



Mathematics Plan

Introductory Statement

This is the whole school plan for Mount Anville Montessori Junior School (MAMJS). MAMJS is an urban school with 20 classrooms from Morning class to 6th class. This document is a statement of the aims and objectives, principles and strategies for implementing the mathematics programme at MAMJS. It was formulated by the school staff and informed by the Montessori philosophy, DES Mathematical Guidelines, needs of the children and the expertise and experience of the staff.

Rationale

- Pupil and teacher learning is enhanced;
- Shared view of school's philosophy regarding maths;
- Children will benefit from structured approach regarding content and methodology;
- To increase the standard of maths in our school
- Teacher's workload is shared;
- Self esteem of staff and pupils is enhanced;
- Most effective approaches are shared;
- Resources are researched and shared;
- It is the most effective instrument by which efforts and strengths of both teachers and pupils are harmonised and co-ordinated;
- That revision and assessment form an essential part of our maths teaching

Vision

- To support pupils to reach their true potential in maths
 - To give all pupils an opportunity to succeed, supporting the ability of the pupil
 - To foster in our pupils a love of maths in their daily lives
 - To provide the child with the necessary skills to live a full life as a child and later as an adult
 - To emphasise the practical aspects of maths using problem solving and social maths
 - That maths is fun and can be enjoyed by all members of the school community, both individually and collaboratively as a group member

Over-arching aims

We endorse the aims and objectives of the Curriculum for mathematics.

- In the Montessori Department, the Maria Montessori philosophy will be at the fore of teaching methodology.
- To develop a positive attitude towards mathematics and an appreciation for 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 level of development and ability.
- To enable the child to acquire proficiency in fundamental mathematical skills and in recalling basic number facts

Section 1: Classroom Planning

Strands and Strand Units

In order to ensure that all teachers are familiar with the curriculum and its overview across the class level, we have attached the 'Glance Cards' which show the progression and development of mathematical concepts throughout the pupil's life in MAMJS. See Appendix A for Glance Cards and Guidelines for Individual Class Schemes.

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

All the strands of the mathematics programme will be seen and taught as interrelated units in which understanding in one area is dependent on and supportive of ideas and concepts in other strands i.e. pupils using concepts and skills across mathematical topics- connecting with mathematical concepts and applying thereafter.

Standardisation of Some Mathematical Procedures in MAMJ School

It has been decided to standardise the following mathematical procedures throughout the school in order to help children with learning difficulties.

Subtraction: From 2nd class on we should use the decomposition method throughout the school as shown for 2nd class.

Long Multiplication:

$$\begin{array}{r} 54 \\ \times 23 \\ \hline 162 \rightarrow 54 \times 3 \\ 1080 \rightarrow 54 \times 20 \\ \hline 1242 \end{array}$$

Long Division:

$$\begin{array}{r} 28 \quad \overline{)0214} \quad \text{d m s d strategy} \\ \underline{-59} \\ 214 \\ \underline{-112} \\ 112 \\ \underline{-112} \\ 0 \end{array}$$

4) Time Calculations:

$$\begin{array}{r} 1 \text{ hr } 35 \text{ mins.} \\ + 2 \text{ hrs } 45 \text{ mins.} \\ \hline 3 \text{ hrs } 80 \text{ mins. (1hr. 20 mins.)} \\ = 4 \text{ hrs } 20 \text{ mins.} \end{array}$$

5) Finding a Fraction of a Number:

(a) Use Unitary Method. e.g. Find $\frac{3}{8}$'s of 72

$$\begin{array}{r} 8/8 = 72 \\ 1/8 = 9 \\ 3/8 = 27 \end{array} \qquad \begin{array}{r} 8 \overline{) 72} \\ \underline{9} \\ 27 \end{array}$$

(b) of = multiply

$$\text{Find } \frac{3}{8} \text{ of } 72 \quad \rightarrow \quad \frac{3}{8} \times \frac{72}{1}$$

6) Given a fraction find the whole number:

e.g. $\frac{7}{9}$ of a number is 42 find the whole number.

$$\frac{7}{9} = 42$$

$$\frac{1}{9} = 6$$

$$\frac{9}{9} = 54$$

$$\frac{9}{9} = 6 \times 9 = 54$$

7) Fractions: Addition of Mixed Numbers.

$$\begin{array}{r} 2 \frac{5}{6} + 3 \frac{3}{4} \qquad \text{LCD} = 12 \\ = 2 \frac{10}{12} + 3 \frac{9}{12} \\ = 5 \frac{19}{12} \\ = 5 + 1 \frac{7}{12} = 6 \frac{7}{12} \end{array}$$

8) Subtraction of mixed numbers:

$$\begin{array}{r} 3 \frac{1}{5} - 2 \frac{7}{10} \qquad \text{LCD} = 10 \\ = 3 \frac{2}{10} - 2 \frac{7}{10} \\ = 2 \frac{12}{10} - 2 \frac{7}{10} \\ = \frac{5}{10} \\ = \frac{1}{2} \end{array}$$

DECIMALS:

When dealing with decimals we will use money so that children will understand the place-value of the digits within a decimal number and learn from the physicality of the operation:
e.g.

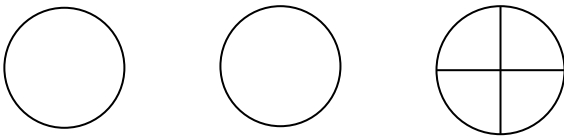
€38 . 38	=>	T	U	.	1/10	1/100	Money
		3	8	.	3	8	Place value

The decimal point is used to separate the pieces from the wholes.

Fractions:

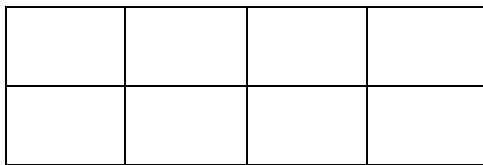
Fractions will be introduced by using Fraction walls and Fraction Circles:

e.g.



1 unit = 2 halves = 4 quarters

Paper folding will also be used to explain the equivalence of fractions:



$\frac{2}{8} = \frac{1}{4}$ $\frac{4}{8} = \frac{1}{2}$ $\frac{6}{8} = \frac{3}{4}$

Decimals: The decimal point never moves:

e.g. $2.4 + 3.76 + 1.957$

2.4
3.76
+ 1.957

} Snowman effect

Discussion skills when working in groups

- Turn-taking
- Active-listening
- Responding positively to the opinions of others
- Confidence in putting forward an opinion
- Ability to explain clearly their point of view

Problem-Solving

The focus is on real life problem solving.

Types of problems

- Word problems
- Practical tasks
- Open-ended investigations
- Puzzles
- Games
- Projects
- Mathematical trails
- Missing Contradictory Surplus Data

Using the Environment

The children are learning all the time from the people and materials around them. In our teaching we look to the environment of the classroom, the school grounds, the locality of the school, the children's homes and the wider world for opportunities to make maths more real, more interesting and more fun.

Creating a maths rich environment

- Maths area/maths table/maths display board in every classroom
- Benchmarks e.g. card marking '1 metre' on wall
- Special box or shelf for maths books/worksheets
- Puzzles and card games
- Mathematic's projects that are on display for pupils throughout the school to appreciate
- Environmental school trails in teachers' shared folder
- Number rich environment in Infant rooms
- Playground games and equipment

Whilst teaching a maths strands, the following skills span the content

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

Assessment and Record Keeping

Assessment is an integral part of the teaching and learning process. All strands of the maths programme will be assessed using a variety of assessment tools.

Teacher Observation

- The teacher observes the child's activity, written work, discussion and questioning during class or group work.
- Interview Method with the pupil and teacher on both a formal and informal basis
- Error Analysis: the teacher and pupil discussing the method and exploring where and how the error occurred
- Homework/Parental feedback
- Work samples, copies and projects.
- Pupils from the Senior classes keeping folders of work samples of each mathematical topic

- Teacher designed tasks and tests
- Oral tests/games of recall skills to ensure knowledge of tables/number facts

Standardised Tests

Sigma-T tests will be administered from 1st class to 6th class in April/May each year. Records will be kept safely in the filing cabinet. The results will be communicated to parents on end-of-year report cards.

Diagnostic Tests

Where an area of concern/challenge had been identified, a more detailed test may be administered. Diagnostic testing will be used in this situation by the learning support teacher with parental consent. Errors will be analysed and used as a means of identifying children's strengths and their readiness for further learning.

Children with Different Needs

Children in each class will show a wide range of ability, attainment and learning styles. Consequently the mathematics programme will be flexible to accommodate children of different levels of ability and will reflect their needs.

Adapting to the needs of the less abled mathematical child

- Use easily computed figures when introducing new concepts
- While the children will be exposed to all aspects of the curriculum, certain areas must be prioritised (milestones/core curriculum concepts)
- Adapting the programme to suit their ability
- More individual attention
- Peer support
- More concrete to abstract approach
- Emphasising maths language
- Maths games
- Maths software (IT Hub and use of I-pads with numeracy apps)
- Resources
- *Supplementary resources and materials made available to all teachers*
- Consultation with Support teacher for advice, resources and supplementary support

Suggesting strategies for challenging the better abled mathematical child

- Problem solving books/Brain Teaser Books/Brainbox
- Maths Facts Book
- Oral maths worksheets
- Maths dictionary/folder
- Group projects that stimulate pupils to expand their thinking and apply learned concepts
- Invite pupils to make up problems, including maths trails
- Maths games
- Maths software

Section 2: Organisational Planning

Timetable

Maths will be allocated - 3 hours per week in Classes Afternooners to 6th class
2.15 hrs for classes from Middle Mornings below

Discretionary time can be allocated, at the teachers and at the schools discretion, especially when specific projects are being carried out in the classroom.

Homework

Maths homework will be given every day, Monday to Thursday. Homework is a consolidation of work cover the school day. It should be reasonable and achievable. Concepts for homework should be already well established in classroom practice. Homework will not be given on a particular concept until it has been well established in practice.

Types of homework

- Written consolidation of work done in class
- Tables
- Problem solving
- Practical assignments
- Research
- Collecting data

Resources and ICT

Teaching materials will be provided at all class levels and in every strand. Children will experience a variety of materials and will have the freedom to choose from these when exploring a mathematical task. A variety of teacher designed worksheets, photocopiable master books, teacher reference books and textbooks will be used in order to present work to the children in a variety of ways. Calculators(4th to 6th), IT Hub and I-pads will enhance the implementation of the mathematical curriculum.

Calculators

Pupils in Fourth, Fifth and Sixth Class learn to use calculators for some maths activities. Children will always be encouraged to estimate first before calculating exact result on the calculator.

Maths and ICT

Like the calculator, the computer is a tool to enhance the implementation of the mathematical curriculum.

Some of the uses of ICT in Mathematics are:

- drill and practice
- adventure programs
- data bases
- spreadsheets
- using the internet to access materials and information

Textbooks

Mathematical textbooks will not be used in the Morning and Montessori 3-6 classes. Textbooks will be evaluated by teachers and will include a balanced treatment of all strands, varied presentation of problems and an emphasis on the use of manipulatives.

A variety of textbooks could be made available to the children based on the quality of their content in particular strands e.g. Mathemagic, Action in Maths, Ready Steady Maths.

Montessori classrooms have rich materials to support the philosophy of discovery and exploration of mathematical concept through a guided teacher approach.

Also having a selection of different mathematic books or graded workcards will help provide extension work for children who have mastered a concept.

Parental Involvement - Home School Links

Communicating with parents about the correct terminology/language and methods being used

- Welcome Meeting at each class level at the start of the school year
- Information meeting for new pupils to the Montessori 3-6 classes hosted by the principal and deputy principal in May.
- Advisory notes as the need arises
- Mathematical folders which provide a guide/samples/descriptors of math concepts
- Write language of tables in the table book
- Parent -teacher meetings
- Open door policy
- Talks given by parents for senior classes
 - Mr Cranwell on Accountant
 - Mr O'Brien on Eye Consultant
 - Dr Murphy on Dentistry and Mouth Trauma
 - Mr Nichol on Geologic and Life work on the oil rigs

Appendix A

Maths language across the Strands

A summary of the language which can be used at each level. It can be used to support language work in the class, as a support to substitute teachers, as a guide to planning, or as a help to ancillary staff working with students in the classroom or within the school context. It is not an exhaustive list and can be added to as required.

Junior Infants	Senior Infants
Long/short, longer/shorter More than/less than/ same as First/last Over, under, up, down, on, beside, in Shape Square, circle, triangle, rectangle Roll/ do not roll Fit/ do not fit Round/not round, thick, thin Long/short, tall/short, wide/narrow, longer, shorter, wider than Heavy/light, heavier/ lighter, balance, weigh Full/nearly full/empty/holds more /holds less/ holds as much as Morning/evening, night/day, lunchtime, bedtime, early/late, days of the week, schooldays, weekends Buy, sell, spend, coins pence, how much? cent Enough/more/as many as/less	As Junior Infants plus: Ordinal number – first, second, third, last Above, below, near, far, right, left Cube, cuboid, sphere, cylinder Edge, corner, face, straight, curved, round, flat, side, corner As long as/as wide as/longest/shortest Yesterday/today/tomorrow/seasons/soon/not yet/birthday Cost, price, cheap/expensive, change, too much/too little Cost, price, cheap/expensive, change, too much/too little Pictogram sets
First Class	Second Class
As Senior Infants plus: Between, underneath, on top of, around, through, left, right Square, rectangle, triangle, circle, semicircle; pentagon Half Cube, cuboid, cylinder, sphere cone Length, width, height, measure, nearly a metre, a bit more than/a bit less than a metre Heavy, heavier, heaviest, light, lighter, lightest, balance Pour, fill, full, empty, holds more, less or the same amount as Reading day, date and month using calendar Hour, half hour Metre, litre, kilogram 3D shapes	As First class plus: Quarter Cone, oval Metre, centimetre Euro Symmetry Area Digital clock/time Block graph Corners

First Class continued	
3D shapes Roll, slide, stack Faces Edges Corners Equals/Target Partioning/Splitting/Joining Problem Solving Number Story Odd/Even Place in Order Terminology for coins, cent, coins, How much how many, change Measurement – finger tip/span/stride Estimate Investigate Notation board/bead frame	

Third Class	Fourth Class
As Second class plus: Regular/irregular shapes Sphere, triangular sphere, prism, pyramid Sides, angles, parallel and non-parallel lines Tessellate Nets Symmetry Vertical, horizontal and parallel lines Clockwise/anti-clockwise Gramme, kilogram Possible, impossible, might, certain, not sure Roll, toss, spin, chance, random Tenths Minute Equivalent Bar chart	As Third class plus: Equilateral, isosceles, scalene triangle, parallelogram, rhombus, pentagon, octagon Diagonal Oblique, perpendicular lines Acute, obtuse and right angles Perimeter Hundredths Chance, likely, unlikely, never, definitely Bar line graph Scale

Fifth Class	Sixth Class
<p>As Fourth class plus:</p> <p>Thousandths</p> <p>Prime and composite numbers</p> <p>Square and rectangular numbers</p> <p>Factors, multiples</p> <p>Positive and negative numbers</p> <p>Equations</p> <p>Quadrilaterals</p> <p>Diameter, radius, chord, circumference, arc, sector, tangent</p> <p>Tetrahedron</p> <p>Vertices</p> <p>Reflex angle, degrees</p> <p>Millimetre</p> <p>Square metres/centimetres</p> <p>Millilitres</p> <p>Pie chart, multiple bar chart</p> <p>Statistics</p> <p>likelihood</p> <p>rotation</p>	<p>As Fifth class plus:</p> <p>Square roots</p> <p>Quotients</p> <p>Octahedron</p> <p>Scale</p> <p>Ares/hectares</p> <p>Trend graph</p>

Appendix B

Glance Cards

Guidelines for Individual Schemes