MATHEMATICS POLICY

Mathematics Policy 2017/18- Document Status			
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A POLICY FOR MATHEMATICS

To be read in conjunction with our Calculating Policy 2016.

WHY LEARN MATHEMATICS?

The National Curriculum (2014) states that:
"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".

Mathematics provides a way of viewing and making sense of the world and is essential to everyday life. It is used to analyse and communicate information and connect ideas and to tackle a range of practical tasks and real life problems. Our high quality, direct teaching is creative, interactive and lively.
Mathematics is a two way process in which children play an active part developing higher order thinking skills, asking and answering questions, solving problems, contributing points to discussion and explaining, reasoning and demonstrating their methods to the class.

AIMS

The Curriculum for Mathematics at Wrockwardine Wood Infant School and Nursery aims to ensure that all pupils:

- Become **FLUENT** in the fundamentals of mathematics
- Gain **conceptual understanding** and be able to recall and apply their knowledge rapidly and accurately to problems
- **REASON and EXPLAIN mathematically** by following a line of enquiry, justifying or proving outcomes using mathematical language
- Can apply their mathematics to **SOLVE PROBLEMS across the curriculum,** breaking down problems into simpler steps and persevering in seeking solutions.
- Can remedy **misconceptions** through discussion

ATTITUDES

Attitudes we wish to foster and encourage include:-

- Interest and motivation and the willingness to "have a go."
- Talk confidently about maths work.
- Satisfaction derived from a sense of achievement.
- The ability to work independently and also to co-operate within a group.
- A willingness to check and monitor their work, developing systematic work habits.
- Flexibility and creative thinking in overcoming difficulties and developing new approaches.
- To develop a confident and positive attitude to mathematics at an appropriate level.

The programmes of study are organised in a distinct sequence and structured into separate domains. Pupils should make connections across mathematical ideas to develop fluency, mathematical reasoning and competence in solving increasingly sophisticated problems. They should also apply their mathematical knowledge to science and other subjects.

FLUENCY OF MATHEMATICAL UNDERSTANDING

Children's understanding of Mathematics is progressive. Children learn not only in different ways but at different rates. Mathematical experience progresses through a sequence of abstraction. This sequence is:-

1) Experience with physical objects.
2) Spoken language that describes that experience.
3) Pictures that represent the experience.
4) Written symbols that generalise the experience.

Children need to progress through these stages to attain mathematical understanding and competence. A maths textbook or sheet however carefully planned can be concerned with only points 3 and 4 of the sequence - pictures and symbols. We realise the importance of children having practical experiences and using language to talk about and analyse their experiences as well as recording their findings. Research has shown that children need the complete sequence of experiences at all stages if they are to understand the processes they are using and be able to apply them. (Early Childhood Development and Education by Donaldson, Grieve and Pratt)

OUR MATHEMATICS CURRICULUM

- Our Key Stage 1 programmes of study for mathematics is set out year-by-year for Years 1 and 2. We are required to set out our school curriculum for mathematics on a year-by- year basis and make this information available online.

We provide a **'Mastery'** curriculum for al learners which means:

- There is an expectation that all children are capable of achieving high standards in mathematics.
- The majority of children progress through the curriculum content at the same pace. Differentiation is achieved by emphasising deep knowledge and through individual support and intervention.
- Teaching is underpinned by methodical curriculum design and supported by engaging lessons and resources to foster deep conceptual and procedural knowledge.
- Practice and consolidation play a central role. Variation within this builds fluency and understanding of mathematical concepts.
- Precise questioning is used to assess children's skills, knowledge and understanding.

The intention of these approaches is to provide **all** children with full access to the curriculum enabling them to achieve confidence and competence- **'Mastery'**- in mathematics, rather than failing to develop the skills they need for the future.

OUR MATHEMATICS ENVIRONMENT

We recognise the important role displays have in the teaching and learning of mathematics by having a mathematics working wall displayed in every classroom and mathematical learning displayed around school. These working walls provide visual support to promote and enhance

mathematical thinking and discussion using correct mathematical vocabulary. Every class has a maths table which enables children to access mathematical activities throughout the day. Each class is well resourced to support the leaning of mathematical skills and concepts within a language-rich environment.

CALCULATING (Read in conjunction with Calculating Policy 2016)

- As children's counting knowledge develops, they acquire skills that are the foundations of calculation.
- Every child develops their understanding of calculation in different ways and at different times.
- Children are naturally curious about their world and will be able to solve problems for themselves with an increased knowledge of calculation.

We are encouraging children to develop their skills of mental calculations through the playing of maths games. These not only develop and practise existing methods of mental calculation but also encourage them to learn new alternative strategies. Sensitive intervention by the teacher can introduce children to an alternative way of calculating. As children begin to calculate there is a progression of strategies that can occur:

1. **COUNTING STRATEGIES**

During this children may:

- Recognise the quantity of a small number of objects by the pattern (ie 2/3).
- Count everything to calculate.
- Start with one quantity and counts the rest.
- Start with a larger quantity and count the rest.

When children have used these strategies confidently they may then commit some number facts to memory:

2. **STOCK OF KNOWN FACTS**

e.g. Calculating by doubling number.

These stages (1 and 2) provide the foundation for children to create their own strategies which may involve the transformation of numbers:

3. **TRANSFORMATION STRATEGIES**

- Recalls a useful fact e.g. a double.
- Extracts "fives" from one or both numbers.
- Extracts a "ten" (s) by shifting across.

EARLY YEARS FOUNDATION STAGE (Read in conjunction with the EYFS Policy)

NUMBER AND SHAPE, SPACE AND MEASURES (SSM)

The principal focus of mathematics teaching in EYFS is:

- to develop their understanding of numbers, shape, space and measures in a broad range of contexts in which they can explore, enjoy, learn, practice and talk about their developing understanding.
- to provide children with opportunities and problems to practice and extend their skills in these areas and to gain confidence and competence in their use.

Through the mathematics curriculum we foster the characteristics of effective learning. These are:

- **Playing and exploring** - children investigate and experience things, and 'have a go';

- **Active learning** - children concentrate and keep on trying if they encounter difficulties, and enjoy achievements;
- **Creating and thinking critically** - children have and develop their own ideas, make links between ideas, and develop strategies for doing things.

PLANNING IN THE EYFS

Teachers plan using the Early Years Foundation Stage document (EYFS) and the White Rose Mastery document. The four themes of the EYFS underpin all teaching and learning in Mathematics. They are:

- **Learning and Development**
- **A Unique Child**
- **Enabling Environments**
- **Positive Relationships**

Mathematics is made up of the following aspects:

- **Numbers** - is about how children gradually know and use numbers and counting in play and eventually recognise and use numbers reliably, to develop mathematical ideas and to solve problems. It is about how children develop an awareness of the relationship between numbers and amounts and know that numbers can be combined to be 'added together' and can be separated by 'taking away' and that two or more amounts can be compared.
- **Shape, Space and Measures** - is about how through talking about shapes and quantities and developing appropriate vocabulary, children use their knowledge to develop ideas and to solve mathematical problems.

PLANNING

Effective learning builds on and extends what children know and can already do. Our planning is informed by observations we have made of the children in order to understand and consider their current interests, experiences, development and learning needs.

There are three stages of planning the curriculum:

Long Term Planning
Nursery and Reception currently organise the EYFS curriculum through agreed half termly themes over the period of the academic year.

Medium Term Planning (Half termly)
We address particular aspects of the curriculum in more detail for each half term. Each week, lessons will be taught which meet both the Number and the SSM aspects of the curriculum. Learning objectives, assessment opportunities, and activities and experiences for each area of learning and development are identified.

Short Term Planning (Daily)
The daily planning is informed in two ways. Firstly, through ongoing observation of child initiated, adult initiated and adult directed activities both indoors and outdoors. This allows for flexibility in response to individual children's needs and interests and for revision and modification of plans. It is informed secondly by referring to the medium term plans containing objectives and activities/experiences in the half termly theme.

TEACHING AND LEARNING in EYFS

- Children are given the opportunity to access activities and puzzles to support their development of mathematics and adults engage with children to model mathematical language and to develop skills. They use careful questioning to extend children's thinking.
- Children are given time, space and encouragement to discover and use new words and mathematical ideas, concepts and language during child initiated activities in their own play.
- During Child Initiated Learning (CIL), there is always an indoor and outdoor area where children can access mathematics activities. Observations of children during this time inform the next steps for learning and this is addressed and planned for during adult directed time with children working in differentiated groups.
- Children are supported who use a means of communication other than spoken English to develop and understand specific mathematical language while valuing knowledge of numbers, shape, space and measures in the language or communication system they use at home.
- Children's interests can provide a strong starting point to support and extend their mathematical thinking.

PRACTICAL MATHEMATICS and REAL LIFE EXPERIENCES

The very nature of the EYFS promotes the need for children to experience mathematical ideas through play. Both the indoor and outdoor environments are used to explore real life problems and allow children to discover things for themselves.

- Mathematical understanding is developed through all children's early experiences and interests including through stories, songs, games and imaginative play.
- A range of activities are provided, some of which focus on mathematical learning and some which enable mathematical learning to be drawn out.
- Mathematical terms are modelled and used during play and daily routines.

RESOURCES

- Children in our school work in a rich learning environment providing them with countless opportunities to develop their increasing skills.
- The Nursery and Reception classrooms and their respective outdoor areas are fully equipped with a wide range of apparatus for children to select and use. All small equipment is clearly labelled with words and photographs which allows all children to access them.
- The outdoor environment enables children to use much larger equipment to support their learning. This is enhanced through the use of natural objects.
- We have introduced Numicon throughout school to support and enhance mathematical learning.

TALK FOR MATHEMATICS/ QUESTIONING

- In the EYFS, adults work alongside children, modelling the correct vocabulary and demonstrating new ideas. Children are encouraged to describe what they are doing as they work. Knowing the everyday language of mathematics allows children to talk about and explore their ideas.
- Mathematical vocabulary is set in purposeful contexts.
- Children are given opportunities to talk with others during CIL which allows them chances to share and negotiate which are key mathematical skills.
- Children's shared talk when solving problems is extremely valuable.
- Adults use open ended questioning to encourage and support children's problem solving, reasoning and creative thinking in mathematics.
- During adult directed time, children are encouraged to talk about their learning.

RECORDING in EYFS

Adults model a variety of ways for children to record their work. Children are encouraged to select their own way of recording, using marks that they can interpret and explain. This may include:

- numbers
- symbols
- pictures
- finger marks

Evidence is also recorded by adults in the form of:

- Observations
- Photographs
- Annotations

Children's own graphic and practical explorations of Mathematics are valued and shared.

ASSESSMENT in EYFS

We analyse and review what we know about each child's development and learning, and then make informed decisions about supporting the child's progress. This enables us to plan the next steps for individuals and groups of children by providing challenging but achievable activities and experiences to extend the children's learning. All practitioners who interact with the child contribute to the assessment process. Formative assessment may take the form of planned or significant child initiated observations, targeted assessments and annotated examples of work. Photographs and information from parents is also used. Many observations made in the Early Years are recorded on '2Simple' which is an online tool. All observations are placed in children's individual '*Look what I can do'* red folders which are shared with parents each term and form the basis of our school reports.

We track children's progress half termly by highlighting children's individual tracking grids in their Early Years Foundation Stage Profile.

Children's next steps are then identified for each area of development and individual target boards are completed.

The school uses a tracking programme which helps us to ensure all children are making progress from entry to exit.

Staff review the tracking data half termly with the EYFS Leader/Senior Leadership Team, monitoring rates of progress and identifying strategies that will address learning and teaching priorities and next steps.

KEY STAGE 1

The principal focus of mathematics teaching in Key Stage 1 is:

- to ensure that pupils develop confidence and mental fluency with whole numbers, counting and place value.
- work with numerals, words and the four operations,
- working with practical resources (e.g. concrete objects and measuring tools).
- develop their ability to recognise, describe, draw, compare and sort different shapes and use the related vocabulary.
- use a range of measures to describe and compare different quantities such as length,

mass, capacity/volume, time and money.

ATTAINMENT TARGETS

- By the end of the key stage, pupils are expected to know, apply and understand the matters, skills and processes specified in the relevant programme of study.

They should:

- Become **FLUENT**
- Be able to **REASON** and **EXPLAIN** mathematically
- Be able to **SOLVE PROBLEMS**

PLANNING IN KEY STAGE 1

The National Curriculum for Mathematics, together with the White Rose Mastery documents form the basis for our planning in Mathematics. Teachers also use the book 'Lines of Development' (Deboys and Pitts).

Long Term Planning

On our long term plan we have a programme for:

- **Number –** Number and Place Value, Addition, Subtraction, Multiplication, Division, Fractions, Statistics (year 2)
- **Geometry –** Properties of shapes, Position and Direction
- **Measurement-** Length/ Height, Mass/ Weight, Capacity/ Volume, Time, Money

These areas of maths are set on a yearly overview with an approximate duration for each unit of work. Assessment for learning helps to shape this.

Medium Term Planning (Half termly)

- The medium term planning in Key Stage One uses the White Rose small steps progression guidance. This includes the objectives from the National Curriculum 2014 along with smaller objectives which can be achieved within individual lessons. This planning includes samples of questions and activities which could be further planned to support children to develop their mathematical knowledge by developing their fluency in maths, their reasoning and problem solving skills and enhancing the talk for mathematics ion the classroom.

Short Term Planning

- We have a weekly planning sheet for mathematics. This is completed each day to ensure that assessments are informing the work planned for the next day. This planning document ensures that there is a clear sequence of lessons throughout the week.
- Each day the teacher records the focus for oral/mental starter, the objective for the main activity along with the success criteria and details of how the activity is differentiated between three ability groups. A note is made of the key vocabulary, games, exercises and investigations to be carried out and the focus for the plenary session. Opportunities for 'Assessment for Learning' are also marked on this plan.

TEACHING AND LEARNING IN KEY STAGE 1

PRACTICAL MATHEMATICS AND REAL LIFE EXPERIENCES

We encourage our children to take part in practical maths. Working practically:

- Enables children to see the visual picture which encourages them to find different ways of calculating and to develop their own individual way of working.
- Supports all learning styles.

- Allows them the opportunity and time to explore and become familiar with different apparatus and equipment.
- Enables children to talk about their work.
- A mathematics working wall in every classroom which enhances children's knowledge and use of mathematical vocabulary.
- A mathematics table in every classroom or outside area which allows children to access and solve everyday mathematical problems on a daily basis.
- 'Everyday Maths' is an important part of our maths planning. Children are encouraged to see the importance of maths in everyday situations.
- We plan a range of experiences - open, closed, long, short, practical, oral and written tasks. We also plan tasks to develop problem solving skills and those that develop knowledge, skills and understanding and allow children the opportunity to apply what they have learned.

RESOURCES

- Each class is equipped with a full range of maths equipment. Some larger resources and additional equipment to support children with SEN are held centrally in the maths cupboard.
- Children become familiar with the different apparatus, its correct name and its range of uses. They are encouraged to make a choice of which apparatus they are going to use and which apparatus is best for a given task. Thus children are taught the importance of decision making and independence.
- Children checking their work with alternative apparatus provides an additional challenge.
- We have introduced Numicon throughout school to support and enhance mathematical learning.

TALK FOR MATHEMATICS/ QUESTIONING

- Open ended questioning is vital to encourage children to take their work as far as they can. By careful questioning and encouragement teachers can help children to clarify their thoughts and to successfully complete a task.
- Children need language to talk about and analyse problems. There is a wealth of mathematical vocabulary for the children to acquire and this needs daily reinforcement. The mental/oral starter to each lesson is an ideal time to reinforce and extend children's mathematical vocabulary.
- They can develop their skills of reasoning and communicating through carefully planned activities and having these skills modelled for them.
- Careful pairing of children can promote a partnership where children help one another and discuss their learning.
- Talking with children when they are involved in exploration of apparatus and tasks helps to clarify their understanding and develop their powers of communication.
- Talking with children also gives the teacher an opportunity to discuss and address any misconceptions the child may have.

RECORDING IN KEY STAGE 1

When children record mathematical findings they are clarifying their understanding, developing their powers of communication and sharing their conceptions. Children are encouraged from this early age to find their own ways of recording their mathematical work. Time should be taken to share children's work, so that other children can see the different ways chosen to record findings or to present work. Different ways to record work may include:

- Talking
- Using symbols (children's own symbols and universal symbols for mathematics)
- Diagrams
- Constructing models

- Writing
- Graphical representation
- Pictorial and photographic records
- Informal and more formal jottings to show working's out

Each child has an individual maths book where the majority of work is kept. This is dated and commented upon and independent work is marked with an IW in the top corner. Individual theme books contain a sample of cross curricular maths work which has been covered through themes.

ASSESSMENT FOR LEARNING

It is important that children are able to talk about their own learning in mathematics. They should feel enthusiastic and keen to talk about their achievements and ways they can further improve.

- **Self assessment**- Children are encouraged to assess their own learning in relation to the learning objective and success criteria for each lesson. Children are also encouraged to explain the learning power they have been building (Resilience, Resourcefulness, Reflective, Reciprocity)
- **Peer Assessment**- Children are given opportunities to work with a partner/ small groups to assess a piece of work against the lesson objective and success criteria.
- **Teacher assessment**- Teachers use daily assessments in maths to identify and address any misconceptions, to inform their planning for subsequent lessons and to target specific support for individuals or groups.

ASSESSMENT AND FEEDBACK IN KEY STAGE 1 (Read in conjunction with our Assessment Policy and Marking Policy)

- We believe that our response to children's work in their maths books provides the best possible record of an individual child's development. Comments will include the calculating strategies being used as well as an assessment against the lessons learming objective and success criteria.
- The use of 'Brilliant Blue' and 'Chance to Shine' enable children to quickly see where they can make improvements to their work to enhance their learning and where they have been successful in meeting the objective.
- A written response can provide excellent evidence of ongoing teacher assessment and focus on ways forward for individual children. The use of challenges such as 'Convince me.. , Prove that…, Is this true? How do you know? allow children the opportunity to reason mathematically and solve problems.
- Flexible groupings are used effectively in key stage one so that children can choose their own level of challenge within mathematics lessons. Our school uses Bronze, Silver and Gold challenges and this promotes children's ability to self-assess and is developing their skill, competence and confidence at their own level.
- Every half term, children are assessed using a Rising Stars assessment paper. This supports evidence already collected through independent learning which is noted on children's own individual assessment grid (STAT Sheffield). Next steps are planned on target boards which are in individual mathematics books. These are dated with evidence when a child meets a set target.
- Children are encouraged to practice and learn number facts at home. Where appropriate, weekly mental arithmetic tests are held.

The school uses a tracking programme which helps us to ensure all children are making progress across each half term from entry to exit.

Teachers review the tracking data half termly with the Mathematics subject leader/ KS1 Leader/ Senior Leadership Team, monitoring rates of progress and identifying strategies that will address further teaching priorities. Where there are children who need further support developing their understanding and use of the language associated with mathematics, our school runs an intervention group called 'Talking Maths' to address this swiftly.

MODERATION MEETINGS

- Teachers meet together each fortnight in Key Stage meetings to monitor and moderate the work of children in each class. This enables teachers judgements to be secured through a good understanding of our assessment system (STAT Sheffield).
- Teachers use their notes, planning and the children's books to discuss children's progress and attitude. The work of these children is studied and moderated across year groups to ensure a consistency of standards and approach.
- It is also a valuable opportunity to identify the next steps for individual/groups of children.
- These moderation meetings also provide valuable professional development for all teachers. In every class there are children working at all levels and teachers are able to discuss children's attainment and next steps across all year groups
- These meetings enable us to group and target children more effectively and to review their progress.

ANNUAL REPORTS TO PARENTS

- End of year reports give details of children's strengths in mathematics and their attainment in comparison with National Expectations.
- They also include a target for children's mathematical development.
- Parents are asked to share the reports with children and praise their progress over the year. We welcome comments from parents on their children's reports.

PARENTAL INVOLVEMENT

- Parent Consultation evenings are held in the Autumn Term and Spring Term to allow time to discuss the progress a child is making along with their areas for development. In the Summer term, parents are invited to respond to their child's mathematical achievement on their end of year report.
- Parents are invited to play Maths games with their child once a week at the start of the school day in their child's classroom.
- Parents are invited to share the learning in their child's maths books during parent consultation meetings and during exit point activities at the end of a theme of work.
- Parents are encouraged to support their child with weekly homework which is often of a practical nature in the Early Years or to help learn some key number facts in key stage one.
- Parents are encouraged to support their child's mathematical learning at home using the online programme 'Mathletics'. Teachers allocate online games and activities for individuals to log into their own accounts to consolidate and extend their learning.

MONITORING AND EVALUATION

The Governor's take responsibility for overseeing the teaching of Mathematics. They meet each term to discuss curriculum developments. The governor with named responsibility for maths is invited to observe teaching and learning throughout school with the Head teacher and Subject leader. The Governing body review the policy for Mathematics every 3 years.

ROLE OF SUBJECT LEADER

The Head teacher and subject leaders work together to monitor the quality of teaching and learning in mathematics. Subject leaders are given release time each term to monitor different aspects of mathematics teaching and learning. These aspects include:

- Learning Walks
- Lesson observations
- Moderation- Work with colleagues to improve standards in maths
- Support teachers with planning and assessment
- Action plan- Review targets on the previous year's action plan and set new targets.
- Book scrutiny
- Work with small groups of children – Discuss learning which has taken place and targets they are still working on.
- Analyse data
- Plan and deliver effective CPD to improve standards in mathematics.