

## Calculation Policy

This policy provides information on the methods, skills and concepts we teach the children in order to solve problems in the four operations. It is regularly reviewed through professional discussion from teachers.

## Mathematics Intent

Our maths curriculum aims to equip pupils with the knowledge, understanding, skills and methods needed to solve mathematical problems, help them understand the importance of maths in the world; develop their ability to reason mathematically and to nurture a sense of enjoyment and curiosity in the subject.

Through varied and frequent practice with increasingly complex problems over time, our curriculum supports pupils to become fluent in the fundamentals of mathematics, number sense, place value and the four operations, and allows pupils to make clear connections across the subject. This enables pupils to develop conceptual understanding and the ability to recall and apply knowledge rapidly and accurately.

Version Control

| Version | Date | Changes made / Comments | Changes made by |
| :--- | :--- | :--- | :--- |
| 1 | March 2020 | Original Policy | n/a |
| 2 | November 2022 | More information for each section | Josh Twyford |
|  | November 2022 | Monitor and review section added <br> Approved at Curriculum meeting 14.11.22 and circulated to all staff | Stephanie Croucher |


| Reception - Addition |  |  |  |
| :---: | :---: | :---: | :---: |
| Objective | Concrete | Pictorial | Abstract |
| 1:1 Correspondence, stable order and cardinality | Children are taught how to count accuratley and that the final amount counted is the total. These skills are embeded throughout the year and form the basis for more advanced learning. Children use a variety of resources and pictures to count and explore number. |  |  |
| Subitise <br> Before teaching addition in Reception we subitise 1-6 and ask the children to show amounts using their fingers on two hands. We teach the children simple addition facts using subitising and finger discrimination. <br> In the Summer term we begin to conceptually subitise using dice faces and Hungarian 10s frames. | Children use different size dice in their free play and are encouraged to subitise and explain 'how they know that it is 2 ?' "Because 2+2=4" Children have access to two sided counters and are challenged to create patterns that they can subitise. | Children match pictorial representations of amounts using 10 frames, dice faces, hands etc. Hungarian 10 frames are used with two sided counters and children are <br> encouraged to investigate different ways of making amounts linking to number bonds. | Children will match the numeral to an amount they can subitise. |
| Understand the one more and one less relationship between consecutive numbers | Children are taught to take 1 more and 1 away from a group objects. We teach the children to count them to check or subitise if they can then say it as a sentence and/or an equation, " 1 more than 4 is 5 " $4+1=5$. | Children create their own number lines to build their understanding of stable order principle. We teach the children how to find 1 more and 1 less using a number line. | If the children are ready we will teach them how to interpret and begin to write 1 more and 1 less problems as equations. $\begin{aligned} & 6+1=7 \\ & 7-1=6 \end{aligned}$ |


| Solve addition problems up to <br> 10. | Children are taught to combine two groups <br> and count them all to find the total. A <br> -Fingers <br> -Counting all objects of manipulatives are used. <br> -First, then, now stories <br> -Numberlines <br> -Manipulatives (numicon, <br> cubes, counters, bead strings, <br> rekenreks) <br> parts becoming a <br> whole and develop <br> children's <br> understanding of the <br> -10 frames <br> -Counting on of an equation <br> -Adding over 10 using 10 <br> frames and beginning to <br> make a 10 |
| :--- | :--- |
| equallying a total. |  |
| When the children are ready <br> we will teach them how to <br> count on rather than count <br> all. They keep the greater <br> number in their head then <br> count on the amount of the <br> second number. This is <br> supported by the methods <br> above. | Children are taught to add using bead <br> strings and rekenreks, beginning with oral <br> problems (I have 4 cakes, then get 3 more, <br> how many cakes do I have now?). Children <br> are taught to <br> create the first <br> amount, add on <br> the second then <br> count the total. |

## Children are taught the plus symbol and solve problems using pictorial

 representations.

Children solve addition problems using pictorial representations of 10s frames. They are taught to interpret the equation and corresponding image and check it is correct.


Children are taught how to interpret simple addition equations and solve them.

Children regularly take part in recall sessions using number bonds and mental recall is encouraged when solving number bond addition problems.

Whole part part models are used to highlight the two parts becoming one.


|  | Children use first, then, now stories alongside concretes so they can physically see the process of adding amounts together. <br> Children create their own number lines. They are taught to add two amounts using a numberline by finding the first amount or creating it with cubes, jumping forward the second amount and landing on their anwer. <br> Children are taught to add numbers that go over 10 using 10 frames and numicon so they can begin to create a 10 . | Having used cubes to support the number line, children are taught how to use a number line without <br> manipulatives. They find the first amount, count on the second and land on the answer. |  |
| :---: | :---: | :---: | :---: |


| Explore the composition of <br> numbers to 10 | Children explore the composition of <br> numbers to 10 using multilink cubes. They <br> watch Numberblocks then attempt to make <br> different combinations of cubes and say the <br> make up, " $3+1=4$ " etc. <br> Different colour counters are used to teach <br> children that an amount can be made up in <br> different ways. We link this to subitising. | Children investigate images of <br> different combinations of making <br> the same amount. | Children are shown number bond <br> equations and are taught how to <br> use a systematic approach to write <br> them themselves. |
| :--- | :--- | :--- | :--- |
| $0+5=5$ |  |  |  |
| $1+4=5$ |  |  |  |

## Year 1 - Addition

In Year 1 children build on the strategies taught in Reception. They also learn the strategies below. Mental methods are encouraged if the children are ready and teachers focus on ensuring the children are using the most efficient method.

| Objective | Concrete | Pictorial | Abstract |  |
| :---: | :---: | :---: | :---: | :---: |
| Combining 2 parts to make a whole Use a variety of resources e.g. shells, teddy bears, cars. Part-whole | Base 10 resources are introduced (10s and 1s) and children are taught how to add amounts of them together. Children are taught to count 10s first and ensure they do not count the 1 s as 10 and vice versa. |  | $4+3=7$ <br> Four is a part, 3 is a part and the whole is seven. <br> Children use whole part models to find missing parts/the total. These are linked to missing |  |
|  |  |  | $5+\square=$ | $12$ |


|  |  | Bar models are introduced and taught alongside whole part models to highlight two parts making the total. |  |
| :---: | :---: | :---: | :---: |
| Counting on <br> Children are taught to count on using their fingers, putting a number in their head, lines and dots number lines, bead strings and bar models. | Start with the larger number and count on 1 by 1 to find the answer | Bar models are used to encourage children to count on rather than count all. <br> Start at the larger number and count on in ones/jump of 10 then ones to <br> find the answer. <br> Children are taught that a line $=10$ and a dot=1. They are taught to draw amounts using lines and dots then use these to solve addition equations and problems. | The abstract number line: <br> What is 2 more than 4 ? <br> What is the total of 4 and 2 ? <br> $4+2=$ Place the larger number in your head and count on the smaller number |

## Regrouping to

 make 10Using a ten frames and counters/cubes or numicon.


Children begin to explore converting using base 10 resources. They focus on developing their place value knowledge in order to recognise when an equation goes over a 10.


Children to draw the tens frames and counters/cubes

$$
\begin{aligned}
& 6+\square=11 \\
& 6+5=5+\square \\
& 6+5=\square+4
\end{aligned}
$$

Children regularly review and revise number facts, especially number bonds for amounts to 10 . They are taught to move the equation round using what they know. They are taught that the = can move.

## Year 2 - Addition

Children in Year 2 continue to refine the methods taught in Reception and Year 1. They use the same models and visuals (whole part, bar models, lines and dots, 10 frames, Hungarian 10s frames). Teachers focus on ensuring the children are using the most efficient methods, with more emphasis being put on mental maths if possible. During the Summer term, if they are ready, the children begin to learn column method to prepare for Year 3.

| Objective | Concrete | Pictorial | Abstract |
| :---: | :---: | :---: | :---: |
| Adding 3 single digits | $4+7+6=17$ <br> Using concretes such as cubes, numicon etc. <br> Find 10 by adding $4+6=10$ then add 7 . |  | $\begin{aligned} \frac{4+7}{10}+6 & =10+7 \\ & =17 \end{aligned}$ <br> Combine the two numbers that make 10 and then add on the remainder. |




## Reception - Subtraction

Children are introduced to subtraction as the opposite of addition. In Reception the children use a variety of concretes to physically take items away, highlighting how to total is decreasing.

| Objective | Concrete | Pictorial | Abstract |
| :---: | :---: | :---: | :---: |
| Taking away ones | Physically taking away and away and removing objects from a whole (ten frames, Numicon, cubes and other items should be used) | シ囚O <br> Children will use drawings to visualise the equation then cross out to represent subtraction. | Children are introduced to the - symbol and shown simple equations. They are linked to known number facts and decomposition of numbers to 10 . |
| Counting back | Using number lines or number tracks children, children start with 6 and count back 2 . $6-2=4$ | Children to represent what they see pictorially e.g. |  |


| Part whole model |  | Use a pictorial representation of objects to show the part whole model. |  |
| :---: | :---: | :---: | :---: |
| Making 10 <br> Using a ten frame Children are taught to find a 10 by subtracting an amount. |  | This objective is only taught using concrete manipulatives unless pupils are ready to use a pictorial 10 frame where they draw their own pictures to represent amounts. |  |
| Year 1-Subtraction |  |  |  |
| Children in Year 1 continue to develop their understanding and skills when using base 10 resources, number lines, 10s frames and bead strings. They use whole part models and bar models to find missing numbers and use lines and dots to solve subtraction equations and problems. Children use their mental maths where possible and count backwards. |  |  |  |
| Objective | Concrete | Pictorial | Abstract |


| Taking away ones Taking objects away, crossing pictures out, counting backwards, fingers. | Creating a total then using manipulatives to physically take away and remove objects from a whole (ten frames, Numicon, cubes and other items should be used). | Children draw the concrete resources they are using and cross out the correct amount. The bar model can also be used. <br> Children are taught to use lines and dots to represent 10 s and 1 s . They cross these out to show the amount subtracted. | $4-3=$ =4-3 $\square$ |
| :---: | :---: | :---: | :---: |
| Counting back | Using number lines or number tracks children, children start with 6 and count back 2. | Children to represent what they see pictorially e.g. | Children to represent the calculation on a number line or number track and show the jumps. Encourage children to use an empty number line. |


|  |  |  |  |
| :---: | :---: | :---: | :---: |
|  |  |  |  |
| Find the difference Using cubes, Numicon and other objects | Calculate the difference between 8 and 5 . | Children to draw the cubes/concrete objects that they have used. Use the bar model to illustrate what they need to calculate. | Find the difference between 8 and 5 . $8-5$, the difference is ? <br> Hannah has 23 sandwiches. <br> Helen has 15 sandwiches. <br> Find the difference between the number of sandwiches. |
|  |  |  |  |


| Part whole model | Link to addition- use the part whole model to help explain the inverse between addition and subtraction. <br> If 10 is the whole and 6 is one of the parts. What is the other part? $10-6=$ | Use a pictorial representation of objects to show the part whole model. | 5 <br> 10 <br> Move to using numbers within the part whole model. |
| :---: | :---: | :---: | :---: |
| Making 10 <br> Using a ten frame |  | Children to present the ten frame pictorially and discuss what they did to make 10. | Children to show how thay can make 10 by partitioning. $\begin{aligned} & 14-4=10 \\ & 10-1=9 \end{aligned}$ |

## Year 2 - Subtraction



| Doubling | Use practical activites to show how to double a number. | Draw pictures to show how to double a number. <br> Teachers show the children simple double equations if they are ready. |
| :---: | :---: | :---: |
| Counting in multiples. <br> Use cubes, Numicon and other objects in the classroom. Only in 2's, 5's and 10 's. | Count in multiples supported by concrete objects in equal groups | Use a number line or pictures to continue support when counting in multiples of 2,5 and 10. |
| Year 1 - Multiplication |  |  |
| In Year 1 childlren are introduced to the $x$ symbol and equations. They focus on using concreate resources still and contiue to develop their understanding of equal groups. In addition they learn repeated addition and simple arrays. Children are taught what a multiple is and how to count in $2 \mathrm{~s}, 5 \mathrm{~s}$ and 10 s . |  |  |
| Objective | Concrete $\quad$ Pictorial | Abstract |

\begin{tabular}{|c|c|c|c|}
\hline Recognising and making equal groups. \& There are 3 equal groups, with 4 in each group. \& \begin{tabular}{l}
Children to represent the practical resources in a picture. \\
Children are taught what arrays are and how they can be made.
\end{tabular} \& \(4+4+4=12\) \\
\hline Doubling \& Use practical activites to show how to double a number. \& \begin{tabular}{l}
Double 4 is 8

$\square$
$\square$
$\square$
$\square$ <br>
Draw pictures to show how to double a number.
\end{tabular} \& Learn double facts and record as equations.

$$
\begin{aligned}
& 4+4=8 \\
& 3+3=6
\end{aligned}
$$ <br>

\hline
\end{tabular}



| Multiplication - Year 2 |  |  |  |
| :---: | :---: | :---: | :---: |
| Repeated grouping/ repeated addition | $\begin{aligned} & 3 \times 4 \\ & 4+4+4 \end{aligned}$ <br> There are 3 equal groups, with 4 in each group. <br> Number lines to show repeated groups $3 \times 4$ |  | $\begin{aligned} & 3 \times 4=12 \\ & 4+4+4=12 \end{aligned}$ <br> Abstract number line showing 3 groups of 4 $3 \times 4=12$ |
| Arrays showing commutative multiplication |  | 00 00000 Children to <br> represent <br> 00 00000 the arrays <br> 00  pictorially. <br> 00   <br> 00   | Children to be able to use an array to write a range of calculations e.g. $\begin{aligned} & 10=2 \times 5 \\ & 5 \times 2=10 \\ & 2+2+2+2+2=10 \\ & 10=5+5 \end{aligned}$ |
| Division- EYFS |  |  |  |
| In Reception children use practical problems and situations to equally share an amount into equal groups. They are taught to use 1 for you, 1 for you to accurately share. When ready the children are taught to use circles and dots to represent sharing. |  |  |  |
|  | Concrete |  | Pictorial |


| Sharing objects into groups. | Sharing using a range of objects. | Represent the sharing pictorially. |
| :---: | :---: | :---: |
| Division as grouping | Divide quantities into equal groups. Use cubes, counters and other objects. | This objective is only taught using concrete manipulatives unless pupils are ready. |
| Division- Year 1 |  |  |
| In Year 1 child and solve divis | continue to share using concretes. Children are taught the circle and equations using objects, lines and dots and counting in multiples w | t method. They are introduced to the division symbol and record ready. |


| Sharing objects into groups. | Sharing using a range of objects | Children use pictorials to represent equal groups. They are taught how to use circles and dots to solve division problems. | 3 3 <br> Children use bar models to show equal groups of a number. <br> Children are taught to intrepret and solve divison equations. |
| :---: | :---: | :---: | :---: |
| Division as grouping | Divide quantities into equal groups. Use cubes, counters and other objects. | Teachers use a number line to highlight equal groups. | I have 12 toys and I put them into groups of <br> 3. How many groups? $6 \div 2=$ <br> Children who are ready are taught to count in multiples, lifting a finger each time they say a multiple. |

In Year 2 children continue to refine their methods of solving division problems and equations. Circles and dots continue to be taught alongside counting in multiples. Children learn how to solve division problems that involve remainders using concretes such as sticks/cubes.

| Division as grouping | Divide quantities into equal groups. Use cubes, counters, objects or place value counters to aid understanding. <br>  | Use a number line to show jumps in groups. <br> 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 in each group. | $28 \div 7=4$ <br> Divide 28 into 7 equal groups. How many are in each group? |
| :---: | :---: | :---: | :---: |
| Division linked to arrays Counting in multiples | Link division to multiplication by creating an array and thinking about the number sentences that can be created. E.g. $15 \div 3=5,15 \div 5=3,5 \times 3=15,3 \times 5=15$ |  | Find the inverse of multiplication and division sentences by creating 4 linking number sentences. $\begin{aligned} & 2 \times 5=10 \\ & 5 \times 2=10 \\ & 10 \div 5=2 \\ & 10 \div 2=5 \end{aligned}$ <br> Children are taught to use their multiplication knowledge and count in multiples to solve division problems/equations. |


|  |  |  | $10 \div 2=2,4,6,8,10-$ Lifting a finger each time they say an amount. |
| :---: | :---: | :---: | :---: |
| Repeated subtraction | $6 \div 2=3$ | Children are taught to use number lines to represent repeated subtraction. | Abstract number line to represent the equal groups that have been subtracted. |
| Division with a remainder 2 digit $\div 1$ digit | $13 \div 4=$ <br> Use of lollipop sticks to form wholes- squares are made because we are dividing by 4 . $\square$ $\square$ $\square$ <br> There are 3 whole squares, with 1 left over. | Children are taught to use drawings to represent objects. They | $13 \div 4=3$ remainder 1 <br> Children are taught to use their timestable facts and can also represent this on a numberline. |

## Monitoring and review

This policy is monitored by the governing body, and will be reviewed in three years, or earlier if necessary.

Signed: $\qquad$ Date: $\qquad$

Print Name: $\qquad$

