

JOHN SCOTTUS NATIONAL SCHOOL

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Maths Whole School Plan

Approved: March 2018; next review 2021

Key Points Summary

- Oral fluency: 10m per day; from SI to 5C 100 Maths Starters (or better)
 - Infants: 37m; Everyone else: 46m
- Spiral development of specific maths Language
- Geometry: (suggested books for 2C to 6C; St James' books); bi-annual beautiful maths week in June,
- Beautiful maths (see appendix 1) ;
- Problem Solving: 4 step process; Understand, Plan, Do, Check (**see appendices 7 & 8**)
Thinking By Numbers from (or better) SI on ;
Problem Solving Schedule (See Appendix 8) schedule for learning PS strategies
- Assessment (Individual and Group): e.g. Khan Academy, Standardised, Worksheets, Workbook, EOT tests, Homework; @ Teachers Conference
- Technology, Coding? Websites and apps(see appendix 6)

Action Points:

- Champion mental maths & problem solving
- Ensure relevant language is being learnt; Develop language checklist
- Develop resources for Beautiful Maths
- Organise Beautiful mathsweek
- Develop Vedic maths module for 4C & 6C
- Identify suitable apps

Purposes

The purposes of the Mathematics Whole School Plan are:

1. To guide the preparation of the annual long-term class plan in relation to
 - a. **ethos** (including implementation) and
 - b. areas of the **curriculum** where the school wishes to develop, select, co-ordinate, or emphasize (as a school), and,
2. To provide information of decisions taken for the above purposes and for the purpose of whole-school **efficiency**, which restrict Class Teachers choice in areas such as class textbooks and workbooks, time allocated to a subject, methodologies, standardised assessment etc.

Vision and Aims

1. In essence, we believe that the creation and everyone and everything in it is a unity. There is only one, although, on the surface there appear to be billions. In mathematics this is represented by the number 'one'; all other numbers arise from one, just as everything is contained in the one Self.
2. One of the reasons for setting up JSS was to provide the child with knowledge of the universe. Mathematics is the language of nature. The laws of nature provide evidence of a single source, according to the wise. (see Appendix 3).

3. Mental maths, as well as being highly practical, develops the power of **attention** and thus allows one to 'Laetus Impresens'. (see appendix 4)

4. Mathematics is inherently **beautiful**; the study of mathematics is delightful; unity can be experienced in mathematics. JSS believes that giving the child good material is essential. Maths expresses beauty in simple and elegant processes and applications. (see appendix 5)

Following on from this, we believe the purpose of education is to discover whether or not this is true.

We think that the study of maths in a particular way will enable pupils to

- 1) experience this unity
- 2) understand this unity intellectually
- 3) develop an excellent practical competency in maths and
- 4) experience the beauty of Maths

We fully endorse the aims of the Primary School Curriculum for mathematics as set out on page 12 of the Curriculum.

Practical Ethos

We believe that children do better at Maths if they enjoy it. We believe that children will enjoy Maths if they have a solid understanding of the basics and a strong fluency in mental maths. Therefore, we place an emphasis on developing this fluency on a daily basis in all classes by devoting 10 minutes to mental maths. Teachers are recommended to develop lessons using the "100 Mental Maths Starters" from Senior Infants on.

Teachers are encouraged to explore the beauty of maths – see Appendix 1

Curricular Emphasis

(For the avoidance of doubt, all areas of the curriculum must be covered; this list covers items requiring particular emphasis.)

Junior Infants

- Classifying/Matching/Comparing/Ordering/Combining/Adding/Partitioning
- Number stories 1-5 & writing the numbers 1-5
- Relevant Language

Senior Infants

- Number stories to 10;
- More than; less than
- Relevant Language

1st Class

- Number bonds to 20; (+ and -)
- Counting, up to 100 & back in various ways;
- 100 square & Place Value:
- Relevant Language

2nd Class

- Number Square
- Counting: in 2s, 3s, 4s, 5s, 6s, 10s
- Place Value: up to 199; renaming up to 99, addition & subtraction

3rd Class

- Multiplication & division tables to 12, and 25
- Understanding of =, ×, ÷

4th Class

- Multiplication & division tables to 12, and 25
- Understanding of =, ×, ÷, <, >, ()

5th Class

- Long division
- Percentages

6th Class

- Number: adding negative numbers, $\sqrt{\quad}$, multiples, LCM, factors, common factor
- Algebra: use of letters for variables in equations

Concrete materials are used extensively in teaching and learning. Aistear is a key learning methodology in Infants

Standardisation

Language

- It is essential that children become literate in mathematical language. There is a language checklist for each class to ensure all language is taught.

Teaching Strategies

Number facts

- Subtraction: we use the renaming method
- Calculators are used from 4th Class on, in selected areas of the curriculum

Problem-solving

- Teachers are encouraged from SI up to have formal problem solving classes. We use Thinking By Numbers to assist in this regard.
- We use a 4-step model: what is the problem; how may it be solved; solve it; check the answer

Assessment

- Children in JI & SI are assessed by teacher observation and the teacher noting down in writing whether the curriculum objectives had been achieved for each child in terms of number (1-5) recognition, number writing, ability to classify, order, work with number bonds etc.
- Children from 1C up are formally assessed twice a year: once before Christmas and a standardised test in May. Additionally in 5C & 6C there is an Easter test and smaller tests at half-term.

Children with different needs

1. Children with learning difficulties

- Any child with a STEN score of 4 or below on the Drumcondra test is targeted for Learning Support subject to resource availability.
- Teachers in mainstream classes provide a differentiated programme to cater for children with learning difficulties in the following ways: prepare the child for the upcoming class; provide an additional workbook for extra work at home

2. Children with exceptional ability

- We recognise these children by providing them from 1st Class on with more challenging work based on for example, the New Zealand Maths website.
- A structure exist for providing extra in-class teaching in 5th & 6th class.
- For other classes there is a range of additional workbooks, for example Brain Teasers.

Resources

- Mathemagic is used for individual assessment and sets the minimum standard from JI to 1C; from 2C on Maths Matters is used
- Every class is equipped with comprehensive sets of maths resources

ICT

- It is planned to have 1 laptop for every 2 children from 3rd-6th class by September 2020.
- It is planned to have 1 iPad for every 2 children from JI-2nd class by September 2020.
- Maths specific apps and websites suggested by staff (see appendix 6)

Bi-annual Maths Week

Staff development

- The holder of the post of responsibility for Maths is responsible for promoting mathematics in the school including encouraging teachers to maintain & update their maths teaching skills. A plan for this is agreed with the Principal annually.

Parental communication

Parents are informed every year an autumn PT meeting of the content of the mathematics programme and the approaches/methodologies used in this school in relation to ...

The role of parents in helping their child to love Maths; Early mathematical activities - sorting, classifying ...; methodology for subtraction - particularly at 2nd class; methodology for division - particularly at 4th class; the role of calculators from 4th to 6th classes; learning number facts at all levels – tables; the methods used in number formation at infant level; the expectations in relation to layout and presentation of work; the problem-solving model; how we use mental mathematics; the rationale for playing mathematical games in class; how assessment information is shared with parents

Implementation & Review

(a) Roles and Responsibilities

The post holder for mathematics is responsible for how this plan will be supported, developed and implemented,

(b) Approval: This plan was approved at a staff meeting on 12th May 2010

The plan will be implemented during 2010/11.

(c) Next Review: Autumn 2013

Success criteria

- **How will we know that the plan has been implemented?**
 - Long Term class plans will be consistent with the Whole School Maths Plan
 - Extra 10m per day timetabled
 - Thinking By Numbers used
 - 100 Maths Starters used daily
 - St James Geometry course being taught
 - The beauty of maths being explored
- **How will we know that the plan has achieved its aims? What are the indicators?**
 - Positive feedback from teachers
 - Inspectors' suggestions/report
 - Positive feedback from second level schools
 - Results of standardised tests

Beautiful Maths

Quantity: Arithmetic: Number: Measure

Structure: Algebra:

Space: Geometry: Shape & Space

Analysis: Data

	Maths	Maths Week	Art	Geography/Science	History
Junior Infants	Number patterns with 2D shapes e.g. counters				
Senior Infants	concrete puzzles				
1st Class	abstract puzzles e.g. NZ, tessellation		daffodils & parallelograms';	bees & hexagons	
2nd Class	Square numbers; St James Geometry book				
3rd Class	St James Geometry book		perspective,		Leonardo da Vinci & Vitruvian Man
4th Class	St James Geometry book: e.g. drawing a regular pentagon with a compass & straight-edge	Vedic Maths Module (Maths Week in June)		Studying leaf 'veins'	
5th Class	St James Geometry book		stick men, perspective,	Studying sunflowers, Why are seeds/eggs spherical/ovular? Why are cups/mugs cylindrical? Why are bee-hive cells hexagonal?	
6th Class	Fibonacci series, St James Geometry book, Golden Mean, Study Prime numbers	Vedic Maths Module (Maths Week in June)	stick men; perspective,	Studying pine cones; how does shape make a building 'beautiful' e.g. the American Embassy;	Paul Erdos: The Man Who Loved Only Number

"... then thought begins to be aroused within us, and the soul perplexed and wanting to arrive at a decision asks 'What is absolute unity?' This is the way in which the study of the one has a power of drawing and converting the mind to the contemplation of true being. " – Plato

Appendix 3

"The whole heaven is number and harmony" - Aristotle

"Number rules the universe" - Pythagoras

"Behold the heaven, the earth, the sea; all that is bright in them or above them; all that creep or fly or swim; all have forms because all have number. Take away number and they will be nothing...Ask what delights you in dancing and number will reply: 'Lo, here I am.' Examine the beauty of bodily form and you will find that everything is in its place by number. Examine the beauty of bodily motion and you will find everything in its due time by number." - St. Augustine

"All the effects of nature are only the mathematical consequences of a small number of immutable laws" - Laplace [Fr. mathematician]

"That vast book which stands forever open before our eyes, the universe, cannot be read until we have learned the language and become familiar with the characters in which it is written. It is written in mathematical language, without which means it is humanly impossible to comprehend a single word" - Galileo

Appendix 4

"The mathematician does not study pure mathematics because it is useful; he studies it because he delights in it and he delights in it because it is beautiful" - Poincaré [Fr. mathematician]

Appendix 5

"This Cosmic Manager, the Cosmic Mathematician is eternally free from mistakes. The Cosmic Mathematician is present within everyone ..." Maharishi

Draft Primary Maths Curriculum 2018:

Mathematics is a tool that helps us to make sense of our world

Mathematics is used to think about, see and organise our everyday lives and the world. Primary mathematics education should enable children to communicate and solve real world problems in mathematical terms. It is also essential to support children to develop the language of mathematics. Thus, mathematical thinking should be promoted, and 'maths talk' should be integral to the teaching and learning process.

Maths is beautiful and worthy of pursuit in its own right

Through playful and creative learning opportunities, children can experience the beauty and power of mathematics. It is important that children have the opportunity to engage with mathematics as a discipline in its own right and to explore its many intriguing aspects. Primary mathematics education should foster a love of mathematics. It should provide children with the opportunity to explore, discover and refine their ideas. Children should also be supported to think

critically and flexibly, and to be creative and innovative in their approach to learning mathematics.

Mathematics is everywhere and for everyone

Mathematics is a human activity that develops in response to everyday problems and interactions. Primary mathematics education should provide children with opportunities to engage with deep, meaningful and challenging mathematics in educational settings, including social and familial settings. Such engagement will result in children co-constructing knowledge and skills as they interact and collaborate to solve complex and real problems.

Appendix 6

Recommended Apps and Websites



**READ QUESTION
SEVERAL TIMES**

**DRAW A
DIAGRAM**



**DISCUSS
WITH
OTHERS**

UNDERSTAND

**Write it in a
number sentence**

$$\begin{array}{r} 75 \\ \times 54 \\ \hline \end{array}$$
$$3/9 \text{ of } 81 =$$
$$34 + 56 =$$

**HIGHLIGHT
UNDERLINE
IMPORTANT WORDS**



**DECIDE WHICH OPERATION TO
USE**



**BREAK
PROBLEM
INTO
DIFFERENT
PARTS**

PLAN



**ESTIMATE
THE
ANSWER**



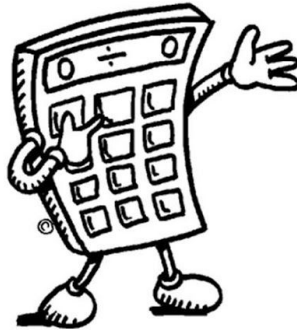
**Gather and
record
necessary
information**

WRITE
PROBLEM
VERTICALLY

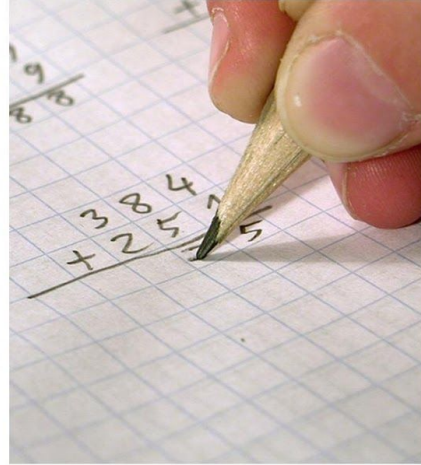
$$\begin{array}{r} 27 \\ \times 25 \\ \hline 135 \\ +540 \\ \hline 675 \end{array}$$

I ♥²
Maths

DO



DO THE
CALCULATIONS!
FIND THE ANSWER



DOES THE ANSWER MAKE SENSE?

COMPARE
YOUR
ANSWER
TO YOUR
ESTIMATE

CHECK



USE YOUR
CALCULATOR TO
CHECK YOUR
ANSWER.

CHECK
YOUR
ANSWER
WITH
SOMEONE
ELSE



Appendix 8

<u>PS Strategies</u>
<u>1. Understand</u>
<ul style="list-style-type: none">● Don't panic
<ul style="list-style-type: none">● Don't rush
<ul style="list-style-type: none">● Read carefully several times
<ul style="list-style-type: none">● Look for clues
<ul style="list-style-type: none">● Say it in your own words
<ul style="list-style-type: none">● Write out the problem in maths language
<ul style="list-style-type: none">● Highlight the words/parts that you know are important
<ul style="list-style-type: none">● Model it by drawing a picture or diagram
<ul style="list-style-type: none">● Look for a pattern?
<ul style="list-style-type: none">● Try to simplify it?
<ul style="list-style-type: none">● Discard irrelevant information
<ul style="list-style-type: none">● Check to see if your understanding makes sense
<ul style="list-style-type: none">● Discuss it with someone else. Ask questions.
<ul style="list-style-type: none">● Keep going
<ul style="list-style-type: none">● Teacher models each strategy in a whole-class setting first, then groups, then individual
<u>2. Plan</u>
<ul style="list-style-type: none">● Decide what the problem is about: e.g. + - ÷ X etc.
<ul style="list-style-type: none">● If necessary break up the problem into different parts and sequence
<ul style="list-style-type: none">● Decide which part to do first
<ul style="list-style-type: none">● Gather and record any necessary information e.g. measurements
<ul style="list-style-type: none">● Write out the proposed operations neatly
<ul style="list-style-type: none">● Estimate the answer

3. Do

- Write the problem vertically

- Do the calculations

4. Check

- Does the answer make sense; does it look right?

- Redo the calculations

- Check your answer with someone else