

# *Newton Hall Infants' School*



## *Mathematics Policy*

*2023 – 2024*

*Maths Lead – Mr Robson*

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*"Mathematics is, in its way, the poetry of logical ideas" Albert Einstein.*

*At Newton Hall Infants' School, we believe that the teaching of mathematics should equip children with the strategies, knowledge and mathematical language to help them to understand and make sense of the world around them.*

*Mathematics is integral in everyday life and with this in mind we endeavour to ensure that our children develop a healthy and enthusiastic attitude towards mathematics, which will stay with them and make them confident lifelong learners.*

*Mathematics is a whole network of concepts and relationships, which children learn to use to and communicate to tackle a range of practical tasks and real life problems. Our aim is that all of our children become **independent learners**, who can apply logical reasoning, problem solving skills and the ability to think in abstract ways. Mathematics teaching and learning at Newton Hall Infant School, is not confined to 'Maths lessons', instead links are established across a range of subject areas to support the understanding that Maths is real!*

### *Curriculum Intent, Implementation, and Impact*

*Our approach to the curriculum in mathematics is based upon a mastery curriculum which is language rich, involving lots of practical learning experiences. We believe that children learn best if they are exposed to new concepts with hands on practise and immersion in new technical vocabulary. Our children are taught mathematical knowledge through the support of concrete resources and pictorial representations, before moving on to a more abstract approach. We ensure that they have a firm grasp of the four key calculations, (addition, subtraction, division and multiplication), so that by Year 2 children are confident with abstract learning and problem solving. We use the CPA (concrete, pictorial, abstract) approach in our teaching of Mathematics.*

#### **Concrete**

*Children use practical equipment e.g. Numicon, double sided counters, Base 10 to gain a solid understanding of mathematical concepts, making links with new learning and developing analytical thinking for problem solving. Across school every new concept in mathematics is taught practically and in real contexts first, to support understanding and deepen learning.*

**Pictorial**

When children are ready they replace concrete apparatus with a pictorial representation – essentially a drawing or picture which still provides them with a support to access their learning. This is sometimes used directly alongside the concrete resources to aid understanding.

**Abstract**

Once children really understand the concept, they can then move into the abstract – using numbers and symbols and formal written methods, as well as developing their mental recall.

At the point in which children are secure with their fluency in areas of the mathematics curriculum – their thinking is challenged and extended through open ended, high order questioning and problem solving activities, as well as variation in how problems and questions are presented.

**How is the content / theme chosen?**

The content is chosen to ensure coverage of the knowledge, skills and expectations, as set out in the National Curriculum programmes of study, as well as the EYFS framework. Content may be linked to teaching and learning in other subject areas, such as Science. The content may be adapted or changed, based upon the needs of specific cohorts.

**How do we ensure progression of knowledge and skills?**

At Newton Hall Infants School, we have in place tracking documents to ensure children make progress and identify those who may need additional support. Skills are progressive and reference to the Ready to progress criteria ensures skills are mastered before moving on. We use the White Rose Education Maths scheme, to ensure that key learning and understanding has taken place by the end of a specific year group, ensuring children are then ready to extend and deepen their knowledge in subsequent years.

**How is the subject taught?**

In Key Stage 1, the school follows a mastery approach using the White Rose Education Maths scheme. Activities and resources are also used from Primary Stars/NCETM to supplement this where necessary. Planning is reactive, identifying gaps in learning is essential and teachers use their professional judgement to adapt planning, as and when gaps in learning become evident. The importance of mastering basic skills has been a priority for us and will

continue to be. Teachers use resources which best meets the needs of the children.

Within each daily lesson or weekly overview, class teachers carefully plan the specific outcomes for their year group, based upon age appropriate knowledge and skills, as well as the needs of the cohort or individuals within it. There is a strong focus on basic skills and knowledge acquisition during lessons.

Each lesson begins with a recap of prior learning using Flashback 4. Key mathematical vocabulary is then reinforced or introduced as a further opportunity to ensure that children have learnt and remembered what has previously been taught.

Questioning is used to check their understanding, prior knowledge and address key misconceptions, before new concepts or skills are introduced.

Modelling is used by class teachers to clarify expectations, children are then given plentiful opportunities to consolidate, build upon and apply basic skills in through fluency practise (including variation of questions and activities). The teacher skilfully removes any scaffolds, which have supported the children's initial understanding, when they are ready, before ensuring time for independent practise.

Children are taught how to reason and this becomes an expectation throughout their mathematics learning. Problem solving opportunities are interwoven throughout mathematics lessons, as well as other daily opportunities, so that children can apply the knowledge and skills that they have learnt.

Across schools Maths working walls are used for children to refer back to, to support them and build independence. These walls change throughout the year to coincide with the units that have been taught. These walls may show/demonstrate correct methods, examples of children's work, vocabulary as well as other mathematical aids.

## *How do we know that our children are making progress?*

Ongoing assessments of the children's knowledge and skills are observed daily by the class teacher. Misconceptions are addressed and next steps carefully planned. Children's outcomes are compared to the subject specific skills and knowledge documents, as well as the year group expectations from the National Curriculum or EYFS Framework. Children will complete an end of unit assessments from WRM to help staff assess and pinpoint areas for further teaching or intervention. Senior leaders and subject leaders gather an overview of children's learning and outcomes through monitoring activities. Regular assessments are collated for children in EYFS and Key Stage 1 which are used to plan appropriate next steps for their future learning, as well as provide an overview of learning within a subject area across the whole school. Progress is monitored closely by subject leaders and senior management.

## *Impact of our Mathematics Teaching*

Our mathematics curriculum has a clear impact on pupils independence, resilience and problem solving skills. Pupils are confident to try new learning. As a result of this, outcomes at the end of EYFS and KS1 remain above National for all groups of learners and there is a positive impact on progress through each phase. Pupils talk about maths positively and look forward to their maths lessons.

### *Impact*

By the end of Key Stage One most children:

### *Number*

- Count in steps of 2, 3, and 5 from 0, and in tens from any number, forward and backward
- Recognise the place value of each digit in two-digit numbers
- Have fluency in addition and subtraction facts within 10, through continued practice and can add and subtract across 10.
- Add and subtract within 100 by applying related one-digit addition and subtraction facts: add and subtract only ones or only tens to/from a two-digit number.
- Solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts.

- Recognise, find, name and write fractions,  $\frac{1}{3}$ ,  $\frac{1}{4}$ ,  $\frac{2}{4}$ ,  $\frac{3}{4}$  of a length, shape, set of objects or quantity and recognise the equivalence of  $\frac{2}{4}$  and  $\frac{1}{2}$  and write simple fractions for example,  $\frac{1}{2}$  of 6 = 3

### Measure

- Choose and use appropriate standard units to estimate and measure length/height in any direction (m/cm); mass (kg/g); temperature ( $^{\circ}\text{C}$ ); capacity (litres/ml) to the nearest appropriate unit, using rulers, scales, thermometers and measuring vessels
- Compare and order lengths, mass, volume/capacity and record the results using  $>$ ,  $<$  and  $=$
- Recognise and use symbols for pounds (£) and pence (p); combine amounts to make a particular value and find different combinations of coins that equal the same amounts of money
- Solve simple problems in a practical context involving addition and subtraction of money of the same unit, including giving change
- Compare and sequence intervals of time, tell and write the time to five minutes, including quarter past/to the hour and draw the hands on a clock face to show these times
- Know the number of minutes in an hour and the number of hours in a day

### Geometry

- Identify and describe the properties of 2-D shapes, including the number of sides and line symmetry in a vertical line
- Recognise and name common 3-D shapes, identifying 2-D shapes on the surface of 3-D shapes, [for example, a circle on a cylinder and a triangle on a pyramid]
- Compare and sort common 3-D shapes and everyday objects
- Order and arrange combinations of mathematical objects in patterns and sequences
- Use mathematical vocabulary to describe position, direction and movement, including movement in a straight line and rotation as a turn and in terms of right angles for quarter, half and three-quarter turns (clockwise and anticlockwise)

### Statistics

- Interpret and construct simple pictograms, tally charts, block diagrams and simple tables
- Ask and answer simple questions by counting the number of objects in each category and sorting the categories by quantity

## EYFS

There is strong subject knowledge in EYFS, where children spend time exploring, acquiring, and reinforcing the basic concepts, before being offered challenging opportunities to work beyond the early learning goals. Our intent for mathematics in the Early Years is that children have a deep understanding of the number system, first to 5 and then to 10 in order to prepare them for Key Stage 1. Children in EYFS follow the White Rose Education Maths Scheme and supplement when the teacher feels is appropriate for their children.

Children in EYFS learn how to subitise and build the foundations to progress into a mastery curriculum. They learn about a range of representations and there is a strong focus on mathematical language development.

The EYFS curriculum moves from practical concrete opportunities into pictorial and abstract calculations when children are ready for this. Children are exposed early on to key concepts such as place value and number bonds, so that they have a good basis from which to work from in Key Stage 1.

Maths is taught daily as part of a focus, discrete teaching activity in EYFS. Children are then provided with learning activities based upon this teaching, so that they can refine and develop their knowledge and start to apply their skills. In addition to this, opportunities for mathematics teaching and learning are developed through the routines of the school day, e.g. counting how many children are here today.

Mathematics challenges, as well as opportunities to apply skills and embed knowledge, are carefully planned for through the areas of provision in both the indoor and outdoor learning environments.

Children leaving Reception will be familiar with number bonds to 10.

We have chosen number bonds that our children should be confident with when leaving Reception.

$$0+10 = 10$$

$$1+9 = 10$$

$$2+8 = 10$$

$$5+5 = 10$$

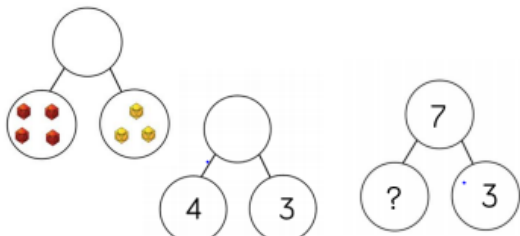

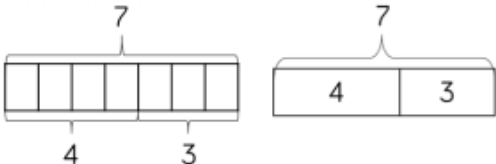

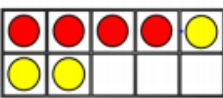




## Addition and Subtraction

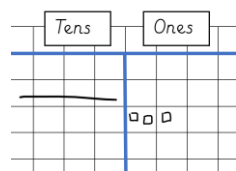
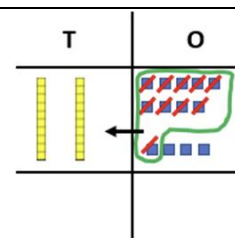
### Year 1

#### *Skills:*

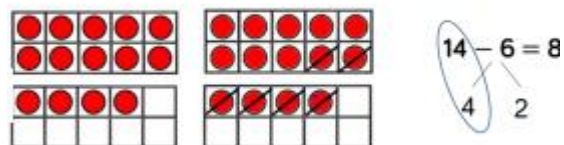
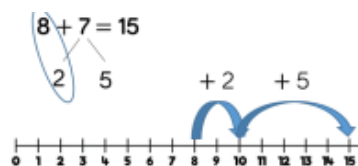
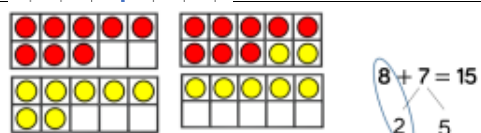
- *Add and subtract 1-digit numbers within 10*
- *Add and subtract 1 and 2-digit numbers to 20*

<p>Part-whole model to develop the concept of finding the total (aggregation) for addition and partitioning for subtraction.</p>	
<p>Creating a bar model using equipment (cubes and counters) to develop the concept of aggregation for addition and finding the difference for subtraction.</p>	
<p>Pictorial representation of a bar model to develop the concept of aggregation for addition and reduction (less than) for subtraction.</p>	
<p>Numicon are used to develop the concept of augmentation (more than) for addition and partitioning for subtraction.</p>	
<p>Ten frames are used to develop the concept of augmentation for addition and partitioning for subtraction.</p>	
<p>Bead strings are used to develop the concept of augmentation for addition and reduction for subtraction.</p>	
<p>Number tracks are used to develop the concept of augmentation for addition and reduction for subtraction.</p>	

When adding or subtracting one-digit numbers that cross 10, it is important to highlight the importance of ten ones equalling one ten. Different concrete manipulatives (such as Base 10) will be used to represent this exchange. When children draw base 10 they should draw a long horizontal line for a 10 and a small square for a 1.



As children's understanding progresses, they will be taught to partition their jump using concrete resources alongside number lines. Children should be encouraged to find the number bond to 10 when partitioning the subtracted number. Ten frames, Numicon and number lines are particularly useful for this.

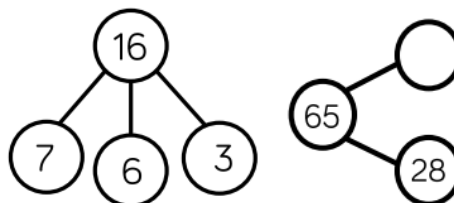


## Year 2

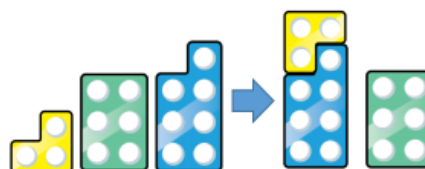
### Skills:

- Add and subtract 1 and 2-digit numbers to 20
- Add three 1-digit numbers
- Add and subtract 1-digit and 2-digit numbers to 100
- Add two 2-digit numbers to 100

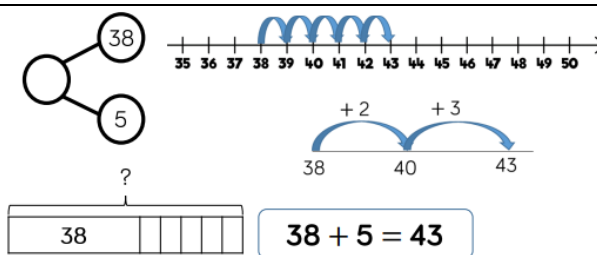
Part-whole models will continue to be used to develop understanding of addition and subtraction. Children will be encouraged to look for number bonds to 10 or doubles to add numbers more efficiently.



Concrete manipulatives will be used to highlight number bonds to 10 are effective when adding three 1-digit numbers.

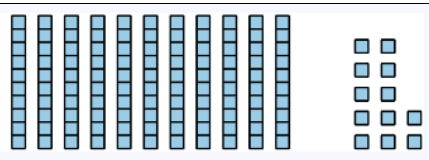


When adding single digits to a 2-digit number, children will be encouraged to count on from the larger number.



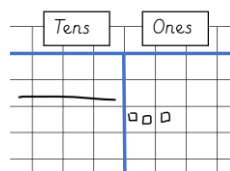
When subtracting, children will be encouraged to use a blank number line and count on from the smaller number to find the difference. They will be encouraged to jump in multiples of 10 to become more efficient.

Children will be taught to apply their knowledge of number bonds to 10 to add more efficiently e.g:  $7 + 5 = 12$  so  $37 + 5 = 42$ . Hundred squares and concrete manipulatives such as Base 10 will be used to develop this concept.



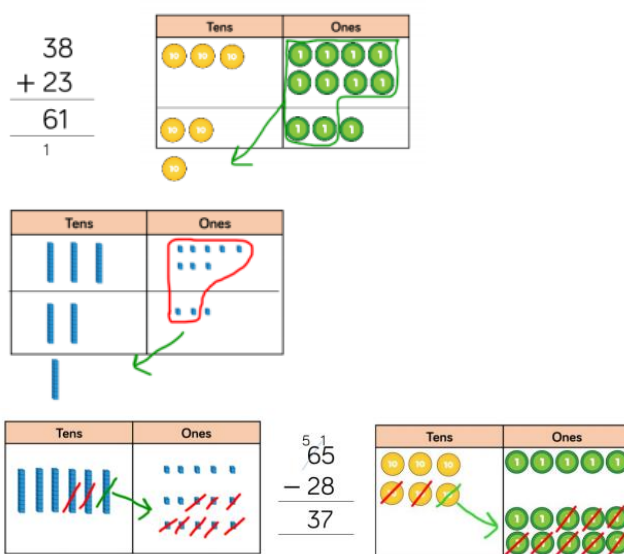
1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

When children draw base 10 they should draw a long horizontal line for a 10 and a small square for a 1.

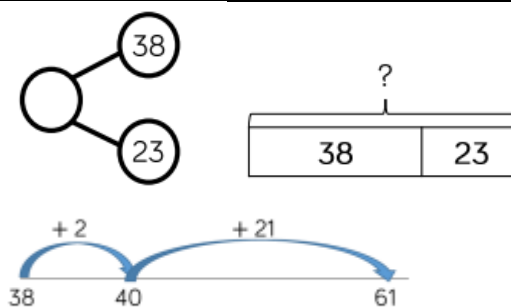


Children will be encouraged to use the formal written method of column addition when calculating alongside base 10, or place value counters. When regrouping (carrying digits to the next place value column) digits should be written below the line.

Children will be encouraged to use the formal written method of column subtraction when calculating alongside straws, base 10 or place value counters.



Part-whole models, number lines, and bar models will continue to be used as pictorial representations. Children will be encouraged to use their knowledge of number bonds to 10, and jump in multiples of ten to become more efficient.



## Multiplication and Division

*Times Tables Progression:*

### **Year 2**

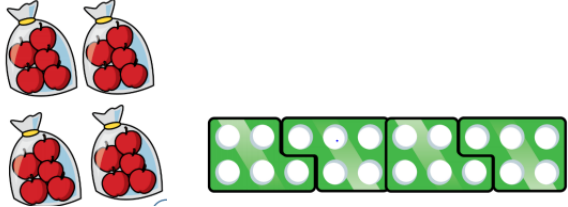
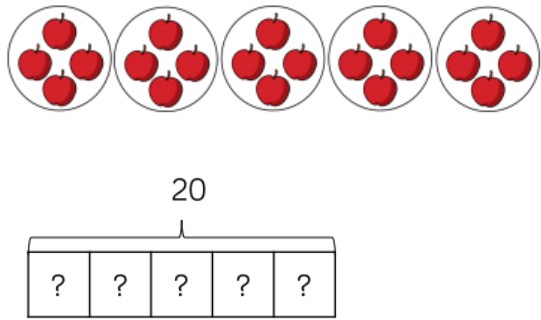
- *2 times table*
- *5 times table*
- *10 times table*

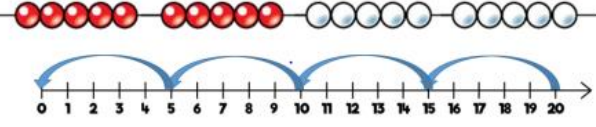
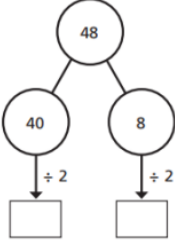
Encourage daily counting in multiples both forwards and backwards. This can be supported using a number line or a hundred square. Look for patterns using concrete manipulatives to support. Children should learn multiplication and division facts for each times table.

### Year 1 and 2

*Skills:*

- *Solve 1-step problems using multiplication*
- *Solve 1-step problems using sharing (division)*
- *Solve 1-step problems using grouping (division)*
- *Divide 2-digits by 1-digit*

<p>Children represent multiplication as repeated addition in many different ways. In Year 1 children are NOT expected to record multiplication formally – they use concrete and pictorial representations to solve problems. In Year 2 children are introduced to the multiplication symbol.</p>	 <p> <math>5 + 5 + 5 + 5 = 20</math>  <math>4 \times 5 = 20</math>  <math>5 \times 4 = 20</math> </p>
<p>Children solve problems by sharing amount into equal groups. In Year 1, children are NOT expected to record division formally – they will use concrete and pictorial representations to solve problems.</p>	 <p> <math>20</math>  <math>\overline{) \quad ? \quad ? \quad ? \quad ? \quad ?}</math> </p>

<p>In Year 2, children are introduced to the division symbol.</p>	$20 \div 5 = 4$						
<p>Children solve problems by grouping and counting the number of groups. Grouping encourages children to count in multiples and links repeated subtracting on a number line.</p>							
<p>When dividing larger numbers, children can use manipulatives that allow them to partition into tens and ones. Part-whole models can provide children with a clear written method that matches the concrete representation.</p>	<table border="1" data-bbox="790 586 1157 734"> <thead> <tr> <th>Tens</th> <th>Ones</th> </tr> </thead> <tbody> <tr> <td>10 10</td> <td>1 1 1 1</td> </tr> <tr> <td>10 10</td> <td>1 1 1 1</td> </tr> </tbody> </table> <div style="text-align: center; margin-top: 20px;">  </div> <div style="text-align: center; margin-top: 20px;"> <math display="block">48 \div 2 = 24</math> </div>	Tens	Ones	10 10	1 1 1 1	10 10	1 1 1 1
Tens	Ones						
10 10	1 1 1 1						
10 10	1 1 1 1						

### Fluency Bee

Children have fluency sessions across the week, further to their Maths lessons. We use the Fluency Bee Scheme across school to teach our fluency sessions. Each session has a number focus and a corresponding PowerPoint. Sheets are available for each session if the teacher feels they are appropriate, these can also be used for intervention. We find that the practical learning during fluency sessions is more beneficial and can initiate some great conversations amongst the children and staff. Enabling staff to ask quality questions to further the children's knowledge.

Fluency sessions are important so that our children can be confident with numbers by using varied and regular practice. It helps them develop a strong number sense and frequently use a range of skills.

### Enabling and Adapting the Maths Curriculum

At Newton Hall Infants' we are able to support all pupils, including SEND and less experienced learners in the Maths curriculum on a personalised approach that can include:

- ✓ Pre – teaching of topic vocabulary
- ✓ Preferred method of communication used
- ✓ Pre-teaching of specific concepts
- ✓ Focus on oracy – well managed environmental background noise.
- ✓ Visual prompts and organisers
- ✓ Sentence stems
- ✓ Building on prior knowledge
- ✓ Breaking learning down into small steps
- ✓ CPA (concrete, pictorial abstract) approach
- ✓ Use of maths manipulatives
- ✓ Task chunking
- ✓ Rehearsing fluency - Daily Fluency Bee Lessons
- ✓ Drawing of word problems
- ✓ Modelled 'thinking out loud' to scaffold problem solving
- ✓ Adult scaffolding to further break down tasks and learning into smaller steps.
- ✓ Active Maths – use of Maths of the Day
- ✓ Worked examples to use as a model
- ✓ Scaffolded recording e.g use of scribe or writing frames/worksheets
- ✓ Adaptations to resources e.g enlarged diagrams/additional labelling
- ✓ Use of real life references to make content less abstract – supported by pictorial/video resources.
- ✓ Practical learning experiences
- ✓ Mixed ability peer pairings/groupings/flexible groupings
- ✓ Multi sensory approaches – songs/games
- ✓ Overlearning of key concepts.
- ✓ Use of concept development model to identify gaps in prior knowledge
- ✓ WRM assessment