

Maths Intent, Implementation and Impact

Maths Intent (the What) and Implementation (the How):

How we ensure an ambitious Maths curriculum – a mastery curriculum:

Our Maths teaching is underpinned by the belief that all children need **a deep understanding of the mathematics they are learning**. This is what we mean by Mastery. There is one set of Mathematical concepts for all. We ensure all pupils have access to these concepts and the rich connections between them. Mastery is, therefore, the aim for all children, hence we have an ambitious Maths curriculum for all.

Mastery is a continuum. We believe mastery is only going to be achieved when **more time is spent on key concepts** that are revisited and reviewed. This allows for the development of depth and sufficient practice to embed learning. Devoting time to key concepts enables us to:

- Represent concepts in lots of different ways (multiple representations).
- Teach the processes, then allow the children to apply their knowledge, increasingly rapidly and accurately. (Following a process / procedure won't enable mastery; applying a process will!)
- Commit key facts to children's long term memory.

Therefore, at an age appropriate level, we expect the vast majority of our children to be able to:

- **Use mathematical concepts, facts and procedures appropriately, flexibly and fluently**
- **Have a sufficient depth of knowledge and understanding to reason and explain mathematical concepts and procedures and use them to solve a variety of problems.**
- **Recall key number facts e.g. number bonds and times tables with speed and accuracy and use them to calculate and work out unknown facts.**

How we ensure challenge

We ensure that the majority of pupils will move through the curriculum at broadly the same pace. However, based on good AfL, our teachers make decisions about when to progress children, based on the security of pupils' understanding and their readiness to progress to the next stage. This does not mean that 'we hold children back' and that all children access the same questions and same activities all of the time. Pupils who grasp concepts rapidly are challenged by 'going deeper', being offered rich and more sophisticated problems before any acceleration through new content. Differentiation still takes place although it will often be through the same concept, posing different questions and problems for 'rapid graspers' to extend their thinking. Mastery strategies such as 'Prove it; What's the same? What's different?; True or False and the Spot the Mistake are used. 'Deepening' through differentiation is important in all year groups but of paramount importance in our mixed age classes. Those who are not sufficiently fluent with earlier material, consolidate their understanding, including through additional practice, before moving on. A ceiling is not put on children's learning and flexible grouping is adopted based on pre-assessments.

How we ensure a well sequenced, progressive curriculum

We teach the National Curriculum 2014. Pupils gain understanding of the mathematics relevant to their year group so that it is built upon in subsequent years.

- Our **high level long term map** for Maths outlines in year groups / mixed age classes when mathematical knowledge, in units of work, will be taught and revisited. This is the basis for our well sequenced and progressive curriculum.
- Our **Calculation policies** outline in more detail which concepts and procedures / strategies will be introduced and then developed.
- Our **weekly planning** is based on White Rose Maths which is tailored to the needs of our children. We use many concrete resources throughout the school to ensure children are exposed to multiple representations of a concept. This is part of our CPA (Concrete, Pictorial and Abstract) approach.

Whilst we teach Maths in progressive distinct domains (units of work) we recognise that Maths is an interconnected subject. Therefore, we encourage children to make connections across mathematical ideas to develop fluency, mathematical reasoning and competence in solving increasingly sophisticated problems. Children also apply their mathematical knowledge across the curriculum, and particularly in Science, where relevant.

We regard talk in Maths as important and introduce mathematical vocabulary in an age appropriate way. We encourage children to verbalise their thinking; our teachers ensure that pupils build secure foundations by using discussion to probe and remedy their misconceptions.

We make time to teach Maths:

Children in EYFS and Year 1 there are 4 Maths inputs a week and this is supplemented by continuous provision throughout the week.

Children in Year 2 and KS2 have a daily Maths session lasting for 50 mins to 1 hour.

If children are not reaching the expectations outlined below we intervene quickly by giving extra support. We give catch up support by small group interventions, pre-teach and post teach. The content of these sessions is determined by on-going gap analyses and our in depth knowledge of each child. These sessions are additional to our daily Maths sessions.

In addition, Year 2 and KS2 have daily retrieval sessions focussing on current teaching, previous teaching and the recall of identified key facts. Year 1 will complete this on alternative weeks with EYFS accessing this learning through continuous provision. The Maths Facts are progressive, specific facts which are non-negotiables that every child should know by the end of each year group. These sessions ensure daily review of facts and concepts, and also ensure mathematical declarative and procedural knowledge is secure in the long term memory.

In KS2 we use a baseline assessment each half term to check children's knowledge of multiplication facts. We practice 3 times a week to ensure instant recall is being developed, and aim for all children to know the facts to 12 x 12 by the end of Year 4. We also engage children in practice on TTRockstars and Hit the Button – running inter-class battles and taking part in inter-school competitions. We also assess the children's knowledge in Year 4 by replicating the MTC half termly.

We build a skilled team who can teach Maths:

Every member of our teaching staff continues to access PDET training by our Maths Consultant on each domain in the Maths curriculum. This has focussed on Maths subject knowledge and pedagogical subject knowledge. Our Maths Subject Leader has also accessed PDET CPD. We have carried out in-house CPD sessions based on the modelling and expectations for retrieval.

Leaders in our academy prioritise the teaching of Maths. Maths is identified as a key priority on our Academy Improvement Plan. Leaders monitor the provision of Maths through learning walks in Maths sessions, planning and book scrutinies and the impact of this provision through the analysis of (i) end

of year cohort data (end of KS1 and 2 Maths) and (ii) individual pupil attainment and progress throughout the year (on going assessments).

Early Maths (Implementation and Impact):

EYFS:

From the beginning of EYFS we prioritise the **five principles of counting**:

- (i) The one-to-one principle: A child knows that we only count each item once.
- (ii) The stable order principle: A child knows that the order of the number names always stays the same. We always count by saying one, two, three, four, five....in that order.
- (iii) The cardinal principle: A child knows that the number they attach to the last object they count gives the answer to the question how many....?
- (iv) The abstraction principle: A child knows that we can count anything – they do not all need to be the same type of object.
- (v) The order irrelevance principle: A child knows that we count a group of objects in any order and in any arrangement and we will still get the same number.

We also prioritise:

- **Subitising**: the ability to recognise how many there are in a small group of objects without counting them. This allows children to see that numbers can be represented in different ways.
- **Unitising**: one object can have a value of more than one (equivalence). e.g. using Base 10 equipment, Numicon, coins.

EYFS Impact

By the end of EYFS, we expect the vast majority of our children to achieve the ELGs in Number and Numerical Patterns.

Number ELG: Children will have a deep understanding of number to 10, including the composition of each number. They will subitise (recognise quantities without counting) up to 5 and automatically recall (without reference to rhymes, counting or other aids) number bonds up to 5 (including subtraction facts) and some.

Numerical Patterns ELG: Children will verbally count beyond 20, recognising the pattern of the counting system. They will compare quantities up to 10 in different contexts, recognising when one quantity is greater than, less than or the same as the other quantity. Children will have opportunities to explore and represent patterns within numbers up to 10, including evens and odds, double facts and how quantities can be distributed equally.

KS1 (Implementation and Impact):

In KS1 our main priority is to ensure children are developing an appropriate, deep understanding and fluency of **place value and the four operations**.

We focus on:

- Using the CPA approach (Concrete, Pictorial and Abstract) as a way to introduce children to a range of representations. Each year group / class has a toolkit of concrete resources.
- Practice to aid fluency at this early stage.
- Early Addition and Subtraction strategies which include:

- (i) Addition and Subtraction facts to 20
- (ii) Recording when appropriate, using the word 'and' progressing to = .
- (iii) Including putting the 'answer' at the front e.g. $10 = 4 + 6$ and including missing numbers $4 + _ = 10$
- (iv) Exploring commutative $4 + 6 = 6 + 4$
- (v) Exploring balanced sides e.g. $4 + 6 = 3 + 7$

Progressing to:

- (vi) Derive and use related subtraction and addition facts to 100
- (vii) Recording of balanced sides e.g. $8 + 5 = 10 + 3$
- (viii) Including missing numbers e.g. $8 + _ = 10 + 4$; $9 + _ = 10 + _$
- (ix) Structured progression to addition of larger numbers:
 - e.g. How does making 10 help to solve
 - 2 digit and 1 digit (with a 1 in the tens column, bridging ten) e.g. $14 + 7 = 10 + 10 + 1$
 - 2 digit and 2 digit (with a 1 in both the ten columns) e.g. $14 + 17 = 20 + 10 + 1$
 - 2 digit and 2 digit e.g. $27 + 18 = 30 + 10 + 5$
- Partitioning in different ways.
- Early multiplication and division strategies which include:
 - (i) Repeated addition
 - (ii) Counting in multiples
 - (iii) Arrays
 - (iv) Progressing from division as sharing to grouping. (Division as sharing becomes an inefficient strategy as soon as numbers become larger. Division as grouping also enables the connection to be made between \times and \div .)

(See detailed progression in our Calculation policies.)

In addition, we aim for children to:

- Develop their ability to recognise, describe, draw, compare and sort different shapes and use the related vocabulary.
- Use a range of measures to describe and compare different quantities such as length, mass, capacity/volume, time and money.

We develop visualisation by:

- Using equipment
- Seeing equipment but not using it
- Visualising using a jotting.
- Introducing such methods as bar modelling to visualise mathematical concepts and solve problems.

We build in opportunities for verbalisation of thinking in younger years leading to written explanations of thinking / reasoning by Year 5/6. Children encouraged to answer in 'full sentence answers' by the use of sentence stems.

KS1 Impact

By the end of KS1 we expect the vast majority of our children to have developed confidence and mental fluency with whole numbers, counting and place value including working with numerals, words and the four operations.

Lower KS2 (Implementation and Impact)

In Lower KS2 our main priority is to ensure children **are becoming increasingly fluent with the four operations (including efficient methods), number facts and place value (including simple fractions and decimals) and are able to problem solve.**

We focus on:

- Continuing to use the CPA approach (Concrete, Pictorial and Abstract) as a way to develop children's conceptual understanding.
- Encouraging the most efficient strategies for calculation. Children are taught a range of strategies; they are taught to look at the calculation as a whole to encourage thinking about what the numbers mean rather than just the digits and using one strategy.
- Progressing understanding of multiplication by looking for linked / connected calculations:
- Progressing understanding of division by e.g.:
 - (i) By halving to make the calculation easier:
 - (ii) By dividing the dividend and the divisor by any number to make the calculation easier
 - (iii) Divide by partitioning in different ways.

(See detailed progression in our Calculation policies.)

In addition, we aim for children to:

- Draw with increasing accuracy and develop mathematical reasoning so they can analyse shapes and their properties, and confidently describe the relationships between them.
- Use measuring instruments with accuracy and make connections between measure and number.

LKS2 Impact

By the end of Year 4 we expect the vast majority of our children to have:

- **Become increasingly fluent with whole numbers and the four operations, including number facts and the concept of place value.**
- **Developed efficient written and mental methods and perform calculations accurately with increasingly large whole numbers.**

- Developed their ability to solve a range of problems, including with simple fractions and decimal place value.
- Memorised their multiplication tables up to and including the 12 multiplication table and show precision and fluency in their work.

Upper Key Stage 2 (Implementation and Impact)

In Upper KS2 our main priority is to ensure that children are:

- Extending their understanding of the **number system and place value** to include larger integers.
- Developing connections between multiplication and division with **fractions, decimals, percentages and ratio**.
- Developing their ability to **solve a wider range of problems**, including **increasingly complex properties of numbers** and arithmetic, and problems demanding efficient written and mental methods of calculation.
- Introduced to the language of **algebra** as a means for solving a variety of problems.

In addition, we aim for children:

- to consolidate and extend their knowledge developed in number in geometry and measures.
- Classify shapes with increasingly complex geometric properties and learn the vocabulary they need to describe them.

UKS2 Impact

By the end of Year 6, we expect the vast majority of our children to:

- Be fluent in written methods for all four operations, including long multiplication and division, and in working with fractions, decimals and percentages.
- Have deep conceptual understanding and the ability to recall and apply mathematical knowledge rapidly and accurately.
- Reason mathematically by following a line of enquiry, using their knowledge of relationships and generalisations, and justify using mathematical language
- Solve problems by applying their mathematics to a variety of problems with increasing sophistication, including breaking down problems into a series of simpler steps and persevering in seeking solutions.