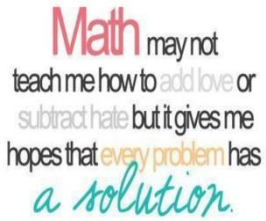
It is magic until you understand it, and it is mathematics thereafter - Bharati Krishna

Duston Eldean Primary School
'TOGETHER WE GROW'

Mathematics Policy



Aims:

Our teaching in mathematics should:

- Develop mathematical thinkers.
- Ensure relational understanding of concepts covered.
- Ensure the correct use of mathematical vocabulary
- Develop reasoning.
- Identify connections in children's learning to move fluently between representations of mathematical ideas.
- Enable the application of mathematical knowledge to science and other subjects.

The National Curriculum for mathematics (2014) aims to ensure that all pupils:

- become ***fluent*** in the fundamentals of mathematics, 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.

Curriculum

Foundation Stage

The Statutory Framework for EYFS (2021) identifies mathematics as a specific area of the curriculum and divides learning into two sections: number and numerical patterns. The Early Learning Goals for each of these areas set out what children are expected to achieve by the end of Foundation stage. Weekly focused whole class teaching sessions introduce a topic supported by an additional 3 x 20 minute daily follow up teaching to reinforce learning. Teacher led groups consolidate learning and provide additional support. Other Opportunities for children to immerse themselves in mathematics are provided, through continuous provision, in the Foundation Stage setting.

Key Stage 1 and 2

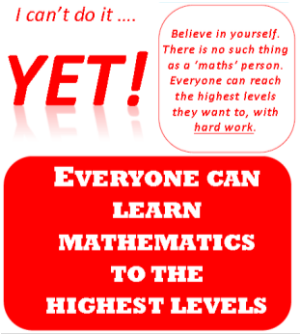
The National Curriculum for mathematics (2014) describes in detail what pupils must learn in each year group. Combined with our Written Calculation Policy (see Appendix 1), this ensures continuity, progression and high expectations for attainment in mathematics. The Maths Guidance for Key Stage 1 and 2 (2020) identifies the Ready to progress criteria for each year group. We use these statements to prioritise learning to build form foundations.

- We follow the National curriculum 2014 and all children are taught the curriculum for their year group.
- 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 rich and sophisticated problems rather than acceleration through new content. Going Deeper is the key to challenging more able pupils.
- Pupils who are not sufficiently fluent with earlier material should consolidate their understanding, including through additional practice, before moving on.
- Daily mathematics lessons are planned.
- Additional mental maths session take place to develop speed and fluency of facts e.g. number bonds, times tables.
- Retrieval of learning is planned in to help develop stronger memory connections.

Maths at Eldean
Our approach to Mathematics is designed to enhance understanding and enjoyment, as well as raise attainment for every child following a Mastery approach. Mathematical concepts are explored using a variety of representations and problem-solving contexts give pupils a richer and deeper learning experience.

'Mathematics is an interconnected subject in which pupils need to be able to move fluently between representations of mathematical ideas. The programmes of study are, by necessity, organised into apparently distinct domains, but pupils **should make rich connections across mathematical ideas to develop fluency**, mathematical reasoning and competence in solving increasingly sophisticated problems. (National Curriculum 2014)

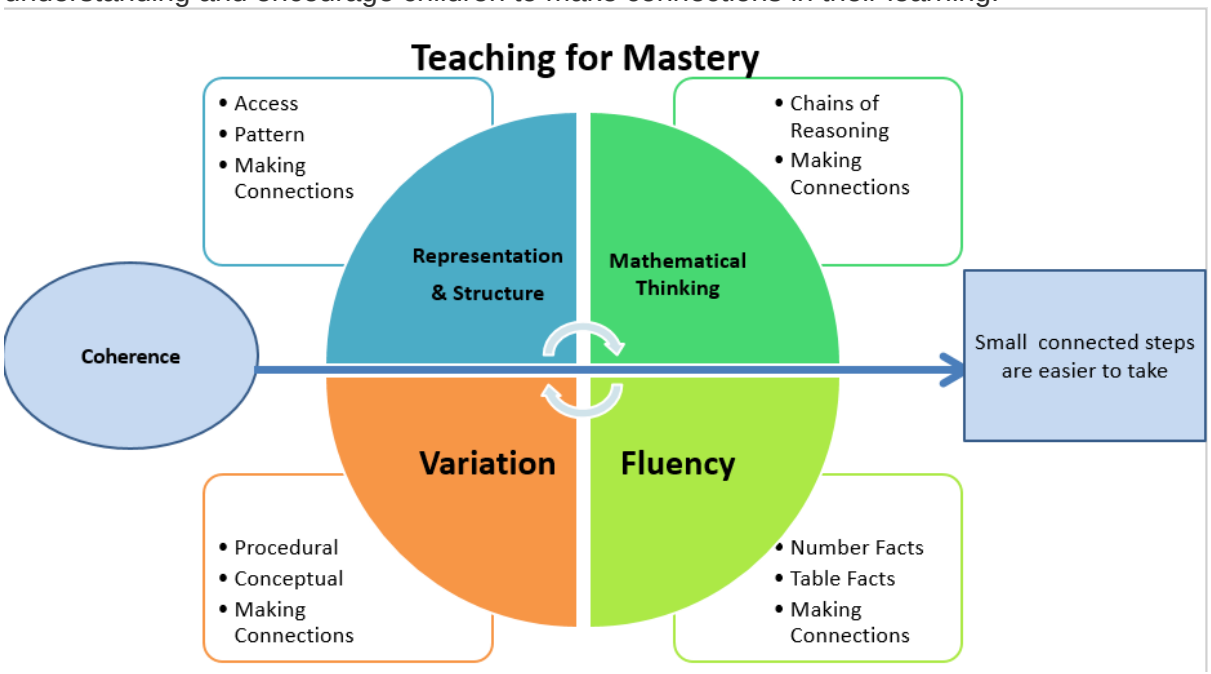
What is Mastery?
Mastery is a journey and long-term goal, achieved through exploration, clarification, practice and application over time. A mathematical concept or skill has been mastered when a person can represent it in multiple ways, has the mathematical language to communicate related ideas, and can independently apply the concept to new problems in unfamiliar situations.



Mastery may also be demonstrated through children:

- Identifying which mathematical approach is most effective in different scenarios
- Combining different concepts to solve complex problems
- The ability to apply knowledge to real-life situations

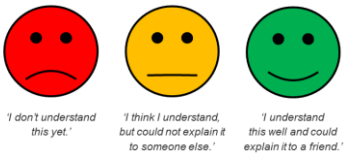
5 Big Ideas
The diagram below shows the five key components to teaching which help to establish deep understanding and encourage children to make connections in their learning.



Problem solving

Mathematical problem-solving is at the heart of our 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 grasping the principles. Problem solving is at the heart of every lesson and many lessons start with a real life problem that needs to be solved.

Inclusion and High expectations



We believe no child should be left behind. We focus on pupils 'keeping up over catching up'. Continuous AfL within lessons enables teachers to identify children who need additional support and clarification of concepts. Children are actively encouraged to ask questions if they are not sure. The vast majority of the class will therefore be working on the age appropriate curriculum. Plans are put in place for children with significant needs.

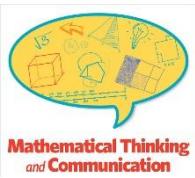
Pre-teach and Post-teach

Focused specific support is used in Key Stage 2 to give additional time to children either to go over the learning from the previous lesson or to give them an introduction to the lesson before they do it. This helps to build confidence and consolidate understanding. These small group sessions, often led by a Teaching Assistant, allow misconceptions to be addressed and understanding to be secured.

Concrete, pictorial, abstract

Objects, pictures, words, numbers and symbols are everywhere. In order to develop a deep understanding of concepts, we follow a Concrete, Pictorial and Abstract (CPA) approach to learning. Children are encouraged to physically represent mathematical concepts using a range of equipment. Objects and pictures are used to demonstrate and visualise abstract ideas, alongside numbers and symbols. Our approach incorporates all of these to help pupils explore and demonstrate mathematical ideas, enrich their learning experience and deepen understanding. Together, these elements help cement knowledge so pupils truly understand what they've learnt.

Mathematical language



The way pupils speak and write about mathematics transforms their learning. We use a carefully sequenced, structured approach to introduce and reinforce mathematical vocabulary. Teachers model this in the lesson and children are expected to use the correct terminology when communicating their thinking. It is clearly displayed in all lessons.

STEM Sentences

We always ask pupils to explain the mathematics in full sentences (not just what the answer is, but how they know it's the right answer). This is key to building mathematical language and reasoning skills. Skeletal sentences (STEM) are created for the children to use in a lesson so that they can make connections in their thinking to understand what each part represents.

12 = 10 + 3 or 10 + 3 = 12

____ is made of ____ add ____.
____ add ____ makes ____

Choral and Rehearsing
Choral (speaking together as a class) and rehearsing (repetition of the choral) are used to build instant recall of facts, make learning memorable and to clarify definitions.

Some facts just need to be learnt and children require a quick recall of these facts.
E.g. '½ = 0.5', 'There are 10 ones in 1 ten', '90° in a right angle.'

Definitions of mathematical words need to be accurate to enable children to use them appropriately.
E.g. Perimeter – the total length/distance around the outside of a 2D shape.

Making learning memorable will help children to retain and internalise learning.
E.g. 'Factors fit', 'Multiples are more'

Modelling
Modelling the learning is key to ensuring understanding. In whole class work we follow an I do, you do, we do approach to allow children to gain the confidence to work independently

I do – The teacher models the learning for the children ensuring that they are clear about what each part represents. This is a crucial time to address mis-conceptions.

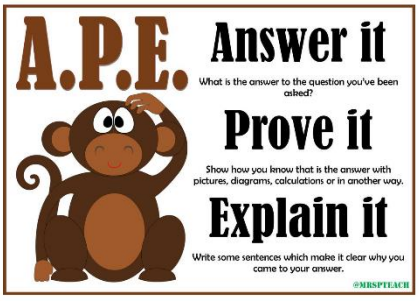
We do – working together, the teacher and children solve a similar problem either working as a whole class or with the children working in pairs. This stage is important to ensure the correct mathematical vocabulary is being used.

You do – those that are confident work independently to solve a problem or those not fully secure can work with a partner or adult.

Flying the Kite

Allowing the children to try things out for themselves and discovering patterns is a crucial part of mathematics. However, children can go off on a tangent and the balance between letting them go and pulling them back in allows them to explore yet keep to the main teaching concept.

The answer is only the start.
Answering the question is only the beginning. Our philosophy is: 'Being able to answer a question shows that you are a good mathematician but being able to explain and prove it show you are an excellent mathematician.'
Proving and explaining an answer requires a chid to communicate their thinking which enables them to use mathematical language and internalise their thinking. It just as important knowing how you got to an answer as it is to finding the answer.



Variation

Procedural Variation – is used to support pupils' deeper understanding of a mathematical procedure or process. This might be to compare the same procedure used to calculate two different sets of numbers. By asking the pupils to compare two successive procedures where the first is linked to a second. Children can observe relationships, observe the variant and invariant properties of the procedure - i.e. what stays the same and what changes? (depending on the numbers/ conditions) leading to generalising about the procedure. What do you notice? Is there a relationship between the calculations? Questions are carefully crafted to encourage children to look for connections in the calculations. This develops reasoning and enables answers to be achieved efficiently.

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

Using known facts and making connections between calculations to calculate efficiently with mathematical reasoning.

e.g.

$256 + 74 = \square + 75$

By looking at this number sentence children can see that there is a difference of 1 between 74 and 75 so they know that there is a difference of 1 between 256 and the missing number. Since 74 is 1 less than 75, the missing number needs to be one less than 256 so that it balances. The missing number is 255

$24 \times \square = 12 \times 36$

Comparing the two sides of the number sentence, the children can see that 12 is half of 24. Therefore to balance this out this missing number must be half of 36. The missing number is 18.

Conceptual Variation – the opportunity to work on different representations of the same mathematical idea. This might be for instance looking at multiple representations of the number 54 with Dienes, PV counters, arrow cards, 100 square etc. These multiple representations will 'showcase' to pupils the different conceptual ideas that underpin a mathematical idea. So in the context of place value, some will reveal the quantity/ value of a digit, some will reveal the importance of position of a digit, others will support the order of the number and some will reveal the additive or multiplicative nature of place value.
Looking at how a specific skill could be utilised in a range of ways and challenging children to apply skills in different contexts will help to deepen learning.

What is at the heart of using conceptual or procedural variation is the dialogue that evolves through them to deeper pupils' understanding. Questions to work on are carefully chosen to enable pupils to identify the relationship/patterns leading to the formalisation of rules and generalisations.

e.g. When looking at multiplying by 4.

I can fit 4 muffins in each box. If I have 6 boxes, how many muffins do I have in total? 	There are 24 children. I put them into groups of 4. How many groups are there? 	¼ of the sweets in my Smarties tube are red. If there are 36 smarties in total, how many are red? 

Depth
Rather than extending children onto the next Year's curriculum, we challenge the more able children through developing depth of understanding. This is achieved though varied representation, context and the need to apply multiple skills to solve and investigate problems.

Generalising relationships.
Children are actively encouraged to look for patterns as they work. Questions like 'What do you notice' and 'What's the same? What's different?' help draw children's attention in. Once patterns have been spotted we can then ask 'Always, Sometime, Never?' to drill down to see if it is true for all eventualities and if so a generalisation can be formed.

Fluency

We aim for children to become efficient, accurate and flexible in their thinking. Fluency involves the:

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

Foundation Stage and Key Stage 1, follow the NCETM 'Mastering Number' program which develops automaticity of mental maths skills.

All children in Key Stage 1 have individual log in details for Numbots and are expected to log on, at least weekly, as part of their homework. Fluency and speed of calculating are the focus of this programme.

KS2 have specific fluency sessions, in addition to maths lessons to focus on key mental maths skills and automaticity of skills and knowledge.

Times tables

Developing instant recall of times table facts is achieved through our Timestable Rockstar Program. All children in Key Stage 2 have individual log in details and are expected to log on, at least weekly, as part of their homework. In addition to this, paper tests are completed in class against the clock to ensure regular practise of recall and the self-challenge to improve.

We learn times table facts in a number of ways including: looking at patterns and identifying connections between the timetables; rolling numbers (See T: drive) and using known facts to find unknown facts, (See Times table progression document for more information).

Assessment

- Pre-assessments are used to identify what individuals already know prior to planning a unit of work.
- Pre-teach/post-teach happens before the lesson to give children opportunity to consolidate understanding of the previous lesson or to gain a head start on the new learning.
- On-going assessments are planned in to ascertain whether a concept has been achieved.
- Termly assessments provide a further measure of understanding.
- End of Key stage assessments take place in Year 2 and Year 6.

Marking and Feedback

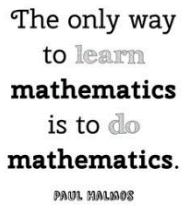
- Children are encouraged to self-mark within a lesson so that misconceptions can be quickly addressed. .
- Children self-evaluate understanding
- Marking pointers are used to identify strengths and areas for development. (See Maths Marking Pointers)

Homework

Challenges are set to consolidate or apply skills developed in class.

Cross curricular

Where possible and relevant, teachers make cross curricular links between Maths and other subject areas to promote our cross curricular approach and links to real life. For example, Statistics in Maths will be linked to a Science topic that involves collecting data.



Resources

Key resources should be readily available for children to access themselves within the classroom e.g. hundred square, multi-link.
Shared equipment is stored in the large purple cupboard near Year 4 and in the Year 3 and 4 base.

Role of the subject leader

- Keep up to date with current thinking and practice.
- Monitor planning and weekly reviews of learning.
- Create a Development Plan which identifies whole school priorities to move teaching and learning forward.
- Analyse data and arrange support and interventions (in conjunction with SENCo) where needed.
- Provide support with planning and subject knowledge to all staff.
- Ensure teachers understand the requirements of the National Curriculum and help them to plan lessons. Lead by example setting high standards in their own teaching.
- Conduct Professional Development Visits with a view to identifying support required.
- Keep parents informed about Mathematics issues.
- Discuss regularly with the Head teacher and the mathematics governor the progress of implementing National Curriculum for Mathematics in school.
- Monitor and evaluate mathematics provision in the school by conducting regular work scrutiny, learning walks and assessment data analysis.
- Co-ordinate the purchase of resources.
- Gain the views of pupils and staff.
- Provide professional development for staff based on needs.

Maths Ambassadors

An able, enthusiastic mathematician is selected from each class to meet together to help direct the development of maths. Their role is to help develop enthusiasm for maths and to organise fun opportunities for maths.

Governing Body

The mathematics curriculum team will encourage positive links with the Maths governor to keep the governing body informed of all major issues related to mathematics in the school. The subject Lead will report to governors to inform them of developments and progress within mathematics.