

Mathematics.

Scoil Mháirtín.

Whole School Plan for Mathematics.

■ **Introductory Statement and Rationale**

(a) Introductory Statement

This document is a statement of the aims and objectives, principles and strategies for implementing the Mathematics Programme in Scoil Mháirtín. It has been formulated by the staff of the school and informed by the Curriculum Statements and Guidelines, needs of the children and expertise of the staff.

(b) Rationale

We are devising the Mathematics plan to provide the child with a wide range of knowledge and the necessary skills that enable him/her to live a full life as a child and later as an adult. In this way the child will be given a language and a system through which he/she may analyse, describe and explain a wide range of experiences, make predictions and solve problems. We believe it is important to show the relevance of Maths to our daily lives and to nurture an interest in Maths, which may lead to further study.

■ **Vision and Aims**

(a) Vision:

This plan will focus on meeting the needs of our children in the area of Maths. Parental involvement will be encouraged as much as possible to support their child's learning in Maths.

(b) Aims:

We endorse the aims of the Mathematics Curriculum which are:

- To develop a positive attitude towards Mathematics and appreciation of both its practical and its aesthetic aspects
- To develop problem-solving abilities and a facility for the application of Mathematics to everyday life
- To enable the child to use mathematical language effectively and accurately
- To enable the child to acquire an understanding of mathematical concepts and processes to his/her appropriate level of development and ability
- To enable the child to acquire proficiency in fundamental mathematical skills and in recalling basic number facts.

The broad objectives of the Mathematics Curriculum are:

Early Mathematical Activities

- Classify similar objects for colour, size, texture, set and complement of the set
- Match equivalent and non-equivalent sets using one to one correspondence
- Compare length, width, height, weight, quantity, thickness, size or sets
- Order objects according to length or height, and order sets without counting.

Number

- Understand, develop and apply place value in the denary system
- Understand and use the properties of number
- Understand the nature of the four number operations (addition, subtraction multiplication, division) and apply them appropriately
- Approximate, estimate, calculate mentally and recall basic number facts
- Understand the links between fractions, percentages and decimals, and state equivalent forms
- Use acquired concepts, skills and processes in problem - solving.

Algebra

- Explore, perceive, use and appreciate patterns and relationships in numbers
- Identify positive and negative integers on the number line
- Understand the concept of a variable, and substitute values for variables in simple formulae, expressions and equations
- Translate verbal problems into algebraic expressions
- Acquire an understanding of the properties and rules concerning algebraic expressions
- Solve simple linear equations
- Use acquired concepts, skills and processes in problem - solving.

Shape and Space

- Develop a sense of spatial awareness
- Investigate, recognise, classify and describe the properties of two-dimensional and three-dimensional shapes
- Deduce informally relationships and rules about shape
- Combine, tessellate and partition two-dimensional shapes and combine and partition three-dimensional shapes
- Draw, construct and manipulate two-dimensional and three-dimensional shapes
- Identify symmetry in shapes and identify shape and symmetry in the environment
- Describe direction and location using body-centred (left/right, forward/back) and simple co-ordinate geometry
- Use acquired concepts, skills and processes in problem - solving.

Measures

- Know, select and use appropriate instruments of measurements
- Estimate, measure and calculate length, area, weight, capacity and average speed using non-standard and appropriate units of measurements
- Estimate, measure and calculate angles, time and money using non-standard and appropriate units of measurement
- Recognise and appreciate measures in everyday use
- Use acquired concepts, skills and processes in problem - solving.

Data

- Collect, classify, organise and represent data using concrete material and diagrammatic, graphical and pictorial representation
- Read, interpret and analyse tables, diagrams, bar charts, pictograms, line graphs and pie-charts
- Appreciate, recognise and express the outcomes of random processes
- Estimate and calculate using examples of chance
- Use acquired concepts, skills and processes in problem - solving.

Curriculum Planning

Strands and Strand Units:

At the start of each year, teachers will familiarise themselves with the objectives for their class and make sure that their individual planning for the year incorporates all the strands of the Maths curriculum.

Approaches and Methodologies. The following approaches and methodologies will be used:

- **Guided talk and discussion:** Talk and discussion is seen as an integral part of the learning process and opportunities should be provided during the Maths class for children to discuss topics and problems with the teacher, other individual children and groups. To facilitate effective discussion, the children will be trained in the following skills; turn-taking, active listening, positive response to the opinions of others, confidence in putting forward an opinion and the ability to explain clearly their point of view.
- **The use of manipulatives:** Children will have access to a wide range of mathematical equipment during lessons and will have an opportunity to work with concrete materials individually, in pairs and in groups. Ready, Set, Go – Maths (Eunice Pitt) has been introduced in Junior Infants and this programme is entirely based on the use of manipulatives.
- **Active learning/Guided discovery:** As part of the Maths programme for each class, children are provided with structured opportunities to engage in exploratory activities to construct meaning, to develop mathematical strategies for problem - solving and to develop self motivation in mathematical activities.
- **Collaborative/Co-operative learning;** We would encourage children to work co-operatively through the use of the following strategies; - working as a group (learning the skills associated with same; e.g. listening to others, turn-taking, appreciating that others opinions are important) learning from peers, pair work, group work and whole class work.
- **Using the environment as a learning resource:** The school building and grounds are used as a resource to support the Maths programme e.g. numbers are seen in different locations, number games are painted on the playground. Over the school year, class teachers will identify aspects of the environment that could act as a setting for Maths trails, problem - solving, measurement, and shape and space activities e.g. measuring the playground, marking out 100 metres for a sprint, using a stop-watch to time runners.
- **Data:** Children are encouraged to collect data from their class and represent it in bar charts and pie charts. As part of projects, pupils should be made aware of the importance of entering relevant data and of asking clear questions to obtain the required information.
- **Language – Concepts/Skills:** There is a strong link between language and concept acquisition. We feel it is important to have a common approach throughout the school to the terminology used and the correct use of symbol names.

Addition & Subtraction; It is hoped that by Second Class, the children will have encountered most of the terms associated with addition, (add, and, count on, plus, more, altogether, total, sum of) and subtraction (take away, count back, subtract, less than, left, decrease, minus, difference).

When adding and subtracting, the children will work from the top down.

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e.g. - $\frac{4}{9}$, will be taught as follows: 9 take 4

Regrouping /renaming will be taught where necessary.

Multiplication & Division; These mathematical operations are introduced in Third Class and it is hoped that by Fifth Class most of the vocabulary associated with them will have been encountered, i.e. multiply, multiply by, times, groups/sets of, divide, divide by, shared between, split.

Equals; is, is the same as, will be, answer is, means

Place Value; The term 'units' will be used

Tables; Tables will be learned as they are read

e.g. $11 - 4 = 7$ will be learned as follows; 11 take 4 is 7

$9 \times 6 = 54$ will be learned as follows; 9 sixes are 54

The learning of multiplication tables will begin in Third Class. Division tables will be learned in Fourth Class. Subtraction and division will be learned as the inverse of addition and multiplication. A variety of methods may be used to teach tables; e.g. counting in 2's, 3's ..., reciting from memory, listening to tapes. Tables will be revised regularly in the relevant classes.

Care will be taken that children, during their school career, are exposed to the different terms used in relation to the symbols. Alternate methods of doing addition, subtraction, multiplication and division may be introduced by class teachers once the pupils have mastered the agreed method.

A more comprehensive breakdown on ' Maths Language' will be given to each teacher to ensure a common approach throughout the school.

- **Recording;** This may be performed in a variety of ways such as written, concrete, oral and pictorial (including photographs for a permanent record)
- **Integration;** A cross curricular approach will help the child to make connections between different curricular areas, add to the child's enjoyment of Mathematics and encourage the transfer of learning.
- **Linkage;** Linkage is integration within a subject area. All the strands in the Maths Curriculum should be seen and taught as integrated units, in which understanding in one area is dependent on and supportive of ideas and concepts in other strands.

Skills

The following skills will be acquired by the children through the study of the various strands in the Maths curriculum:

- Applying and problem-solving
- Communicating and expressing
- Integrating and connecting
- Reasoning
- Implementing
- Understanding and recalling
- Estimating

Problem-solving: Children are encouraged to use their own ideas as a context for problem - solving. Theories can be tested out in class to see if they are correct. With regard to problem - solving, children should be taught the following strategies:

Understanding the problem:

- Read the problem
- Read it again
- Say, in your own words, what you are trying to find out
- Find the important information
- Look for key phrases
- Write what you know

Solving the problem:

- Look for a pattern
- Guess and check
- Write an equation
- Break the problem down and solve each part

Additional help:

- Construct a model
- Draw a picture
- Make an organised list or table
- Use objects to act out the problem
- Use easier numbers
- Work backwards

Answering the problem:

- Use all the important information
- Check your work
- Decide if the answer makes sense
- Write the answer in a complete sentence.

Estimation: Estimation skills are essential throughout the strands of the Maths curriculum and at all levels. Children will be encouraged to make sensible guesses, to test, and revise where appropriate. When estimating, a variety of strategies will be encouraged i.e. Front-end, clustering, rounding and special numbers. Children will also be taught to investigate the reasonableness of their estimates.

These strategies are explained on pages 32 – 34 of the Teacher Guidelines for Maths.

Assessment and Record Keeping

Assessment is used by teachers to inform their planning, selection and management of learning activities, so that they can make the best possible provision for meeting the varied mathematical needs of the pupils in our school. Teachers select from the following range of assessment approaches:

- Teacher observation of knowledge, skills development and participation in activities.
- Teacher designed tests and tasks
- Work samples, portfolios and projects
- Diagnostic tests (mainly Resource/Learning Support)
- Standardised Tests.

Teacher Observation

The curriculum makes reference to the validity of teacher observation as a means of building a broad understanding of a child's strengths. Teachers will note anything that they feel is important in relation to the child's progress in Maths e.g.

- The level of engagement in, or attention to, activities
- Strengths and concerns in relation to written work
- Involvement in discussions
- The response to and initiation of questioning during class or group work.

Teacher designed tests and tasks

The following are used throughout the school to inform the class teacher of each child's progress in Maths:

- Oral Tests (tables, mental maths etc)
- Written tests for numerical competence
- Problem - solving exercises that use a variety of mathematical skills
- Projects that require the compilation of data, or the drawing of a diagram.

Standardised Testing:

- Children are formally assessed by means of standardised tests e.g.. Drumcondra
- All children are tested in May
- The Learning Support teacher will keep the result of each child's test, and each class teacher will have a copy of the results for his/her class
- Standardised Test results are communicated to the parents orally at Parent/Teacher meetings, and in writing, via the end of year reports
- The actual test is shredded and disposed of, but the results are kept for the duration of the pupil's stay in school.

Children with Different Needs

Children in each class will display a wide range of abilities, attainment and learning styles. The Maths programme aims to meet the needs of all the children in the school. Teachers, varying the pace, content and methodologies to ensure learning, will achieve this. Computer technology and calculators can be used effectively both in remediation work and in extension activities for the more able child. Evidence of this differentiated approach will be recorded in the teacher's planning notes.

Children who receive scores at or below the 10th percentile on standardised tests will have priority in attending the Learning Support teacher for supplementary or parallel teaching in Maths. The availability of supplementary or parallel teaching in Maths to pupils with a score above the 10th percentile however, depends on the caseload of the Learning Support teacher. Arrangements will be in accordance with the recommended selection criteria as outlined by the D.E.S.. Diagnostic tests may also be administered where the need arises.

If there are children who qualify for supplementary teaching, but for whom there is no possibility of receiving formal supplementary teaching, the following will happen:

- The learning support teacher will liaise with the class teacher on resource books and materials that could be used by the class teacher and the child in the mainstream setting
- If the child is already attending the Learning Support teacher for English, it may be possible on occasion, for the child to receive some help with his/her Maths work as part of the supplementary teaching lessons.

The progress of such children will be reviewed regularly.

The Learning Support Teacher will liaise with the class teacher as well for the children who do not qualify for supplementary teaching but demonstrate difficulty with Maths activities, either on an ongoing basis or with particular concepts.

The requirements of children with special needs will be taken into consideration when planning class lessons. The SNA supports particular groups of children as directed by the class teacher. Grants as appropriate will be accessed to support the needs of individual children.

Equality of Participation and Access

- Equal opportunities are given to boys and girls to participate in discussion, use manipulatives, and present their work to the class/school etc
- All children have access to services, facilities or amenities in the school environment
- We endeavour to identify the needs of, and make the necessary provision for the following;
 - Children with disabilities
 - Families with literacy problems
 - Families for whom English is not the first language

Organisational Planning

Timetable

This subject is allocated 3 hrs (2.25hrs for Infant classes) per week and is timetabled accordingly by the class teachers. There is 2 hrs discretionary time available each week that teachers can occasionally use to support the Maths curriculum. In keeping with the D.E.S numeracy initiative, proposing an increase the amount of time allocated to maths, we have allocated ten extra minutes every day to mental maths.

When drafting timetables for withdrawal of pupils for supplementary teaching, teachers endeavour to allow these pupils to remain in class for as much of the mainstream mathematics programme as possible.

Homework:

- Maths homework should reflect approaches as set out in the curriculum
- From 1st class up, Maths homework should be included each night homework is given
- Homework allocated should take account of the different levels of ability in the class and should be a positive experience for all concerned
- Children should generally be given a mixture of number work, the current concept being taught and mental Maths
- Tables may also be given for homework
- Practical activities (e.g. weighing) should be given from time to time, bearing in mind the the age, ability and level of independence of the child
- Time should be allocated for the correction of Maths homework and the reviewing of any problems arising.

Resources and I.C.T.

Equipment/textbooks/supplementary materials/calculators

We acknowledge the importance of concrete materials in the development of mathematical concepts for children in all classes.

- Maths equipment is stored in the store room
- When a class is finished with the equipment, it should be returned to its correct position in the store room
- Junior Infants maths equipment is kept in the classroom for ease of access.

Textbooks/Workbooks

Ready, Set, Go- Maths (Eunice Pitt) is in use in Junior Infants.

The Mathemagic scheme is followed throughout the rest of the school. We feel it best reflects the objectives of the Maths curriculum. Assessment tests which accompany the Maths scheme are available for use.

Teachers may also use a variety of supplementary textbooks/workbooks e.g. Shadow Book, Figure it Out, Mental Maths, Maths Mate, Maths Quest, Maths Challenge. A table book is used throughout the school and we have incorporated one in our school journal. Tables Champion (educate .ie) may be used to reinforce number facts.

Calculators

From 4th class upwards children are permitted to use calculators alongside traditional paper and pen methods. Calculators are particularly useful for handling larger numbers, to check answers, to explore the number system and to remove computational barriers for weaker children. They also allow the child to focus on the structure of problem-solving questions. It is important that the skill of estimation is developed along with the use of calculators.

ICT

ICT is a valuable tool in Mathematics. Drill and practice programs provide an attractive alternative to pen and paper tasks. Adventure programs give experience in solving specific mathematical problems and in the general area of problem-solving.

- We have a variety of software /videos/DVDs currently available in the school to support the various strands/strand units in Mathematics.
- The software is stored in the Data Room.
- Staff are encouraged to use the Internet to enrich Maths lessons, following the school code of practice. Mathletics, (an online, interactive programme of maths activities which can be tailored to the ability of each individual pupil) is currently available to pupils from 1st Class to 6th Class. Other sites worth visiting include Transum.org and Maths Starter of the day.
- Inter-active whiteboards have been installed in most of our classrooms.

Individual Teachers' Planning and Reporting

Teachers are encouraged to refer to curricular policies when planning a scheme of work for the year to ensure that all strands are covered. Cúntas Míosúil serve in reviewing and developing the school plan.

Staff Development:

- Teachers have access to reference books, resource materials, and websites relating to Maths topics.
- Teachers are encouraged to attend courses and are given an opportunity at staff meetings to share what they have learned.

Parental Involvement

We encourage parents to be actively supportive of the Mathematics programme, and of the approaches and methodologies used in this school:

- The role of calculators in 4th – 6th classes
- The expectation in relation to layout/presentation of work
- Our problem-solving strategies
- How we use Mental Mathematics
- The rationale for playing mathematical games in class
- How assessment information is shared
- The Homework Journal is used as a vehicle for two-way communication between teacher and parent on progress in Maths and other issues.
- Parent/Teacher meetings are held annually, affording both parties an opportunity to discuss each individual child's progress
- Parents are encouraged to approach the teacher/school if their child is experiencing difficulty in any area of Maths.

Success Criteria

The success of this plan will be measured using the following criteria:

- Continuity of content and methodology will be evident in teachers preparation and monthly reports
- Ongoing assessment, formal and informal, will show that pupils are acquiring an understanding of mathematical concepts and a proficiency in Maths skills appropriate to their age and ability.

Implementation

Class teachers have primary responsibility for the implementation of the Maths programme for their own class.

Review

Progress will be reviewed as and when necessary, based on the results of assessments across all classes and on the teachers views as to the effectiveness of the plan.

Ratification and Communication

This reviewed plan was compiled on the 18th of September, 2012 and was ratified by the Board of Management of Scoil Mháirtín on _____

Signed: _____
Chairperson of B.O.M.

This plan was communicated to teachers and will be implemented in classes from Sept. 2012.