

Our ambition at Silverstone CE Primary is for all children to achieve a secure and deep understanding of maths. We strive to ensure children reach their full potential, leave the school being numerate and have a love for number, tackling maths with confidence as it is a skill for life.

## Intent:

### **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.**

### **We build a skilled team who can teach Maths:**

Leaders in our school and academy trust prioritise the teaching of Maths. Maths has been identified as a key priority on our Academy Improvement Plan in the previous 3 years. Leaders monitor the provision of Maths through learning walks in Maths sessions; book looks; planning scrutiny; pupil and staff voice; 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).

## Implementation:

### **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; Compare; True or False' 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, will 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 / phases when mathematical knowledge, in units of work, will be taught. This is the basis for our well sequenced and progressive curriculum.
- Our **Progression maps** provide an overview of the progression of knowledge for the national curriculum content for each aspect of maths such as place value, addition, multiplication and fractions. NCETM progression documents are also used alongside the White Rose. These allow subject leaders to have an overview of the progression of concepts over time and allow class teachers to know what children have learnt previously and how the learning continues subsequently.
- Our **Calculation policies** outline in more detail which concepts and procedures / strategies will be introduced and then developed. (We are presently developing these detailed documents in other areas of the Maths curriculum to supplement our Maths planning)
- Our **weekly planning** is based on White Rose maths which is tailored to the needs of our children. We progress through the 'small steps' within each unit of work. When required some small steps are grouped together and occasionally some small steps are not taught as more time is spent on prior small steps before moving on. Teachers are given the flexibility to use the resources they feel are of the greatest benefit to the children they are teaching, including the use of Classroom Secrets. All staff are aware of the CPA (Concrete, Pictorial and Abstract) approach

and concrete resources are used throughout the school to ensure children are exposed to multiple representations of a concept.

There are two tiers to our maths curriculum sequence:

- Tier 1 = sequence of units of work
- Tier 2 = sequence of learning within each unit of work

**Tier 1** can be seen in our long-term maps and knowledge is sequenced deliberately. We purposely start with place value to develop a strong understanding of number so this knowledge can be applied to addition, and subtraction. Addition in turn supports the understanding of multiplication (repeated addition) and this then supports the understanding of division.

Further in the year we then focus on measures as this enables children to use the skills of the four number operations to solve problems involving area and perimeter

The teaching of fractions enables children to use their knowledge of + and – when adding fractions, x for finding equivalent fractions and their knowledge of division to find fractions of quantity.

When teaching decimals children use their knowledge of fractions and place value. This then supports to teaching of concepts such as money. Statistics enable children to use their calculation skills.

Shape doesn't always link to number so can be taught in isolation.

**Tier 2** can be seen within each unit of work with the sequence of teaching the small steps from the White Rose scheme of work. These small steps are deliberate and enable knowledge to build up within the unit of work. Using their professional judgement and knowledge of the children in the class, teachers will sometimes change the order of teaching the small steps or combine small steps if it benefits the learning of new maths knowledge.

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 from early years. We encourage children to verbalise their thinking; our teachers ensure that pupils build secure foundations by using discussion to probe and remedy their misconceptions.

**How Maths is structured across the school****EYFS**

Children have a daily mathematical focus and use continuous provision to embed knowledge and provide the firm foundations for maths that children will encounter as they move up the years in primary school.

The six key concepts are:

- Cardinality and Counting
- Comparison
- Composition
- Pattern
- Shape and Space
- Measures

**Key Stage 1 and Key Stage 2**

Children have a daily maths lesson for one hour.

New knowledge/concepts are often introduced through a 'my turn, our turn, your turn' approach. This enables steps to success to be generated with the children and scaffolding/support gradually taken away as children gain independence with applying the new knowledge.

If children are not reaching the expectations outlined below (see Impact) we intervene quickly by giving extra support. Our extra support may be 1:1 adult support, small group interventions as well as pre-teaching and post teaching as necessary. The content of these sessions is determined by on-going gap analysis and our in-depth knowledge of each child. Additional adult support is sometimes provided within lessons and sometimes outside the daily maths lesson.

In addition, 'Fast Maths' or 'Key Instant Recall Facts' are taught at the start of every maths lesson. Both of these strategies ensure mathematical declarative and procedural knowledge is secure in the long-term memory.

'Fast Maths' is an element to ensure daily review of key concepts at the start of at least 3 maths lessons per week. See Appendix 1 for Fast Maths Expectations

'Key Instant Recall Facts' (KIRFS) also ensure a daily review of basic number facts. These progressive, specific facts are non-negotiables that every child should know by the end of each term in each year group. KIRFS happen at least 3 times per week.

TT Rock stars is used by children from Year 2 to Year 6. Children have the opportunity to access TT rock stars during the week and are expected to use this resource as part of their homework.

## Impact:

### **EYFS IMPACT**

**By the end of EYFS, we expect the vast majority of our children to achieve the ELGs in Number and Shape, Space and Measure.**

Number ELG: Count reliably with numbers from one to 20, place them in order and say which number is one more or one less than a given number. Using quantities and objects, they add and subtract two single-digit numbers and count on or back to find the answer. They solve problems, including doubling, halving and sharing.

Shape, Space and Measure ELG: Children use everyday language to talk about size, weight, capacity, position, distance, time and money to compare quantities and objects and to solve problems. They recognise, create and describe patterns. They explore characteristics of everyday objects and shapes and use mathematical language to describe them.

From the beginning of EYFS, after baseline assessments, 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.

### **Key Stage 1 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.**

In KS1 our main priority is to ensure children are developing an appropriate, deep understanding and fluency of number, **place value and the four operations**. **Children will also be secure with reasoning and problem solving (age appropriate)**

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 10
  - (ii) Recording when appropriate, using the symbol = .
  - (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) Subtraction and addition facts to 20
  - (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. The children progress towards answering in 'full sentence answers' through the use of sentence stems.

### **Lower KS2 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.**

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), where appropriate, 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:
  - (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.

### **Upper Key Stage 2 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.**

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.

Calculators are introduced near the end of KS2 to support pupils' conceptual understanding and exploration of more complex number problems, if written and mental arithmetic are secure.

In addition, we aim for children to:

- 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.



## **Appendix 1 - Fast Maths**

### **Purpose**

- To consolidate, review and practice learnt knowledge.
- This is linked to the Rosenshine Principle – 'Reviewing material'
- Opportunity to review and consolidate concepts you taught recently, or key calculation skills

### **How is it different from KIRF (Key Instant Recall Facts)**

- Fast maths covers the concepts you have taught in maths that are not key instant recall facts

### **When**

- Start of maths lessons at least 3 times per week

### **How long**

- The clue is in the name – Fast Maths
- It should last between 5 and 10 minutes and should not distract from the main teaching element of the lesson

### **What questions should be asked?**

- Have a fluid approach – it depends on what you feel needs to be reviewed
- It must only include knowledge you have previously taught, remember it is an opportunity to review recently learnt knowledge
- Maximum of 5 questions – most children will hopefully complete at least 3 questions
- Most of the time the questions will be based on the same concept/knowledge
- Sometimes, when you feel it is relevant, questions can be on different concepts/knowledge if you are reviewing a recent concept as well as practicing a particular key calculation skill.

### **Should adults model how to answer questions**

- Have a fluid approach – you know your class!
- It is not usually necessary to model beforehand, the children simply get started straight away with the questions
- Sometimes, if you know it is a general misconception, you will model an example at the start to remind the children of the key steps to success before children complete all the questions
- Do not spend time modelling how to answer the question at the end. From scanning the class you will see if children have been successful or not
- If most are successful you will provide the children with the answers and through your discussion with the class ('our turn' approach) recap the steps to success you have seen the children use.

- If most children are making the same errors then tell the class you have realised you need to recap this again.
  - Option 1 - The next day's fast maths will start with you modelling the misconception with a 'my turn, our turn, your turn' approach (remember this is no longer than 10 minutes and must not distract from the main teaching element of the lesson).
  - Option 2 – the misconception may require a full lesson so will be address at a later time during the term or when the concept is covered again within the long term plan

**Expectation of teacher and TA during fast maths**

- TA to support focus children including Pupil Premium children
- Teacher can support focus children but will mainly scan class to assess children's ability - AfL