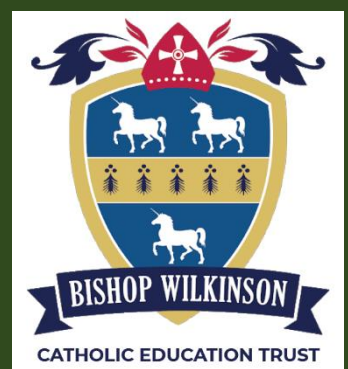




**St. Joseph's Catholic
Infant & Junior Schools
Birtley**

Mathematics Strategy

November 2022



Contents:Statement of intent

1. [Teaching and learning](#)
2. [Planning](#)
3. [SEND](#)
4. [Assessment and reporting](#)
5. [Cross-curricular links](#)
6. [Resources](#)
7. [Equal opportunities](#)
8. [Monitoring and review](#)

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.

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

We aim to be able to reason mathematically – be able to follow a line of enquiry, conjecturing relationships and generalisations, and developing an argument, justification or proof using mathematical language.

We aim to be problem solving - where children can solve problems by applying their mathematics to a variety of routine and non-routine problems with increasing sophistication, including breaking down problems into a series of simpler steps and persevering in seeking solutions.

Through the teaching of maths, our intent is 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

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 of what a unit of study could look like 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)
- x2 teacher directed input tasks per week, increasing to x3 when children become more independent – 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	Compare quantities up to 10 in different contexts, recognising when one quantity is greater than, less than or the same as the other quantity.

	<i>hoop. How many go in and how many don't?</i>	
3	<i>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.</i>	<i>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.”</i>
4	<i>Use vocabulary: ‘more than’, ‘less than’, ‘fewer’, ‘the same as’, ‘equal to’. Encourage children to use these words as well.</i>	<i>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.</i>
5	<i>Verbally count beyond 20, recognising the pattern of the counting system – bridging the 10. e.g. Start at 37 – bridging 10s.</i>	<i>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.</i>
6	<i>Begin to recognise and revise even numbers from previous taught session and count in 2s.</i>	<i>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.”</i>
7	<i>Introduce a number track for counting with missing numbers.</i>	<i>To know double facts and how quantities can be distributed equally</i>
8	<i>Begin to recognise and revise even numbers from previous taught session and count in 2s.</i>	<i>Explore and represent patterns within numbers up to 10, including odds.</i>
9	<i>Introduce a 100 square for counting with missing numbers.</i>	<i>Explore and represent patterns within numbers up to 10, including odds.</i>

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	<i>Recall addition facts to 20</i>	<i>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.</i>
2	<i>Recall subtraction facts to 20</i>	<i>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</i>

3	<i>Show that addition of two numbers can be done in any order (commutative) and subtraction of one number from another cannot</i>	To write associated division facts linked to the array e.g. $12 \div 3 = 4$ $12 \div 4 = 3$ To use commutativity and inverse relations to develop multiplicative reasoning (for example, $4 \times 5 = 20$ and $20 \div 5 = 4$).
4	<i>Adding three one-digit numbers</i>	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	<i>Recall and use multiplication and division facts for the 2, multiplication tables</i>	To connect the 10 multiplication table to place value, and the 5 multiplication table to the divisions on the clock face.
6	<i>Recognising odd and even numbers and identifying patterns when completing: Odd + odd = Even + even = Odd + even = Even + odd =</i>	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	<i>Compare and order numbers from 0 up to 100; use and = signs</i>	To enable pupils to answer and solve word problems linked to multiplication and division of 2s, 5s and 10s.
8	<i>count in steps of 2, 3, and 5 from 0, and in tens from any number, forward and backward</i>	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	<i>Recall and use multiplication and division facts for the 5 and 10 multiplication tables</i>	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	<i>compare and order numbers from 0 up to 100; use and = signs</i>	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	<i>Multiply and divide numbers mentally. Multiply and divide whole numbers and those involving decimals by 10, 100 and 1,000.</i>	<i>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.</i>
2	<i>Establish whether a number up to 100 is prime and recall prime numbers up to 19.</i>	<i>Recognise multiples and factors, including finding all factor pairs of a number, and common factors of two numbers.</i>

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	<p>These mental and oral starter objectives are taken from the addition and subtraction unit (a previous unit of study to develop pupils' fluency and automaticity)</p> <p>Add and subtract whole numbers with more than four digits, including using formal written methods. Add and subtract numbers mentally using increasingly large numbers.</p>	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.
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.

Mathematics Mastery

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.

The Long-Term Overview:

The Long-term planning outlines the units to be taught within each year group.

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 follow a particular scheme of learning and do not limit staff to using resources from a particular provider. We instead, provide staff with a wide range of resource banks for them to use to best suit the needs of their children. This bank includes but is not limited to, White Rose Hub, Power Maths, Twinkl, NRich, Target Your Maths, NCETM, Primary Stars, Testbase and some apps such as Times Tables Rock Stars and Learning by Questions. The maths subject leader has devised a long-term plan for the school based on learning that is linked from unit to unit (where possible) and one which ensures clear and constant re-visitation through the year so that learning is embedded.

Medium Term Planning

In addition to the long-term plan, the subject leader for Maths has created a medium term plan that stipulates what should be taught on a week-to-week basis. Teachers are expected to use their professional judgement to adjust this according to the needs of the pupils. Where concepts are not embedded, teachers could spend a longer (but appropriate) time on it. Where concepts are embedded quickly, teachers should move the learning on. Concepts are embedded when pupils are fluent and have the opportunity to apply skills through reasoning and problem solving.

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.

Changes to the medium-term plans will be shared with the subject leader.

Short Term Planning

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

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.

Lessons will be planned so that pupils 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, and could include a range of 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, which could include manipulatives, pictures, 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 and adapting learning in accordance with the ability of the learners.
- 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.

Homework

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

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.'

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

Quality First Teaching is the first approach we take to Mathematics teaching at St Joseph's, where all children receive the support, they need from the class teach through carefully planned and differentiated work to suit the needs of children. We appreciate that some children still need further support than what can be provided through lessons in the classroom.



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. They will be delivered across a half term basis initially with pre and post intervention assessment used to measure the success of the intervention.

Phase	Resources		Ratio
EY	1st Class @ Number		
1 st 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.

KSI	<p>1st Class @ Number 1</p> <p>1st Class @ Number 2</p> <p>Plus One</p> 	<p>for children who need further support at the level of the Year 1 curriculum</p> <p>for children who need further support at the level of the Year 2 curriculum</p> <p>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.</p> <p>Counting backwards and forwards Adding and subtracting up to 10 Introduction to doubling and halving</p>	<p>1:4</p> <p>1:4</p> <p>1:1</p>
KS2	<p>Power of 2</p> 	<p>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</p>	<p>1:1</p>

		<p>up to adult basic skills. 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.</p> <p>Age range – infants to basic adult numeracy Special needs – Dyslexia, Dyscalculia</p>	
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In addition to the above resources, St. Joseph's also enable pupils to access school-led tutoring, which is 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 Assessments
Spring	White Rose Assessments *2023 Testbase KS1 Test Trial for Year 1 and 2	Testbase Mid-Year Reviews
Summer	MERIT Testbase End of Year Tests *2023 Testbase KS1 Test Trial for Year 1	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.

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.

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.

Monitoring will happen formally and informally across the year and could take form as

- Learning walks
- Questionnaires of various stakeholders
- Book scrutiny
- Pupil interviews
- Moderation exercises
- Pupil Progress Meeting
- Termly data analysis

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.