

# Jotmans Hall Primary School

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## Mathematics Policy

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# Mathematics Policy

**The importance of mathematics:** 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 a creative and highly inter-connected discipline that has been developed over centuries, providing the solution to some of history's most intriguing problems. It is essential to everyday life, critical to science, technology and engineering, and necessary for financial literacy and most forms of employment. A high-quality mathematics education therefore provides a foundation for understanding the world, the ability to reason mathematically, an appreciation of the beauty and power of mathematics, and a sense of enjoyment and curiosity about the subject.

(Mathematics, The National Curriculum in England 2014)

## Introduction

This document is a statement of the aims, principles and strategies for the teaching of mathematics at Jotmans Hall Primary School.

## Aims

Using the National Curriculum 2014 it is our aim to develop:

- ✓ a positive attitude towards mathematics and an awareness of the fascination of mathematics.
- ✓ competence and confidence in mathematical knowledge, concepts and skills.
- ✓ an ability to solve problems, to reason, to think logically and to work systematically and accurately.
- ✓ initiative to work independently and in cooperation with others.
- ✓ an ability to communicate mathematically.
- ✓ an ability to use and apply mathematics across the curriculum and in real life.
- ✓ an understanding of mathematics through a process of enquiry and experiment.

## Organisation

Children will be taught mathematics using the National Curriculum 2014. Lesson objectives are always shared with the class and expectations made clear.

## **Early Morning Maths (E.M.M.)**

From Year 1 Early Morning Maths is set during the registration period. This is used to reinforce and develop mathematical procedures and concepts recently taught within the class lesson.

### **Daily Maths Lesson:**

- *A Mental and Oral Starter:*

Warm up, practise and recall of skills involving the whole class.

- *A Main Teaching Activity:*

Direct teaching through demonstrating, modelling and discussion. Teachers use a variety of visual, aural and kinaesthetic resources and mathematical language during this part of the daily maths lesson. Children participate actively in activities related to the learning objective.

- *A Plenary*

Reference is made to the learning objective of the lesson.

All mathematics lessons are based upon common objectives for the class. Within each part of the Mathematics lesson, there is suitable differentiation to meet the needs of the whole class, groups and individual children, including where appropriate, expectations relevant to different year groups. Teachers employ a range of strategies to ensure inclusion.

The Daily Maths lesson is monitored by the Mathematics Co-ordinator and members of the Senior Management Team. Feedback is given to the teacher.

### **Planning**

At KS1 and KS2 teachers use the National Curriculum 2014 to ensure that all parts of the appropriate Programme of Study are taught.

Long Term planning is provided by the National Curriculum.

Medium term planning follows guidance and pacing suggested within the Scholastic Planning Guide for the 2014 Curriculum.

Short Term planning is completed daily and includes teaching and learning activities, differentiation, focus support and vocabulary. Short Term planning is led by key questions and the on-going assessment of previous lessons.

A system of highlighting successfully covered objectives on Medium Term plans allows for clarity of coverage. This is monitored by the mathematics co-ordinator.

Short Term plans are also monitored by the Mathematics Co-ordinator in conjunction of samples of work. Feedback is given to teachers.

### **Assessment**

#### **See Assessment Policy**

Children are actively encouraged to participate in self-assessment of their progress in mathematics.

Regular table tests and Mental Maths tests should be taking place from Year 2 to help children learn the basic number facts.

Short term Assessments take place during the lessons as questions and answers, and the evaluation and marking of children's work. This assessment is used to inform the teachers day to day planning and daily planning documents should be altered accordingly.

Children should be aware of their next steps by use of the 'tickled pink' and 'green for grow' marking system. Teachers should use this marking system to quickly amend children's misconceptions and consolidate understanding. Children should be able to discuss their work and know what they need to do in order to improve. This is monitored by book scrutinies and lesson observations carried out by the Maths co-ordinator.

The children are being continually assessed and their levels are continually monitored. Both formative and summative assessments are used to inform this assessment. Summative tests may be used by teachers at the end of a unit of work and during the school's assessment weeks in the Autumn, Spring and Summer Term.

From September 2014, an analysis of children's achievement in the different strands of National Curriculum 2014 will be used to inform school focus of the Maths Curriculum Targets, resourcing issues and INSET as well as to target children for appropriate intervention strategies.

Teachers meet regularly in year groups and whole school to review pupils work against objectives and expectations outlined at each step within assessment without levels. This ensures a consistency throughout the school.

At all stages, assessments are used to inform planning.

### **Progression**

Children are introduced to the process of calculation through practical, oral and mental activities. As children begin to understand the underlying ideas they develop ways of recording to support their thinking and calculation methods, use particular methods that apply to special cases, and learn to interpret and use signs and symbols involved. The methods taught at Jotmans Hall Primary School are in line with the National Curriculum 2014 (See Appendix 1). At the start of KS1 they are taught informal methods for mental and written calculations and these progress so by the end of Year 6 children should be able to correctly use mental, written and calculator methods in a variety of situations.

### **Target Setting**

Mathematics targets are set each term, but can be extended if necessary, across the whole school. A maths focus is decided by the Mathematics Co-ordinator from analysis of children's achievement and discuss with teachers. The relevant curriculum objectives are used, progressing from Reception to Year 6. These objectives are then broken down into bronze, silver and gold levels.

Each class should:

- ✓ Complete work relevant to these objectives throughout the term.
- ✓ Regularly refer to and discuss the targets with the children.
- ✓ The focus should be a regular part of the class EMM and Mental Starters
- ✓ A Maths Wall should be on display in each classroom to remind the children of their targets.
- ✓ Assessment should form an integral part of each lesson.

## **Special Needs**

Where teachers are concerned that children have specific learning difficulties in mathematics they should be firstly try a variety of inclusion and intervention strategies as outlined in the SEND teacher information file. If a child's progress is still causing concern they should be referred to the school SENCO for further assessment. **See Inclusion Policy**

## **Children's Recording**

At Jotmans Hall Primary School we place great emphasis in our teaching of mathematics on the importance of discussion and development of thinking and reasoning skills. Children will be actively encouraged to use pictures, diagrams and written methods to support and show their thinking. This will include the development of jottings, empty number lines and informal methods on route to the use of standard methods for addition, subtraction, multiplication and division.

In the Foundation Stage there will be no emphasis on recording mathematics but emergent recording will be valued and children will work towards recognising and reading numbers and the correct formation of numerals. At this stage, modelling simple calculations is done by the teacher. The aim within the Foundation Stage is for children to recognise the patterns in numbers and be confident in talking about larger number and their relationships with the need to count, order and problem solve in the real world.

As children progress through the school they will be encouraged to use a range of recording formats. They will be taught to be neat and tidy and organised in their layout and as the children progress the range of mathematical paper used will increase and children will be encouraged to use thinking space within their work to support mental calculation. Where possible children will be encouraged to record their own calculations and pre-printed worksheets will be used to ensure that children benefit from a range of recording types.

## **Book Layout**

*Key Stage 1 – Large 15mm squared workbooks.*

(Throughout Key Stage 1 there should be a strong emphasis on teaching the children the correct layout, it is understood that this is a developmental process and errors are expected, but they should be commented upon by the teacher and an improvement in the standard should be evident)

- All work must show a short date (e.g. 25.1.10) and Learning Objective (either written by the child or an adult).
- Number work must be set out as one digit per square.
- A margin should be ruled one square wide, in which the question numbers should be written.
- Work should not be rubbed out, but crossed out neatly.

*Key Stage 2 – Large 10mm squared work books. (Upper School – small 7mm squared workbooks)*

- All work must show a short date (e.g. 25.1.10) and Learning Objective.
- All work must be completed in pencil.
- Number work must be set out as one digit per square.
- A margin should be ruled one square wide, in which the question numbers should be written. When appropriate number work is being completed, each page of the maths books should be folded in half, lengthways so two columns of sums can be set on each page.
- When writing fractions, the single square should contain the whole fraction with a diagonal line drawn from top right to bottom left.
- All children should know how to use a ruler accurately to measure and draw lines.

- Work should not be rubbed out, but crossed out neatly.

## **Marking**

### **See Marking and Feedback Policy**

All work should be marked and used for the teacher's day to day and long term assessment. Through marking and discussions children should be aware of their next steps and how they are to improve their work.

#### *Tickled pink*

- Work that has been completed correctly is to be highlighted pink. In the case of mathematics this may mean highlighting the Learning Objective.

#### *Green for Grow*

- Any work that needs to be corrected, improved or re-done should be highlighted in green. Children should be allowed the necessary time to complete the corrections. Books should show evidence of improvement, not continually repeated mistakes.
- ✓ Independent work or work supported by an adult should be evidenced.
- ✓ Self marking and children's own assessment should be used frequently, but not as the only source of marking.
- ✓ Teacher's comments should be constructive.
- ✓ Praise should be given for correct or improved work.
- ✓ Teacher's handwriting should be neat and clear.

## **Resources**

Teachers plan from a wide range of published resources to suit their class needs. These resources are kept in central storage and support in their use is offered by the mathematics co-ordinator.

All classes have a set of basic equipment to support the curriculum. Specialist equipment is kept in a central storage. Also each classroom is equipped with a set of teaching resources specifically to support an emphasis on practical mathematics lessons.

Resources are audited annually and purchased in order of priority.

A variety of representations of the number system should be accessible to children in every lesson e.g. numerals, 0-100 number squares and a variety of other grids, appropriate numbered and blank number lines and tracks, place value charts and grids.

## **Homework**

### **See Homework Policy**

Homework is set in line with government guidance. Children are given a homework buffet to be completed. This consists of eight tasks; of which the children are to complete five. The tasks are a mix of mathematics and literacy tasks as well as other curriculum subjects, with a cross curricular emphasis. Homework is linked to current teaching and there is an emphasis on parental involvement. Where children do not complete the tasks, this will be followed up with the child and if necessary with the parents. If appropriate, extra support and time will be given to the child during the school day in order for the tasks to be completed.

## **MyMaths**

MyMaths subscription website is used by Years 1 to 6 to help to support classwork and homework for individual children. Teachers are able to set the work the child can access and differentiate it accordingly. Children can also use MyMaths for revision, boosters and extension activities. My Maths is in accordance with The National Curriculum 2014.

## **Parents/ Carer Involvement**

Parents and Carers will be kept informed of their children's achievement and attainment through reports, parent consultations and if necessary one to one consultations throughout the year.

Workshops and information events will be used to support parents and their carers in their understanding of mathematics teaching and disseminating ways to support children learning mathematics at home. Parental involvement is seen as crucial to success at school.

## **The Role of the Co-ordinator**

The mathematics co-ordinator will work closely with all staff to plan for and sustain improvement in the teaching and learning of mathematics. The co-ordinator will:

- ✓ Lead staff development through developing their confidence and expertise in INSET, staff meetings, support and advice.
- ✓ Take a lead in policy development and the production of schemes of work designed to ensure progression and continuity in mathematics throughout the school.
- ✓ Support colleagues in their development of detailed work plans and implementation of the scheme of work and in assessment and record keeping activities.
- ✓ Monitor progress in mathematics and advise the headteacher on action needed.
- ✓ Monitor teaching and learning and disseminate good practice.
- ✓ Take responsibility for the purchase and organisation of mathematical resources.
- ✓ Keep up-to-date with developments in mathematics education and disseminate information to colleagues as appropriate.

## **Inclusion Statement**

At Jotmans Hall Primary School, we are aware that some children have difficulty accessing the curriculum. Therefore, in line with the Disability and Discrimination Act of 2005 and Equality Act 2010, and the SEN and Disability Code of Practice 2014, resources and material will be adapted and reasonable adjustments made to make sure that this subject is accessible to all the children in our care.

Children identified as Gifted and Talented in Science have the opportunity to attend extra-curricular activities throughout the year.

### **Outdoor Learning**

Jotmans Hall Primary School aims to develop outdoor education for all of the children in our school. It can provide positive opportunities for active learning, promote skills of enquiry, problem solving, communication, co-operation, creativity and evaluation. Our school grounds provide a variety of different activities, terrains and habitats already but we plan to develop these further to support this agenda. We believe that the outdoor learning environment has much to offer children. It can afford relevant, engaging experiences that support learning in all areas of the curriculum, including Literacy and Maths. These may be presented as building on existing outdoor play, transferring activities normally carried out indoors, school projects, environmental education or off-site visits.

### **Cross-Curricular Project Work**

- In the Foundation Stage and Key Stage 1, Foundation subjects are taught through a topic based approach, making cross-curricular links where possible. A new topic is covered each term, from a rolling programme.
- In Key Stage 2, Foundation subjects are taught as separate units, but cross-curricular links are made wherever possible. These refer to a subject based rolling programme.
- During the Summer Term the Class Teachers are free to choose a topic, through which the children will have the opportunity to apply skills learnt in the previous terms.

*Mathematics is an interconnected subject in which pupils need to be able to move fluently between representations of mathematical ideas. The programmes of study are, by necessity, organised into apparently distinct domains, but pupils should make rich connections across mathematical ideas to develop fluency, mathematical reasoning and competence in solving increasingly sophisticated problems. They should also apply their mathematical knowledge to science and other subjects.*

*'National Curriculum 2014'*

It is the responsibility of the Class Teachers to ensure that the key objectives are covered and that there is a progression of skills. The Subject Co-ordinator should check that this is happening through the School.

### **ICT**

ICT is embedded throughout all curriculum subjects. Children should, wherever possible, cover ICT objectives through their cross-curricular work. All staff and pupils must adhere to the E-Safety Policy, a copy of which can be found on the Safeguarding Notice Board.

*Calculators should not be used as a substitute for good written and mental arithmetic. They should therefore only be introduced near the end of key stage 2 to support pupils' conceptual understanding and exploration of more complex number problems, if written and mental arithmetic are secure. In both primary and secondary schools, teachers should use their judgement about when ICT tools should be used.*

*'National Curriculum 2014'*

## **Spoken language**

*The national curriculum for mathematics reflects the importance of spoken language in pupils' development across the whole curriculum – cognitively, socially and linguistically. The quality and variety of language that pupils hear and speak are key factors in developing their mathematical vocabulary and presenting a mathematical justification, argument or proof. They must be assisted in making their thinking clear to themselves as well as others and teachers should ensure that pupils build secure foundations by using discussion to probe and remedy their misconceptions.*

*'National Curriculum 2014'*

Throughout the maths lesson children should be encouraged to explain and discuss their answers through open ended questioning set by the adults and by the children themselves.

## **Thinking Skills**

Thinking skills are essential in 'learning how to learn'. When Teachers focus on creative and well tried ways of thinking, standards rise, learning is accelerated and pupils grow in confidence and self-esteem.

At Jotmans Hall we are using the 'Let's Think' materials to develop thinking skills. Learners will be encouraged to share a common language and perception, respond to a challenge, think better in groups, think about their own learning and use their thinking in different situations throughout the curriculum.

In the Foundation Stage and Key Stage 1, Thinking Skills will be taught through Literacy, Maths or Science or taught as a discrete Thinking Skills lesson.

In Key Stage 2, years 3-5, Thinking Skills will be taught through Science. In year 6, Thinking Skills will be taught through Literacy, Maths or Science or taught as a discrete Thinking Skills lesson.

## **Problem Solving Across the Curriculum**

Effective problem solving and investigating is an important part of learning and teaching throughout the whole curriculum.

Children should explore types of problem solving and investigating to prompt previous knowledge, probe understanding, and promote and extend their thinking.

Problem solving activities or investigations:

- are effective (natural) strategies for learning.
- are active approaches to learning
- give children responsibility for their learning

Problem solving should permeate through all learning objectives and should not be seen as a 'bolt-on' activity. In shared work Teachers can use short problem-solving or investigative activities to:

- refer to previous work and pose questions to assess children's prior knowledge.
- demonstrate and scaffold investigations and problem solving, making explicit the key strategies applied.
- use an investigation or problem to teach the objective
- model the various methods of recording (e.g. tabulation, diagrams, etc)
- teach children how to interpret, select and use information
- encourage opportunities for thinking aloud and communicating with others.

In independent time Teachers can provide short or extended problem-solving or investigative activities to:

- support children in drawing out patterns, principles, conclusions, justifying answers or identifying relationships
- promote the social context for positive dialogue
- support children in developing a wide range of strategies in order to develop the skills of working systematically, including finding all possibilities
- help children record their thinking in a variety of ways including diagrammatic representation and simple algebraic notation.

In the plenary the Teacher may use a problem-solving or investigative activity to:

- assess children's understanding of the objectives being taught
- prepare children for the next lesson or series of lessons
- provide opportunities to communicate children's different approaches to the specific problem solving activities in order to address any misconceptions.

## Appendix One

Mathematics – key stages 1 and 2

### Mathematics Appendix 1: Examples of formal written methods for addition, subtraction, multiplication and division

This appendix sets out some examples of formal written methods for all four operations to illustrate the range of methods that could be taught. It is not intended to be an exhaustive list, nor is it intended to show progression in formal written methods. For example, the exact position of intermediate calculations (superscript and subscript digits) will vary depending on the method and format used.

For multiplication, some pupils may include an addition symbol when adding partial products. For division, some pupils may include a subtraction symbol when subtracting multiples of the divisor.

#### Addition and subtraction

$789 + 642$  becomes

$$\begin{array}{r} 7 & 8 & 9 \\ + & 6 & 4 & 2 \\ \hline 1 & 4 & 3 & 1 \\ & 1 & 1 \end{array}$$

$874 - 523$  becomes

$$\begin{array}{r} 8 & 7 & 4 \\ - & 5 & 2 & 3 \\ \hline 3 & 5 & 1 \end{array}$$

$932 - 457$  becomes

$$\begin{array}{r} 8 & 12 & 1 \\ \cancel{9} & \cancel{3} & 2 \\ - & 4 & 5 & 7 \\ \hline 4 & 7 & 5 \end{array}$$

$932 - 457$  becomes

$$\begin{array}{r} 1 & 1 \\ 9 & 3 & 2 \\ - & \cancel{4} & \cancel{5} & 7 \\ \hline 5 & 6 \\ 4 & 7 & 5 \end{array}$$

Answer: 1431

Answer: 351

Answer: 475

Answer: 475

#### Short multiplication

$24 \times 6$  becomes

$$\begin{array}{r} 2 & 4 \\ \times & 6 \\ \hline 1 & 4 & 4 \\ 2 \end{array}$$

Answer: 144

$342 \times 7$  becomes

$$\begin{array}{r} 3 & 4 & 2 \\ \times & 7 \\ \hline 2 & 3 & 9 & 4 \\ 2 & 1 \end{array}$$

Answer: 2394

$2741 \times 6$  becomes

$$\begin{array}{r} 2 & 7 & 4 & 1 \\ \times & 6 \\ \hline 1 & 6 & 4 & 4 & 6 \\ 4 & 2 \end{array}$$

Answer: 16 446

### Long multiplication

$24 \times 16$  becomes

$$\begin{array}{r} 2 \\ 2 \quad 4 \\ \times \quad 1 \quad 6 \\ \hline 2 \quad 4 \quad 0 \\ 1 \quad 4 \quad 4 \\ \hline 3 \quad 8 \quad 4 \end{array}$$

Answer: 384

$124 \times 26$  becomes

$$\begin{array}{r} 1 \quad 2 \\ 1 \quad 2 \quad 4 \\ \times \quad 2 \quad 6 \\ \hline 2 \quad 4 \quad 8 \quad 0 \\ 7 \quad 4 \quad 4 \\ \hline 3 \quad 2 \quad 2 \quad 4 \\ 1 \quad 1 \end{array}$$

Answer: 3224

$124 \times 26$  becomes

$$\begin{array}{r} 1 \quad 2 \\ 1 \quad 2 \quad 4 \\ \times \quad 2 \quad 6 \\ \hline 7 \quad 4 \quad 4 \\ 2 \quad 4 \quad 8 \quad 0 \\ 3 \quad 2 \quad 2 \quad 4 \\ 1 \quad 1 \end{array}$$

Answer: 3224

### Short division

$98 \div 7$  becomes

$$\begin{array}{r} 1 \quad 4 \\ \hline 7 \quad \overline{)9 \quad 8} \end{array}$$

Answer: 14

$432 \div 5$  becomes

$$\begin{array}{r} 8 \quad 6 \quad r \, 2 \\ \hline 5 \quad \overline{)4 \quad 3 \quad 2} \end{array}$$

Answer: 86 remainder 2

$496 \div 11$  becomes

$$\begin{array}{r} 4 \quad 5 \quad r \, 1 \\ \hline 1 \quad 1 \quad \overline{)4 \quad 9 \quad 6} \end{array}$$

Answer:  $45\frac{1}{11}$

### Long division

$432 \div 15$  becomes

$$\begin{array}{r} 2 \quad 8 \quad r \, 12 \\ \hline 1 \quad 5 \quad \overline{)4 \quad 3 \quad 2} \\ 3 \quad 0 \quad 0 \\ \hline 1 \quad 3 \quad 2 \\ 1 \quad 2 \quad 0 \\ \hline 1 \quad 2 \end{array}$$

Answer: 28 remainder 12

$432 \div 15$  becomes

$$\begin{array}{r} 2 \quad 8 \\ \hline 1 \quad 5 \quad \overline{)4 \quad 3 \quad 2} \\ 3 \quad 0 \quad 0 \quad 15 \times 20 \\ \hline 1 \quad 3 \quad 2 \\ 1 \quad 2 \quad 0 \quad 15 \times 8 \\ \hline 1 \quad 2 \\ \frac{12}{15} = \frac{4}{5} \end{array}$$

Answer:  $28\frac{4}{5}$

$432 \div 15$  becomes

$$\begin{array}{r} 2 \quad 8 \quad 8 \\ \hline 1 \quad 5 \quad \overline{)4 \quad 3 \quad 2 \quad 0} \\ 3 \quad 0 \quad \downarrow \\ 1 \quad 3 \quad 2 \\ 1 \quad 2 \quad 0 \quad \downarrow \\ 1 \quad 2 \quad 0 \\ \hline 0 \end{array}$$

Answer: 28.8