Mathematics Policy

Introduction

At Holywell First School we believe that mathematics equips pupils with a uniquely powerful set of tools, through developing an ability to calculate, reason and solve problems. It enables children to understand and appreciate relationships and patterns in both number and space in their everyday lives. Through their growing knowledge and understanding, they also learn to appreciate the contribution made by many people to the development and application of mathematics.

This revised policy takes into account the new National Curriculum (2014)

It should be read in conjunction with the following school policies:

- Written Methods Calculation Policy
- Basic Skills Policy
- Maths Teaching and Learning Profile
- Assessment for Learning and Marking Policy
- Maths Curriculum Intent, Implementation and Impact Statement – Appendix 1

Purposes

It is our aim to:

1) To develop lively, enquiring minds encouraging pupils to become self- motivated and confident through a growth mindset
2) Create problem solvers, who can reason, think logically, work systematically and apply their knowledge of mathematics
3) To promote understanding, skills and logical thinking.
4) To ensure there is dedicated daily maths lessons, which teaches the requirements of the new National Curriculum
5) To secure high standards through effective teaching and learning throughout the school.
6) To establish clear, realistic targets for raising standards and to provide a manageable plan for achieving them.
7) To enable children to calculate accurately and efficiently both mentally and with pencil and paper using a range of strategies.
8) To develop an awareness of mathematics in the environment and in everyday situations and to use and apply mathematics across the whole curriculum using mathematical terms.
9) Enable the subject leader to review, monitor and evaluate the planning, teaching and assessment of mathematics throughout the school.
10) An ability to communicate using mathematical language
11) Promote a growth mindset about children's ability to learn mathematics

Aims of the new National Curriculum

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 have conceptual understanding and are able to recall and apply their knowledge rapidly and accurately to problems

- **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 non-routine problems with increasing sophistication, including breaking down problems into a series of simpler steps and persevering in seeking solutions.

School Curriculum - Programme of Study

Foundation Stage

The programme of study for the Foundation stage is set out in the EYFS Framework. Mathematics involves providing children with opportunities to develop and improve their skills in counting, understanding and using numbers, calculating simple addition and subtraction problems; and to describe shape, spaces and measures.

Key Stage 1 and 2

The Programmes of study for mathematics are set out year by year for Key Stages 1 and 2 in the new National Curriculum (2014). 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. By the end of each key stage, pupils are expected to know, apply and understand the matters, skills and processes specified in the relevant programme of study.

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. This should involve working with numerals, words and the four operations, including with practical resources (e.g. concrete objects and measuring tools).
At this stage, pupils should develop their ability to recognise, describe, draw, compare and sort different shapes and use the related vocabulary. Teaching should also involve using a range of measures to describe and compare different quantities such as length, mass, capacity/volume, time and money.
By the end of Year 2, pupils should know the number bonds to 20 and be precise in using and understanding place value. An emphasis on practice at this early stage will aid fluency.
Pupils should read and spell mathematical vocabulary, at a level consistent with their increasing word reading and spelling knowledge at Key Stage 1.

Lower Key Stage 2

The principal focus of mathematics teaching in lower Key Stage 2 is to ensure that pupils become increasingly fluent with whole numbers and the four operations, including number facts and the concept of place value. This should ensure that pupils develop efficient written and mental methods and perform calculations accurately with increasingly large whole numbers.
At this stage, pupils should develop their ability to solve a range of problems, including with simple fractions and decimal place value. Teaching should also ensure that pupils draw with increasing accuracy and develop mathematical reasoning so they can analyse shapes and their properties, and confidently describe the relationships between them. It should ensure that they can use measuring instruments with accuracy and make connections between measure and number.
By the end of Year 4, pupils should have memorised their multiplication tables up to and including the 12 multiplication table and show precision and fluency in their work.
Pupils should read and spell mathematical vocabulary correctly and confidently, using their growing word reading knowledge and their knowledge of spelling.

Teaching and Learning

Teachers' planning and organisation

We teach the programmes of study using as mastery approach, which ensures continuity and progression in the teaching of mathematics. Within a unit of work, the time spent on teaching a specific learning objective or set of learning objectives depends on the needs of the children.

Lessons follow the 5 principles for mastery teaching

1) Coherence (The small progressive step journey which the learning takes. This takes into account prior learning and children's starting points)

2) Representation and Structure (Children will have access to a range of concrete equipment (manipulatives) before moving on to a visual and abstract representation)
3) Fluency (All children will be given time to practice and become fluent in the quick recall of key facts)
4) Mathematical Thinking (Al children will have the opportunity to solve problems, make connections and reason within a lesson)
5) Variation (How questions and problems are shown and varied so that they progressively deepen children's understanding)

All teachers plan daily mathematics lessons following this structure using an agreed planning format. Planning is usually created on a weekly basis.
Planning includes the learning objective, key vocabulary possible misconception, what concrete manipulative and pictorial and abstract representations will be used, the teacher input and a Fluency, Greater Depth (Problem Solving) and Captain Challenge (Reasoning) activity to complete independently.
Where possible, using pre-assessment data, teachers pre-empt 'big' misconceptions that the children will have – e.g. a rectangle/oblong has four lines of symmetry (diagonals). Teachers also plan which vocabulary they will use and which models, images and concrete resources they will use to aid learning.
Effective plenaries are only part-planned as misconceptions arise during the teaching of the lesson. However, all plenaries refer to the learning outcome in a meaningful way, allowing the children some time for self-assessment.
We ensure that across each term children are given a range of experiences in mathematics lessons e.g. practical activities and mathematical games, group problem solving activities, individual, group and whole class discussion activities, open and closed tasks.
We ensure that children can use a range of methods to calculate and have the ability to check whether their chosen methods are appropriate, reliable and efficient.

A Typical Lesson
A typical lesson in Years 1 to 4 will have the following components:
- Daily Hi 5 Maths session, either before or away from the mathematics lesson which focuses on three (Key Stage 1) and five (Key Stage 2) key skills. See Basic Skills Policy
- Main teaching session which lasts approximately 40 minutes and uses the five mastery principles

Recalling core knowledge such as number bonds, number facts and times tables with speed and accuracy is fundamental. Therefore, there is a daily Hi 5 Maths session from Years 1 to 4, which focuses on the practise of basic key skills per session. The session is quick paced and interactive. In Key Stage 1, this lasts between 15- 20 minutes and Key Stage 2 between 20 – 25 minutes. All children should be actively involved in the session and included through personalised questioning, challenge tasks and support.

Pupils in Reception, Year 1 and Year 2 undertake a daily 10 minute 'Number sense' session using the principles of the NCETM 'Mastering Number' programme which aims to develop fluency and flexibility with number facts and relationships. A key representation used in this is the Rekenrek.

The main teaching session will include both teaching input and pupil activities and a balance between whole class, guided group and independent work, (groups, pairs and individual work) effectively 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

Differentiation
Our staff have high expectations of all children, irrespective of ability, and encourage them to be successful and achieve their full potential. Our aim is to ensure challenge for all.
Children are encouraged to have a growth mindset about their ability to do mathematics. Encouraging children to 'have a go' is seen as paramount. We aim to develop the mantra that: 'it's okay to be stuck because it is fantastic when you get unstuck!'

Differentiation of tasks is done in various ways:
- Open ended questioning and activities which allow children to link their learning and reason
- Recording e.g. allowing some children to give verbal responses and photographing their learning

🎬 Resourcing e.g. Use of concrete equipment such as Numicon, cubes, 100 squares, number lines, mirrors to support some children
🎬 Groupings are of mixed attainment and are not fixed

Part of the independent work often involves some focused, targeted group work from the teacher. However, groupings are 'fluid and flexible' based on the children's performance in a previous lesson or the beginning of that particular lesson.
Where Learning Support Assistants are available, they are fully briefed before the lesson and use the same teaching methods modelled by the teacher to support individuals or groups. This is done either verbally or is written down on the teachers planning.

Guidelines

1) Children should be provided with a variety of practical experiences related to number and place value, addition and subtraction, multiplication and division, Fractions (including decimals), measurement, geometry: properties of shapes and statistics.

2) Children should be provided with a daily variety of experiences to develop mental and recorded skills in numeracy with and without counting aids, standard and non standard measures, 2D and 3D shapes and to collect, handle and interpret data.

3) Children should experience activities, which promote an understanding of the concepts of each Key Performance Indicator (number and place value, addition and subtraction, multiplication and division, Fractions (including decimals), measurement, geometry: properties of shapes and statistics.).

4) Investigation, estimation and discovery should be developed through ensuring sound understanding of number operations.

5) During the Hi 5 sessions, mental maths strategies, games and practical activities will help support the teaching of basic skills and the understanding of mathematical principles and vocabulary.

6) Children should be given the opportunity to collaborate and discuss mathematical activities and to use a variety of practical applications throughout the whole of their work. A wide variety of apparatus, activities and challenges will be used to extend confidence and understanding in using and applying maths.

7) Planning will based upon the new National Curriculum (2014). The mathematics Programmes of Study, NCETM prioritisation materials and the 'Ready to Progress Criteria (2020) inform medium term plans and subsequently weekly planning. Class teachers are responsible for the relevant provision of their own classes and individually develop weekly plans which give details of learning objectives and appropriate activities. Although planned in advance, they are adjusted in light of daily assessments. Where appropriate, maths will be taught through a creative curriculum approach. Assessment information using the 'Maths Smalls Steps Progression' document will be used to inform planning so that lessons are pitched at the children's individual levels, use differentiation and include an element of 'challenge' which is the children's next steps in their learning.

8) Termly pupil progress meetings will be held by the Senior Leadership Team with class teachers to track the progress of individual children and groups of learners. Children who are not making expected progress will be referred to the schools intervention manager.

9) The school actively works to narrow the gap between pupils in receipt of pupil premium and those that do not. This is done through a number of strategies:
- Planned high quality teacher led interactions and interventions
- The attainment and progress of pupils in receipt of Pupil Premium will be closely monitored by the class teacher who will complete a half-termly Pupil Premium tracker sheet that is submitted to the Head teacher.
- This will be used at termly pupil progress meetings with the Senior Leadership Team who discuss attainment and progress.
- Interventions and extra support/resources will be directed as required.

- Interventions are tailored to meet the needs of the children and gaps in their knowledge.
- When marking work, the class teacher will set marking challenges which are challenging next steps. (see marking policy)

10) The maths subject leader will monitor resources, effectiveness of planning, staff in need of in-service support, the effectiveness of agreed assessment procedures and use of the schools calculation policy and work with partnership First and Middle Schools as part of the assessment group.

11) The maths coordinator will work alongside the Interventions manager to direct intervention programmes such as Numicon, Pre-teaching, NumberBlocks and Dyscalculia. This will be reviewed half-termly and the progress of children who have received this will be tracked.

Homework:

Children in Key Stage One and Two will be set weekly mathematics homework on Google Classroom. This involves:

1) Key Stage 1 playing a set number of games on NumberBot which aims to develop children's understanding, recall and fluency in mental addition and subtraction, so that they move from counting to calculating. In the summer term, pupils in Year 2, begin to play Times Tables Rockstars
2) Key Stage 2 playing a set number of games on Times Table Rockstars, which aims to develop children's understanding, recall and fluency of multiplication and division facts.

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Chair of Strategic Policy and Direction Committee: _____

Appendix 1

Subject – Mathematics:

School Vison and motto:

'Making Learning an Adventure'

At Holywell Village First School we have high aspirations for our children to become well-rounded and responsible future citizens. They are happy, independent and have positive self-esteem. Our children have a thirst for learning. They are curious about the world around them and are confident to 'have a go'. They are reflective learners who persevere and demonstrate good communication and social skills. They are thoughtful, caring and kind.

'We want our children to be the best they can be.'

Mathematics Curriculum Intent

Why do we teach maths?

At Holywell Village First School, we strive for our children to be successful and proficient mathematicians. Maths is a skill we use on a daily basis and is an essential part of everyday life. Therefore, mathematics forms an important part of our broad and balanced curriculum where we endeavour to ensure that children develop an enjoyment and enthusiasm for maths that will stay with them throughout their lives and empower them in future life. We believe that unlocking mathematical fluency is an essential life skill for all learners and is a pre-requisite to being able to reason and solve problems mathematically. Our aim is to develop a positive culture of deep understanding, confidence and competence in maths that produces strong, secure learning. As a school, we recognise that the key to unlocking the potential in our children is through the development of basic mathematical skills and the understanding of mathematical concepts. We therefore place great emphasis on the use of concrete resources and pictorial representations at all ages, to enable children to fully understand the concepts and principles, when presented with abstract calculations and questions.

The National Curriculum for Mathematics in England (DfE, 2014) Mathematics Programmes of Study: Key Stages 1 and 2) underpins our vision for the teaching of Mathematics and ensures 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 non-routine problems with increasing sophistication, including breaking down problems into a series of simpler steps and persevering in seeking solutions

Our curriculum is unique to HVFS

We believe that mathematics lessons should be fully inclusive of every child and reduce inequalities so that everyone can achieve and be successful in mathematics.

Our intent is to fulfil the requirements of the National Curriculum for mathematics but to also:

- Ensure the curriculum from Nursery to Year 4 is coherently sequenced so that all children develop their:
  - Fluency
  - Problem Solving
  - Reasoning

(CHALLENGE)

- Ensure children are taught the different types of knowledge in which they can become fluent. This fluency relates to recalling, using and applying their understanding as well as fluency in explaining relationships
  (CHALLENGE)
- From their very first day in school, ensure children have the appropriate declarative knowledge (the 'I know that' and relates to facts and formula), procedural knowledge (the 'I know how' and relates to methods) and conditional knowledge (the 'I know when' and relates to reasoning and problem solving) by KS 2
(CONFIDENCE)
- Ensure that children are taught mathematics daily so that they can become confident mathematicians
(CITIZENSHIP)
- Ensure children have opportunities to apply their mathematics learning into real life contexts and examples
  (CHALLENGE, CITIZENSHIP, CONFIDNECE)

Implementation

How do we teach Mathematics?

We deliver these through a Mastery Curriculum. At Holywell First School, this means we teach our curriculum in blocks to enable pupils to develop their knowledge and skills. This enables us to support all learners as the length of time provides those children who need it the time to understand the core concept of each area whilst offering opportunities for depth of understanding and creative thinking through finding connections for others.

By following the National Curriculum and NCETM curriculum, we ensure that each year we build on the previous year's learning and as a staff, we have taken time to think about the journey each child takes through our school and ensure they are ready for their next steps.

Our mathematics curriculum and lessons are effective and age appropriate. We implement mathematics in the following ways:

Progression documents such as the NCETM 'Ready to Progress' and our calculation policy identify the skills across each year group, ensuring children learn new skills every year and develop previously taught skills. They are carefully used to ensure that children are not being stretched outside their year group but rather deepened within it.

The curriculum is designed so that depth can be achieved. This allows for lots of opportunities for practice within one context so that children can master the learning intended by the curriculum

The curriculum content is organised and sequenced so that pupils can master the key foundational knowledge. It also maximises the likelihood of pupils making meaningful connections between prior learning and concepts. In order to do this, teachers will ensure that pupils have secure prerequisite knowledge before moving on to concepts and ideas that are more complex.

The different types of knowledge - declarative ('I know that' facts and formula), procedural ('I know how' relating to methods) and conditional ('I know when' relating to problem solving and reasoning) are sequenced together so that pupils become familiar with their reciprocal relationships.

To develop pupils' levels of procedural fluency, time is given within a lesson to rehearse key content in terms of number facts and procedures, as well as the conceptual understanding, which sit alongside these, such as relationships.

We have an inclusive approach to mathematics; all children are included in all sessions and taught the same mathematical concept. We aim to keep the majority of our children on the same journey with resources and questioning used to support and challenge where appropriate. We understand the conceptual journey is key for all children to deeply understand a concept and therefore, we follow the concrete, pictorial, abstract approach. When introducing a new concept we allow children time to explore this with concrete resources, selected specifically to highlight the key features of that concept. We then use pictorial images and stories alongside representations such as part-part whole models and bar models to further support understanding before moving onto the abstract mathematics and ensuring our children are fluent and proficient in each skill. There is careful consideration of the learning trajectory so that a concept is broken down into small steps, which all pupils can access.

In Key Stage 1 and 2, our lessons are carefully planned to build on previous learning with each lesson structured into small steps with opportunities for discussion to ensure children build a deep understanding of the topic. Our planning identifies these 'small steps' and breaks down the teaching sequence into small achievable steps. Where children require additional support, 'scaffolds' are used to support children further to ensure that they have secured the small step before moving on. These 'scaffolds' may be in the form of returning to concrete resources or pictorial representations. Teachers carefully select and use manipulatives to reveal and draw out the mathematical structures and relationships. These are skilfully removed when pupils no longer need them.

For children who understand a concept quicker, challenge is used to deepen and challenge learners further within the curriculum area.

Recalling core knowledge with speed and accuracy is fundamental to our mathematics curriculum. In Key Stage 1 and 2, teachers plan daily core fluency knowledge sessions (Hi5), which focus on recalling with speed and accuracy number facts, number bonds, multiplication facts and relationships and laws.
In EYFS and Key Stage 1, the teaching helps children achieve fluency with age appropriate basic numbers and facts. This runs alongside opportunities, which foster and promote mathematical thinking.
In Early Years Foundation Stage, we relate the mathematical aspects of the children's work to the Development Matters statements and the Early Learning Goals, as set out in the EYFS profile document. Mathematics development involves providing children with opportunities to develop and improve their skills in counting, understanding and using numbers; calculating simple addition and subtraction problems; and describing shapes, space, and measures. Children will develop their understanding through planned, purposeful play and through a mix of adult-led and child-initiated activity. EYFS combine planning and activity ideas from the NCETM and White Rose Maths.
Lessons in Years 1 to 4 are taught using the NCETM 'Curriculum Prioritisation Document' but also combine this with planning and resources drawn from White Rose Maths Hub.
Times tables play an important part in our maths learning, with children developing their fluency in rapid recall of tables up to 12 x 12 by the end of year 4. While the rapid recall of times tables are being developed, children are also learning how to apply and manipulate their understanding of this to reason and solve problems.

Vocabulary

Mathematics is a vocabulary-rich subject. In each medium-term plan, teachers plan vocabulary development carefully so that pupils benefit from repeated encounters with words. This ensures that pupils have the language required to access a full range of mathematical lessons and concepts.
Pupils are taught the specific meaning of terms and all adults in the classroom will use specific and precise terminology to enable children to make more careful observations and enhance their problem solving and reasoning.

Our mathematics lessons have the following structure:

Fluency Warm up

Recalling core knowledge such as number bonds, number facts and times tables with speed and accuracy is fundamental. Therefore, there is a daily Hi 5 Maths session from Years 1 to 4, which focuses on the practise of basic key skills per session. The session is quick paced and interactive. In Key Stage 1, this lasts between 15- 20 minutes and Key Stage 2 between 20 – 25 minutes. All children should be actively involved in the session and included through personalised questioning, challenge tasks and support.

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Main Teaching

We follow a lesson design of teacher input, fluency activity, then application through a greater depth problem (Problem solving) and/or a captain Challenge problem (conjecturing/reasoning). Where some children are already fluent in a concept, they may begin on the greater depth or Captain Challenge problem, which allows them to reason, make connections and think mathematically. They may work on these activities with the class teacher or independently, whilst the teacher and support staff deliver specific interventions to children. Lessons are designed on the principle of 'concrete, pictorial to abstract' and where applicable, a range of manipulatives is used across the school to support children secure key concepts, and to become fluent in methods of calculation. Careful questioning is used to probe the pupil's understanding throughout a lesson and responses are expected in full sentences, using precise mathematical vocabulary.

In order to develop the children's knowledge and develop deep understanding of the concept/content being taught, they are given clear direction, step-by-step instruction, practice and feedback during the main teaching session. Instructions are broken down into small segments and draw pupils' attention to the concept.

Plenary

All lessons have a 'review and assess ' at the end of the lesson. Here pupils are asked to evaluate their own success against the success criteria/learning objective of the lesson.

Impact

By the end of Year 4 and ready to transition to middle school, we aspire that a Holywell First School mathematician will have developed a bank of efficient and accurate skills that can be used to calculate effectively. These will have been underpinned by the Concrete, Pictorial and Abstract process so children understand rather than just do, which ultimately will allow children to identify when answers do not make mathematical sense. Children will be able to apply these calculation skills and understanding of other areas to become confident and resilient problem-solvers with the ability to reason and articulate their ideas mathematically. Due to the embedding of fact sentences, children will have the language to be able to justify, reason and explain their answers.

Assessment and Feedback

Ongoing assessment informs the teaching and learning sequence.
Formative assessment within every lesson helps teachers to identify the children who need more support to achieve the intended outcome and who are ready for greater stretch and challenge through planned questioning or additional activities. The school has introduced the 'Small Steps Progression' document, which they have taken from the White Rose Maths Hub and NCETM curriculum Prioritisation materials and adapted it as an assessment tool for mathematics. Staff use these small steps and assess children's progress against these as they are taught. At the end of each maths unit, teachers indicate which children are not working at the expected level and working at a greater depth. This data is collected in by the SLT (Maths coordinator) and children who have not yet made the expected progress, or children who are working behind the expectations for their year group are identified.

Pupil Progress meetings are then held to review the successes of the term, and to identify next steps for those vulnerable children identified. The information from these meetings is used to plan support timetables and further CPD for staff. The data analysis is supported by lesson observations, planning and book scrutinies and small step progression monitoring which are carried out termly.
Our maths books evidence work of a high standard of which children clearly take pride; the components of the teaching sequences demonstrate good coverage of fluency, reasoning and problem solving. Our feedback and interventions support children to strive to be the best mathematicians they can be, ensuring a high proportion of children are on track or above. Our school standards are high, we moderate our books both internally and externally and children are achieving well.

Mathematics subject leader
July 2022