Argyle Primary School

Mathematics Policy

Review Date: Spring 2024
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Review Date: Spring 2025

Mathematics Policy

Purpose of study

'*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'.*

National Curriculum 2014

Why teach mathematics?

Mathematics teaches children how to make sense of the world around them through developing their ability to calculate, reason and solve problems. It enables children to understand relationships and patterns in both number and space in their everyday lives. The tools of mathematics are also vital components of many other subjects including science, geography, history and design and technology. Maths is a creative discipline. Through their growing knowledge and understanding, children learn to appreciate the contribution made by many cultures to the development and application of mathematics.
It transcends cultural boundaries and its importance is universally recognised.

The intent of our policy is to ensure that:

- Children become confident and competent with numbers and the number system. They develop rapid recall of key number facts and mathematical vocabulary;
- Children develop proficiency in calculating mentally and by the end of Year 6 are equipped with an efficient, reliable, compact written method of calculation for each operation that they can apply reliably and accurately;
- Children have developed the ability to solve problems through decision-making and reasoning in a range of contexts – they are able to apply a range of taught strategies;
- Children have developed a practical understanding of the ways in which information is gathered and presented;
- Children are able to discuss features of shape and space and use a range of units to measure accurately;
- Children are able to understand the importance of mathematics in everyday life and apply their mathematical skills across a range of practical tasks in everyday contexts;
- Children enjoy mathematics, develop resilience and a creative approach to solving mathematical challenges;
- Children see the importance of mathematics across the wider curriculum, and recognise its relevance to human creativity and achievement and to their future career opportunities.

Teaching and learning of Mathematics at Argyle:

All staff have high expectations for all our pupils and the vast majority are expected to work within the age expected band. In order to support this, lessons follow a journey to mastery approach which:

- Makes use of mathematical representations that expose the underlying structure of the mathematics;
- Helps children to make sense of concepts and achieve fluency through carefully structured questions, exercises and problems that use conceptual and procedural variation to provide 'intelligent practice', which develops conceptual understanding and procedural fluency in parallel;

- Blends whole class discussion and precise questioning with intelligent practice and, where necessary, individual support.

(NCETM)

- In order to do this, we have placed a huge focus on pupils experiencing a balance of arithmetic/fluency and reasoning/problem solving. All pupils in KS2 will have a daily hour of mathematics which is split into two distinct half hour sessions. One of which will focus on arithmetic and the other on reasoning. Pupils in KS1 will also have a daily hour of maths but there is an expectation that a balance of reasoning and arithmetic is taught throughout the lesson. Pupils in EYFS will be taught maths through a range of direct input sessions, guided work and activities for pupils to access in the continuous provision. Additionally, all pupils in KS1 and KS2 will complete daily fluency activities in order to secure key knowledge facts.

All pupils should be provided with reasoning prompts and sentence stems to support their ability to articulate their methods or to explain a mathematical term. Opportunities for pupils to practice this should be embedded within the lesson. All pupils should also be allowed the opportunity to use equipment or pictorial representations in order to build procedural and conceptual knowledge.

Our pedagogical approach is broadly based upon Rosenshine's Principles of Direct Instruction. We support these principles in the following ways:

- Daily, weekly and monthly review – pupils have opportunities to continually revisit and consolidate prior learning through daily fluency tasks;
- Present new material using small steps – through the use of the White Rose scheme of work, the small steps to progression are a series of learning objectives that children need to master in order to progress on to more challenging learning;
- Ask questions – pupils are exposed to a range of questions that challenging their thinking throughout the lesson and allow the teacher to assess how well the material has been learned;
- Provide models – worked examples modelled by the teacher show pupils how to solve problems and answer questions;
- Guide student practice – all pupils will have the opportunity to work in a guided group with the teacher at least once a week;
- Check for student understanding – formative assessment is used throughout the lesson through a range of strategies including the use of whiteboards, number fans, targeted questioning etc;
- Obtain a high success rate – teachers check to ensure that pupils are able to apply their new knowledge with a high success rate. Through analysis of this success rate, teachers identify whether to move onto the next step or whether to reteach a particular skill/strategy;
- Provide scaffolds for difficult tasks – learning is scaffolded through a range of strategies such as the use of manipulatives;
- Independent practice – daily fluency practice (arithmetic workouts) allows pupils to develop fluency and automaticity.

Differentiation

The vast majority of pupils within the classroom should be accessing the same learning objective. However, differentiation can be achieved through:

- Varying the degree of support provided;

- Providing or asking for alternative representations;
- Providing alternative concrete resources;
- Use of scaffolded sentence stems;
- Ensuring that the 'small step' being taught builds upon knowledge that the pupil is secure in.

Pupils in KS2 should be taught to self-assess their understanding of a concept and choose the appropriate related task. This can be presented to children as a 'chilli challenge' level of learning where pupils can choose from a mild, medium or spicy (See Appendix).

Differentiation should be evident in books and should reflect that, whilst the pupil is working towards mastery of the same learning objective, the way in which this has been achieved is appropriate for the child.

Where pupils are working significantly below the age-related expectation (e.g. pupils new to schooling or some pupils with ECHPs) pupils should be working on the same unit of work pitched at the appropriate level. For example, fractions, place value, addition and subtraction.

At the end of each lesson, pupils should be reflecting upon their learning. In KS2, this can be achieved through self-assessing (e.g. pupils making their own work) or peer-assessing (pupils comparing answers and discussing similarities / differences). Teachers should then look over the work and identify the next steps to be taught. All incorrect work should be addressed either in the next lesson or by giving pupils the opportunity to go back and make corrections.

"Mathematics is the art of explanation."
Paul Lockhart, A Mathematician'

Mathematics curriculum planning:

At Argyle Primary school we follow the White Rose scheme of planning. Additionally, wherever possible, cross curricular links should be exploited. Detailed planning can follow the format of a word-based document or a Smartboard presentation but must be stored in a centrally based online planning folder. Medium term planning and weekly planning is checked at least half termly by the subject leader in collaboration with the teachers. Where support for planning is identified, Senior Leaders work alongside the year group / teacher in order to ensure that the planning is of high quality and pitched to meet the needs of all pupils.

Pupils in Reception and KS1 will also follow the NCETM Mastering number programme. This programme aims to secure firm foundations in the development of good number sense. The aim over time is that children will leave KS1 with fluency in calculation and a confidence and flexibility with number. Attention will be given to key knowledge and understanding needed in Reception classes, and progression through KS1 to support success in the future.

Mathematics learning environment:

All classes should have a maths working wall which is updated according to the unit being taught. This wall should display:

- The current learning journey;
- Key vocabulary relating to the unit being taught;
- Sentence stems to support oracy and reasoning;
- Possible misconceptions.

Within the classroom, there should be a range of resources to support the teaching and learning of mathematics. These should be clearly labelled and accessible for pupils to use when they require.

Assessment:

Teachers will assess children's work in mathematics from three aspects (long-term, medium-term and short-term).

Short term – throughout the lesson the teacher should be using a range of strategies to help assess learning. Learning can then be supported within the lesson through the use of mini-plenaries or targeted support. At the end of the lesson the teacher should look through the children's books and ensure that the next lesson meets the needs of the pupils and addresses any misconceptions. Once a week the scores from the daily fluency practice (arithmetic workouts) will be recorded and the marked assessments will be sent home in order to keep parents updated with their child's progress.

Medium term – At the beginning of each unit, pupils complete the White Rose assessment for the previous year so as to ensure that they have the prerequired knowledge in order to access the learning. Pupils then complete the end of unit test once the unit has been taught. Teachers then use this assessment to identify whether the child has met the targets on the learning journey. Any targets met should be highlighted in green and those not met should be highlighted in pink. This could be done either in collaboration with the child, or after the child has had the opportunity to self-assess. Teachers should then use this to accurately update the Target Tracker statements for each pupil.

Long term – Each term, pupils will complete formal assessments. This is then used to assess where pupils are working in relation to the age-related expectation (or the one in which they are working at).

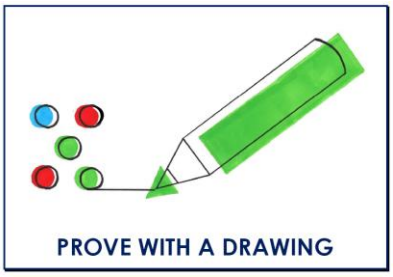
Home Learning:

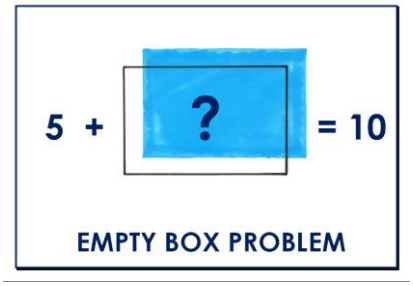
All pupils in Key Stage 1 and 2 are allocated a video to watch which pre-exposes them to learning that will be taught in the upcoming week. Pupils can then watch this video as many times as they need so as to ensure understanding prior to completing a diagnostic quiz / activity. The quiz / activity allows teachers to assess pupil understanding and ensure that the learning within lessons is appropriately pitched.
Pupils will also be provided with a Times Tables Rock Star log on which they can use to support their fluency in times table facts.

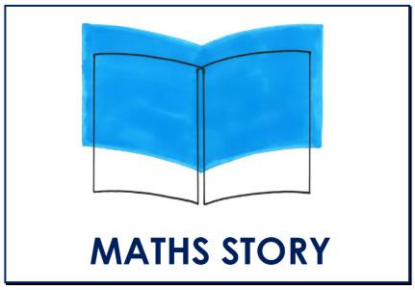
This policy will be reviewed at least every two years.

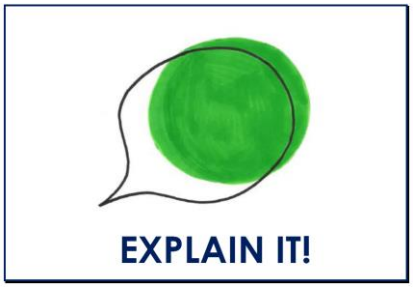
Appendix

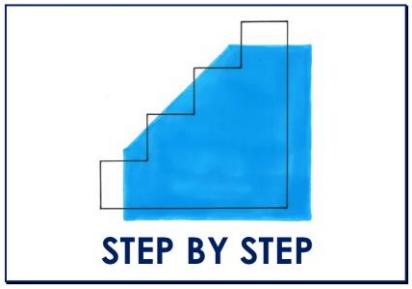
Maths Reasoning Labels

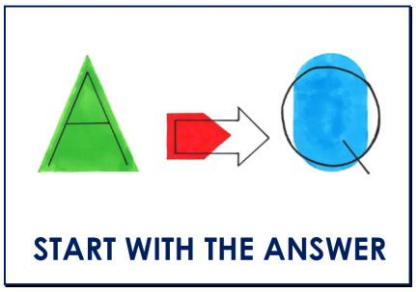


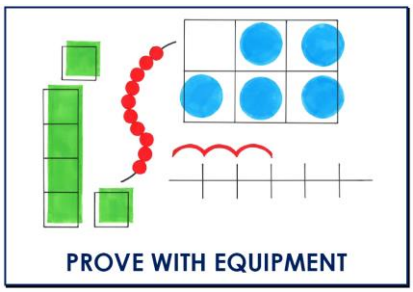


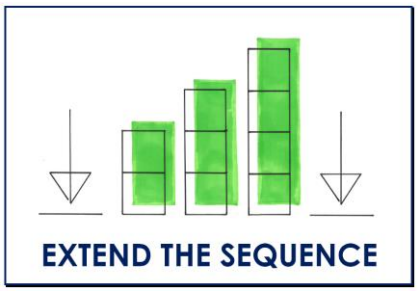


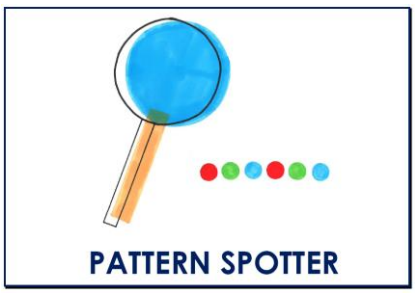


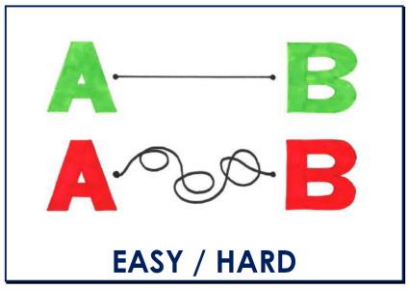


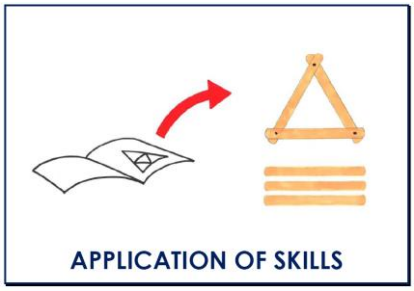


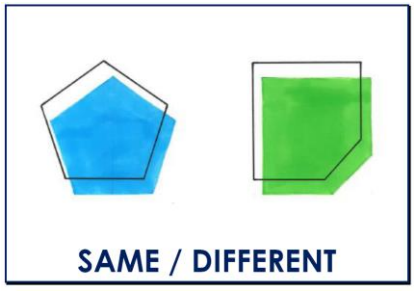


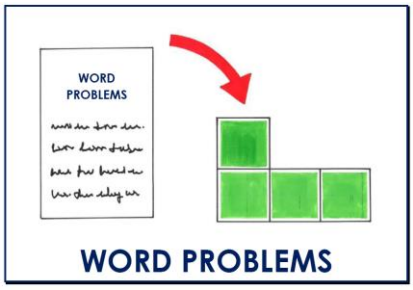


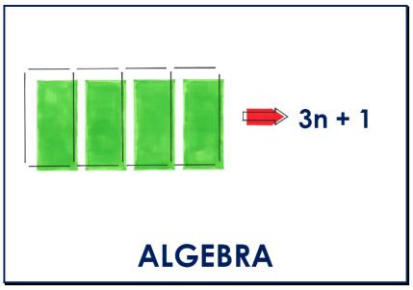


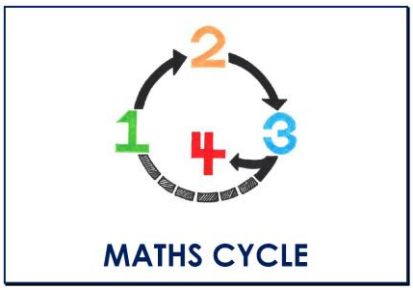


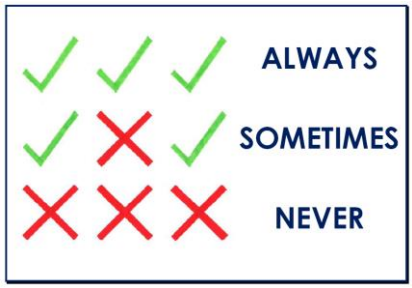








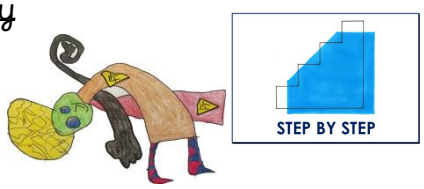




Example of 'Chilli Challenge'

LO: To use partitioning to add 2 digit numbers mentally

S.C



- I can start with the biggest number;
- I can add the tens then the units;
- I can start to work without jottings;

Deeper Learning: I can fill in the empty boxes to make addition equations correct.

Mild	Spicy	Extra Hot
24 + 7 = 15 + 6 = 38 + 5 = 29 + 8 = 35 + 9 = 44 + 8 = 26 +7 = 19 + 5 = 34 + 8 = 46 + 9 =	54 + 37 = 75 + 16 = 38 + 25 = 29 + 62 = 35 + 51 = 44 + 18 = 26 +47 = 19 + 53 = 34 + 28 = 46 + 49 =	94 + 79 = 95 + 26 = 38 + 59 = 29 + 87 = 37 + 96 = 44 + 86 = 26 +79 = 39 + 75 = 34 + 86 = 76 + 89 =