Cumwhinton School

CUMWHINTON
SCHOOL

Maths Policy

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1	Jo Burke	September 23	
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Date of Review: June 2024

At Cumwhinton, our mathematics curriculum follows the Programme of Study, Aims of the National Curriculum and the Early Years Foundation Stage Framework.

Mathematics is a creative and highly inter-connected discipline that has been developed over centuries, providing the solution to some of history's most intriguing problems. It is essential to everyday life, critical to science, technology and engineering, and necessary for financial literacy and most forms of employment. A high-quality mathematics education therefore provides a foundation for understanding the world, the ability to reason mathematically, an appreciation of the beauty and power of mathematics, and a sense of enjoyment and curiosity about the subject.

Aims

The National Curriculum for mathematics aims to ensure that all pupils:

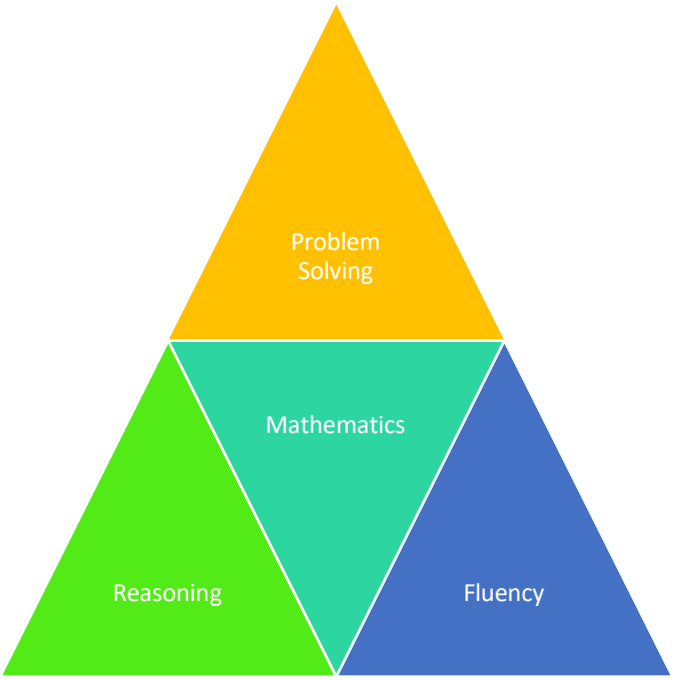
- become fluent in the fundamentals of mathematics, including through varied and frequent practice with increasingly complex problems over time, so that pupils develop conceptual understanding and the ability to recall and apply knowledge rapidly and accurately.

- 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.

At Cumwhinton School we see Maths very much as a multi-discipline, cross curricular, interconnected subject which should encourage creativity. As much revolves around the discussion about Maths between talk partners as it does the completion of calculations. We want the children to see Mathematics as being relevant to their world and applicable to everyday life as well as being something that they will need as they move on through their school life and ultimately to the world of employment. To that end, a high-quality, inter-related and creative Maths experience should be one that develops the children's ability to think mathematically and one which allows them to apply the tools to which they have been exposed in a variety of ways.

Following the introduction of the new National Curriculum in 2014 the emphasis has been to ensure that all children have access to the following strands of Mathematics:



This means that children need to be regularly exposed to opportunities involving increasingly complex problem solving which allows them to apply their Maths knowledge. In doing so, they should be encouraged to develop an argument and line of enquiry that they can prove and justify using mathematical vocabulary. This includes the ability to break down problems, both routine and non-routine, into a series of steps.

Approach

The programmes of study set out within each domain in the new National Curriculum will be used to ensure children get the learning experiences that is required.

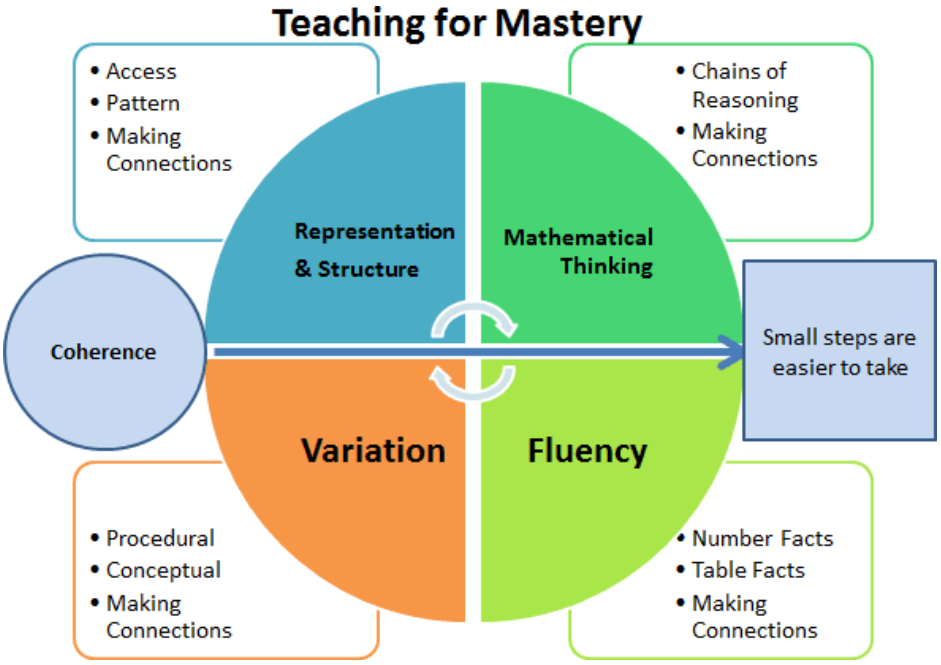
A Progression in Mental Mathematics strategy has also been adopted and disseminated to teachers (Third Space Learning).

It is important that children can explore Maths and present their findings not only in a written form but also visually and verbally; to that end the school will adopt the CPA approach: concrete, pictorial, abstract. This will allow the children to experience the physical aspects of Maths before finding a way to present their findings and understandings in a visual form before relying on the abstract numbers.

All staff at Cumwhinton School attend staff meetings that regularly have a Maths focus, which provide information on current thinking and introduces them to new teaching methodologies and ideas.
The school has been involved with the NCETM and NNW MathsHub through the Co-Maths Lead for the school being the Mastery Readiness Lead for Cumbria. Our approach to planning and delivery of HQTL is based around the 5 Big Ideas of Mastery in Mathematics produced by the NCETM.

Opportunities for Mathematical Thinking allow children to make chains of reasoning connected with the other areas of their mathematics. A focus on Representation and Structure ensures concepts are explored using concrete, pictorial and abstract representations, the children actively look for patterns as well as specialise and generalise whilst problem solving. Coherence is achieved through the planning of small connected steps to link every question and lesson within a topic. Teachers use both procedural and conceptual Variation within their lessons and there remains an emphasis on Fluency with a relentless focus

on number and times table facts.



The NNW MathsHub and school have provided training for teaching assistants and teachers around Mastery in Mathematics and plan to deliver continuous training in line with research and new mathematical teaching and learning ideas.

6 Teaching Principles of High-Quality Teaching and Learning in Mathematics

- Teachers believe in the importance of mathematics and that the vast majority of children can succeed in learning mathematics in line with national expectations.

- The whole class is taught mathematics together. We do not group children by ability. The learning needs of individuals are addressed through careful scaffolding, questioning and appropriate rapid intervention where necessary, to provide the appropriate support and challenge.

- The reasoning behind mathematical processes is emphasized. Teacher/pupil interaction explores how answers were obtained as well as why the method worked and what might be the most efficient strategy.

- Precise mathematical language, often couched in full sentences, is used by teachers so that mathematical ideas are conveyed with clarity and precision (STEM Sentences are used to reinforce correct language use). We value 'mathematical talk' and children get lots of opportunity to talk about and evaluate their mathematics during lessons.

- Conceptual variation and procedural variation are used extensively throughout teaching. This helps to present the mathematics in ways that promote deep, sustainable learning.

A. Conceptual variation is where the concept is varied and there is intelligent practice. Positive variation is showing what the concept is, and negative variation is showing what the concept isn't.

This clears away misconceptions at the very start. Within positive variation, both standard and non-standard representations are shown.

B. Procedural variation is where different procedures and/or representations are used to bring about understanding. For example, teachers may collect several solutions for a problem (some right, some wrong) before guiding the class towards the most efficient method. It also involves highlighting the essential features of a concept or idea through varying the non-essential features. Variation is not the same as variety – careful attention needs to be paid to what aspects are being varied (and what is not being varied) and for what purpose.

- Sufficient time is spent on key concepts to ensure learning is well developed and deeply embedded before moving on.

8 Classroom Norms to Establish in Mathematics

1. Everyone can learn mathematics to the highest levels.
2. If you **'can't do it'**, you **'can't do it yet'**.
3. Mistakes are valuable.
4. Questions are important.
5. Mathematics is about creativity and problem solving.
6. Mathematics is about making connections and communicating what we think.
7. Depth is much more important than speed.
8. Maths lessons are about learning, not performing.

Assessment

See Assessment Policy and Feedback and Marking Policy (to be review October 2023)

Teaching and Learning - A 'Mastery' Approach

The teaching and learning of mathematics at Knowle Primary Academy should include aspects of the following Mastery approach strategies in every lesson and/or over a series of lessons:

'Concrete, pictorial, abstract (CPA) is a highly effective approach to teaching that develops a deep and sustainable understanding of maths.'

CONCRETE

Concrete is the "doing" stage, using concrete objects to model problems. Instead of the traditional method of mathematics teaching, where a teacher demonstrates how to solve a problem, the CPA approach brings concepts to life by allowing pupils to experience and handle physical objects themselves. Every new abstract concept is learned first with a "concrete" or physical experience. For example, if a problem is about adding up four baskets of fruit, the pupils might first handle actual fruit before progressing to handling counters or cubes which are used to represent the fruit.

PICTORIAL

Pictorial is the "seeing" stage, using representations of the objects to model problems. This stage encourages pupils to make a mental connection between the physical object and abstract levels of understanding by drawing or looking at pictures, circles, diagrams or models which represent the objects in the problem. Building or drawing a model makes it easier for pupils to grasp concepts they traditionally find more difficult, such as fractions, as it helps them visualise the problem and make it more accessible.

ABSTRACT

Abstract is the "symbolic" stage, where pupils are able to use abstract symbols to model problems (Hauser). Only once a child has demonstrated that they have a solid understanding of the "concrete" and "pictorial" representations of the problem, can the teacher introduce the more "abstract" concept, such as mathematical symbols. Pupils are introduced to the concept at a symbolic level, using only numbers, notation, and mathematical symbols, for example +, –, x, / to indicate addition, subtraction, multiplication, or division.

What is Fluency?

Fluency comes from deep knowledge and practice. This is the first stage of pupils's understanding.

Fluency includes: conceptual understanding, accuracy, rapid recall, retention and practice

Accuracy Pupils carefully completing calculations with no or few careless errors.

Pace – Pupils are able to quickly recall the appropriate strategy to solve the calculation and progress through a number of questions at an age-appropriate pace.

Retention – Pupils will be able to retain their knowledge and understanding on a separate occasion to when the concept was first introduced.

The key to fluency is deep knowledge and practice and making connections at the right time for a child.

What is Reasoning?

Verbal reasoning demonstrates that pupils understand the mathematics. Talk is an integral part of mastery as it encourages students to reason, justify and explain their thinking. This is tricky for many teachers who are not used to focusing on verbal reasoning in their mathematics lessons. You might, for example, get young learners to voice their thought processes. Older students could take part in class debates, giving them the space to challenge their peers using logical reasoning.

Mathematical Talk: A mastery classroom should never be a quiet classroom. The way pupils speak and write about 5 mathematics transforms their learning. Mastery approaches use a carefully sequenced, structured approach to introduce and reinforce mathematical vocabulary.

To encourage talk in mathematics, teachers may introduce concepts by including sentence structures (stem sentences). Pupils should be able to say not just what the answer is, but how they know it's right. This is key to building mathematical language and reasoning skills. This gives pupils the confidence to communicate their ideas clearly, before writing them down.

Example Stem Sentences: The denominator is 5 because the whole has been divided into 5 equal parts. The numerator is 3 because 3 equal parts have been shaded/circled.

Teachers then maintain a high expectation upon pupils to repeat and use the correct mathematical vocabulary to explain their understanding verbally and in their reflection comments. By also displaying the vocabulary during the lesson, pupils will be able to use this independently.

When questioning and encouraging mathematical talk, teachers should provide regular, purposeful opportunities.

For example: - Show me how to complete the calculation - Teach your friend how to complete the calculation - How do you know which operation to use? - Why have you chosen this method? - How else can you represent this number? - What have you learnt today? - True or False - Odd one out - Sometimes, always, Never

What is Problem Solving?

Mathematical problem solving is at the heart of the Mastery Approach. Pupils are encouraged to identify, understand and apply relevant mathematical principles and make connections between different ideas. This builds the skills needed to tackle new problems, rather than simply repeating routines without a secure understanding.

Mathematical concepts are explored in a variety of representations and problem-solving contexts to give pupils a richer and deeper learning experience. Pupils combine different concepts to solve complex problems, and apply knowledge to real-life situations. Through problem solving, pupils are required to select their mathematical knowledge and apply this to a new concept.

Problem solving is more than just word problems – puzzles and investigations.

Planning – Teaching and & Learning

All year groups (EYFS – YEAR 6) use the White Rose Math's SOL (Scheme of Leaning) and Progression Resources to teach sequenced and coherent mathematics. Each LTP is split into Blocks that are taught through Small Steps. Teacher use the WRM Blocks to ensure they teach new knowledge and skills that are underpinned by previous learning and building towards future learning. Work can be differentiated and personalised to meet the needs of the children by teachers accessing the Progression Documents that are available on our school website.

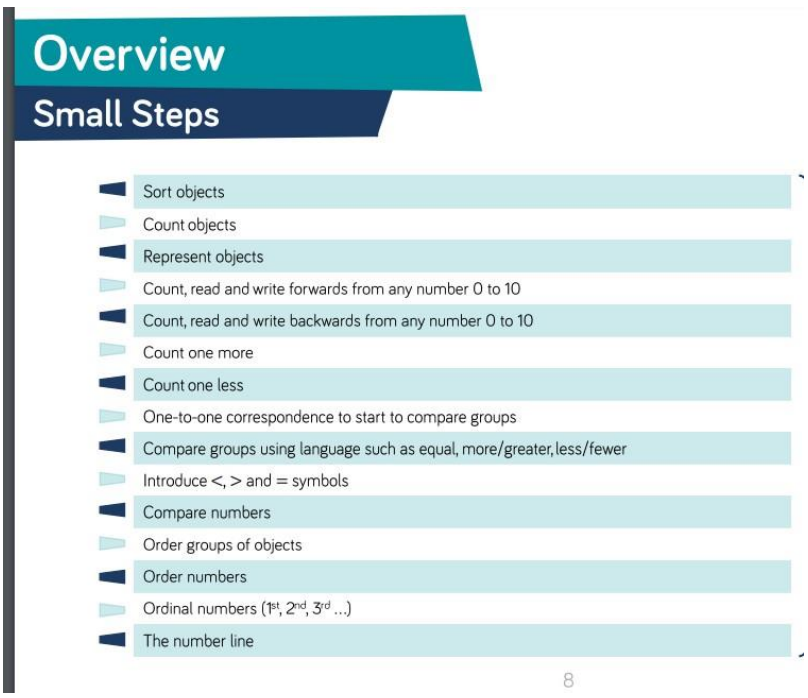
EYFS use an adapted form of the WRM, through the combination of the Development Matters and WRM. Numerical Patterns and Number is front and centre in the long term over view, ensuring the ELGs are met.

Teachers have access to a wide range of resources to support them in their planning of high-quality mathematics. Teacher are encouraged to use the notes and guidance from WRM to support them in planning lessons that meets the needs of **all children**.

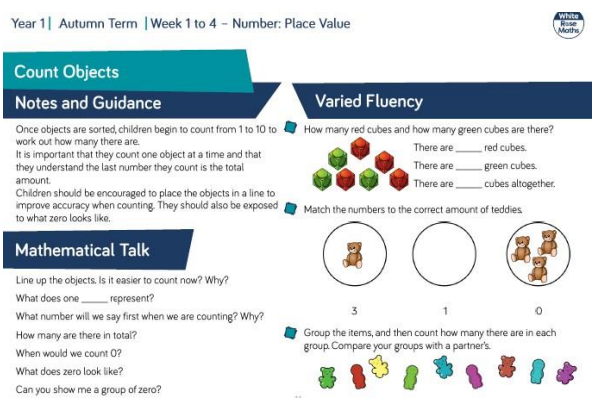
Year 1 example of WRM SOL

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12
Autumn	Number: Place Value (within 10)				Number: Addition and Subtraction (within 10)					Geometry: Shape	Number: Place Value (within 20)	
Spring	Consolidation	Number: Addition and Subtraction (within 20)			Number: Place Value (within 50)			Measurement: Length and Height		Measurement: Weight and Volume		Consolidation
Summer	Consolidation	Number: Multiplication and Division			Number: Fractions		Geometry: Position and Direction	Number: Place Value (within 100)		Measurement: Money	Measurement: Time	

WRM Small steps Year 1 example (Number – Place Value)



Year 1 example – Notes and Guidance



Resources

When resourcing and planning using the White Rose Planning, teachers to also choose resources which complement it and follow the Mastery Approach: Concrete, Pictorial and Abstract. Teachers have the flexibility to choose resources they feel are most effective to support the needs of all learners (differentiation) and ensure they achieve the aims of fluency, reasoning and problem solving.

Recording of Learning (to be reviewed October 2023)

Pupils have a blue square-paged Maths Exercise Book each. All Learning to be evidenced. This could be photographs, worksheets or mathematical jottings.

The presentation of mathematics books to be consistent, age appropriate and show that pupils take pride in the appearance of their work.

- The date to be written in either figures or words
- The Knowledge to be at the top of the page on the left hand side (handwritten or typed)
- When sticking in question sheets/resources, these to be trimmed to ensure they fit
- Pencils and rubbers to be used – no pens

Assessment

Please refer to Assessment Policy (to be reviewed October 2023)

Feedback and Marking

Please refer to Feedback and Marking Policy (to be reviewed October 2023)

What Mathematics looks like at Cumwhinton School…

What a Maths lesson looks like in our school:

- Mixed ability groupings / seating which allows children to work with different people over the course of time.
- Lots of talk—Reasoning/Mathematical Inquiry/Maths Talk/Use Mathematical Vocabulary
- Problem solving throughout – puzzles/investigations/misconceptions/corrections and mistakes
- Mini plenaries to share misconceptions, pose questions, challenge ideas
- Free access to manipulatives/concrete resources
- Feedback given to pupils at point of need, usually within the lesson – allowing teacher to adapt/extend/challenge or support immediately;
- Children freely accessing work/tasks that challenges their thoughts and ideas – free movement between task to ensure challenge is sustained (Key Stage 2)

This is our philosophy:

- All pupils can succeed
- All children will be challenged
- Mastery
- CPA approach
- Problem solving & Reasoning at the heart of everything
- Cross-curricular links wherever possible

This is how it works:

- Focus on mathematical language-key vocabulary displayed for children to see/teacher models use of key vocabulary/methods/strategies and pupils encouraged to use throughout lessons.
- Many opportunities to talk mathematically
- Prove It! Convince me!
- Children given time they need –may return to a task in following lesson – not 'compartmentalised' sessions but 'fluid'
- TA's sometimes used to pre-teach a concept ahead of the lesson

This is what we do:

- Planning document includes discrete focus on 3 aims of curriculum- Fluency, Reasoning and Problem Solving; reflection to drive next steps learning and planning; SMSC
- Positive use of mistakes/misconceptions- learning environment
- Regular book looks, learning walks, planning audits, pupil voice (see M&E Policy/Toolkit)
- Whole school CPD
- Raised profile of Mathematics- STEM week, NSPCC Number Day, World Maths Day, whole school displays-celebration of learning
- Parental involvement

This is what you might typically see:

- Open ended investigations- low threshold/high ceiling tasks
- Problems/Puzzles/Investigations
- Different representations of mathematical concepts
- Paired/group work
- Active maths where children move around the room
- Engagement and perseverance
- Children challenging themselves
- Children talking about, sharing and reflecting on their learning

This is what differentiation looks like:

- Effective and well-thought out use of concrete resources
- Probing questions to support struggling learners
- Learners show more than one way of representing their ideas
- Well-thought out learning environment, including placement of learners

This is how we know how well our pupils are doing:

- Tracking
- Pupil progress meetings
- Teacher assessment –White Rose End of Term Progress Checks/WRM end of block assessments/Scholar Pack Summative Checkpoints
- Marking and feedback – Live Marking – misconceptions/corrections and teaching completed during the lesson so progress is sustained.
- Photo evidence of practical maths – annotated either by child (KS2) or teacher (KS1) so that the journey of learning is clear including mistakes/misconceptions (a photo can tell you nothing or be very misleading).
- Targeted use of TAs- TA's noting and recording observations of individual children
- Scheduled TA/Teacher meetings

This is the impact of the teaching:

- Confident children who can talk about maths
- Maths is always in top 2 lessons – a love of Maths
- Depth of understanding/application in different contexts

This is how we use intervention:

- Targeted intervention for children identified through monitoring by TA/Teacher/SENCO
- Rapid Intervention during the lesson by Teacher/TA/High Achiever pupil to ensure learning does not stop and method/strategies discussed to enable progress by struggling pupil;
- Intervention sessions during assembly or after school

This is how we challenge the higher attainers/rapid graspers:

- Problem solving/puzzles/investigations that promote perseverance and Growth Mindset in different contexts
- Further reasoning and justification – Prove it/Convince Me

- Generalising and testing rules