Attleborough Primary School

Mathematics Policy

Date: October 2022
Review: September 2024

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Intent

"Mathematics is a creative and highly inter-connected discipline...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." (DfE, 2013, p.3)

At Attleborough Primary School, we recognise the importance of mathematics in day-to-day life and seek to continue leading children through the journey to numerical literacy. We want all of our pupils to be excited about maths and to see themselves as mathematicians. Furthermore, we seek to instill a sense of curiosity through learning about how mathematics has developed over the centuries, other number systems and strategies as well as develop our pupils' abilities to solve puzzles and problems.

The aims of mathematics and how these contribute to the school's aims

National Curriculum 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 generalisation, and developing an argument, justification or proof using mathematical language
- Can **solve problems** by applying their mathematic to a variety of routine and non-routine problems with increasing sophistication, including breaking down problems into a series of simple steps and persevering in seeking solutions.

School Intent

• provide a relevant, challenging and enjoyable curriculum for all pupils;
• meet the requirements of the National Curriculum programmes of study;
• promote mathematics as an essential element of communication, which allows pupils to describe, illustrate, interpret, predict and explain;
• provoke an appreciation of the relationships in mathematics; that mathematics is not an arbitrary collection of disconnected items;
• show pupils the fascination of mathematics and promote ways of doing mathematics which harness their imagination, initiative and flexibility of mind;
• build pupils' confidence by creating a "can do" ethos and growth mindset in the classroom;
• encourage pupils to work systematically and to show a respect for accuracy and meaning;
• encourage pupils to work independently and with others.

Strategy for implementation

Scheme of Work

The school uses White Rose Maths (WRM) to structure its teaching of mathematics from EYFS to Year 6. White Rose is a block-based scheme of learning where each strand is broken down into small teaching steps. Each step scaffolds children's learning to ensure children have a secure prior knowledge before moving on to the next step. Subsequent blocks continue to revisit and use prior learning including through daily Flashback 4 materials. The school supplements the scheme with other resources.

There is flexibility within eat set of termly plans with usually one week 'spare' so that teachers can extend their teaching time on certain topics as needed and have time for assessment. Teachers are clear that 'steps' are not 'lessons' and that one step may need more than one lesson to cover content and secure knowledge.

Mastery

At Attleborough Primary School, we consider 'mastery' to mean that children have a secure understanding of mathematical concepts and processes, combined with a genuine procedural fluency. Children are able to apply their learning and solve different types of problems. Children who master a concept quickly are expected to deepen their understanding, for example, by applying it to solve problems embedded in investigations or more complex contexts. A child who had not mastered a concept may be further supported through intervention so that they gain more experience and can achieve mastery.

Ensuring Continuity and Progression

Each 'block' is split into small steps of conceptual understanding which children need to secure before they should move on to the next one. These small steps are linked to the learning trajectories which were devised by Sarama and Clements using their research into children's progression of mathematical understanding. Each step includes the follow sections:

- **'Get Ready':** refresh and review learning from recently taught lessons
- **'Let's learn':** new learning introduced in this step with varied examples of fluency, problem solving and reasoning questions
- **'Your turn':** independent/group activity opportunities placed throughout the new learning to give children the opportunity to practise new knowledge. This structure ensures that children are active learners and can practise in 'mini-steps' before building on new knowledge further.

Flashback 4 resources are used daily in Years 1 to 6. These include four questions in a familiar format with reviews of prior learning.

Assessment data is input onto Pupil Asset termly and this is used by the Maths Leader and Senior Leadership Team alongside class teachers to track pupil progress and identify pupils who may need further support.

At the end of the year, each teacher has time allocated to discuss individual pupil attainment and progress with their new teacher for the subsequent year.

Ensuring procedural and conceptual fluency

It is essential that children continue to build on their understanding of maths to become fully fluent mathematicians. At Attleborough Primary School, this is accomplished through teaching children a range of representations using the Concrete, Pictorial, Abstract Approach to teaching; giving them opportunities to practise and embed key age-related knowledge (e.g. x tables, number bonds etc); and opportunities to apply these skills. Tackling Tables cards and Propeller Education boards are used across in Years 1 to 6 to support fluency and knowledge recall daily.

Opportunities for true problem solving

Problem solving is more than just solving a basic word problem. It requires children to think, make choices and apply one or more areas of mathematics. White Rose includes opportunities for varied problem solving and reasoning in each step. There are questions to discuss and try together and similar questions for children to attempt independently. The school also uses metacognition strategies to support pupils in problem solving.

Opportunities for developing mathematical reasoning

NRICH consider there to be five steps in the progression of reasoning:

1. Describing – simply tells what they did
2. Explaining – offers some reasons for what they did/chose to do
3. Convincing – confident that their chain of reasoning is right, uses phrase such as 'I think that…'
4. Justifying – a correct logical argument that has a complete chain of reasoning to it and uses words such as 'because', 'therefore', 'that leads to…'
5. Proving – a watertight argument that is mathematically sound, often based on generalisations and underlying structure where wider ideas have been thought of.

White Rose supports this through varied opportunities such as partner discussion activities and 'show me' tasks.

Organisation

Early Years Foundation Stage

In Reception, children have some direct teaching time for mathematics where they review previous learning and new learning is introduced. Teaching includes interactive and concrete resources to engage pupils and time to listen to their developing understanding of number, shape, space and measure. A range of activities are available for pupils to choose from during the school day as part of continuous provision which continue to build on their learning both with an adult and independently. Early years classrooms use materials from the TEEMUP project to supplement resources.

Key Stage One

Mathematics in Key Stage One continues to build on children's early learning of number and shape. It is taught for at least one hour each day with extra time during the week dedicated to revisit and review learning including knowledge recall for number bonds and in Year 2, multiplication and division facts for the 2, 5 and 10 times tables.

Children will be taught to use a range of mathematical equipment for place value and calculation as well as other manipulatives such as 2D and 3D shapes.

Key Stage Two
Mathematics is taught for at least one hour each day with an extra fifteen minute "Flashback" session which focuses on a range of knowledge recall activities including number bonds and multiplication tables and completing Flashback 4 activities.

Mathematics is also embedded into the wider school curriculum through activities which relate to termly topics including history, geography and science.

There is no specific structure that lessons are expected to follow but most lessons will review previous learning, include new learning and review this.

Planning
Planning is carried out in three phases:-

- **Long term** block planning details curriculum coverage throughout each year group
- **Medium term** step-by-step planning is used each term to show learning objectives to be covered during the term
- **Short term** individual step planning is used by teachers to suit their class, this includes notes and guidance on how the step builds on previous knowledge, things to look out for (e.g. misconceptions) key questions and vocabulary and types of questions that could be used.

Teaching and Learning
We provide all pupils with direct teaching every day which is oral, interactive and stimulating. Teaching styles and lesson structure provide opportunities for pupils to consolidate their previous learning, use and apply their knowledge, understanding and skills, pose and ask questions, investigate mathematical ideas, reflect on their own learning and make links with other work.

Our approach to teaching is based on four key principles:
• a dedicated mathematics lesson every day;
• direct teaching and interactive oral work;
• an emphasis on choosing appropriate strategies;
• activities which all pupils should be able to access with appropriate differentiation through resourcing and adult/peer support

Teachers incorporate co-operative learning CLIPs into their lessons to give structured opportunities for children to work together and learn from each other. Teachers aim to create an environment where pupils are secure and feel confident in being able to take risks in their learning. They are responsible for planning and teaching all elements of the mathematics curriculum to their pupils. The mathematics subject leader provides

support and guidance to all teachers as well as monitoring learning through observations, book looks, learning walks, pupil interviews and reviewing summative assessments.

Teachers may be supported by teaching assistants, whose work is directed by the teacher. In general, their role is to support the pupils so that they can derive as much benefit and make as much progress in lessons as possible by guiding the learning rather than removing the learning from the task. Support staff take part in staff development and have regular discussions with teachers about the purpose of activities and the progress that pupils they work with make. They may contribute to planning, assessment and evaluation.

Children use books with squared paper to help them in structuring their calculations as well as drawing shapes and graphs accurately. Teachers ensure that they engage pupils in using appropriate structural apparatus, demonstrating and modelling how to use it as well as giving pupils the opportunity to choose resources to use themselves.

Assessment and recording Assessment for Learning

Assessment in mathematics is continuous. Short term, formative assessments are made during each lesson to inform immediate changes to the lesson and subsequent lessons. These short term assessments are closely matched to the teaching objectives. Children may be asked to self-assess their understanding according to the learning objective at the end of each lesson to help the teacher identify pupils in need of further support. Teachers feedback to pupils what has gone well in their work and how they can improve. They also indicate with a 'traffic light' whether a child has achieved the learning objective. Extra questions may be given to consolidate or challenge learning further depending on outcomes in the lesson.

Summative assessments are used throughout the year to support teachers in assessing pupil progress as well as formatively to plan for future lessons for the whole class or small group interventions. This includes Arithmetic and Problem Solving and Reasoning Tests which test children's wider knowledge and ability to apply their learning in different contexts outside of lesson time.

As a school, we recognise the importance of ensuring that pupils, teachers and parents have a good understanding of an individual's learning. Assessment data and lesson outcomes are used to inform next steps. This may include having intervention time outside of the maths lesson to address misconceptions or to fill gaps in learning. This could be in a small group or individually. Children's progress and targets are shared with

parents at Parent Consultation evenings which are held in the Autumn and Spring term and an annual report is sent out at the end of each academic year.

Assessment data is input onto Pupil Asset termly and this is used by the Maths Leader and Senior Leadership Team alongside class teachers to track pupil progress and identify pupils who may need further support.

At the end of the year, each teacher has time allocated to discuss individual pupil attainment and progress with their new teacher for the subsequent year.

Inclusion

All pupils are included in the daily mathematics lessons and have experience of direct, interactive and lively teaching appropriate for their age and stage of development.

During the starter, teachers use a mixture of questions directed at the whole class and some questions pitched specifically at particular groups or individuals within the class, in order to ensure the involvement of all pupils. Teachers leave sufficient "thinking time" after questions and use a balance of open and closed questions. During the main teaching activity, teachers plan activities which are differentiated around a single mathematical theme/objective. Teachers will also use co-operative strategies to help pupils to review, practise and support each other in learning.

When progress falls significantly outside the expected range, several factors are considered – classroom organisation and support, teaching materials, teaching style, and differentiation – so that additional or different action can be taken to enable the child to learn more effectively. Assessment against the National Curriculum allows us to consider each child's attainment and progress against expected levels.

Intervention sessions are used for children of all attainment levels to help fill gaps in their learning. Those who are on Education Health Care Plans or Learning Support Plans may be given additional targets to work on in school and at home to support accelerated progress. High attaining pupils are also identified and opportunities given for pupils' to show their understanding through questioning and deeper reasoning tasks.

Learning resources

Year group areas and classrooms include a wide range of mathematical resources for pupils and teachers to use including number lines, cubes, counting sticks, Base Ten, place value counters and computer software as appropriate.

Planning and lesson resources are also used from a range of online resource banks including White Rose, Twinkl, NRich and Gareth Metcalfe's ISeeProblemSolving and ISeeReasoning.

The learning environment

Classrooms are stimulating learning environments. Displays contain a mixture of:
• working walls, which focus on the topic that is currently being taught and is changed when a new topic begins
• prompts to help pupils develop an image of number and the number system (for example number squares and number lines) and to help them remember key facts and vocabulary;
• pupils' work which shows development of reasoning and problem solving skills

Homework

Regular and frequent homework is set for pupils in Key Stage One and Two and is focused on current learning. Pupils in Key Stage 2 also have access to Tackling Tables website/App which they can use to practise recall of multiplication tables.

The role of parents and carers

Parents and carers (female parents/carers in particular) play a vital role in the attainment outcomes for children they look after. Early maths work before children start school as well as playing games and talking about numbers has a significant impact on children's potential outcomes by the end of Key Stage Two. Therefore, it is vital that parents are also enthused about maths and engaged in supporting their child. To do this, the school needs to support parents so that they can help at home.

Parents may also become involved in the following ways:
•invitations to parents to attend 'Maths Cafes' with a focus on a specific area of mathematics
•invitations for parents to come into school and engage in a range of mathematical activities

• regular opportunities for parents to have confidential discussions about their child's progress with the teacher;
• displays around the school which promote the subject and explain how it is taught;
• through work sent home which might require parents to work with or help their child;
• information on the school website about how to help at home including links to other websites and even videos.

Leadership and management

Leadership and management roles

The mathematics subject leader is responsible for supporting the development of effective teaching across the school.

The main roles are to:
• teach demonstration lessons;
• ensure that teachers are familiar with the National Curriculum 2014 and the school's calculation policy and help them plan lessons;
• lead by example in the way they teach;
• prepare, organise and lead training, with the support of the headteacher;
• support the headteacher in carrying out an audit and agreeing an action plan with staff and the governing body;
• work co-operatively with the SEND Co-ordinator in providing advice and support to staff;
• observe colleagues with a view to identifying the support they need;
• attend training to broaden their knowledge of mathematics and teaching of mathematics;
• discuss regularly with the headteacher and governor responsible for mathematics the school's progress in implementing the mathematics programme of study as set out in the national curriculum.

Monitoring and Evaluation

There are plans in place to monitor regularly the work of the school and to evaluate how effective the teaching and learning is in raising standards. These judgements take into account the pupils' attainment on entry and their relative progress across the school. Monitoring focuses on those aspects of teaching which have direct relevance to pupils and their learning, namely:
• what the pupils are learning;
• their attitudes to learning;
• the standards they attain;
• the quality of our planning and teaching.

Evaluation of this information informs strategic planning. To do this, the following monitoring activities take place across the school year in line with the school's policy:

- looking at pupils' work;
- talking with a sample group of pupils;
- observing lessons;
- discussing with staff, pupils, parents and the governing body;
- analysing questionnaires given to pupils, staff and parents;
- completing learning walks
- analysing a range of data and records (e.g. assessments and test results).

Review

This policy will be reviewed bi-annually in line with the school's policy review programme. The subject leader is responsible for reporting to the governors' curriculum committee about the quality of its implementation and its impact on standards. In the light of this, policy amendments may be made.

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