

Whole School Development Plan Mathematics

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Mathematics

Introductory Statement and Rationale

Introductory Statement

This document is a statement of the aims and objectives, principles and strategies for implementing the mathematics programme at Scoil Ghormáin Naofa.

It was formulated by the school staff and informed by the Curriculum Statements and Curriculum Guidelines (1999), the Literacy and Numeracy for Learning and Life Document (2011), Circular 0056/2011, the needs of the children in Scoil Ghormáin Naofa and the expertise and experience of the staff of Scoil Ghormáin Naofa.

Rationale

- To maintain and develop high numeracy standards in Scoil Ghormáin Naofa.
- To provide a coherent, consistent whole school plan which will inform teachers' yearly planning.
- To increase the profile of numeracy in school.
- To enhance children's problem-solving strategies.
- To provide a structure for regular analysis of numeracy standards leading to more focused teaching and learning.

Vision and Aims

Vision:

In keeping with the ethos and philosophy of the school, where each child is valued in the diversity of their needs, this Maths plan is intended to aid each pupil in maximising his/her individual level of potential.

Aims:

- To develop a positive attitude towards mathematics and an 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.

Content of Plan

Curriculum:

Strands and Strand Units:

Strands Classes	Junior and Senior Infants	1st and 2nd Class	3rd and 4th Class	5th and 6th Class
Early Mathematical Activities	Classifying. Matching. Comparing. Ordering.			
Number	Counting. Comparing and Ordering. Analysis of number.	Counting and numeration. Comparing and ordering. Place value. Operations. Fractions.	Place value. Operations. Fractions. Decimals.	Place value. Operations. Fractions. Decimals and percentages. Number theory.
Algebra	Extending patterns.	Exploring and using patterns	Number patterns and sequences. Number sentences.	Directed numbers. Rules and properties. Variables. Equations.
Shape and Space	Spatial awareness 3-D shapes. 2-D shapes.	Spatial awareness. 2-D shapes. 3-D shapes. Symmetry. Angles.	2-D shapes. 3-D shapes. Symmetry. Lines and angles.	2-D shapes. 3-D shapes. Symmetry. Lines and angles.
Measures	Length. Weight. Capacity. Time. Money.	Length. Area. Weight. Capacity. Time. Money.	Length. Area. Weight. Capacity. Time. Money.	Length. Area. Weight. Capacity. Time. Money.
Data	Recognising and interpreting data.	Recognising and interpreting data.	Recognising and interpreting data. Chance	Recognising and interpreting data. Chance

Approaches and Methodologies:

In the mathematics curriculum the strands and strand units are viewed through the lens of the approaches and methodologies. (Teacher Guidelines: Mathematics pp. 30 – 67)

2.1 General

- All children should be provided with the opportunity to access the full range (all strands) of the mathematics curriculum. *It is important that teachers individual planning reflect the objectives as outlined in the curriculum and not follow a text and that there be consultation between class teachers and LS/Resource teachers for those pupils who attend LS/Resource.*
- We strive to ensure that there is less emphasis and reliance on textbooks and workbooks and more on active learning strategies.
- We ensure that the textbooks in use are in line with content objectives for the class level.
- Appropriate use of concrete materials is encouraged in all classes. *(Teachers in the middle and senior classes are reminded of the importance of same.)*
- Opportunities are provided for all children from fourth to sixth class to use calculators *e.g. to check answers, to explore the number system, to remove computational barriers for weaker children or to focus on problem solving.*
- We ensure that the number limits are being adhered to, particularly at first and second classes where the emphasis is on the development of the concept of place value, *e.g. more work within the hundred square without going past 100 (Teacher Guidelines: Mathematics, p. 70)*
- We are in agreement that formulae are being ‘discovered’ by children rather than being taught by rote, *e.g. length by breadth (but we also see the need for learning rules by rote after discovery.)*
- There is an emphasis on simple fraction families in the senior classes.
- Pupils will be collecting real data in other areas of the curriculum and using it to represent their findings i.e. using data from other subjects such as geography, history or science to find the answer to a question, gathering data to answer their own questions such as ‘Do more/less children walk to school this year than five years ago?’ ‘What are the three favourite vegetables eaten by children in our class?’
- Estimation skills will be developed and refined with the emphasis on using estimation in all areas of mathematics.
- Profile of mathematics as a subject to be enjoyed by all children is encouraged in Scoil Ghormáin Naofa *e.g. mathematics fun days, display of mathematics work in school etc.*

2.2 Talk and Discussion

Talk and discussion in mathematics is taken seriously and seen as an integral part of the learning process, *e.g. teacher/pupil, pupil/pupil, pupil/teacher.*

Opportunities are provided for pupils to explain how they got the answer to a problem, discuss alternative ways of approaching a problem or give oral descriptions of group solutions.

Scaffolding

The teacher actively models the language to be used, particularly when talking through the problem-solving process.

Integration

Areas in other subjects will be identified where mathematical processes are appropriate and useful, *e.g. gathering data in history and geography, measuring temperatures in science?*

Opportunities where a thematic approach could be used across a number of subjects are identified (*Teacher Guidelines: Mathematics pp. 53 and 57 for examples*)

Linkage

Opportunities where a thematic approach might be used for linkage are identified, *e.g. when dealing with decimals are we also aware of their use in data – pie charts; measures – all areas but particularly money for introducing decimals (See Teacher Guidelines: Mathematics pp. 52 & 56)*

Mathematical language in context

There is a conscious effort made to use the children's own ideas and environment as a basis for reinforcing mathematical language, *e.g. you are taller than he is, teacher's table is longer/wider than yours*

Teachers will identify common approaches to the language used in:

- Addition – total, sum of, add, and ...
- Subtraction – minus, subtraction, take-away, difference, less than ...
- Multiplication – times, product of, multiply, groups of ...
- Division – divide, share, split, groups of ...
- Equals – same as, is, will be, answer is, means ...

Note: It is important that children are exposed to the different terms used in relation to the symbols e.g. +, add, plus etc.

Number facts

- There is a common approach to the teaching of number facts (tables), *e.g. for the 3x tables we count the groups of 3.*
- Children are made aware of the commutative properties of multiplication tables and of their relationship with division
- We teach subtraction and division tables separately to addition and multiplication but we then lead the children to make the connection between them.

2.3 Active learning and guided discovery

There are agreed strategies for teaching:

- Addition – top to bottom
- Subtraction – use of materials and decomposition
 - **Vertical:** start from the top using the words 'take away' =16 take away four equals 12.
 - **Horizontal:** Read from left to right using the words 'take away' 5 take away 1 equals 4.
- Multiplication – vertical/horizontal presentation, skip counting, using mental strategies such as identifying doubles, near doubles, multiplying by 5 and 10, using games to reinforce facts, developing and honing estimation skills.
- Division – concept of sharing, understanding division as repeated subtraction, developing and honing estimation skills

The children are encouraged to develop personal benchmarks, particularly in the measures strand, *e.g. noting their height in relation to a metre, the width of their finger as close to a centimetre.*

Mathematical games are in use at each level, *e.g. dice, cards, dominoes, spinner games, games devised by the children themselves.*

2.4 Collaborative and co-operative learning

We take steps to ensure that children learn the skills needed to work *as a group* rather than just *in a group*, *e.g. listening to others, turn-taking, appreciating that others' opinions are important.* These provide opportunities for children to learn from their peers, *e.g. buddy systems, older children 'teaching' younger ones?*

Each class uses a variety of organisational styles, *e.g. pair work, group work and whole class work*

2.5 Problem-solving

- Children are encouraged to use their own ideas as a context for problem-solving, *e.g. my mammy bought a 2 litre bottle of orange for the party yesterday – was it cheaper than two 1 litre bottles?*
- There is agreement on using strategies such as RAVECCC* and ROSE* to support children's problem-solving strategies? It is not essential to choose only one but it is useful if teachers are aware of those in use, particularly those working with children with special needs.

*RAVECCC – Read, Attend to key words, Visualise, Estimate, Choose numbers, Calculate, Check

*ROSE – Read, Organise, Solve, Evaluate

(All of these are just variations and teachers can easily construct their own to suit their circumstances.)

- In making problem-solving more accessible and realistic for children teachers use checkable answers or use a calculator for larger numbers as part of their programme.
- We are providing opportunities for all children, Infants to Sixth class and including those with special needs, to have the opportunity to experience problem-solving activities, *e.g. by giving oral problems; by having them use objects to solve the problem; by using smaller numbers; by using items in the environment, e.g. how many beads can I hold in one hand – a little, a lot, more than teacher?*

2.6 Using the environment

- We are using the school environment to provide opportunities for mathematical problem-solving *e.g. putting numbers on doors; having a puzzle of the week on the school notice board; having a mathematics facts board (Did you know?) to which children can contribute; using large dice in PE to pick teams; set number of laps to run; using hula hoops for sorting children in PE etc.*
- Mathematical trails are being developed within or outside of the school building.
- We give children opportunities to present/display their mathematical work in the class/corridor/school.

2.7 Skills through content

- Teachers are making sure that skills are being actively developed through the content (*Teacher Guidelines: Mathematics pp. 68-69*) There is evidence to be seen that transfer of those skills is taking place in other areas.

- **Applying and problem solving**, e.g. selecting appropriate materials and processes in science
- **Communicating and expressing**, e.g. discussing and explaining the processes used to map an area in geography
- **Integrating and connecting**, e.g. recognising mathematics in the environment
- **Reasoning**, e.g. exploring and investigating patterns and relationships in music
- **Implementing**, e.g. using mathematics as an everyday life skill
- **Understanding and recalling**, e.g. understanding and recalling terminology, facts, definitions, and formulae
- All classes encourage the use of mental mathematics.

2.8 Presentation of work

We provide a variety of options for recording work, e.g. drawing a picture to show the result; using ICT; using concrete materials to demonstrate how the result was obtained; using a diagram; telling/explaining

3. 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 children. The following are other assessment tools used by teachers:

- Teacher observation
- Worksheets and work in copies
- Assessment games
- Extension and enrichment activities based on the strand unit being taught. Samples can be seen in the Teacher's Manual
- Ongoing teacher-designed tests.
- Oral tests (tables, continuation of number patterns, ...)
- Problem solving exercises that use a variety of mathematical skills
- The Drumcondra/Sigma T standardised test is administered every year at the end of May from 1st - 6th class while teacher designed tests are used throughout the year. The results of each child's tests will be kept in their school file. Results of the standardised test are communicated to parents in school end of year reports In accordance, with the numeracy and literacy strategy 0007/2012, standardised test results at the end of 2nd, 4th and 6th are made available to the Board of Management and the DES at the end of each school year.

Following assessment teachers may do the following:

- Give extra help to individual who need it.
- Decide to increase time spent using concrete materials.
- Discuss the situation with forwarding teacher at the end of the school year and beginning of new school year.
- Discuss concerns with parents and encourage parents to help the child in an informal way.
- Consult with the Learning Support Teacher who will provide support when needed using available resources within the school.

4. Children with Different Needs:

4.1 Children with learning difficulties

The strategies used by teachers to ensure the participation of children with special needs in relation to mathematics are as follows:

- Children with special needs are provided with access to all strands of the mathematics curriculum insofar as that is possible.
- Teachers in mainstream classes provide a differentiated programme to cater for children with learning difficulties.
- Supplementary teaching is available for children with learning difficulties in mathematics under the general allocation and low incidence resource hours.
- There are regular meetings to ensure a collaborative approach between the class teacher and the learning-support/resource teacher.
- ICT may be used to support teaching and learning for children with special needs

4.2 Children with exceptional ability

The strategies used in the school/class to provide challenges for children of exceptional ability are as follows:

- A differentiated programme.
- Independent research projects.
- Use of ICT to support their work.

5. Equality of Participation and Access:

- Equal opportunities are afforded to boys and girls in the presentation of and participation in the mathematics curriculum in Scoil Ghormáin Naofa
- Children with disabilities (learning or physical) are catered for in the course of the class teacher's planning, with supplementary teaching available where necessary.
- All children have equal access to ICT resources.

Organisation:

6. Timetable:

In accordance with the Literacy and Numeracy Strategy (2011), classroom time allocation is now increased to 4 hours and 25 minutes (3 hours 25 minutes infant classes) for mathematics. Maths may be integrated into other subjects and additional discretionary time may be allocated to maths teaching by individual teachers. Where a pupil is attending Learning Support, every effort is made to insure that this withdrawal does not clash with maths time.

7. Homework:

Homework is given in line with general homework policy. Homework is differentiated to take into account the varying levels of abilities in each class. Every effort is made to coordinate homework between the class teacher and the learning support/resource teacher

8. Resources and ICT: (Teacher Guidelines: Mathematics p. 18, pp.72-73)

- Mathematics resources/materials are stored centrally.
- An inventory is kept in the resource room.
- Materials, equipment, games, textbooks, supplementary books are selected when funds are available and if teachers identify a need for a particular item or book

ICT (Teacher Guidelines: Mathematics pp. 60-61, Information and Communications Technology (ICT) in the Primary School Curriculum: Guidelines for Teachers)

- The internet is widely used to support the teaching of Maths.
- Teachers share expertise at staff meetings
- There is a code of practice to ensure safe Internet usage

9. Individual Teachers' Planning and Reporting:

Individual teachers will design a mathematics education plan specifically for their own class while at the same time ensuring that their class plans coordinate with and feed into the overall school plan, set out in the policy. This should ensure clear progression as children move from class to class.

Strands covered in Mathematics Education each month are recorded on the Cúntas Míósúil. The Cúntas Míósúil will be very relevant in recording what has been covered and in reviewing and developing the school plan for the following years.

10. Staff Development:

The school will access the PDST Mathematics Cuiditheoir through the Regional Curriculum Support Service to support the staff in certain strands if necessary.

Teachers will be notified of courses relating to Mathematics Education available in the area. Skills and expertise within the school are shared and developed through inputs at staff meetings and collegiate networking among teachers.

11. Parental Involvement - Home School Links:

Parents have a responsibility to support the schools policy for the teaching of mathematics. Information evenings will be held as the need arises for support for parents around new approaches to the teaching of mathematics so that they can be facilitated in supporting their children's development in mathematics.

- The importance of trial and error, estimation, the use of concrete materials and the role of calculators
- The school's approach to e.g. subtraction, division, calculations using fractions.
- The fact that Maths homework may be used on practical activities
- The use of the Homework Journals as a vehicle for two-way communication between teacher and parent on progress in Mathematics

Teachers and parents are afforded the chance to discuss each child's progress in Maths at P/T Meetings. They can, discuss ways of assisting that progress. Parents and teachers are welcome to make individual arrangements to discuss matters of relevance at other times throughout the year.

12. Community Links:

We are very much aware of the school's role in the community and we are also conscious of the fact that the expertise of people in the community is an invaluable resource to any school. Guest speakers or evening events around the teaching of mathematics may be held from time to time. Guest speakers may be open to the public during events such as Maths Week.

Success Criteria

We will know this plan has been implemented when:

- Teachers' preparation is based on this plan
- Procedures in this plan are consistently referred to and followed

This policy will have achieved its aims when

- There is positive feedback from teachers/parents/children
- Children have a positive attitude to and appreciation of the value of mathematics
- Children have an interest in the mathematical aspects of everyday life
- Children have an ability to engage appropriately in Problem Solving activities
- Children have confidence and competence in mathematics

Implementation and Review

1. Roles and Responsibilities:

Each teacher and the staff as a group will evaluate the progress in Mathematics by referring back to our set of stated objectives as outlined in this plan. A short session at staff meeting will be allocated to this work.

2. Timeframe:

The content of this policy will be reviewed at the end of the school year 2016/2017 and every two years thereafter.

Ratification and Communication

The Mathematics policy was drawn up by the teaching staff of Scoil Ghormáin Naofa in the 2015/2016 academic year and was ratified by the Board of Management on _____. Parents can inspect the policy via the school website or the school office.

Signed: _____
Chairperson BOM

Signed: _____
Principal

Date: _____

Date: _____