

# All Saints CEVA Primary School



## Calculation Guidance

February 2019

The National Curriculum for mathematics aims to ensure that all pupils:

- become fluent in the fundamentals of mathematics, including through varied and frequent practice with increasingly complex problems over time, so that pupils have conceptual understanding and are able to recall and apply their knowledge rapidly and accurately to problems
- reason mathematically by following a line of enquiry, conjecturing relationships and generalisations, and developing an argument, justification or proof using mathematical language
- can solve problems by applying their mathematics to a variety of routine and non-routine problems with increasing sophistication, including breaking down problems into a series of simpler steps and persevering in seeking solutions.

The following calculation guidance has been devised to meet the requirements of the National Curriculum 2014 for the teaching and learning of mathematics, and is also designed to give pupils a consistent and smooth progression of learning in calculations across the school. The expectation is that pupils will move through the programmes of study at broadly the same pace, however their progression will be defined by the security of their understanding and readiness to build on their learning. Children who grasp concepts quickly will be challenged to apply their skills in a range of problem-solving contexts, whilst children who struggle to become fluent in their calculations can be supported with a range of apparatus and additional practice. Please note that early learning in number and calculation in Reception follows the "Development Matters" EYFS document, and this calculation guidance is designed to build on progressively from the content and methods established in the Early Years Foundation Stage.

The calculation guidance is organised as a progression document, to show how the teaching of each of the four operations builds from Foundation Stage through Key Stages 1 and 2. When learning a new concept, children will be encouraged to explore the operation and methods **practically** to help their understanding grow. Over time, as knowledge becomes established, techniques will be refined through the use of **pictures and diagrams** until the children are competent and able to calculate number sentences using **written, abstract methods**.

It is important that any type of calculation is given a real life context or problem solving approach to help build children's understanding of the purpose of calculation, and to help them recognise when to use certain operations and methods when faced with problems. This must be a priority within calculation lessons. Children will be taught and encouraged to use the following processes in deciding what approach they will take to a calculation, to ensure they select the most appropriate method for the numbers involved:

- Can I solve this calculation using a mental strategy?
- Can I use my drawings or jottings to help me?
- Do I need to apply a written method to solve this calculation?

This document has been created following the 'White Rose Calculation Policy Guidance' and the AB BC Maths 'Progression in Mental Calculation' and 'Progression in Written calculation' documents. A wide range of teaching strategies and apparatus will be used to deliver this calculation guidance including: Numicon, Cuisenaire rods, multilink cubes, place value counters, number lines, tens frames and bar modelling.

## *EYFS Overview*

In Early Years, children will be taught the numbers 1-20 using “the story of” approach, where children spend time exploring the meaning of each number using concrete and pictorial apparatus. The use of concrete equipment is used to help children build visual representations of number and establish a secure foundation for counting and calculating. Once this understanding is secure, they will learn how to count reliably from 1 to 20, place them in order and say what is one more or one less than a given number. Children will be introduced to the “part, part, whole” method to help them to understand that numbers can be combined or split in different ways. Using quantities and objects, they will write digits, add and subtract two single-digit numbers and count on or back to find the answer. They also solve problems, including doubling, halving and sharing. Children use everyday language throughout the Foundation Stage to talk about size, weight, capacity, position, distance, time and money to compare quantities and objects, and to investigate problems and real-world scenarios e.g. weighing ingredients in cookery and discussing costs during shop role-play. They recognise, create and describe patterns. Furthermore, they explore features of everyday objects and shapes and use mathematical language to describe them.

## *KSI Overview*

Children in Years 1 and 2 will be given a really solid foundation in the basic building blocks of mental and written arithmetic. Through being taught place value, they will develop an understanding of how numbers work, so that they are confident in 2-digit numbers and beginning to read and say numbers above 100. A focus on number bonds, first via practical hands-on experiences and subsequently using memorisation techniques, enables a good grounding in these crucial facts. They will also have experienced and been taught pairs to 20. Their knowledge of number facts enables them to add several single-digit numbers, and to add/subtract a single digit number to/from a 2-digit number. Another important conceptual tool is their ability to add/subtract 1 or 10, and to understand which digit changes and why. This understanding is extended to enable children to add and subtract multiples of ten to and from any 2-digit number. The most important application of this knowledge is their ability to add or subtract any pair of 2-digit numbers by counting on or back in tens and ones. Children may extend this to adding by partitioning numbers into tens and ones. Children will be taught to count in 2s, 5s and 10s, and will have related this skill to repeated addition. They will explore and learn the associated 2x, 5x and 10x tables, as well as being introduced to their 3x table. Engaging in a practical way with the concept of repeated addition and the use of arrays enables children to develop a preliminary understanding of multiplication, and asking them to consider how many groups of a given number make a total will introduce them to the idea of division. They will also be taught to double and halve numbers, and will thus experience scaling up or down as a further aspect of multiplication and division. Fractions will be introduced as numbers and as operators, specifically in relation to halves, quarters and thirds.

## *LKS2 Overview*

In Lower KS2, children build on the concrete and conceptual understandings they have gained in KS1 to develop a real mathematical understanding of the four operations, in particular developing arithmetical competence in relation to larger numbers. In addition and subtraction, they are taught to use place value and number facts to add and subtract numbers mentally and will develop a range of strategies to enable them to discard the 'counting in ones' or fingers-based methods of the infants. In particular, they will learn to add and subtract multiples and near multiples of 10, 100 and 1000, and will become fluent in complementary addition as an accurate means of achieving fast and accurate answers to 3-digit subtractions. Standard written methods for adding larger numbers are taught, learned and consolidated, and written column subtraction is also introduced. This key stage is also the period during which all the multiplication and division facts are thoroughly memorised, including all facts up to the 12 x 12 table. Efficient written methods for multiplying or dividing a 2-digit or 3-digit number by a single-digit number are taught, as are mental strategies for multiplication or division with large but friendly numbers, e.g. when dividing by 5 or multiplying by 20. Children will develop their understanding of fractions, learning to reduce a fraction to its simplest form as well as finding non-unit fractions of amounts and quantities. Links with a decimal number are introduced and children multiply and divide numbers by 10 and 100.

## *UKS2 Overview*

Children move on from dealing mainly with whole numbers to performing arithmetic operations with both decimals and fractions. They will consolidate their use of written procedures in adding and subtracting whole numbers with up to 6 digits and also decimal numbers with up to two decimal places. Mental strategies for tackling increasingly large numbers will also be taught. These will draw upon children's robust understanding of place value and knowledge of number facts. Efficient and flexible strategies for mental multiplication and division are taught and practised, so that children can perform appropriate calculations even when the numbers are large, such as  $40,000 \times 6$  or  $40,000 \div 8$ . In addition, children extend their knowledge and confidence in using written methods for multiplication and division. Fractions and decimals are also added, subtracted, divided and multiplied, within the bounds of children's understanding of these more complicated numbers, and they will also calculate simple percentages and ratios. Negative numbers will be also added and subtracted.