THAKEHAM PRIMARY SCHOOL

KNOWLEDGE DEVELOPMENT OVERVIEW: Mathematics

SUBJECT: MATHS

NATIONAL CURRICULUM

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.

Aims

The national curriculum for mathematics aims to ensure that all pupils:

- become fluent in the fundamentals of mathematics, including 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 nonroutine problems with increasing sophistication, including breaking down problems into a series of simpler steps and persevering in seeking solutions.

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. Our curriculum ensures children apply mastery skills. We follow the White Rose maths scheme, with Deepening Understanding used to extend fluency, reasoning and problem solving. Children should also apply their mathematical knowledge to science and other subjects.

INTENT

At Thakeham Primary School we value every pupil and the contribution they make. As a result, we aim to ensure that every child achieves success and that all are enabled to develop their skills in accordance with their level of ability in accordance with our School Vision.

Mastery

Pupils are required to explore maths in depth, using mathematical vocabulary to reason and explain their workings. A wide range of mathematical resources are used, and pupils are taught to show their workings in a concrete, pictorial and abstract form wherever suitable. They are taught to explain their choice of methods and develop their mathematical reasoning skills. We encourage resilience, adaptability, and acceptance that struggle is often a necessary step in learning.

High Expectations	**Modelling**	**A Vocabulary Rich Environment**	**Pattern and Connection Identification**
All children are expected to succeed and make progress from their starting points.	Teachers teach the skills needed to succeed in mathematics providing examples of good practice and having high expectations.	We intend to create a vocabulary rich environment, where talk for maths is a key learning tool for all pupils. Pre-teaching key vocabulary is a driver for pupil understanding and develops the confidence of pupils to explain mathematically.	All children will have opportunities to identify patterns or connections in their maths; they can use this to predict and reason and to also develop their own patterns or links in maths and other subjects.

Fluency	**Reasoning**	**The Teaching of Problem Solving**	**Mastery**
We intend for all pupils to become fluent in the fundamentals of mathematics, including 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.	We intend for all pupils to reason mathematically by following a line of enquiry, conjecturing relationships and generalisations and developing an argument, justification or proof using mathematical language.	We intend for all pupils to 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.	All children secure long-term, deep and adaptable understanding of maths which they can apply in different contexts.

EYFS

Number ELG

Children at the expected level of development will:

- Have a deep understanding of number to 10, including the composition of each number.
- Subitise (recognise quantities without counting) up to 5.
- Automatically recall (without reference to rhymes, counting or other aids) number bonds up to 5 (including subtraction facts) and some number bonds to 10, including double facts.

Numerical Patterns ELG

Children at the expected level of development will:

- Verbally count beyond 20, recognising the pattern of the counting system.
- Compare quantities up to 10 in different contexts, recognising when one quantity is greater than, less than or the same as the other quantity.
- Explore and represent patterns within numbers up to 10, including evens and odds, double facts and how quantities can be distributed equally.

IMPLEMENTATION

White Rose & Deepening Understanding	**Pre/Post Teaching and Fluency**	**Assessment**
Every class from EYFS to Y6 follows the White Rose scheme of learning which follows the objectives set out in the National Curriculum. Lessons may be adapted or personalised to address the individual needs and requirements for the class but overall coverage is maintained. We also use a range of planning resources including those provided by the NCETM, NRICH, Maths Shed and Classroom secrets to enrich our children's maths diet.	Every class has a ten-minute slot within the day where they are set a maths task to ensure general maths knowledge and fluency are maintained and developed: these make take many forms across the different classes including, arithmetic, times tables or set questions about a focused maths topic. There is also a 15-minute slot daily which is used for focused pre or post teaching interventions. These slots are used on a discretionary basis to suit the individual needs of the children in each class or from outcomes of a taught lesson.	Throughout our teaching we continuously monitor pupils' progress against expected attainment for their age, making formative assessment notes where appropriate and using these to inform our teaching. Summative assessments are completed at the end of each maths unit and at the end of each term. The results form discussions in our termly pupil progress meetings, intervention objectives and our summative school tracker. The main purpose of assessment is to always ensure that we are providing excellent and consistent provision for every child.
Online Maths Tools	**Concrete, Pictorial, Abstract (CPA)**	**Continuing Professional Development (CPD)**
In order to advance individual children's maths skills in school and at home, we utilise Times Tables Rock Stars and Sumdog for multiplication practise, application and consolidation of all units.	We implement our approach through high quality teaching which delivers appropriately challenging work for all individuals. To support us, we have a range of mathematical resources in the classrooms	We continuously strive to better ourselves and frequently share ideas and activities that have been particularly effective. We take part in training opportunities and regional networking events,

	including Numicon, Base 10 and counters (concrete equipment). When children have grasped a concept using concrete equipment, images and diagrams are used (pictorial) prior to moving to abstract questions. Abstract maths relies on the children understanding a concept thoroughly and being able to use their knowledge and understanding to answer and solve maths without equipment or images.	such as the NCETM work groups and Sustaining Mastery Course.
Cross Curricular Maths is taught across the curriculum ensuring that skills taught in maths lessons are applied in other subjects particularly those that involve elements of real life maths.	**Whole School Events** We celebrate National Maths Day and have whole school maths themed days. We also plan competitions such as TTRS launch day in LKS2 and Sumdog national competitions. These days' focus on one particular theme within maths that we as a school would like to further develop.	

Pupils are provided with a variety of opportunities to develop and extend their mathematical skills in and across each phase of education. Maths is taught following the National Curriculum 2014, the West Sussex guidelines and appropriate teaching resources within a Mastery approach. 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.

'A mathematical concept or skill has been mastered when, through exploration, clarification, practice and application over time, a person can represent it in multiple ways, has the mathematical language to be able to communicate related ideas, and can think mathematically with the concept so that they can independently apply it to a totally new problem in an unfamiliar situation.'

[1] Mastering Mathematics: Teaching to transform achievement, Dr Helen Drury.

The teaching of mathematics at Thakeham Primary School provides opportunities for:

- Group work
- Paired work
- Individual work
- Whole class teaching.

All children (except EYFS) are taught in vertically grouped classes and work is differentiated to suit the needs of the various levels of ability and year groups. The aim of the Mastery approach is for all learners to be successful in mastering the learning appropriate to their year group. We do place emphasis however on ensuring there are opportunities for challenge within the expectations of their year group. Differentiation we use may be by task, outcome, resources provided or support given.

All children within a maths lesson should understand what they are learning and why (learning objective) and know what they need in order to complete the task (use of the 'Toolkit'). Learning is developed and embedded through use of 'stem sentences' (these express key conceptual ideas or generalities and provide a framework to embed conceptual knowledge and build understanding).

In line with our school value 'curiosity' questioning is a vital part in all our mathematics sessions and questions will be continuously adapted by the teacher and support staff based on assessment for learning.

Within mathematics lessons, through careful planning and preparation, pupils engage in:

- the development of mental strategies
- written methods
- practical activities and mathematical games
- investigational work

- problem solving and reasoning
- mathematical discussion
- consolidation of basic skills and number facts
- Working with computers as a mathematical tool.

At Thakeham Primary School we value and understand the importance of hands-on, practical learning and impact this has on children's engagement and understanding of mathematical concepts. Any activity sheets used should seek to build on and follow on from this and not replace these vital learning opportunities.

At Thakeham, 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 the appropriate terminology in our teaching and children are also expected to use it in their verbal and written explanations. To ensure there is adequate time for developing these mathematical skills, each class has a dedicated maths lesson each day. Each lesson is 60 minutes long. Children also have the opportunities to develop and apply these skills across the curriculum.

Children in KS1 and KS2 participate in a weekly times tables test in line with our Rainbow Times Tables Awards.

The lesson format we follow includes a mental/oral starter, a main teaching activity and a plenary session.

Disadvantaged and SEND pupils are at the heart of all planning sequences in the school. Like with every other lesson, we deploy a range of scaffolds, differentiation and support strategies in order to ensure every pupil can access the learning. This is reviewed as part of the Assess, Plan, Do, Review cycle.

IMPACT

Pupil Voice	**Evidence in Knowledge**	**Evidence in Skills**	**Outcomes**
Through discussion and feedback, children talk enthusiastically about their maths lessons and speak about how they love learning about maths. They can articulate the context in which maths is being taught and relate this to real life purposes. Children show confidence and believe they can learn about a new maths area and apply the knowledge and skills they already have.	Pupils know how and why maths is used in the outside world and in the workplace. They know about different ways that maths can be used to support their future potential. Mathematical concepts or skills are mastered when a child can show it in multiple ways, using mathematical vocabulary to explain their ideas, and can independently apply the concept to new problems in unfamiliar situations. Children demonstrate a quick recall of the facts and procedures. This includes recollection of all times tables.	Pupils use acquired vocabulary in maths lessons. They have the skills to use methods independently and show resilience when tackling problems. The flexibility and fluidity to move between different contexts and representations of maths. Children show a high level of pride in the presentation and understanding of the work. The chance to develop the ability to recognise the relationships and make connections in maths lessons. Teachers plan a range of opportunities to use maths inside and outside of school.	At the end of each year, we expect the children to have achieved Age related expectations for their year group. Some children will have progressed further and achieved greater depth. Children who have gaps in their knowledge receive appropriate support and interventions and are expected to make three steps of progress against their baseline. Mastery All children secure long term, deep and adaptable understanding of maths which they can apply in different contexts.

Assessment

To develop learning, pupils will be continuously assessed using a variety of strategies – observation, questioning, marking in accordance to our school Assessment and Feedback Policy. In EYFS, pupils will be assessed and the Foundation profile completed throughout the year.

The quality of marking is crucial. Teachers use 'PECS' (Prove, Explain, Choose, Solve – see appendix 3) up to 3 times a week, as a strategy which requires children to reflect on their learning. This links to our Super Learning Hero, 'Reflective, Reviewing, Rowen.' All other marking should be linked to the marking codes in our Assessment and Feedback Policy. Information collected through marking about individual successes or misconceptions (formative assessment information) will influence what is taught in following lessons, and may result in planning adaptations.

Progress against the year group objectives is recorded on a target card at the back of the children's maths books and updated half-termly.

All lessons are evaluated and teachers note children not meeting the lesson objectives as well as those exceeding them in order to inform future planning.

Statutory Assessment at Thakeham Primary School

- EYFS: Children are assessed in The early learning goals (ELGs) in the three prime areas of learning (communication and language; physical development; and personal, social and emotional development) and the ELGs in the specific areas of mathematics and literacy
- In year 2 children take end of Key Stage 1 SATs which assess their mathematical skills and knowledge. This involves an arithmetic paper and a second paper that assesses children's ability to apply mathematics to problems and to reason.
- From 2020, year 4 children will undertake a Mathematics Times Tables Check. The purpose of the MTC is to determine whether year 4 pupils can recall their multiplication tables fluently. The children will be tested using an on-screen check answering answer multiplication questions in six seconds. The questions are selected from the 121 number facts that make up the multiplication tables from 2 to 12, with a particular focus on the 6, 7, 8, 9 and 12 times tables as they are considered to be the most challenging.
- In year 6 children take end of Key Stage 2 SATs which assess their mathematical skills and knowledge. This consists of 2 components as in Key Stage 1 (arithmetic and reasoning) but there are 3 papers in total (2 reasoning papers and 1 arithmetic paper).

National Curriculum Requirements

For information about the Primary National Curriculum requirements, please navigate to the following locations as detailed below (links to the EYFS Statutory Framework and Primary National Curriculum for England).

Early Years (Year R – including pupils aged 4): https://assets.publishing.service.gov.uk/media/65aa5e42ed27ca001327b2c7/EYFS_statutory_framework_for_group_and_school_based_providers.pdf

Key Stage 1 through to Key Stage 2 (Years 1,2,3,4,5 and 6): https://assets.publishing.service.gov.uk/media/5a81a9abe5274a2e8ab55319/PRIMARY_national_curriculum.pdf

Support	Challenge
The expectation is that the majority of pupils will move through the programmes of study from the Early Years Statutory Framework and the National Curriculum at broadly the same pace. However, decisions about when to progress are always based on the security of pupils' understanding and their readiness to progress to the next stage. We scaffold learning with the progressive use of the CPA approach, first using manipulatives for concrete understanding, then pictorial and finally abstract. Those who are not sufficiently fluent with earlier material are supported with consolidating their understanding, through additional practice or pre-teaching within subsequent lessons or in small group interventions, before moving on. We are very mindful of the need to work closely with children and take time to learn about their strengths and weaknesses, being vigilant about not adopting false labels to ensure their needs in maths are met.	Pupils are challenged through high expectations, knowing children well and fostering an inclusive environment which encourages a growth mind set within our children. By giving quality feedback, ensuring engagement and challenge through effective questioning and modelling, we develop independence in our mathematicians. Teachers provide opportunities for children to be challenged through more in depth investigations where children need to be prepared to take risks and sometimes push through their comfort zone. Children who grasp concepts rapidly are challenged by being offered rich and sophisticated problems requiring application of their developing reasoning skills, before any acceleration onto a wider and deeper understanding of each objective.

Knowledge Development

EYFS	Years 1 to 6
We follow the Whiterose scheme of learning as our base for our maths teaching. To access long term planning, medium term planning and skills progression maps for Year R, navigate to here: https://whiteroseeducation.com/resources?year=reception&subject=maths	We follow the Whiterose scheme of learning as our base for our maths teaching. To access long term planning, medium term planning and skills progression maps for Years 1 and 2, navigate to here: https://whiteroseeducation.com/resources?year=mixed-1-2&subject=maths To access long term planning, medium term planning and skills progression maps for Years 3 and 4, navigate to here: https://whiteroseeducation.com/resources?year=mixed-3-4-new&subject=maths To access long term planning, medium term planning and skills progression maps for Years 5 and 6, navigate to here: https://whiteroseeducation.com/resources?year=mixed-5-6-new&subject=maths

Last audited: 31.1.2024 by WMC