Redhill Primary Academy

POLICY FOR
MATHEMATICS

In the context of the National Curriculum Programmes of Study for Key Stages 1 and 2

This policy outlines the teaching and organisation of the mathematics learning at Redhill Primary School. It aims to establish the entitlement for all pupils to develop as confident, enthusiastic and thinking mathematicians.

REFERENCES USED IN DEVELOPING OUR POLICY

The following texts would make good background reading to give a flavour of the way we work and to the thoughts and ideas which underlie our philosophy and to support your teaching.

Mathematics Explained for Primary Teachers – Derek Haylock

What's Math Got To Do With It? - Jo Baoler

Good Practice in Primary Mathematics : Evidence from Successful Schools (https://www.gov.uk/government/publications/good-practice-in-primary-mathematics-evidence-from-successful-schools)

NCETM – Mastery in Mathematics (https://www.ncetm.org.uk/Default.aspx?page=13&module=res&mode=100&resid=47230&)

Development in confidence and Capabilities in Primary School (http://dera.ioe.ac.uk/11154/1/DCSF-RR118.pdf)

In addition:

Mathematics Programmes of Study – Curriculum 2014

AIMS

We aim for the children to:

- believe in themselves as mathematicians
- have an ever-increasing understanding, knowledge and skills in number and number operations
- calculate accurately and confidently with written methods and show an accurate recall of basic number facts
- develop positive attitudes towards mathematics as an interesting and useful subject: showing an appreciation of the creative aspects of mathematics and an awareness of its aesthetic appeal (this may be demonstrated through art and design projects)
- recognise that mental, jottings, written and calculator methods all have a place and be able to make sensible and confident decisions about when to use them
- be able to apply their knowledge, understanding and skills to real life contexts and a wide variety of problems
- develop the ability to think clearly and logically in mathematics with confidence, independence of thought and flexibility of mind
- develop as mathematical thinkers, through a process of enquiry, reasoning and communication, and as such be confident enough to take risks in their learning and make mistakes they can learn from
- be comfortable with talking about their work and the strategies they have used
- be able to formulate, test and revise hypotheses in their searches for mathematical patterns, sequences and rules
- perceive mathematics as a lively, dynamic and enjoyable subject
- understand mathematics as having relevance in their own lives and in the world in general, recognising that mathematics will be relevant, used constantly and help them to solve problems they meet in everyday life

PRINCIPLES

We believe that:

We should teach the children to manage their own learning; this includes taking risks, learning from making mistakes, developing a sense of resilience and perseverance, as well as developing the process of trial and improvement through their work. However, we do not want them to see themselves as failures, as this is the most impenetrable barrier to further learning in mathematics. Therefore, we need to distinguish between errors (a simple mistake which a child is able to identify themselves and correct) and misconceptions (where the child does not have the necessary understanding or concepts on which to build to understand the task in hand). In this case, the child's work is correct in terms of their understanding at that point in time. We should instead encourage the children to make judgements themselves by saying for example – let's test this, that would mean that, what about if . . .

- We should develop an interested but impassive approach so as to ensure that children explain their thinking and do not look for us just for approval of right answers

- Errors are an essential part of learning which enable teachers to assess what meaning the child is making of the activity; they become a starting point for discussion and interaction

- Misconceptions can be disguised by correct answers. Correct answers do not tell you if a child understands the concepts involved; we can only discover this by observing the child working or by questioning/talking about their ideas and methods

Therefore:

- We should emphasise talking about the work and processes within the activity

- We should encourage thinking aloud

- We should always attempt to develop confidence in themselves as mathematicians

- We should not criticise children's work nor should we allow other children to do so
  (however, we will challenge their thinking and methods to develop their learning further)

- We should encourage children to experiment with ideas and mathematical language

- We should emphasise the thinking process of mathematics rather than correct answers and show that being able to explain how they arrived at the answer is clearly valued more than the answer itself

- We should always work from what the children understand and can do. We should avoid presenting them with tasks for which they do not have the necessary concepts, ensuring that progression in teaching is clearly structured

- We should plan activities which allow children to achieve their potential by extending the activity to the limits of their mathematical thinking (this may be an open-ended task, on-going investigation or line of enquiry)

- As far as possible, real life contexts should be used to extend and enhance the mathematics curriculum so that children are dealing with actual problems as well as ensuring mathematics takes an important role in other curriculum subjects

- We should take opportunities to model mathematics by carrying out mathematical tasks in the classroom whenever feasible. This could involve joining in with the children's investigations in class, praising use of mathematical skills in other areas or recognising mathematics in the world around us while out on trips

- We should emphasise the child's own methods of calculating and solving problems and these should be considered and discussed, and later, possibly considered alongside more conventional ones **when there is a good reason for doing so and we are sure the children have the necessary understanding of how they work**

- We should encourage children to test out their ideas, even when privately we know they may not be effective or mathematically correct

- We should encourage children to reflect on past experiences and use it in helping them with the problems they are faced with

- We should accept that some mathematical problems will require longer periods of uninterrupted time and plan for this accordingly

- We should give emphasis to looking for patterns and relationships and reasoning and communicating (using practical equipment or models, verbally and in written form) about the mathematics that is done

- We should provide pupils with opportunity to work together in different groupings so that they have opportunity to take on different roles and learn different ways of operating as well as working alone

GUIDELINES

As originally introduced in the National Numeracy Strategy, in general we use the structure of the three-part lesson: teaching input (to include a mental starter), activity time (independent, group work, adult focus, ICT/Games) and plenary. We believe that whole class discussion is a vital and powerful learning time when concepts and skills are taught, children's ideas can be shared - which is the basis of how we work - and misconceptions challenged; this shared time will often start and finish sessions. However, some sessions work better with 'mini-plenaries' which take place throughout the lesson to address misconceptions or redirect learning. Teachers will adapt lessons flexibly to take account of the specific needs of their children and the activity planned.

When marking work, we try to avoid using crosses as this may sap confidence so prefer to give children a chance to review their work by asking questions or suggesting they check again. Usually, we prefer to discuss the work or comment on it, making reference to the learning objective/success criteria for that session. If a teacher can see that a child has been unable to carry out a task, then they will carefully plan next steps to ensure the child has a clearer understanding; this may be individually, with an adult, or in the form of a focus group. It is generally inappropriate to tell a child they were wrong if their understanding of the concept was incorrect, it is more appropriate to say "you found this tricky". For independent groups, teachers will mark work completed and identify a close the gap (CTG) to help children to move towards their next steps. This may be a correction, a further challenge or a way of applying their knowledge to a new context or situation. Children are then given time to respond to these comments (see marking policy).

Mental agility is highly valued at Redhill. We believe that this is an essential basis for much of the work in mathematics, and therefore give plenty of opportunities to develop confidence and ability in mental calculations both in school and through homework activities. In particular, children are encouraged to develop knowledge of number bonds, times-tables, doubles/halves and place value facts. As a result, children are expected to make good progress in mental methods across school as well as written methods for all four operations.

Throughout school, we aim to use a 'mastery' approach to the teaching and learning of the Mathematics curriculum. The children are taught skills and concepts, which they are given opportunities to practice, methods and strategies are refined for efficiency, and there are opportunities for application of skills. Over the year, key skills will be repeated and reinforced with opportunities to work in a range of contexts, real-life situations and problem-solving activities, including opportunities for reasoning and communication, to ensure that there is greater depth in learning and not just coverage of the curriculum (see mastery in maths policy).

CURRICULUM OVERVIEW

At Redhill Primary Academy, our curriculum has been designed to ensure our learners become confident, efficient mathematicians who show an enthusiasm and appreciation for the subject as a whole. Our curriculum has been designed to cover the objectives of the National Curriculum through the teaching of key topics; nevertheless, it also allows the opportunity to embed key skills through a balance of fluency, reasoning and problem-solving activities in all year groups. Knowledge and skills are sequenced so that pupils build on what they already know and can do, whilst allowing opportunities for consolidation and over-learning. This ensures all children are

given the chance to master the skills needed to deal with mathematics in real-life. In addition to this, they are given opportunities to apply their knowledge and skills, in increasingly more complex problems, to ensure that the children have to think in more sophisticated ways about the maths they are using. As part of this, they are expected to reason: to communicate their knowledge, skills and understanding. As a result, children will develop their thinking skills and the accuracy of mathematical language needed for everyday life.

When designing our curriculum, we have focused on ensuring that we cover the broad balance of topics needed for a complete mathematics curriculum. All 7 key areas are addressed: number and place value, addition and subtraction, multiplication and division, shape and space, measures, data handling and algebra. Although algebra is only compulsory at Y6, we have chosen to build in early algebra skills in all year groups – this allows children to think at greater depth and show more sophisticated reasoning skills. Wherever possible, we chose to make links to other subject areas: this ensures that the children can understand how mathematics relates to real-life and emphasises the importance of the skills and knowledge which is being taught.

Long Term Plans

For our long-term plans, we have chosen to follow the model of the White Rose Schemes of Work. This includes teaching key blocks in greater depth, for a longer period of time, which ensures that the knowledge and skills are embedded in the long-term memory. Each block is planned with small steps in mind – starting from what children already know and building towards the end of year expectations. This allows for consolidation of work from previous year groups to support all ability levels. However, to ensure that knowledge and skills are not forgotten, opportunities are planned in to later blocks to revise and revisit key knowledge and skills whilst applying these in new contexts. Typically, each year group will start with the teaching of place value and number. These are the key concepts on which all other maths is built, therefore an essential building block in the teaching and learning of new objectives for each year group. These are then built on with the teaching of addition and subtraction, before multiplication and division. These are designed to be taught in their pairs – we recognise the importance of children understanding the relationships between the operations in order to fully master a secure knowledge of number facts. Where appropriate, other blocks such as perimeter, area, money and measures are built in; this ensures that children understand how skills are built up over time and how important the connections are between different areas of learning. We have also made the decision to spend a longer period of time focusing on the teaching and learning of fractions. This is a key target area for children with a broad range of objectives to be taught, especially at Key Stage 2. Our aim is for children to be secure with the key knowledge and skills in this topic before they are moved on. In blocks focusing on measures and data handling, opportunities are specifically planned to use number skills previously taught, showing children how this knowledge is important in the real world.

Although all year groups follow a similar structure, there are more significant changes in the way that Foundation Stage and Year 1 work. There are planned opportunities each term for revisit of key number skills and greater emphasis is placed on the understanding of number itself. Children are encouraged to read, write, count with, compare and order numbers, as well as developing a secure understanding of what each number is (eg: the fourness of 4) This involves opportunities to break a number in to different parts, use different models and images to create and work with it, as well as using songs and rhymes to see how it fits in to the overall number system. This is essential in ensuring children understand the number system and can manipulate and work with numbers in different ways: all key knowledge in developing secure

mental arithmetic skills in future years. Wherever possible, place value skills are reinforced as our number facts involving addition, subtraction, multiplication and division, all essential in developing our children as fluent and confident mathematicians.

Day-to-Day Teaching

In our day-to-day teaching, it is expected that mathematics will form a part of their daily diet. This will normally be an hour at Key Stage 2 and between 45 minutes and an hour at Key Stage 1. The first part of the lesson will normally be an activity on mental arithmetic: often this will be a revision of knowledge already taught, an opportunity to practice fluency or apply in a different context, or may involve the specific teaching of an arithmetic rule. This ensures that children have a secure grasp of age-appropriate number facts and the knowledge to be able to apply arithmetic rules. In the main part of the maths session, the children will be taught towards an objective or aim, usually taken from the National Curriculum itself. This may be a new piece of knowledge or a new skill, or the opportunity to consolidate previous learning or to apply in a different context. We strongly believe that in order to master knowledge and skills fully, children are given opportunities to consolidate and have continued practise over time. As part of this time, children will have opportunities to try things for themselves, work in pairs or groups on an investigation, practise and consolidate key knowledge through fluency practise and to reason and problem-solve. At the end of the session, a plenary time will normally be held. This allows the children time to reflect on their learning and to consider what they need to remember for the next lesson/future work. Times are flexible: these respond to the age and need of the children, as well as the content and context of the lesson.

In order to ensure our teaching of mathematics is to the highest standard, we focus on the importance of using models and images to support the learning of new concepts. We move from real-life objects to physical models to abstract images before expecting children to work independently. This ensures they can understand the mathematics behind the concept they are being taught: they can see why it works, they can try it for themselves, they can make sense of the mathematics with supporting materials first. We aim to use a wide range of models and images across school, recognising that some are more effective for different jobs and that children may have a specific preference. This includes diennes blocks, numicon, place value arrows and counters, cubes and multi-link, counters and counting equipment, as well as practical equipment like shapes and measuring equipment in other lessons. Indeed, children are often given opportunities to choose the model which is most beneficial for them. There are a wide range of resources available in all classrooms to support teachers and children, as well as a centralised resource area (in the main corridor) for more specialised resources.

Planning

No written planning is required for daily maths lessons. Overviews for each block may be produced by teams where needed. Detailed AB should be provided by the planner to support the teaching and learning: this should include a mental starter, learning objective, success criteria, teaching input with models/images/challenges as appropriate, and a suggested plenary. These are guidelines only and will be adapted and changed by teachers as needed.

INCLUSION

As part of our inclusion policy, we ensure that every child, regardless of their ability, race, gender, religion, social background, culture or disability, receives a broad and balanced mathematics curriculum through inclusion in the daily mathematics session. At times, children may come out of a session to receive additional support or to challenge their thinking further. During each session, teachers will use a mixture of questions directed at the whole class and some questions differentiated for particular groups or individuals, in order to ensure the involvement of all pupils. Work during the activity time can be differentiated around a single mathematical theme to ensure it is appropriate for a spectrum of abilities; this could be by outcome, type of activity, adult support, use of resources, size of number, how open-ended the task is or the depth of mathematical thinking involved. All children will have opportunities to work with adults to develop their mathematical knowledge, understanding and skills further.

SEN:
Children with Special Education Needs may have work which is differentiated to match their ability level and to focus on their specific targets. This may involve tracking back to objectives from previous year groups where appropriate. They may also have additional support from the teacher or teaching assistant, which is again focused upon their particular needs, in lessons or as part of additional intervention. These should have strong links with targets on Provision Maps, Educational Health Care Plans (EHCPS) or reports from other experts (eg: LSAT, screening tests) In addition to this, children will be targeted when mis-conceptions are identified, either in a session or through marking. This will be addressed as soon as possible to ensure the child's learning is not hindered over a longer period.
(For further information, please see SEN policy.)

Many staff have received training to support children with specific learning difficulties in mathematics (dyscalculia) and have a wide range of practical resources in the classrooms to make learning more accessible. Further practical resources are available in a central maths resource area (situated outside the library) There are also a number of useful books to support teaching, including The Dyscalculia Assessment and The Dyscalculia Tool Kit (which are used by our highly trained TAs to screen for specific difficulties), as well as the Numicon Resource Box, Abacus Books and Number Kit Box.

High Attainers:
In our school we believe that challenging the higher attaining children is just as important as supporting the lower attaining children. We use a wide range of strategies to do this.
These include:

- Identifying challenging targets for HA children and ensuring planning of independent activities and teaching in guided groups meets these
- Differentiated activities suitable for the stage of learning the children are working at – this may involve producing work separately for one child
- Enrichment activities to extend the learning in the lesson (eg: the Challenge Box Activities, Mathematical Challenges for Able Pupils, developing greater depth in learning of skills or concepts through a rich and varied array of problems)
- Making tasks open-ended so there is not just one correct answer and asking children to apply their mathematical knowledge to new situations and problem-solving activities
- Using additional adults to target and challenge HA children

- Making lessons flexible – they might not need a traditional 3 part session and can be given a longer session to "have a go" or to "try something new"
- Using websites to provide real life contexts, problem solving activities, opportunities to try out and learn new skills (eg: NRICH, NCETM)
- Enriching the learning experience: making learning fun through games and ICT, making links to other curriculum subjects to show the real life worth, developing learning in real-life situations, offering opportunities for independence and self-direction, using higher level thinking skills (Ref: Bloom's taxonomy)
- Ensuring children are involved in reflecting on their own learning; using success criteria for self and peer assessment, identifying targets and next steps in learning, yearly assessment grids and as teachers, reflecting upon this to inform further planning, groupings and targets
- Making groupings flexible – this may be across classes or across year groups. Opportunities should also arise for children to work with like-minded peers to develop communication and reasoning as well
- Special activity days – this may involve children going out of school (visits, G+T courses), people coming in to work with groups (eg: secondary schools, problem solving company, mathematical competitions

To ensure we have high expectations across school, we set challenging targets for end of Key Stage levels; this also includes the number of children working at greater depth. This is based on previous attainment as well as expecting that children will make excellent progress across school.

RESOURCES

All class bases have a general stock of equipment to use as mathematical models/images: numicon, counters, multi-link cubes, diennes blocks and bead strings. Foundation Stage, KS1 classes and Year 3/4 classes have further resources to support key areas, including number fans, clock faces, money, counting equipment, place value counters, a bead bar and a large hundred square. General support materials, such as hundred squares, digit cards, number lines, times-tables squares, place value mats, maths mats and operation mats, are used in classes to support learning. A master version of these is available for staff in the resources folder in the maths curriculum subject folder (on workgroup). Additional resources, such as fraction walls/squares, shapes, measuring equipment and construction resources, are stored in a central Maths Resource Area, situated in the main corridor. Children have access to the central resources and individual teachers are responsible for ensuring they are replaced tidily in the correct place at the end of their use.

Teacher resources are to be found in the Business Manager's room (resources room). These consist of the files containing the 'Steps' materials, 'Maths Focus' materials, games and a collection of materials from which other ideas can be taken (eg BEAM). These support implementation of the mathematics curriculum, providing a range of activities and game ideas. There are also specialist materials to support children with difficulties in mathematics, including the Abacus books, Dyscalculia materials, Numicon kit and Number Kit box.

ICT Resources are also to be found on the Internet (eg: interactive resources – school subscription) as well as additional suggestions on the school website. The school also has a paid subscription to My Maths (used for homework and booster revision), Times Tables Rockstars/NumBots (for developing number bonds and times tables) and Maths Frame (Y2-Y6 – linked to curriculum objectives). Where

teachers use other internet sites, they are responsible for checking the value of the site as an aid to mathematical learning.

HOMEWORK

Mathematics homework is set as appropriate and may be weekly/fortnightly according to the age of the child. We focus on key skills and their application to practical situations, linking to personal targets where appropriate. Some homework may be worksheet based where as other homework might involve more practical work such as shopping or making recipes/models. We also subscribe to the 'My Maths' website which is used to provide homework activities, to reinforce teaching and provide booster revision. Feedback on homework will be provided to the children in oral or written form and house points given as appropriate (see homework policy) Additional work on times tables is given for all children in Key Stage 2 and from Spring Term, children in year 2 as well. This involves a weekly focus on a specific times table and children are then tested on this in the following week. Children are encouraged to make use of the website, Times Tables Rockstars, to develop their skills further. Half-termly assemblies are held to promote this further.

ORGANISATION OF MATHS WORK

RECORDING WORK

In Nursery and Reception, work is recorded in a variety of ways. Photographs and observations are used to provide evidence as well as some written recording where appropriate. In Nursery, this work is kept in the children's learning journey folder. In Reception, adult focused tasks are recorded in their daily maths books, whereas maths activities that the children have chosen to do during child-initiated time are recorded in their learning journeys. These are used to support the on-going assessments which make up the Early Years profile.

In the rest of the school, all work is done in a maths book with squared paper (although some year 1s will continue to use a larger book in the autumn term when it is more appropriate for their particular needs). Additional activities may be photocopied and stuck in. In each session, children will be given a learning focus sheet which contains the objective and success criteria for that session (these will contain differentiated "I can" statements to enable children to aspire to achieve to the highest possible level or may contain differentiated statements where appropriate). At the end of the session, children are encouraged to assess their work/their partner's work against the success criteria and are encouraged to add comments to their work for teachers to respond to. (For further information, please see teaching and learning policy.)

Use of ICT

We aim to have an ICT element in all maths sessions where it is appropriate to do so. We use interactive whiteboards for the majority of teaching sessions and make use of an extensive range of on-line resources for class/group activities and teacher created activ boards. When activities are ICT based, these should be evidenced in children's books. This may be a photograph, screen shot of the website or print out of an activity. Often a CTG question will be included to ensure understanding which the teacher will monitor.

ASSESSMENT and RECORD KEEPING

Assessment in mathematics is carried out informally on a daily basis by watching/interacting with the children as they work, marking written work at the completion of a session, as well as during discussions at the beginning/end of sessions. We feel that this type of assessment has a vital role in providing information on the children's ability so that we can ensure that we are matching work appropriately and challenging the children's thinking further. In each maths session, the objective and success criteria for a particular activity is shared with the children; this will be done orally, shown through the AB session and on sheets put in each child's book. Children are encouraged to evaluate their own learning and that of others. At the end of each session, they will use the success criteria to self-assess their own work. The teacher (or other adult) will then use the success criteria to evaluate the learning as well and set CTG tasks or further challenges as required.

Teachers use the yearly assessment grids to assess children's progress towards age related expectations (ARE), using evidence from mathematics lessons as well as other mathematical activities (for example, early morning activities or quizzes, as well as cross-curricular work). During each assessment period, we will also assess children's ability more formally using tests in most year groups. These enable children to become familiar with a test format and also help to confirm teacher judgements. (For further information, please see assessment policy.)

SUCCESS CRITERIA

The success criteria for the policy are as follows:

- Children are not only competent in mathematics but also confident about the mathematics they do.
- All areas of mathematics are being covered in an academic year.
- There is progression and continuity from year to year.
- Children's progress and achievements are monitored systematically and interventions are used to ensure more rapid rates of progress where required.
- The majority of our mathematicians in Year Two and Year Six are reaching at least national levels of achievement (ARE), with many achieving above expected levels (greater depth)
- Some of our mathematicians, in some areas of maths, are working well above average expectations.

Our main criteria for success would be to have all children, whatever their level of achievement, enjoying their maths and having a real 'feel' for the subject. We want to feel that we enable all the children to achieve their full potential.

REVIEW DATE

Assessment and recording procedures are reviewed regularly to ensure that they are working and workable. Review of the scheme of work will be undertaken as we go along and games, ideas and individual units of work are evaluated as they are done so those which work particularly well can be recognised.

The maths policy is reviewed at intervals and was last reviewed in Autumn term 2019.