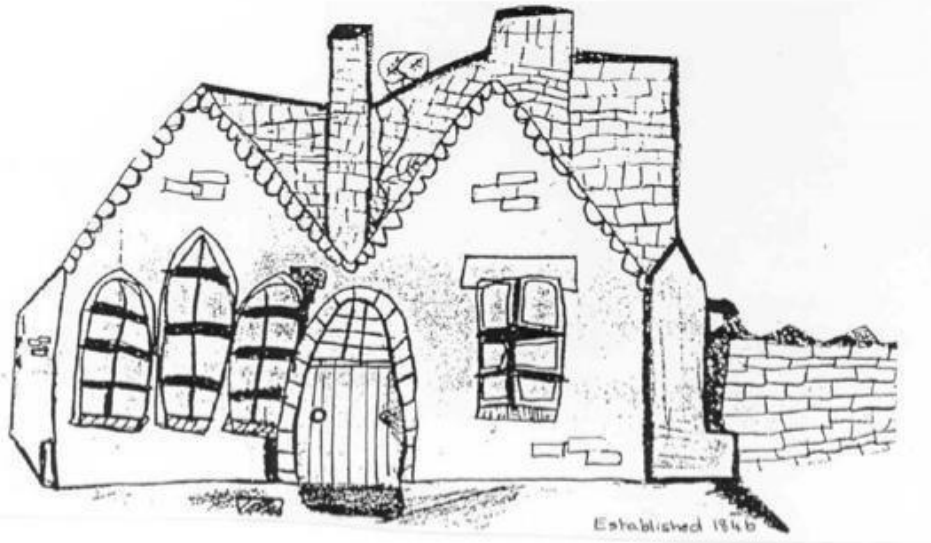Fullness of life for all, through working together with the love of Christ.

Mathematics Curriculum Purpose and Rationale

Our curriculum is driven by our Christian Vision and values, the culture and diversity of our local, national and global community.

'*Fullness of life for all, through working together with the love of Christ.*'

At Quinton Church Primary School, we believe that everyone should have life in all its fullness. Therefore, our aim is for everyone to be part of our **Christian community** where everyone is happy, safe and supported, feels **loved** and demonstrates kindness; understands **justice** and shows fairness to all; and receives high quality education and is empowered to live life to the full (John 10:10).

We are not only inspired by John 10:10, but by Micah 6:8, which shows us how to live life in all its fulness.
'*The LORD has told us what is good. What he requires of us is this: to do what is just, to show constant love, and to live in humble fellowship with our God.*'

Be kind, be fair, be thankful.

Curriculum Purpose: Why study Mathematics?

Why do we teach Mathematics?

The Maths Mastery programme is a whole-school approach to teaching mathematics that aims to raise attainment for all pupils and *close the attainment gap* between pupils from low-income families and their peers.

The programme aims to deepen pupils' understanding of key mathematical concepts. Compared to traditional curricula, fewer topics are covered in more depth and greater emphasis is placed on **problem solving and on encouraging mathematical thinking.**

For all of our pupils, from Reception to Year 6, maths mastery embeds a deep, long term and adaptable understanding of concepts through the concrete, pictorial and abstract (CPA) approach. Through our curriculum, we develop pupil's ability to make connections and secure transferable skills. At the heart of our teaching for mastery are opportunities for the children to become proficient in fluency in concepts, reasoning and problem solving. With high expectations for all our pupils, we aim to deliver a mastery curriculum that promotes engagement and enjoyment through exciting, lively lessons and enables our pupils to leave school with good mathematical understanding.

National Curriculum

The national curriculum for mathematics aims to ensure that all pupils have:

Fluency - 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.

Reasoning - reason mathematically by following a line of enquiry, conjecturing relationships and generalisations, and developing an argument, justification or proof using mathematical language.

Application/Problem Solving - 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.'

Through our mastery approach, we aim for all children to be confident and competent mathematicians who have a secure understanding of numbers and the number system. We want children to see how Mathematics links to their everyday life.

See below for a breakdown of individual year group expectations and programmes of study. For more details, please click:

https://www.gov.uk/government/publications/national-curriculum-in-england-mathematics-programmes-of-study/national-curriculum-in-england-mathematics-programmes-of-study

Year 1 Programme of Study

Number - number and place value	Number - addition and subtraction
Pupils should be taught to: - count to and across 100, forwards and backwards, beginning with 0 or 1, or from any given number - count, read and write numbers to 100 in numerals; count in multiples of 2s, 5s and 10s - given a number, identify 1 more and 1 less - 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 - read and write numbers from 1 to 20 in numerals and words	Pupils should be taught to: - read, write and interpret mathematical statements involving addition (+), subtraction (−) and equals (=) signs - represent and use number bonds and related subtraction facts within 20 - add and subtract one-digit and two-digit numbers to 20, including 0 - solve one-step problems that involve addition and subtraction, using concrete objects and pictorial representations, and missing number problems such as 7 = ? − 9
Number - multiplication and division	**Number - fractions**
Pupils should be taught to: - 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	Pupils should be taught to: - recognise, find and name a half as 1 of 2 equal parts of an object, shape or quantity - recognise, find and name a quarter as 1 of 4 equal parts of an object, shape or quantity
Measurement	**Geometry - properties of shapes**

Pupils should be taught to:
- compare, describe and solve practical problems for:
  - lengths and heights [for example, long/short, longer/shorter, tall/short, double/half]
  - mass/weight [for example, heavy/light, heavier than, lighter than]
  - capacity and volume [for example, full/empty, more than, less than, half, half full, quarter]
  - time [for example, quicker, slower, earlier, later]
- measure and begin to record the following:
  - lengths and heights
  - mass/weight
  - capacity and volume
	Pupils should be taught to:
	- recognise and name common 2-D and 3-D shapes, including:
	  - 2-D shapes [for example, rectangles (including squares), circles and triangles]
	  - 3-D shapes [for example, cuboids (including cubes), pyramids and spheres]

- time (hours, minutes, seconds) - recognise and know the value of different denominations of coins and notes - sequence events in chronological order using language [for example, before and after, next, first, today, yesterday, tomorrow, morning, afternoon and evening] - recognise and use language relating to dates, including days of the week, weeks, months and years - tell the time to the hour and half past the hour and draw the hands on a clock face to show these times	**Geometry - position and direction** Pupils should be taught to: describe position, direction and movement, including whole, half, quarter and three-quarter turns

Year 2 Programme of Study

Number - number and place value	Number - addition and subtraction

Pupils should be taught to:
 	
• count in steps of 2, 3, and 5 from 0, and in 10s from any number, forward and backward
• recognise the place value of each digit in a two-digit number (10s, 1s)
• 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
	Pupils should be taught to:
	
	• 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 1s
	  • a two-digit number and 10s
	  • 2 two-digit numbers
	  • adding 3 one-digit numbers
	• show that addition of 2 numbers can be done in any order (commutative) and subtraction of 1 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

Number - multiplication and division	Number - fractions
Pupils should be taught to: • 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 2 numbers can be done in any order (commutative) and division of 1 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 •	Pupils should be taught to: • 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 $\frac{1}{2}$

Measurement Pupils should be taught to: • 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	**Geometry - properties of shapes** Pupils should be taught to: • 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
Geometry - position and direction Pupils should be taught to: • 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 anti-clockwise)	**Statistics** Pupils should be taught to: • interpret and construct simple pictograms, tally charts, block diagrams and 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

Year 3 Programme of Study

Number - number and place value	Number - addition and subtraction

Pupils should be taught to:
 	
• count from 0 in multiples of 4, 8, 50 and 100; find 10 or 100 more or less than a given number
• recognise the place value of each digit in a 3-digit number (100s, 10s, 1s)
• compare and order numbers up to 1,000
• identify, represent and estimate numbers using different representations
• read and write numbers up to 1,000 in numerals and in words
• solve number problems and practical problems involving these ideas
	Pupils should be taught to:
	
	• add and subtract numbers mentally, including:
	   • a three-digit number and 1s
	   • a three-digit number and 10s
	   • a three-digit number and 100s
	• add and subtract numbers with up to 3 digits, using formal written methods of columnar addition and subtraction
	• estimate the answer to a calculation and use inverse operations to check answers
	• solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction

Number - multiplication and division	**Number - fractions**
Pupils should be taught to: • recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables • 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 • 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	Pupils should be taught to: • count up and down in tenths; recognise that tenths arise from dividing an object into 10 equal parts and in dividing one-digit numbers or quantities by 10 • recognise, find and write fractions of a discrete set of objects: unit fractions and non-unit fractions with small denominators • recognise and use fractions as numbers: unit fractions and non-unit fractions with small denominators • recognise and show, using diagrams, equivalent fractions with small denominators • add and subtract fractions with the same denominator within one whole [for example, $\frac{5}{7} + \frac{1}{7} = \frac{6}{7}$] • compare and order unit fractions, and fractions with the same denominators • solve problems that involve all of the above

Measurement	Geometry - properties of shapes
Pupils should be taught to: • measure, compare, add and subtract: lengths (m/cm/mm); mass (kg/g); volume/capacity (l/ml) • measure the perimeter of simple 2-D shapes • add and subtract amounts of money to give change, using both £ and p in practical contexts • tell and write the time from an analogue clock, including using Roman numerals from I to XII, and 12-hour and 24-hour clocks • estimate and read time with increasing accuracy to the nearest minute; record and compare time in terms of seconds, minutes and hours; use vocabulary such as o'clock, am/pm, morning, afternoon, noon and midnight • know the number of seconds in a minute and the number of days in each month, year and leap year • compare durations of events [for example, to calculate the time taken by particular events or tasks]	Pupils should be taught to: • draw 2-D shapes and make 3-D shapes using modelling materials; recognise 3-D shapes in different orientations and describe them • recognise angles as a property of shape or a description of a turn • identify right angles, recognise that 2 right angles make a half-turn, 3 make three-quarters of a turn and 4 a complete turn; identify whether angles are greater than or less than a right angle • identify horizontal and vertical lines and pairs of perpendicular and parallel lines
Statistics Pupils should be taught to: • interpret and present data using bar charts, pictograms and tables • solve one-step and two-step questions [for example 'How many more?' and 'How many fewer?'] using information presented in scaled bar charts and pictograms and tables	

Number - number and place value

Pupils should be taught to:

- count in multiples of 6, 7, 9, 25 and 1,000
- find 1,000 more or less than a given number
- count backwards through 0 to include negative numbers
- recognise the place value of each digit in a four-digit number (1,000s, 100s, 10s, and 1s)
- order and compare numbers beyond 1,000
- identify, represent and estimate numbers using different representations
- round any number to the nearest 10, 100 or 1,000
- solve number and practical problems that involve all of the above and with increasingly large positive numbers
- read Roman numerals to 100 (I to C) and know that over time, the numeral system changed to include the concept of 0 and place value

Number - addition and subtraction

Pupils should be taught to:

- add and subtract numbers with up to 4 digits using the formal written methods of columnar addition and subtraction where appropriate
- estimate and use inverse operations to check answers to a calculation
- solve addition and subtraction two-step problems in contexts, deciding which operations and methods to use and why

Number - multiplication and division

Pupils should be taught to:

- recall multiplication and division facts for multiplication tables up to 12×12
- use place value, known and derived facts to multiply and divide mentally, including: multiplying by 0 and 1; dividing by 1; multiplying together 3 numbers
- recognise and use factor pairs and commutativity in mental calculations
- multiply two-digit and three-digit numbers by a one-digit number using formal written layout
- solve problems involving multiplying and adding, including using the distributive law to multiply two-digit numbers by 1 digit, integer scaling problems and harder correspondence problems such as n objects are connected to m objects

Number - fractions (including decimals)

Pupils should be taught to:

- recognise and show, using diagrams, families of common equivalent fractions
- count up and down in hundredths; recognise that hundredths arise when dividing an object by 100 and dividing tenths by 10
- solve problems involving increasingly harder fractions to calculate quantities, and fractions to divide quantities, including non-unit fractions where the answer is a whole number
- add and subtract fractions with the same denominator
- recognise and write decimal equivalents of any number of tenths or hundreds
- recognise and write decimal equivalents to $\frac{1}{4}, \frac{1}{2}, \frac{3}{4}$
- find the effect of dividing a one- or two-digit number by 10 and 100, identifying the value of the digits in the answer as ones, tenths and hundredths
- round decimals with 1 decimal place to the nearest whole number

	- compare numbers with the same number of decimal places up to 2 decimal places - solve simple measure and money problems involving fractions and decimals to 2 decimal places
Measurement Pupils should be taught to: - convert between different units of measure [for example, kilometre to metre; hour to minute] - measure and calculate the perimeter of a rectilinear figure (including squares) in centimetres and metres - find the area of rectilinear shapes by counting squares - estimate, compare and calculate different measures, including money in pounds and pence - read, write and convert time between analogue and digital 12- and 24-hour clocks - solve problems involving converting from hours to minutes, minutes to seconds, years to months, weeks to days	**Geometry - properties of shapes** Pupils should be taught to: - compare and classify geometric shapes, including quadrilaterals and triangles, based on their properties and sizes - identify acute and obtuse angles and compare and order angles up to 2 right angles by size - identify lines of symmetry in 2-D shapes presented in different orientations - complete a simple symmetric figure with respect to a specific line of symmetry
Geometry - position and direction Pupils should be taught to: - describe positions on a 2-D grid as coordinates in the first quadrant - describe movements between positions as translations of a given unit to the left/right and up/down - plot specified points and draw sides to complete a given polygon	**Statistics** Pupils should be taught to: - interpret and present discrete and continuous data using appropriate graphical methods, including bar charts and time graphs - solve comparison, sum and difference problems using information presented in bar charts, pictograms, tables and other graphs

Number - number and place value	**Number - addition and subtraction**
Pupils should be taught to: • read, write, order and compare numbers to at least 1,000,000 and determine the value of each digit • count forwards or backwards in steps of powers of 10 for any given number up to 1,000,000 • interpret negative numbers in context, count forwards and backwards with positive and negative whole numbers, including through 0 • round any number up to 1,000,000 to the nearest 10, 100, 1,000, 10,000 and 100,000 • solve number problems and practical problems that involve all of the above • read Roman numerals to 1,000 (M) and recognise years written in Roman numerals	Pupils should be taught to: • add and subtract whole numbers with more than 4 digits, including using formal written methods (columnar addition and subtraction) • add and subtract numbers mentally with increasingly large numbers • use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy • solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why
Number - multiplication and division	**Number - fractions (including decimals and percentages)**
Pupils should be taught to: • identify multiples and factors, including finding all factor pairs of a number, and common factors of 2 numbers • know and use the vocabulary of prime numbers, prime factors and composite (non-prime) numbers • establish whether a number up to 100 is prime and recall prime numbers up to 19 • 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 • multiply and divide numbers mentally, drawing upon known facts • 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 • multiply and divide whole numbers and those involving decimals by 10, 100 and 1,000	Pupils should be taught to: • compare and order fractions whose denominators are all multiples of the same number • identify, name and write equivalent fractions of a given fraction, represented visually, including tenths and hundredths • recognise mixed numbers and improper fractions and convert from one form to the other and write mathematical statements > 1 as a mixed number [for example, $\frac{2}{5} + \frac{4}{5} = \frac{6}{5} = 1\frac{1}{5}$] • add and subtract fractions with the same denominator, and denominators that are multiples of the same number • multiply proper fractions and mixed numbers by whole numbers, supported by materials and diagrams • read and write decimal numbers as fractions [for example, $0.71 = \frac{71}{100}$] • recognise and use thousandths and relate them to tenths, hundredths and decimal equivalents

- recognise and use square numbers and cube numbers, and the notation for squared (^{2}) and cubed (^{3}) - solve problems involving multiplication and division, including using their knowledge of factors and multiples, squares and cubes - solve problems involving addition, subtraction, multiplication and division and a combination of these, including understanding the meaning of the equals sign - solve problems involving multiplication and division, including scaling by simple fractions and problems involving simple rates	- round decimals with 2 decimal places to the nearest whole number and to 1 decimal place - read, write, order and compare numbers with up to 3 decimal places - solve problems involving number up to 3 decimal places - recognise the per cent symbol (%) and understand that per cent relates to 'number of parts per 100', and write percentages as a fraction with denominator 100, and as a decimal fraction - solve problems which require knowing percentage and decimal equivalents of $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{5}$, $\frac{2}{5}$, $\frac{4}{5}$ and those fractions with a denominator of a multiple of 10 or 25
Geometry - properties of shapes Pupils should be taught to: - identify 3-D shapes, including cubes and other cuboids, from 2-D representations - know angles are measured in degrees: estimate and compare acute, obtuse and reflex angles - draw given angles, and measure them in degrees (°) - identify: - angles at a point and 1 whole turn (total 360°) - angles at a point on a straight line and half a turn (total 180°) - other multiples of 90° - use the properties of rectangles to deduce related facts and find missing lengths and angles - distinguish between regular and irregular polygons based on reasoning about equal sides and angles	**Geometry - position and direction** Pupils should be taught to: identify, describe and represent the position of a shape following a reflection or translation, using the appropriate language, and know that the shape has not changed
Statistics Pupils should be taught to: - solve comparison, sum and difference problems using information presented in a line graph - complete, read and interpret information in tables, including timetables	

Number - number and place value	**Number - addition, subtraction, multiplication and division**
Pupils should be taught to: • 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 0 • solve number and practical problems that involve all of the above	Pupils should be taught to: • 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 4 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
Number - Fractions (including decimals and percentages)	**Ratio and proportion**
Pupils should be taught to: • 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, $\frac{1}{3} \div 2 = \frac{1}{6}$]	Pupils should be taught to: • solve problems involving the relative sizes of 2 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

- 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 3 decimal places and multiply and divide numbers by 10, 100 and 1,000 giving answers up to 3 decimal places
- multiply one-digit numbers with up to 2 decimal places by whole numbers
- use written division methods in cases where the answer has up to 2 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

- solve problems involving unequal sharing and grouping using knowledge of fractions and multiples

Algebra

Pupils should be taught to:
- use simple formulae
- generate and describe linear number sequences
- express missing number problems algebraically
- find pairs of numbers that satisfy an equation with 2 unknowns
- enumerate possibilities of combinations of 2 variables

Measurement

Pupils should be taught to:
- solve problems involving the calculation and conversion of units of measure, using decimal notation up to 3 decimal places where appropriate
- use, read, write and convert between standard units, converting measurements of length, mass, volume and time from a smaller unit of measure to a larger unit, and vice versa, using decimal notation to up to 3 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 (cm^3) and cubic metres (m^3), and extending to other units [for example, mm^3 and km^3]

Geometry - properties of shapes	Geometry - position and direction
Pupils should be taught to: • draw 2-D shapes using given dimensions and angles • recognise, describe and build simple 3-D shapes, including making nets • 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	Pupils should be taught to: • describe positions on the full coordinate grid (all 4 quadrants) • draw and translate simple shapes on the coordinate plane, and reflect them in the axes
Statistics Pupils should be taught to: • interpret and construct pie charts and line graphs and use these to solve problems • calculate and interpret the mean as an average	

Which Christian values underpin the curriculum content?

School values:

Kindness- compassion, service, peace, love

Fairness- justice, forgiveness, wisdom

Thankfulness- hope, friendship, trust

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 **kind**, positive relationship with them. Mathematics is a challenging subject which requires **hopeful** 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 Mathematics?

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 Mathematics. 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.

Curriculum Rationale: Why study Mathematics in this way?

Why has the specific knowledge been selected?

The Mathematics Curriculum follows the White Rose Scheme of learning which ensures that children deepen their mathematical knowledge and build upon prior learning over time. Through following the national curriculum, it 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. Mathematics is taught in the order prescribed by White Rose Maths Hub 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. (See progression document)

How are Mathematics lessons delivered at Quinton?

Mathematics is taught daily, with lessons being around one hour in length. A lesson will often start with a 'Flashback 4' or 'Do Now' which consists of questions that have already been taught. This enables the children to revisit key knowledge and skills, practise them and then allows teachers to address any misconceptions. A lesson will then move to whole class teaching through 'My turn' where the teacher models skills and knowledge for the lesson and then moving to 'Our Turn' employing the ping-pong style of teaching (episodic), with children practising the skill modelled by the teacher then moving towards more independent practise. They will work in pairs and groups to discuss their ideas and can be used as mini teachers to demonstrate their understanding to the class, with the class supporting or challenging their ideas. During this section of the lesson, all children should be exposed to the CPA approach (concrete-pictorial-abstract). This is not done in isolation, but instead all children work through each element, concrete, pictorial and abstract alongside each other. Each anchor task has a *dive deeper* element to challenge the rapid graspers.

Most lessons will also include **intelligent practice**; carefully crafted questions focussed on the one key piece of learning.

This has 3 sections:

- simple examples linked to key learning of the lesson. Focus on procedural fluency: 'what it is' and 'What is it also' (Standard & non-standard) and variation.
- Active argument and reasoning
- Reasoning and problem-solving, apply to different contexts, make connections.

At the end of the lesson, there is an exit ticket which has a question directly related to the learning objective. This is an opportunity for the pupil to demonstrate their understanding.

There will also be daily arithmetic sessions, which provide children with the opportunity to return to previous learning and consolidate their knowledge so that they can know and remember more as well as practising and recapping key arithmetic skills and procedures. These sessions also include teaching, practice and assessment of key number facts, appropriate to the year group.

What is the impact?

Mathematics 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 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.

Mathematics Curriculum Aims

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

In EYFS, aims are outlined as Early Learning Goals (ELGs).
ELG: Number
Children at the expected level of development will:
- Have a deep understanding of number to 10, including the composition of each number;
- Subitise (recognise quantities without counting) up to 5;
- Automatically recall (without reference to rhymes, counting or other aids) number bonds up to 5 (including subtraction facts) and some number bonds to 10, including double facts.

ELG: Numerical Patterns
Children at the expected level of development will:
- Verbally count beyond 20, recognising the pattern of the counting system;
- Compare quantities up to 10 in different contexts, recognising when one quantity is greater than, less than or the same as the other quantity;
- Explore and represent patterns within numbers up to 10, including evens and odds, double facts and how quantities can be distributed equally.

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 be reversed. • 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.
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 (one third 1/3, one quarter ¼, one half ½, two quarters 2/4 and three quarters 3/4) of a length, shape, set of objects or quantity • write simple fractions for example, ½ of 6 = 3 and recognise the equivalence of 2/4 and 1/2.

The end of Key Stage expectations for Key Stage 2 are that pupils can:

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
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, Decimals and Percentages**: • 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, ¼ × ½ = 1/8] divide proper fractions by whole numbers [for example, 1/3 ÷ 2 = 1/6] • associate a fraction with division and calculate decimal fraction equivalents [for example, 0.375] for a simple fraction [for example, 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 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	**Geometry**: • draw 2-D shapes using given dimensions and angles • recognise, describe and build simple 3-D shapes, including making nets • 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

• 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]	• 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