



NORTH CAVE C of E PRIMARY SCHOOL

MATHEMATICS STRATEGY

I can do all things through him who strengthens me.

Philippians 4:13

School vision:

A Christian school at the heart of the community that we serve.

Achieving our goals as we are guided by God's light.

Believing in ourselves, in each other and in God.

Caring and nurturing all of God's children in our school family.

Sharing our aspirations through our exciting, enriched and inclusive curriculum.

'Therefore encourage one another and build each other up, just as in fact you are doing.' 1 Thessalonians 5 Verse 11

INTENT

At North Cave Church of England Primary School our mathematics curriculum follows the Programme of Study and Aims of the National Curriculum. We intend for pupils to develop a love of maths and a sense of enjoyment about the subject through our maths mastery approach. we teach for mastery and believe that fluency, reasoning and problem solving are at the core of all maths lessons, including maths across the curriculum. Our maths teaching for mastery supports the idea that everyone can do maths. All pupils are encouraged by the belief that by working hard at maths they can succeed.

Our curriculum is challenging and exciting as we deliver active lessons by involving teaching that promotes curiosity, creativity, resilience and growth mindset. It is essential to everyday life, critical to science, technology and engineering. We intend to help all our children understand the role of mathematics in the world around them and encourage them to become lifelong learners by being confident to problem solve, have the ability to reason mathematically and be confident in the use of arithmetic.

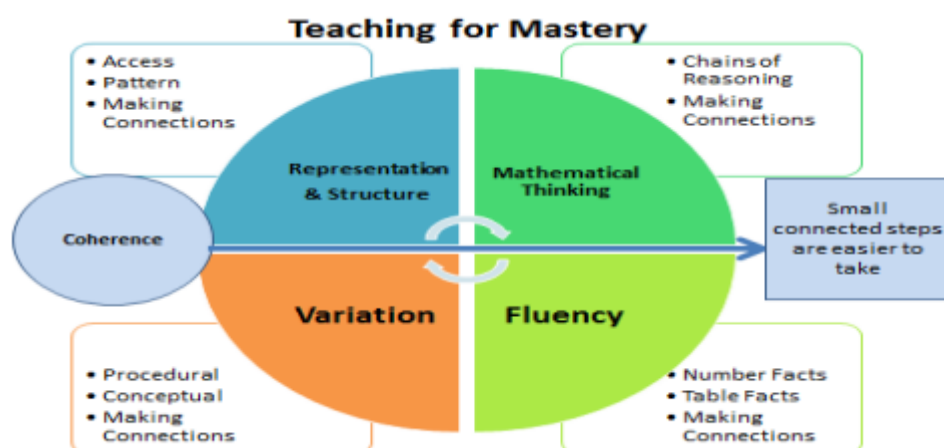
The National Curriculum for mathematics aims to ensure that all pupils: become **fluent** in the fundamentals of mathematics, including through varied and frequent practice with increasingly complex problems over time, so that pupils develop conceptual understanding and the ability to recall and apply knowledge rapidly and accurately.

reason mathematically by following a line of enquiry, conjecturing relationships and generalisations, and developing an argument, justification or proof using mathematical language can **solve problems** by applying their mathematics to a variety of routine and non- routine problems with increasing sophistication, including breaking down problems into a series of simpler steps and persevering in seeking solutions.

Our vision for Mathematics

- To promote a positive attitude towards mathematics in all pupils
- To ensure all pupils are engaged in and are enjoying exploring Mathematics
- To enable all pupils to find links between mathematics and other areas of the curriculum, including Science
- To ensure all pupils progress in mathematics and are challenged appropriately through an in depth understanding
- To use a wide range of concrete, pictorial and abstract representations to develop all pupils' relational understanding of mathematics
- To ensure all pupils are confident using mathematical vocabulary when reasoning about mathematics
- To promote a growth mind set in all pupils, particularly when Problem Solving

Principles of a Maths Mastery Approach is to establish:



At North Cave C.E. Primary School we use the White Rose scheme across school. The lessons are broken down into small, connected steps that gradually unfold the concept, providing access for all children and leading to a generalisation of the concept and the ability to apply the concept to a range of contexts. Our small steps enable us to develop mastery and address all aspects in a logical progression. This will ensure deep and sustainable learning for all pupils.

As a result of teachers develop detailed knowledge of the curriculum in order to break the mathematics down into small teaching and learning in mathematics, our aim is that pupils will be able to meet the key aims of the National Curriculum for maths.

Coherence

- At North Cave C.E. Primary School we aim to promote children's curiosity and enable them to safely take risks and learn from first hand experience wherever necessary
- Our primary focus is to support the children to become fluent in mathematical understanding from the most basic level so that they can build upon their own understanding.
- We aim to enable our children to develop conceptual understanding, recall of number facts and patterns and apply their knowledge rapidly and accurately.
- We aim to promote children's ability to reason through opportunities to discuss their thinking and understanding. This emphasis may result in less written work but much deeper understanding.
- We promote problem solving and solution finding. This is not only true in mathematical learning but in almost all aspects of school life.
- We aim to support children to make progress at their own pace. Often misconceptions cause greater difficulties at a later stage of learning. We will promote smaller group learning opportunities whenever possible and encourage children to revisit their thinking to ensure they feel secure in their understanding and able to move confidently on to next steps and challenges.

Aims

We aim to develop lively, enquiring minds encouraging pupils to become self motivated, confident and capable in order to solve problems that will become an integral part of their future. The National Curriculum for mathematics aims to ensure that all pupils:

- Become fluent in the fundamentals of mathematics, including through varied and frequent practice with increasingly complex problems over time, so that pupils have conceptual understanding and are able to recall and apply their knowledge rapidly and accurately to problems
- Reason mathematically by following a line of enquiry, conjecturing relationships and generalisations, and developing an argument, justification or proof using mathematical language

- Can solve problems by applying their mathematics to a variety of routine and nonroutine problems with increasing sophistication, including breaking down problems into a series of simpler steps and persevering in seeking solutions.

Representation and Structure

Representations used in lessons expose the mathematical structure being taught, the aim being that Our children can do the maths without recourse to the representation.

Mathematical structures are the key patterns and generalisations that underpin sets of numbers – they are the laws and relationships that we want children to spot. Using different representations can help children to ‘see’ these laws and relationships.

Mathematical Thinking

If taught ideas are to be understood deeply, they must not merely be passively received but must be worked on by the student: thought about, reasoned with and discussed with others.

- Looking for pattern and relationships
- Logical Reasoning
- Making Connections

Fluency

We support our children in their development of a quick and efficient recall of facts and procedures and the flexibility to move between different contexts and representations of mathematics.

- Quick recall of facts and procedures
- The flexibility and fluidity to move between different contexts and representations of mathematics.
- The ability to recognise relationships and make connections in mathematics

Variation

This is twofold. It is firstly about how the teacher represents the concept being taught, often in more than one way, to draw attention to critical aspects, and to develop deep and holistic understanding. It is also about the sequencing of the episodes, activities and exercises used within a lesson and follow up practice, paying attention to what is kept the same and what changes, to connect the mathematics and draw attention to mathematical.

Procedural variation – This is a deliberate change in the type of examples used and questions set, to draw attention to certain features.

Conceptual variation – When a concept is presented in different ways, to show what a concept is, in all of its different forms.

IMPLEMENTATION

At North Cave C.E Primary School we have a consistent, systematic high quality, whole school approach to teaching mathematics using the White Rose Maths scheme. Children are introduced to White Rose Maths in Reception.

Pupils in Key Stage 1 have a daily Maths lesson lasting approximately 1 hour.

Pupils in Key Stage 2 have a daily Maths lesson lasting approximately 1 hour.

Each lesson will have time set aside for reasoning practise. In addition to this, there will be separate opportunities to develop fluency to strengthen skill and knowledge. Skills progression for maths

(including mental maths) have been mapped out across the school to enable children to make sufficient progression in maths each year.

White Rose flashback materials are used, particularly in Key Stage One to support the embedding of skills.

Maths challenges, problem solving and reasoning is provided using the White Rose materials as well as other reputable places e.g. NCETM and Classroom Secrets.

The main objectives for each year group are given highest priority in line with the DFE document 'Ready to Progress'.

Pupils are assessed according to curriculum standards for each year group. It is required that the vast majority of children will have the expected understanding/ mastery of the curriculum, and some will have a deeper understanding.

A typical Maths lesson will provide the opportunity for all children, regardless of their ability, to work through Fluency, Reasoning and Problem Solving activities.

Maths is a journey and long-term goal, achieved through exploration, clarification, practice and application over time. At North Cave C.E. Primary School learning in mathematics is defined as: The process of acquiring essential knowledge, skills, understanding and behaviours required for deep understanding and mastery of skills and content. At each stage of learning, children should be able to demonstrate a deep, conceptual understanding of the topic and be able to build on this over time.

There are three levels of learning:

- Shallow learning: surface, temporary, often lost
- Deep learning: it sticks, can be recalled and used
- Deepest learning: can be transferred and applied in different contexts

The deep and deepest levels are what we are aiming for by teaching maths using the Mastery approach.

Progress in mathematics is defined as the widening and deepening of essential knowledge, skills, understanding and behaviour. This means that pupils will use the same content repeatedly, each time in a richer and more challenging context, thus deepening their understanding. Through the focus of attainment and achievement in mathematics through effort, creativity and high expectations for all pupils.

Lessons are taught using a multimethod approach to problem solving to support the development of reasoning skills and rich questioning is ongoing throughout each lesson. Children use objects and pictures to problem solve in order to help them visualize abstract ideas. Whole class teaching with scaffolding, stretch and challenge for all learners. Sentence stems are provided for reasoning tasks.

Additional intervention is provided for children struggling with mathematical concepts.

Misconceptions are identified and used as a starting place for concept building. Close monitoring of children making the slowest progress through regular assessments, data analysis and pupil progress meetings with provision adjusted accordingly.

Summative assessment at three points in the year to guide summative judgements and identify any gaps in knowledge.

Long term planning

The National Curriculum for Mathematics 2014, Birth to 5 Matters 2021 and the Early Learning Goals (Number, Numerical Patterns) provide the long-term planning for mathematics taught in the school.

Medium term and short term planning

Children in Years 1 to 6 use the White Rose scheme to support their learning. These materials support a mastery approach to teaching and learning and have number at their heart. They ensure teachers stay in the required key stage and support the ideal of depth before breadth. They support pupils working together as a whole group and provide plenty of time to build reasoning and problem-solving elements into the curriculum.

Concrete/Pictorial/Abstract Approach**Concrete representation**

The children are first introduced to an idea or a skill by acting it out with real objects. In division, for example, this might be done by separating apples into groups of red ones and green ones or by sharing 12 biscuits amongst 6 children. This is a 'hands on' approach using real objects and it is the basis for conceptual understanding.

Pictorial representation

This is used when a child has sufficiently understood the hands-on experiences performed and can now relate them to representations, such as a diagram or picture of the problem. In the case of division this could be the action of circling objects.

Abstract representation

The symbolic stage – a student is now capable of representing problems by using mathematical notation, for example: $12 \div 6 = 2$. This is clearly the more confusing and mysterious of the three and without the 'hands on' and pictorial steps can be tricky for children to understand.

Times Tables and Multiplication check

At North Cave C.E. Primary School we have a structure for learning the times tables. This supports the children in Year Four who will be assessed by the Multiplication Check. Education City is used to monitor progress of our Year Four children.

Additional teaching

In addition to a daily Maths lesson, there are other timetabled sessions within the school week where the children develop mental fluency, practice recall of number facts and specific procedures as part of arithmetic. In these sessions, teachers use digital technologies such as Education City, games, worksheets, concrete apparatus etc.

Maths Intervention is carefully planned for specific pupils within each year group and predominantly focuses on:

- Learning number bonds and counting
- Recall of multiplication and division facts
- Arithmetic procedures
- Solving one and two step word problems

Progression of skills

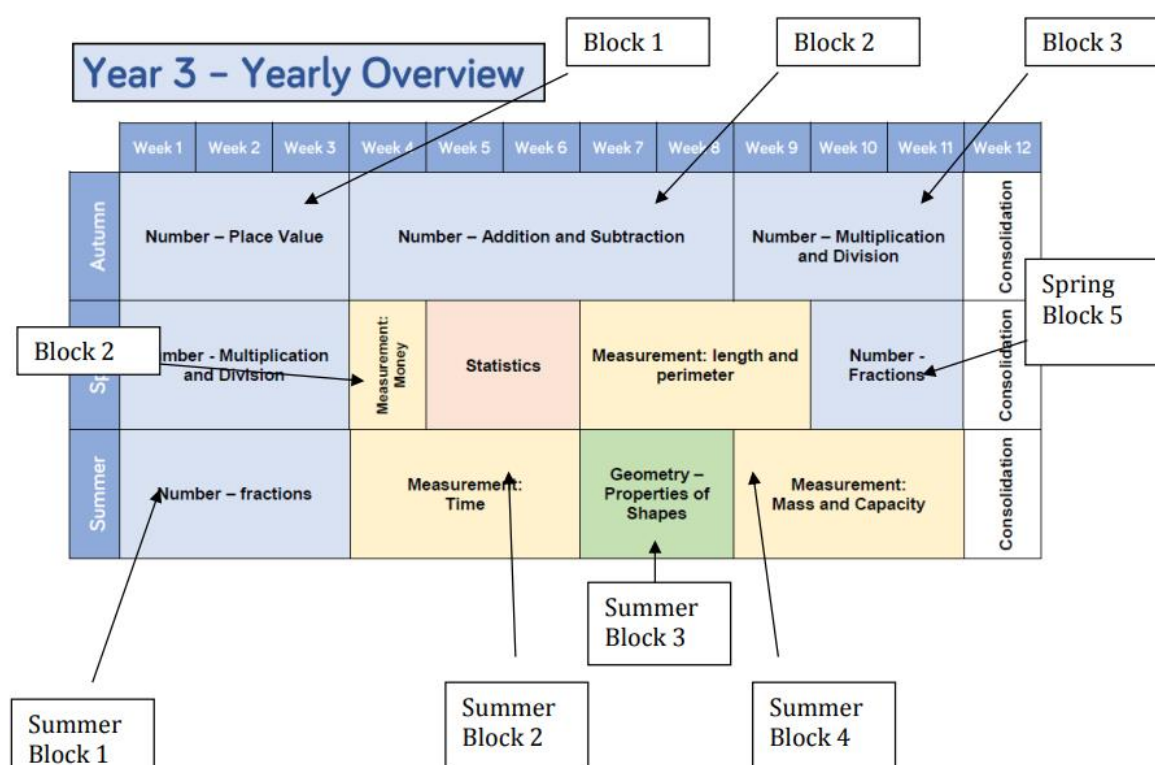
Our Mapping the Mathematics Curriculum document shows the progression of skills taught across North Cave C.E. Primary School.

Number:

A large proportion of time is spent reinforcing number to build competency and fluency. Number is usually at the heart of any primary mastery scheme of learning, with more time devoted to this than other areas of mathematics. It is important that pupils secure these key foundations of mathematics before being introduced to more difficult concepts. This increased focus on number will allow pupils to explore the concepts in more detail and secure a deeper understanding. Key number skills are fed through the rest of the scheme so that students become increasingly fluent.

Our planning aims for all pupils to master the age group expectations of the National Curriculum by including rich, deep activities. Rapid graspers should not be accelerated through concepts, instead they should complete Challenge questions. We predominantly use White Rose Maths, NCETM and Classroom Secrets challenges.

At North Cave C.E. Primary School the White Rose Maths yearly overview provides a Long Term Plan and is arranged into 'Blocks'



Each term, the Learning Objectives are listed and are time related to ensure coverage and pace

Year 3 – Spring Term

Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12
Number – 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 they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods. Solve problems, including missing number problems, involving multiplication and division, including positive integer scaling problems and correspondence problems in which n objects are connected to m objectives.			Measurement – money Add and subtract amounts of money to give change, using both £ and p in practical contexts.	Statistics Interpret and present data using bar charts, pictograms and tables. Solve one-step and two-step questions [for example, ‘How many more?’ and ‘How many fewer?’] using information presented in scaled bar charts and pictograms and tables.		Measurement – length and perimeter <u>Measure, compare, add and subtract: lengths (m/cm/mm); mass (kg/g); volume/capacity (l/ml).</u> Measure the perimeter of simple 2D shapes.			Number – fractions Count up and down in tenths; recognise that tenths arise from dividing an object into 10 equal parts and in dividing one-digit numbers or quantities by 10 Recognise and use fractions as numbers: unit fractions and non-unit fractions with small denominators. Recognise, find and write fractions of a discrete set of objects: unit fractions and non-unit fractions with small denominators. Solve problems that involve all of the above.		Consolidation

EYFS

Mathematics within the EYFS is developed through purposeful, play based experiences and will be represented throughout the indoor and outdoor provision. The learning will be based on pupil’s interests and current themes and will focus on the expectations from Development Matters / Early Years Outcomes. Mathematical understanding can be developed through stories, songs, games, imaginative play, child initiated learning and structured teaching. As pupils progress, they will be encouraged to record their mathematical thinking in a more formal way.

“Developing a strong grounding in number is essential so that all children develop the necessary building blocks to excel mathematically. Children should be able to count confidently, develop a deep understanding of the numbers to 10, the relationships between them and the patterns within those numbers. By providing frequent and varied opportunities to build and apply this understanding - such as using manipulatives, including small pebbles and tens frames for organising counting - children will develop a secure base of knowledge and vocabulary from which mastery of mathematics is built. In addition, it is important that the curriculum includes rich opportunities for children to develop their spatial reasoning skills across all areas of mathematics including shape, space and measures. It is important that children develop positive attitudes and interests in mathematics, look for patterns and relationships, spot connections, ‘have a go’, talk to adults and peers about what they notice and not be afraid to make mistakes.”

Statutory framework for the early years foundation stage

Key Stage 1 Maths

The principal focus of mathematics teaching in key stage 1 is to ensure pupils develop confidence and mental fluency. The essential idea behind the mastery approach is that all children have a deep understanding so that future learning continues to build on solid foundations. If the subject is represented using concrete materials, pictorial representations and abstract symbols, it will allow children to visualise maths in varied ways, see connections and to independently explore and investigate a topic. Practical activities and resources offer the children a deeper mathematical understanding of more complex concepts. Providing children with visual representations also offers a scaffold when developing a more robust understanding of maths. Throughout Key Stage 1, it is important that children gain a secure knowledge of number and place value and become confident when using the four operations in both formal methods as well as problem solving where often the approach is not immediately evident. Alongside number work, our children begin to identify fractions using shapes, objects and quantities and make connections to equal sharing and grouping. Pupils are taught to count to ten in fractions, recognise equivalent fractions and develop their understanding of fractions on a number line. At this stage, our children will also develop their ability to recognise, describe, draw, compare and sort different shapes. Our children have the opportunity to use a range of measures to describe and compare different quantities such as length, mass, capacity/volume, time and money and are expected to use related vocabulary for all topics. Other subjects may have strong links to some maths topics allowing cross-curricular teaching. For example, shape through art or computing, measures through science or coordinates in geography. This is to ensure we continually maximise learning opportunities for all pupils across an entire curriculum.

Key Stage 2 maths

Lower Key Stage 2 – Years 3-4. The principal focus of mathematics teaching in lower Key Stage 2 is to ensure that pupils become increasingly fluent with whole numbers and the four operations, including number facts and the concept of place value. This should ensure that pupils develop efficient written and mental methods and perform calculations accurately with increasingly large whole numbers. At this stage, pupils should develop their ability to solve a range of problems, including with simple fractions and decimal place value. Teaching should also ensure that pupils draw with increasing accuracy and develop mathematical reasoning so they can analyse shapes and their properties, and confidently describe the relationships between them. It should ensure that they can use measuring instruments with accuracy and make connections between measure and number. By the end of Year 4, pupils should have memorised their multiplication tables up to and including the 12 multiplication table and show precision and fluency in their work.

Upper Key Stage 2 – Years 5-6 The principal focus of mathematics teaching in upper Key Stage 2 is to ensure that pupils extend their understanding of the number system and place value to include larger integers. This should develop the connections that pupils make between multiplication and division with fractions, decimals, percentages and ratio. At this stage, pupils should develop their ability to solve a wider range of problems, including increasingly complex properties of numbers and arithmetic, and problems demanding efficient written and mental methods of calculation. With this foundation in arithmetic, pupils are introduced to the language of algebra as a means for solving a variety of problems.

Teaching in geometry and measures should consolidate and extend knowledge developed in number. Teaching should also ensure that pupils classify shapes with increasingly complex geometric properties and that they learn the vocabulary they need to describe them. By the end of Year 6,

pupils should be fluent in written methods for all four operations, including long multiplication and division, and in working with fractions, decimals and percentages.

IMPACT

At North Cave C.E. Primary School, the impact in maths will be:

- Quick recall of facts and procedures.
- The flexibility and fluidity to move between different contexts and representations of mathematics.
- The ability to recognise relationships and make connections in mathematics.
- A mathematical concept or skill has been mastered when a child can show it in multiple ways, using the mathematical language to explain their ideas, and can independently apply the concept to new problems in unfamiliar situations.
- More children achieving working at the expected standard or working above the expected standard.
- Evidence of success and challenge evident in all work.

The impact will be seen:

- During lesson drop ins and internal monitoring to ensure the teaching and assessment of mathematics is of high quality and consistent across the school.
- External moderation of schools within the The Education Alliance.
- Our tracking and assessment system which enables formative and summative assessment to be recorded so that leadership and class teachers have a clear view of progress and of any children who are not on track to make expected progress.
- Sufficient and effective additional support for children in danger of falling behind or those experiencing significant difficulty, to enable them to keep up.
- Fast feedback (pupil conferencing in lessons) is provided to the children to address misconceptions immediately.
- Summative assessments will be collected at two points in the year and these will be discussed during our pupil progress meetings