North Wheatley CofE Primary

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Mathematics Policy

January 2023

North Wheatley C of E Primary School
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1. Aims and Intent

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 Mathematics Curriculum Intent at North Wheatley

At North Wheatley we implement the National Curriculum and White Rose Maths to deliver a curriculum that provides pupils with a range of contexts and approaches to their learning and embeds a mastery approach to their mathematical understanding. It is a maths curriculum planned with aspirations for pupils to leave North Wheatley C of E Primary with:

- A fluent approach in the fundamentals of maths.
- The ability to reason mathematically and solve problems by applying their learning to varied, real-life problems.
- The ability to demonstrate passion and respect for the subject.
- The knowledge to apply a range of taught strategies confidently and independently to support pupils in becoming mighty mathematicians.
- An understanding of the Rosenshine Principles of reviewing, questioning, modelling and sequencing concepts to ensure that children develop a secure understanding of their learning in maths which they can apply confidently and accurately.

2. Teaching and Learning – The Mastery Approach

The teaching and learning of mathematics at North Wheatley 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.' (Maths - no problem!)

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

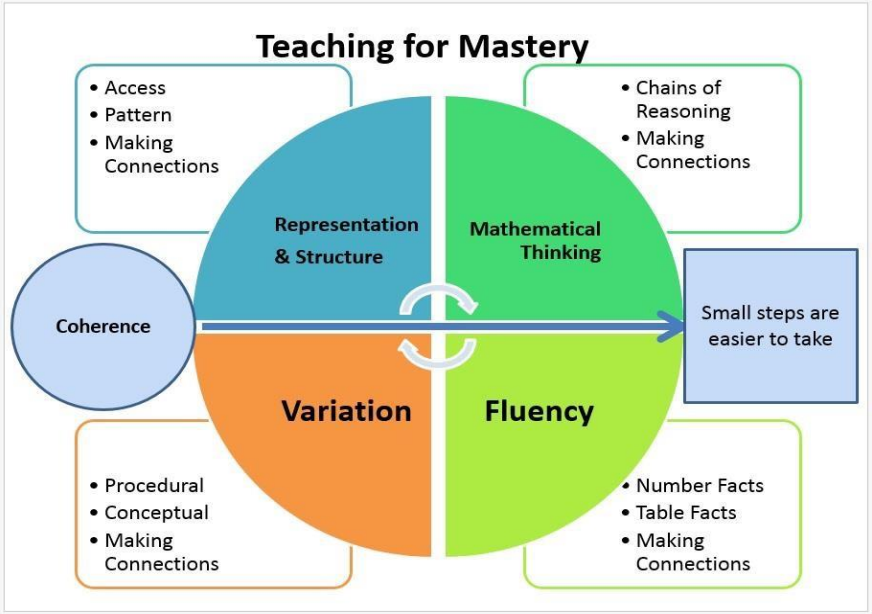
fruit. Each classroom has a station of concrete resources that support this area of teaching but is also encouraged to be used in future lessons as a scaffold to support pupils more independently.

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. 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.



Fluency

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

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. 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 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 stem sentences (examples of these can be found in the WRM planning schemes). 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.

To help support this we have developed the following generic stem sentences:

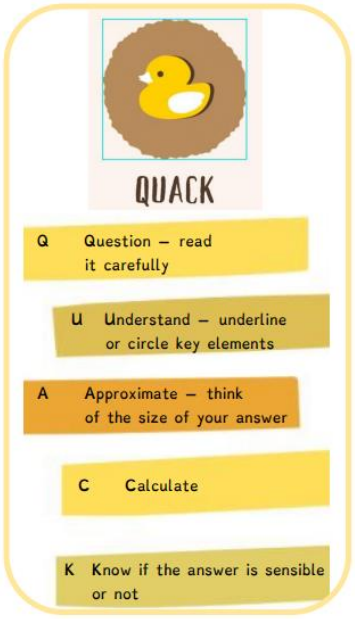
- *I know that…* opportunities for pupils to discuss their declarative knowledge – their understanding and use of facts, formulae, principles and rules.
- *I know when…* opportunities for pupils to discuss their conditional knowledge – their ability to problem solve and draw upon specific knowledge needed to solve the problem they are faced with.
- *I know how…* opportunities for pupils to discuss their procedural knowledge – their understanding of the procedure required in order to get to the correct answer.

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.

At North Wheatley we use the 'QUACK' approach to tackle problem solving:



This can be found in pupils' planners and on display as part of the Maths Learning Journey.

3. Lesson Structure and Planning

'The expectation is that the majority of pupils will move through the programmes of study at broadly the same pace. However, decisions about when to progress should always be based on the security of pupils' understanding and their readiness to progress to the next stage. Pupils who grasp concepts rapidly should be challenged through being offered rich and sophisticated problems before any acceleration through new content. Those who are not sufficiently fluent with earlier material should consolidate their understanding, including through additional practice, before moving on.' (National Curriculum).

Planning

At North Wheatley, Teachers from FS2 to Year 6 follow the White Rose Planning (WRM). This provides our Long Term Plans and Medium Term planning for each year group. Where necessary, mixed aged planning may be used to help staff to map out their blocks of learning to complement the delivery of maths to two year groups. In cases where this is not possible, or does not work effectively, staff may wish to discuss these issues with the Maths Lead who will support to find a suitable solution.

Written short term planning is not required but should instead be clearly evident within the lesson slides and should be available on Dropbox for access by SLT. Staff may choose to use the WRM small steps for their lessons but should always ensure that learning objectives follow the expectations laid out in the maths target books as the coverage of the curriculum will be clear and recorded for each individual pupil.

At the beginning of each new WRM block a knowledge organiser should be shared with pupils. This should be stuck into maths exercise books and shared on individual class pages. These can be used as a further scaffold and memory prompt as the block progresses. Pupils may choose to annotate these and personalise them to support their own journey.

Lesson Structure

North Wheatley Primary follows a learning journey approach to lessons, both on an individual basis and within a block of learning. Lesson slides and working walls display the journey which is based from staff training and knowledge about the Rosenshine Principles and our on-going development of supporting meta-cognition within the classroom.

Pupils begin by considering their prior learning and the end point of their learning journey. Within maths, this is usually the targets that should be met by the end of the block. The vocabulary for the lesson will be shared and discussed too so that pupils are able to use this language within their learning.

Starters to refer back to prior learning or to revisit misconceptions should be evident in lessons, with the expectation that WRM Flashback 4 will be completed once a week by pupils to cover learning from previous sessions and blocks.

Over the course of an objective being taught (this may vary depending on the objective), there should be opportunities for pupils to use a range of concrete, pictorial and abstract approaches. This does not always need to be evident in books, especially for concrete lessons. Pupils and staff may choose to share learning via Seesaw or verbal feedback during practical lessons may be sufficient if pupils have benefitted from this more than written feedback or recording of their learning.

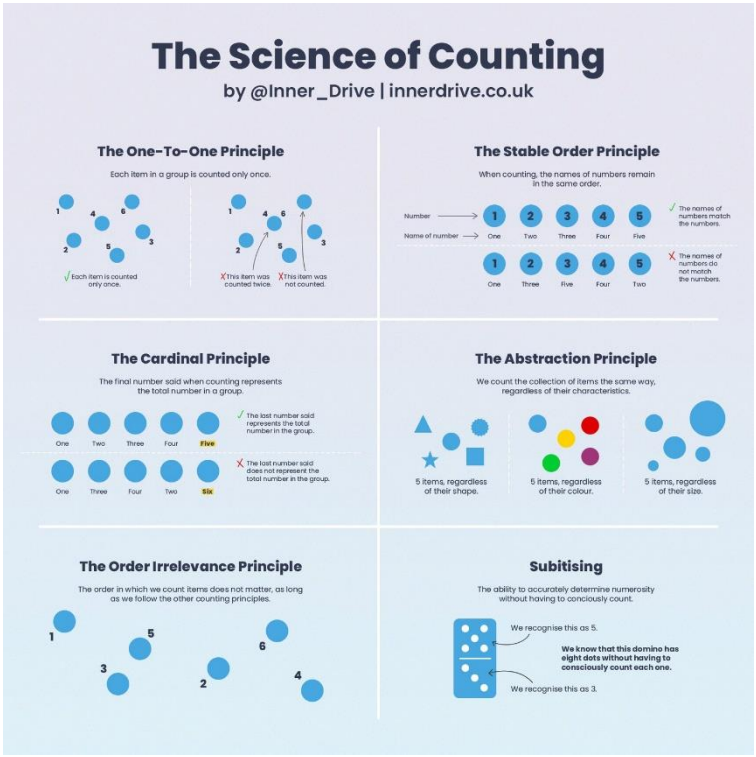
Reasoning and Problem Solving questions are taken from WRM, using the snipping tool, staff are able to adapt the WRM resources to incorporate the school headers which include the date, block, learning objective and targets that may be met in the session. In some cases Testbase may also be used to allow pupils the opportunity to experience SATs style questions. However, the majority of problems will be sought from WRM.

For the majority of pupils, differentiation of tasks should not be necessary as we encourage pupils to attempt learning within their year group. This is vital to ensure that gaps between those working at ARE and those not yet working at ARE does not get wider as their curriculum should not be limited for the latter. However, scaffolds, such as the use of concrete resources, pace of learning or adult support may be used. For specific pupils (those on SIS or SEN plans) this may be adapted further or booster groups used to help to make accelerated progress and not fall significantly behind their peers.

Early Years Foundation Stage

Lessons in the Early Years is a vital foundation to the understanding of maths throughout a pupils' journey through North Wheatley. The approaches used are in line with the expectations of the rest of school with a mixture of C-P-A and fluency, reasoning and problem-solving approaches to learning tasks and challenges. These tasks may be planned sessions leading from an input, following the school target books and White Rose Maths curriculum. However, staff may use in the moment opportunities and play experiences to develop mathematical thinking and language in an every day context. This demonstration of knowledge and skill application will be assessed and recorded into target books in FS2. Target books objectives are split across three areas: Number, Pattern and Shape, Space and Measure.

The Principles of Counting (see below) are also tracked and formally assessed in target books through FS2, however this will also be recorded on Seesaw for FS1 pupils to support their journey through EYFS and to guide staff with areas of strengths and development for individual pupils.



4. Assessment

Formative assessments are a key part of end of year judgements at North Wheatley. Feedback and target book updates, end of block assessments (found at WRM), questioning and reviews of apps such as TTRS all form part of the day-to-day assessments that staff will undertake.

The use of target books within lessons is a key part of the assessment process. Teaching staff should have ownership of this and should be the only people filling out these. Support staff may wish to inform teachers of the achievements of pupils they are working with so that targets can be signed off in books. Pupils should not be signing off targets. Targets are to be signed off in pencil when they have been achieved as part of a piece of independent learning. This may be the target that is being taught as part of the lesson, a skill being used in a starter or pulling prior knowledge and other maths skills into a problem. During summative assessments, targets are signed off in a green pen so that it is clear that this skills has been demonstrated in 'test conditions' and is therefore clearly embedded. At the end of each block within the WRM curriculum, the majority of targets for this block should be signed off with any remaining ones hopefully being signed off during summative assessment opportunities. The aim is for pupils to get a target signed off for evidence of fluency, problem solving and reasoning. Where assessments have taken place a score of 55% (total score) is deemed as expected standard and 85% as greater depth.

Summative assessments will take place once per term with data being uploaded to O-Track for monitoring and progress checks. From here, pupils may be identified for targeted support or booster groups. This data will be shared with all staff as part of termly pupil progress meetings.

5. Vocabulary

Staff at North Wheatley have discussed and agreed to the following vocabulary which supports teaching and learning and is present in the White Rose Maths curriculum, National Curriculum and our school target books. This is not an exhaustive list but the key vocabulary that is often misused, misunderstood or more recently introduced into the curriculum that staff may need to familiarise themselves with.

Array	Shapes or objects arranged in a rectangle are called an array, these are often used in multiplication and division problems.
Bar Model	A pictorial representation of a problem or concept where bars or boxes are used to represent the known and unknown quantities.
Bonds	Pairs which make up a total (Eg. A bond of 10 is 4 and 6).
Commutative	The commutative law of arithmetic says that you can change the order of the numbers when adding or multiplying and the answer will not change.
Fewer	We use fewer with countable nouns when we compare two things, to say that one thing is smaller in number than another thing (books, problems, days, cups…).
Formal Method	Column addition or subtraction, long/short multiplication and division.
Less	We use less with uncountable nouns when we compare two things, to say that one thing is smaller in amount than another thing (work,
Ones	This is the accepted unit of measures for 1-digit numbers (previously referred to as ‘units’).
Subitise	The ability to look at a small number of objects/pictorial representations and instantly recognise how many objects without needing to count.
Subtraction	This should be the most frequently used term when teaching, whilst ‘take away’ may be a reference point it should be considered that pupils may be familiar with this term in other contexts and may get confused.