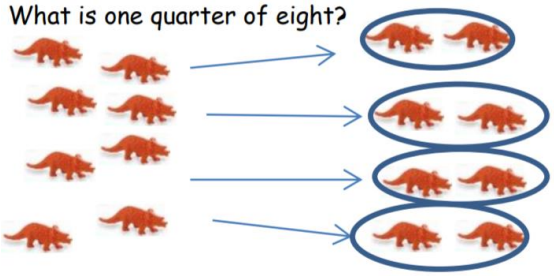
how many lots of
repeated subtraction
split

Stage 1

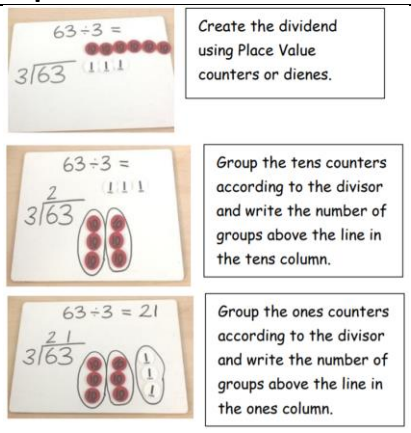
Vocabulary - halve, half, share, share equally, groups, divide	
Method	**Example/Representation**
Introducing division through sharing into groups.	
Problem solving through sharing and halving	
Children to understand that half is to be shared into two equal groups.	

Stage 2

Vocabulary - groups of, equal groups of, halve, share, share equally, divide, divided by, divided into, repeated subtraction, inverse	
Method	**Example/Representation**

Sharing into 2 groups using the division ÷ symbol.	
Sharing into 3 groups practically or with pictorial representations.	Can you share 6 apples between 3 plates? 
Children to associate 'quartering' with division by 4.	Can you cut the pizza into quarters?  What is one quarter of eight? 
Arrays to support division.	**15 ÷ 3 = 5** 

Stage 3

Method	Example/Representation
Introduction of the bus stop method using place value counters or dienes.	

Glossary

Array- An ordered collection of counters, numbers etc. in rows and columns.

Commutativity- Multiplication and division are both commutative as they can be done in any order. Division and subtraction are not commutative.

Difference- The amount by which one number or value is greater than another, obtained by subtracting the smaller from the larger.

Hundred Square -The numbers 1 – 100 arranged in uniform rows and columns to aid the understanding of number and to assist with calculations.

Inverse operation - The inverse operation is that which reverses the effect of the other one. Addition and subtraction are inverse operations. Multiplication and division are inverse operations.

Logical - Using an approach that is structured, logical, clear and organised to solve a given problem or calculation.

Manipulatives - Manipulatives are objects which are designed so that a learner can perceive some mathematical concept by manipulating them. The use of manipulatives provides a way for children to learn concepts in a developmentally appropriate, hands-on way.

Mental Methods - Using methods and strategies in your head to solve a given problem.

Multiple - When two numbers are multiplied together, the result is called a multiple.

Number bonds - A pair of numbers with a particular total e.g. number bonds to ten are all pairs of whole numbers with the total10.

Number sentence - A mathematical sentence involving numbers. For example: 3 + 6=9.

Number line - A line where numbers are represented by points up on it.

Partition - To split a number into component parts. For example: the two-digit number 38 can be partitioned into 30 + 8 or 19 +19.

Place Value - The value of a digit that relates to its position or place in a number. For example: in 1482 the digits represent 1 thousand, 4 hundreds, 8 tens and 2 ones respectively.

Product - The result of multiplying two or numbers together.

Remainders - What is ‘left over’ when one number cannot be exactly divided by another.