St. Joseph's Catholic
Infant & Junior Schools
Birtley

Mathematics Strategy

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BISHOP WILKINSON
CATHOLIC EDUCATION TRUST

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Statement of intent

St Joseph's Catholic Infant and Junior Schools, Birtley 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.

"If a group of 50 teachers all taught the same subject, students taught by the most effective teacher in that group would learn in six months what those taught by the average teacher would learn in a year"

Dylan William

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 (2021) 'Statutory framework for the early years foundation stage'
- DFE (2020) Ready to Progress Criteria.

Roles and responsibilities

The subject leader is responsible for:

- Preparing policy documents, curriculum plans and schemes of work for the subject.
- 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.

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:

Early Years Mathematics:

Number ELG

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.

Numerical Patterns ELG

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.

Key Stage 1 and 2.

The national curriculum

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

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.

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.
  - 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.

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.

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.

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.

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.

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.
- 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.

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 using online resources and the creation of spreadsheets.
- ICT will be used to record findings, using text, data, and tables.

Teaching and learning: The Learning Journey Sequence Throughout a Mathematics Unit of Study

In order to promote a standardised approach to mathematics arithmetic and problem solving – it is vital that we recognise the components of an effective mathematics strategy, which leads to good outcomes at the end of key stage 2.

- Fluency in number bond recall up to 100.
- Fluency and automaticity in multiplication and associated division facts up to 12x12
- An understanding of the most efficient algorithm that enables pupils to access calculations for: addition, subtraction, multiplication and division (both long and short methodologies)
- An understanding of the algorithms for calculation of addition, subtraction, multiplication and division of fractions.
- Recognising the order of BIDMAS calculations.

In order to achieve these objectives, we recognise that regular and progressive teaching is required from EY, up to Year 6. Therefore, we have outlined a potential walkthrough unit of study for EY, Key Stage 1 and Key Stage 2, to help teachers to plan a unit of work.

A week of EY mathematics teaching and learning should broadly consist of:

- x1 daily mathematics meeting as a whole-class (5 sessions per week)
- x3 teacher directed input – which must be recorded in exercise books – separate to Tapestry Learning Journal, working in ratios of approximately 1:8
- Corresponding activities should take place outside of the mathematics lesson to promote good formation of orthographic correspondence linking the numeral to the written form.

Early Years Example	***Mental and Oral Starters – whole-class input*** ***Children in Reception will be able to:***	**Unit of Study – Teacher guided activity** **Should operate on 1:8 basis** ***Focus: Numerical Patterns ELG***
1	*Verbally count beyond 20, recognising the pattern of the counting system – bridging the 10.* *Sing counting songs and number rhymes and read stories that involve counting.*	*Compare quantities up to 5 in different contexts, recognising when one quantity is greater than, less than or the same as the other quantity.*
	Use vocabulary: 'more than', 'less than', 'fewer', 'the same as', 'equal to'. Encourage children to use these words as well.	*Compare quantities up to 8 in different contexts, recognising when one quantity is greater than, less than or the same as the other quantity.*
2	*Plan games which involve partitioning and recombining sets. For example, throw 5 beanbags, aiming for a hoop. How many go in and how many don't?*	*Compare quantities up to 10 in different contexts, recognising when one quantity is greater than, less than or the same as the other quantity.*
3	*Verbally count beyond 20, recognising the pattern of the counting system – bridging the 10.* *Sing counting songs and number rhymes and read stories that involve counting.*	*Explore and represent patterns within numbers up to 10, including evens.* *Discuss and demonstrate different ways children might record quantities (for example, scores in games), such as tallies, dots and using numeral cards.* *Model conceptual subitising: "Well, there are three here and three here, so there must be six."*
4	*Use vocabulary: 'more than', 'less than', 'fewer', 'the same as', 'equal to'. Encourage children to use these words as well.*	*Explore and represent patterns within numbers up to 10, including evens* *Discuss and demonstrate different ways children might record quantities (for example, scores in games), such as tallies, dots and using numeral cards.*
5	*Verbally count beyond 20, recognising the pattern of the counting system – bridging the 10.* *e.g. Start at 37 – bridging 10s.*	*To know double facts and how quantities can be distributed equally.* *Provide a range of visual models of numbers: for example, six as double three on dice, or the fingers on one hand and one more, or as four and two with ten frame images.* *To use pictorial imagery to support calculations.*

6	*Begin to recognise and revise even numbers from previous taught session and count in 2s.*	*To know double facts and how quantities can be distributed equally.* *Emphasise the parts within the whole: "There were 8 eggs in the incubator. Two have hatched and 6 have not yet hatched."*
7	*Introduce a number track for counting with missing numbers.*	*To know double facts and how quantities can be distributed equally*
8	*Begin to recognise and revise even numbers from previous taught session and count in 2s.*	*Explore and represent patterns within numbers up to 10, including odds.*
9	*Introduce a 100 square for counting with missing numbers.*	*Explore and represent patterns within numbers up to 10, including odds.*

A mathematics unit of study in Key Stage 2 should broadly consist of*:

Year 2 Example	***Mental and Oral Starters:***	**Unit of Study** **Multiplication and Division**
1	*Recall addition facts to 20*	To recall and use multiplication and division facts for the 2 times table and to make links to even numbers. *To develop reasoning explaining why a number cannot be in the 2x table e.g. 23.*
2	*Recall subtraction facts to 20*	*To recognise that an array is repeated addition and to demonstrate that multiplication can be completed in any order and that 'x' means 'of':* *e.g. 4 groups of 3 = 12* *3 groups of 4 = 12*
3	*Show that addition of two numbers can be done in any order (commutative) and subtraction of one number from another cannot*	*To* write associated division facts linked to the array e.g. 12 / 3 = 4 12 / 4 = 3 To use commutativity and inverse relations to develop multiplicative reasoning (for example, 4 × 5 = 20 and 20 ÷ 5 = 4).
4	*Adding three one-digit numbers*	To recall and use multiplication and division facts for the 5 and 10 times table and to make links odd/even numbers. To begin to develop reasoning explaining why a number cannot be in the 5 and 10x tables e.g. 23.
5	*Recall and use multiplication and division facts for the 2, multiplication tables*	To connect the 10 multiplication table to place value, and the 5 multiplication table to the divisions on the clock face.
6	*Recognising odd and even numbers and identifying patterns when completing:* *Odd + odd =* *Even + even =* *Odd + even =* *Even + odd =*	To develop further fluency in pictorial representations of multiplication facts e.g. using 5 fingers/bags of sweet to introduce children to problem solving.

7	*Compare and order numbers from 0 up to 100; use and = signs*	To enable pupils to answer and solve word problems linked to multiplication and division of 2s, 5s and 10s.
8	*count in steps of 2, 3, and 5 from 0, and in tens from any number, forward and backward*	To refine pupils' ability to answer and solve word problems linked to multiplication and division of 2s, 5s and 10s – and introduce the concept of monetary amounts.
9	*Recall and use multiplication and division facts for the 5 ad 10 multiplication tables*	To ensure that pupils understand the concept of division word problems and begin to share amounts evenly through distribution diagrams e.g. bar method.
10	*compare and order numbers from 0 up to 100; use and = signs*	Assessment lesson

A mathematics unit of study in Key Stage 2 should broadly consist of*:

Year 5 Example	***Mental and Oral Starters:***	**Unit of Study Multiplication and Division**
1	*Multiply and divide numbers mentally.* *Multiply and divide whole numbers and those involving decimals by 10, 100 and 1,000.*	*Establish whether a number up to 100 is prime and recall prime numbers up to 19.* *Know and use the vocabulary of prime numbers, prime factors, and non-prime numbers.*
2	*Establish whether a number up to 100 is prime and recall prime numbers up to 19.*	*Recognise multiples and factors, including finding all factor pairs of a number, and common factors of two numbers.*
3	*Identify and use square numbers and cube numbers, and the notation for squared (²) and cubed (³).*	*Multiply numbers up to four digits by a one-digit number using a formal written method.*
4	*Multiply and divide whole numbers and those involving decimals by 10, 100 and 1,000.*	*Multiply numbers up to four digits by a two-digit number using a formal written method, including long multiplication for two-digit numbers.*
5	*Identify and use square numbers and cube numbers, and the notation for squared (²) and cubed (³).*	*Multiply numbers up to four digits by a two-digit number using a formal written method, including long multiplication for two-digit numbers.*
6	*Know and use the vocabulary of prime numbers, prime factors, and non-prime numbers.*	*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.*
7	***These mental and oral starter objectives are taken from the addition and subtraction unit (a***	*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.*

	previous unit of study to develop pupils' fluency and automaticity) *Add and subtract whole numbers with more than four digits, including using formal written methods. Add and subtract numbers mentally using increasingly large numbers.*	
8	*Use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy.*	*Solve problems involving multiplication and division, including using knowledge of factors and multiples, squares, and cubes.*
9	*Read Roman numerals to 1,000 (M) and recognise years written in Roman numerals.*	*Solve problems involving multiplication and division, including using knowledge of factors and multiples, squares, and cubes.*
10	*Interpret negative numbers in context: count forwards and backwards with positive and negative whole numbers, including through 0.*	*Solve problems involving addition, subtraction, multiplication and division and a combination of these, including understanding the meaning of the equals sign.*

While it is impossible to document every single learning journey step, as a broad synopsis – the learning journey of mathematics should broadly contain the above steps.

Mathematics Arithmetic:

Mathematics arithmetic fluency and automaticity will be taught through a mathematics basic skills session, which focuses on developing fluency in the four operations and other basic concepts e.g. multiplying and dividing by 10, 100 or 1000, where appropriate.

The purpose of which is to revisit and revise taught skills so that it is embedded into pupils' long-term memory, adhering to the Ofsted principle of: 'knowing more and remembering more'.

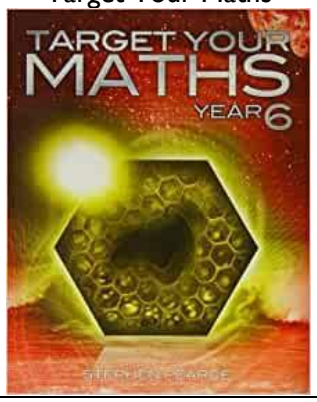
There is much debate about the best way to teach children to gain fluency and automaticity of number concepts and fluency. Equally, we recognise that no two schools are the same and they will differ in philosophy and approach to the teaching of mathematics.

Here at St. Joseph's, we recognise the importance of arithmetic which underpins much of the mathematics curriculum. Therefore, we seek to conduct mathematics basic skills sessions outside for the lesson, on a morning at least three times a week, for 15 minutes.

The Long-Term Overview:

At St. Joseph's, we seek to attempt to cover the mathematics curriculum twice, per year, and recognise that different cohorts will cover the curriculum at different paces depending upon abilities; however, we believe that if the curriculum is covered twice per year group, then there are more opportunities available to pupils to become refined in key mathematical skills.

At. St. Joseph's – we do not use one particular scheme or resource; but recognise that each scheme has benefits and the teacher is therefore the decisive element in the classroom, and carefully selects a resource depending upon which resource best fits the needs of the learning journey sequence.

Resource	Benefits	Areas of Caution
White Rose Maths	- created by specialist maths teachers - broken down into small steps to if teaching of objectives. - provides a range of reasoning and problem-solving questions linked to each small step. - provides key questions for teachers to use. -provides stem sentences for teachers to use.	- fewer opportunities for varied fluency - lacks differentiation for pupils with SEND - the linear approach to the long-term overview WRM means that pupils sometimes have a year between topics.
Power Maths	- mastery approach - interactive and physical resources available for staff	- lacks differentiation for SEND. - individual lessons jump between different representations before allowing children to consolidate one method.
Target Your Maths 	- provides opportunity for varied fluency - covers all areas of each programme of study. - differentiated 3 ways	- reasoning questions are provided but would require pupils to write these out in order, or to be preprinted to underline the important information to develop good test paper habits - questions do not allow for intelligent practice.
Learning by Questions (app)	- useful for fluency practice - appealing to pupils - test style questions - good revision tool	- not suitable for main activity as no way to record workings.

Learning by Questions		
Testbase testbase	useful for test paper practice or end of unit revision study sessions fortnightly mathematic arithmetic tests are online and available for download best printed as booklets pupils can practice test fluency in squares	
Times Table Rock Star TIMES TABLES ROCK STARS	Good preparation for the multiplication times table check Good for visual multiple representations	Lacks problem solving/reasoning

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 Joseph's Catholic Infant and Junior School we do not prioritise between technical proficiency and conceptual understanding, and we aim to develop these in parallel.

Planning

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

Throughout St. Joseph's, 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, with clear teacher modelling, and interactive oral work with the whole class and targeted groups.

Teachers will ensure that all maths lessons include a focus on mental calculation, this should be as part of the mental and oral starter, if it is not part of the lesson objective.

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, considering 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.

SEND Interventions:

Mathematics: 'Mathematics equips pupils with uniquely powerful ways to describe, analyse and change the world. It can stimulate moments of pleasure and wonder for all pupils when they solve a problem for the first time, discover a more elegant solution, or notice hidden connections. Pupils who are functional in mathematics and financially capable are able to think independently in applied and abstract ways, and can reason, solve problems and assess risk.'

Therefore, it is vital of our pupils with SEND are given the right support to help them to access the mathematics curriculum.

The British Dyslexia Association states that:

Dyscalculia is a specific and persistent difficulty in understanding numbers which can lead to a diverse range of difficulties with mathematics. It will be unexpected in relation to age, level of education and experience and occurs across all ages and abilities.

Mathematics difficulties are best thought of as a continuum, not a distinct category, and they have many causal factors. Dyscalculia falls at one end of the spectrum and will be distinguishable from other mathematics issues due to the severity of difficulties with number sense, including subitising, symbolic and non-symbolic magnitude comparison, and ordering. It can occur singly but often co-occurs with other specific learning difficulties, mathematics anxiety and medical conditions.

Therefore, it is important that all those not attaining or achieving are given the support that is necessary to help them to further their ability to compute mathematical equations to prevent financial poverty later on in life.

As a result, St. Joseph's have several SEND interventions available to help pupils to close the gaps to their age-related counterparts. These resources help to support pupils' long-term memory enabling them to know more and remember more, over time.

Phase	Resources		Ratio
EY	1st Class @ Number		
1st Class@Number 1 and 2 comes ready-made with detailed session guidance and extensive resources. A specially trained teaching assistant delivers up to 30 half-hour sessions to a group of up to four children, for 10 -15 weeks. The children continue to take part in their normal class mathematics lessons. The lessons focus on number and calculation, developing children's mathematical understanding, communication and reasoning skills. Stimulating, enjoyable games and activities engage the children and build their confidence. Each topic starts with a simple assessment that helps the teaching assistant to tailor sessions to the children's needs.			

The teaching assistant starts working with their group of pupils straight after the first training day. Then the training runs alongside the implementation of the teaching programme, so that the Teaching Assistant is trained topic by topic. Pupils nationally, following 1st Class@Number made an average Number Age gain of 13 months in only 4 mnths – over 3 times the expected progress. 93% of them showed more confidence and interest in learning mathematics in class after 1stClass@Number.			
KS1	1st Class @ Number 1	for children who need further support at the level of the Year 1 curriculum	1:4
	1st Class @ Number 2	for children who need further support at the level of the Year 2 curriculum	1:4
	Plus One 	The book covers basic number work, such as counting forwards and backwards with numbers up to 10, adding and subtracting numbers up to 10, and introducing doubling and halving. It is for anyone who benefits from repeated practice and explanation as the book, Plus 1, stems from the need of some people to have more reinforcement and practice than is often available. Counting backwards and forwards Adding and subtracting up to 10 Introduction to doubling and halving	1:1
KS2	Power of 2 	Power of 2 is ideal for anyone who benefits from repeated maths practice as all our books are designed to appeal to all age ranges. The Power of 2 book has been used with students aged 8 and upwards, right up to adult basic skills.	1:1

		The clear language and repetition benefits students with dyslexia and those with English as an Additional language. Students with dyscalculia benefit from the highly structured approach with clear explanations. Age range – infants to basic adult numeracy Special needs – Dyslexia, Dyscalculia	

In addition to the above resources, St. Joseph's also enable pupils to access school-led tutoring, which if part-funded by the DfE. Staff recognise the benefits of each intervention strategy and school-led tutoring will take place, if pupils are deemed to require additional support. Assessment of/for learning will be evaluated at this point.

Assessment and reporting

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

Pupils aged between three and four will be assessed in accordance with the 'Statutory framework for the early years foundation stage', 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 indicating to parents whether pupils have attained the Early Learning Goal.

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 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, to demonstrate where pupils are at a given point in time.

Standardised tests will be used once a year, towards the end of the academic year, 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.

Term	KS1	KS2
Autumn	White Rose Assessments	White Rose
Spring	White Rose Assessments	Testbase Mid-Year Reviews
Summer	MERIT Testbase End of Year Tests	MERIT Testbase End of Year Tests

Year 2 and Year 6 to use previous years DfE statutory assessment tests.

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.

Marking and Feedback:

See marking and feedback strategy for full summary; however, as a brief overview:

Mathematics	Depending on the task set, the teacher may have a whole-class discussion and the child may mark the set task. Ticks should be small and occur in pencil (not pen), crosses (not dots) indicate areas for improvement. The teacher should give a cursory glance to the work and, if necessary, give contextual feedback to pupils. Mistakes should be corrected either beside the incorrect calculation or at the end of the piece of work. Errors and misconceptions should be addressed by the teacher, through teaching and learning. It is the expectation that after every lesson, the teacher should have marked their books in preparation for the next lesson.
Basic Skills Mathematics	Whole-class discussion with shared answers. Children to correct mistakes as they go. Errors/misconceptions to be explained in whole-class setting.

Resources

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

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

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

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.

All work completed in Maths books to be done in pencil.

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

The table below outlines a range of resources available to teachers to aid planning. Teachers should choose

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. Joseph's 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.

Monitoring and review

This policy will be reviewed on an annual basis by the subject leader.

The subject leader will monitor teaching and learning in the mathematics at St. Joseph's Catholic Infant and Junior Schools, ensuring that the content of the national curriculum is covered across all phases of pupils' education.

The local governing committee will meet regularly to discuss progress in mathematics.

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