

Mathematics policy

There are four main purposes to this policy:

- To establish an entitlement for all pupils;
- To establish expectations for teachers of this subject;
- To promote continuity and coherence across the school;
- To state the school's approaches to this subject in order to promote public, and particularly parents' and carers', understanding of the curriculum.

Introduction

The importance of mathematics to the curriculum

Mathematics equips pupils with a 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, many forms of employment, science and technology, medicine, the economy, the environment, and in public decision-making. Different cultures have contributed to the development and applications of mathematics. Today the subject transcends cultural boundaries and its importance is universally recognised. Mathematics is a creative discipline. It can stimulate moments of pleasure and wonder when a pupil solves a problem for the first time, discovers a more elegant solution to that problem, or suddenly sees hidden connections.

Expectations

By the end of Key Stage 1, the performance of the great majority of the pupils should be within the range of levels 1 to 3. Most pupils are expected to achieve level 2.

By the end of Year 4, the performance of the great majority of pupils should be in the range of levels 1 to 4. Most pupils are expected to achieve level 3.

By the end of Key Stage 2, the performance of the great majority of the pupils should be within the range of levels 3 to 5. Most pupils are expected to achieve level 4.

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

The school aims to:

- provide a relevant, challenging and enjoyable curriculum for all pupils;
- meet the requirements of the National Curriculum programmes of study;
- make full use of the National Numeracy Strategy and the Framework for teaching mathematics to cover the National Curriculum in ways which give particular emphasis to numeracy skills;

- 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 an "I can do this" ethos 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

Entitlement and curriculum provision

During the foundation stage, in the reception year, our aim is for pupils to cover a broad curriculum that leads towards achieving the national expectations as described in the Early Learning Goals. In this way, the pupils are ready to take a full part in the dedicated mathematics lesson by the end of the year. In order to achieve this, lessons comprise of: a whole class introduction, involving some counting, with finger games, number rhymes and songs; and a plenary for the whole class to discuss what has been learnt and for the teacher to assess and reward progress. The pupils may undertake group activities at the same time or activities may be structured across the school day, according to the pupils' age, stage of development and level of maturity.

From Year 1, all pupils have a dedicated mathematics' lesson every day. In Key Stage 1, lessons last about 45 minutes and 60 minutes in Key Stage 2. This amounts to 17 per cent and 21 per cent at Key Stage 1 and 2 respectively.

Teaching and Learning

We aim to provide all pupils with some 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' lessons every day;
- direct teaching and interactive oral work;
- an emphasis on mental calculation;

- activities differentiated in a manageable way so that all pupils are engaged in mathematics related to a common theme.

As much time as possible is spent in each lesson in direct teaching and questioning of the whole class, groups or individuals. There is an appropriate range of elements in the teaching, namely directing, instructing, demonstrating, explaining and illustrating, questioning and discussing, consolidating, evaluating responses and summarising. Pupils are encouraged to make decisions, communicate their understanding to others and to reason. Teachers aim to create an environment where pupils are secure and feel confident in being able to take risks in their learning.

Teachers 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.

Teachers are supported by teaching assistants, whose work is directed by the teacher. In general, their role is to help the pupils they work with derive as much benefit and make as much progress in lessons as possible. They 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.

Assessment and recording

Assessment and recording are undertaken at three levels: short-term, medium-term and long-term.

Short-term assessments

Teachers keep their own informal records of those pupils whose progress is markedly different from that which is expected. These informal records are notes of anything that surprises them, either in terms of a lack of understanding or exceptionally good progress.

These observations are supplemented by:

- short, informal tests focusing on rapid recall of mental calculation skills;
- homework and other informal tests (which are often followed immediately by marking and discussion with the whole class).

Medium-term assessments

Each unit of work is evaluated using information arising from short-term assessment and medium-term assessments. Teachers highlight termly plans to indicate the extent to which:

- pupils have met the objectives;
- pupils have responded but the objective needs more attention;
- objectives were not covered, or pupils did not achieve them.

On two days every half term assessment activities such as investigations are planned which involve a range of ideas and skills linked to one or more of the key objectives covered previously. Assessments are made as a result of this work. Teachers provide constructive written and oral comments (not marks out of 10) on any written work produced as soon as possible after the assessment activity in order to help pupils to appraise their own performance and focus on what they need to do to improve.

The pupils' progress in achieving the key objectives is recorded using a class record as described on page 35 of section 1 of the Framework.

As a result of these assessments, individual targets are discussed with pupils. These targets are related to the list of key objectives. Parents are kept informed about these through a leaflet. It also explains how they can support their child's learning.

Short and medium-term assessments are designed to be largely formative.

Long-term assessments

These are undertaken through a combination of teacher assessment and end of year tests. The tests used are the national tests at the end of Year 2 and 6 and the optional tests for Years 3, 4 and 5.

Summative teacher assessments are made in relation to each child at the end of each year. In order to moderate judgements teachers in each key stage examine samples of pupils' work, representing a range of ability, from each class and each year group.

At the end of each year, teachers use their informal records (from short-term assessment), their class record of key objectives (from medium-term assessment) and their highlighted termly plans to support them in writing annual report to parents.

Continuity and progression

The yearly teaching objectives and the termly planning sheets from the Framework are used consistently by all teachers to ensure continuity and progression across the school. Teachers also use the supplement of examples in the Framework to ensure that planned activities, irrespective of the age and ability, are pitched at the right level.

Teachers' records referred to above (see assessment section) are transferred to the next teacher (including a summary of short-term jottings about progress), together with a recent example of each pupil's written work.

Each teacher has time allocated to discuss each pupil's attainment and progress with their existing teacher at the end of the term before pupils move class.

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 mental oral session, 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.

Across each week all pupils have the opportunity discuss their learning during the plenary.

Organisation

A typical lesson in Years 1 to 6 is structured along the following lines:

- oral work and mental calculation (about 5 to 10 minutes) focusing on whole-class work to rehearse, sharpen and develop mental and oral skills;
- the main teaching activity (about 30 to 40 minutes) which comprises of a significant amount of direct teaching and pupils’ activities involving work with the whole class, groups, pairs or individuals as appropriate;
- a plenary (about 10 to 15 minutes) to work with the whole class to sort out misunderstandings, identify progress, summarise key facts and ideas, make links to other work, discuss next steps and set work to do at home.

Learning resources

The following resources are used regularly and are available as appropriate in all classrooms:

- number tracks for Reception and Year 1 that are placed conveniently for teachers and pupils to use (i.e. they can touch them);
- a long number line that is placed conveniently for teachers and pupils to use (i.e. they can touch them);
- digit cards; numbers up cards
- place value or arrow cards;
- large 100 squares accessible for pupils to touch;
- sets of 2-D and 3-D shapes as appropriate;
- squared paper of different sizes.
- number rods
- white boards

Small apparatus, e.g. counters, interlocking cubes, pegs and pegboard, straws, rulers, coins, dominoes, dice, base 10 equipment, calculators (when needed), measuring equipment and some mathematical software to support whole-class teaching of mathematical concepts, is also provided as appropriate.

Wherever resources are appropriate, classrooms have sufficient without the need to share with others.

The learning environment

Classrooms are stimulating learning environments. Displays contain a mixture of:

- problems to stimulate imagination;
- 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 celebrates achievement.

Extra curricular opportunities and out-of-school opportunities

Three times a year there is a school mathematics investigation where the whole school engages in a focused activity on a particular theme.

The aim of these events is to promote a positive attitude towards mathematics and to show that everyone can contribute, learn something new and derive pleasure from mathematics.

Homework

Regular and frequent homework is set for pupils in Key Stage 2. This consists of short written exercises or tasks, which consolidate and develop work done in lessons. Pupils in Years 5 and 6 are expected to undertake mathematics homework for 2 hours per week.

The pupils in Years 3 and 4 are expected to undertake mathematics homework once or twice per week.

These tasks are varied, interesting and fun. They must motivate and stimulate pupils' learning and encourage good study skills.

In Key Stage 1, homework is set no more frequently than once per week but it is rarely written work.

Activities in both key stages comprise of the following:

- activities that makes use of the home context;
- number games or puzzles;

- some number facts to learn by heart;
- activities requiring pupils to collect data or take measurements;
- problems to think through and decide how they might be solved;
- preparing contributions to group presentations to the rest of the class.

The role of parents and carers

The role of parents is very important and school seeks to support the education partnership between home and school. Parents may become involved in the following ways:

- attending workshops, open days and open evenings so that national expectations, the mathematics curriculum and our approach to teaching can be explained;
- invitations for parents to help in classrooms;
- regular opportunities for parents to have confidential discussions about their child's progress with the teacher;
- prominent 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;
- by a termly newsletter about mathematics activities in school;
- through an established family numeracy programme designed to help those parents who want to become more confident in their own mathematical skills.

The contribution of mathematics to other subjects in the curriculum

Literacy

- teaching mathematical vocabulary and technical terms;
- asking pupils to read and interpret problems;
- expecting pupils to locate and discuss the mathematics in problems;
- expecting pupils to explain, argue and present their conclusions to others, both orally and in writing;

Literacy supports mathematics, for example in the Foundation Stage and Key Stage 1. Stories, rhymes and songs are sometimes chosen which rely for their appeal on the pleasure of counting, the sequencing of events, and the use of everyday words such as "on" and "under", "up" and "down" to describe position or direction. In Key Stage 2, the Literacy Hour can be used to read non-fiction in which mathematical vocabulary, graphs, charts and tables have to be interpreted.

Numeracy

Numeracy is not a subject in its own right. It is a skill that is acquired through being taught mathematics effectively.

Numeracy is a proficiency that involves confidence and competence with numbers and measures. It requires an understanding of the number system, a repertoire of computational skills and an inclination and ability to solve number problems in a variety of contexts. Numeracy demands practical understanding of the ways in which information is gathered by counting and measuring, and is presented in graphs, diagrams, charts and tables. Numeracy is the application of number and computational skills across the curriculum and in daily life

Through our approach to the teaching of mathematics we aim to achieve good standards of numeracy in all our pupils.

ICT

Computers are used as teaching tools in the daily mathematics lesson in order to encourage pupils to:

- explore, describe and explain number patterns (e.g. by using a counting programme or a spreadsheet);
- practise and consolidate certain number skills (e.g. by using programmes designed to sharpen the rapid recall of mental skills or to remember the names of 2-D shapes);
- explore and explain patterns in data (by using data-handling applications);
- estimate and compare measures of length or distance, angle and time (by using a floor robot or a program which allows the child to navigate a point around the screen);
- experiment with, and discuss properties of, patterns in shape and space (by using applications that transform shapes and create geometric patterns).

Spiritual development

Mathematics is not a dry, unyielding subject that requires merely pupils to memorise facts and procedures. Real mathematical activity is creative, personal and enlightening. The way in which ideas are created and problems solved is a significant part of what makes us human. Pupils are encouraged to be aware of the power and beauty of mathematics, to reflect on and celebrate their own abilities, as well as those of others, and to see how mathematics can sometimes give insight into situations which go beyond the physical (e.g. when appreciating the idea of infinity).

Personal, social and health education

The ability to work collaboratively as well as individually is an essential quality in good mathematics' learning. Group work and problem solving activities are a regular feature of lessons so that pupils develop qualities

such as tolerance and the ability to see other points of view. These activities encourage pupils to develop their own strengths when working as a member of a team.

Pupils are encouraged to reflect on the moral and social implications of what might be the best "mathematical" solution when looking at real life problems (e.g. the best place to build a road or the most efficient way of making a business profitable).

Leadership and management

Staff development and training opportunities

As a result of monitoring and evaluation procedures and the whole-school staff development policy, individual teachers and whole-school needs are identified. Funds allocated for the National Numeracy Strategy are used to fund supply for training, to enable teachers to observe colleagues' lessons and to observe leading mathematics' teachers in other schools.

All teachers have the opportunity to observe lessons in this school and one lesson of a leading mathematics' teacher in the first and second year of implementation of the National Numeracy Strategy.

The mathematics' leader will attend all centrally organised numeracy and mathematics' training. The mathematics' leader will attend one conference per year for subject leaders.

Funds are allocated for the equivalent of up to two days each financial year for the services of mathematics' advisers to support and monitor the school's progress in implementing the National Numeracy Strategy and raising standards of attainment.

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 Framework 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 SEN co-ordinator in providing advice and support to staff;

- observe colleagues from time to time, with a view to identifying the support they need;
- attend training to broaden their knowledge of mathematics and mathematics' teaching;
- discuss regularly with the headteacher and governor responsible for numeracy the school's progress in implementing the National Numeracy Strategy.

The role of the headteacher is very important in ensuring that the school is successful in raising levels of attainment in mathematics. The headteacher's role is to:

- lead, manage and monitor the implementation of the National Numeracy Strategy, including monitoring teachers' planning and the quality of teaching in classrooms;
- with the governor responsible for numeracy, keep the governing body informed about the progress of the National Numeracy Strategy;
- carry out an audit of mathematics across the school with the subject leader;
- agree an action plan for achieving the school's targets with the whole staff and governing body;
- plan, organise and lead an annual open evening or day for parents to inform them about the National Numeracy Strategy and ways in which they can support it;
- support the subject leader, SEN co-ordinator and staff in implementing the National Numeracy Strategy;
- deploy support staff, with the help of the SEN co-ordinator, to maximise their impact;
- manage the school's allocation of funds for training, including the release time for staff (e.g. to observe leading mathematics' teachers, demonstration lessons in school, shared teaching sessions or support for planning).

The full governing body retains responsibility for raising standards in mathematics; the role of the numeracy governor is to raise the profile of the subject and to be source of support and a critical friend to the school.

The governor's role is to:

- attend some training;
- meet with the headteacher and subject leader to discuss the school's progress and future plans in implementing the National Numeracy Strategy;
- hold discussions with teachers and observe some teaching at each key stage with the headteacher or the subject leader;
- produce and agree a section for the annual governors' report about mathematics;
- support locally-planned activities for Maths Year 2000;

- work with the school to inform parents about, and involve them in, their children's mathematics.

How the subject is monitored and evaluated

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' ability on entry and their relative progress across stages.

Annual action plans will take the above into account. Monitoring focuses on those aspects of our work 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;
- looking at teachers' planning;
- discussing with staff, pupils, parents and the governing body;
- analysing questionnaires to pupils, staff and parents;
- analysing a range of data and records (e.g. assessments and test results).

Review

This policy will be reviewed 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.