



Mathematics and Numeracy Calculation Policy. (Teaching guidance for class staff)

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Nominated Governor:

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Lead Governor: Quality and Outcomes Committee

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.

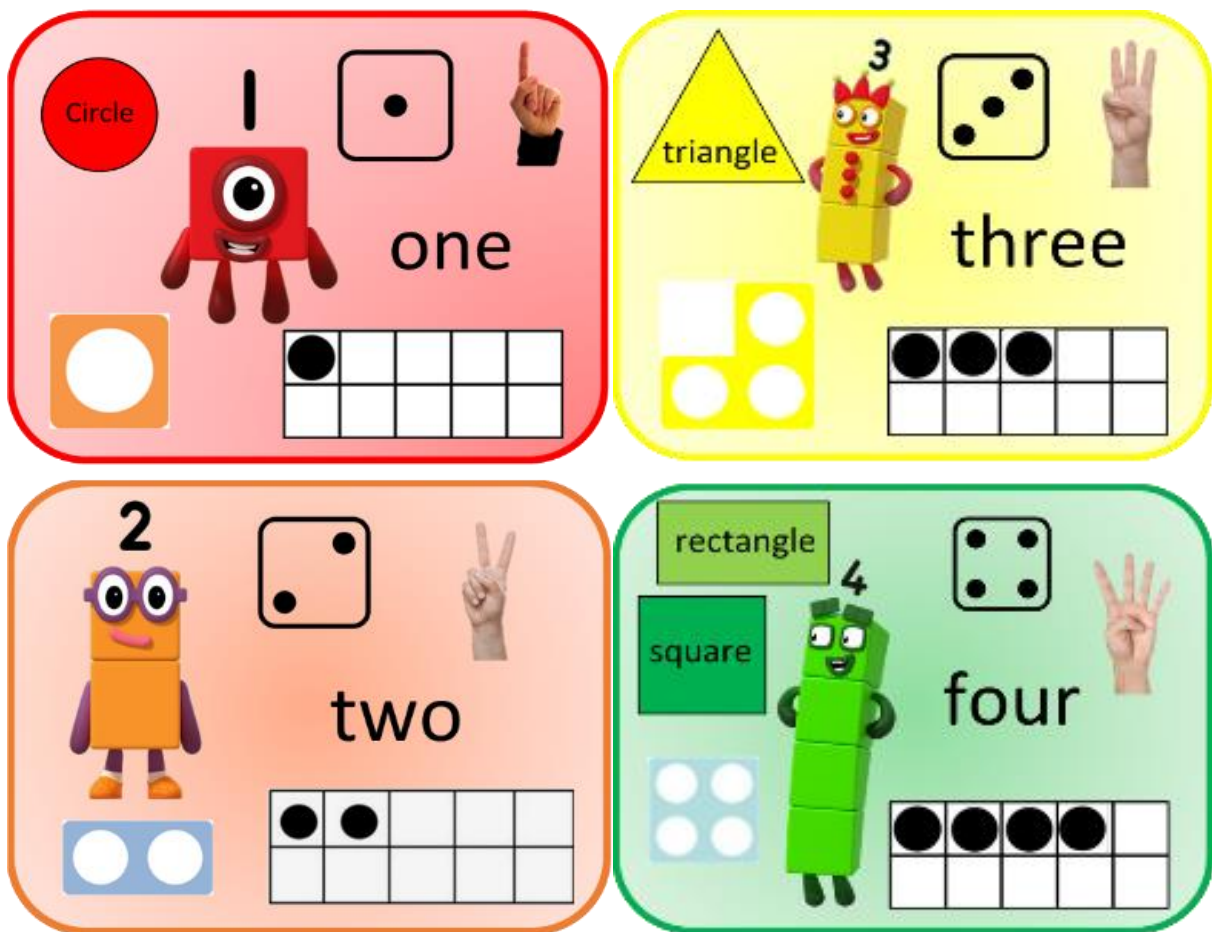
Early Mathematics

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 practice 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.



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 +




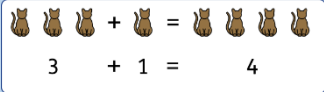




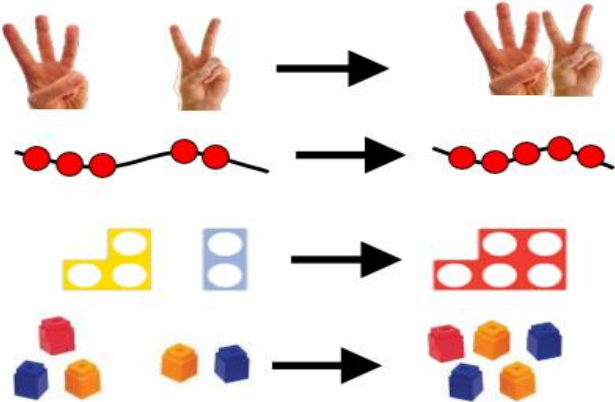
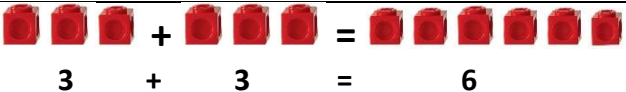
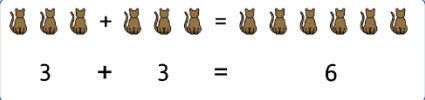
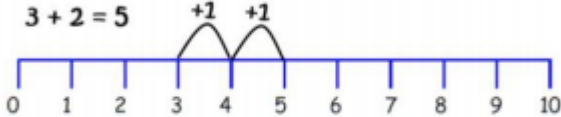
add
and
plus
sum

more than
addition
count on
total
increase

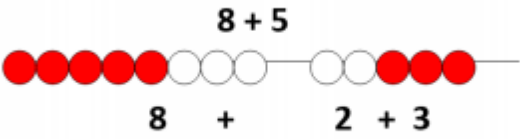
join
bigger
together
more

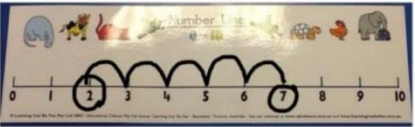

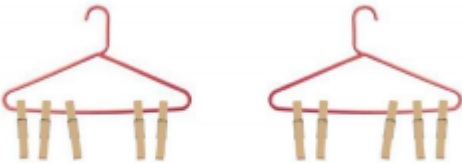


Stage 1

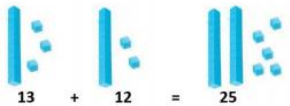
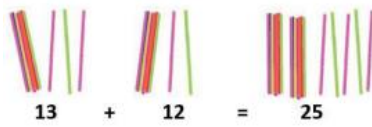
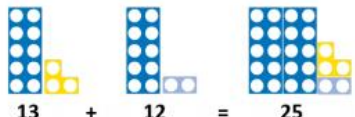

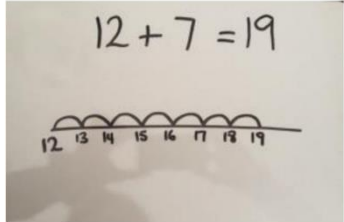

| Vocabulary - add, more, and, make, sum, total, altogether, score, double, one more, two more, ten more..., how many more to make... ?, how many more is... than...? | |
|--|---|
| Method | Example/Representation |
| Practical resources and real life objects <ul style="list-style-type: none"> - Adding sets of objects together - Finding one more - | <p>How many cubes are there?</p>  <p>What if I give you one more? How many now?</p>  |
| One More | |
| One more using Numicon and 10 Frames <ul style="list-style-type: none"> - Children to understand that one more than * will always be. - Children to be familiar with Numicon and 10 frames to support addition to 10. | <p>Can you add one more? What is the answer?</p>  |
| One More with the introduction of the + symbol using visuals to support. <ul style="list-style-type: none"> - Using one more with addition - Using numbers to support understanding. | <p>There are 3 cats and I find one more, how many are there altogether?</p>  |
| One more with number and pictorial support. | <p>How many cat's are there? Can you add one more?</p>  |
| One more with the introduction of full number sums. <ul style="list-style-type: none"> - Use of practical resources. | <p>Find me 3 cubes, add one more.</p> $3+1=4$ |
| Counting on from the larger number. <ul style="list-style-type: none"> - Children encouraged to count on from the bigger number | <p>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.</p> $1+3=4 \quad 4+1=4$ |

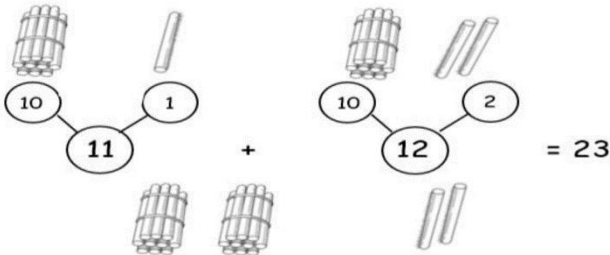
| | |
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| <ul style="list-style-type: none"> - Use of Numicon so children can start on the bigger number rather than counting from 0. <p>Children to continue this throughout their addition journey as the sums get larger.</p> |  |
| <p>Adding sets of objects</p> <ul style="list-style-type: none"> - Children to practise adding larger sets of numbers together with resources. - Number sums available to support if this will support the child. |  |
| <p>Introduction of number sums using practical resources/ real life objects</p> |  $3 + 3 = 6$ |
| <p>Number sums using visual representations</p> |  $3 + 3 = 6$ |
| <p>Introduction of number sums</p> | <p>3+4=7</p> |
| <p>Develop understanding of addition as counting along a number line.</p> |  |

Stage 2



| <p>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...?</p> | |
|--|--|
| Method | Example/Representation |
| <p>Using bead strings to count on through bridging to 10.</p> |  $8 + 5$ $8 + 2 + 3$ |

| | |
|--|---|
| <p>Using a prepared number line or track to solve simple addition sums.</p> | <p>$2 + 5 = 7$</p>  <p>$4 + 2 = 6$</p>  |
| <p>Understand that addition is commutative and can be done in any order. Support children to count on from the biggest number.</p> |  <p>$3 + 2 = 5$ or $2 + 3 = 5$</p> |
| <p>Developing knowledge and understanding of number bonds to 10.</p> |  <p>$7 + 3 = 10$ $6 + 4 = 10$ $9 + 1 = 10$</p> |
| <p>Vary position of missing numbers in a number sentence.</p> | <p>$2 + \square = 5$</p> <p>$\square + 4 = 7$</p> |
| <p>Counting on in jumps of one using a hundred square.</p> |  |

| | |
|---|--|
| <p>Addition of 2 digit numbers using practical resources.</p> | <p style="text-align: right;">Dienes' Apparatus</p>  <p style="text-align: center;">$13 + 12 = 25$</p> <p style="text-align: center;">Counting Straws</p>  <p style="text-align: center;">$13 + 12 = 25$</p> <p style="text-align: center;">Numicon</p>  <p style="text-align: center;">$13 + 12 = 25$</p> |
| <p>Counting on in 10 using jumps on a hundred square.</p> | <p style="text-align: center;">$32 + 26$</p>  |
| <p>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.</p> | <p style="text-align: center;">$12 + 7 = 19$</p>  |
| <p>Adding by partition numbers into tens and ones when adding two 2-digit numbers that lie within the tens boundary.</p> | <p style="text-align: center;">T O T O $26 + 32$</p>  <p style="text-align: center;">$50 + 8 = 58$</p> |

| | |
|--|---|
| |  $26 + 32 = 20 + 30 + 6 + 2 =$ |
|--|---|

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. | <div style="display: flex; justify-content: space-between;"> <div style="text-align: center;"> $\begin{array}{r} \text{T} \quad \text{U} \\ 40 \quad 5 \\ + 10 \quad 7 \\ \hline 50 + 12 \quad 62 \end{array}$ </div> <div style="text-align: center;"> Introduce practically, e.g.  </div> </div> |
| Progress to expanded written methods involving hundreds. | $ \begin{array}{r} \text{H} \quad \text{T} \quad \text{U} \\ 100 \quad 40 \quad 5 \\ + 100 \quad 20 \quad 7 \\ \hline 200 + 60 + 12 \quad 272 \end{array} $ |
| Reinforce understanding with use of arrow cards. |  |

Subtraction -


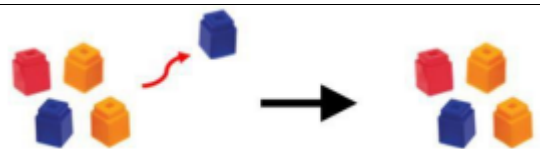


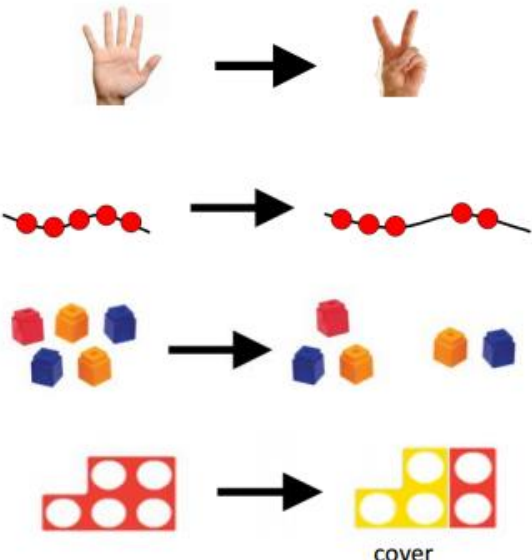

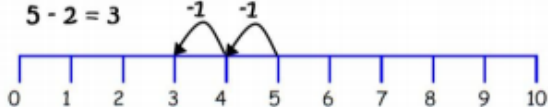
subtract
subtraction
take away
take

less
less than
minus
reduce



fewer
count back
difference
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 - takeaway from sets of objects |  <p>I had 5 dinosaurs and 2 moved out. How many have I got left?</p> |
| Find one less |  |

| | |
|--|---|
| <p>Takeaway using fingers and other practical resources.</p> |  |
| <p>Takeaway using pictorial support by crossing out.</p> |  $5 - 2 = 3$ |
| <p>Introduction of symbols to form number sums.</p> | $5 - 2 = 3$ |
| <p>Counting back on a number line.</p> |  $5 - 2 = 3$ |

Stage 2

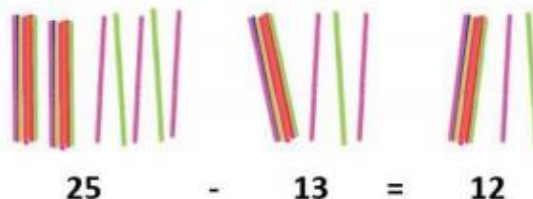
| <p>Vocabulary - subtract, take away, minus, leave, how many fewer is... than..?, how much less is..? half, halve, how many are left/left over?, how many are gone?, one less, two less, ten less..., how many fewer is... than...?, how much less is...? =, equals, sign, is the same as, count on, count back, difference between. How many more is...than..?, how much more is..?,</p> | |
|---|---|
| Method | Example/Representation |
| <p>Using bead strings to count back by bridging through 10.</p> | <p>$13 - 5$</p>  <p>$13 - 3 - 2$</p>  |

Counting back in jumps of 1 using a hundred square.

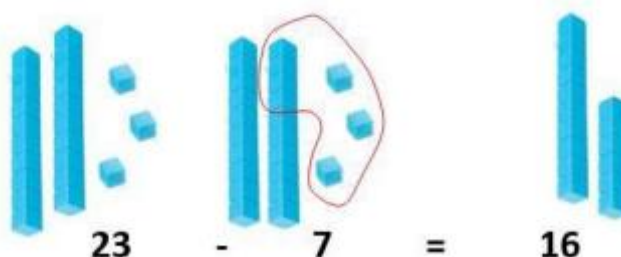


Subtraction of two digit numbers using practical resources.

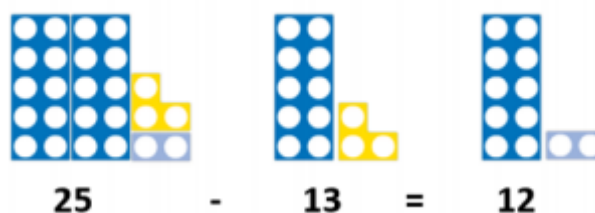
Counting Straws



Dienes' Apparatus



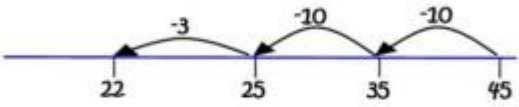
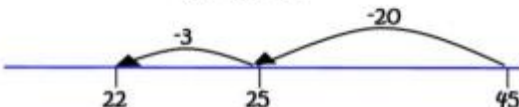
Numicon



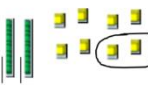

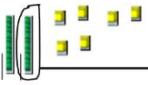


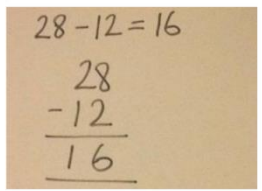



Counting backs in jumps of 10 using a hundred square.

58 - 26



| | |
|--|---|
| Using a numberline to count back, and find the difference. | <p>$45 - 23 = 22$</p>  <p>$45 - 23 = 22$</p>  |
|--|---|

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 collum method using Deines. | <div>   <div>Subtract ones first</div> </div> <div>   <div>Then subtract tens</div> </div> <div>  </div> <div> $28 - 12 = 16$  </div> <div> <p>$66 - 54$</p> <table> <tr> <td>T</td> <td>U</td> </tr> <tr> <td>60</td> <td>6</td> </tr> <tr> <td>- 50</td> <td>4</td> </tr> <tr> <td colspan="2"><hr/></td> </tr> <tr> <td>10+2</td> <td></td> </tr> </table> <p>$\rightarrow 12$</p> </div> <div> <p>Introduce practically, e.g</p> <p>66</p>  <p>take away 54</p>  <p>leaves</p>  </div> | T | U | 60 | 6 | - 50 | 4 | <hr/> | | 10+2 | |
| T | U | | | | | | | | | | |
| 60 | 6 | | | | | | | | | | |
| - 50 | 4 | | | | | | | | | | |
| <hr/> | | | | | | | | | | | |
| 10+2 | | | | | | | | | | | |

| | |
|--|---|
| Subtraction using expanded written method with exchange. | <p>81 - 57 ...recorded as</p> <div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;"> <p>T U</p> $\begin{array}{r} 80 \ 1 \\ - 50 \ 7 \\ \hline \end{array}$ <p>→ 70 11</p> </div> <div style="text-align: center;"> <p>T U</p> $\begin{array}{r} 70 \ 11 \\ - 50 \ 7 \\ \hline \end{array}$ <p>20+4 → 24</p> </div> <div style="text-align: center;"> <p>T U</p> $\begin{array}{r} 70 \ 80 \ 11 \\ - 50 \ 7 \\ \hline \end{array}$ <p>20+4 → 24</p> </div> </div> |
| Subtraction using compact written method. | <p>81 - 57</p> <div style="text-align: center;"> <p>T U</p> $\begin{array}{r} 7 \ 8 \ 11 \\ - 5 \ 7 \\ \hline 2 \ 4 \end{array}$ </div> |

Multiplication x






times
multiply
multiplication

lots of
repeated addition


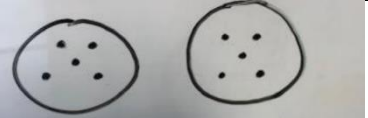
array
groups of
product

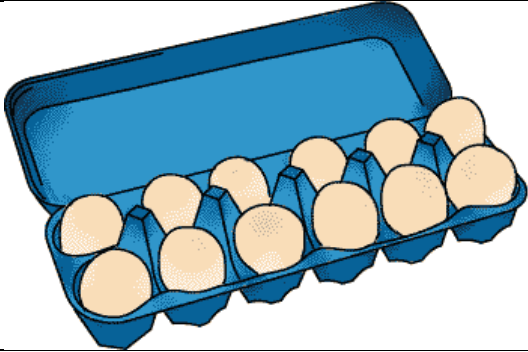
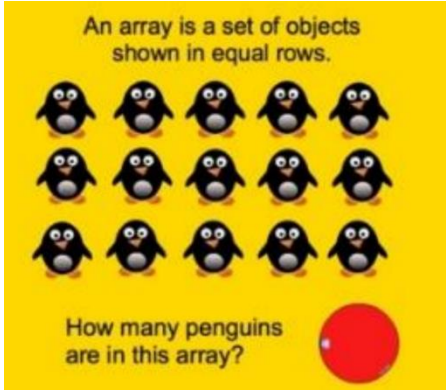
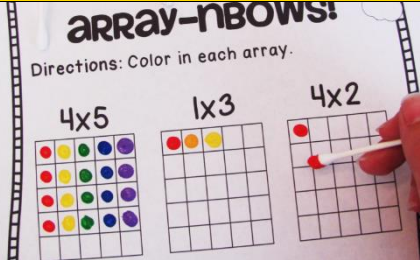


Stage 1

| Vocabulary - group, lots of, double | |
|-------------------------------------|---|
| Method | Example/Representation |
| Grouping objects into equal groups |  |

| | |
|--|---|
| Children to practise doubling a set of objects |  <p>Double 4 is 8</p> |
| Children to count in their 2's, 5's and 10's using a variety of methods, including a hundred square. | <p>Counting songs, use of fingers and clapping.</p>  |

Stage 2

| <p>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</p> | |
|---|---|
| Method | Example/Representation |
| Repeated addition using practical resources. | <p>$5+5+5=$</p>  <p>3×5 is the same as $5+5+5=$</p> |
| Multiplication through grouping |  <p>$5 \times 2 = 10$</p> <p>$5 + 5 = 10$</p> |
| Introducing arrays in a practical method. | <p>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?</p> |

| | |
|---|---|
| |  |
| Children to be introduced to pictorial arrays to support with layout and understanding. | $5+5+5 =$ $5 \times 3 =$  |
| Drawing/finger painting arrays (ensure that dots are placed in rows) |  |
| Ensure children understand the comutative property of multiplication | <p>3×5 and 5×3 are the same.</p> $3 \times 5 = 15$  $5 \times 3 = 15$  |

Stage 3

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.

| Method | Example/Representation |
|--------|------------------------|
|--------|------------------------|

| | |
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| Two figure doubling with practical resources. | <div><div><div>11</div><div>12</div><div>13</div><div>15</div><div>16</div><div>17</div><div>18</div><div>19</div><div>20</div></div><div>Choose a number card and then use the Numicon shapes to help double it.</div><div>Double <div>14</div> is 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|---|--|

Division ÷


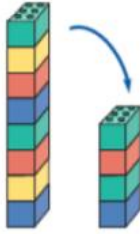
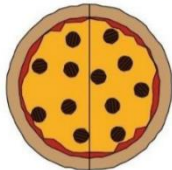
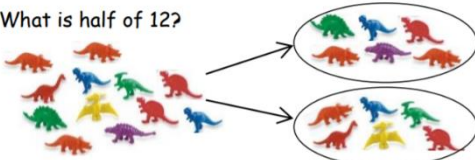


divide
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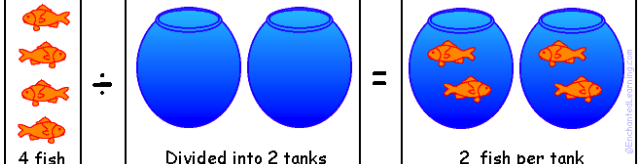
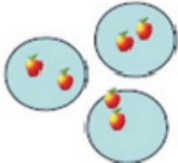

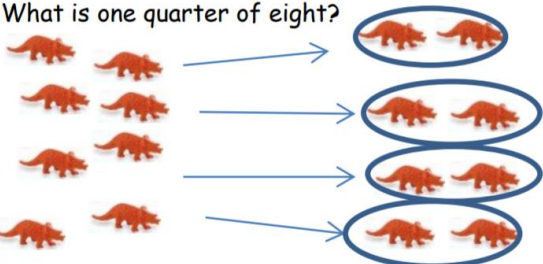

how many lots of
repeated subtraction
split

Stage 1

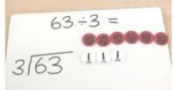
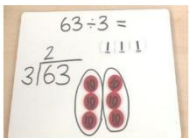
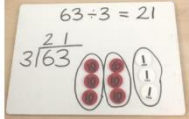
| Vocabulary - halve, half, share, share equally, groups, divide | |
|---|--|
| Method | Example/Representation |
| Introducing division through sharing into groups. |  |
| Problem solving through sharing and halving |  <p>What is half of 8? Half of 8 is 4</p> |
| Children to understand that half is to be shared into two equal groups. | <p>Can you cut the pizza in half?</p>  <p>What is half of 12?</p>  |

Stage 2

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

| | |
|---|---|
| <p>Sharing into 2 groups using the division \div symbol.</p> |  <p>4 fish \div Divided into 2 tanks = 2 fish per tank</p> |
| <p>Sharing into 3 groups practically or with pictorial representations.</p> | <p>Can you share 6 apples between 3 plates?</p>  |
| <p>Children to associate 'quartering' with division by 4.</p> | <p>Can you cut the pizza into quarters?</p>  <p>What is one quarter of eight?</p>  |
| <p>Arrays to support division.</p> | <p>$15 \div 3 = 5$</p>  |

Stage 3

| Method | Example/Representation |
|--|---|
| <p>Introduction of the bus stop method using place value counters or dienes.</p> | <div data-bbox="946 1493 1328 1581">  <p>Create the dividend using Place Value counters or dienes.</p> </div> <div data-bbox="946 1623 1344 1759">  <p>Group the tens counters according to the divisor and write the number of groups above the line in the tens column.</p> </div> <div data-bbox="946 1780 1344 1898">  <p>Group the ones counters according to the divisor and write the number of groups above the line in the ones column.</p> </div> |

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 total 10.

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.