Riverview ETNS Mathematics Policy
December 2020

Introductory Statement

Riverview ETNS is a developing school. At the time of writing we cater for children up to and including 3rd class and by September 2023 we will cater for children up to 6th class. This policy is based on the Primary Curriculum 1999 along with decisions and ideas suggested and practised by our school's current teachers, and should provide a framework that promotes the inter-curricular teaching and learning of mathematics (maths) throughout the school as it grows.

Rationale

It is intended that this policy will support us to:

- Communicate our approach to maths in Riverview
- Outline the content, methodologies and language for the teaching of maths at each class level
- Support consistency in teaching methodologies throughout the school
- Outline details on planning, resources and assessment
- Inform new or temporary teachers of the approaches used in our school

Vision

That every child and teacher in Riverview feels empowered and excited to approach mathematical problems (whether labelled as maths or 'hidden' maths) applying broad, creative thinking and with growth mindset and collaborative spirit.

Aims

We aim to:

- Encourage a positive attitude towards maths and an appreciation of both its functional and aesthetic aspects, and the interweaving of the two
- Provide activities which stretch each child's creative boundaries, thus fostering increased creative thinking and ability

- Support each child to use mathematical language effectively and accurately across the curriculum
- Enable each child to acquire a deep understanding of mathematical concepts and processes to his/her individual level of development and ability
- Enable each child to develop a solid 'number sense' which will inform their mathematical activity.
- Develop understanding, fluency and proficiency with 'number facts' through a range of diverse strategies.
- Provide activities which strengthen each child's ability to collaborate with peers effectively, with fun and good spirit
- Develop the ability to think and reason logically
- Develop problem-solving abilities and a facility for the application of mathematics to everyday life
- Foster an environment of comfortable mistake-making and risk-taking; and subsequent reflection, amending and re-trying
- Integrate maths into all other curriculum areas and Forest School
- Place a large emphasis on active learning and outdoor strategies
- As a staff, reflect, discuss and amend our practises frequently, as we are informed by observation and assessment

Curriculum Planning

The curriculum is classified into five strands for all classes:

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

However, each strand is not taught individually; rather, students should engage with multiple strands in all maths lessons and activities, as advised by the curriculum:

These strands, although presented in separate sections, are not isolated areas. They should 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. Such linkage within the subject is essential." Mathematics Curriculum 1999 p.3

Teachers use the textbook *Operation Maths* (Edco) as a curriculum guide, and the accompanying assessment books to assess students' ability to complete a written test at the end of each term. (See Assessment section of this document for further methods of assessment.)

Overview of strands and skills for each class (taken from the Mathematics Curriculum, p.10):

Overview

infant to second classes

Skills development

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

Strands	Infant classes *Strand units*	First and second classes *Strand units*
Early mathematical activities	• Classifying • Matching • Comparing • Ordering	
Number	• Counting • Comparing and ordering • Analysis of number *Combining* *Partitioning* *Numeration*	• Counting and numeration • Comparing and ordering • Place value • Operations *Addition* *Subtraction* • Fractions
Algebra	• Extending patterns	• Exploring and using patterns
Shape and space	• Spatial awareness • 3-D shapes • 2-D shapes	• Spatial awareness • 2-D shapes • 3-D shapes • Symmetry • Angles
Measures	• Length • Weight • Capacity • Time • Money	• Length • Area • Weight • Capacity • Time • Money
Data	• Recognising and interpreting data	• Representing and interpreting data

Overview

third to sixth classes

Skills development

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

Strands	Third and fourth classes *Strand units*	Fifth and sixth classes *Strand units*
Number	• Place value • Operations *Addition and subtraction* *Multiplication* *Division* • Fractions • Decimals	• Place value • Operations *Addition and subtraction* *Multiplication* *Division* • Fractions • Decimals and percentages • Number theory
Algebra	• Number patterns and sequences • Number sentences	• Directed numbers • Rules and properties • Variables • Equations
Shape and space	• 2-D shapes • 3-D shapes • Symmetry • Lines and angles	• 2-D shapes • 3-D shapes • Symmetry • Lines and angles
Measures	• Length • Area • Weight • Capacity • Time • Money	• Length • Area • Weight • Capacity • Time • Money
Data	• Representing and interpreting data • Chance	• Representing and interpreting data • Chance

Approaches and Methodologies

A thematic approach will be adopted by teachers on a regular basis, allowing integration of maths within all subject areas, using a variety of approaches and methodologies.

1. Maths throughout the day
    - Day, date, times, sequence of day's events, timetables, comhaireamh as Gaeilge
    - Fine motor skills and using fingers: naming fingers, counting on fingers
    - Songs and rhymes which incorporate counting and mathematical concepts
    - PE/yard/active breaks: counting jumps/reps in 1s, 2s, 5s, months of the year, etc..

2. Stories as stimulus
    - Fairytales which use numbers, planets where beings have different numbers of fingers and hence a different base number, etc.
    - History and Geography of particular mathematical concepts
    - Stories as a base for problem solving or word problems

3. Play
    - Free and structured play of manipulatives: interlocking cubes, Numicon, links, counters, dominoes, playing cards, dice, lego, pattern-making manipulatives
    - Board games: Snakes & Ladders, Draughts/Chess, Uno
    - Role play (e.g. shop)

4. Talk & discussion
    - Number talks (see Resources section)
    - Student presentations and ideas
    - Defense and debate (e.g. 'I think this shape is a square because..' , 'I don't think the surface area of these 2 shapes is equal because)
    - Partner/group talk during project work
    - Whole-class discussion and real life examples

5. Projects
    - Open-ended investigations lasting over several sessions
    - Whole-school projects
    - Science experiments incorporating measurements and data

6. Maths stations or teacher-led small group work
    - Each class engages in station work for a 6 week block (minimum) per year
    - Stations may be differentiated by ability
    - Stations may include new concepts explored with class teacher, ICT, independent/guided book work, group investigation, tasks, revision of familiar concepts

7. Outdoor maths

- Outdoor Aistear/Play (Infants) using natural materials, blocks, hoops, chalks, etc
- Maths trails
- Maths in Forest School (see resources)
- Capacity games and activities
- Spatial awareness activities: Giant clock, rounders, drills, counting games (Mr Wolf, Clumps, etc)

8. Writing, recording and book work
    - Textbook: Operation Maths
    - Mental Maths book
    - Maths journals / self-assessment books
    - End of term written tests

9. Maths wall displays
    - Vocabulary and images of concepts already explored in lessons
    - 'Maths eyes' - drawing students' attention to patterns existing in our immediate environment
    - General: One hundred square, calendar, birthday dates

10. Pair/group work and collaborative work (without teacher)
    - Clipboard outdoor investigations/ maths trails
    - Collecting data from other classes for data projects
    - Assembling a display poster
    - Carrying out a task or project

Skills

- Estimation
- Counting forwards/backwards, in 2's, 10's, etc
- Operations (-, +, x, /) orally or written
- Translating between words and maths code
- Making things from concrete materials or drawing pictures
- Describing observations and realisations (oral, written or pictorial/concrete)
- Working in a team to solve problems
- Using appropriate mathematical language (see Table 1 in Appendix for suggested vocabulary for each class)

Resources

- Books:
    - Operation Maths (including teacher resource book and At Home book)
    - Mental Maths
    - Mindset Mathematics
- Mini whiteboards and pens
- Maths copybooks/scrapbooks/journals, at class teacher's discretion
- Interactive whiteboard

- Concrete materials (see table in appendix)
- Websites:
    - Nrich.org
    - Youcubed.org
    - Haveyougotmathseyes.com
    - Mathsweek.ie
    - Topmarks.co.uk/maths-games
    - Mathletics.ie
    - Khanacademy.org
    - Operation maths online resources
- Outdoor maths resources
    - Stones, sticks, pebbles
    - Bandanas
    - Containers of different sizes
    - Mats with numbers
    - Beanbags with numbers
    - Chalks
    - Clipboards, pencils

Differentiation

Research has shown that learning in mixed ability groups is advantageous for students; therefore the majority of maths learning in Riverview happens without ability grouping, apart from in maths stations where groups are streamed in order to teach specific concepts to particular groups. Tasks, questions and projects are, in general, open-ended and allow for individual creativity, mistakes, reflection and growth mindset.

Where a child demonstrates a particular difficulty in accessing the tasks:

- The teacher will provide extra support and assistance to the child during maths lessons
- The teacher may engage a support teacher to work in class during a maths lesson
- Maths stations will allow the child to work at a slower pace in a smaller group
- If necessary, a child may leave the classroom to work one-to-one, or in a small group, with a support teacher on a particular task

AEN details:
Where an ongoing difficulty with maths has been identified:

- A child may be timetabled for regular extra support in maths, where capacity in the AEN timetable allows.
- This may occur individually or in a small group

Where a child demonstrates exceptional ability in maths:

- The teacher may ask this child to assist another child/children in the class, thus facilitating the child to take the next step in her/his learning: learning to effectively share their knowledge and abilities, which, in turn, reinforces their own
- The teacher may provide extension tasks onto the original task set for the class
- The child may attend a higher class for maths once a week
- The school may engage with organisations such as the Centre for Talented Youth.

Assessment

"It is important that children view assessment as a positive experience which can help them in future work. They can be encouraged to take an active part in recording their own

successes in a personal notebook and to practise self-assessment by discussing their achievements or problems with the teacher."
Teacher Guidelines, Curriculum 1999

1. Teacher observation

Children are primarily assessed by teacher observation. As well as observing during the maths lesson, teachers may also take notes, checklists, photos and examine written/drawn work. Teachers also observe the children's own reflections on their learning.

2. Self-assessment

In all tasks, activities and projects, children reflect on their own understanding and learning. This can be facilitated by the teacher in the following ways:

- Questioning, preferably with open-ended, higher order questions, to avoid a children being right or wrong
- Conferening: sometimes the teacher might want to talk one-to-one with a child about how they feel they are doing
- Presentations: a project session will often finish with the children presenting to the class, the teacher or their group what they have made or discovered
- Work and/or photos displayed on the wall: Sometimes children may reflect over a longer period of time, and make reflections and conclusions days later after the work has been done, or in light of new knowledge

3. Tests

At the end of each term, children will complete the test for that term in their Operation Maths test booklets. It is important that children learn how to engage in a very specific task in silence with no help from their peers or the teacher. Children are encouraged to check back over their work before and after the teacher has marked it.

4. Standardised Testing

Children will undertake standardised tests in mathematics in accordance with the National Literacy and Numeracy strategy (2011), in 2nd, 4th and 6th class, in the May/June period. Standardised tests may be issued in other classes at the discretion of the school. For further details, please see Assessment Policy.

Homework

Children will have at least one maths related part of their homework each week. This may be one or more of the following:

- Page(s) from Operation Maths at Home book
- Page from Mental Maths book
- Specific maths task allocated by teacher
- Mathematical elements within homework projects

Number Facts:

Proficiency with basic number facts is central to more advanced work with numbers and problem-solving. We acknowledge the diversity of mental strategies and 'tricks' which can be used in calculating number facts. We aim to help children to notice and understand these and move towards the adoption of efficient strategies.

Children will develop understanding, fluency and automaticity of number facts through the a range of methodologies such as:

- visual patterns (e.g. five frames, ten frames, dice patterns)
- observation of number patterns (e.g. multiples of 4 are all even, digits in the two-digit multiples of 9 add up to 9 etc.)
- songs & rhymes
- choral chanting and 'counting choirs'.
- skip counting and tables
- counting sticks
- whole-class games and tournaments
- dice and card games

Staff Continuous Professional Development (CPD) in maths
Each year at least one teacher undergoes CPD in maths education, and relays the information learned to the other teachers. This document and classroom practises may be updated as a result.

Implementation
The Principal, in cooperation with staff and the Maths coordinator, will be responsible for the implementation of this policy and the upkeep of resources.

Review
It will be necessary to review this plan on a regular basis to ensure optimum implementation of the Maths curriculum in the school. The whole staff is responsible for coordinating this Review with possible input from: teachers, pupils, parents, Board of Management, DES and Inspectors.

Ratification and Communication
This policy has been made available to school personnel and the Parents' Association and is readily accessible to parents via the school website. A copy of this policy will be made available to the Department and the patron if requested. This policy will be reviewed by the Board of Management at regular intervals.

This policy was adopted by the Board of Management on - - -

Signed (Principal): _____
Date: _____

Signed (Chairperson of Board of Management): _____
Date: _____

Table 1: Suggested symbols and terminology for each class (Teacher Guidelines p.70)

Symbols, numerals, fractions and terminology

	Junior infants	Senior infants	First class	Second class	Third class	Fourth class	Fifth class	Sixth class
Symbols		+ =	– frame □ p cent	< > £ €	× ÷ decimal point		% degree°	positive and negative notation +2, −5 exponent e.g. 4^2
Numerals	0–5	6–10	to 99	to 199	to 999	to 9999		
Decimals					one place of decimals 0.1 $\frac{1}{10}$	two places of decimals 0.01 $\frac{1}{100}$	three places of decimals 0.001 $\frac{1}{1000}$	
Fractions			$\frac{1}{2}$	$\frac{1}{4}$	$\frac{1}{8}$ $\frac{1}{10}$	$\frac{1}{3}$ $\frac{1}{5}$ $\frac{1}{6}$ $\frac{1}{9}$ $\frac{1}{12}$		
Measures			metre litre kilogram	centimetre	gram millilitre	kilometre m^2, cm^2	millimetre	ares hectares
2-D shapes	square, circle, rectangle, triangle		semi-circle	oval	hexagon	parallelogram rhombus pentagon octagon triangles: *equilateral isosceles scalene*	quadrilateral trapezium	
3-D shapes		cube, cuboid sphere, cylinder		cone	triangular prisms pyramid		tetrahedron	octahedron
Time	vocabulary of time	read time in one-hour intervals	read time in half-hour intervals	read time in quarter-hour intervals	read time in five-minute intervals		24-hour clock	

Table 2: Suggested mathematical equipment for classrooms (Teacher Guidelines p.72)

Suggested list of mathematical equipment

Number

- number lines, strips, abacus and rubber stamp abacus
- magnetic board strips
- counters, beads, string, buttons, Unifix cubes, spools and sorting trays
- Dienes blocks, Cuisenaire rods
- pegboards and pegs
- number ladder
- story of 10 boards
- hundred square (with and without numbers)
- fraction, decimal, percentage walls
- number slabs
- number balance
- playing-cards and dominoes
- notation boards

Shape and space

- 2-D and 3-D shapes, geo-boards, tangrams, geo-strips
- direction compass
- set-squares, clinometer
- blackboard compass, set-squares and protractor
- 360° and 180° protractors
- gummed paper, paper shapes
- construction straws
- construction kits

Measures (standard and non-standard)

Length

- unmarked sticks, metre stick, half and quarter-metre sticks, trundle-wheel, height chart, tape measures, rulers, ribbon or string
- bamboo poles

Weight

- balance, kitchen scales and bathroom scales, weights, spring balance

Capacity

- litre, half and quarter-litre containers, varied collection of containers for comparison

Time

- clock faces and rubber stamps, clock (analogue and digital)
- calendar and date stamps
- sequencing pictures

Money

- facsimile money, money stamps

General mathematical equipment

- Lego, books and games
- water or sand tray
- scissors (left and right-handed)
- magnifying glass, magnets, microscope
- rain gauge, barometer and thermometer
- overhead projector
- television and video programmes
- computer programs
- calculators
- selection of dice