TANNERS WOOD JMI SCHOOL

MATHS POLICY

Adopted by Governing Body:	Date: October 2017	Review Date: October 2019
Signed by:	Chair of Governors	Headteacher: *Mrs P Qureshi*

Tanners Wood School- Maths Policy

Introduction

Our Maths Policy reflects the aims of the school and outlines the agreed ways in which all members of the school community will contribute to a positive learning environment. At Tanners Wood we value every pupil and the contribution they have to make. We aim to ensure that every child achieves success and that the learning environment empowers them to develop their skills and become independent learners.

The policy should be read in conjunction with the school's calculation policy.

Rationale

Mathematics equips pupils with the uniquely powerful set of tools to understand and change the world. These tools include logical reasoning, problem solving skills and the ability to think in abstract ways.

Mathematics is important in everyday life. It is integral to all aspects of life and with this in mind we endeavour to ensure that children develop a positive and enthusiastic attitude towards mathematics that will stay with them.

The National Curriculum 2014 for mathematics describes in detail what pupils must learn in each year group. Combined with the School Calculation Policy, and the Herts for Learning Block Planning Materials and Domain Progression documents, this ensures continuity and progression and high expectations for attainment in mathematics.

It is vital that a positive attitude towards mathematics is encouraged amongst all of our pupils in order to foster confidence and achievement in a skill that is essential in our society. Pupils learn best through making connections between both the different Domains in Maths and the connections that exist with other subjects. At Tanners Wood School we use the National Curriculum for Mathematics (2014) as the basis of our mathematics programme. We are committed to ensuring that all pupils achieve mastery in the key concepts of mathematics, appropriate for their age group, in order that they make genuine progress and avoid gaps in their understanding that provide barriers to learning as they move through education.

Assessment for Learning, mathematical fluency, arithmetic competency, investigation, problem solving and the development of mathematical thinking, together with a rigorous approach to the development of teacher subject knowledge are the essential components of the Tanners Wood approach to this subject.

Principles

- Policy and provision are evaluated and reviewed regularly
- Resources of time, people and equipment are planned, budgeted for and detailed when appropriate in the School Improvement Plan and Maths Subject Leader Action Plan
- Supported by the Subject Leader for Maths, teachers engage in joint professional development through coaching to optimise the quality of teaching in mathematics
- The governing body discharge their statutory responsibility with regard to mathematics
- Planning of mathematics ensures continuity and progression across all year groups and Key Stages

The aims of our policy

We aim to provide the pupils with a mathematics curriculum and high quality teaching to produce individuals who are numerate, creative, independent, inquisitive, enquiring and confident. We also aim to provide a stimulating environment and adequate resources so that pupils can develop their mathematical skills to the full.

We use a variety of teaching and learning styles in mathematics in order to secure and develop understanding as children progress through the school. Our teachers strive to:

- build children's confidence and self esteem
- develop children's independence
- allow all children to experience success and develop a love of learning
- contextualise mathematics
- provide opportunities for children to explore practical approaches to mathematics including the use of concrete resources and representations of mathematics through images
- encourage children to select independently the resources to help them
- challenge children of all abilities
- encourage deeper learning and thinking through greater depth reasoning
- develop children's understanding of mathematical language through stem sentences and talk
- allow children to ask questions as well as answer them
- encourage children to embrace mistakes and see them as a way of unpicking misunderstandings and propelling mathematical understanding.

Our pupils should:

- have a well-developed sense of the size of a number and where it fits into the number system
- know by heart number facts such as number bonds, multiplication tables, doubles and halves
- use what they know by heart to figure out numbers mentally
- calculate accurately and efficiently, both mentally and in writing
- recognise when it appropriate to use mental methods or written and be able to do so effectively.
- draw on a range of calculation strategies contained within the Calculation Policy
- make sense of number problems, including non-routine/real problems and identify the operations needed to solve them
- explain their methods and reasoning, using correct mathematical terminology
- judge whether their answers are reasonable and have strategies for checking them where necessary
- suggest suitable units for measuring and make sensible estimates of measurements
- explain and make predictions from the numbers in graphs, diagrams, charts and tables
- develop spatial awareness and an understanding of the properties of 2d and 3d shapes.

To provide adequate time for developing mathematics, maths is taught daily and discretely. However, application of skills are linked across the curriculum where appropriate.

Provision

Early Years Foundation Stage (EYFS)

We follow EYFS curriculum guidance for Mathematics. However, we are committed to ensuring the confident development of number sense and put emphasis on mastery of key early concepts. Pupils explore the 'story' of numbers to twenty and the development of models and images for numbers as a solid foundation for further progress.

All Years

Pupils are provided with a variety of opportunities to develop and extend their Mathematical skills, including group work, paired work, whole class teaching and individual work.

Pupils engage in:

- 'rich' tasks that are open ended and promote challenge for all (low threshold, high ceiling)
- real maths which promotes relational understanding
- practical work
- investigational work
- problem solving

- mathematical discussion
- consolidation of basic skills and number facts
- the development of mental strategies
- written methods
- maths games

We recognise the importance of establishing a secure foundation in mental calculation and recall of number facts before standard written methods are introduced. We use accurate mathematical vocabulary in our teaching and children are expected to use it in their verbal and written explanations.

Mathematics contributes to many subjects and it is important the children are given opportunities to apply and use Mathematics in real contexts. It is important that time is found in other subjects for pupils to develop their Mathematical skills, e.g. there should be regular, carefully planned opportunities for measuring in science and technology, for the consideration of properties of shape and geometric patterns in technology and art, and for the collection and presentation of data in history and geography. To this end every year group has identified opportunities within their Yearly and Termly Overviews to include cross curricular opportunities.

We endeavour at all times to set work that is challenging, motivating and encourages the pupils to think about how they learn and to talk about what they have been learning. Additional enrichment opportunities are provided for pupils to further develop mathematical thinking e.g. through cooking, music, and maths investigations and games.

Problem Solving

At Tanners Wood we recognise that problem solving is one of the three main aims of the Maths Curriculum 2014. Therefore, teachers plan problem solving and investigational activities to ensure that pupils develop the skills of mathematical thinking and enquiry.

It is very important that children are exposed to regular problem solving which goes beyond simple word problems. At Tanners Wood we explicitly teach strategies for problem solving.

These strategies include:

- Drawing a picture
- Guess and check
- Make a list
- Working backwards
- Logical reasoning
- Make the problem simpler
- Checking for patterns
- Using objects
- Make a table, chart or graph
- Act it out

Learning walls are set up to reflect these strategies and support children to remember and use them.

Reasoning

Reasoning is the second of the three main aims of the Maths Curriculum 2014. Reasoning is about:

- making and testing predictions, conjectures or hypotheses
- searching for patterns and relationships
- making and investigating general statements by finding examples that satisfy it
- explaining and justifying solutions, results, conjectures, conclusions, generalisations and so on
- disproving a conjecture by finding counter-examples.

The end of Key Stage tests require pupils to explain and justify their reasoning as they respond to instructions such as:

- explain how you know
- explain why she is correct
- explain how this is possible.

In order to support pupils reasoning, speaking frames are provided for the Learning Wall which should be used regularly with the children. Adults should also model their own thinking through use of the following sentence stems and in this way promote learning by drawing attention to the Maths within.
These include:

- I noticed that …
- I decided to ... because…
- First I tried ……
- I already know that …… so ……
- When I looked at ……
- I noticed that ……this didn't work, so ……
- I know this is true because ....
- This reminds me of ……..
- I noticed a connection between ……
- I wondered why ……

Strategies to encourage reasoning

There are a number of strategies that can be helpful to encourage reasoning in mathematics lessons.
For example:

- Collect and discuss their annotations and explanations. Refine the children's contributions. Show the class how to record these. Stress the value of annotations.
- Key Stage 1 or 2 assessment questions are used as a discussion starter, sharing strategies for finding the solution, including annotating the diagram and working backwards to decide what missing information needs to be found.
- Present statements, and ask children to decide if they are always true, sometimes true or never true. Discuss children's choices and reasons.
- Ask children to give a peculiar, obvious and generalised example of a mathematical concept (POGS).

Questioning

A teacher's questions are central to the development of pupils' reasoning. They prompt pupils to analyse, justify and evaluate their problem-solving strategies. At Tanners Wood we recognise that the quality of our questioning is extremely important and affects the quality of learning. In order to provide appropriate challenge for all learners we will prompt thinking through our questions. In particular we recognise the importance of the power of higher order questions to develop thinking. Examples of these questions will be displayed on the Learning Wall and include:

- What do you notice?
- What is the same and what's different?
- Will this always happen?
- Can you explain why?
- How could you do it differently?
- What do you think will happen if……?
- What if you…..……?
- Do you agree?
- What could you try next?

In addition, we will encourage children to ask and answer their own questions. A Bloom's Taxonomy display and Bloom's sentence stems in each classroom support children to ask and answer a wide variety of questions including

higher order questions.

Fluency

Fluency is the third of the three main aims of the Maths Curriculum 2014. At Tanners Wood we recognise that fluency goes beyond children being able to chant facts such as times tables and number bonds. It requires them to have the ability to manipulate these facts and make connections with other areas of maths. Fluency is built into every maths lesson to secure understanding and develop mathematical reasoning and thinking.

How can we support children in becoming fluent?

As with much of mathematics, the key to fluency is in making connections, and making them at the right time in a child's learning.

- Manipulatives. The meaning is not in the manipulatives themselves – it has to be constructed by children over a period of time, through playing around with them and connecting them directly to mental and recorded calculation.
- Talking about their work. The quality of the talk is important. It is not simply children sharing how they did a particular calculation, but describing why and how it worked, and how their method is the same or different to those of others.
- Consolidation in meaningful contexts. By offering children practice in context we help them to make links between the types of situations that a particular strategy might suit.

The use of manipulatives, meaningful contexts and quality talk supports children to:

- count with meaning
- use facts to find other facts
- achieve quick recall of facts, vocabulary and meaning
- count on and back
- choose methods and procedures flexibly
- make connections to other areas of mathematics

Resources

At Tanners Wood we recognise the importance of manipulatives for helping children make sense of the abstract world that is Maths. Children will develop a bank of models and images related to a range of concepts.

A bank of essential mathematics manipulatives and resources including base ten equipment, Cuisenaire, multi-link, counters, place value counters, bead strings, number lines and 100 squares is kept in each classroom. Further resources relating to key whole school topics are kept in the dining room cupboards. A regular audit of all resources will take place.

All children are encouraged to use manipulatives or images in lessons. When manipulatives and images are modelled well by the teacher, and used correctly by the pupils, they can make pupils think more deeply and secure a better understanding.

At Tanners Wood It is essential that ALL pupils access these materials and they are not just perceived as suitable for the least able. The most able pupils can accelerate their learning by the use of manipulatives and models to support understanding of mathematical concepts.

Adults should be aware of the subconscious messages they may inadvertently display to children in referring to resources e.g. by saying counters are available for those that need them carries an implicit message that you shouldn't need to do so! Counters should be used to secure a deeper understanding is a more effective and positive

message which will result in far deeper learning and a better understanding.

Learning Walls and Maths Displays

In line with the learning environment expectation document, every classroom will have a:

- number line.
- large bead bar
- Maths Learning Wall using the main titles - **fluency, problem solving and reasoning.** These will be supported by questioning, reasoning frames, speaking frames and problem solving strategies to support learning.

Technology

Technology is used in various ways to support teaching and motivate children's learning. Each classroom has a laptop connected to a smart TV and a 'visualiser'. All teachers are encouraged to use computing to enhance teaching and learning in mathematics where appropriate. The school subscribes to MyMaths.co.uk to facilitate further practise of key skills online and for home learning.

Timetabling

To provide adequate time for developing mathematics, maths is taught daily and discretely. Maths lessons may vary in length but will usually last for about 45 minutes in Reception and Key Stage 1 and 60 minutes in Key Stage 2.

A Typical Lesson

A typical lesson in Year R to 6 will often have the following components:

- Fluency practice across the range of mathematics. This will involve work to revisit, rehearse, sharpen and develop arithmetic and written methods.
- Main teaching session. This will include both teaching input and pupil activities and a balance between whole class, guided grouped and independent work, (groups, pairs and individual work) effectively differentiated and offering appropriate challenge. Sometimes the focus for this session is new learning, at other times pupils may be practising, to master the application of a concept they have learned earlier. The focus of this session may vary for different children depending on their learning needs.
- Plenary. This will involve work with the whole class to sort out misconceptions, identify progress, to summarise key facts and ideas and what to remember, to make links to other work and to discuss next steps.

Within lessons and over sequences of lessons teachers plan a coherent teaching and learning programme based on the model:

Revisit -> Review -> Teach -> Practise -> Apply

In line with the school Home Learning Policy, at times there may be opportunities to develop skills and understanding of mathematics through additional activities, some of which may take place at home.

Teachers plan learning to meet the needs of all pupils, whether they have a specific learning difficulty in maths or whether they are particularly able. When scrutinising work in maths books, the Subject Leader for Maths expects to see learning from any one lesson on a similar theme, providing challenge for low attaining and middle attaining pupils and opportunities for 'greater depth' reasoning for high attaining– possibly with individual work for pupils with special educational needs.

EYFS

In the Early Years Foundation Stage, teachers use notes and photographs to capture pupils' progress. This evidence is

kept both on planning and in the Learning Journey which contains a wide range of information, such as assessment of prior knowledge before a unit of work, assessment following a piece of work, recording photographs of key moments of learning and recording quotes that demonstrate emerging understanding.

KS1 and KS2

Throughout the rest of the school planning will be annotated to indicate where children demonstrate either a key moment of learning or a need for further reinforcement of the concept or skills. These annotations (provided by all the adults working in the classroom) will feed forward into the following day's planning and will be referred to as a starting point when returning to the next term's planning.

Every teacher will track the progress of 6 children within the class who will form a representative group of children at a range of levels within the class. Hertfordshire assessment guidelines will be used to track the children. Statements should only be highlighted where the children are able to demonstrate application of the skills or knowledge naturally and 'at a distance' from the direct teaching input.

Teachers integrate the use of formative assessment strategies such as effective questioning, clear learning objectives, the use of top ticks (success criteria) and effective feedback and response in their teaching. The school's Marking and Presentation Policy inform high quality feedback and pupils' response to it in Mathematics.

Summative Assessment

Pupils are assessed against the EYFS Profile at the end of the Foundation Stage. National Curriculum tests are used at the end of KS1 and 2; teachers use past and sample papers to inform their assessments as they prepare pupils for them. Question level analysis of all summative tests should inform future planning and teaching.

Moderation

Each term a formal moderation exercise is carried out across the school in mathematics, which continues informally in teachers' preparation and assessment time. In these exercises, teachers compare the work of pupils at a particular 'Hertfordshire step' with other pupils in different year groups. This internal, within phase, and cross phase moderation is supplemented with regular external moderation.

<u>Role of the Subject Leader</u>

- Is a maths champion for the school, ensuring a high profile for the subject.
- Ensures teachers understand the requirements of the National Curriculum and helps them to plan lessons.
- Leads by example, by setting high standards in their own teaching.
- Prepares, organises and leads CPD and joint professional development – including coaching, with the support of the Head Teacher.

- Works with the SENCO/PPG Leader to ensure children who are falling behind are given appropriate intervention.
- Observes colleagues from time to time with a view to identifying the support they need.
- Attends CPD and disseminates to the rest of the staff as appropriate.
- Keeps parents informed about curriculum updates
- Discusses regularly with the Head teacher and the Maths Governor the progress of implementing the National Curriculum for Mathematics in school
- Monitors and evaluates mathematics provision in the school by conducting regular work scrutiny, learning walks and assessment data analysis.