Our Lady's RC Primary School

Maths Policy

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Signed: B. Parkinson (Person Responsible) **Date:** 7.3.2023

Signed:..... (Headteacher) **Date:**.....

Signed:..... (Chair/Governor) **Date:**.....

"Learning and loving together; we grow with Jesus"

Our Core Values

During Summer 2020 workshops, we revisited both our Mission Statement and Core Values. This involved everyone in discussion, reflection and prayer about the values, Mission and Aims of our Catholic school. There was a calling to all to re-commit to our purpose and to work together to understand our roles and responsibilities as part of Our Lady's

Our Mission Statement is:

"**Learning and loving together; we grow with Jesus**"

The Core Values that provide the foundation for that Mission are:

Faithful	Positive	Safe
Nurturing	Forgiving	Fair
Respectful	Honest	

NURTURE

The School's six nurturing principles sum up our practice and theory. They underpin the context, organisation and curriculum.

1. Children's learning is understood developmentally
2. The classroom offers a safe base
3. the importance of nurture for the development of wellbeing
4. Language as a vital means of communication
5. All behaviour is communication
6. The importance of transition in children's lives

Our Mission is represented by this design. As with the statement itself, the logo was developed by all stakeholders, with the children in particular providing the symbolic ideas of **growth – the tree**, **love – the hearts** and **Christ – the Cross**

Contents

Teaching principles

- Teaching is underpinned by a belief in the importance of mathematics and that the vast majority of children can succeed in learning mathematics in line with national expectations for the end of each key stage.

- The whole class is taught mathematics together, with no differentiation by acceleration to new content. The learning needs of individual pupils are addressed through careful scaffolding, skilful questioning and appropriate intervention, in order to provide the necessary support and challenge.

- Children with an identified SEND may need carefully differentiated work to meet the objectives from lower year groups in order to make progress.

- A full range of interventions will include:

    - Groups identified from assessments as 'Greater Depth'
    - Groups identified from objectives they haven't achieved in previous year groups for rapid acceleration.

  These groups are fluid and meet the needs of the children on a half termly basis.

- SEND children will have targets identified on their pupil passport plans which will inform their interventions.

- Factual knowledge (e.g. number bonds and times tables), procedural knowledge (e.g. formal written methods) and conceptual knowledge (e.g. of place value) are taught in a fully integrated way and are all seen as important elements in the learning of mathematics.

- The reasoning behind mathematical processes is emphasised. Teacher/pupil interaction explores in detail **how** answers were obtained, **why** the method/strategy worked and what might be the most efficient method/strategy.

- Interim methods (e.g. expanded methods for addition and multiplication) to support the development of formal written algorithms are used for a short period only, as stepping stones into efficient, compact methods. (See appendix 1)

- Precise mathematical language, couched in full sentences (stem sentences), are **always** used by teachers, so that mathematical ideas are conveyed with clarity and precision. Pupils are required to do the same (e.g. when talking about fractions, both the part and its relationship to the whole are incorporated into responses: "*The shaded part of the circle is one quarter of the whole circle"*). (See appendix 2)

- Conceptual variation and procedural variation are used extensively throughout teaching, to present the mathematics in ways that promote deep, sustainable learning. (See appendix 3)

- Carefully devised exercises employing variation are used. These provide **intelligent practice** that develops and embeds fluency and conceptual knowledge. The inclusion of all these techniques within each lesson contributes to the 'Five big ideas for mastery teaching.' (See appendix 4)

- Sufficient time is spent on key concepts (e.g. multiplication and division) to ensure learning is well developed and deeply embedded before moving on with the use of Times Tables Rock stars application, Demon tables and regular counting sessions.

- Frequent additional practice, outside the lesson, is encouraged, in order to develop pupils' fluency and consolidate their learning.

Lesson design

- Programmes of study and lesson content are carefully sequenced, in order to develop a coherent and comprehensive conceptual pathway through the mathematics. Medium term plans such as those demonstrated by the 'White Rose Maths Hub' show the lengths of time which are spent on each topic.

- Learning is broken down into small, connected steps, building from what pupils already know.

- Difficult points and potential misconceptions are identified in advance and strategies to address them planned.

- Key questions are planned, to challenge thinking and develop learning for all pupils with stem sentences embedded to ensure key vocabulary is being used. This is consistent across school.

- Contexts and representations are carefully chosen to develop reasoning skills and to help pupils link concrete ideas to abstract mathematical concepts.

- The use of high quality materials and tasks to support learning and provide access to the mathematics, is integrated into lessons. These may include textbooks, visual images and concrete resources.
- Sticky knowledge is revisited at the beginning of most lessons to ensure knowledge transition into the long term memory.

Features of teaching

- The day will start with a 'Snappy Maths' activity which provides the children with an opportunity to practice and develop fluency for the objectives they are meeting in their daily maths lesson.
- Every morning, all classes will have an hour's lesson which comprises:

  - 5- 10 minutes fluency starter- an opportunity to practice key maths facts to support the lesson (some groups will work with a Teaching assistant during this time). Sticky knowledge can also be revisited in this time.

  - 30-35 minutes whole class teaching with a ping-pong approach to facilitate deep conceptual understanding. Every teaching session starts with a real-life example to contextualise the maths. This is the 'In focus' task, 'Let's learn and 'Guided practise' in the 'Maths no problem' textbooks.

  - 20 minutes independent variation practice: during this time the teacher and assistants will work with specific fluid groups to implement same day interventions. The variation practice is primarily made up of the pupil workbook from 'Maths no problem', however, in order to provide children with access to other materials which demonstrate depth of understanding- materials from White Rose Maths hub, NCETM assessment and spine (PD) materials and other high quality materials will also be used as appropriate.

  - 5 minutes problem solving or reasoning problems are incorporated throughout or at the end of the lesson which is a carefully chosen to support depth of understanding. Children are moved on to these quicker during the lesson if they have met the objective.

- Lessons are sharply focused; digression is generally avoided.

- Key new learning points are identified explicitly with use of a WALT and clear and precise vocabulary.

- There is regular interchange between concrete/contextual ideas and their abstract/pictorial representation. This is also demonstrated upon each maths working wall in class.

- Mathematical generalisations are emphasised as they emerge from underlying mathematics, which is thoroughly explored within contexts that make sense to pupils.

- Making comparisons is an important feature of developing deep knowledge. The questions "*What's the same, what's different?"* are often used to draw attention to essential features of concepts.

- Repetition of key ideas, often in the form of whole class recitation (stem sentences), is used frequently. This helps to verbalise and embed mathematical ideas and provides pupils with a shared language and vocabulary to think about and communicate mathematics. Flash back 4's and Fluent in 5 can also be used to enhance 'Sticky knowledge' to help retrieval of key number facts.

- Teacher-led discussion is interspersed with short tasks involving pupil to pupil discussion and completion of short activities.

- Formative assessment is carried out throughout the lesson; the teacher regularly checks pupils' knowledge and understanding and adjusts the lesson accordingly. This is then marked accordingly using a traffic light stamp (Green- WALT met. Amber – A few misconceptions but mostly correct. Red – WALT not met with intervention needed.)

- Short homework/out of class tasks are set once a week, to consolidate learning and provide formative feedback. Children will also be expected to spend homework time practicing and consolidating tables and key maths facts. This can be written work, Mathletics or Times Table Rockstars. This is Numbots for Y1 and YR.

- Snappy maths (5-10 minute) fluency activity to be completed with the children every other day to enhance number fact knowledge. This can be done at the start of a lesson or the start of the day as an example. The teacher can decide where this fits within their timetable.

- Teachers discuss their mathematics teaching regularly with colleagues, sharing teaching ideas and classroom experiences in detail and working together to improve their practice as part of a Teacher Research Group (TRG) model. Currently, the teachers at Our Lady's engage in TRG's across the school and also attend a wider North-West TRG which allows teachers from schools across the North-West to collaborate and share expertise.

- **Spiritual, moral, social and cultural development**
  The teaching of mathematics supports the social development of our children through the way we expect them to work with each other in lessons. We group children so that they work together, and we give them the chance to discuss their ideas and results.

Planning

- The White Rose Maths Hub Curriculum Overview shows the length of time spent on topics and the order they are taught which follows a coherent journey.
- The White Rose activities allows for the full daily lesson and any relevant differentiation and opportunities for formative assessment to be used from the Textbook with PD NCETM spine materials to be used alongside these to ensure correct vocabulary, variation and fluency. NCETM and other documents can be used to support teacher's pedagogies.
- Supplementation of activities, white board resources and teaching materials from White Rose Maths will also support new and supply teachers when necessary.
- Children with an identified SEND will have separate planning based on targets set in their pupil passports.
- All planning identifies models, images and conceptual/ procedural variation as previously stated.

Assessment

- Formative and summative assessment will be an integral part of the maths curriculum.
- Summative assessment will be met using PUMA Rising Star test for Reception and Year 1, SATS tests for Years 2 and 6 with Years 3-5 using NFER.
- In addition, NFER and statutory SATS tests will be undertaken formally at the end of the year from year two to six.
- Fortnightly arithmetic test resources will be used in or outside of the maths lesson to support progression through school and enable all children to confidently access the statutory end of year assessments.
- Ongoing formative assessment involving problem solving and reasoning will also be integrated fully into each topic to support children's reasoning skills and enable them to develop the skills they need to access statutory end of year tests. These materials can include: NCETM Mastery and greater depth documents, pitch and expectation, PD spine activities and White Rose problem solving questions.

- All types of formative and summative assessment will be fully inputted into Our Lady's tracking system to enable teachers to update and keep track of children's achievements of the yearly objectives.

- Marking is undertaken both by pupils and teachers and is an integral part of the assessment process to aid pupil progress. Marking will be relevant and focussed and will allow the children time to review their own work and make relevant corrections. This includes peer and self-assessment. The use of a traffic light highlights quickly which children have achieved the objectives for that lesson.

SMSC in Mathematics

Spiritual development in Mathematics

The study of mathematics enables students to make sense of the world around them and we strive to enable each of our pupils to explore the connections between their mathematics skills and every-day life. Developing deep thinking and an ability to question the way in which the world works promotes the spiritual growth of pupils. Pupils are encouraged to see the sequences, patterns, symmetry and scale both in the man-made and the natural world and to use maths as a tool to explore it more fully.

Moral development in Mathematics

The moral development of pupils is an important thread running through our mathematics curriculum. Pupils are provided with opportunities to use their maths skills in real life contexts, applying and exploring the skills required in solving various problems. For example, pupils are encouraged to analyse data and problem solve and reason why this data may be true or false. All pupils are made aware of the fact that the choices they make when answering a problem lead to various different answers. They must then make a choice that links to the outcome or answer they are looking for. The logical aspect of this relates strongly to the right/wrong responses in maths.

Social development in Mathematics

Problem solving skills and teamwork are fundamental to mathematics through creative thinking, discussion, explaining and presenting ideas. Pupils are always encouraged to explain concepts to each other and support each other in their learning. All our children sit within a mixed ability setting to encourage this. During this discussion time, pupils realise their own strengths and feel a sense of achievement which often boosts confidence. Over time they become more independent and resilient learners.

Cultural development in Mathematics

Mathematics is a universal language with a myriad of cultural inputs throughout the ages. Various approaches to mathematics from around the world are used and this provides an opportunity to discuss their origins. This includes different multiplication methods from Egypt, Russia and China, Pythagoras' Theorem from Greece, algebra from the Middle East and debates as to where Trigonometry was first used. We try to develop an awareness of both the history of maths alongside the realisation that many topics we still learn today have travelled across the world and are used internationally.

Appendix 1:

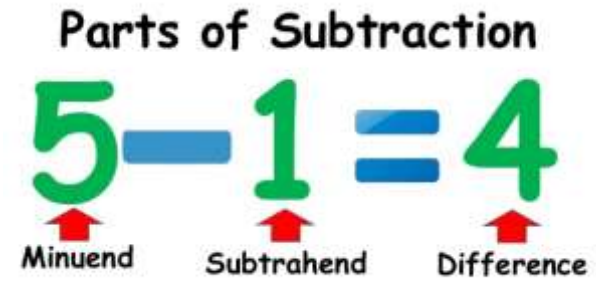
Mastery calculation policy

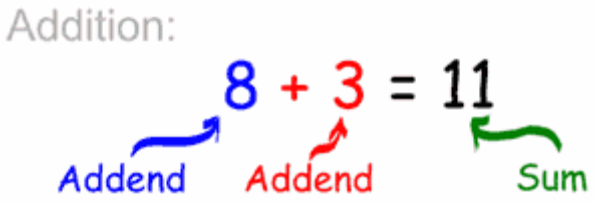
See attached link: Calculation Policy

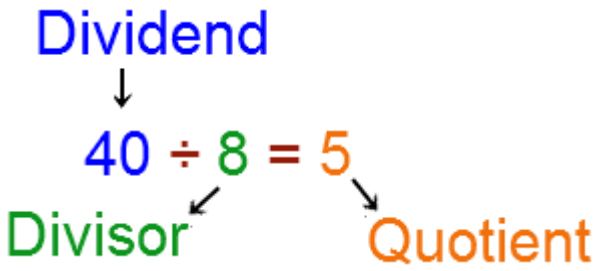
Appendix 2:

Mathematical language

At Our Lady's, precise mathematical language, couched in full sentences, is **always** used by teachers, so that mathematical ideas are conveyed with clarity and precision. Pupils are required to do the same (e.g. when talking about fractions, both the part and its relationship to the whole are incorporated into responses: "*The shaded part of the circle is one quarter of the whole circle*"). As part of a Mastery curriculum in Shanghai, children are exposed to the mathematical names of parts of number sentences so that the structure of the maths can be appreciated more clearly. These names are shown below and will be used in lessons where it is of a benefit to aid understanding.







Appendix 3:

Procedural and conceptual variation

Teaching with Variation

East Asian Paradox

The East Asian learner paradox refers to the apparent contradiction between the teacher-dominated learning environment in East Asia, which is generally perceived to be non-conducive to learning, and the outstanding performance of East Asian students in comparative studies.

Repetition leads to Superficial Learning?

Many Western educators hold the view that students should be encouraged to understand rather than to memorise what they are learning (Purdie, Hattie & Douglas, 1996) as they believe that understanding is more likely to lead to high quality outcomes than memorizing (Dahlin & Watkins, 2000).

Teaching with Variation

The central idea of teaching with variation is to highlight the essential features of the concepts through varying the non-essential features.
Gu, Huang & Marton, 2004

Variation theory is posited on the view that "when certain aspects of a phenomenon vary while its other aspects are kept constant, those aspects that vary are discerned".
Lo, Chik & Pang, 2006

Drawing Attention to Making Connections

Learning amounts to being able to discern certain aspects of the phenomenon that one previously did not focus on or which one took for granted, and simultaneously bring them into ones focal awareness
(Lo,Chik & Pang, 2006, p.3).

Variation Theory

It is argued that variation problems as an "indigenous" Chinese practice aim to discern and to compare the invariant feature of the relationship among concepts and solutions. This practice also aims to provide opportunities for making connections, since comparison is considered the pre-condition to perceive the structures, dependencies, and relationships that may lead to mathematical abstraction. (Sun 2011)

According to the Theory of Variation, a key feature of learning involves experiencing a phenomenon in a new light (Marton,1999). In other words thus, teaching with variation helps

students to actively try things out, and then to construct mathematical concepts that meet specified constraints, with related components richly interconnected (Watson & Mason, 2005).

Procedural Variation

$2 \times 3 =$	$6 \times 7 =$	$9 \times 8 =$
$2 \times 30 =$	$6 \times 70 =$	$9 \times 80 =$
$2 \times 300 =$	$6 \times 700 =$	$9 \times 800 =$
$20 \times 3 =$	$60 \times 7 =$	$90 \times 8 =$
$200 \times 3 =$	$600 \times 7 =$	$900 \times 8 =$

The child is carrying out the procedural operation of multiplication, but through connected calculations has the opportunity to think about key concepts involving multiplication and place value. This leads to intelligent practice.

Procedural variation is dynamic, where I move between one calculation and the next there is a connection.

Children need to be taught from an early age to look for and recognise these connections

It provides the opportunity:

- **To focus on relationships, not just the procedure**
- **To make connections between problems**
- **Using one problem to work out the next**

Intelligent Practice

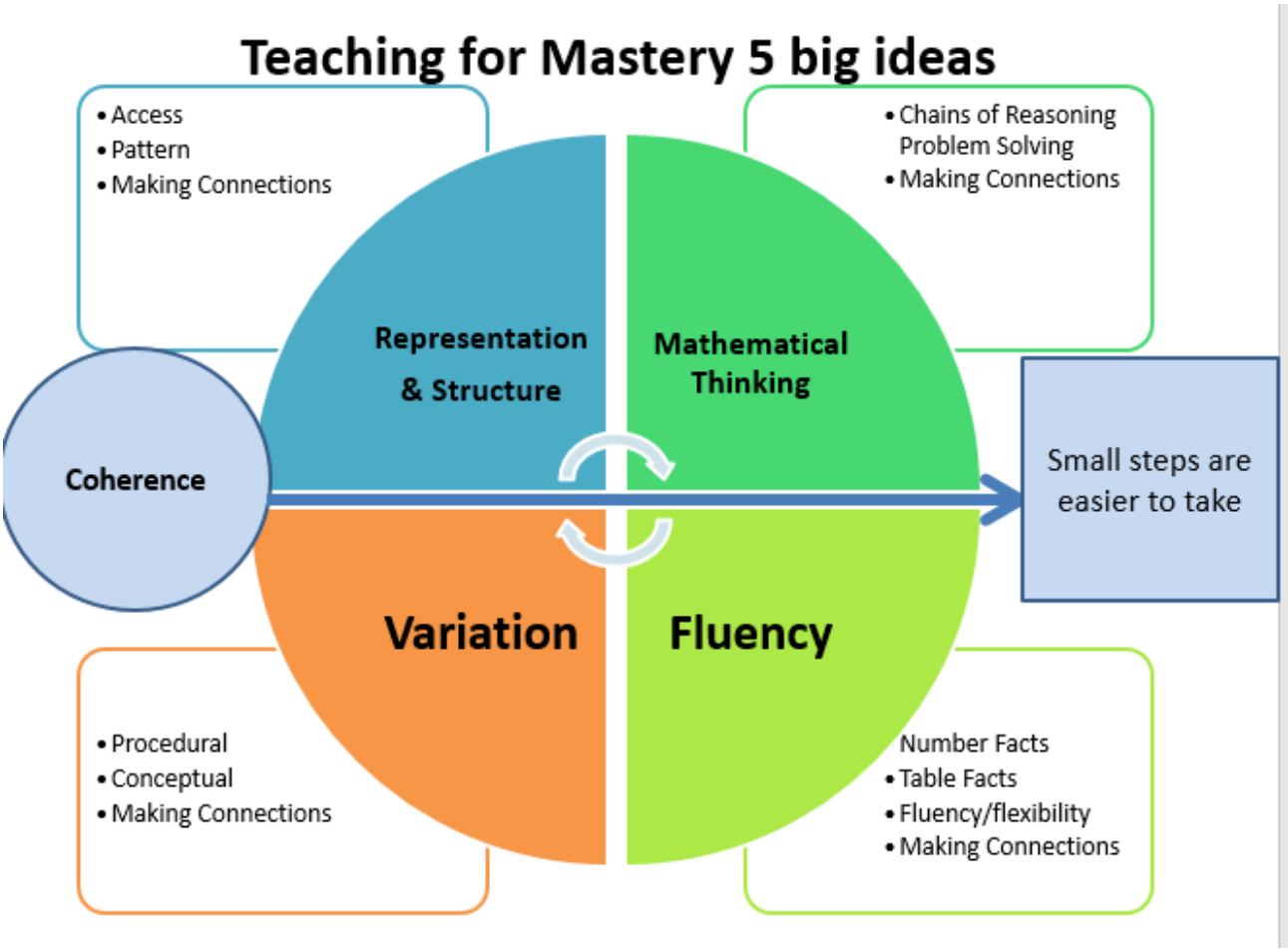
Intelligent practice exploits variation to engage pupils in rich practice which both develops fluency and engages pupil in reasoning and conceptual development.

Conceptual Variation

By using "conceptual variation" The students can learn from multiple perspectives from: concrete to abstract, from special to general, highlighting the essential features and clarifying the connotation of concept by excluding the obstructing of backgrounds. Thus through conceptual variation, students can be helped to understand the essence of concepts and establish the substantial relationship.

Appendix 4:

The five Big ideas


Teaching for Mastery 5 big ideas
• Access
• Pattern
• Making Connections
• Chains of Reasoning
Problem Solving
• Making Connections
Representation
& Structure
Mathematical
Thinking
Coherence
Small steps are
easier to take
Variation
Fluency
• Procedural
• Conceptual
• Making Connections
Number Facts
• Table Facts
• Fluency/flexibility
• Making Connections