

Maths Scheme Montessori

Primary Classes: 2 ½ – 6 years

Introduction

Learning mathematical concepts in a Montessori classroom begins concretely and progresses towards the abstract. The children move from simple to complex. The process is taught first and facts come later. Order, coordination, concentration, and independence are experienced by the child using concrete materials. The mathematical curriculum formally begins with the introduction to number but the mathematical skills are developed in the young child's work with the sensorial materials. These materials introduce the child to attributes and qualities i.e. length, width, height, colour and all the associated mathematical language. This is a developmental curriculum that spans from 2 ½ to 6 years old. Each lesson is given individually as the child shows he/she is ready. This ensures each child is appropriately challenged at their developmental level.

Aims:

- To provide the pupils of the primary Montessori classes with a maths programme that is developmentally appropriate and socially relevant.
- To support the aims of the primary curriculum for maths by:
- Developing a positive attitude towards maths
- Developing problem solving abilities and the facility to apply maths to everyday life
- Enabling the children to use maths language effectively and accurately
- Enabling the child to acquire an understanding of mathematical concepts and processes to his/her level of development and ability.
- Enabling the children to acquire proficiency in fundamental maths skills and in recalling basic number facts

The scheme covers the five strands of the mathematics curriculum -

- Strand 1 Number
- Strand 2 Algebra
- Strand 3 Shape and space
- Strand 4 Measures
- Strand 5 Data

The following skills span the content of each of these five Strands

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

The content of the Maths Scheme for the primary Montessori classes builds on the work the children have done in the previous years and will consolidate and develop the pupils' experience, skills and mathematical knowledge in an environment that promotes enthusiasm, curiosity and creativity in the child.

Mathematical Yearly Overview for 3-6 Class

Strand	Strand Unit	Montessori Material	Linkage and Integration
Early Mathematical Activities	Classifying Matching Comparing Ordering		
Number	Counting Comparing & Ordering	<p>Middle Morning (Junior Infant) Using concrete materials count the number of objects in a set 0-10, number rods, sandpaper numerals, number rods and cards, spindle boxes, counters and cards, memory game</p> <p>Afternoon (Senior Infant) Using concrete materials count the number of objects in a set 0-20, teen boards, teen beads, teen boards and beads together, strip boards, snake game Golden bead material, 0, 10, 100, 1000 cards and beads</p> <p>Middle Morning (Junior Infant) Using concrete materials (spindle boxes, cards & counters, coloured bead stairs, memory game, story of ten with red rods) compare equivalent sets 0-10 by matching, lay out objects in ascending order Ordinal Number Language: 1st, 2nd, 3rd, 4th, 5th ...</p> <p>Afternoon (Senior Infant)</p>	

		<p>Using concrete materials (teen boards, ten boards, teen boards with beads, snake game,) compare equivalent sets 0-20 by matching, lay out objects in ascending order Ordinal Number Language: 1st, 2nd, 3rd, 4th, 5th ... Copy work: filling in missing number in ascending and descending order</p> <p>Analysis of Number</p> <p>Middle Morning (Junior Infant) Using concrete materials explore ways of making numbers in a set 1-10, number rods, strip boards, snake game, 4 and 1 is 5, 2 and 2 and 1 is 5....</p> <p>Combining</p> <p>Simple addition with beads</p> <p>Afternoon (Senior Infant) Using concrete materials explore ways of making numbers in a set 1-20, strip boards, snake game Simple addition with beads Using golden bead material and decimal system cards, explore ways of making numbers in a set 1-9000, golden beads and large cards Operations addition and subtraction with golden beads Recording on squared paper/copy</p> <p>Partitioning</p> <p>Middle Morning (Junior Infant) Using concrete materials partition sets of objects 1-5 Simple addition with beads</p> <p>Afternoon (Senior Infant) Using concrete materials partition sets of objects 0-10 Record pictorially on paper/copy Simple addition with beads Addition with Bank Game</p> <p>Numeration</p> <p>Middle Morning (Junior Infant) Using concrete materials develop an understanding of conservation of number 1-10, number rods, number rods and cards, spindle boxes, counters and cards, memory game, golden bead material and decimal system cards Sandpaper numerals. Read and write numerals 0-5 on squared paper Identify empty set / zero: Spindle boxes Estimating number of objects at a glance 0-5: number rods, spindles, counter and cards Oral problems: addition cards</p>	
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		<p>Afternoon (Senior Infant) Using concrete materials develop an understanding of conservation of number 1-10, number rods, number rods and cards, spindle boxes, counters and cards, memory game, golden bead material and decimal system cards Sandpaper numerals. Read and write numerals 0-10 on squared paper Identify empty set / zero: Spindle boxes Estimating number of objects at a glance 2-10: number rods, spindles, counter and cards Oral problems: addition cards</p>	
Algebra	Extending patterns	<p>Middle Morning (Junior Infant) Threading beads with pattern cards extending pattern, 2 shapes, 2 colours Putting Gummed paper shapes in pattern Four Knobless Cylinder Boxes and extension cards Afternoon (Senior Infant) Threading beads with pattern cards. Copy and extending patterns with 3 and 4 shapes, colours, size, number Cutting and sticking paper into patterns Counters and Cards Activity: Using counters to make different arrays of same number Missing numbers: Copy work, fill in the blanks 1 to 10</p>	<p>Visual Arts: Repeating patterns</p>
Shape and Space	<p>Spatial awareness</p> <p>3-D Shapes</p>	<p>Middle Morning (Junior Infant) Preposition Cards: over, under, up, down, on, beside, in Geometric Cabinet Afternoon (Senior Infant) Preposition Cards: above, below, near, far, right, left Geometric Cabinet</p> <p>Middle Morning (Junior Infant) Geometric Solids: cube, sphere, ovoid, ellipsoid, rectangular prism, square based prism, triangular based prism, cone, square based pyramid, triangular based pyramid Extensions: which solids do/do not roll, do/do not fit together Solving tasks and problems: 4 cylinder blocks, geometric cabinet Afternoon (Senior Infant) As Above Exploring Geometric Solids: edges, faces, corners/vertices, straight, curved, round, flat Combine solids to make other shapes</p>	<p>Physical Education: Dance Gymnastics</p> <p>Visual Arts: Construction Making designs with metal insets SESE: 3D shapes in the child's environment</p>

	<p>Capacity</p>	<p>Afternoon (Senior Infant) As Above using vocabulary and discussion estimating weight Extensions: 1. Ordering a group of objects, lightest to heaviest 2. Use a weighing Scales to weigh and compare objects, how many chestnuts will balance an apple?</p> <p>Middle Morning (Junior Infant) Fill and empty different sized containers using smaller containers and discuss pouring, spooning, full, nearly full, empty, holds more, holds less, holds as much as. Emphasise that full means full to the top.</p> <p>Afternoon (Senior Infant) As Above using exact vocabulary and discussion estimating and measuring capacity. Estimation: how many spoons of rice to fill glass? How many egg cups will fill jug? Maths Language cards: Written prepared slips with pictures problems – how many glasses of lentils will fill a basin?</p>	<p>SESE Geography: The Physical World</p>
	<p>Time</p>	<p>Middle Morning (Junior Infant) Simple timelines, morning/night, day/night, early/late, days of week.... Calendar/Weather Charts Language Cards: sequence pictures/photographs with child’s daily routine, daily events</p> <p>Afternoon (Senior Infant) As Above using vocabulary and discussion yesterday/today/tomorrow, seasons Clocks , o’clock and half past Putting pictures in time order Reading sentences and putting in time order</p>	<p>SESE Geography: The Physical World SESE History: Myself and my family</p>
	<p>Money</p>	<p>Middle Morning (Junior Infant) Exploration of real money, shapes, size, colour and value differences/similarities Identifying 1c, 2c and 5 c Use stamps of coins and ink pad to make booklets/pages with coins</p> <p>Afternoon (Senior Infant) As Above plus, 10c, 20c, 50c, €1 and €2 Use stamps of coins and ink pad to make booklets/pages with coins Problem solving with Picture Cards with values eg. 20c and child makes with lower denominations</p>	<p>Gaeilge: Ag Siopadóireacht SESE History: Artefacts</p>

Data	Recognising and interpreting data	<p>Middle Morning (Junior Infant) Classifying and sorting sets according to one criterion: Colour tablets, Progressive exercises, geometric cabinet, fabrics, language cards (living/non-living, plant/animal, vertebrate/invertebrate) Use real objects, pictures and photos to represent sets Language: enough, more, as many as, less</p> <p>Afternoon (Senior Infant) Classifying and sorting sets according to one and two criteria: Colour tablets, Progressive exercises, geometric cabinet, fabrics, language cards (living/non-living, plant/animal, vertebrate/invertebrate) Use real objects, pictures and photos to represent sets, red/not red objects, with/without wheels Representing data in two/three rows or columns, interpretation and discussion of results</p>	SESE Geography: Human Environments and Natural Environments
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Maths Language

- Class Development. Revise language already cover in previous classes.

Montessori Classes

2 ½ - 6

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, 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. Pictogram sets.

Methodologies

A variety of methodologies is an important aspect of the maths programme as it helps children with differing learning styles to access the curriculum. The following approaches will be employed to enhance each child's mathematical education;

- **Guided discussion-includes discrete teaching of discussion skills such as:** turn –taking, active listening, positively responding to peers, clarity and confidence in giving opinions
- **Hands on approach-** pairs or individually
- **Maths Language-**consistency in use of language, symbols and directionality in computation work
- **Estimation procedures-**estimate first, write down your estimate, solve the problem, compare your estimate with the actual result
- **Estimation strategies-**front end strategy, clustering strategy, rounding strategy, special strategy
- **Problem Solving-**estimating, making a model , drawing a diagram, trial and error, making a table or chart of the information, patterns in problems, guesstimate, breaking down into parts, number sentences, manipulatives, act out problem , solving a simpler version of the problem
- **Use of Environment-**Mathematical Trails
- **IT Hub and I-pads-** to be used as a teaching tool/ aid to address drill and practice and to access supplementary materials and information from the internet.

Differentiation

Whole class teaching of maths will include a range of differentiation strategies to support less able and better able pupils and e.g. variations in computation practice work, mixed ability group work, peer tutoring, extension and extra practice activities available to students, additional use of manipulatives. There will be explicit teaching of Maths language. Purposeful practice will be practiced through maths projects, worksheets, collaborative group tasks, maths games and software.

Children in the Primary Montessori class may benefit from supplementary support in numeracy from time to time. There will be a team approach to the planning of their work with the emphasis on consolidating key concepts and reinforcing activities. They may focus on a modified/extension/consolidation/reinforcement programme of the primary Montessori class mathematical scheme of work. See Learning Support Policy for further guidance.

Assessment

Assessment is a continuous, dynamic informal and formal process.

The following assessment tools are a menu of concepts that will be used

- **Teacher observation**-this is ongoing and will be used as follows: to check understanding of concepts, correct use of methodologies, layout and presentation of work skills, engagement in pair or group activities. Checklists.
- **Error Analysis/ Interview**-may be used if more detailed information necessary.
- **Teacher designed tasks and tests**-daily oral tables and mental maths, weekly written table's tests, termly written revision tests based on the class textbook.
- **Work samples**-used to support improvements in layout and presentation of work, to identify and correct common computation and methodology mistakes and to affirm children's progress and development. Samples to be kept in folder.
- **Pupil profiles**-compilation of test results and work samples, kept in folder in classroom and used for reporting to parents and other teachers.
- **Standardised testing**- If felt that its needed on an individual basis.
- **Diagnostic testing**-administered by the learning support teacher, subsequent support strategies devised in consultation with class teacher etc.

Resources/ Manipulatives

The Montessori Materials are used as a concrete aspect of each lesson in our classrooms. All of these materials are outlined in the Directress' teaching Albums which each Directress has in their classroom.