

Coningsby St. Michael's  
Church of England Primary School

# Mathematics Policy

September 2023

## *The Importance of Mathematics*

'Mathematics is a creative and highly inter-connected discipline that has been developed over centuries, providing the solution to some of history's most intriguing problems. It is essential to everyday life, critical to science, technology and engineering, and necessary for financial literacy and most forms of employment. A high-quality mathematics education therefore provides a foundation for understanding the world, the ability to reason mathematically, an appreciation of the beauty and power of mathematics, and a sense of enjoyment and curiosity about the subject.'

(National Curriculum, 2014)

### *INTENT*

We teach maths at Coningsby St Michael's Primary School to develop independent, reflective problem solvers who can apply mathematical logic to everyday life experiences.

A mastery approach is used to teach mathematics to develop a deep and secure mathematical knowledge. We aim for all children to have a positive experience of maths through providing them with a concrete, pictorial abstract route to their learning. We aspire for all children to reason, conjecture and apply their mathematics using the correct mathematical vocabulary to a range of different problem solving situations including real life scenarios.

### *AIMS*

The 2014 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 National Curriculum for Mathematics*

Mathematics is an interconnected subject in which pupils need to be able to move fluently between representations of mathematical ideas. The 2014 National Curriculum programmes of study are, by necessity, organised into apparently distinct domains, but pupils should make rich connections across mathematical ideas to develop fluency, mathematical reasoning and competence in solving increasingly sophisticated problems. They should also apply their mathematical knowledge to science and other subjects.

## **Coningsby St. Michael's C. of E. Primary School**

The expectation is that the majority of pupils will move through the programmes of study at broadly the same pace. However, decisions about when to progress should always be based on the security of pupils' understanding and their readiness to progress to the next stage. Pupils who grasp concepts rapidly should be challenged through being offered rich and sophisticated problems before any acceleration through new content. Those who are not sufficiently fluent with earlier material should consolidate their understanding, including through additional practice, before moving on.

### ***Cross curricular***

Mathematics teaches children how to make sense of the world around them through developing their ability to calculate, reason and solve problems. It is a core subject with a range of cross-curricular links but most often, is best taught discretely, using opportunities from other subjects to rehearse skills in a context. Numeracy involves developing confidence and competence in number work; geometry, measure, statistics and the using and applying of these skills.

### ***Spoken language***

The national curriculum for mathematics reflects the importance of spoken language in pupils' development across the whole curriculum – cognitively, socially and linguistically. The quality and variety of language that pupils hear and speak are key factors in developing their mathematical vocabulary and presenting a mathematical justification, argument or proof. They must be assisted in making their thinking clear to themselves as well as others and teachers should ensure that pupils build secure foundations by using discussion to probe and remedy their misconceptions. At Coningsby St Michaels, children are encouraged to justify, reason and provide proof through the use of logic prompts and open ended-questioning. Mathematical discussion is a requisite of every mathematics task both within defined mathematics lessons and through cross-curricular learning.

### ***Implementation***

At Coningsby St Michael's children are taught the mathematics curriculum through daily sessions. Coverage of the 2014 national curriculum through a tailor made spiral curriculum with support from Maths consultant Jenny Cook with reference to White Rose, NCTEM mastery documents, NCTEM PD materials, Nrich, I see maths and Power Maths scheme to provide challenge, mastery and problem solving opportunities for the children.

A daily session of 1 hour in KS1 and KS2 will include 2 minutes of counting using the counting progression map and also 2 minutes of language development each day. The daily session will include the use of modelling and metacognition strategies such as I do, we do, you do

A daily 15 minute mental fluency session also takes place to practise learn and apply mental skills using a journey through mental calculation provided by Jenny Cook consultancy. Within this session the children will also practise two Key Instant Recall Facts (KIRFs) each half term. These KIRFs are also sent home and available on the class pages on the school website for parents to provide support at home. In Key Stage 2 and year 2 the children also have the opportunity to practise times table facts through Times Table Rock Stars at home via the app. In KS1, the children have access to Numbots both at home and at school.

Progression through calculation across the school is ensured by the use of the calculation policy which gives the steps through concrete, pictorial abstract methods to build children's understanding through a build it, draw it, write it approach.

## Coningsby St. Michael's C. of E. Primary School

Mathematics evidence is collected by annotations on planning, photographs (which are put on the class pages of the school website) and written work to show the progression of the children and is marked in accordance to the schools marking policy.

Mathematics is assessed using 10 minutes of morning work at the start of the day to revisit, rehearse, refresh and retrieve mathematics work. The children will have a mixture of fluency, reasoning and problem solving tasks to retrieve and refresh maths already taught, to rehearse new skills taught last week, month, term, year and also as a pre assessment looking at the work to be taught next week.

### ***Inclusion***

Wherever possible we aim to fully include all pupils in maths teaching. Through our maths teaching we provide learning opportunities that enable **all** pupils to make progress. We set suitable learning challenges and respond to each child's individual needs.

The programmes of study in the National Curriculum shows the progression in children's use of written methods of calculation in the strands Number and place value; Addition and subtraction and Multiplication and division.

	Number and place value	Addition and subtraction	Multiplication and division
Year 1	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> <li>• count to and across 100, forwards and backwards, beginning with 0 or 1, or from any given number</li> <li>• count, read and write numbers to 100 in numerals; count in multiples of twos, fives and tens</li> <li>• given a number, identify one more and one less</li> <li>• identify and represent numbers using objects and pictorial representations including the number line, and use the language of: equal to, more than, less than (fewer), most, least</li> <li>• read and write numbers from 1 to 20 in numerals and words.</li> </ul>	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> <li>• read, write and interpret mathematical statements involving addition (+), subtraction (–) and equals (=) signs</li> <li>• represent and use number bonds and related subtraction facts within 20</li> <li>• add and subtract one-digit and two-digit numbers to 20, including zero</li> <li>• solve one-step problems that involve addition and subtraction, using concrete objects and pictorial representations, and missing number problems such as <math>7 = \square - 9</math>.</li> </ul>	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> <li>• solve one-step problems involving multiplication and division, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher.</li> </ul>
Year 2	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> <li>• count in steps of 2, 3, and 5 from 0, and in tens from any number, forward and backward</li> <li>• recognise the place value of each digit in a two-digit number (tens, ones)</li> <li>• identify, represent and estimate numbers using different representations, including the number line</li> <li>• compare and order numbers from 0 up to 100; use <math>&lt;</math>, <math>&gt;</math> and <math>=</math> signs</li> <li>• read and write numbers to at least 100 in numerals and in</li> </ul>	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> <li>• solve problems with addition and subtraction: <ul style="list-style-type: none"> <li>○ using concrete objects and pictorial representations, including those involving numbers, quantities and measures</li> <li>○ applying their increasing knowledge of mental and written methods</li> </ul> </li> <li>• recall and use addition and subtraction facts to 20 fluently, and derive and use related facts up to 100</li> <li>• add and subtract numbers using</li> </ul>	<p>Pupils should be taught to:</p> <ul style="list-style-type: none"> <li>• recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers</li> <li>• calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication (<math>\times</math>), division (<math>\div</math>) and equals (=) signs</li> <li>• show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot</li> <li>• solve problems involving multiplication and division, using materials, arrays,</li> </ul>

**Coningsby St. Michael's C. of E. Primary School**

	<p>words</p> <ul style="list-style-type: none"> <li>• use place value and number facts to solve problems.</li> </ul>	<p>concrete objects, pictorial representations, and mentally, including:</p> <ul style="list-style-type: none"> <li>○ a two-digit number and ones</li> <li>○ a two-digit number and tens</li> <li>○ two two-digit numbers</li> <li>○ adding three one-digit numbers</li> </ul> <ul style="list-style-type: none"> <li>• show that addition of two numbers can be done in any order (commutative) and subtraction of one number from another cannot</li> <li>• recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems.</li> </ul>	<p>repeated addition, mental methods, and multiplication and division facts, including problems in contexts.</p>
	<b>Number and place value</b>	<b>Addition and subtraction</b>	<b>Multiplication and division</b>
<b>Year 3</b>	<p><b>Pupils should be taught to:</b></p> <ul style="list-style-type: none"> <li>• count from 0 in multiples of 4, 8, 50 and 100; find 10 or 100 more or less than a given number</li> <li>• recognise the place value of each digit in a three-digit number (hundreds, tens, ones)</li> <li>• compare and order numbers up to 1000</li> <li>• identify, represent and estimate numbers using different representations</li> <li>• read and write numbers up to 1000 in numerals and in words</li> <li>• solve number problems and practical problems involving these ideas.</li> </ul>	<p><b>Pupils should be taught to:</b></p> <ul style="list-style-type: none"> <li>• add and subtract numbers mentally, including: <ul style="list-style-type: none"> <li>○ a three-digit number and ones</li> <li>○ a three-digit number and tens</li> <li>○ a three-digit number and hundreds</li> </ul> </li> <li>• add and subtract numbers with up to three digits, using formal written methods of columnar addition and subtraction</li> <li>• estimate the answer to a calculation and use inverse operations to check answers</li> <li>• solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction.</li> </ul>	<p><b>Pupils should be taught to:</b></p> <ul style="list-style-type: none"> <li>• recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables</li> <li>• write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods</li> <li>• solve problems, including missing number problems, involving multiplication and division, including positive integer scaling problems and correspondence problems in which n objects are connected to m objects.</li> </ul>
<b>Year 4</b>	<p><b>Pupils should be taught to</b></p> <ul style="list-style-type: none"> <li>• count in multiples of 6, 7, 9, 25 and 1000</li> <li>• find 1000 more or less than a given number</li> <li>• count backwards through zero to include negative numbers</li> <li>• recognise the place value of each digit in a four-digit number (thousands, hundreds, tens, and ones)</li> <li>• order and compare numbers beyond 1000</li> <li>• identify, represent and estimate numbers using different representations</li> <li>• round any number to the nearest 10, 100 or 1000</li> <li>• solve number and practical problems that involve all of the above and with increasingly large positive numbers</li> <li>• read Roman numerals to 100 (I to C) and know that over time,</li> </ul>	<p><b>Pupils should be taught to:</b></p> <ul style="list-style-type: none"> <li>• add and subtract numbers with up to 4 digits using the formal written methods of columnar addition and subtraction where appropriate</li> <li>• estimate and use inverse operations to check answers to a calculation</li> <li>• solve addition and subtraction two-step problems in contexts, deciding which operations and methods to use and why.</li> </ul>	<p><b>Pupils should be taught to:</b></p> <ul style="list-style-type: none"> <li>• recall multiplication and division facts for multiplication tables up to <math>12 \times 12</math></li> <li>• use place value, known and derived facts to multiply and divide mentally, including: multiplying by 0 and 1; dividing by 1; multiplying together three numbers</li> <li>• recognise and use factor pairs and commutativity in mental calculations</li> <li>• multiply two-digit and three-digit numbers by a one-digit number using formal written layout</li> <li>• solve problems involving multiplying and adding, including using the distributive law to multiply two digit numbers by one digit, integer scaling problems and harder correspondence problems such as n objects are connected to m objects.</li> </ul>

**Coningsby St. Michael's C. of E. Primary School**

	the numeral system changed to include the concept of zero and place value.		
	<b>Number and place value</b>	<b>Addition and subtraction</b>	<b>Multiplication and division</b>
<b>Year 5</b>	<p><b>Pupils should be taught to:</b></p> <ul style="list-style-type: none"> <li>• read, write, order and compare numbers to at least 1 000 000 and determine the value of each digit</li> <li>• count forwards or backwards in steps of powers of 10 for any given number up to 1 000 000</li> <li>• interpret negative numbers in context, count forwards and backwards with positive and negative whole numbers, including through zero</li> <li>• round any number up to 1 000 000 to the nearest 10, 100, 1000, 10 000 and 100 000</li> <li>• solve number problems and practical problems that involve all of the above</li> <li>• read Roman numerals to 1000 (M) and recognise years written in Roman numerals.</li> </ul>	<p><b>Pupils should be taught to:</b></p> <ul style="list-style-type: none"> <li>• add and subtract whole numbers with more than 4 digits, including using formal written methods (columnar addition and subtraction)</li> <li>• add and subtract numbers mentally with increasingly large numbers</li> <li>• use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy</li> <li>• solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why.</li> </ul>	<p><b>Pupils should be taught to:</b></p> <ul style="list-style-type: none"> <li>• identify multiples and factors, including finding all factor pairs of a number, and common factors of two numbers</li> <li>• Know and use the vocabulary of prime numbers, prime factors and composite (non-prime) numbers</li> <li>• establish whether a number up to 100 is prime and recall prime numbers up to 19</li> <li>• multiply numbers up to 4 digits by a one- or two-digit number using a formal written method, including long multiplication for two-digit numbers</li> <li>• multiply and divide numbers mentally drawing upon known facts</li> <li>• divide numbers up to 4 digits by a one-digit number using the formal written method of short division and interpret remainders appropriately for the context</li> <li>• multiply and divide whole numbers and those involving decimals by 10, 100 and 1000</li> <li>• recognise and use square numbers and cube numbers, and the notation for squared (<sup>2</sup>) and cubed (<sup>3</sup>)</li> <li>• solve problems involving multiplication and division including using their knowledge of factors and multiples, squares and cubes</li> <li>• solve problems involving addition, subtraction, multiplication and division and a combination of these, including understanding the meaning of the equals sign</li> <li>• solve problems involving multiplication and division, including scaling by simple fractions and problems involving simple rates.</li> </ul>
<b>Year 6</b>	<p><b>Pupils should be taught to:</b></p> <ul style="list-style-type: none"> <li>• read, write, order and compare numbers up to 10 000 000 and determine the value of each digit</li> <li>• round any whole number to a required degree of accuracy</li> <li>• use negative numbers in context, and calculate intervals across zero</li> <li>• solve number and practical problems that involve all of the above.</li> </ul>	<p><b>Pupils should be taught to:</b></p> <ul style="list-style-type: none"> <li>• multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication</li> <li>• divide numbers up to 4 digits by a two-digit whole number using the formal written method of long division, and interpret remainders as whole number remainders, fractions, or by rounding, as appropriate for the context</li> <li>• divide numbers up to 4 digits by a two-digit number using the formal written method of short division where appropriate, interpreting remainders according to the context</li> <li>• perform mental calculations, including with mixed operations and large numbers</li> <li>• identify common factors, common multiples and prime numbers</li> <li>• use their knowledge of the order of operations to carry out calculations involving the four operations</li> <li>• solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why</li> </ul>	

