'Let your light shine' Matthews 5:16

Maths Curriculum Purpose and Rationale

'At Hawkesley, we say to our children to *'let your light shine.' (Matthew 5:16).* In order to do this, we provide a knowledge rich curriculum. The bible says, 'For wisdom is better than rubies...' Proverb 8:11. We believe that through the accumulation and application of knowledge, children are equipped to experience, *'life in all its fullness' (John 10:10). '*

Taken from the Hawkesley Curriculum Vision Statement

Why do learners at Hawkesley Church Primary Academy need to study Maths?

Mathematics is a creative and highly inter-connected discipline that introduces children to concepts, skills and thinking strategies that are 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; it helps them to make sense of the numbers, patterns and shapes they see in the world around them and offers ways of handling data in an increasingly digital world. Mathematics provides children with the ability to reason mathematically and offers children powerful ways of communicating: they learn to explore and explain their ideas using symbols, diagrams, spoken and written language. Studying Mathematics stimulates curiosity; fosters creativity; equips children with the skills they need for life everyday life and society beyond school; and is crucial to the development of successful learners.

What are the aims for the Maths curriculum?
(i.e. what do we want learners to be able to know and do by the time they leave Hawkesley Church Primary Academy?

At Hawkesley Church Primary Academy we aim to ensure that by the time they leave at the end of Key Stage 2, all children are number literate. This means having the confidence and *skill* to *use* numbers and *mathematical* approaches in all aspects of life. Mathematics at Hawkesely Church Primary Academy follows the national curriculum and aims to ensure that children:

- become fluent in the fundamentals of mathematics, including through varied and frequent practice with increasingly complex problems over time, so that pupils develop conceptual understanding and the ability to recall and apply knowledge rapidly and accurately.
- 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.

National Curriculum

The end of Key Stage expectations for Key Stage 1 are that pupils can:

Number and place value:
- 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 a two-digit number (tens, ones)
- identify, represent and estimate numbers using different representations, including the number line
- compare and order numbers from 0 up to 100; use <, > and = signs
- read and write numbers to at least 100 in numerals and in words
- use place value and number facts to solve problems.

Addition and subtraction:
- solve problems with addition and subtraction: using concrete objects and pictorial representations, including those involving numbers, quantities and measures
- applying their increasing knowledge of mental and written methods
- recall and use addition and subtraction facts to 20 fluently, and derive and use related facts up to 100
- add and subtract numbers using concrete objects, pictorial representations, and mentally, including:
- a two-digit number and ones
- a two-digit number and tens
- two two-digit numbers
- adding three one-digit numbers
- show that addition of two numbers can be done in any order (commutative) and subtraction of one number from another cannot
- recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems.

Multiplication and division:
- recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers
- calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication (×), division (÷) and equals (=) signs
- show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot

Measurement:
- choose and use appropriate standard units to estimate and measure length/height in any direction (m/cm); mass (kg/g); temperature (°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

• solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts.	• 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 • identify and describe the properties of 3-D shapes, including the number of edges, vertices and faces • identify 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 2-D and 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 distinguishing between 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 • ask and answer questions about totalling and comparing categorical data **Fractions:** • recognise, find, name and write fractions $\frac{1}{3}$, $\frac{1}{4}$, $\frac{2}{4}$ and $\frac{3}{4}$ of a length, shape, set of objects or quantity • write simple fractions for example, $\frac{1}{2}$ of 6 = 3 and recognise the equivalence of $\frac{2}{4}$ and $\frac{1}{2}$.

The end of Key Stage expectations for Key Stage 2 are:

Number and place value:	Statistics:

• read, write, order and compare numbers up to 10 000 000 and determine the value of each digit • round any whole number to a required degree of accuracy • use negative numbers in context, and calculate intervals across zero • solve number and practical problems that involve all of the above.	• interpret and construct pie charts and line graphs and use these to solve problems • calculate and interpret the mean as an average
Four operations • multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication • 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 • 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 • perform mental calculations, including with mixed operations and large numbers • identify common factors, common multiples and prime numbers • use their knowledge of the order of operations to carry out calculations involving the four operations • solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why • solve problems involving addition, subtraction, multiplication and division • use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy.	**Fractions:** • use common factors to simplify fractions; use common multiples to express fractions in the same denomination compare and order fractions, including fractions > 1 • add and subtract fractions with different denominators and mixed numbers, using the concept of equivalent fractions • multiply simple pairs of proper fractions, writing the answer in its simplest form [for example, $\frac{1}{4} \times \frac{1}{2} = \frac{1}{8}$] divide proper fractions by whole numbers [for example, $\frac{1}{3} \div 2 = \frac{1}{6}$] • associate a fraction with division and calculate decimal fraction equivalents [for example, 0.375] for a simple fraction [for example, $\frac{3}{8}$] • identify the value of each digit in numbers given to three decimal places and multiply and divide numbers by 10, 100 and 1000 giving answers up to three decimal places • multiply one-digit numbers with up to two decimal places by whole numbers • use written division methods in cases where the answer has up to two decimal places • solve problems which require answers to be rounded to specified degrees of accuracy • recall and use equivalences between simple fractions, decimals and percentages, including in different contexts.
Measurement: • solve problems involving the calculation and conversion of units of measure, using decimal notation up to three decimal places where appropriate • use, read, write and convert between standard units, converting measurements of length, mass, volume and time from a smaller unit	**Geometry:** • draw 2-D shapes using given dimensions and angles • recognise, describe and build simple 3-D shapes, including making nets

- of measure to a larger unit, and vice versa, using decimal notation to up to three decimal places - convert between miles and kilometres - recognise that shapes with the same areas can have different perimeters and vice versa - recognise when it is possible to use formulae for area and volume of shapes - calculate the area of parallelograms and triangles - calculate, estimate and compare volume of cubes and cuboids using standard units, including cubic centimetres (cm3) and cubic metres (m3), and extending to other units [for example, mm3 and km3]	- compare and classify geometric shapes based on their properties and sizes and find unknown angles in any triangles, quadrilaterals, and regular polygons - illustrate and name parts of circles, including radius, diameter and circumference and know that the diameter is twice the radius - recognise angles where they meet at a point, are on a straight line, or are vertically opposite, and find missing angles - describe positions on the full coordinate grid (all four quadrants) - draw and translate simple shapes on the coordinate plane, and reflect them in the axes
Ratio and proportion: - solve problems involving the relative sizes of two quantities where missing values can be found by using integer multiplication and division facts - solve problems involving the calculation of percentages [for example, of measures, and such as 15% of 360] and the use of percentages for comparison - solve problems involving similar shapes where the scale factor is known or can be found - solve problems involving unequal sharing and grouping using knowledge of fractions and multiples	**Algebra:** - use simple formulae - generate and describe linear number sequences - express missing number problems algebraically - find pairs of numbers that satisfy an equation with two unknowns - enumerate possibilities of combinations of two variables.

Which values underpin the curriculum content?

Throughout the teaching of Mathematics, many of the Christian Values are evident. In order for the children to become successful Mathematicians, the teacher must foster a positive relationship with them. Mathematics is a challenging subject which requires *courage* and *perseverance* to tackle complex concepts and problem solving, developing children's resilience. This can only be successful if there is *trust* in the classroom between the teacher and learner. In addition, there can often be *joy* found within Mathematics. As children's knowledge and application of concepts deepen, as their *perseverance* is rewarded and their successes are realised, children receive great satisfaction, happiness and *joy* at being able to complete something which they previously found challenging.

How are British Values taught from Maths?

The British Values are:

- Democracy
- The rule of law
- Individual liberty
- Mutual respect
- Tolerance of those with different beliefs

British Values are woven across the whole of the primary curriculum and opportunities to refer to them directly are possible through the teaching of Maths. For example, we can include the teaching of democracy and individual liberty when learning about data handling and statistics, where we provide people with opportunities to vote and then can analyse the data collected. Mutual respect and tolerance are paramount when working together in paired and group work to solve mathematical problems and challenges. Democracy is also encouraged through critical thinking during the problem solving process as children have to be able to explain and justify their reasoning.

Which links to careers can be made within the Maths curriculum?

Maths can be used within countless careers in a range of different ways. The professions where Maths is particularly important include:

- Secondary Maths Teacher
- Primary Teacher
- Accountant
- Astronaut
- Shop Assistant
- Data consultant
- Investment analyst
- Banker
- Statistician
- Systems developer
- Financial trader
- Insurance underwriter
- Meteorologist

- Quantity Surveyor
- Engineer
- Astronomer
- Financial manager
- Game designer

Curriculum Rationale: Why study Maths this way?

Why has the specific knowledge been selected?

The Maths Curriculum follows the White Rose Scheme of learning which ensures that children deepen their mathematical knowledge and build upon prior learning over time. It, through following the national curriculum, provides children with the essential foundations to understanding key concepts such as number and place value which are critical in developing reasoning and problem solving skills that are necessary for children to apply mathematical concepts.

Why is it taught in the order that it is?

Maths is taught in this order so that children are provided with the essential foundations to understanding key concepts such as number and place value. Once the key concepts are embedded, children then develop the ability to use this knowledge and apply to reasoning and problem solving questions.

How are Maths lessons delivered at Hawkesley?

Maths is taught on a daily basis, with lessons being around one hour in length. A lesson will always start with a do now task, which provides children with the opportunity to return to previous learning and consolidate their knowledge so that they can know and remember more. Following this, there will be a taught arithmetic section, followed by the main teach where new concepts are introduced. Children are presented with concepts in a range of different ways and fluency is ensured. They are then introduced to a range of reasoning and problem solving questions where they apply the concepts. At the end of the lesson, there is an exit ticket which has a question directly related to the learning objective.

What is the impact?

Maths is taught in this way so that children are able to know and remember more, consolidating and building upon prior learning. This ensures that key skills and knowledge are transferred to the long term memory. As a result, when children complete end of unit/half term/termly assessments, they are able to apply their knowledge with greater confidence and accuracy, therefore the overall results are increasing across the school.

Maths Curriculum Aims (end-points)

What are the aims, end-points, of specific stages of the curriculum?

The end of Key Stage expectations for Key Stage 1 are that pupils can:

Number and place value:	Addition and subtraction:
- 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 a two-digit number (tens, ones) - identify, represent and estimate numbers using different representations, including the number line - compare and order numbers from 0 up to 100; use <, > and = signs - read and write numbers to at least 100 in numerals and in words - use place value and number facts to solve problems.	- solve problems with addition and subtraction: using concrete objects and pictorial representations, including those involving numbers, quantities and measures - applying their increasing knowledge of mental and written methods - recall and use addition and subtraction facts to 20 fluently, and derive and use related facts up to 100 - add and subtract numbers using concrete objects, pictorial representations, and mentally, including: - a two-digit number and ones - a two-digit number and tens - two two-digit numbers - adding three one-digit numbers - show that addition of two numbers can be done in any order (commutative) and subtraction of one number from another cannot

	• recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems.
Multiplication and division: • recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers • calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication (×), division (÷) and equals (=) signs • show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot • solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts.	**Measurement:** • choose and use appropriate standard units to estimate and measure length/height in any direction (m/cm); mass (kg/g); temperature (°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 • 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.
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- compare and sort common 2-D and 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 distinguishing between rotation as a turn and in terms of right angles for quarter, half and three-quarter turns (clockwise and anticlockwise).	**Fractions:** - recognise, find, name and write fractions 3 1, 4 1, 4 2 and 4 3 of a length, shape, set of objects or quantity - write simple fractions for example, 2 1 of 6 = 3 and recognise the equivalence of 4 2 and 2 1.

The end of Key Stage expectations for Key Stage 2 are:

Number and place value: - read, write, order and compare numbers up to 10 000 000 and determine the value of each digit - round any whole number to a required degree of accuracy - use negative numbers in context, and calculate intervals across zero - solve number and practical problems that involve all of the above.	**Statistics:** - interpret and construct pie charts and line graphs and use these to solve problems - calculate and interpret the mean as an average
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- identify common factors, common multiples and prime numbers - use their knowledge of the order of operations to carry out calculations involving the four operations - solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why - solve problems involving addition, subtraction, multiplication and division - use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy.	- identify the value of each digit in numbers given to three decimal places and multiply and divide numbers by 10, 100 and 1000 giving answers up to three decimal places - multiply one-digit numbers with up to two decimal places by whole numbers - use written division methods in cases where the answer has up to two decimal places - solve problems which require answers to be rounded to specified degrees of accuracy - recall and use equivalences between simple fractions, decimals and percentages, including in different contexts.
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Ratio and proportion: solve problems involving the relative sizes of two quantities where missing values can be found by using integer multiplication and division facts	**Algebra:** - use simple formulae - generate and describe linear number sequences - express missing number problems algebraically - find pairs of numbers that satisfy an equation with two unknowns

• solve problems involving the calculation of percentages [for example, of measures, and such as 15% of 360] and the use of percentages for comparison • solve problems involving similar shapes where the scale factor is known or can be found • solve problems involving unequal sharing and grouping using knowledge of fractions and multiples	• enumerate possibilities of combinations of two variables.