

MATHEMATICS POLICY

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OUR SCHOOL'S AIMS FOR TEACHING MATHEMATICS

- To foster a sense of enjoyment and confidence in mathematical activity.
- To develop mathematical skills and concepts.
- To encourage children to use the most appropriate and quickest method of calculation.
- To develop the ability to work independently and co-operatively.
- To foster an appreciation of mathematical pattern.
- To encourage children to develop an investigative approach to learning mathematics.
- To offer support when misconceptions arise.
- To encourage each child to reach its full potential.
- To enable children to be more numerate and be able to apply mathematics in everyday situations.
- To raise standards in teaching and learning.

FOSTERING POSITIVE ATTITUDES

Some desirable qualities for children to have, in order to work successfully at mathematics, are:

- Confidence
- Co-operation
- Independence
- Curiosity
- Persistence
- Enjoyment

To Foster Positive Attitudes

- We need to spread our teaching and support evenly among the children and expect contributions from all the children.
- We need to have sufficient subject knowledge and be confident in what we are teaching. We must seek help if necessary.
- We need to make sure the children have the independence to select their own materials and move from task to task without reference to the teacher.
- We need to organise our room so that it is mathematically stimulating and visually attractive by using posters, patterns, 3D models and, above all, children's work. Materials should be easily available to children.

LESSON ORGANISATION

A typical lesson is structured as follows:

- Oral work
- Main teaching activity
- Plenary

The first five to ten minutes of a lesson can be used in a variety of ways to rehearse and sharpen skills, sometimes focusing on the skills that will be needed in the main part of the lesson.

The main part of the lesson provides time for

- Introducing a new topic, consolidating previous work or extending it;
- Making links between aspects of mathematics.
- Developing vocabulary, using correct notation and terms and learning new ones.
- Using mathematical equipment (protractor, trundle wheel etc.)
- Using and applying concepts and skills.

Sometimes the teacher will be working directly with the whole class and at other times with groups or individuals, where good direct teaching is achieved by balancing different elements e.g. directing, instructing, demonstrating, explaining and illustrating, questioning and discussing, consolidating, evaluating and summarising.

The plenary is a time when the teacher helps pupils to assess their developing knowledge and skills:

- Correct misconceptions
- Reinforce lesson objectives
- Set/check homework
- Summarise key points to remember
- Marking

NUMERACY ASSESSMENT: OUR WHOLE-SCHOOL POLICY

Short-term assessment

Short-term assessments can be made on the back of the weekly planning sheet. These will help check that children have grasped the main teaching points in a unit of work, whether they have any misunderstandings, and whether they are ready to move on. They will give information that will help inform our planning. Short-term assessments will be closely matched to our teaching objectives.

Medium-term assessment

Medium-term assessments, half-termly, are to review and record the progress children are making in relation to the key objectives, i.e. what they know and can do. They are to identify children's progress against specific individual targets and to give feedback and set new targets. They help inform planning for the next half term. They provide information to feed end-of-year assessments.

After each six-weekly block, we keep a record of the KEY objectives which the children have understood or not as the case may be. We use this record to identify any individuals or groups who are failing and plan a time to re-address those failing and assess again. We record all results on a record sheet of key objectives as a cumulative record.

Long-term assessment

At the end of the school year we use medium-term assessments to make our teacher assessments for writing reports. We use QCA end-of-year tests in maths. We analyse children's answers. Teacher assessments are made in Year 6 against National Curriculum level descriptions.

RESOURCES

The school caters for children of Year 3 National Curriculum through to Year 6. It is organised around four bases, one for each year. Each base has two classrooms, a practical area and a small enclosed room.

Each class is equipped with basic number and other small apparatus, which is readily available to the children for everyday use. Each base is equipped with larger apparatus and resources to share, which is also easily accessible and stored in the practical area or the small enclosed room of that base. Numeracy Focus (scheme of work) published by Heinemann Rigby has been a major resource which has been bought recently for Years 3, 4 and 5.

The use of these resources is monitored and discussed regularly in staff meetings. Year 6 rely primarily on the Heinemann SPMG scheme, supplemented by Numeracy Focus, Lonsdale School Revision Guides and a range of other material. A 'PIP' machine for use in position/direction and measure/angle is also available to each year group. Each class has its own computer linked to the Internet. Children are encouraged to use computers in the daily mathematics lesson when appropriate and are used as a teaching aid in focus groups to develop understanding. Maths programmes include: Counter, Play Train, Minimax etc. New calculators have been purchased with an additional OHP calculator.

USING ICT IN MATHEMATICS LESSONS

There are three key principles, which underpin any decision to use Information and Communication Technology (ICT) in the mathematics lesson.

- ICT should enhance good maths teaching. It should be used in lessons only if it supports good practice in teaching maths.
- Any decision about using ICT in a particular lesson or sequence of lessons must be directly related to the teaching and learning objectives for those lessons.
- ICT should be used if the teacher and/or the children can achieve something more effectively with it than without it

A variety of software is available in school to enable children to learn skills in Data Handling, Graphing, Spreadsheets and Data bases. A range of software to develop mathematical skills is also pre-loaded on all PCs in each classroom.

MATHEMATICS ACROSS THE CURRICULUM

We need to look for opportunities for drawing mathematical experience, and developing children's numeracy skills, out of a wide range of children's activities. Mathematics contributes to many subjects, often in practical ways, and often offers opportunities to apply and use it in real contexts.

ENGLISH

Mathematics lessons can help develop and support pupils' literacy skills: for example, by teaching mathematical vocabulary and technical terms, by asking children to read and interpret problems to identify the mathematical content, and by encouraging them to explain, discuss and present their conclusions to others. The literacy hour will include non-fiction texts in which mathematical vocabulary; graphs, charts and tables have to be interpreted.

SCIENCE

Almost every scientific investigation or experiment is likely to require one or more of the mathematical skills of classifying, counting, measuring, calculation, estimating, and recording in tables and graphs. In science pupils will, for example, order numbers, including decimals, calculate simple means and percentages, use negative numbers when taking temperatures, decide whether it is more appropriate to use a line graph or bar chart, and plot, interpret and predict from graphs.

ART, DESIGN AND TECHNOLOGY

Measurements are often needed in art and design and technology. Many patterns and constructions are based on spatial ideas and properties of shapes, including symmetry. Designs may need enlarging or reducing, translating or rotating; introducing ideas of multiplication and ratio.

INFORMATION AND COMMUNICATIONS TECHNOLOGY

Children will apply and use mathematics in a variety of ways when they solve problems using ICT. For example, they will collect and classify data, enter it into data handling software, produce graphs and tables, and interpret and explain their results. Their work in control includes the measurement of distance and angle, using uniform non-standard then standard measures.

HISTORY, GEOGRAPHY AND RELIGIOUS EDUCATION

In history and geography children will collect data by counting and measuring, using dates and timelines, and make use of measurements of many kinds. The study of maps includes the use of co-ordinates and ideas of angle, direction, position, scale and ratio.

PHYSICAL EDUCATION AND MUSIC

Athletic activities require measurement of height, distance and time, while ideas of counting; time, symmetry, movement, position and direction are used extensively in music, dance, gymnastics and ball games.

RELIGIOUS EDUCATION, CULTURAL

Use of symbolic representation, in pattern eg. rangoli, tessellations and in number systems.

The key to making the most of all these opportunities is to identify the mathematical possibilities across the curriculum at the planning stage. We must draw children's attention to the links between subjects by talking frequently about them, both in mathematics and in other lessons.

EQUAL OPPORTUNITIES

Boys and girls are given equal opportunities in mathematics. They are encouraged to reach their potential. Each child is included in the daily maths lesson. After the end-of-year tests the needs of the pupil are identified and support is given where necessary. Any particular groups are targeted. When planning for differentiation a task should be set from the point already understood, and for learning to take place, must advance from that point.

SPECIAL EDUCATIONAL NEEDS – LOW ACHIEVERS

Pupils with special educational needs should be included fully in the daily mathematics lesson, so that they benefit from the emphasis on oral and mental work and participate in watching and listening to other children demonstrating and explaining their methods.

These children need to work on the objectives for their year if these are within their grasp, with emphasis on access and support. Adaptations may be necessary, for example, the pace at which the oral and mental part of the lesson is conducted. More thinking time might be required and questioning differentiated. When pupils have specific learning difficulties in mathematics the framework can be used to identify suitable objectives and can be incorporated into the IEP, tracking back to earlier stages if it is appropriate to do so.

If there are particular weaknesses with pupils' learning or understanding then consultation with support staff, SEN co-ordinator and parents is essential to consolidate key points. Training for staff is provided for Springboard 3, 4 and 5 which is aimed at identifying and supporting children who are failing to achieve the appropriate level. Booster classes are provided for Year 6 children.

SPECIAL EDUCATIONAL NEEDS – HIGH ATTAINERS

Mathematically able pupils

- grasp new materials quickly
- approach problems from different directions and persist in finding solutions
- generalise patterns and relationships
- use mathematic symbols confidently
- develop concise logical arguments.

These pupils will need extension and enrichment activities in mathematics. The teacher will need to find material to extend these pupils. Extra objectives can be drawn from:

- the Year 7 draft framework, for able Year 6 pupils
- mathematical challenges for able pupils in KS 2 DFEE publication
- books of investigations and open problems
- mathematical magazines
- computer access to the Internet
- calculators to solve challenging and investigative activities
- sessions from the five-day training courses
- professional development materials 3 and 4.

In the daily three-part lesson you can:

- direct more challenging questions towards the most able pupils
- help pupils to build on their own learning strategies and to apply their mathematical knowledge
- give separate, more open-ended tasks to this group of pupils, but linked to a common theme
- set homework giving the pupils the opportunity to tackle challenging questions and puzzles.

MENTAL CALCULATIONS

The National Numeracy Strategy emphasises the teaching of mental calculation. The aim is that children will always be able to recognise when calculations can be done “in their heads” and choose effective strategies to work out the answers. Children should be taught a repertoire of strategies and given regular opportunities to use, extend and refine them. The framework for teaching mathematics sets out, in yearly teaching programmes and supplements of examples, a progression of mental calculation strategies to teach. Visual representations or models of the number system provide good support to help teach mental calculations. Number lines help children to see where numbers lie in relation to each other and how to use multiples of ten, one hundred and one thousand as “staging posts” or “landmarks”, helping children to decide on an appropriate mental strategy. A number line also helps children visualise, and so make sense of, the steps on a calculation and any adjustments they need to make.

STAGE ONE

Using mental calculation

- to develop and maintain the recall of number facts: addition and subtraction bonds, multiplication and division facts.
- to help children develop mental strategies for carrying out calculations to which they cannot rapidly recall the answers.
- to encourage children to regard mental methods as a “first resort” in carrying out calculations.

STAGE TWO

Supporting mental calculations with written jottings

- to build on this mental facility, leading to pencil and paper methods that reflect strategies and which lay foundations for formal algorithms.
- to develop formal written methods for calculations that are too complex to carry out mentally or without jottings.

WRITTEN CALCULATIONS

Up to the end of Year 3, the emphasis is on children working mentally, with calculations recorded in horizontal number sentences, and with some informal jottings for more challenging numbers. In Years 4 to 6, children are taught more formalised written methods of calculation, starting with expanded methods and working gradually towards more compact standard methods by the end of Year 6. First, children are shown how to record in columns, initially with two-digit numbers, but soon extending to three-digit numbers. A characteristic of mental calculation is working from left to right, starting with the most significant digit. This can be done with written additions in columns, using an expanded layout, as children should realize that they can add numbers in any order. Finally, the working can be contracted to a familiar standard form.

Children should be able to explain the link between expanded and contracted layouts and appreciate that the compact method is quicker. If they cannot use the compact method without making errors, then they should return to the expanded format.

MATHEMATICAL LANGUAGE

Children need to acquire appropriate vocabulary so that they can participate in the activities, lessons and tests that are part of classroom life. Mathematical language is crucial to children's development in thinking. Without the vocabulary they cannot make progress in understanding different areas of mathematical knowledge.

The DfEE publication called *Mathematical Vocabulary*, ISBN 0855229551, clearly lists words for each year group, with new words for the year printed in red.

A structured approach to the teaching and learning of vocabulary is essential if children are to move on and begin to use the correct mathematical terminology. Teachers can use the lists to identify the vocabulary, relating them to a series of lessons they are planning. They can make provision for the introduction of new vocabulary and the consolidation of familiar terms. Key vocabulary should be included in the weekly planning sheets.

Ways in which we can develop understanding of mathematical vocabulary:

- Find out the extent of the children's mathematical vocabulary and the depth of their understanding, and build on this.
- Plan introduction of new words in a suitable context, using relevant real objects, mathematical apparatus, pictures or diagrams.
- Explain their meanings carefully and rehearse them several times.
- Encourage their use in context in oral sessions, particularly through questioning.
- Sort out any ambiguities or misconceptions children may have.
- Use every opportunity to draw attention to new words or symbols with the whole class, in a group or when talking to individual children.
- The final stages are learning to read and write new mathematical vocabulary in a range of circumstances, ultimately spelling the relevant words correctly.

MARKING

Marking of children's work should

- Contribute to progress and attainment
- Be consistent in approach and effective in developing children's thinking
- Be positive, encouraging and supportive.

Reasons for marking work:

- To show children which parts of their work are correct or incorrect
- To give children encouragement
- To establish individual learning targets
- To help children correct mistakes
- To indicate your satisfaction or your displeasure
- To indicate to parents that their child's work is receiving attention.

How marking is carried out.

- If a child has completed an assignment correctly except for one error in one calculation, then indicate where the child has made a mistake.
- If a child was correct but had used a method of calculation with which you were not familiar, then ask the child to explain his/her method.
- If a child appeared to understand how to do the work but had made a large number of careless slips, then a comment stating this and instructions to correct mistakes should be made.
- If a child's work was very untidy, then speak to that child and set a target to improve tidiness.
- If a child had only completed a small part of an assignment, then find out if the child understands what he/she is doing.
- If a child had not understood the assignment, then find time to give help and assistance to that child, or make use of support staff to help.

HOMEWORK

Each year group is given homework on a regular basis. The homework “load” is increased as the child progresses through the school. The set homework should be within the individual child’s ability and integrated with work done at school, to consolidate, as well as to challenge the more able child.

PARENTAL ACCESS AND INVOLVEMENT

An open invitation is offered to parents to attend a Numeracy Evening for Parents, in particular to Year 3 parents. Part of this meeting will involve summarising the parents’ roles in helping their child with Numeracy, for example:

- To talk about mathematics at home in everyday situations.
- To play games involving chance, number, turn-taking.
- To take any opportunity to talk/play mathematics.
- To correct vocabulary, eg. with coins – pence not pennies.
- To share/discuss with their child any homework set.

Opportunities to discuss children’s progress and attainment can be discussed and individual learning targets shared, at Parents’ Evenings in the Autumn and Spring terms. A report for parents and children is written in the Summer term. Any records or assessments made on children are available, should parents wish to see them, by prior appointment.