

The Raglan Junior School

Mathematics Policy

This policy describes the purpose, nature and management of mathematics. Our policies determine obligatory procedure but are also working documents. They should not be filed away and left to gather dust but should rather be reflected upon and amended in light of experience.

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Principles And Rationale

Mathematics is important in everyday life, many forms of employment, science and technology, medicine, the economy, the environment and development and public decision-making. Mathematics transcends cultural boundaries. It can stimulate moments of pleasure and wonder when a student solves a problem for the first time, discovers a more elegant solution or suddenly sees hidden connections.

Our pedagogy and methodologies in mathematics are based on a conviction that mathematical ability is a life skill which empowers us to understand and change our world. Using the National Curriculum as a starting point, including some elements from the programmes of study (POS) at key stage 3, we use aspects of the Primary National Strategy (PNS) to organize and facilitate the learning required.

<http://www.standards.dfes.gov.uk/primaryframework/mathematics>

There are Seven Strands to our Mathematics Curriculum

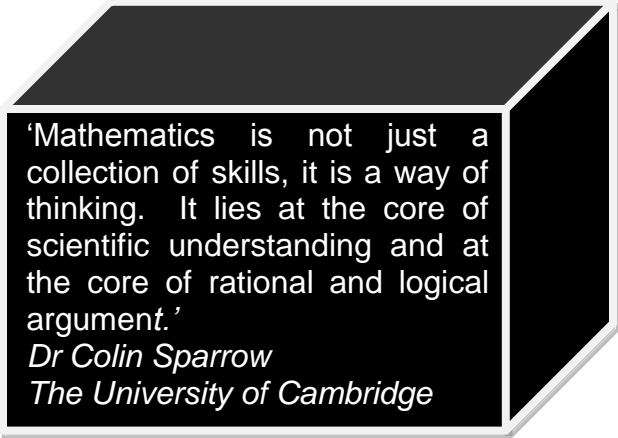
- Using and applying mathematics
- Counting and understanding number
- Knowing and using number facts
- Calculating
- Understanding shape
- Measuring
- Handling data

The school's outcomes are to develop:-

1. confident individuals
2. successful learners
3. responsible citizens

We achieve these outcomes through our teaching and learning in mathematics by developing:-

- a positive attitude
- the fascination of mathematics
- competence in knowledge
- a grasp of concepts
- logical reasoning
- systematic working
- problem solving
- secure mental arithmetic
- initiative
- independent and co-operative working
- application
- enquiry and experiment
- transferable skills



'Mathematics is not just a collection of skills, it is a way of thinking. It lies at the core of scientific understanding and at the core of rational and logical argument.'

*Dr Colin Sparrow
The University of Cambridge*

Methodology And Approach

- a mathematics lesson every day
- emphasis on mental calculations and understanding
- additional teaching of mental arithmetic lessons where appropriate
- focus on short, direct, instructional teaching – sharing of knowledge
- errors and misconceptions used to direct further teaching within a lesson
- interactive questioning
- focus on children working independently and partner working
- focus on analysis, application and problem solving
- Stepped Activities which become more difficult and demanding but cater for the less able in the early sections

Planning

There is a long-term plan of the mathematics curriculum, medium plans outlining topics of work and weekly plans from which direct teaching is informed. Planning guidance and expectations are provided to staff following direction from the subject leader.

Schemes of Work

We do not use one single scheme of work. However we draw upon the following published resources:

- Abacus Evolve Maths
 - Pupil Books
 - Talk Maths
 - Interactive Teaching Resource
- Teejay Mathematics
- Heineman, SPMG
- Medal Maths (Homework)
- Word Problems

Timetabling

A mathematics lesson is taught every day and lasts 60 minutes. All mathematics teaching takes place at the same time enabling all members of staff to teach and support.

Setting And Streaming

- **Setting** is the grouping of children within an ability range across an age range
- **Streaming** is the grouping of children within an ability range across the school
- **Differentiation** is the matching of work within a group to differing abilities

Differentiation Children in years 3 and 4 are neither set nor streamed unless they have particular special needs. Children are grouped by ability within the class group.

Setting takes place in years 5 and 6 consisting of larger higher-ability levels and smaller groups or classes for average and below average levels.

Streaming takes place for children working below level 2 and follows a highly-adapted and individualized curriculum.

Organisation Of Learning

Display

Classrooms should have the following support materials on display:-

- a number line at the front of the room – appropriate to the level of the mathematics being taught (at instructional level, the level above)
- a 0-99 square (not a 1-100 square)
- calculation vocabulary posters (as approved and provided by the School)
- other mathematical vocabulary
- times tables charts
- measures fact tables

Mathematics displays at the front of each room are solely for ‘mathematical support’ covering all seven strands of the curriculum. They should be instructional and not the other type of enrichment mathematics - these should be used in other display areas.

Seating and Working

Children should be grouped by mathematical ability which should be changed for different topics; just because a child works well in number does not mean that that child would be working in a similar level in spatial or investigative work.

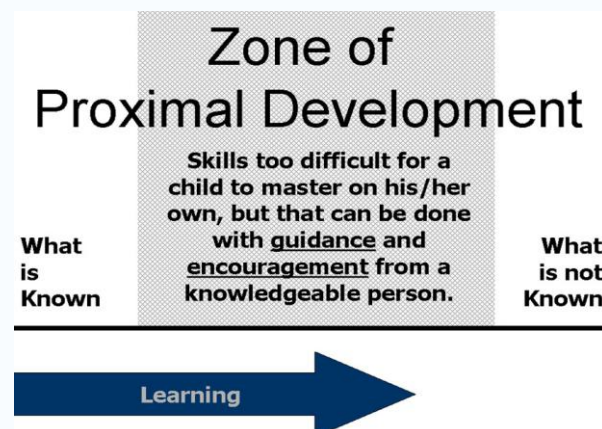
Focus Groups

Teachers and any support staff are required to be noted on daily planning forms as working with a designated ‘focus group’. During the independent working session, the teacher should be sitting and **leading** the teaching of a group. Targets in children’s books should be taught or picked up at these times, where appropriate, and formative and summative assessments should be made to adapt teaching and maximize learning. It will sometimes be appropriate to push children onto a more difficult level of working in these situations. (This was noted as a strength of responsive teaching and effective Assessment for Learning in our most recent Ofsted inspection). If the opposite was found and children had struggled in the focus group, despite the teacher’s intervention, planning should be annotated and adapted accordingly for the next day.

Plans should be changed, they should be based on sound judgement of progress; **planning which never changes is likely to indicate a focus on teaching rather than learning**. Highly adapted teaching and planning are likely to accelerate learning.

Development of Mathematical Understanding and the use of Mathematical Equipment

Whilst we uphold that instructional learning is important in our teaching of mathematics (a hierarchical subject) a balance is struck between Vygotsky’s proximal zone of learning theory and Piaget.



The four development stages are described in *Piaget's theory* as:

1. **Sensorimotor stage**: from birth to age 2. Children experience the world through movement and senses (use five senses to explore the world).
2. **Preoperational stage**: from ages 2 to 7 (magical thinking predominates. Acquisition of motor skills) Egocentricism begins strongly and then weakens. Children cannot conserve or use logical thinking.
3. **Concrete operational stage**: from ages 7 to 11 (children begin to think logically but are very concrete in their thinking) **Children can now conserve and think logically but only with practical aids.** They are no longer egocentric.
4. **Formal operational stage**: after age 11 (development of abstract reasoning). Children develop abstract thought and can easily conserve and think logically in their mind.

Equipment and practical resources should be used as often as possible. This leads us to the equipment which should be used in lessons – it is better to experiment with practical resources.

Lesson Structure

We do not strictly adhere to prescriptive structure of teaching advocated in the 1998 national Numeracy Strategy's '3 part lesson' model. This consisted of a mental and oral starter of ten minutes, direct teaching, independent work and culminated in a ten-minute plenary. We have not found this model to be effective and adopt the following:-

- Fast rapid-recall mental warm ups
- Mental rote learning of number facts and shapes
- Short burst Direct teaching
- Non-restricted working across curriculum units: independent work not always a direct follow-on of teaching (not always follow the leader!)
- Practical before written approach using a wide variety of concrete apparatus
- Rigorous consolidation using written methods
- Investigations where differentiation can be by outcome
- Multi-session plenaries
- Responsive and adaptive teaching

Calculation Methods

Mental Calculation Methods

Calculation methods are important. We teach specific mental calculation strategies which develop mathematical understanding.

Jottings will be used on whiteboards to assist mental calculation. These jottings are not used as part of the formal written methods adopted by the school, with the exception of children working at level 2 or below.

Mental strategies include:

Counting

Additional Support

Extension

Monitoring

Place value + Partitioning

19 = 1 ten and 9 units

190 as 1 hundred and 9 tens

Number bonds

e.g. $3+7=10$; $30+70=100$;

$300+700=1000$

Times tables instant recall

Up to 12x tables random order

Associated Division Facts

Up to 12x tables random order (inverse)

Chunking

Counting on
Near multiples
Doubling
Halving
Crossing tens and hundreds boundaries
Compensation and Adjust

Formal Written Methods

Our formal written methods develop systematic organisation which, in turn, promotes accuracy. One method of written calculation per operation is taught consistently at every national curriculum level with the exception of division where long and short methods are taught. We publish separate guidance booklets on the methods of calculation used consistently.

Recording

In mental calculations, children are encouraged initially to develop informal and personal methods of working out – these are called **jottings**.

Conventions of Presentation and Layout

There are occasions when it is both quick and convenient to carry out written calculations. It is also important to record aspects of mathematical investigations. Children are taught a variety of methods for recording their work and they are encouraged and helped to use the most appropriate and convenient method of recording.

Children are encouraged to use mental strategies before resorting to a written algorithm, unless they have special needs where a written strategy accompanies the mental process.

Exercise Books for Recording

It is policy that the following pattern is used:

Year 3:	1 cm squares
Year 4:	1 cm squares –move to 7 mm squares when individual children are ready
Year 5:	7 mm squares
Year 6:	5 mm squares

- All written work must be presented clearly.
- Jottings may be ‘scribbled’ down on rough paper or in margins to demonstrate the learning process.
- When using squares one square should be used for each digit.
- When involved in routine practice of calculations the children are encouraged to fold a page in half creating two columns for answers.
- A **margin** should be drawn each day and time taken to encourage careful drawing of such.
- The date is written in short form (e.g. 15.8.09)
- A short title which explains the learning objective noted.
- E.g. Time Problems; (time is not wasted writing out lengthy learning objectives).

Assessment Categories

What type of assessment is it?	What is its purpose?	When will it be used?	What are the key characteristics of this form of assessment?
<p>Day-to-day assessment</p> <p>(Formative assessment – also called Assessment FOR Learning)</p>	<p>To provide ongoing checks on learning and progress, at the point of learning</p> <p>Crucially, it informs planning</p>	<p>A range of assessment strategies will be used on a day-to-day basis as part of your teaching and learning repertoire</p> <p>The Assessment for learning section provides guidance on developing assessment for learning in schools and classrooms.</p> <p>The planning guidance on the Primary Framework website supports teachers with day-to-day assessment at unit level.</p>	<p>It is an essential part of learning and teaching (questioning, discussion, dialogue, feedback). It involves sharing learning goals with learners (e.g. success criteria, curricular targets).</p> <p>It involves learners in peer assessment and self-assessment.</p> <p>It provides feedback that helps learners recognise the next steps they need to take, and how to take them.</p> <p>It is underpinned by the confidence that every learner can improve.</p>
<p>Periodic assessment</p> <p>(Summative assessment or Assessment OF Learning)</p>	<p>To take an overview of progress and to provide diagnostic information (Question-level analysis) about the progress of individual children which is linked to national standards</p> <p>We use: previous SATS papers Non Verbal Reasoning MALT maths papers</p>	<p>At regular (usually half-termly or termly) intervals to provide an overview of performance based on a wide range of evidence This is tracked on a piece of software in school called Target Tracker.</p> <p>Termly grids of pupil's attainment and progress are printed out and targets are set from these.</p>	<p>It uses teacher assessment to make a periodic review of progress and attainment across a whole task.</p> <p>It identifies gaps in experience and informs planning.</p> <p>It helps learners know and recognise the standards they are aiming for.</p> <p>It involves both learner and teacher reviewing and reflecting on evidence of attainment.</p> <p>We alter plans of work, groupings, streaming and setting arrangements based on the findings of assessment</p>
<p>Transitional assessment</p>	<p>To provide a summary of where, in relation to national standards, learners are at a given point in time</p>	<p>At points of transition : Between units of work – assessment questions</p> <p>Termly Annually Formal KS2 SATS</p>	<p>It brings together a range of evidence, including tests, to reach a view of attainment. It is externally validated and externally communicated.</p> <p>It is set within the framework of national standards.</p>

Marking

Mathematical work can generate a great deal of marking and it is recognised that it is not always desirable to mark every piece of work.

The children themselves can mark exercises which involve routine practice with support and guidance from the teacher. Where appropriate children in Years 5 and 6 are encouraged to check computational exercises with a calculator. This can foster independence in the children, who can seek help if they are unable to locate and correct their errors.

The quality of marking is crucial. A simple 'X' is of little assistance to a child unless accompanied by an indication of where the error occurred, together with an explanation of what went wrong; even better is a well-thought question written for the child to attempt with an adult next time.

Marking should be both diagnostic and summative. School policy is that it is best done through conversation (and a short accompanying note in the book, especially when part of a focus group) with the child but acknowledges that constraints of time do not always allow this (for more detail see the School Marking Policy). It may also be appropriate to give verbal feedback to the entire class; this ought to be noted on annotation of plans.

Additional Support

When additional adults are in the room, they should be working with, questioning, developing and supporting the understanding of specially identified children and those close to them during all parts of the lesson. Specialist small groups may be withdrawn for streaming.

Extension

As a significant number of children attain higher-than-average results at the end of year 6, we embrace teaching objectives from key stage 3.

Pupils who are working higher than average in all year groups may also receive additional support and challenge from specialists. Some pupils are also recorded as gifted in mathematics and provision is made for them through the leadership of the mathematics and gifted and talented leaders.

In every class, higher ability children should be set work according to their ability at instructional level rather than chronological age; this means that it is possible that a child or group in year 3 could be using year 5 text books and objectives. Structured challenge should be highly evident in planning, recorded work and monitoring.

ICT

ICT should be used as much as possible to provide visual, aural and kinaesthetic stimulation. Children should be active learners as much as possible; especially in the use of the interactive whiteboard, it is more than an electronic blackboard and interactive programmes which are judiciously selected should support teaching and learning. Children should be given ample opportunities to develop their mathematics using computing software.

Records Of Achievement/Collecting Evidence

Reports are completed before the end of the summer term and parents are given opportunity to discuss their child's progress on two separate occasions. Teachers use the information gathered from their assessments to help them comment on individual children's progress. 'Working levels' are shared with parents. Currently, these are levels taken from SATS papers.

Homework

Written homework, which is largely computational rather than problem solving and thus seeks to reinforce the four rules of number, is set at least weekly and is matched to the child's ability.

A termly curriculum letter informs parents of mental arithmetic facts to be learnt and rehearsed at home. Additional materials for parents and tutors wishing to reinforce the child's learning may be purchased from the school bookshop.

Parental Involvement

Calculation guidance is offered to parents in the form of booklets, these also provide guidance for parents to help their children. A school shop recommends and sells additional mathematical resources. Opportunities are offered annually to parents to help them understand the changing approaches to mathematics e.g. open evenings or workshops. Parents are able to discuss progress at parents' evening and open afternoons and to view their children's work.

Monitoring And Evaluation

Our monitoring policy outlines formal and informal procedures which include lesson observations, monitoring of books, planning, results, peer observations, performance management and one-to-one interviews of moderation of work during which feedback, support, challenge and targets are provided.

Auditing, Improvement Planning, Funding And CPD

An annual subject audit is completed and from this priorities for development written in the form of a subject improvement plan. Funding bids can be submitted in advance of the fiscal year against identified priorities for improvement and measured impact against outcomes.

Continuing Professional Development and up-to-date subject knowledge is identified and managed by the subject leader. Additional training and the effectiveness of its impact is noted in the School Improvement Plan and accompanying audits alongside the annual CPD audit.

Resources

Resources are stored in classrooms and centrally.

The Governing Body

A link governor should be identified and procedures established for meeting the subject leader to discuss progress on the subject improvement plan at least twice annually. Governor feedback is provided to the relevant committee of the Governing Body.

This policy will be reviewed by the subject leader following analysis of results each year and any recommendation for change submitted to the governing body as required. The policy will be reviewed at least once every two years.