The Drive Primary School

Mathematics Policy

Reviewed September 2022

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Introduction

This policy outlines what we are aiming to achieve in respect of pupils' mathematical education. It also describes our agreed approach to the planning, delivery and assessment of the mathematics curriculum as outlined in the National Curriculum 2014.

It provides information and guidance for teachers, governors and other interested persons.

Aims

Mathematics helps children to make sense of the world around them through developing their ability to calculate, to reason and to solve problems. It enables children to understand and appreciate relationships and patterns in both number and space in their everyday lives. At The Drive we are aiming for our pupils to develop a mastery approach by providing depth and greater depth through fluency, reasoning and problem solving.

Mathematics Curriculum Planning

Mathematics is a core subject in the National Curriculum, and we use the Programme of Study 2014 as well as White Rose small steps planning as the basis for implementing the statutory requirements.

We carry out the curriculum planning in mathematics in two phases (long-term and a detailed medium-term which is adapted as the term goes on).

Our medium term mathematics plans, which are adopted from the 2014 National Curriculum Programme of Study and White Rose give details of the main teaching objectives for each term and defines what we teach. They ensure an appropriate balance and distribution of work across each term. The NCETM Ready to Progress document supports teachers in planning and prioritising key objectives for each year group and is used as an assessment tool to assess children on their understanding of these fundamental objectives.

Teaching and learning style at The Drive

Fluency

Time dedicated to Maths fluency in addition to daily maths lessons

Every day at 9:05am until 9:30am children in KS2 practise written methods for calculations as well as mental calculations linked to number, fractions and measurement. The same emphasis on number fluency in KS1 is practised at 12:45pm until 1:15pm. This additional time to the daily maths lesson, is to develop fluency in the use of written methods, general arithmetic and maths facts, allowing more time in the daily maths lessons for quality reasoning and problem solving activities (deepening children's understanding in order 'to master' the mathematics).

Teachers closely follow our policy for progression in calculations to ensure consistent methods are taught. (See video on website of written calculations).

Recall of multiplication facts and number bonds

At The Drive we believe recall of these number facts is an essential part of each child's mathematical 'toolbox'. Once children have this fundamental skill, it will enable them to succeed in more complex maths problems. Although recall is our aim, it is important that children acquire a strong number sense and gain a conceptual understanding of multiplication and number bonds knowing 'why' and 'how' rather than just 'what' the answer is. This deeper thinking process allows for meaningful application, enabling them to successfully implement the skill in other aspects of their learning.

In Early Years and KS1 we emphasise the conceptual learning of number bonds through Numicon and Ten Frames. In Years 3 and 4, conceptual understanding of multiplication and division facts is taught exploring arrays. Children are tested weekly on their times table facts and their progress is recorded on their individual Multiplication Card.

To support children further with their fluency of number facts, children have dedicated sessions on Numbots in KS1 and Times Table Rock Stars in KS2.

Revisiting topics

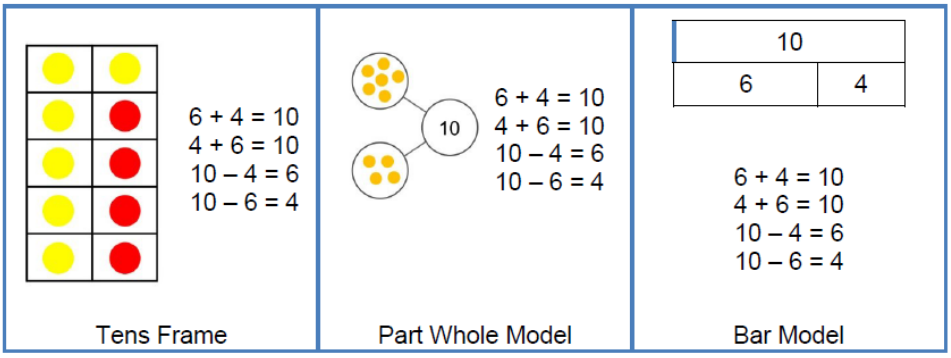
As already described above, children retain number facts through daily 30 minute arithmetic practice which is taught over and above the maths lessons. At the beginning of lessons, children have the opportunity to revisit previous topics through a 'Recap' task. This consists of a 5-10 minute task which helps to keep mathematical facts, concepts and vocabulary 'simmering'.

Method of teaching

Concrete, Pictorial and Abstract (CPA) Approach

Children can find Maths difficult because it is abstract. At The Drive, we use a **concrete > pictorial > abstract** (**CPA**) method. Pupils are introduced to a new mathematical concept through the use of concrete resources in a context (See calculation policy CPA).

When they are comfortable solving problems with physical aids, they are given problems with pictures or visual aids– usually pictorial representations of the concrete objects they were using or a structured model such as part whole models or bar models.



It is important that the maths is contextualised to develop their understanding of the concept. For example, a lesson about addition and subtraction could start with this contextual story:

"There are 11 people on a bus. At the next stop 4 people get on. At the next stop 6 people get off. How many are now on the bus?"

Building these steps across a series of lessons, can help pupils better understand the relationship between numbers and the real world, and therefore helps secure their understanding of the mathematical concept they are learning.

Reasoning

At The Drive, we strongly believe that reasoning is fundamental to knowing and doing mathematics well. It enables children to make use of all their other mathematical skills and so could be thought of as the 'glue' which helps mathematics makes sense. Reasoning is encouraged by teachers throughout EVERY Maths lesson from Early Years to Year 6; always verbally and in KS2 in written form too. Teachers use rich questioning strategies to develop children's conceptual understanding in every lesson.

For example:

- What's the same, what's different?
- Odd one out
- Here's the answer. What could the question have been?"

- Always, sometimes or never true
- True or false
- Hard or easy
- Explain the mistake
- Explain why

In order to embed conceptual understanding and to support children to communicate their ideas with mathematical precision and clarity, stem sentences and vocabulary are displayed and referred to during the lesson. These sentence structures often express key conceptual ideas or generalities.
For example:

- **I say, you say, you say, you say, we all say**

If the rectangle is the whole, the shaded part is one third of the whole.

Having modelled the sentence, the teacher then asks individual children to repeat this, before asking the whole class to chorus chant the sentence.

- **Children fill in the missing parts of a sentence; varying the parts but keeping the sentence stem the same.**

There are 12 **stars**. $\frac{1}{3}$ of the **stars** is equal to **4 stars**

Children use the same sentence stem to express other relationships. For example:

There are 12 **stars**. $\frac{1}{4}$ of the **stars** is equal to **3 stars**

There are 12 **stars**. $\frac{1}{2}$ of the **stars** is equal to **6 stars**

- **Repeating a mathematical generalisation or "rule" which emerges within a lesson.**

When adding 10 to a number, the ones digit stays the same.

This is repeated in chorus using the same sentence, which helps to embed the concept.

Problem Solving and Investigations

Children at The Drive have weekly opportunities to apply their learning to solve problems. Quality problem solving activities enable children to 'understand the world, have the ability to reason mathematically, have an appreciation of the beauty and power of mathematics and develop a sense of enjoyment and

curiosity about the subject' (DfE, 2013). *After all, becoming a mathematical problem solver really is the point of doing mathematics.*

Planning for Problem Solving

As well as frequent mini problems, it is our policy that children experience a whole lesson dedicated to investigation and problem solving at least 3 times a half term.

Children develop the following skills through various types of problem solving:

- Pattern spotting
- **Working systematically***
- Using diagrams and pictorial information
- Working backwards
- Trial and improvement
- Visualising
- Conjecturing and generalising
- Reasoning logically

***Working systematically is the most important skill to teach as it ensures children are working in an efficient manner to 'get inside the maths' of a problem.**

When planning for problem solving, teachers ensure they are focusing on a specific skill from above in order for the children to build up a repertoire to improve their confidence and resilience in solving problems.

We believe that children learn to select a skill to use as they become more experienced at problems and they don't become problem solvers just by doing problems!

We aim for our children to have experience in solving the five different types of problems:

- Word problems
- Visual problems
- Finding all possibilities
- Logic problems
- Rules and pattern

Recording in KS1

It is difficult to evidence reasoning from young learners in KS1. For this reason, teachers in Years 1 and 2 record children's explanations on post-it notes which are evidenced in a floor book alongside photos. Evidence of problem solving and investigations is also recorded in this manner.

Displays

Maths displays are presented as working walls on white backing paper in each classroom. Any writing, vocabulary and pictorial representations must be large and clear enough for all children to see and refer to. Mathematical vocabulary

for the current topic must be on display and referred to by the children when giving reasoning explanations.

Homework and additional programmes in school.

Children in KS2 are set weekly homework on Times Tables Rock Stars and KS1 are set weekly homework on Numbots. Numbots supports children in school and at home to strengthen their ability to subitise, add and subtract. Times Table Rock Stars is a fun way for children to learn their times table by instant recall. Weekly tasks are also set on MyMaths in KS2 which consolidate the children's learning in their weekly topics.

Interventions and additional support

Teachers dedicate their time during fluency practice to lower attainers to boost their performance in this area of maths. During daily maths lessons, TAs give extra support to this group.

Additional intervention programmes which are taught over and above the daily maths sessions are First Class @ Number for Year 2 children and Success @ Arithmetic for children in Year 3 and 4. The teaching assistants who carry out these interventions have been trained to deliver these specialised programmes.

Assessment and recording

We assess children's work in mathematics from three aspects (short-term-formative assessment, medium-term and long-term). Formative assessment is the foundation of our assessment at The Drive. We use the Ready to Progress document to assess children's weekly learning and determine the next steps; therefore teachers use them to inform their day-to-day teaching.

We make medium-term assessments to measure progress against the key objectives, and to help us plan future work. At the end of each term, we assess each child's overall progress through *Head Start Maths Tests*. We use these results as well as evidence from children's books to assess if children are making expected progress and are on track for meeting age related expectations by the end of the academic year. The assessment coordinator, maths coordinator and other members of SLT cross moderate evidence from tests, books and interviews with children to ensure accurate overall judgements are made termly.

We use national tests with children in Year 2 and Year 6 (SATs).

The Foundation Stage

We teach mathematics in our Nursery and Reception classes. As the classes are part of the Foundation Stage of the National Curriculum, we relate the mathematical aspects of the children's work to the objectives set out in the Early Learning Goals. We give all the children ample opportunity to develop their understanding of number, measurement, pattern, shape and space through varied activities that allow them to enjoy, explore, practise and talk confidently about mathematics.

Use of Ten Frames in the Foundation Stage and KS1

Tens frames is a visual resource to enhance children's understanding of number. Five frames and ten frames are used in order to develop a strong sense of five and ten to ensure foundations for place value and mental calculations in KS1. Our aim is to increase the number of children, starting in Reception, who can instantaneously recognise the number of objects in a small group (subitizing) and deepen their sense of number before writing numbers where there is often confusion with teen numbers etc. and the value of each digit. Ten frames are later used to support children's understanding of addition and subtraction concepts including the concept of bridging through ten.

(Please read about the new programme we are using in KS1 and EYFS called Number Sense on our website).