Mathematics and Calculation Policy

"We are the seeds. Our school is the good ground which provides everyone with all they need to grow and achieve." *(Our children)*

St Michael's is a Church of England Primary School built on distinctive Christian Values at the very heart of its community.

We will provide:

- a welcoming, inclusive school with strong relationships across our community, that celebrates diversity;
- excellent teaching with a nurturing approach, guiding first steps to next steps;
- an inspirational and challenging curriculum which ignites curiosity, encourages resilience and grows confidence so children become lifelong learners;
- a happy, safe and stimulating environment in which children can achieve their full potential;

So that our children will flourish in all they do and become good citizens

"And some seed fell on good ground. This seed grew and made 100 times more grain." *(Luke 8:8)*

Table of Contents

Achieving and growing together

Statement of intent

St Michael's CE Primary School recognises that maths is both a key skill within school, and a life skill to be utilised through everyday experiences. A high-quality maths education provides a firm foundation for understanding how maths is used in everyday life and activities, developing pupils' ability to reason mathematically.

Through the teaching of maths, we aim to develop:

- A positive attitude towards maths and an awareness of the relevance of maths in the real world.
- A process of enquiry and experiment.
- An ability to solve problems and think logically in order to work systematically and accurately.
- An ability to work both independently and in cooperation with others.
- Competence and confidence in pupils' maths knowledge, concepts and skills.
- An appreciation of the creative aspects of maths and an awareness of its aesthetic appeal.

1. Legal framework

This policy has due regard to statutory guidance including, but not limited to, the following:

- DfE (2013) 'National curriculum in England: Mathematics programmes of study'

- DfE (2017) 'Statutory framework for the early years foundation stage'

2. Roles and responsibilities

The **subject leader** is responsible for:

- Preparing policy documents, curriculum plans and schemes of work for the subject. This includes the calculation policy (appendix I)

- Reviewing changes to the national curriculum and advising on their implementation.

- Monitoring the learning and teaching of maths, providing support for staff where necessary.

- Ensuring the continuity and progression from year group to year group.

- Encouraging staff to provide effective learning opportunities for pupils.

- Helping to develop colleagues' expertise in the subject.

- Organising the deployment of resources and carrying out an **annual** audit of all maths-related resources.

- Liaising with teachers across all phases.

- Communicating developments in the subject to all teaching staff.

- Leading staff meetings and providing staff members with the appropriate training.

- Organising, providing and monitoring CPD opportunities in the subject.

- Ensuring common standards are met for recording and assessing pupil performance.

- Advising on the contribution of maths to other curriculum areas, including cross-curricular and extra-curricular activities.

- Collating assessment data and setting new priorities for the development of maths in subsequent years.

The **classroom teacher** is responsible for:

- Acting in accordance with this policy.

- Ensuring progression of pupils' mathematical skills, with due regard to the national curriculum.

- Planning lessons effectively, ensuring a range of teaching methods are used to cover the content of the national curriculum.

- Liaising with the **subject leader** about key topics, resources and support for individual pupils.

- Monitoring the progress of pupils in their class and reporting this on an **annual** basis to parents.

- Reporting any concerns regarding the teaching of the subject to the **subject leader** or a member of the **senior leadership team (SLT)**.

- Undertaking any training that is necessary in order to effectively teach the subject.

The special educational needs coordinator (SENCO) is responsible for:

- Liaising with the subject leader in order to implement and develop maths throughout the school.

- Organising and providing training for staff regarding the maths curriculum for pupils with special educational needs and disabilities (SEND).

- Advising staff how best to support pupils' needs.

- Advising staff on the inclusion of mathematical objectives in pupils' individual education plans.

- Advising staff on the use of teaching assistants in order to meet pupils' needs.

3. Early years provision

Activities and experiences for pupils will be based on the seven areas of learning and development, as outlined in the DfE's 'Statutory framework for the early years foundation stage'.

Provision for early years pupils focusses on four specific areas:

Literacy

Maths

Understanding the world

Expressive arts and design

Activities will provide pupils with the opportunity to develop and improve their skills in counting, understanding and using numbers, calculating simple addition and subtraction problems, and describing shapes, spaces and measurements.

All activities will adhere to the objectives set out in the framework.

During the early years foundation stage, pupils will be taught to:

- Count with numbers from 1 to 20, placing them in order and naming the number that is one more or less than a given number.

- Use quantities and objects to add and subtract two single-digit numbers, and count forwards or backwards to find the answer.

- Solve problems, including doubling, halving and sharing.

- Use everyday language to talk about size, weight, capacity, position, distance, time and money in order to compare quantities and objects, and solve problems.

- Recognise, create and describe patterns.

- Use mathematical language to describe everyday objects and shapes.

4. The national curriculum

The national curriculum is followed and provides a full breakdown of the statutory content to be taught within each unit.

4.1. In Year 1, pupils will be taught to:

Number and place value

- Count to 100, forwards and backwards, beginning with 0 or 1, from any number.

- Count, read, and write numbers from 1 to 100.

- Count in multiples of 2, 5, and 10.

- Identify one more and one less from a number.

- Identify and represent numbers using objects and pictures (using a number line) and use language of: equal to, more than, less than (fewer), most, least.

- Read and write numbers from 1 to 20 in numerals and words.

Addition and subtraction

- Read, write, and interpret statements involving addition, subtraction, and equals signs.

- Represent and use number bonds and related subtraction facts within 20.

- Add and subtract one and two-digit numbers to 20, including 0.

- Solve one-step problems which involve addition and subtraction.

Multiplication and division

- Solve one-step problems using multiplication and division, calculating the answer using concrete objects and pictorial representations.

Fractions

- Recognise, find and name a half as 1 of 2 equal parts.

- Recognise, find and name a quarter as 1 of 4 equal parts.

Measurement

- Compare, describe and solve practical problems for lengths and heights, weight, time, capacity and volume.

- Measure and begin to record lengths and heights, weight, time, capacity and volume.

- Recognise and know the value of different denominations of coins and notes.

- Sequence events in chronological order using language.

- 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.

Properties of shapes

- Recognise and name common 2D and 3D shapes.

Position and direction

- Describe position, direction and movement, including whole, half, quarter and three-quarter turns.

4.2. **In Year 2, pupils will be taught to:**

- **Number and place value**
  — Count in steps of two, three and five from 0, and in 10s from any number, forwards and backwards.
  — Recognise the place value of each digit in a two-digit number.
  — Identify, represent and estimate numbers using different depictions, including the number line.
  — Compare and order numbers from 0 to 100, using <, > and = signs.
  — Read and write numbers 1 to 100 in numerals and 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.
  — Apply increasing knowledge of mental and written methods.

— Recall and use addition and subtraction facts to 20, 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, two two-digit numbers, and adding three one-digit numbers.
— Show that the addition of two numbers can be done in any order 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.
  — Recognise odd and even numbers.
  — Calculate mathematical statements for multiplication and division within the multiplication tables and write them using x, ÷, and = signs.
  — Show that multiplication of two numbers can be done in any order, 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.

- **Fractions**
  — Recognise, find, name, and write fractions of a length, shape, set of objects or quantity.
  — Write simple fractions and recognise their equivalence, e.g. $\frac{1}{2}$ and $\frac{2}{4}$.

- **Measurement**
  — Choose and use appropriate standard units to estimate and measure length/height in any direction, mass, temperature, and capacity to the nearest appropriate unit.
  — Compare and order lengths, heights, mass, volume/capacity, and record the results using >, < and =.
  — Recognise and use symbols for pounds (£) and pence (p), and 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, e.g. giving change.
  — Compare and order 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.

- **Properties of shapes**
  — Identify and describe the properties of 2D shapes, including the number of sides, and line symmetry in a vertical line.
  — Identify and describe the properties of 3D shapes, including the number of edges, vertices and faces.
  — Identify 2D shapes on the surface of 3D shapes.

Achieving and growing together

— Compare and sort common 2D and 3D shapes using everyday objects.

- **Position and direction**
  — 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, distinguishing between rotation as a turn, and in terms of right angles for quarter, half and three-quarter turns.

- **Statistics**
  — 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 data.

4.3. **In Year 3, pupils will be taught to:**

- **Number and place value**
  — Count from 0 in multiples of 4, 8, 50 and 100, finding 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 concepts.

- **Addition and subtraction**
  — Add and subtract numbers mentally, including a three-digit number and 1s, a three-digit number and 10s, and a three-digit number and 100s.
  — Add and subtract numbers with up to three digits, using formal written methods of columnar addition and subtraction.
  — Estimate the answer to a calculation and reverse operations to check answers.
  — Solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction.

- **Multiplication and division**
  — 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, including for two-digit numbers times one-digit numbers, using mental maths 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.

- **Fractions**
  — Distinguish what tenths are.

— Count up and down in tenths.
— Distinguish, find and write fractions of a discrete set of objects: unit fractions and non-unit fractions with small denominators.
— Distinguish and use fractions as numbers: unit fractions and non-unit fractions with small denominators.
— Distinguish and show, using diagrams, equivalent fractions with small denominators.
— Add and subtract fractions with the same denominator within one whole.
— Compare and order unit fractions, and fractions with the same denominators.
— Solve problems that involve all of the above.

4.4. Measurement
— Measure, compare, add and subtract lengths, mass, volume/capacity.
— Measure the perimeter of simple 2D shapes.
— Add and subtract amounts of money to give change.
— 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, record, compare and read times, with increasing accuracy to the nearest minute.
— Use vocabulary such as o'clock, am/pm, morning, afternoon, noon, and midnight.
— Distinguish the number of seconds in a minute and the number of days in each month, year and leap year.
— Compare the durations of events.

- **Properties of shapes**
  — Draw 2D shapes and make 3D shapes using modelling materials; recognise 3D shapes in different orientations and describe them.
  — Recognise angles as a property of a shape or a description of a turn.
  — Identify right angles and distinguish that two right angles make a half-turn, three make three-quarters of a turn, and four 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**
  — Show data using bar charts, pictograms and tables.
  — Solve one and two-step data using bar charts, pictograms and tables.

4.5. In Year 4, pupils will be taught to:

- **Number and place value**
  — Count in multiples of 6, 7, 9, 25 and 1,000.
  — Find 1,000 more or less than a chosen number.
  — Count negative numbers from 0.
  — Recognise place value of each digit of a four-digit number.
  — Recognise, 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 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.

- **Addition and subtraction**
  — Add and subtract numbers with up to four digits using formal written methods, and columnar addition and subtraction where necessary.
  — Estimate and use inverse operations to check the answers to a calculation.
  — Solve addition and subtraction two-step problems in different contexts, deciding which operations to use and why.

- **Multiplication and division**
  — Use multiplication and division facts for tables up to 12x12
  — Use place value, known and derived facts to multiply and divide mentally, including: multiplying by 0 and one; dividing by one; multiplying together three 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 one digit, integer scaling problems, and harder correspondence problems such as 'n' objects connected to 'm' objects.

- **Fractions (including decimals)**
  — 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 hundredths.
  — Identify 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 one decimal place to the nearest whole number.
  — Compare numbers with the same number of decimal places, up to two decimal places.
  — Solve simple measure and money problems, involving fractions and decimals, to two decimal places.

- **Measurement**
  — Convert between different units of measurement.
  — Measure and calculate the perimeter of a rectilinear figure 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.

- **Properties of shapes**
  — Compare and classify geometric shapes, including quadrilaterals and triangles, based on their properties and sizes.
  — Recognise acute and obtuse angles, and compare and order angles – up to two right angles – by size.
  — Recognise lines of symmetry in 2D shapes presented in different orientations.
  — Complete a simple symmetric figure with respect to a specific line of symmetry.

- **Position and direction**
  — Describe positions on a 2D 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**
  — 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.

4.6. **In Year 5, pupils will be taught to:**

- **Number and place value**
  — 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.

- **Addition and subtraction**
  — Add and subtract whole numbers with more than four digits, including using formal written methods.
  — Add and subtract numbers mentally using 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 context, deciding which operations and methods to use and why.

- **Multiplication and division**

- Recognise multiples and factors, including finding all factor pairs of a number, and common factors of two numbers.
- Know and use the vocabulary of prime numbers, prime factors and non-prime numbers.
- Establish whether a number up to 100 is prime and recall prime numbers up to 19.
- Multiply numbers up to four 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.
- Divide numbers up to four 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.
- Identify and use square numbers and cube numbers, and the notation for squared (^{2}) and cubed (^{3}).
- Solve problems involving multiplication and division, including using 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.

- **Fractions (including decimals and percentages)**
  - 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, know how to convert from one form to the other, and write mathematical statements greater than one as a mixed number.
  - 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.
  - Recognise and use thousandths and relate them to tenths, hundredths and decimal equivalents.
  - Round decimals with two decimal places to the nearest whole number and to one decimal place.
  - Read, write, order and compare numbers with up to three decimal places.
  - Solve problems involving numbers with up to three decimal places.
  - Recognise the percent symbol (%) and understand that percent relates to 'number of parts per 100,' writing percentages as a fraction with a denominator of 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.

- **Measurement**
  - Convert between different units of metric measurement.

- Understand and use approximate equivalences between metric units and common imperial units such as inches, pounds and pints.
- Measure and calculate the perimeter of composite rectilinear shapes in centimetres and metres.
- Calculate and compare the area of, including using standard units, square centimetres (cm^2) and square metres (m^2), and estimate the area of irregular shapes.
- Estimate volume and capacity.
- Solve problems involving converting between units of time.
- Use all four operations to solve problems involving measure using decimal notation, including scaling.

- **Properties of shapes**
  - Identify 3D shapes, including cubes and other cuboids, from 2D representations.
  - Know that angles are measured in degrees, and estimate and compare acute, obtuse and reflex angles.
  - Draw given angles, and measure them in degrees (°).
  - Identify angles at a point and 360° (one whole turn), angles at a point on a straight line and 180° (half a turn), and 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.

- **Position and direction**
  - 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**
  - Solve comparison, sum and difference problems using information presented in a line graph.
  - Complete, read and interpret information in tables, including timetables.

4.7. **In Year 6, pupils will be taught to:**

- **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 0.
  - Solve numerical and practical problems that involve all of the above.

- **Addition, subtraction, multiplication and division**
  - Multiply multi-digit numbers of up to four digits by a two-digit whole number using the formal written method of long multiplication.
  - Divide numbers of up to four 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 of up to four 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 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 (including decimals and percentages)**
  - — Use common factors to simplify fractions, and use common multiples to express fractions in the same denomination.
  - — Compare and order fractions, including fractions greater than one.
  - — 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.
  - — Divide proper fractions by whole numbers.
  - — Associate a fraction with division and calculate decimal fraction equivalents for a simple fraction.
  - — Identify the value of each digit in numbers given to three decimal places, and multiply and divide numbers by 10, 100 and 1,000 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.

- **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 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.

Achieving and growing together

— Enumerate possibilities of combinations of two variables.

- **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.
  — 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 the volume of cubes and cuboids using standard units, including cubic centimetres (cm^3) and cubic metres (m^3), and extend to other units.

- **Properties of shapes**
  — Draw 2D shapes using given dimensions and angles.
  — Recognise, describe and build simple 3D 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.

- **Position and direction**
  — Describe positions on the full coordinate grid.
  — Draw and translate simple shapes on the coordinate grid, and reflect them in the axes.

- **Statistics**
  — Interpret and construct pie charts and line graphs, and use these to solve problems.
  — Calculate and interpret the mean as an average.

5. Cross-curricular links

Wherever possible, the maths curriculum will provide opportunities to establish links with other curriculum areas.

English

- Mathematical terminology is used, where appropriate.

- Maths-based texts are sometimes used in English lessons and in guided reading sessions.

Science

- Pupils' data collection and analysis skills are further developed through the conduction of physical experiments, using units of measurement, calculating averages and interpreting results.

- Pupils record their finding using charts, tables and graphs.

Humanities

- Data analysis, pattern seeking and problem-solving skills are developed through the teaching of geography.

- Pupils' understanding of time and measurements of time are developed through discussions of historical events.

ICT

- Pupils are encouraged to use calculators and other electronical devices, gaining confidence throughout their school experience.

- ICT will be used to enhance pupils' maths skills through the use of online resources and the creation of spreadsheets.

- ICT will be used to record findings, using text, data and tables.

6. Teaching and learning

Pupils will be taught to describe key characteristics and associated processes in common language, as well as understand and use technical terminology and specialist vocabulary.

Pupils will undertake independent work, and have the opportunity to work in groups and discuss work with fellow classmates.

Lessons will allow for a wide range of mathematical, enquiry-based research activities, including the following:

Questioning, predicting and interpreting

Pattern seeking

Collaborative work

Problem-solving activities

Classifying and grouping

Lessons will involve the use of a variety of sources, including data, statistics, graphs and charts.

The **classroom teacher**, in collaboration with the **subject leader**, will ensure that the needs of all pupils are met by:

Setting tasks which can have a variety of responses.

Providing resources of differing complexity, according to the ability of the pupils.

Setting tasks of varying difficulty, depending on the ability group.

Utilising teaching assistants to ensure that pupils are effectively supported.

A maths mastery approach is taken to the curriculum, in which fluency comes from deep knowledge and practice. This means that structured questioning is used to ensure that pupils develop fluent technical proficiency and think deeply about the underpinning mathematical concepts.

Focus is put on the development of deep structural knowledge and the ability to make connections, with the aim of ensuring that what is learnt is sustained over time.

At St Michael's CE Primary School, we do not prioritise between technical proficiency and conceptual understanding, and we aim to develop these in parallel.

7. Planning

All relevant staff members are briefed on the school's planning procedures as part of their staff training.

Throughout St Michael's CE Primary School, maths is taught as a discrete lesson and as part of cross-curricular themes when appropriate.

Teachers will use the key learning content in the DfE's statutory guidance 'National curriculum in England: mathematics programmes of study', published in 2014.

Lesson plans will demonstrate a balance of interactive and independent elements used in teaching, ensuring that all pupils engage with their learning.

There will be a clear focus on direct, instructional teaching and interactive oral work with the whole class and targeted groups.

Teachers will ensure that all maths lessons include a focus on mental calculation.

Long-term planning will be used to outline the units to be taught within each year group.

Medium-term planning will be used to outline the vocabulary and skills that will be taught in each unit of work, as well as highlight the opportunities for assessment.

Medium-term plans will identify learning objectives, main learning activities and differentiation.

Medium-term plans will be shared with the **subject leader** to ensure there is progression between years.

Short-term planning will be used flexibly to reflect the objectives of the lesson, the success criteria and the aims of the next lesson.

Short-term planning is the responsibility of the teacher. This is achieved by building on their medium-term planning, taking into account pupils' needs and identifying the method in which topics could be taught.

All lessons will have clear learning objectives, which are shared and reviewed with pupils.

Homework will be set on a **weekly** basis and will build on that week's lesson objectives.

Homework will take a variety of formats, including mental maths tasks, games, data analysis activities and written tasks.

8. Assessment and reporting

Pupils will be assessed and their progression recorded in line with the school's **Assessment Policy**.

Pupils aged between two and three will be assessed in accordance with the 'Statutory framework for the early years foundation stage', in order to identify a pupil's strengths and identify areas where progress is less than expected.

An EYFS Profile will be completed for each pupil in the final term of the year in which they reach age five.

The progress and development of pupils within the EYFS is assessed against the early learning goals outlined in the 'Statutory framework for the early years foundation stage'.

Throughout the year, teachers will plan on-going creative assessment opportunities in order to gauge whether pupils have achieved the key learning objectives.

Assessment will be undertaken in various forms, including the following:

Talking to pupils and asking questions

Discussing pupils' work with them

Marking work against the learning objectives

Pupils' self-evaluation of their work

Classroom tests and formal exams

Formative assessment, which is carried out informally throughout the year, enables teachers to identify pupils' understanding of subjects and inform their immediate lesson planning.

In terms of summative assessments, the results of end-of-year assessments will be passed to relevant members of staff, such as the pupil's future teacher, in order to demonstrate where pupils are at a given point in time.

Standardised tests will be used termly, to measure each pupil's attainment in all areas of maths. These results will be compared with an 'average' for all pupils of that age.

Parents will be provided with a written report about their child's progress during the **Summer** term every year. These will include information on the pupil's attitude towards maths, understanding of mathematical terminology, investigatory skills and the knowledge levels they have achieved.

Verbal reports will be provided at parent-teacher interviews during the **Autumn** and **Spring** terms.

The progress of pupils with SEND will be monitored by the **SENCO**.

9. Resources

The **subject leader** is responsible for the management and maintenance of maths resources, as well as for liaising with the **school business manager** in order to purchase further resources.

Maths resources will be stored in **each classroom**, including calculators, rulers and protractors.

Resources which are not required regularly, and those in relation to key whole-school topics, will be stored centrally.

Display walls will be utilised and updated regularly, in accordance with the area of maths being taught at the time.

Maths equipment and resources will be easily accessible to pupils during lessons.

The **subject leader** will undertake an audit of maths equipment and resources on an **annual** basis.

10. Equal opportunities

All pupils will have equal access to the maths curriculum.

Gender, learning ability, physical ability, ethnicity, linguistic ability and/or cultural circumstances will not impede pupils from accessing all maths lessons.

Where it is inappropriate for a pupil to participate in a lesson because of reasons related to any of the factors outlined above, the lessons will be adapted to meet the pupil's needs and alternative arrangements involving extra support will be provided where necessary.

All efforts will be made to ensure that cultural and gender differences will be positively reflected in all lessons and teaching materials used.

St Michael's CE Primary School aims to provide more academically-able pupils with the opportunity to extend their mathematic thinking through extension activities such as problem solving, investigative work and research of a mathematic nature.

11. Monitoring and review

This policy will be reviewed on a **regular** basis by the **subject leader**.

The **subject leader** will monitor teaching and learning in the subject at St Michael's CE Primary School, ensuring that the content of the national curriculum is covered across all phases of pupils' education.

Members of the Governing Body are briefed to oversee the teaching of numeracy, and meets regularly with the **subject leader** to review progress.

Any changes made to this policy will be communicated to all teaching staff.

– Calculation Policy (from White Rose Maths Hub)
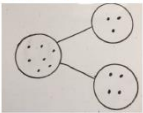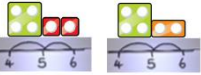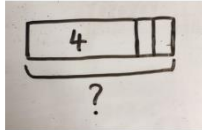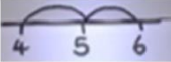
Calculation policy: Guidance
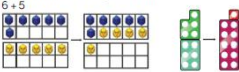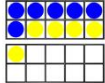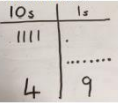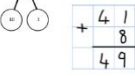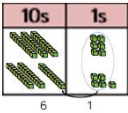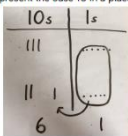
	EYFS/Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Addition	Combining two parts to make a whole: part whole model. Starting at the bigger number and counting on- using cubes. Regrouping to make 10 using ten frame.	Adding three single digits. Use of base 10 to combine two numbers.	Column method- regrouping. Using place value counters (up to 3 digits).	Column method- regrouping. (up to 4 digits)	Column method- regrouping. Use of place value counters for adding decimals.	Column method- regrouping. Abstract methods. Place value counters to be used for adding decimal numbers.
Subtraction	Taking away ones Counting back Find the difference Part whole model Make 10 using the ten frame	Counting back Find the difference Part whole model Make 10 Use of base 10	Column method with regrouping. (up to 3 digits using place value counters)	Column method with regrouping. (up to 4 digits)	Column method with regrouping. Abstract for whole numbers. Start with place value counters for decimals- with the same amount of decimal places.	Column method with regrouping. Abstract methods. Place value counters for decimals- with different amounts of decimal places.
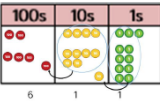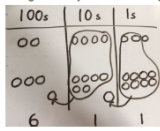
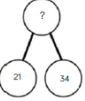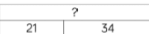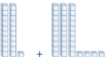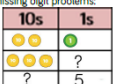|	EYFS/Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Multiplication	Recognising and making equal groups. Doubling Counting in multiples Use cubes, Numicon and other objects in the classroom	Arrays- showing commutative multiplication	Arrays 2d × 1d using base 10	Column multiplication- introduced with place value counters. (2 and 3 digit multiplied by 1 digit)	Column multiplication Abstract only but might need a repeat of year 4 first(up to 4 digit numbers multiplied by 1 or 2 digits)	Column multiplication Abstract methods (multi-digit up to 4 digits by a 2 digit number)
Division	Sharing objects into groups Division as grouping e.g. I have 12 sweets and put them in groups of 3, how many groups? Use cubes and draw round 3 cubes at a time.	Division as grouping Division within arrays- linking to multiplication Repeated subtraction	Division with a remainder-using lollipop sticks, times tables facts and repeated subtraction. 2d divided by 1d using base 10 or place value counters	Division with a remainder Short division (up to 3 digits by 1 digit-concrete and pictorial)	Short division (up to 4 digits by a 1 digit number including remainders)	Short division Long division with place value counters (up to 4 digits by a 2 digit number) Children should exchange into the tenths and hundredths column too

Achieving and growing together

Key language: sum, total, parts and wholes, plus, add, altogether, more, 'is equal to' 'is the same as'.

Concrete	Pictorial	Abstract
Combining two parts to make a whole (use other resources too e.g. eggs, shells, teddy bears, cars).	Children to represent the cubes using dots or crosses. They could put each part on a part whole model too.	$4 + 3 = 7$ Four is a part, 3 is a part and the whole is seven.
Counting on using number lines using cubes or Numicon.	A bar model which encourages the children to count on, rather than count all.	The abstract number line: What is 2 more than 4? What is the sum of 2 and 4? What is the total of 4 and 2? $4 + 2$

Regrouping to make 10; using ten frames and counters/cubes or using Numicon. $6 + 5$	Children to draw the ten frame and counters/cubes.	Children to develop an understanding of equality e.g. $6 + \square = 11$ $6 + 5 = 5 + \square$ $6 + 5 = \square + 4$
TO + O using base 10. Continue to develop understanding of partitioning and place value. $41 + 8$	Children to represent the base 10 e.g. lines for tens and dot/crosses for ones. 10s / 1s 1111 . ... 4 / 9	$41 + 8$ $1 + 8 = 9$ $40 + 9 = 49$ $+ \begin{array}{r} 4\ 1 \\ 8 \\ \hline 4\ 9 \end{array}$
TO + TO using base 10. Continue to develop understanding of partitioning and place value. $36 + 25$ 10s / 1s 6 / 1	Children to represent the base 10 in a place value chart. 10s / 1s 111 11 1 6 1	Looking for ways to make 10. $36 + 25 =$ $30 + 20 = 50$ $5 + 5 = 10$ $50 + 10 + 1 = 61$ 1 5 36 Formal method: $\begin{array}{r} +25 \\ \hline 61 \\ 1 \end{array}$
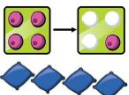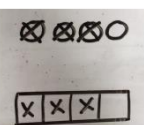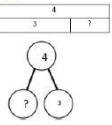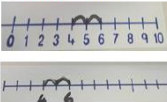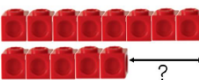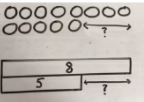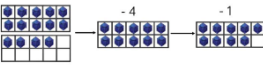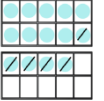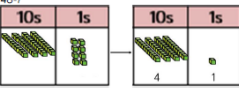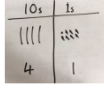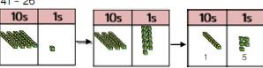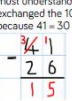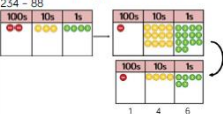
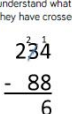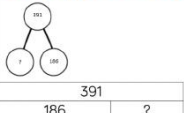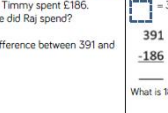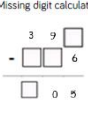|		
Use of place value counters to add HTO + TO, HTO + HTO etc. When there are 10 ones in the 1s column- we exchange for 1 ten, when there are 10 tens in the 10s column- we exchange for 1 hundred. 100s / 10s / 1s 6 / 1 / 1	Chidren to represent the counters in a place value chart, circling when they make an exchange. 100s / 10s / 1s 6 / 1 / 1	$\begin{array}{r} 243 \\ +368 \\ \hline 611 \\ 1\ \ 1 \end{array}$

Conceptual variation; different ways to ask children to solve 21 + 34

	Word problems: In year 3, there are 21 children and in year 4, there are 34 children. How many children in total? $21 + 34 = 55$. Prove it	$\begin{array}{r} 21 \\ +34 \\ \hline \end{array}$ $21 + 34 =$ $\square = 21 + 34$ Calculate the sum of twenty-one and thirty-four.	Missing digit problems: 10s / 1s

Achieving and growing together
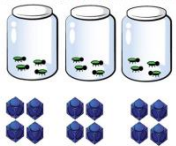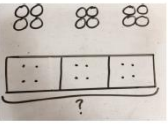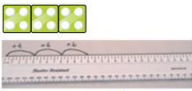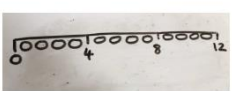
Key language: take away, less than, the difference, subtract, minus, fewer, decrease.

Concrete	Pictorial	Abstract
Physically taking away and removing objects from a whole (ten frames, Numicon, cubes and other items such as beanbags could be used). 4 – 3 = 1 	Children to draw the concrete resources they are using and cross out the correct amount. The bar model can also be used. 	4 - 3 =
Counting back (using number lines or number tracks) children start with 6 and count back 2. 6 – 2 = 4 	Children to represent what they see pictorially e.g. 	Children to represent the calculation on a number line or number track and show their jumps. Encourage children to use an empty number line

Finding the difference (using cubes, Numicon or Cuisenaire rods, other objects can also be used). Calculate the difference between 8 and 5. 	Children to draw the cubes/other concrete objects which they have used or use the bar model to illustrate what they need to calculate. 	Find the difference between 8 and 5. 8 – 5, the difference is ☐ Children to explore why 9 - 6 = 8 - 5 = 7 - 4 have the same difference.
Making 10 using ten frames. 14 – 5 	Children to present the ten frame pictorially and discuss what they did to make 10. 	Children to show how they can make 10 by partitioning the subtrahend. 14 - 5 = 9 ／＼ 4 1 14 – 4 = 10 10 – 1 = 9

Column method using base 10.
48-7
 	
	Children to represent the base 10 pictorially.
	
		Column method or children could count back 7.
		
		  4 8
		– 7
		  4 1

Column method using base 10 and having to exchange. 41 – 26 	Represent the base 10 pictorially, remembering to show the exchange. 	Formal column method. Children must understand that when they have exchanged the 10 they still have 41 because 41 = 30 + 11.
Column method using place value counters. 234 – 88 	Represent the place value counters pictorially; remembering to show what has been exchanged. 	Formal colum method. Children must understand what has happened when they have crossed out digits. 234 – 88 6

Conceptual variation; different ways to ask children to solve 391 - 186

	Raj spent £391, Timmy spent £186. How much more did Raj spend? Calculate the difference between 391 and 186. 391 -186 What is 186 less than 391?	☐ = 391 – 186	Missing digit calculations 3 9 ☐ - ☐☐ 6 ☐ 0 5

Key language: double, times, multiplied by, the product of, groups of, lots of, equal groups.

Concrete	Pictorial	Abstract
Repeated grouping/repeated addition 3 × 4 4 + 4 + 4 There are 3 equal groups, with 4 in each group. 	Children to represent the practical resources in a picture and use a bar model. 	3 × 4 = 12 4 + 4 + 4 = 12
Number lines to show repeated groups- 3 × 4 Cuisenaire rods can be used too.	Represent this pictorially alongside a number line e.g.: 	Abstract number line showing three jumps of four. 3 × 4 = 12

Achieving and growing together

Use arrays to illustrate commutativity counters and other objects can also be used. $2 \times 5 = 5 \times 2$ 2 lots of 5 5 lots of 2	Children to represent the arrays pictorially.	Children to be able to use an array to write a range of calculations e.g. $10 = 2 \times 5$ $5 \times 2 = 10$ $2 + 2 + 2 + 2 + 2 = 10$ $10 = 5 + 5$
Partition to multiply using Numicon, base 10 or Cuisenaire rods. 4×15	Children to represent the concrete manipulatives pictorially.	Children to be encouraged to show the steps they have taken. 4×15 10 5 $10 \times 4 = 40$ $5 \times 4 = 20$ $40 + 20 = 60$ A number line can also be used
Formal column method with place value counters (base 10 can also be used.) 3×23 10s 1s 6 9	Children to represent the counters pictorially. 10s 1s 6 9	Children to record what it is they are doing to show understanding. 3×23 $3 \times 20 = 60$ $3 \times 3 = 9$ 20 3 $60 + 9 = 69$ 23 $\times\ 3$ 69

Formal column method with place value counters. 6×23 100s 10s 1s 100s 10s 1s	Children to represent the counters/base 10, pictorially e.g. the image below. 100s 10s 1s	Formal written method $6 \times 23 =$ 23 $\times\ 6$ 138 1 1
When children start to multiply 3d × 3d and 4d × 2d etc., they should be confident with the abstract: To get 744 children have solved 6 × 124. To get 2480 they have solved 20 × 124.		1 2 4 $\times$ 2 6 7 4 4 2 4 8 0 3 2 2 4 Answer: 3224

Conceptual variation; different ways to ask children to solve 6 × 23

23 23 23 23 23 23 ?	Mai had to swim 23 lengths, 6 times a week. How many lengths did she swim in one week? With the counters, prove that 6 x 23 = 138	Find the product of 6 and 23 $6 \times 23 =$ $\square = 6 \times 23$ 6 23 $\times\ 23$ $\times\ 6$	What is the calculation? What is the product? 100s 10s 1s

Calculation policy: Division

Key language: share, group, divide, divided by, half.

Concrete	Pictorial	Abstract
Sharing using a range of objects. $6 \div 2$	Represent the sharing pictorially.	$6 \div 2 = 3$ 3 3 Children should also be encouraged to use their 2 times tables facts.
Repeated subtraction using Cuisenaire rods above a ruler. $6 \div 2$ -2 -2 -2 3 groups of 2	Children to represent repeated subtraction pictorially. -2 -2 -2	Abstract number line to represent the equal groups that have been subtracted. -2 -2 -2 3 groups
2d ÷ 1d with remainders using lollipop sticks. Cuisenaire rods, above a ruler can also be used. $13 \div 4$ Use of lollipop sticks to form wholes- squares are made because we are dividing by 4. There are 3 whole squares, with 1 left over.	Children to represent the lollipop sticks pictorially. There are 3 whole squares, with 1 left over.	$13 \div 4 = 3$ remainder 1 Children should be encouraged to use their times table facts; they could also represent repeated addition on a number line. '3 groups of 4, with 1 left over'
Sharing using place value counters. $42 \div 3 = 14$ 10s 1s 10s 1s 10s 1s = 14 10s 1s	Children to represent the place value counters pictorially. 10s 1s	Children to be able to make sense of the place value counters and write calculations to show the process. $42 \div 3$ $42 = 30 + 12$ $30 \div 3 = 10$ $12 \div 3 = 4$ $10 + 4 = 14$

Achieving and growing together

Short division using place value counters to group.
615 ÷ 5

100s	10s	1s

1. Make 615 with place value counters.
2. How many groups of 5 hundreds can you make with 6 hundred counters?
3. Exchange 1 hundred for 10 tens.
4. How many groups of 5 tens can you make with 11 ten counters?
5. Exchange 1 ten for 10 ones.
6. How many groups of 5 ones can you make with 15 ones?

Represent the place value counters pictorially.

Children to the calculation using the short division scaffold.

$$5 \overline{)6^{1}1^{1}5}$$ = 123

Long division using place value counters
2544 ÷ 12

1000s	100s	10s	1s

We can't group 2 thousands into groups of 12 so will exchange them.

1000s	100s	10s	1s

We can group 24 hundreds into groups of 12 which leaves with 1 hundred.

$$12 \overline{)2544}$$

1000s	100s	10s	1s

After exchanging the hundred, we have 14 tens. We can group 12 tens into a group of 12, which leaves 2 tens.

1000s	100s	10s	1s

After exchanging the 2 tens, we have 24 ones. We can group 24 ones into 2 group of 12, which leaves no remainder.

Conceptual variation; different ways to ask children to solve 615 ÷ 5

Using the part whole model below, how can you divide 615 by 5 without using short division?

I have £615 and share it equally between 5 bank accounts. How much will be in each account?

615 pupils need to be put into 5 groups. How many will be in each group?

$$5 \overline{)615}$$

615 ÷ 5 =

☐ = 615 ÷ 5

What is the calculation?
What is the answer?

100s	10s	1s

This policy has been approved by the Governing Body and Head teacher of St. Michael's C of E Primary School.

Chair of Governors ….

Signed: … *Jackie Chevaugeon* … ……………………………………

Print Name: … … JACKIE CHEVAUGEON………………………………………..

Date:… …8.1.2019 … ………………………….

Head Teacher

Signed: …… *Johnston* ……………………………………………………..

Print name:……GAVIN JOHNSTON……………………………………….

Date: ………8.1.2019…………………………………………..

REVIEW DATE … … Spring 2021…………………………..

Achieving and growing together