Scoil Chormaic
COMMUNITY NATIONAL SCHOOL
SCOIL NÁISIÚNTA POBAIL

Castlemill, Balbriggan, Co. Dublin
Muileann an Chaisleáin, Baile Brigín, Co. BÁC

Whole School Plan
for
Mathematics

Contents

                                Scoil Chormaic CNS

1.   Introduction

Scoil Chormaic Community National School aims to *cherish, nurture* and *educate* the children in its care. Scoil Chormaic CNS is a very diverse school; over half of our population speaks English as an additional language and over forty different countries are represented within our walls.

This policy was developed in response to the first round of school self-evaluation in numeracy. Consequently, it draws on the voices of children, parents, teachers and management. It also affords due attention to national trends in mathematics, current best practice, and research findings in mathematics.

The plan was drafted in June 2015 and was implemented in draft format from September 2015. It was ratified in October 2015. Given its concurrent development with School Self Evaluation in Numeracy, some of the school improvement plan's actions are embedded in the current policy. This policy received the input of the whole school community, and was drafted by Patrick Burke (Special Duties Teacher with responsibility for mathematics).

1.1.   Ratification and Communication

This plan will be communicated to staff and parents in Term 1, 2015/2016, prior to formal implementation.

Following ratification, it will be placed on the school website.

Hard copies of the plan will be made available to all teaching staff in Term 1, 2015/2016.

This plan was ratified by Board of Management/ Single Manager on   15/10/15

Signed: Signed:

Mr. Ian Murphy, *Single Manager*   Ms. Deirdre Corcoran, *Principal*

1.2.   Rationale

This plan was designed to:

- Provide a unified approach to the teaching of mathematics in the school.
- Identify and bolster best practice mathematics teaching and learning in the school.
- Tie together the class-level planning that has been a feature of mathematics in the school since its establishment. Ensure appropriate development across classes.
- Act as a resource for teachers and parents in planning yearly work in mathematics.
- Facilitate the induction of new staff members, as well as ease the movement of teachers between class levels, and the support setting.

1.3.   Vision

In line with the school's vision statement, we strive to facilitate each child in reaching their full potential in mathematics. Children are presented with learning experiences that enable them to progress their mathematical understanding and skills at a level that is developmentally appropriate. We endeavour to provide mathematics education that helps

children to use mathematics in their everyday lives; to apply and problem-solve, to communicate and express, to integrate and connect and to reason mathematically.

1.4.   Aims

The school's aims can be aligned with our mathematical aims as follows:

Cherish	Nurture	Educate
• Mathematics will be taught at a level appropriate for the unique needs of our learners. • Mathematical connections will be made between the home, school and wider community. • The diversity of our population will be acknowledged in our teaching and learning of mathematics. • Each child's contribution to mathematics will be valued.	• A positive attitude towards mathematics will be nurtured; children will see its use in everyday life. • Children's interests, talents and affinities for mathematics will be fostered. • A maths-rich environment will be created.	• A variety of learning experiences will be provided to enable children's mathematical progression. • Children will be given every opportunity to reach their maximum mathematical potential. • Children will draw on a range of mathematical skills flexibly and judiciously. • Children will achieve a level of content knowledge and understanding appropriate for their own abilities, talents and class level.

2.   Content

2.1.   Mathematics Curriculum - Content

Scoil Chormaic CNS implements the full *Primary School Curriculum* (1999), and accordingly, the Mathematics curriculum is taught at each class level. This teaching is characterised by the approaches recommended in this whole school plan, bearing in mind areas of emphasis decided at school level. For the sake of brevity, the entire curriculum is not repeated here. An overview of the content, approaches and language to be taught at each class level can be found in the following appendices:

Mathematical Language	· Appendix A, Page 11
Tables/ Number facts	· Appendix B, Page 15
Teaching Content, Sequence and Approaches specific to class levels	· Appendix C, Page 23
Mental Mathematics	· Appendix E, Page 35

2.2.   Approaches and Methodologies

All mathematics teaching in the school is guided by the following **underlying principles of teaching** and **general approaches.** Further information is available in the appendices.

Active Learning & Guided Discovery	· Children work actively in individual and collaborative settings. · Textbooks are used sparingly, as a **resource only.** · The teacher serves to elicit, support and extend children's prior and new learning. · Conceptual understanding takes precedence over rote use of procedures.
Multiple Representations	· **All** concepts, **at every class level**, will be introduced with the use of concrete materials. · These will be followed by the use of appropriate pictorial materials. · Children will use **abstract** representations following success in their use of concrete/pictorial materials.
Mathematical Language, Talk and Discussion	· Mathematical language will be modelled through explicit teaching. · Children will be given opportunity to **use** mathematical language in a variety of classroom configurations and settings (e.g. pair work). · Due attention will be given to the skill of communicating and expressing.
Skills through Content	· The skills of the curriculum are given due attention in teacher preparation and planning. · Skills can be explicitly modelled in *isolation,* but their application will be *embedded in teaching.*

2.3.   Maths-rich Environment

Mathematics and numeracy provide a lens with which to view the world. Accordingly, children need every opportunity to apply their mathematical knowledge to their environment, and to use their environment to further their mathematical knowledge. The following approaches are used in the school to foster this reciprocal link:

- Maths noticeboard on general display
- Maths displays in every classroom
- Display of children's works
- Annual and termly projects to 'sign' the school with mathematical information
- Frequent informal maths trails (to find shapes, measure)
- More formal maths trails (E.g. Maths Week)
- Informal and formal reference to the *Maths Eyes* approach

2.4.   Skills Development

Teachers include the skills of the mathematics curriculum in all lessons. The **skills through content** approach is adopted; this means that children will develop their skills while working on a particular content area of the curriculum. For example, children may **reason** how to categorise shapes while completing activities in the **shape and space** strand. They may then explain their reasoning to their group, developing their **communicating and expressing skills.**

2.4.1. Applying and Problem Solving

Problem solving is used as an approach to teaching at all possible opportunities. For that reason, there is no dedicated time of the week during which problems should be taught.

It is recognised that, that children in our school benefit from a structured approach to written word problems. The **RUDE** approach is used across the school for problem solving in this context:

1. Read the problem
2. Underline important words
3. Draw a picture
4. Estimate an answer

Teachers are **not** limited to using this approach for other types of problems.

Each of the types of problems represented in the primary school curriculum should be taught throughout the course of the year at each class level. The frequency for each problem below is a **minimum** guideline, and should, in most cases, be exceeded. In junior and senior infants, the frequencies may vary.

Type of problem	Frequency	Guidance/Examples
Word problems	Weekly	• Written problems provided by the teacher • Problems generated and written by children, for other children to solve • Problems from textbooks
Practical Tasks	Weekly	• Using concrete materials to find the answer to problems. • Problems involving measurement in the school/classroom/home *(e.g. which is the longest corridor in the school?)*
Open-ended investigation	At least once termly	• Problems that have more than one answer • Samples from www.nrich.maths.org
Puzzles	As appropriate for topic	• Tangrams to make pictures (shape and space) • Pattern solving (algebra) • Mathematical riddles
Games	As appropriate for topic	• Place value games (e.g. from Mata sa Rang resources) • Feely bag games (shape and space)
Projects	At least once a year	• E.g.Planning/buying food for a party using prices from an online shopping website
Mathematical Trails	Informally at every opportunity. Formally twice a year.	• *Maths Week* trails • Maths scavenger hunts • Walks to find shapes, angles, lines in the environment.

2.4.2. Communicating and Expressing

The instructional framework for teaching mathematics is endorsed (c.f. Appendix F). The skill of communicating and expressing can be developed by:

- Explicitly modelling and teaching mathematical vocabulary and sentence structures
- Providing regular opportunities for children to work in pairs and groups
- Asking children to **explain** and **justify** their answer
- Eliciting many solution methods for one problem/question
- Creating a safe environment for mathematical thinking; valuing effort and not emphasising errors
- Using pupils' explanations for lesson's content
- Probing children's answers and encouraging them to elaborate

- Allowing children to communicate their responses in a variety of ways; using concretes, orally, pictorially, in writing, videos.

2.4.3. Integrating and Connecting

Teachers include curriculum integration and linkage in their plans (see section 5.1 of this plan). Teachers promote integrating and connecting by:

- Emphasising the connections between operations; e.g. multiplication is repeated addition, or the inverse of division
- Consolidating work in the number strand through work in other strands (e.g. adding money using the formal algorithm).
- Incorporating numeracy in other subject areas; e.g. measurement in science, counting time and duration in music, writing capacities/weight in procedures, use of number or other mathematical concepts in Aistear.
- Capitalising on incidental references to numeracy during the teaching day, e.g. pointing out parallel lines in the PE hall, counting books in twos.

2.4.4. Reasoning

Children should be enabled, through active learning and guided discovery, to reason mathematically. In this way, teachers in Scoil Chormaic CNS can scaffold children in forming new mathematical knowledge. Teachers will help promote mathematical reasoning by:

- Giving children the opportunity to deduce and induce approaches to mathematics, before directly teaching the strategy.
- Discussing problems and topics using probing questions to foster reasoning.
- Asking children to explain how they got an answer, and prompting them to fully explain their reasoning.
- Transferring known content to new contexts.

2.4.5. Implementing, Understanding and Recalling

The ability to draw on appropriate and accurate mathematical procedures and content knowledge is recognised in the school. In particular, it is recognised that some children with special educational needs may need to rely on known procedures to work mathematically, but **not** at the expense of conceptual understanding.

2.5. Presentation of Work

Careful presentation is acknowledged as an important feature of accurate and precise mathematical work.

2.5.1. Numeral formation

Children should be able to recognise numerals presented and written in a variety of forms. However, in order to achieve consistency within and across the different learning settings, a unified approach to the teaching of numeral formation is used in the infant classes. The following numeral formation is taught, starting on the highlighted points:

Note that:

Four is not enclosed. The first downwards stroke is vertical, not slanted.

Five is written by making a downward stroke, followed by a loop, and then marking the top horizontal line.

Eight is written by 'starting like an s'.

See Appendix E for rhymes to accompany the teaching of these numerals.

2.5.2. Copy work

Children begin using squared maths copies in First Class. The frequency with which these copies are used will increase as children progress through class levels.

As a general rule, work in maths copies should be presented as follows:

- Ruled – 'in two squares and down two squares'
- Dated – the date written at the top of the page
- Titled and numbered – Exercise should be numbered in the ruled column
- One numeral/number per square
- The page may be split down the middle to fit more work on the page

2.5.3. Other modes of presentation

Copy books and textbook represent only two ways in which children's work and progress can be displayed. Other modes of presentation that are actively encouraged include:

- Charts and posters for project work
- Photographing work using school iPads/ Cameras
- Presenting work using technology (e.g. presentations, videos)
- Use of whiteboards for skills practice
- Oral presentations
- Using playdough, rice, sand and other concrete materials to form numerals

2.6.   Homework

Homework in mathematics serves three main purposes in Scoil Chormaic CNS:

1. Consolidate work learned in school
2. Facilitate learning of mathematical facts
3. Foster home-school connections and extend maths knowledge beyond the classroom

Therefore, the homework set for each child should be at his/her level and differentiated accordingly. This differentiation may take the form of different work or reduced amounts of work.

Bearing the three purposes above in mind, the type of homework set in maths each year is agreed at a class-level by teachers.

Mental or **oral** maths homework is considered to be of equal or greater importance than written work. This includes the memorisation of tables.

Children are encouraged to **explain** their maths homework to their parents, in order to share the **mathematical language** with which they are familiar.

3.   Children with Different Needs

Scoil Chormaic CNS is fortunate to have a diverse community of learners. These include children who:

- need to work at a mathematical level other than their class level
- need extra support to work at class level
- need specific support in particular areas of maths
- demonstrate exceptional mathematical attainment and require further challenges

3.1.   Model of Support Teaching for Mathematics

The primary model of support for mathematics is **in-class support** and **team teaching.** However, this does not entirely preclude withdrawal teaching from occurring, after consultation between class and support teachers regarding the best way to support a child or group of children.

Particular emphasis is placed on collaborative teaching for active methodologies and programmes like *Ready, Set, Go, Maths* in the infant classes.

3.2.   In-class differentiation

A combination of approaches for differentiation are employed in all classes, based on the needs of learners:

By Process	By Product	By Content
·Extended use of concrete materials. ·Extended use of pictorial representations. ·Variety of mixed and ability groups. ·One to one or small group support. ·Different mathematical strategies may be emphasised.	·different amount of work to complete. ·Different mode of presentation (E.g. number sentence v. picture) ·Partial completion	·Mathematical content at a different class level, within the same strand unit (where warranted) ·Mathematical content at a different difficulty level, or different level of complexity, within the same strand unit. ·Different skills emphasis (e.g. implementing versus problem solving)

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4.   Assessment and Record Keeping

4.1.   Self-Assessment

Teachers decide these strategies at their own discretion. Some recommended approaches include:

- Mathematical scrapbooks, journals and dictionaries
- Thumbs up / Thumbs down
- Two stars and a wish

- Traffic lights
- Conferencing

4.2.   Teacher designed tasks and tests

Teacher designed tasks and tests are used for assessment for and of learning. These tests help to identify areas that require attention in upcoming weeks and terms.

A **teacher designed test** is carried out at each class level **at least once termly** (usually towards the end of the term). These tests are sent home for parents to view and sign, before being returned to the teacher.

Teachers have discretion in designing these assessments at class level. Assessments drawn from maths schemes (e.g. Planet Maths) are appropriate.

Teachers may use their own discretion to assess more regularly, for example at the end of a particular topic.

Teachers typically test **tables** on a weekly basis, though this is not obligatory.

Children's strengths and weaknesses in mathematics are outlined to parents formally at **parent-teacher meetings (second half of Term 1)** and in **summer written reports** (May/June). Difficulties that a child may be having are given particular attention.

4.3.   Standardised Tests

Standardised tests are used in every class from First upwards. The school uses the **SIGMA-T** test developed by the CDU in Mary Immaculate College. The test is administered annually during the month of May.

Results are communicated to parents via the school report in the month of June. When necessary, a face-to-face meeting may be arranged after the report has issued.

Results are also used to inform interventions for maths and planning.

4.4.   Ready, Set, Go, Maths Assessments

The **significant goals** outlined in the RSGM manuals are given particular attention in Junior and Senior infants.

Teachers monitor children's attainment of these goals **on an ongoing basis.** This may involve working with one child during small group work (during in-class support time), and working with a different child on a different day.

Particular attention is given to children's development of **one to one correspondence** and **conservation of number** in Junior Infants. Children who are having difficulty with these concepts are prioritised for remediation as soon as possible; remediation is not left until later in the year.

4.5.   Record Keeping

The following records are kept on mathematical progress:

- Information as it relates to specific diagnoses and maths difficulties are noted in children's Individual Pupil Learning Profiles.
- RSGM Assessments should be passed from Junior Infants to Senior Infants, and onwards to First Class.
- SIGMA-T results are kept on each child's Aladdin profile; SIGMA-T response booklets are kept in each child's physical file held by their class teacher
- Teachers keep a record of any teacher designed tests run during the year in their assessment folder

- Teachers keep a record of tables test results in their assessment folder.
- Incidental notes and observations on a child's mathematical development may be recorded in pupil profiles (e.g. learning support profiles passed to new teachers).

5.   Planning and Preparation

The planning for teaching and learning in mathematics is informed by the following, in order:

1. The needs of the children in the class
2. This school plan and other pertinent plans (e.g. School Improvement Plan)
3. The *Primary School Curriculum* for the class level
4. Programmes being implemented in the school; e.g. *Ready, Set, Go, Maths*
5. The consolidation activities available in textbooks; e.g. *Planet Maths*

5.1.   Planning Format

5.1.1.   Long-term planning

Long-term plans for mathematics, completed termly or yearly, will contain the following specific sections, appropriate for the particular class:

Aims	Breakdown of Curriculum Content: Strands, Strand Units, Objectives	Mathematical Language	Focus of Skills Development	Linkage and Integration
Teaching Methodologies and Approaches	Differentiation	Assessment	Resources	
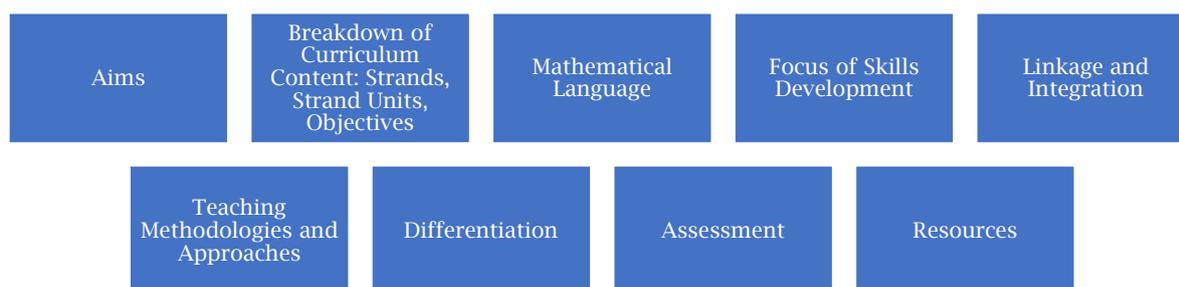
5.1.2.   Short-term planning

Short-term plans for mathematics, completed weekly (for probationary teachers) or fortnightly, will contain the following specific sections, appropriate for the particular class and the work being completed in a **particular week/fortnight**:

Strand(s) and Strand Unit(s)	Objectives	Skills	Mathematical Language	Activities and Methodologies
Resources	Differentiation	Assessment	Integration and Linkage	
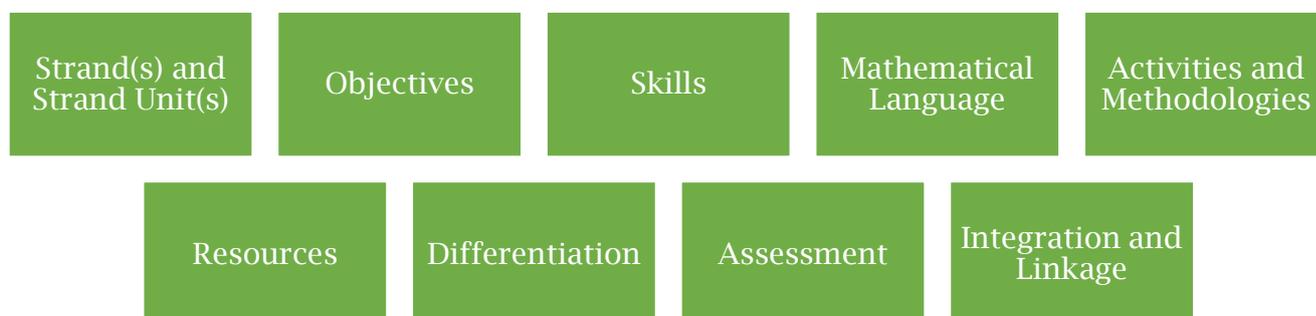
5.2. Timetabling

All classes will comply with the minimum times for mathematics set out in Circular 56/2011. That is:

Infants: 3 hours 25 minutes per week / 41 minutes daily
First- Sixth Class: 4 hours 10 minutes per week / 50 minutes daily

In most cases, these time allocations will be exceeded. The school has agreed (in 2012) that, pending renewed time allocations from the NCCA, extra time for mathematics will be drawn from integrated teaching, discretionary time and a reduction in time for Arts/SESE subjects.

5.3. Reporting

The *cúntas míosúil* will be used to record progress in mathematics. The content, including objectives covered, will be detailed by each teacher, as it applies to their particular class.

Given the centrality of mathematics and numeracy to the curriculum, it is expected that professional reflection on progress in mathematics will be included in the appropriate section of the agreed cúntas míosúil format.

6. Resources

Teaching mathematics developmentally requires a range of materials, including those that are purchased, school-made, or those that are readily available in the everyday classroom.

- A core stock of counters, dice and cubes are available in every classroom.
- Ready, Set, Go, Maths trollies have been prepared with all of the requisite materials required for both junior and senior infants.
- All resources available in the staff resource room are used communally. They are deployed using a sign in / sign out system.
- Electronic resources will be made available on the shared drive/shared storage.
- Internet resources accompany some of the programmes in use in the school (*Planet Maths).*
- Textbooks are available as a resource at each class level (Planet Maths is the core textbook).

Teachers take shared responsibility in maintaining maths equipment. New maths equipment is ordered by Special Duties Teacher A, after consultation on spending priorities with teachers. Given the developing nature of the school, mathematics equipment is purchased on an ongoing basis. The equipment available in October 2015 is included in appendix F. Updated inventories will be placed in the staff resource room, and will be made available electronically.

7. Technology

Technology plays an increasingly important role in real-life mathematics. A variety of technology resources are available for teaching maths in the school, including:

- iPads – a variety of apps for different skills are available
- PCs/Laptop Computers (in some classrooms)
- Interactive Whiteboards
- Cameras
- Visualisers

Teachers are encouraged to use technology appropriately to enhance children's learning. This includes:

- Modelling the use of concrete materials under the visualiser
- Using iPad apps for drill and practice (tables, practising telling the time)
- Using iPads/PCs to access the internet (e.g. to look up timetables, make online shopping lists)
- Playing online games on the IWB
- Using the iPad camera app/ cameras for maths trails, recording work
- Practising numeral formation using drawing apps
- Deploying iPads in stations

8.   Staff Development

A range of reference materials for mathematics are available in the staff resource room, including:

- Teaching guides (e.g. PDST Handbooks)
- Academic Texts (e.g. Teaching Number in the Classroom with 4-8 Year Olds)
- A variety of mathematics schemes: resource books and textbooks

All professional development notifications and literature that are received by the school, as they relate to mathematics, are relayed to staff by Special Duties Teacher A. This notification will take the form of staff announcements on Aladdin, postings on the CPD noticeboard, and notices on the staff notice whiteboard in the staff room.

The school provides funding for professional development that supports the roll-out of specific programmes. This includes training in programmes like *Mata sa Rang.* Given the limited funding available, this training will be targeted at teachers who are directly involved in the class-level that would most benefit from the professional development.

Time is made available at staff meetings to:

- Facilitate professional development from outside agencies (e.g. PDST, SESS)
- Promote the sharing of professional learning internally
- Discuss progress in mathematics (as it relates to this plan, SSE)

9.   Parent and Community Links

Given our community focus, parents play an important role in the development of mathematics in the school.

Parent information sessions are held with each class level annually, in September, during which parents are informed of the new mathematics content and approaches their children will learn during the year.

Information about mathematics in the school is also made available on the school website, www.scoilchormaiccns.ie.

Parents are encouraged to take an active role in their children's mathematical development through:
- Attending class information at the start of the year
- Attending parent/teacher meetings
- Helping their children with homework
- Helping out in classrooms when teachers seek volunteers
- Talking to their children about maths that they see in the environment
- Fostering a positive attitude towards maths

From time to time members of the **wider community** will be involved in mathematical work in the school. This may include guest talks from agencies (e.g. Engineers Ireland) or from the Balbriggan community.

10. Implementation and Review

10.1. Roles and responsibilities

The plan will be implemented by all members of the teaching staff. The principal will play a role in overseeing its implementation. Guidance on particular aspects of the plan can be sought from Special Duties Teacher A (Patrick Burke, Mathematics coordinator).

10.2. Timeframe

The plan will be reviewed formally after one year, in May/June 2016, in line with school self-evaluation in mathematics. In addition, it will require specific review in light of:

- Progression to having Fifth and Sixth Class in the school.
- Changes to the Mathematics Curriculum for (Junior Infants – Second Class, and subsequently Third – Sixth Class)

11.   Appendix A: Mathematical Language

11.1.   Vocabulary for Core Operations

The following vocabulary is introduced at each class level. The language taught in previous class levels is maintained. Note that the term **number sentences or number stories** is used to describe mathematical operations. The term **sum** refers to addition only. Note that the language 'five **into** fifteen is three' should be avoided for division. All language will be explicitly modelled and used orally/aurally before progressing to written from (in First class on).

	Junior Infants	Senior Infants	First Class	Second Class	Third Class	Fourth Class	Fifth and Sixth Class
Equals sign =	altogether makes makes *(the formal equals sign is not introduced in JI)*	is the same as equals =			equivalent		
Addition +	____ and ____ altogether makes more (than) combine partition add *(for teacher use)*	___ and/ add/ plus ___ is the same as ___ and/ add/ plus ____ equals count on +	Addition Plus Add And	sum	Total Increase	Raise	
Subtraction -	*Informal use by the teacher.* (e.g. *How many are left?*)	____ take away _____ leaves____ ___ subtract ___ leaves *(formal sign not introduced)*	Subtraction Subtract Minus Less Difference -	More than	Decrease	Reduce	
Multiplication x			doubles/double *skip counting*- 2s, 5s, 10s	*Skip counting-2s, 3s, 5s, 10s Repeated addition*	Multiply ___ groups of ___ ___ times ___ array repeated addition triple/treble x	Product	Multiplicator Multiplicand
Division ÷					Divide Share Fair share Split Remainder		Quotient Divisor Dividend

11.2.   Language and Presentation of Formal Algorithms in the Operations

The teaching of these procedures **only** follows extensive work with concrete materials and opportunities for the use of informal/child-invented strategies.

11.2.1. Addition without renaming

	T	U	
	8	2	
+	1	5	
	9	7	

I am adding eighty two plus fifteen.
I will start with the units. Two plus five is seven. *I will write the seven under the units.*
Then I will add the tens. Eight tens plus one ten is nine tens. *I will write nine under the tens.*
So eighty two plus fifteen is ninety seven.

After practice and repetition, the text in italics may be omitted for the sake of efficiency.

11.2.2. Addition with renaming

	T	U	
	4	5	
+	3₁	6	
	7	1	

I am adding forty five plus thirty six.
I will start with the units. Five plus six is eleven. I cannot write eleven under the units, so I will put down one unit, and carry the one ten.
Then I will add the tens. Four tens plus three tens is seven tens, plus one more ten is eight tens. *I will write eight under the tens.*
So forty five plus thirty six is seventy one.
After practice and repetition, the text in italics may be omitted for the sake of efficiency.

11.2.3. Subtraction without renaming

	T	U	
	7	8	
-	1	6	
	6	2	

I am subtracting sixteen from seventy eighty. [Check if the number on the bottom is lesser in value]
I will start with the units. Eight take away six leaves two. *I will write two under the units.*
Then I will subtract the tens. Seven tens take away one ten leaves six tens.. *I will write six under the tens.*
So seventy eight subtract sixteen is sixty two.

After practice and repetition, the text in italics may be omitted for the sake of efficiency.

11.2.4. Subtraction with renaming

	T	U	
	²3̶	¹5	
-	1	8	
	1	7	

I am subtracting eighteen from thirty five. [Check if the number on the bottom is lesser in value]
I will start with the units. I cannot subtract eight from five. I exchange a ten to make ten units. I cross out three, and that leaves two tens. When I bring that ten over into the units, I have fifteen. Fifteen take away eight is seven. *I will write seven under the units.*
Then I will subtract the tens. Two tens take away one ten leaves one ten. *I will write one under the tens.*
So thirty five take away eighteen is seventeen.
After practice and repetition, the text in italics may be omitted for the sake of efficiency.

11.2.5. 'Short' Multiplication

	T	U
	1	**4**
x	₂	**5**
	7	**0**

I am multiplying fourteen by five.
I will start with the units. Four multiplied by five is twenty. I cannot write twenty under the units, so I will put down zero and carry over two tens.
Then I will multiply the tens. One ten multiplied by five is five tens. I will add on the two tens. That gives me seven tens.
So fourteen multiplied by five is seventy.

After practice and repetition, the text in italics may be omitted for the sake of efficiency.

11.2.6. Long Multiplication

		T	U
		4₁	3
	x	1	6
		2	5	8
+	4	3	0
	6	8	8

I am multiplying forty three by sixteen. *I will multiply thirty three by six, and then by ten, and add the two together.*

Three multiplied by six is eighteen. *I cannot write eighteen under the units, so* I will put down eight and carry over the ten.
Four tens multiplied by six is twenty four tens. Add the ten I carried over, and that gives twenty five tens. So six multiplied by forty three is two hundred and fifty eight.

Next, I will multiply forty three by ten. I will put down a zero because I am multiplying by tens.
Three multiplied by one is three. Four multiplied by one is four.
So forty three multiplied by ten is three hundred and thirty.

Now I must add up. *Eight plus zero is eight. Five plus three is eight. Two plus four is six.*

So overall, forty three multiplied by sixteen is six hundred and eighty eight.

After practice and repetition, the text in italics may be omitted for the sake of efficiency.

11.2.7. Short Division

	2	3	r.2
4	9	¹4	

I am dividing ninety four by four. I will divide the tens, then the units.
Nine tens divided by four is two, with one ten left over. I will write the two in the tens space, and carry over the one ten. That makes fourteen units.
Fourteen divided by four is three, with two left over. I will write the three in the units space. I have a remainder of two that I cannot divide equally.
So ninety four divided by four is twenty three remainder two.
After practice and repetition, the text in italics may be omitted for the sake of efficiency.

11.2.8. Long division

The traditional algorithm for long division will be replaced by a multiples and repeated subtraction approach, which makes more logical sense.

			1	4	r.	24	
25	3	7	4				
	2	5	0	10			
	1	2	4				
	1	0	0	4			
		2	4	14			

Rough Work- Multiples of 25

25 x 2 = 50
25 x 4 = 100
25 x 8 = 200
25 x 16 = 400

I am dividing three hundred and seventy four by twenty five.

I will use multiples of twenty five to see how many times I can take twenty five away from three hundred and seventy four.

I will start with ten, and write it down on the right hand side. Ten multiplied by twenty five is two hundred and fifty. I will take two hundred and fifty away from three hundred and seventy four to see how much is left. There is one hundred and twenty four left.

I know that four times twenty five is one hundred. I will write four down on the right hand side.
I will take away one hundred from one hundred and twenty four to see how much is left. There is twenty four left.

Twenty four is less than twenty five, so I cannot take away another twenty five. Twenty four is a remainder.

When I add up how many times I can take away twenty five, I have ten plus four, which is fourteen.

So three hundred and seventy four divided by twenty five is fourteen remainder twenty four.

Children may use any combination of multiples to reach an answer. They may be encouraged to write out the multiples of the divisor prior to starting, to ease the process. Use of doubles and near doubles will facilitate this.

11.3. Maths language for other strands

All language will be explicitly modelled and used orally/aurally before progressing to written form (in First class on).

11.3.1. Junior Infants

Due attention is given to the mathematical phrases and vocabulary outlined in Ready, Set, Go Maths, as well as the following.

Early Mathematical Activities			
Classifying	Matching	Comparing	Ordering
Colours Big Bigger Biggest Long/tall Longer/taller Wide/ wider / widest Heavy / heavier / heaviest Is the same as/ is not the same as I like…. / I don't like Rough Small / smaller/ smallest Short / shorter / shortest Narrow / narrower /narrowest Light /lighter / lightest Different to Things that are ..../ things that are not …	More than Enough As many as	…. Than (e.g. longer than….)	First Next Before Start Last After Finish
Number			
Counting	Comparing and Ordering	Analysis of Number	
One (1) Two (2) Three (3) Four (4) Five (5) Six (6) Seven (7) Eight (8) Nine (9) Ten (10) None Number Count How many? Count up to….	More than Same as First Too many Enough Less than/ fewer than As many as Last Not enough About the same as	___ and ____ altogether makes ____ ____ and _____ makes _____ Zero (0) Left Add	
Shape and Space			
Spatial Awareness	3D Shapes	2D Shapes	
Over	Roll/do not roll	Square	

Up On In Straight lines Under Down Beside Outside Moving in… Curved lines	Corner Fit together/do not fit together Stack(ed)	Triangle Round Thick Shape Circle Rectangle Not round Thin Corner	
Measures			

Length	Weight	Capacity	Time	Money
Long Longer than Tall Wide Wider than Short Shorter than Taller than Narrow Narrower than	Heavy Heavier Balance Light Lighter Weigh	Full Empty Holds less than Nearly full Holds more than Holds as much as	Morning Evening Night Day Lunchtime Dinnertime Bedtime Early Late Monday Tuesday Wednesday Thursday Friday Saturday Sunday	Cent 1c 2c 5c Buy Sell Spend Coins How much?

Data
Recognising and interpreting data
Sort Enough More than Less than As many as

11.3.2. Senior Infants

Due attention is given to the mathematical phrases and vocabulary outlined in Ready, Set, Go Maths, as well as the following.

Number			
Counting	Comparing and ordering	Analysis of Number	
Zero – Twenty	Second Third How many more?	Number line/strip Count back___ ____ from ___leaves____ take away	___ plus ____ is the same as ___ plus ____ equals count on +
Shape and Space			
Spatial Awareness	3D Shapes	2D Shapes	
Above Near Far Right Below	Cube Cuboid Sphere Cylinder Edge	Straight Curved Smaller Flat Side	

Left Through Behind Stop	Corner Straight Curved Round Flat Roll Face	Larger		
Measures				
Length	Weight	Capacity	Time	Money
As long as As wide as As high as High Higher Longest Shortest Highest Guess Measure Length Height Width	Weight Size Shape Balance Order Check Guess	Capacity Containers Fill Amount Compare Guess Check Record Results	Time Yesterday Tomorrow Today Week Day O'clock Birthday Seasons Soon Net yet Festivals (Christmas, Back to school…) Holidays Day	Cent (1-20) Change Cost Price Cheap Expensive Too much Too little Sell amount
Data				
Recognising and interpreting data				
Groups Criteria Criterion With/without Choose				

11.3.3. First Class

Number				
Counting and Numeration	Comparing and ordering	Place value	Fractions	Operations
Re-count Number 0-99 Numeral Set Count on Count back Number line Hundred square Guess Estimate Compare Less than	How many First – tenth Patterns	Tens Units Value Greater Lower	Half Whole Set	Addition Number Number sentence Number line Hundred square Count on Count back Counting in twos/threes… Doubles Near double Pair Number stories

More than About the same as				Renaming Guess Estimate Check Notation board Left How many do I need Fewer Subtraction Difference Symbols The same as Equals Number balance

Algebra
Extending and using patterns
Odd Even Record Count in ….

Shape and Space			
Spatial Awareness	2D Shapes	3D Shapes	
Between Underneath On top of Around Closed shape Open shape Shape Directions	Semicircle Size Curved/not curved 2-D Number Length Side	3-D Slide Vertices/ Vertix	

Measures				
Length	Weight	Capacity	Time	Money
Length Width Height Guess Compare Measure Record Widest Metre Nearly a metre A bit more than 1m A bit less than 1m Standard units Same length as	Guess Compare Measure Record Heaviest Lightest Standard units Kilogram Same weight as… Largest Smallest	Measure Pour Litre (l) Holds the same amount as… Measure Standard unit	Months of the year Day before Day after Time Calendar Half past Clock face Clock hands Later Earlier	1c – 50c Equal value

Data
Representing and interpreting data
Pictograms Classify How many more? How many less?

11.3.4. Second Class

Number				
Counting and numeration	Comparing and ordering	Place Value	Fractions	Operations
0-199 Between Before After	Greater than, > Less than, < Ordinal number on the calendar Equal to =	Hundreds	Quarter	Sum More than
Algebra				
Extending and using patterns				
Count on Count back Number patterns Group(s)				
Shape and Space				
Spatial Awareness	2D Shapes	3D Shapes	Symmetry	Angles
Full Turn Half turn Quarter turn Forward Backwards	Oval Differences Two dimensional Half Quarter	Cone	Line symmetry Symmetrical Mirror image	Turn Corners Square corners
Measure				
Length	Area	Weight	Capacity	Time
Centimetre Trundle Wheel Tallest Shortest	Cover Space	Half kilogram Quarter kilogram	Half-litre Quarter-litre	Quarter past Quarter to Date
Data				
Representing and interpreting data				
Table Chart Block Graph				

11.3.5. Third Class

Number	
Place Value	Operations
Whole numbers Thousand Notation board Base ten digit (one digit, two digit, three digit) Value Whole numbers Decimal numbers one place of decimals one decimal place	Rounding Repeated addition Multiplication Division Sharing Remainder Tenths Equal Groups Repeated subtraction half fractions equivalent fractions denominator numerator

Algebra
Number patternsand sequences
Sequence Rule

Shape and Space			
2D Shapes	3D Shapes	Symmetry	Angles
Hexagon Irregular shapes Regular shapes Tesselate	Triangular prism Pyramid Net Vertix/vertices/ corners	Symmetrical Asymmetrical	Angles Parallel Perpendicular Right Angle Obtuse Angle Acute Angle Vertical Horizontal Clockwise Anti-clockwise Greater than/less than/ equal to

Measure				
Length	Area	Weight	Capacity	Time
centimetre convert	square	gram scale digital scale	millilitre container	daily weekly monthly annual a long time ago last year last month yesterday immediately in a week's time *five minute intervals* *past/to* analogue digital

Data	
Representing and interpreting data	Chance
Scale	Possible Impossible Might Certain Not sure Likely Least likely Most likely Unlikely Results

11.3.6. Fourth Class

Number	
Place Value	Decimals/ Fractions
Four digit	One place of decimals Two places of decimals Hundredths

Algebra
Number patterns and sequences
Sequence Rule

Shape and Space		
2D Shapes	Symmetry	Angles
Equilateral triangle Isosceles triangle Scalene triangle Parallelogram Rhombus Pentagon Octagon	Diagonal	Oblique Perpendicular Diagonals Intersecting lines Acute angle Obtuse angle Right angle

Measure				
Length	Area	Weight	Capacity	Time
perimeter kilometre	square centimetres square metres	gram scale digital scale	instrument of measurement	*No new vocabulary*

Data	
Representing and interpreting data	Chance
Scale - 1 is to 2/5/10/100	Chance Likely Unlikely Never Definitely

11.3.7. Fifth Class

Number			
Operations	Fractions	Decimals/ Fractions	Number Theory
Algorithm	Improper fractions Mixed fractions	Percent	prime number composite number square number rectangular number factor multiple
Algebra			
Directed number			
Positive number Negative number			
Shape and Space			
2D Shapes	3D Shapes	Lines and Angles	
Quadrilateral Trapezium Diameter Radius	Tetrahedron	Reflex angle Straight angle Rotation Degrees Protractor Set Square	
Measure			
Length	Area	Capacity	
Metric unit Millimetre	Breadth	Graduated jug	
Data			
Representing and interpreting data		Chance	
Pie chart Statistics Most frequent Most popular		Outcome Processes Frequency table Frequency chart	

11.3.8 Sixth Class

Number			
Operations	Fractions	Decimals/ Fractions	Number Theory
Compute	Ratio Natural number Multiple	Profit Loss Discount VAT Interest Decrease	Square Root Exponential Variable
Algebra			
Directed number			
Positive number Negative number			
Shape and Space			
Octahedron Circumference Coordinates Plot			
Measure				
Length	Area	Capacity	Time	Money
Metric unit	Surface area	Volume	Time zones	Currency

Millimetre	Acre Hectare Scale plan		Distance Average speed	Convert Exchange rate

Data
Representing and interpreting data
Trend graph Data set

Scoil Chormaic CNS

12. Appendix B: Tables and Number Facts

Tables will be introduced as follows. Skills/exercise books relating to tables must also follow this plan.

Class	Junior Infants			Senior Infants			First Class			Second Class			Third Class			Fourth Class Fifth Class Sixth Class
Term	T 1	T2	T3	T1	T2	T3	T1	T2	T3	T1	T2	T3	T1	T2	T3	T1/2/3
Addition +		Introduce number bonds of five	Number bonds of five learned	Revise	Introduce number bonds to 10	Number bonds to 10 learned	Addition tables 1-10 ----- Number bonds 0-20		Revision	Revision		Revision	Revision			Revision
Subtraction -							Subtraction tables 1-10	Revision			Revision	Revision	Revision			Revision
Multiplication x									Skip counting: 1, 2, 5, 10			Skip counting: 1, 2, 3, 4, 5, 10	2s, 4s, 8s, 5s, 10s,	3s, 6s, 9, 7s	Revision	Revision
Division ÷															All tables 1-10, in tandem with multiplication	Revision

Language of tables (this should be varied, but if a standard form is desired, teachers may use the following)

- **Addition:** 5 + 2 = 7 will be read as *'Five and two is seven'*
- **Subtraction:** 8 – 3 = 5 will be read as '*Eight take away three is five'.*
- **Multiplication:** 5 x 2 = 10 will be read as '*Five times two is ten'*
- **Division:** 15 ÷ 3 = 5 will be read as '*Fifteen divided by three is five'*

13. Appendix C: Teaching Content, Approaches and Sequence

The information outlined gives a broad provision of what will be completed at each class level, and how it will be approached.

13.1. Junior Infants

o   All work at this level is rooted in concrete materials with accompanying mathematical discussion. Conceptual and language development is key.
o   The **Ready, Set, Go Maths** programme will be used to teach **Early Mathematical Activities** and the **Number strand,** as well as aspects of other strands (E.g. sorting objects by **length**). Ready, Set, Go Maths will be used a minimum of three times a week. Please refer to the programme for detailed guides on the language and practices to be used. Specifically, Junior Infants will complete all activities from the following sections of the Ready, Set, Go Maths programme:

Sorting	Relationships and Operations	Counting and Recognition	Understanding Number

1. Towards the Notion of a Set
  a. Random collections
  b. One property collections
  c. Two property collections
  d. Three property collections
 	
2. Using pictorial representations:
  a. Carroll and Tree diagrams
  b. Reasoning activities
 	
3. The Notion of Subsets
  a. Using logic people*
 	
A variation of the logic people used in the RSGM manual will be used.
	1. Making patterns
	  a. Copying patterns
	  b. Continuing patterns
	  c. Devising patterns
	2. Relationships - Comparing Sets
	  a. Compare unequal sets
	  b. Compare equal sets
	  c. Compare sets using more/less language
	3. Compare quantities within 5
	4. Partitioning sets within 5
	  a. Subsets within 5
	  b. Calculate mentally within 5
	5. Addition within 5
	  a. Add two numbers practically
	6. <u>Introducing</u> the commutative property
	
	*Note that formal symbols **are not** introduced in Junior Infants.*
		1. Counting activities
		  a. Rhythm counting
		  b. Pendulum counting
		  c. Class number line
		  d. Class picture line
		  e. Bead line
		  f. Individual number track
		  g. Individual number cards
		  h. Individual blank track
		2. Counting forwards from 1
		3. Counting forwards and backwards
		4. Recognising numerals
		5. Recognising and ordering numbers
		6. Counting quantities
		7. Counting forwards from different starts
		8. Number after
		9. Counting backwards from different starts
		10. Number before
		
		Note that the counting above is within five initially, then ten.
			1. Developing one to one correspondence
			2. Towards knowing the numbers up to five
			  a. Understand that the final number in the count refers to the whole set
			  b. Cardinality within five
			  c. Understand first, second, last, after before
			  d. Order numbers to five, compare quantities within five
			  e. Conservation of number within five
			3. Towards knowing the numbers up to 10
			  a. Understand cardinality within 10
			  b. Order numbers to 10, compare quantities within 10
			  c. Conservation of number within 10

o The following broad outline of works is strongly recommended, as per sample plans developed at Junior Infant level and PDST recommendations (see http://www.pdst.ie/sites/default/files/RSGM%20Jnr%20Inf%20Scheme.pdf) :

Term 1	Term 2	Term 3

1) Early Mathematical Activities/ Data
  a) Sorting for one property collections: colour, shape, size, thickness
  b) Sorting two property collections
  c) Sorting three property collections
  d) Sorting two and three property collections
2) Number
  a) Counting 1-5
  b) Components of the number 5 (partitioning)
  c) Compare sets: more/less
3) Shape and Space
  a) 2D shapes
4) Measures
  a) Length
  b) Time
	1) Algebra
	  a) Identify, copy, extend patterns in colour shape and size
	2) Early Mathematical Activities
	  a) Comparing sets without counting
	  b) Counting
	  c) Matching
	  d) Ordering
	3) Number
	  a) Conservation of number to five
	  b) Analysis of number: Combining and partitioning to five
	  c) Ordinal numbers
	4) Measures
	  a) Weight
	  b) Capacity
	  c) Money
		1) Number
		  a) Analysis of number: Combining, partitioning
		  b) Numeration: read, write, order numerals to five
		  c) Calculate mentally within 5
		  d) Oral problems within 5
		2) Data
		3) Shape and space
		  a) Spatial Awareness
		  b) 3D Shapes
		
		Revision and assessment

13.2. Senior Infants

o **General Approach:** Almost all work at this level is rooted in concrete materials with accompanying mathematical discussion. An introduction to formal symbols will take place in the second and third terms. Conceptual and language development is key.

o **Ready, Set, Go Maths** will be used at least three times a week to teach the number and algebra strand. Other topics will be taught on the remaining days. Please refer to the RSGM programme for detailed guides on the language and practices to be used. Specifically, Senior Infants will complete all activities from the following sections of the Ready, Set, Go Maths programme. Revision of some Junior Infant concepts and activities will be necessary.

Sorting	Relationships and Operations	Counting and Recognition	Understanding Number

1. Towards the Notion of a Set (Revision)
  a. One property collections
  b. Two property collections
  c. Three property collections
2. Using pictorial representations:
  a. Venn diagrams
  b. Reasoning activities
3. The Notion of Subsets
  a. Using logic people
    o Venn Diagrams
    o Tree diagrams
    o Carroll diagrams
    o Games for logic people
4. Sorting activities using logic blocks
  a. Venn diagram
  b. Games using logic blocks
	1. Making patterns (Revision)
	  a. Copying patterns
	  b. Continuing patterns
	  c. Devising patterns
	2. Relationships - Comparing Sets
	  a. Compare sets using more/less language
	3. Compare quantities within 10
	4. Partitioning sets within 10
	5. Addition within 10
	6. Introducing the commutative property
	7. Subtraction within 10
	8. Towards mental confidence
	9. Using Cuisenaire to consolidate learning within 10
	
	Children will be introduced to formal symbols for addition and the equals sign in Term 2. The equals sign will be paired with the following language: 'is the same as' and 'equals', **not** *altogether makes. Children will* **not** *be introduced to formal symbols for subtraction (until First Class).*
		1. Counting activities
		  a. Rhythm counting
		  b. Pendulum counting
		  c. Class number line
		  d. Class picture line
		  e. Bead line
		  f. Individual number track
		  g. Individual number cards
		  h. Individual blank track
		2. Counting forwards from 1
		3. Counting forwards and backwards
		4. Recognising numerals
		5. Recognising and ordering numbers
		6. Counting quantities
		7. Counting forwards from different starts
		8. Number after
		9. Counting backwards from different starts
		10. Number before
		
		Note that counting is done to ten initially, for revision. It then continues to 15, and 20.
			1. Developing one to one correspondence (revision as required)
			2. Towards knowing the numbers up to 15 (20)
			  a. Understand cardinality within 15 (20)
			  b. Order numbers within 15(20), compare quantities within 15(20)
			  c. Awareness of structure and pattern of 2-digit numbers within 15 (20)
			  d. Appreciate the composition of 2-digit numbers

o The following broad outline of work is strongly recommended, as per sample plans developed at Senior Infant level, based on PDST recommendations (see http://www.pdst.ie/sites/default/files/RSGM_Snr%20Inf%20Scheme.pdf) :

Term 1	Term 2	Term 3

1) Early Mathematical Activities (RSGM)
  a) Sorting one, two collections
  b) Identify, copy, extend and make patterns in colour, shape and size
2) Number
  a) Counting to 10; finding cardinality to 10
  b) Comparing and ordering within 10
  c) Number recognition/formation within 10 (15, by end of term)
  d) Before/after/forwards/backwards within 10
  e) Form sets of 10, match sets of 10
  f) Use ordinal number (first, second, third, last)
  g) Combining within 10
  h) Partitioning within 10
3) Shape and Space
  a) 2D Shapes
  b) 3D Shapes
  c) Spatial Awareness
4) Algebra
5) Measures
  a) Time
6) Data
	1) Early Mathematical Activities
	  a) Sorting three property collections
	  b) Sorting using Venn diagram
	  c) Sorting using Tree diagram
	  d) Sorting using Carroll diagram
	2) Number
	  a) Counting, recognition, formation to 20
	  b) Identify the empty set, numeral 0
	  c) Comparing and ordering within 10
	  d) Combining within 10
	  e) Partitioning within 10
	3) Measures
	  a) Money (recognise to 20c, use to 10c)
	  b) Weight
		1) Early Mathematical Activities
		  a) Sorting using logic blocks/ Venn/Carroll/Tree diagrams
		  b) Reasoning using logic blocks
		2) Number
		  a) Subtraction within 10(end of Term, as per RSGM)
		  b) Counting backwards within 20
		  c) Comparing and ordering within 10 (revision)
		  d) Combining within 10 (revision)
		  e) Partitioning within 10 (revision)
		3) Measures
		  a) Length
		  b) Capacity
		4) Data

13.3. First Class

o **Concrete Materials: Concrete materials will continue to form the basis for the majority of new learning in First Class**. They play a particularly significant role in developing children's understanding of place value.
o **Conceptual Place Value**: Children are encouraged to develop an understanding of **conceptual place value,** which emphasises strong mental strategies, an understanding of the relative size of numbers, an ability to relate numbers to each other and a flexible understanding of the value of different numbers. This understanding is of far greater significance than a rote ability to identify the value of digits as tens or units.
o **Base Ten Materials:** A range of materials for teaching place value and addition/subtraction are available. However, as children **need to understand the use of ten as an iterative unit,** they need several weeks experience in bundling units into tens before using pre-grouped base ten blocks (Dienes blocks). The initial stages of teaching place value, addition and subtraction should use **ungrouped** base ten materials.
o **Money:** As children will need to have a good understanding of place value to teach money, it should be taught in Term 3.
o **Fractions:** The link between the **fraction (half)** and the whole **(one)** should be emphasised. Linear, area and set models for representing fractions are recommended.
o The following active approaches and concrete materials are **strongly recommended**, **in the sequence in which they are written**:

Analysing numbers to 20	Place Value	Adding without renaming	Adding with renaming	Subtracting without renaming
1. Ten frames and counters (See *Mata sa Rang* resources) 2. Using 10 x2 grid (See Ready, Set, Go Maths P. 151) 3. Unifix cubes 4. Cuisenaire Rods (particularly useful for missing addends- 8+ □= 10) 5. Empty numberline	**Pre-grouped concrete materials (e.g. Dienes blocks) should <u>not</u> be used at the early stages.** 1. Counting Choir/ Counting forwards and backwards to 100 (to learn number names) 2. Bundling a variety of concrete materials into single tens (straws, lollipop sticks, unifix cubes). 3. Constructing tens with concrete materials, *without* units (*x* tens). 4. Constructing tens with single units remaining (x tens and y ones). 5. Associate formal number names with tens (e.g. six tens is sixty). Repeat,	1. Adding numbers using a variety of concrete materials (without notation) 2. Adding numbers using concrete materials with children's own method of recording. 3. Adding using understanding of place value (e.g. adding tens and units separately, using an empty numberline, using the hundred square). 4. Adding numbers using vertical recording, using concrete materials and notation boards (ungrouped, then pregrouped).	1. Adding numbers using a variety of concrete materials (without notation) 2. Adding numbers using concrete materials with children's own method of recording. 3. Adding using understanding of place value (e.g. adding tens and units separately, using an empty numberline, using the hundred square). 4. Adding numbers using vertical recording, using concrete materials and notation boards (ungrouped, then pregrouped).	1. Subtracting numbers using a variety of concrete materials and digit cards to represent the number to be removed (without notation) 2. Subtracting numbers using concrete materials/digit cards with children's own method of recording. 3. Subtracting using understanding of place value (e.g. adding tens and units separately, using an empty numberline, using the hundred square). 4. Subtracting numbers using vertical recording, using concrete materials, digit cards and notation boards (ungrouped, then pregrouped).

	including units. 6. Record formal symbols on place value chart. 7. Equivalent groupings: (e.g. 53 = five tens and three units, or four tens and 13 units) 8. Arrow cards	5. Adding numbers vertically without using concrete materials.	5. Adding numbers vertically without using concrete materials.	5. Subtracting numbers vertically without using concrete materials.

o   The following schedule is strongly recommended:

Term 1	Term 2	Term 3

1) Number (within 20)
  a) Counting and Numeration
  b) Comparing and ordering
  c) Operations: Addition (within 20)
  d) Place Value within 99 (after midterm)
2) Measures
  a) Time
  b) Length
3) Data
4) Algebra
5) Shape and space
  a) Spatial Awareness
  b) 2D Shapes
	1) Number
	  a) Counting and numeration
	  b) Comparing and Ordering
	  c) Operations: Addition without renaming (within 99) and Subtraction (within 20)
	  d) Place Value within 99
	2) Algebra
	3) Measures
	  a) Time
	  b) Weight
	4) Shape and Space
	  a) 3D Shapes
		1) Number
		  a) Counting and numeration
		  b) Comparing and Ordering
		  c) Operations: Addition with renaming (within 99) and Subtraction (within 99)
		  d) Place Value
		  e) Fractions
		2) Measures
		  a) Money
		  b) Capacity

13.4. Second Class

- o **Concrete Materials:** Concrete materials continue to play an important role in consolidating and extending children's understanding of concepts, including place value.
- o **Conceptual Place Value**: Children are encouraged to develop an understanding of **conceptual place value,** which emphasises strong mental strategies, an understanding of the relative size of numbers, an ability to relate numbers to each other and a flexible understanding of the value of different numbers. This understanding is of far greater significance than a rote ability to identify the value of digits as tens or units.
- o **Base Ten Materials:** A range of materials for teaching place value and addition/subtraction are available. However, as children **need to understand the use of ten/hundred as an iterative unit,** they need several weeks experience in bundling units into tens, and tens into hundreds before using pregrouped base ten blocks (Dienes blocks). The initial stages of teaching place value, addition and subtraction should use **ungrouped** base ten materials.
- o **Money:** As children will need to have a good understanding of place value to teach money, it should be taught in Term 2/3.
- o **Fractions:** The link between the **fractions (halves, quarters)** and the whole **(one)** should be emphasised. Linear, area and set models for representing fractions are recommended.
- o The following active approaches and concrete materials are **strongly recommended**, **in the sequence in which they are written**:

Place Value	Subtraction with renaming
1. Counting Choir/ Counting forwards and backwards to 200 (to learn number names) 2. Bundling a variety of concrete materials into single tens (revision) (straws, lollipop sticks, unifix cubes). 3. Bundling a variety of concrete materials into hundreds 4. Associate formal number names with the numbers 100-199. (e.g. 11 tens is one hundred and ten). 5. Record formal symbols on place value chart. 6. Equivalent groupings: (e.g. 153 = One hundred, five tens and three units, or fifteen tens and 13 units) 7. Arrow cards	1. Encourage mental strategies such as moving on the hundred square, subtracting tens/units separately. 2. Use materials grouped by children (eg. Lollipop sticks) and informal notation. 3. Use pregrouped materials (Dienes) and informal notation 4. Use pregrouped materials (Dienes) and formal, vertical algorithm 5. Use formal, vertical algorithm without concrete materials. *The number to be subtracted should be represented by **digit cards.***

Term 1	Term 2	Term 3

1) Number
   a) Operations: Addition with and without renaming, subtraction without renaming
   b) Place Value within 99
   c) Counting and numeration within 99
   d) Fractions
   e) Comparing and ordering
	1) Number
	   a) Counting and numeration within 199
	   b) Operations: Addition with and without renaming, and subtraction with and without renaming within 99
	   c) Place Value within 199
	 2) Measures
		1) Number
		   a) Addition and subtraction (with/without renaming) within 199
		 2) Measures
		   a) Length
		   b) Capacity
		   c) Area

2) Algebra
3) Shape and Space
   a) 2D Shapes
   b) Angles
   c) Symmetry
4) Measures
      a. Time
	a) Money
	  b) Time
	  c) Area
	3) Shape and Space
	   a) Spatial Awareness
	   b) 3D Shapes
		d) Money
		3) Algebra
		   a) Extending and using pattern
		4) Data

13.5. Third Class

o **New Operations**: The introduction of multiplication and division is a key development at this level. Children will be encouraged to see the interrelationship between the two operations. They will be introduced to multiplication first, shortly followed by division.

o **Concrete Materials: Concrete materials play an important role in developing a conceptual understanding of multiplication and division.** These materials could include, counters, lollipop sticks, cubes, Cuisenaire rods as well as classroom objects (E.g. groups of books).

o **Conceptual Place Value**: Children should be enabled to develop a sophisticated understanding of place value to 999. The construction and deconstruction of numbers using pregrouped or ungrouped materials will be important in achieving this. Oral counting will also be important. Children should continue to use concrete materials in developing an understanding of addition/subtraction to 999.

o **Multiple modes of representation:** Children should be able to understand multiplication and division in a variety of ways (see below).

Place Value	Multiplication	Division	Fractions/Decimals
1. Counting Choir/ Counting forwards and backwards to 999 (to learn number names) 2. Bundling a variety of concrete materials into tens, hundreds 3. Associate formal number names with the numbers represented concretely to 999. Repeat, including units. 4. Using pregrouped base ten materials to make numbers. 5. Equivalent groupings: (e.g. 253 = One hundred, five tens and three units, or twenty five tens and three units) 6. Arrow cards	1. Practise skip counting. Use skip counting to find total of groups of concrete materials. 2. Create multiple equal groups of concrete materials. Record as repeated addition. 3. Skip counting/repeated addition using empty number line. 4. Introduction of multiplication notation as more efficient way of recording repeated addition. 5. Creating/using arrays (useful for teaching commutative and distributive property). 6. Using dot strips to record multiples. 7. Making pictorial records of multiplication (e.g. drawing pictures).	1. Fair sharing of concrete materials. 2. Repeated subtraction of concrete materials. Recording of same. 3. Repeated subtraction on the empty number line.	1. Linear models of fractions: linear paper folding, Cuisenaire rods. 2. Set models of fractions: counters, cubes, arrays, pictures. 3. Area models of fractions: circles, squares, pegboards, folded paper. 4. Experience with getting the same fraction for different sized wholes (e.g. different lengths of paper).

Term 1	Term 2	Term 3

1) Number
  a) Place Value to 999
  b) Addition/Subtraction to 999 (note: subtraction across zero will specific
	1) Number
	  a) Multiplication- revision, distributive property, two digit by one digit (informal notation)
		1) Number
		  a) Multiplication- formal algorithm (2 digit by 1 digit)
		  b) Division – formal algorithm (2 digit

teaching – e.g. 900 – 632)
 c) Multiplication – introduction with concretes, repeated addition, one digit by one digit multiplication, commutative property
 d) Division- introduction with concretes, simple recording
 2) Measures
   a) Time
   b) Money
 3) Data
   a) Representing and interpreting data (note: importance of scale in graphs)
   b) Chance
 4) Algebra
   a) Number Patterns
   b) Number Sentences
	b) Division – revision, remainders, different ways of writing division, arrays for division
	 c) Fractions
	 d) Decimals
	 2) Measures
	   a) Money
	   b) Capacity
	   c) Time
	   d) Area
	   e) Weight
	 3) Shape and Space
	   a) Symmetry
		divided by 1 digit)
		 2) Shape and Space
		   a) 2D Shapes
		   b) 3D Shapes
		   c) Area
		   d) Lines and angles
		
		 Revision

13.6. Fourth, Fifth and Sixth Class

- **Operations**: The language of operations should be borne in mind (see previous sections of this school plan). The approach to long division requires specific attention in fifth class.
- **Concrete Materials: Concrete materials continue to play an important role in developing a conceptual understanding of multiplication and division.** Teachers may choose to change the use of Dienes blocks as follows, to develop conceptual understanding into the decimals and fractions:
  - Red 1000 cube becomes '1'.
  - Blue 100 flat becomes '1/10'.
  - Green 10 rod becomes '1/100'.
  - Yellow 1 cube becomes '1/1000'.
- **Conceptual Place Value**: Children should be enabled to develop a sophisticated understanding of place value to 9999 and beyond. The construction and deconstruction of numbers using pre-grouped or ungrouped materials will be important in achieving this. Oral counting will also be important.
- **Multiple modes of representation:** Children should be able to understand multiplication and division in a variety of ways. See PDST manuals on place value, fractions, decimals and percentages for recommended practice.
- **Oral Counting:** Children should continue to count orally using numbers that are appropriate to learning. Particular attention should be given to crossing 10s, 100s, and 1000s (E.g. counting from 9998 to 10,001)

14. Appendix D: Numeral Formation Rhymes

See: http://www.lansdowne.staffs.sch.uk/Numeracy/Number%20Formation%20Rhyme%20Cards.pdf for posters.

Around and round and round we go,

When we get home we have a zero.

Start at the top and down we run,
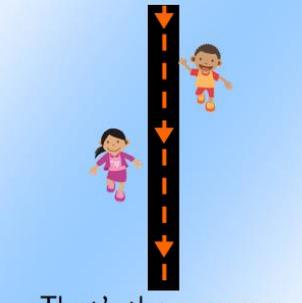
That's the way we make a one.

Around and back on a railroad track

Two, two, two

Around the tree and around the tree,
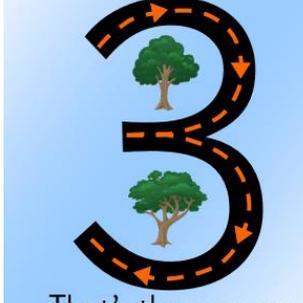
That's the way we make a three.

Down and over, down some more
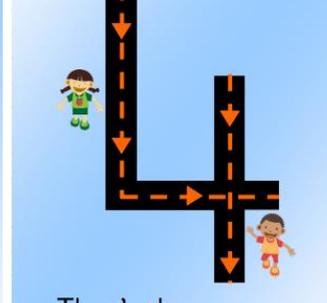
That's the way we make a four.

Down and around then a flag on high

That's the way we make a five.

Down we go and make a loop,
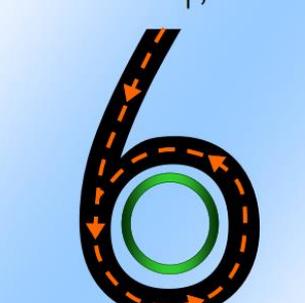
Number six makes a hoop.

Across the sky and down from heaven,

That's the way we make a seven.

Make an 's' and do not wait
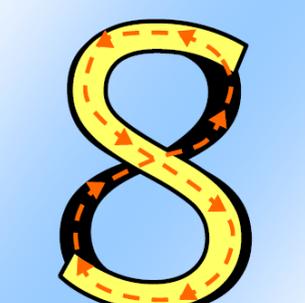
When it's joined up you have an eight.

Make a loop and then a line,

That's the way we make a nine.

15.   Appendix E: Mental Mathematics

Mental strategies are an important aspect of mental maths. Children should be able to draw on a range of mental strategies to solve different operations. Being able to use these strategies lessens a reliance on formal computations.

Whenever possible, children should be encouraged to **share their own mental strategies** with other children. This will allow for a variety of strategies to be shared in the class.

See the PDST Mental Maths strategy handbooks for advice and ideas:
http://www.pdst.ie/sites/default/files/Mental%20Maths%20Workshop%201%20Handbook.pdf

15.1.   Addition and Subtraction Mental Strategies

The following strategies should be explicitly taught/revised at each class level, while drawing on those previously taught.

	Commutative Property	Facts of 10	Counting forwards and backwards	Doubles/ near doubles	Bridging through ten	Reordering	Partitioning place value	Compensating	Think addition	Keeping a constant distance
JI			✓							
SI	✓	✓	✓							
First Class	✓	✓	✓	✓						
Second Class			✓	✓	✓	✓			✓	
Third Class			✓				✓			
Fourth Class			✓					✓		
Fifth Class			✓							✓
Sixth Class			✓							✓

15.2. Multiplication and Division Mental Strategies

The following strategies should be explicitly taught/revised at each class level.

	Skip Counting	Commutative Property (multiplication)	Associative Property	Distributive Property	Inverse Relationship	Doubles/ double doubles/ double and one more set	Doubling and Halving	Partitioning by place value	Factorisation	Rounding and compensating	Using Known facts	Using multiples of ten	Partial products/ quotients
Second Class	✓												
Third Class	✓	✓		✓	✓	✓					✓		
Fourth Class			✓			✓		✓			✓		✓
Fifth Class							✓				✓	✓	
Sixth Class									✓	✓	✓		