



Maths Curriculum Plan

This curriculum plan was developed by the staff to provide guidance for all teachers and to ensure whole-school collaboration and development of children's maths skills.

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1. Introductory Statement

This curriculum plan was drafted using a consultation process among staff members in 2017. It was reviewed as part of a School Self-Evaluation Process and after the maths curriculum was applied at all class levels during the 2021-2022 academic year. This is a living document that will continue to be revised and reshaped.

2. Rationale

Maths is a core subject which has links with other curricular areas. By exposing students to number in many and varied contexts, children will develop a range of skills and a sense of achievement relating to maths. This will help them gain an understanding of number and other maths concepts that they will be able to apply to everyday life. Therefore, the maths curriculum plan is a core planning document, providing clear objectives for teachers, which will facilitate students' mathematical development, reflected in levels of interest and achievement in this curricular area.

3. Vision

Learning experiences in maths at Knocknacarra Educate Together NS will be constructed in a manner which will endeavour to develop students' mathematical competencies according to individual ability. Working with the support of parents at home who can reinforce activities and learning as developed in the classroom, children will master skills that will be used creatively towards answering questions of importance. By providing relevant opportunity and practice, along with varied pacing in class, students will experience both fun and success in maths. This will assist them in developing a realisation that maths is relevant to their lives, now and in the future.

4. Aims

- To ensure mastery of basic skills and strategies so that students are able to compute numeric information from a variety of sources.
- To provide early intervention to ensure that all children, regardless of ability range, are given opportunities to experience understanding and success in maths.
- To build on computational skill development that is the foundation for most mathematical tasks.
- To provide students with wide-ranging opportunities to apply skills, in order to develop computational, conceptual and problem-solving maths abilities.
- To support the students' use of procedures to estimate realistically and accurately.
- To facilitate the children in developing an understanding of the relationships between numbers and word problems.
- To present opportunities for problem solving, activity-based and on paper, in a way that provides for creative exploration with number.
- To develop students' abstract and lateral thinking abilities through provision of opportunities to use and develop reasoning skills.
- To enable all students to participate, to the best of their abilities, by providing them with a broad mathematical learning environment.
- To provide opportunity for students to develop life skills maths, particularly those relating to shape and space, number, time and money.

5. Approaches and Methodologies

5.1 Talk and Discussion

At the heart of any maths lesson is the use of oral communication to present and reinforce concepts and provide a forum for children to practice higher-order maths skills including analysing, evaluating and synthesising numerical information. Talk and discussion are an integral part of the learning process including teacher/pupil, pupil/pupil and pupil/parent interaction. Opportunities are provided for pupils to explain how they reached an answer and to discuss alternative ways of approaching a task. Teachers use age-appropriate language when talking through the problem solving process using a think-aloud approach. There is a

conscious effort to use the children's own ideas and environment as a basis for reinforcing the maths language.

This contributes directly to the development of children's oral language skills, as described in the English Curriculum Plan. Children will be trained in discussion skills before they effectively use them in a group. Such skills include turn-taking, active listening, appropriate responses to the opinions of others, confidence in putting forward an opinion and developing their ability to explain clearly their point of view.

The language and teaching approaches below are accepted as the school's common approach. To support parents and children when they are at home, a number of videos have been created to show the computation processes used in our school. They are available on the school's website at www.ketns.ie/maths-portal.

Number operations:

$3 + 0 =$ initially taught as 'three *and* zero *make* three', progressing to 'plus' and 'equals'

$5 - 5 =$ initially taught as 'five *take* five *is* zero' progressing to 'minus and 'equals'

$3 \times 4 =$ 'three fours are' (variable first, constant in the middle) and later 3 'multiplied' by 4

$10 \div 5 =$ shown as the inverse of multiplication - begin with 'divided by' and progress onto 'into' etc.

Number Facts:

The children are made aware of the commutative properties of the addition and multiplication tables, and their relationships with subtraction and division respectively. We use mental strategies in multiplication such as identifying doubles, near doubles, multiplying by 5 and 10 and estimation. In division, the concept of sharing is introduced, division is flagged as repeated subtraction and estimation skills are encouraged. More importantly, the relationship between number fact families is emphasised (i.e. $3 \times 4 = 12$, $4 \times 3 = 12$, $12/3 = 4$, $12/4 = 3$).

Agreed Strategies/Algorithms for Operations:

Addition

In the case of 16
 +14

"Start at the top number when adding, begin by using 'and' – e.g. '6 and 4' – and progress to using 'plus' etc. When carrying over the 10, reduce its size and place it at the bottom of the tens column."

Subtraction

In the case of 30
 -14

'0 take 4 I cannot do, cross out the three 10s, rename as two 10s and 10 units, 10 take 4 leaves 6, 2 take 1 leaves 1. How many units have you left?' (6) 'How many 10s have you left?' (1)

Multiplication

In the case of 45
 X 36

Start with '6 multiplied by 5' and then progress to 'six 5s'.

Division

Children will be familiar with the 4 ways of representing short division. (Start with '5 into 30' in the case of 306 divided by 5).

5.2 Use of manipulatives/concrete objects

Manipulatives and concrete objects (counters, Dienes cubes, coins, shapes, bears, coloured beans, etc.) are invaluable tools for helping children to understand abstract mathematical concepts. Therefore, the use of these objects often forms the focus of any initial presentation of new concepts, even in senior classes. Therefore, the school will make every effort to ensure that necessary maths equipment is available.

5.3 Integration and Linkage

A cross-curricular approach will help children make connections between different curricular areas, add to the child's enjoyment of mathematics and encourage the transfer of learning. Likewise, all the strands in the Mathematics Curriculum 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.

5.4 Using the Environment

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

Strategies for creating a math-rich environment:

- Benchmarks (metre marked on a door/wall, actual kilogram weight, metre squared marked out on floor, etc.)
- Special box/shelf of maths books
- Creating a problem-solving ethos in the school
- Maths games for indoor yard time and choice time
- Maths Week (integration of maths across the curriculum)
- Maths trails
- Creating a number-rich environment in the junior section of the school

5.5 ICT

A variety of ICT resources are used to provide children with opportunities for targeted practice. Platforms may be used in the school that are able to be personalised according to each child's individual ability. A range of other websites may be used as well as the online resources connected to the Planet Maths scheme.

5.6 Stations teaching

Stations teaching involves pupils working in groups at various stations. It is a recommended team-teaching method that can be used when sufficient numbers of personnel are available. It is a very important approach to maths teaching used in the school at all ages. Groupings for station teaching are usually but not solely mixed-ability groups. Planning and collaboration on the topics used at each station is necessary.

5.7 Presentation of Work

Focus on presentation of mathematics work is begun in 1st class, with the introduction of squared copies. Cm² copies are used in 1st class and in the 1st term of 2nd class, decreasing in size during the year. From 3rd class and up, children no longer write in their maths texts, instead using their copies and ruling them with two columns per page. There is an agreed approach to teaching numeral formation in the junior classes.

5.8 Problem-solving approach – RAVECCC

Problem solving is the primary function of mathematics education. One of the strategies taught throughout the school is RAVECCC method:

- Read
- Attend to key words
- Visualise
- Estimate

- Choose numbers
- Calculate
- Check

This strategy is modelled for the students and they are given many opportunities to practise.

5.9 Games

Games are used regularly in whole-class and stations teaching settings. Games that develop logical reasoning and general maths skills are used regularly by the children. In addition, a variety of games will be gathered and are sent home as part of homework to be played at home. These special take-home games have been created for Infants to 3rd Class. More information about these games can be found in Section 6.6.

5.10 Maths Investigations

A cross-curricular approach to maths can be achieved through maths investigations. These investigations situate maths concepts in real-life, practical situations. More information about these maths investigations can be found in Section 6.8 as well as Appendix A. The following criteria guide the selection of the investigations:

- Ideally, there is **not one definitive answer**, or if there is, a number of different procedures or processes could be used to achieve the answer. Either way, the teacher and the children **are unaware of the solution before the investigation starts**.
- The investigation requires children to consider the question/problem and **develop a plan** to gather data and compute. The investigation will require children to decide what information to gather and how to use it to find a solution.
- Ideally the investigation should be of **value to the children**, perhaps involving the class in deciding what to investigate. Ideally, the class will genuinely want to find a solution.
- The investigation applies **maths skills in context**. This requires teachers to analyse the investigation and ensure children have a passable (though not necessarily mastered) knowledge of the skills that will be required.
- Ideally, the investigation is not a solitary activity but will require pair, group or whole-class collaboration to ensure an **oral language and shared problem-solving approach**.

Resources that may be helpful in planning these investigations include:

Teaching with Tasks for Effective Mathematics Learning by Peter Sullivan, Doug Clarke and Barbara Clarke

About Teaching Mathematics by Marilyn Burns

My Problem Solving Journal (Folens series)

<http://robertkaplinsky.com/lessons/>

<http://www.figurethis.org/index.html>

<http://www.sides.org.uk/maths/investigations.html>

<http://www.mathsinvestigations.com/indexphotocopiable.php?idnumber=102&id=1&pagetitle=Photocopiable%20Investigations>

<http://www.tes.co.uk/teaching-resource/Maths-Investigations-6291657/>

5.11 Pair and Group Work

Pair and group work is used on occasion to reinforce and revise maths concepts and encourage cooperation amongst pupils. Lessons with well-planned group work or collaborative facilitate student achievement, interest, and motivation. Group activities that involve discussion and sharing of ideas help individuals negotiate a better understanding of key concepts and processes.

5.12 Visits from adult community members

It is planned to form links with members of the local community, including parents, in order to show the relevance of maths in everyday life and the workplace. Where possible, adults will be invited to speak to certain classes on the subject of how maths is useful in their lives. Participants will be asked to the age group

their visit may be relevant for. This will be discussed with the class teacher or principal beforehand. Each talk could consist of:

- Introduction: name, profession, connection to the school (if any).
- A brief account of the visitor’s profession
- The relevance or necessity of maths in the visitor’s daily work
- A question and answer session with the pupils.
- Any relevant resources: e.g. pictures, work samples, books or PowerPoints.

The class teacher will be present at all times during the visit. Visitors may provide notes or worksheets to be copied in advance. The sessions should take no longer than 30-40 minutes including questions and answers and there will be a pre-arranged time for each visit.

5.13 Extension and Supplementary Work

Opportunities for early-finishers and those children with high aptitudes for maths are provided, as appropriate, to ensure differentiation and sufficient progress for all. Teachers are encouraged to source additional worksheets, ICT opportunities and games that can be used in such cases. The Planet Maths scheme offers extra tasks in the teacher guides for each class level.

6. Content – Sequence and Resources

6.1 Key Textbooks

Key texts are used an important resource for lesson planning as well as to provide adequate practice exercises. Related resources that are produced to be used in conjunction with the textbooks, including online supports and teachers’ manuals, are available. Other textbooks are used as supplementary material in addition to those listed below. While textbooks are important components of the maths teaching, it is recognised that they are used to support the more important hands-on experiences and teaching methods used to achieve curriculum objectives.

	Junior Infants	Senior Infants	1 st Class	2 nd Class
Primary Text	<i>Planet Maths – Junior Infants and Number Practice Book</i>	<i>Planet Maths – Senior Infants and Number Practice Book</i>	<i>Planet Maths 1 and Satellite Book</i>	<i>Planet Maths 2 and Satellite Book</i>
Key Resources	<i>Ready Steady Go Maths Mathematics Their Way</i>	<i>Ready Steady Go Maths Mathematics Their Way</i>	<i>Mathematics Their Way</i>	<i>Mathematics Their Way Maths Comprehension Cards – 1</i>

	3 rd Class	4 th Class	5 th Class	6 th Class
Primary Text	<i>Planet Maths 3</i>	<i>Planet Maths 4</i>	<i>Planet Maths 5</i>	<i>Planet Maths 6</i>
Additional Texts	<i>Mad4Maths 3 Maths Challenge 3</i>	<i>Mad 4 Maths Maths Challenge 4</i>	<i>Mad4Maths 5 Maths Challenge 5</i>	<i>Mad for Maths 6 Maths Challenge 6</i>
Supplementary Resources	<i>Number Facts – Multiplication Maths Comprehension Cards – 2</i>	<i>Maths Assessment 4th (Prim- Ed) Maths Comprehension Cards – Set 3</i>	<i>Maths Assessment 5th (Prim- Ed)</i>	<i>Maths Loop Games Assessment 6th (Prim Ed)</i>

6.2 Topics and Skills

The Primary Curriculum objectives inform the progression of skills. A summary of these key concepts and skills, organised according to strand unit, demonstrates the spiral approach to the curriculum.

6.2.1 Junior Infants – Second Class Content

Strand Unit	Junior Infants	Senior Infants	1 st Class	2 nd Class
Number	<p><u>Counting and Numeration:</u> Numerals 0 – 5. Count to 10. Equivalent and non-equivalent sets.</p>	<p><u>Counting and Numeration:</u> Numerals 0 – 10. Count to 20. Combining, partitioning and numeration to 10. Equivalent and non-equivalent sets.</p>	<p><u>Counting and Numeration:</u> Numerals 0-99 and estimating objects in a set 0-20. <u>Comparing and Ordering:</u> Compare equivalent and non-equivalent sets 0-20. Ordinal numbers, first to tenth. <u>Place Value:</u> 0-99 (tens and units). <u>Operations:</u> Addition - Combining or partitioning sets using concrete materials 0-20 - Addition facts within 20 - Number sentences and stories - Solve problems within 20 - Add numbers without renaming within 99 Subtraction - Mental strategies for subtraction 0-20. Estimate differences within 99. - Subtract numbers without renaming within 99. Early Multiplication - Counting in twos, fives, tens. Solve 1-step word sums (+/-). <u>Fractions:</u> Half of sets to 20</p>	<p><u>Counting and Numeration:</u> Numerals 0-199. Estimate objects in a set 0-20. <u>Comparing and Ordering:</u> Compare sets using <, > and =. Ordinal numbers. <u>Place Value:</u> 0-199 (hundreds, tens and units). <u>Operations:</u> Addition - Associative and zero properties - Addition facts within 20 - Number sentences and stories - Solve problems within 99 - Add numbers without and with renaming within 99 Subtraction: - Subtraction as deducting, as complementing and as difference. - Subtract numbers without renaming within 99. Early Multiplications: - Repeated addition and skip counting (2s, 3s, 5s, 10s). - Multiplication as repeated addition. Solve 1-step and 2-step problems <u>Fractions:</u> Halves and quarters of sets to 20. Relationship of quarters and halves.</p>
Algebra	Recognising patterns	Extending patterns	Recognise pattern, including odd and even numbers. Patterns in addition facts. Introduce a frame to show an unknown number.	Patterns and number sequences. Patterns in addition facts. Use frames in addition and subtraction
Shape and Space	<p><u>Spatial Awareness:</u> Vocabulary of spatial relations. <u>3D Shapes:</u> Sphere, cylinder, cuboid, cube. <u>2D Shapes:</u> Circle, square, rectangle, triangle.</p>	<p><u>Spatial Awareness:</u> Vocabulary of spatial relations. Give and follow simple directions. <u>2D Shapes:</u> Square, rectangle, triangle, circle, semicircle. Identify halves of 2-D shapes. <u>3D Shapes:</u> Cube, cuboid, cylinder and sphere.</p>	<p><u>Spatial Awareness:</u> Vocabulary of spatial relations. Give and follow simple directions. <u>2D Shapes:</u> Square, rectangle, triangle, circle, semicircle. Identify halves of 2-D shapes. <u>3D Shapes:</u> Cube, cuboid, cylinder and sphere.</p>	<p><u>2-D Shapes:</u> Square, circle, triangle, rectangle, and semi-circle, oval. <u>3D shapes:</u> Cube, cuboid, cylinder, sphere and cone. <u>Symmetry:</u> Identify line symmetry in shapes and in the environment. <u>Angles:</u> Explore and recognise angles in the environment</p>
Measures	<p><u>Length:</u> Non-standard measurement. Comparing lengths. <u>Weight:</u> Constructive experimentation with scales and containers</p>	<p><u>Length:</u> Non-standard measurement. Comparing lengths. Use of unifix cubes and other manipulatives as standard measures <u>Weight and</u></p>	<p><u>Length:</u> Estimate, measure and record length using non-standard and standard units (centimetres and a metre). <u>Weight:</u> Estimate, measure and record weight using non-standard and standard units (the kilogram). <u>Capacity:</u> Estimate, measure and record capacity using non-standard and standard units</p>	<p><u>Length:</u> Estimate, measure and record length using non-standard units and metres and centimetres. <u>Area:</u> Estimate and measure area using non-standard units. <u>Weight:</u> Estimate, compare, measure and record weight using non-standard units as well as kg, $\frac{1}{2}$ kg and $\frac{1}{4}$ kg and solve simple problems. Objects or substances that weigh 1 kg but vary greatly in</p>

	and comparing items <u>Money:</u> 1c, 2c, 5c coins. <u>Time:</u> Sequencing events, seasons	<u>Capacity:</u> <u>Money:</u> 1c, 2c, 5c, 20c coins. <u>Time:</u> Days of the week, sequencing events, seasons	(litre) and solve simple problems. <u>Money:</u> 1c, 2c, 5c, 10c, 20c, 50c coins. Calculate how many items may be bought with a given sum. <u>Time:</u> Read time in hours and half-hours on 12-hour analogue clock. Read day, date and month using calendar.	size. <u>Capacity:</u> - Estimate, compare, measure and record capacity of containers using non-standard units and litres, $\frac{1}{2}$ litres and $\frac{1}{4}$ litres. <u>Time:</u> Half-hours and quarter hours (to the hour only) on analogue and digital clocks <u>Money:</u> Coins up to value of 2 euro. Write the value of coins as cents and later as euro.
Data	Collect and analyse data in a variety of forms including pictographs and use of manipulatives.	Sort and classify objects by two and three criteria. Represent and interpret data in two, three or four rows or columns using real objects, models and pictures.	Simple tables and charts. Simple block graphs.	

6.2.2 3rd – 6th Class Content

Strand Unit	3 rd Class	4 th Class	5 th Class	6 th Class
Number	<p><u>Place Value:</u> Read, write and order 3-digit numbers. One place of decimals (tenths). Round numbers to nearest 10 and 100.</p> <p><u>Operations</u> Addition/Subtraction</p> <ul style="list-style-type: none"> - With and without renaming 3-digit numbers. <p>Multiplication</p> <ul style="list-style-type: none"> - Repeated addition multiplication of 2 digits by 1 (short multiplication). - Multiplication facts within 100. <p>Division</p> <ul style="list-style-type: none"> - Understanding of division as sharing and as repeated subtraction. - Divide a 1-digit or 2-digit number by a one-digit number (short division) without and with remainders. <p><u>Fractions:</u> Fractions and equivalent forms with denominators 2, 4, 8 and 10.</p> <p><u>Decimals:</u> Identify tenths and express in decimal form.</p>	<p><u>Place Value:</u> Whole numbers 0-9,999. Round numbers to nearest 1000. Decimals to two places (tenths and hundredths).</p> <p><u>Operations</u> Addition/Subtraction</p> <ul style="list-style-type: none"> - +/- without and with renaming, within 9999. <p>Multiplication</p> <ul style="list-style-type: none"> - Multiply 2-digit or 3-digit numbers by a 1- or 2-digit number (short and long multiplication). - Mastery of facts within 100. <p>Division</p> <ul style="list-style-type: none"> - Division facts within 100. - Divide a 3-digit number by a 1-digit number without or with remainders (short division). - Distributive property of division. <p><u>Fractions:</u> Fractions with denominators 2, 3, 4, 5, 6, 8, 9, 10 and 12. Calculate a number, given a multiple fraction of the number. Express one number as a fraction of another.</p> <p><u>Decimals:</u> Express</p>	<p><u>Place Value:</u> Read, write and order 3-digit numbers. One place of decimals (tenths). Round numbers to nearest 10 and 100.</p> <p><u>Operations</u> Addition/Subtraction</p> <ul style="list-style-type: none"> - With and without renaming 3-digit numbers. <p>Multiplication</p> <ul style="list-style-type: none"> - Multiply 2-digit or 3-digit numbers by a 1- or 2-digit number (short and long multiplication). <p>Division</p> <ul style="list-style-type: none"> - Understanding of division as sharing and as repeated subtraction. - Divide a three-digit number by a one- or two-digit number without and with remainders (short and long division). - Mastery of division facts within 100. <p><u>Fractions:</u> Fractions and equivalent forms with denominators 2, 4, 8 and 10. Relationship between fractions and division.</p> <p><u>Decimals:</u> Identify</p>	<p><u>Place Value:</u> Whole numbers 0-9,999. Round numbers to nearest 1000. Decimals to two places (tenths and hundredths).</p> <p><u>Operations</u> Addition/Subtraction</p> <ul style="list-style-type: none"> - +/- without and with renaming, within 9999 <p>Multiplication</p> <ul style="list-style-type: none"> - Multiply 2-digit or 3-digit numbers by a 1 or 2-digit number (short and long multiplication) - Represent multiplication in expanded form. <p>Division</p> <ul style="list-style-type: none"> - Divide a 3-digit number by a 1- or 2-digit number without or with remainders (short and long division). - Distributive property of division. <p><u>Fractions:</u> Fractions with denominators 2, 3, 4, 5, 6, 8, 9, 10 and 12. Calculate a number, given a multiple fraction of the number. Express one number as a fraction of another.</p> <p><u>Decimals:</u> Express</p>

		tenths and hundredths and decimals.	tenths and hundredths.	tenths and hundredths and decimals.
Algebra	<p><u>Number Patterns:</u> Patterns in number, 0-999. Links within and between multiplication tables.</p> <p><u>Number Sentences:</u> Frames in various positions into a word problem.</p>	<p><u>Number Patterns:</u> Patterns in number, 0-9999.</p> <p><u>Number Sentences:</u> Translate an addition, subtraction, multiplication or division number sentence with a frame into a word problem (frame not in initial position).</p>	<p><u>Number Sequences:</u> Identify relationships and record verbal and simple symbolic rules for number patterns.</p> <p><u>Number Theory:</u> Simple prime and composite numbers. Square and rectangular numbers. Factors and multiples.</p> <p><u>Directed Numbers:</u> Positive and negative numbers in context.</p> <p><u>Rules and Properties:</u> Simple properties and rules about brackets and priority of operation.</p> <p><u>Equations:</u> Translate number sentences with a frame into word problems and vice versa. Solve one-step number sentences and equations.</p>	<p><u>Number Sequences:</u> Finding patterns in groups of numbers. Deducing rules for finding missing terms in sequences.</p> <p><u>Number Theory:</u> Simple prime and composite numbers. Square numbers. Simple square roots. Common factors and multiples. Whole numbers in exponential form.</p> <p><u>Directed Numbers:</u> Identify positive and negative numbers on a line. Add simple positive and negative numbers.</p> <p><u>Equations:</u> Translate word problems with a variable into number sentences. Solve one-step number sentences and equations</p>
Shape and Space	<p><u>2D Shapes:</u> Identify, describe, classify and compare the properties of 2-D shapes including regular and irregular polygons. Tessellations.</p> <p><u>3D shapes:</u> Including cylinder and triangular prism. Relationship of 3-D shapes with constituent 2-D shapes</p> <p><u>Symmetry:</u> Identify line symmetry in environment and in 2-D shapes.</p> <p><u>Lines and angles:</u> Vertical, horizontal and parallel lines. Recognise an angle in terms of a rotation. Classify angles as greater than, less than or equal to a right angle.</p>	<p><u>2-D Shapes:</u> Identify and construct equilateral, isosceles and scalene triangles; parallelogram; rhombus; pentagon; and octagon. Construct and draw 2-D shapes using a ruler and set square.</p> <p><u>3-D Shapes:</u> Establish that when prisms are sliced through (in the same direction) each face is equal in shape and size. Construct 3-D shapes.</p> <p><u>Symmetry:</u> Identify lines of symmetry as horizontal, vertical or diagonal. Complete missing half of a shape, picture or pattern.</p> <p><u>Lines and Angles:</u> Identify, describe and classify oblique and perpendicular lines. Draw, and describe intersecting lines and their angles.</p>	<p><u>2-D Shapes:</u> Use angle and line properties to classify and describe triangles and quadrilaterals. Identify the properties of the circle. Construct a circle of given radius or diameter. Tessellate combinations of 2-D shapes. Classify 2-D shapes according to lines of symmetry.</p> <p><u>3-D shapes:</u> Properties of shapes including edges, vertices and faces. Introduction of tetrahedron.</p> <p><u>Lines and Angles:</u> Recognise, classify and describe angles and relate angles to shape and the environment. Estimate, measure and construct angles in degrees. Explore the sum of the angles in a triangle</p>	<p><u>2-D Shapes:</u> Construct triangles from given sides or angles. Construct a circle of given radius or diameter.</p> <p><u>3-D Shapes:</u> Identify and examine 3-D shapes, including octahedron (faces, edges and vertices). Draw and construct nets of simple 3-D shapes.</p> <p><u>Lines and Angles:</u> Recognise, classify and describe angles and relate angles to shape. Estimate, measure and construct angles in degrees. Explore the sum of the angles in a quadrilateral.</p> <p><u>Co-ordinates:</u> Plot simple coordinates. Use a grid to position objects. Find reference points on a map. Find area of plotted shapes on a grid.</p>
Measure	<p><u>Length:</u> Estimate, compare, measure and</p>	<p><u>Length:</u> Rename units as decimals or fractions.</p>	<p><u>Length:</u> Estimate and measure length using</p>	<p><u>Length:</u> Rename lengths. Estimate and</p>

	<p>record lengths of a wide variety of objects using appropriate metric units (m, cm). Rename units of length.</p> <p><u>Area:</u> Estimate, compare and measure the area of regular and irregular shapes.</p> <p><u>Weight and Capacity:</u> Estimate, compare, measure and record the weight and capacity of a wide variety of objects using appropriate metric units (kg, g, l, ml).</p> <p><u>Time:</u> Read and record time in five-minute intervals on analogue and digital clock (12-hour, to and past). Timetables and calendars. Rename minutes as hours and hours as minutes.</p> <p><u>Money:</u> Rename amounts of euro or cents and record using symbols and decimal point.</p>	<p>Estimate and measure the perimeter of regular 2-D shapes. Complete tasks and problems in m, cm and km.</p> <p><u>Area:</u> Estimate and measure area of regular and irregular shapes using standard units (cm², m²).</p> <p><u>Weight:</u> Rename in kg and g using decimals or fractions (250 g = 0.25 kg = 1/4 kg).</p> <p><u>Capacity:</u> Use metric units (l, ml) and major and minor markings on containers (100 ml markings, ½ l, ¼ l). Rename using decimals and fractions.</p> <p><u>Time:</u> Five-minute intervals on analogue and digital clock (12-hour). Timetables. Rename minutes as hours and hours as minutes.</p> <p><u>Money:</u> Rename amounts of money as euro or cents and record using € symbol and decimal.</p>	<p>appropriate metric units (mm, cm, m, km).</p> <p>Estimate and measure the perimeter of regular and irregular shapes.</p> <p><u>Area:</u> Discover that the area of a rectangle is length by breadth.</p> <p>Estimate and measure the area of regular and irregular 2-D shapes. Calculate area using cm² and m².</p> <p><u>Weight:</u> Estimate and measure weight using appropriate metric units (g, kg).</p> <p><u>Capacity:</u> Estimate and measure capacity using appropriate metric units (ml, l).</p> <p><u>Time:</u> Interpret timetables and the 24-hour clock (digital and analogue). Convert between times in 12-hour and 24-hour format.</p> <p><u>Money:</u> Compare 'value for money' using unitary method.</p>	<p>measure the perimeter of regular and irregular shapes. Interpret scales on maps and plans</p> <p><u>Area and Perimeter:</u> Calculate area of regular and irregular 2-D shapes. Measure the surface area of specified 3-D shapes. Calculate area using acres and hectares. Find the area of a room from a scale plan.</p> <p><u>Weight:</u> Select and use appropriate instruments of measurement. Rename weights.</p> <p><u>Capacity:</u> Rename measures of capacity. Find the volume of a cuboid experimentally.</p> <p><u>Money:</u> Explore value for money. Convert other currencies to euro and vice versa. Interest rates and discounts.</p> <p><u>Time and Speed:</u> Explore international time zones. Explore the relationship between time, distance and average speed.</p>
Data	<p><u>Representing and Interpreting Data:</u> Collect, organise and represent data using pictograms, block graphs and bar charts. Read and interpret same.</p> <p><u>Chance:</u> Vocabulary of uncertainty and chance. Order events in terms of likelihood of occurrence. Identify and record outcomes of simple random processes.</p>	<p><u>Representing and Interpreting Data:</u> Collect, organise and represent data using pictograms, block graphs, bar charts and bar-line graphs incorporating the scales 1:2, 1:5, 1:10, and 1:100. Interpret bar-line graphs and simple pie charts involving use of halves, thirds and quarters.</p> <p><u>Chance:</u> Vocabulary: chance, likely, unlikely, never, definitely. Order events in terms of likelihood of occurrence. Identify and record outcomes of simple random processes.</p>	<p><u>Representing and Interpreting Data:</u> Collect, organise and represent data using pictograms, single and multiple bar charts and simple pie charts. Read and interpret them. Compile and use simple data sets. Explore and calculate averages of simple data sets. Use data sets to solve problems</p> <p><u>Chance:</u> Identify and list all possible outcomes of simple random processes. Estimate the likelihood of occurrence of events. Construct and use frequency charts and tables.</p>	<p><u>Representing and Interpreting Data:</u> Collect, organise and represent data using pie charts and trend graphs. Read and interpret them. Calculate averages. Understand the terms average, above average, and below average. Find the total of a group of values from an average. Apply averages in length, speed and time. Compile data sets.</p> <p><u>Chance:</u> Estimate the likelihood of occurrence of events on a scale from 0 to 100%, 0 to 10. Construct/use frequency charts and tables</p>

6.3 Equipment

Concrete materials are essential for introducing new concepts. When children use manipulatives to understand new maths concepts, they engage in a multi-modal learning process. Therefore, these materials are essential for maths teaching, and the school endeavours to provide a range of appropriate materials. Items are stored in individual classrooms but shared freely as required. Those marked with a plus symbol (+) are shared between year bands. Those marked with an asterisk (*) are kept in the store room.

Junior Infants – 2 nd Class		
Unifix cubes+	Weighing scales*	Counters (two-sided)
Plastic teddies	Capacity containers*	Beans (two-sided)
Small animals, people and transport	Pattern blocks	Coloured tiles
Dominoes	Number lines to 10 and to 20	Cuisenaire rods
Tangrams	Hundred squares	Balance*
Sorting trays	Hundred square pocket chart	Trundle wheel*
Wooden blocks	Whiteboard numbers for place value	Metre sticks
Plastic links	Shape construction	Rulers*
Plastic shapes nuts and bolts	Clocks (one set per class band)	Lollipop sticks
Pegs and pegboards*	3D shapes	Digit cards
Gears	Plastic coins+	Number fans (1 st , 2 nd)
Mobilo	Playing cards	Dienes cubes (base-10 blocks)+
Magnatiles	Spinners	

3 rd – 6 th Class		
Dice+	100 squares	Large protractor for whiteboard
Playing cards+	Calculators	Large compass
Dienes Cubes (base-10 blocks)+	Metre sticks	Foreign currency
Counters	Trundle wheel*	Rulers*
Unifix cubes	Toothpicks and foam to construct 3D shapes	String
Tangrams	Pegs, elastic bands and pegboards*	Balance-arm scale*
Flip Charts	Protectors	Electric scale*
Clocks+	Compasses	Capacity containers/beakers*
Clock stamp*	Fraction Towers	Graduated cylinders*
Money+	Fraction charts for the whiteboard	
3-D shapes		

6.4 Tables

Once concepts of number are established firmly, using practice with concrete materials and picture form, children are encouraged to practise addition, subtraction, multiplication and division with the goal of mastery of basic facts. A regular routine of exercises is used to ensure sufficient practice. Games that help children learn these tables in a fun way are encouraged. Beginning in first class, children practise tables as a regular part of homework. This is partially done using *Tables Champion*. Regular assessments allow children, teachers and parents to chart progress.

Senior Infants	1 st Class	2 nd Class
Adding to 10 (practised incidentally at school)	Addition to +12 Subtraction to -12	Addition and Subtraction (+/-12)

3 rd Class	4 th Class	5 th Class and 6 th Class
Revision of +/- Learning x (0-11) Initial link of x to division	Multiplication and Division (0-11)	Assumption that tables are mastered but continued practice. Additional support provided to children who have yet to achieve mastery. Regular review through games.

6.5 Links to Literacy

In an effort to make clear interdisciplinary links between maths and the wider curriculum, the link between literacy and numeracy is made explicit. This helps to ensure children can apply their literacy skills to address problem-solving in maths more effectively. Also, a variety of biographies of mathematicians Below are some examples resources, all of which have now been purchased in the school and are stored for maths lessons in each assigned classroom.

Junior Infants	Senior Infants	1 st Class	2 nd Class
Sequence (picture books) <i>Rosie's Walk</i> <i>Ten Black Dots</i> <i>Just Enough Carrots</i> <i>Fruits: A Counting Poem</i> <i>Double the Ducks</i> <i>How Many Legs?</i> <i>A Pair of Socks</i> <i>Missing Mittens</i>	Sequence (picture books) <i>How Much Does a Ladybird Weigh?</i> <i>Equal Shmequal</i> <i>The Greedy Triangle</i> <i>Centipede's 100 Shoes</i> <i>Captain Invincible and the Space Shapes</i> <i>A Fair Bear Share</i>	<i>One Hundred Hungry Ants</i> <i>More or Less</i> <i>A Mathematician Like Me</i> <i>The Doorbell Rang</i> <i>Computer Decoder: Dorothy Vaughan</i> <i>Spaghetti and Meatballs for All!</i> <i>Centipede's 100 Shoes</i>	<i>A Place for Zero</i> <i>Apple Fractions</i> <i>Maths Craze</i> <i>A Fraction's Goal – Parts of a Whole</i> <i>Nothing Stopped Sophie</i> <i>Shark Swimathon</i> <i>Dave's Down to Earth Rock Shop</i>

3 rd Class	4 th Class	5 th Class	6 th Class
<i>Hershey's Fractions</i> <i>Multiplying Menace: The Revenge of Rumpelstiltskin</i> <i>The Multiplying Menace Divides</i> <i>Sir Cumference and the Fraction Faire</i> <i>Divide and Ride</i> <i>Maryam's Magic</i> <i>2x2=Boo</i>	<i>The Phantom Tollbooth</i> (class novel) <i>Sir Cumference and All the Kings's Tens</i> <i>Sir Cumference and the Off-the-Charts Dessert</i> <i>Emily Noether</i> <i>Sir Cumference Get's Decima's Point</i> <i>The Boy who Loved Maths</i> <i>The Grapes of Math</i>	<i>Penrose the Mathematical Cat</i> <i>Blockhead: The Life of Fibonacci</i> <i>A Very Improbable Story</i> <i>Fractions in Disguise</i> <i>Sir Cumference and the Great Knight of Angleland</i> <i>Sir Cumerence and the Sword in the Cone</i> <i>Ada Lovelace</i>	<i>The Number Devil</i> (read-aloud/class novel) <i>What's Your Angle Pythagoras?</i> <i>Sir Cumference and the First Round Table</i> <i>Sir Cumference and the Isle of Immeter</i> <i>Maths for Kids (Kitchen Pantry Scientist)</i>

6.6 Games

Games are used, both at home and in the classroom, to consolidate basic skills in a fun way. They also allow for logical reasoning practice and development of social skills through play. As part of the SSE process, a series of maths games were organised to be sent home as part of homework to drill and develop skills.

Junior Infants	Senior Infants	1 st Class	2 nd Class
Matching Games <u>Mathematics Their Way:</u> Guess the Secret Attribute <u>Ready Set Go Maths:</u> Sweetie Jars Figure It Out Peep and Tell Make 5 <u>Games to Take Home</u> - Tower Blocks - Snail Trail and Animal Hunt - Colour Towers - Sunny Shapes - Make 5 - The Missing Piece	<u>Mathematics Their Way:</u> Lift the Bowl Prest-O Change-O My Turn, Your Turn Tic Tac Toe <u>Ready Set Go Maths:</u> Change Please Colour Towers Add Them Up Add One Machine <u>Games to Take Home</u> - Change Please - Pawprints - 4 in a Row - Buzz 10 - Three in a Line - Stack, Tell, Spin, Win	<u>Games for the Classroom</u> - Tangrams - Uno - Set - Snakes and Ladders <u>Games to Take Home</u> - Lightning Race (+/-) - Brainbox – Maths - Shape Race - Subtraction Rounders - Add Up Tiles - 15 Pebbles	<u>Games for the Classroom</u> - Loop Cards - Trump Cards - Card games (place value) - Chinese Whispers (mental maths) - Connect Four <u>Games to Take Home</u> - Subtraction Tiles - Lucky 13 - Double the Doubles - First to 50 - Pairs - Odd and Even Tag

3 rd Class	4 th Class	5 th Class	6 th Class
<u>Games in the Classroom</u> - Tangrams - Zeus on the Loose (mental maths +/-) - Card games: Pow, Number Club - Pico Fermi Bagels (place value) - Pizza to Go Fraction Games - Break My Eggs - <i>Fizz Buzz – 101 Spoken Numeracy Games</i> <u>Games to Take Home</u> - Times Tiles - Take 4 and Add - Corners - Number Club - Build a Pyramid - Four in a Row Multiplication	<u>Games in the Classroom</u> - “Follow Me” Loop card games - Sum Swamp - Beat the Clock - Quizzes from Maths Mastery Multiplication & Division Bingo - Maths Facts Race (Big chart of facts; take turns running up and adding one fact; first team finished wins)	<u>Games in the Classroom</u> - Target boards - Loop cards - Games with playing cards to reinforce tables/place value - x/÷ Soccer to reinforce tables	<u>Games in the Classroom</u> - “Who wants to be a Millionaire” teacher designed games - Loop Games - Card Games - Yahtzee - Maths Trail Games for Yard - Sea Battle

6.7 ICT Resources

A variety of online resources are used to ensure children have sufficient opportunities for practice. These activities also develop IT skills and ensure children can practice their skills independently. Study Ladder is introduced in first class. Likewise, children in third class will begin trialling Manga High. These two platforms, as well as other online resources, help children practice their skills at their specific skill level, allowing for differentiation as well as monitoring by the class teacher.

Junior Infants – 2 nd Class	
Folensonline – Planet Maths Studyladder www.crickweb.co.uk/ks1numeracy.html www.bbc.co.uk/schools/websites/4_11/site/numeracy.shtml www.ictgames.com/resources.html	https://ie.ixl.com/math/ www.mathplayground.com www.maths-games.org/ www.lboard.co.uk (TES)

3 rd Class – 6 th Class	
Folensonline – Planet Maths Studyladder Mangahigh (to be trialled) www.maths-packs.co.uk www.crickweb.co.uk/ks2numeracy.html www.ictgames.com/resources.html www.bbc.co.uk/bitesize/ks2/maths/ www.khanacademy.com	www.topmarks.co.uk www.jmathpage.com www.mathsnacks.com www.coolmath4kids.com www.xtramath.com www.bbc.co.uk/skillswise/maths/games Computer Programming: Scratch

6.8 Maths Investigations

As part of the long-term goals, emphasis will be placed on using maths investigations. These are large-scale questions for children to explore that don't follow the typical problem-solving approach that presents problems with one right answer, all the required information in advance and no relevance for the children. Instead, investigations require children to problem-solve at a deeper level. These investigations require children to ask deep questions, seek information and have the potential for varied responses. Details of the sample investigations below, some gathered by colleagues at Limerick School Project NS and others developed by our own staff, are in Appendix A.

Junior Infants	Senior Infants	1 st Class	2 nd Class
Black Dots Black Dots: Doubling	Empty the Bowl Heads or Tails?	Elephant Parade Thirsty?	Combinations Shaping It

3 rd Class	4 th Class	5 th Class	6 th Class
Chocolate Blocks Trip to Spain	Skittle Predictions Three-Colour Triangles	Peruda/Liar's Bluff How Many Hanukkah Candles Do We Need?	Money Measurement Stop or Dare

6.9 Links to Other Parts of the Curriculum

In an effort to dispel the artificial boundaries between subjects in the Primary Curriculum, constant efforts are made to look for connections between the subjects, either through thematic work or specific interdisciplinary lessons. In response to the requirement to increase the amount of time allocated to Numeracy, interdisciplinary lessons are an effective way of fulfilling timetable requirements. Listed below are some examples of such interdisciplinary lessons.

Junior Infants	Senior Infants	1 st Class	2 nd Class
<u>Geography</u> : Maths walks in the vicinity of the school <u>History</u> : Sequencing, simple timelines <u>Art</u> : Shape collages, one-colour collages, experimenting with colour mixing	<u>History</u> : Sequencing, simple timelines <u>Science</u> : pendulums, things that roll <u>Music</u> : beats and rhythm <u>PE</u> : Forming sets of people, Snatch the Bacon <u>Art</u> : Dots drawings, scented pattern art, wax resist pattern art	<u>Geography/P.E.</u> : Maths trails <u>English</u> : Maths oral language exercises <u>Music</u> : Note values <u>Science</u> : Capacity, weight	<u>Geography (Spatial Awareness)</u> : Maps, maths trail <u>S.P.H.E., Healthy Eating</u> : Weight and capacity <u>Art (Drawing)</u> : Symmetry, 2D shapes <u>Music (Composing)</u> : Counting and numeration, patterns.

3 rd Class	4 th Class	5 th Class	6 th Class
<u>Geography</u> : plans, scale, map colouring game (colour adjacent countries differently) <u>Art</u> : Mondrian paintings (parallel and perpendicular lines, right angles) <u>SESE</u> : graphing, e.g. favourite healthy foods	<u>Art</u> : pattern, shape <u>Geography</u> : fractions related to counties and provinces, area <u>Science</u> : capacity, estimation, predictions <u>English</u> : chance and likelihood	<u>Art</u> : self-portraits (proportion), fractions in art work, investigating circles (spirographs), construction and drawing in 3D <u>English</u> : maths journals <u>Geography</u> : understanding of scale in solar system, fractions in flags <u>SESE</u> : 3D shapes (which ones are the strongest), currency/euro/trade	<u>ICT</u> : Scratch <u>Science</u> : Practical applications of capacity and weight <u>Art</u> : Design, perspective drawing <u>PE</u> : Spatial awareness, dance, rhythm <u>Geography</u> : scale in map work, time zones, altitude and temperature (directed numbers)

6.10 Calculator Usage

Calculators are introduced beginning in 4th class. Each child is given, on loan, a calculator. The focus is on using a calculator to check estimates as well as to complete computation in the context of problem-solving. Calculator games are used to reinforce skills (see www.dr-mikes-math-games-for-kids.com/calculator-games.html).

7. Timetabling

Timetabling for maths will follow the guidelines laid out in Circular 0056/2011. This stipulates that time spent on numeracy is at least 6.5 hours per week in infant classes and 8.5 hours per week in all other classrooms. In addition to discrete time devoted to maths lessons, it is acknowledged that maths skills can be developed across the curriculum, and staff will look for ways to develop skills across the curriculum.

8. Homework

Discrete maths homework is a regular feature, focusing primarily on additional practice of skills developed in class. The learning of tables is also an essential component. Consistent and regular practice with tables will help children experience success, and families are encouraged to practice them regularly to ensure mastery. Game packs will be sent home on occasion, and families are urged to play them together to improve numeracy skills but also as a way of spending quality time together.

9. ICT

ICT tools have a unique potential to help support the development of numeracy. A variety of strategies are already being used in the school including the use of maths sites, most notably Manga High (which is being trialled for use from 3rd class and above) as well as Studyladder. Teachers regularly use the internet to source activities and lesson plans as well as research new texts and classroom resources.

In addition to extending and improving on the use of these diverse methods, several action steps in the revised ICT plan have direct links to develop numeracy skills, specifically:

- researching needs-specific ICT tools for SEN children.
- compiling valuable resources (websites, software) specific to classes, subjects and strand units.
- identifying and implementing numeracy assessments on a regular basis using IT resources.

10. Teacher's Planning and Reporting

All teachers will develop yearly and fortnightly/weekly schemes that are based on the objectives of the Primary School Curriculum and this plan. These plans will not only indicate discrete maths lessons and activities but also show clearly the connections between numeracy and the wider curriculum. Cuntaisí míosúla will also indicate the numeracy work completed over the period within both the subject of maths and across the curriculum. These cuntaisí will be reviewed by the principal and stored for a two-year period. SEN teachers will develop IEPs/IPLPs for all children assigned to their caseload. These set out specific and targeted plans for how to develop children's maths skills. At the end of the year, teachers will report to parents information on each child's numeracy development as well as standardised test results, as required under Circular 0018/2012.

11. Assessment

A variety of methods are used to assess maths knowledge. At the heart of assessment, both formal and informal, is observation. This observation is multi-faceted and ongoing. It acts as both assessment for learning and assessment of learning. Simple forms of immediate assessment are useful including the use of individual whiteboards. In addition, teacher-created and directed assessment is used to formally monitor students' mastery of maths skills. This includes term assessments as part of the Planet Maths series as well as more formal Christmas and end-of-year tests administered in senior classes.

Assessment should involve both formative and summative assessment. Formative assessment is considered essential in to ensure that pupils are learning according to their targets.

Standardised testing is used to check progress and is reported to the DES, the Board of Management and parents as required in Circular 0018/2012. Standardised Testing occurs annually in May in Maths. They are administered by class teachers with the help of the support team. The following tests are administered:

Senior Infants – Drumcondra Early Numeracy Test

1st – 6th Classes – Drumcondra Maths Test.

Recognising that standardised testing provides only a partial picture of students' ability in maths, the staff is committed to gathering other forms of evidence to better understand the numeracy development in the school. This includes project-based activities connected to the maths investigations that were developed as part of the school improvement plan. As well, teachers encourage children to engage in various forms of self-assessment.

12. Equality of Participation/Access

We are committed to the provision of equal opportunities for all our pupils in the implementation of our maths programme. Equal opportunities are provided to all pupils to participate in discussions, lessons and projects. We encourage gender awareness through promoting consideration of the roles associated with

men and women in word problems as well as actively encourage both boys and girls are given the same opportunities and encouragement, actively encouraging all children to recognise their maths skills and connect them to daily living.

13. Children with Exceptional Ability

Class teachers will provide opportunities for all students to pursue extra and more challenging maths tasks. In exceptional circumstances, students may work independently at a higher level. Additional resources will be sought for children with exceptional mathematics ability. Parents are informed of the Centre for Talented Youth at DCU and enrichment courses available at University of Galway.

14. Children with Addition Educational Needs

Support teachers are involved in co-teaching and team-teaching (with class teachers). Support is intended for those pupils who score at or below the 30th percentile on a standardised assessment. Support and class teachers meet formally and informally for shared planning. Constant communication between class teachers and support teachers encourages continuity and cohesion.

Children may have differentiated maths programmes depending on their needs. They usually follow the same topic being covered in class at their ability level. Class teachers differentiate activities and lessons to ensure success for all, and children are provided access to all strands. Among the strategies used are:

- Team-teaching – co-teaching, parallel teaching and stations teaching.
- Individual programmes compiled in support plans – usually following the topic covered in class.
- Withdrawal of pupils or groups from class as the need arises.
- Remediation following end-of-unit tests with individual pupils or groups.
- Use of ICT.

15. Continuing Professional Development

As an integral part of the Primary School Curriculum, numeracy will be addressed on a regular basis through staff meetings, other whole-staff professional development experiences and all curriculum planning exercises. Teachers are encouraged to seek out opportunities to improve their practice in maths teaching through their own personal continuing professional development, and all teachers are encouraged to consider connections between their annual personal professional development goals and numeracy.

17. Roles and Responsibilities

Overall responsibility for implementing, supporting and evaluating this English plan rests with the principal as supported by the In-school Management Team. In addition, all class teachers and SEN teachers are responsible for becoming familiar with and applying this plan when completing long- and short-term plans.

18. Review

A review of this plan, as part of the School Self-Evaluation process, was completed in 2022 after consultation with staff. The plan will be reviewed by the staff and amended as required, with a formal review in 2025.

19. Ratification and Communication

This Maths Curriculum Plan was ratified by the Board of Management as indicated below. The plan will be distributed electronically to all teachers as part of the School Plan. A hard copy is available on request.

Paul Adams, chairperson

Date of ratification: 19/10/2022

APPENDIX A – Maths Investigations

Title of the Investigation	Black Dots
Central Question	What can you do with 1/2/3/4/5 dots?
Class Level	Junior Infants
Strand Unit and Key Objectives	Number: explore the components of number 1–5 and count the objects in a set 1–10. Shape: solve problems involving shape and space.
Skills Required	Number recognition Spatial awareness Auditory processing
Materials Needed	<i>Ten Black Dots</i> by Donald Crews <i>About Teaching Mathematics</i> by Marilyn Burns pg. 203 Coloured sticky dots for each child Paper, pencils and colouring pencils
Anticipated Process (allowing for children to be involved in planning)	<ol style="list-style-type: none"> 1. Introduce and read the story <i>Ten Black Dots</i> to the children. 2. Ask the children to recall all the ways in which Donald Crews was able to use the dots in the book. 3. Ask the children to offer their own suggestions for using dots (1–5). 4. Provide the children with paper, pencils and an allocated number of sticky dots. 5. Allow them to complete their pictures. 6. Give the children the opportunity to look and respond to each other’s work.
Possibilities for differentiating the task	Children may be interested in figuring how many dots were used by a group of children. Children struggling with number recognition can be given a number of dots that they are comfortable with.

Title of the Investigation	Ten Black Dots (Follow-on Lesson)
Central Question	Can you count forwards to 10 using doubles?
Class Level	Junior Infants
Strand Unit and Key Objectives	Number – Operations: solve and complete practical tasks and problems involving addition; solve number sentences involving addition; Read, write and order numerals 1–5 & 1–10
Skills Required	Applying and problem-solving Communicating and expressing Reasoning
Materials Needed	Mini – whiteboards, whiteboard markers, 10 black spots, number lines, copies, pens, manipulatives/concrete materials
Anticipated Process (allowing for children to be involved in planning)	<p>Introduction:</p> <ul style="list-style-type: none"> • Discuss the book <i>Ten Black Dots</i> • Everyone show me your left hand, now show me your right hand. How many hands have we altogether? 2, that’s right. We can write this as a number sentence $1 + 1 = 2$ • Think about a dog/cat – Does anyone know how many legs they have? 4, that’s right. Now how many legs have they in the front? And how many at the back? Yes, 2 • Two in the front and two at the back. We can write this as a number sentence, $2 + 2 = 4$ • Show a picture of a ladybird with 3 spots on each side. How many black spots has the ladybird on each side? (refer to partition of previous problems) 3 That’s right. We can write that as a number sentence $3 + 3 = 6$ • Does anyone know how many legs a spider has? 8 that’s right. How many on the left side? How many on the right side? Yes 4 • Four on the left and 4 on the right? We can write this as a number sentence $4 + 4 = 8$. • When we add two number that are exactly the same such as $2 + 2$ and $4 + 4$ we call that adding doubles. <p>Lesson Content: Teacher demonstrating drawing black dots on the white board.</p> $\text{☺} + \text{☺} = \text{☺☺} \quad 1 + 1 = 2$ $\text{☺☺} + \text{☺☺} = \text{☺☺☺☺} \quad 2 + 2 = 4$ $\text{☺☺☺} + \text{☺☺☺} = \text{☺☺☺☺☺☺} \quad 3 + 3 = 6$

Title of the Investigation	Empty the Bowl
Central Question	How many rolls will it take to empty a bowl of cubes?
Class Level	Senior Infants
Strand Unit and Key Objectives	Chance and probability
Skills Required	Recording numbers Recognising number on dice Estimating
Materials Needed	Bowl, 20 cubes, tray, dice, recording board.
Anticipated Process (allowing for children to be involved in planning)	<ul style="list-style-type: none"> • Explain to the children that they're going to roll the dice and the number that comes up will tell how many cubes to remove from the bowl. Ask them how many rolls they think it will take to empty the bowl. • Demonstrate the game. • Choose a child to come to the board and record the numbers as they are rolled. • Once the bowl is emptied ask the children to figure out the sum of the rolls recorded. • Play the game several more times until you're sure the children understand the activity. • Ask the children more questions to probe their thinking, raising issues sets the stage for the kind of thinking you would like them to do. "What do you think is the most number of rolls it could possibly take to empty the bowl? Why couldn't be emptied in one roll? Why couldn't it be emptied in 2 rolls?" • On the board list the numbers 1-20 and put tally marks to indicate how many rolls it took you to empty the bowl in each demonstration game. • The children play 5 games in pairs and keep records. • Record on a class graph. • This activity is taken from <i>About Teaching Maths</i> by Marilyn Burns
Possibilities for differentiating the task	With this task I feel there were enough jobs to encourage children of all abilities to take some part or do one of the jobs.

Title of the Investigation	Elephant Parade
Central Question	How many different ways can we line up the different coloured elephants for the elephants parade?
Class Level	1st Class
Strand Unit from the Maths Curriculum and Key Objectives	Shape and space; Spatial awareness. <ul style="list-style-type: none"> • explore, discuss, develop and use the vocabulary of spatial relations - between, underneath, on top of, around, through, left, right. Algebra <ul style="list-style-type: none"> • recognise pattern, explore and use pattern.
Skills Required	Problem solving, reasoning, cooperation, communication.
Materials Needed	Blank elephant parade worksheet (one between two), red and blue counters.
Anticipated Process (allowing for children to be involved in planning)	<ol style="list-style-type: none"> 1. Talk to the whole class about the elephant parade (story on teacher info page). 2. Children to work in pairs. Each pair is given a worksheet that has 12 blank elephant parades on it. 3. Distribute two blue and three red counters to each pair. 4. The children work in pairs, using the counters and the blank parade template to find as many different orders as they can for the five elephants. Each time they find a new order they colour in the elephants in that order. 5. There are 12 blank parades on the sheet but only 10 possible orders. The children must figure this out for themselves.
Possibilities for differentiating the task	Early finishers/high achievers could use an extra colour. For example red, blue and yellow. Differentiate for low ability by starting with three elephants in the parade and two colours.

Title of the Investigation	Thirsty?
Central Question	In this problem learners need to coordinate three pieces of information about each glass: what it contains (orange or blackcurrant juice); how much it contains (full, half full or empty) and its height (tall or short).
Class Level	1st Class
Strand Unit and Key Objectives	Comparing and ordering: use the language of ordinal number, first to tenth when ordering sets and numbers, describing patterns, taking turns.
Skills Required	Logical reasoning skills. Collaborative problem-solving
Materials Needed	You will need to print off this set of clue cards '.
Anticipated Process (allowing for children to be involved in planning)	<p>Possible approach</p> <ul style="list-style-type: none"> This is an ideal problem for learners to tackle in groups of four. Allocating these clear roles (Word, pdf) can help the group to work in a purposeful way - success on this task could be measured by how effectively the group works together as well as by their final solution. Introduce the four group roles to the class. It may be appropriate, if this is the first time the class has worked in this way, to allocate particular roles to particular children. If the class works in roles over a series of lessons, it is desirable to make sure everyone experiences each role over time. Each group of four will need a copy of these cards, which have pictures of glasses of juice on them (Word, pdf). Begin by giving the groups time to become familiar with the cards. You could ask them to talk about what they notice. What is the same and different about the pictures? Can they sort the cards in different ways? Bring the whole class together to share some of these initial ideas. This is a great chance to introduce some of the vocabulary that will come up on the clue cards, such as 'full', 'half full', 'empty', 'short', 'tall', 'not tall', 'not short', 'taller', 'shorter' etc. Now give each group a set of these ten clue cards, which should be shared between all members of the group. Ask the children to read through the cards in turn - this may need adult support, depending on their confidence with reading. You may choose to tell them that the cards with spots on them are the ones to start with, or you may prefer to leave them to work this out for themselves. You could explain that the groups will feed back at the end of the session, sharing the ways they worked, what helped them and what got in the way. You could give each group a large sheet of flipchart paper on which to blutac the pictures of glasses but also the clue cards in the order in which they were used. They could also use this paper to make a note of anything significant as they go along. Give the groups time to arrange the cards according to the clues. Remind them about preparing for feedback and keep them informed about how long they have left. In the plenary, you could start by pinning up each group's large sheet so that the whole class can compare the order in which the groups have used the clue cards as well as comparing their solutions. <p>Key questions</p> <p>If your focus is effective group work, this list of skills may be helpful (Word, pdf). Ask learners to identify which skills they demonstrated, and which skills they need to develop further; or ask them to identify someone else in the group who demonstrated a particular skill.</p> <p>If your focus is mathematical, these prompts might be useful:</p> <p>How are the cards alike? How are the cards different? What do your clues say? What do we have to do with the pictures of the glasses? Who has a good clue to start on? Can you explain that clue in your own words? Let's check over the clues we've used. Do you think we've got the glasses in the right order? How do you know?</p>
Possibilities for differentiating the task	<p>Possible extension</p> <p>This set of clue cards can be used with the same picture cards but finding the arrangement of the glasses requires more sophisticated reasoning.</p> <p>Possible support</p> <p>Some groups may find it helpful to have a set of cards labelled 1st to 8th. You can print out this set or simply use small pieces of paper. This set of clue cards can be used with the same picture cards but finding the arrangement of the glasses requires less sophisticated reasoning.</p>

Title of the Investigation	Combinations Arranging items according to colour in a variety of ways.
Central Question	How many ways can you order the train carriages/ice-cream scoops/rockets?
Class Level	2nd Class
Strand Unit and Key Objectives	Spatial awareness: Explore, discuss, develop and use the vocabulary of spatial relations. Number: Comparing and ordering; use the language of ordinal number
Skills Required	Applying and problem solving, communicating and expressing, reasoning
Materials Needed	Worksheet, counters, cubes and rocket shaped cards.
Anticipated Process (allowing for children to be involved in planning)	<ol style="list-style-type: none"> 1. The children are divided into 4 groups, each with a colour name, according to ability and work ethic. 2. Each group has their central question explained to them and discussed. 3. In pairs, the children use counters and cubes to view the different possibilities. 4. They discuss their findings with their partner. 5. A teacher speaks with the individuals, pairs and groups about their findings. 6. The children complete a worksheet based on the investigation which shows their understanding of the task and put their ideas on paper.
Possibilities for differentiating the task	This task can be differentiated by giving each group a different investigation. The high achievers can work on the train carriage investigation which requires them to arrange 5 blue and 2 red carriages, showing all of the possible arrangements. The 2 middle groups work on a rocket investigation, which requires them to put a rocket together, showing all of the possible arrangements of parts. The weakest group look at ice-cream cones with 3 scoops on them. This requires them to arrange the scoop together, again showing all the possible arrangements.

Title of the Investigation	Shaping It
Central Question	How can we draw geometric shapes within a variety of 2D regular shapes?
Class Level	Rang a Dó
Strand Unit and Key Objectives	Shape and Space: Solve and complete practical tasks and problems involving 2 D shapes
Skills Required	Measurement Spatial awareness Drawing a straight line.
Materials Needed	Paper, ruler, pencil, coloured pencils, scissors, glue
Anticipated Process (allowing for children to be involved in planning)	<ol style="list-style-type: none"> 1. Pictures are created by starting with a square, finding the half-way point on each side and joining the points up. This creates a smaller shape (which also happens to be a square) inside the original. 2. The half-way points of this new shape are then joined up to make a third shape. This way of making new shapes is continued until it gets too small to do properly. 3. Start with a large shape. 4. Can use different colours for each new halving line to help see what has happened more clearly.
Possibilities for differentiating the task	Having made a design, cut out the triangles and the smallest inner shape and rearrange the pieces to form a new shape/design. Talk about and record the things you notice as you have drawn more and more halving lines. What is happening to the enclosed area each time the sides are halved? Try investigating a regular shape first. Try irregular shapes. Predict what will happen.

Title of the Investigation	Chocolate Blocks Source: <i>Teaching with Tasks for Effective Mathematics Learning</i> , p. 147; link to the book <i>The Hershey's Fractions Book</i>
Central Question	This task is designed to target students understanding that fractions are not just "Parts of a whole" but can also be considered as division. The relative size of the fraction is also a key focus.
Class Level	3rd Class
Strand Unit and Key Objectives	Number: Fractions: identify fractions and equivalent forms of fractions with denominators 2, 4, 8 and 10; compare and order fractions with appropriate denominators; calculate a fraction of a set using concrete materials
Skills Required	Observational skills Third class fraction work.
Materials	3 chairs, 6 bars of chocolates, 3 trays, a fraction chart for whiteboard for the lesson's conclusion
Anticipated Process (allowing for children to be involved in planning)	<ol style="list-style-type: none"> 1. Three chairs are set in front of the classroom with chocolate bars placed on each of them. 2. On the first chair there is one block of chocolate, on the second chair there are two blocks of chocolate and on the third chair there are three blocks of chocolate. 3. Ten students leave the room, and one by one they come back in. 4. As they return, they are asked to decide which chair they should stand behind so they get the most amount of chocolate when it is divided up equally amongst those standing behind each chair at the end of the activity. 5. Before each of the final two children re-enter and make their choice of where to stand, the class, as a group, discuss where they think the final two children should go, and why. 6. Carry out the task several times and discuss the results. 7. Show a fraction tower as some of the outcomes the children create may be difficult to compare due to the nature of the denominators, e.g. $\frac{3}{5}$ and $\frac{3}{4}$.
Possibilities for differentiating the task	<ul style="list-style-type: none"> • Lesson 2: This time the bars of chocolate are unwrapped, showing their subdivided sections. Give time and discussion so children recognise that they count the number of squares available and use this information to their advantage. • Lesson 1 was actually easier for the majority of the class to comprehend but there was an element of the class that really enjoyed the challenge of working with more complicated fractions than they would normally be exposed to in third. Mixed numbers was also introduced in the cases where there were more pieces of chocolate at a given chair than people waiting to divide it. • A final conclusion to both lessons was in a question format with the questions escalating in complexity: Why did you choose to stand behind that chair? Are you happy with where you stood? If, at the end, you had the choice to move to a different chair, would you do so? Where would you choose to stand in the queue? Is it best to go first or last?

Title of the Investigation	Trip to Spain
Central Question	Can you budget you money correctly?
Class Level	3rd Class
Strand Unit and Key Objectives	Measures: Money - problem solving Number
Skills Required	Problem solving Communicating and expressing Reasoning Life-skills: Budgeting
Materials Needed	White Board/ Paper/ Trip Brochure
Anticipated Process (allowing for children to be involved in planning)	<ol style="list-style-type: none"> 1. Give each of the children their trip. 2. Together read the instructions on the cover. 3. Review the problem-solving code in class. 4. Either independently or in groups work out what way you wish to spend your budget.
Possibilities for differentiating the task	Variations regarding the budget, activities and requirements Fractions of money to be spent on activities Decimal money amounts

Title of the Investigation	Skittle Predictions
Central Question	Children had to make a prediction of what colour would come out next .They were asked to record the chance of their prediction as a percentage/fraction
Class Level	4th Class
Strand Unit and Key Objectives	Chance and prediction. To provide an opportunity for estimation of probability based on proportions of skittles left in the bag.
Skills Required	A basic understanding of chance events and the language of chance. Prediction/possible/certain/impossible/likely
Materials Needed	Plastic bags/skittles/recording sheets/colours
Anticipated Process (allowing for children to be involved in planning)	<p>Pose question using two different coloured counters. Start with 10 counters of the same colour in the bag and ask children to predict what colour they think the counter would be if we took one out.</p> <p>Then we try it with 9 and 1 and then 5 and 5.</p> <p>Then put skittles into plastic bags. Have 5 groups and each group estimates how many skittles are in the bag and their colours. They draw symbols to represent the skittles and record their results. The students can devise their own recording system. Children begin with a score equal to the number of skittles in their bag and they get a point if their number is correct and lose a point if it is not. The winner is the child with the highest score when the bag is empty.</p>
Possibilities for differentiating the task	Allow for qualitative analysis. Display information in graphs. Use fractions and percentages to predict.

Title of the Investigation	Three-colour Triangle Puzzles
Central Question	Can you predict the colour of the final hexagon? What are the patterns you can identify?
Class Level	4th Class
Strand Unit and Key Objectives	Pattern Shape Data/Chance
Skills Required	Discussing the likelihood of events Predicting probability of results
Materials Needed	Colours, triangle template, Three Color Triangle Puzzles (logic, algorithm) MathPickle . If you wish, you can use concrete manipulatives instead of the template
Anticipated Process (allowing for children to be involved in planning)	<ol style="list-style-type: none"> 1. Look at the video which explains the rules of colouring each line of the triangle. 2 different colours make the third colour. Two of the same colour mean the third colour will also be the same e.g Blue and red makes yellow and blue and blue make blue. The first line determines the colour of all the other lines. https://mathpickle.com/project/threecolortriangle/ 2. Children practise designing their triangle in their pairs or individually. 3. Whole class discussion and children thought about strategy to guess what colour the final line on the triangle will be. Can you work it out in 5 seconds? 4. The children explore with their partner if this short cut rule works with triangles with more or less than 10 in the first line. What are the special numbers? (4,10,28,82) 5. If you want a bigger question: how many red triangles are possible in a completed 5-edge triangle? Of course you can get zero by filling the bottom row with all blues. Can you find a way to get 1, 2, 3, 4... 15? 6. Discussion as a whole class group
Possibilities for differentiating the task	High Threshold/Low Ceiling Task Some learners can focus on how to play the game and learn about simple probability concepts. Higher achievers can write out a strategy/proof for the unsolved maths question above. The children work in mixed ability maths pairs.

Title of the Investigation	How Many Hanukkah Candles Will We Need? (Robert Kaplinsky lesson)
Central Question	How many candles will be needed for the festival of Hanukkah?
Class Level	5th Class
Strand Unit and Key Objectives	Algebra - Number patterns and sequences: explore, extend, and describe sequences
Skills Required	Applying and problem-solving Communicating and expressing Reasoning
Materials Needed	https://robertkaplinsky.com/work/how-many-hanukkah-candles-will-we-need/ Photo/video/model of a menorah
Anticipated Process (allowing for children to be involved in planning)	<ol style="list-style-type: none"> 1. Share the short video of lighting the menorah. 2. Observe and discuss what they know. Make an estimate, discussing low, high and accurate options. 3. Discuss information that needs to be determined to answer the question. In other words, brainstorm questions. Research together for the information, as required, about Hanukkah. 4. Working in groups, use objects, symbols or pictures to show their thinking. 5. Watch the second video and discuss the results.
Possibilities for differentiating the task	Mixed ability groupings For added challenge, how many candles would be needed if Hanukkah lasted 10 nights, 50 nights or 100 nights? Can any patterns be identified?

Title of the Investigation	Peruda/Liar's Bluff
Central Question	How to play Peruda optimally and prove it... Write the optimal strategy for bidding for the person who starts the game.
Class Level	5th Class
Strand Unit and Key Objectives	Data > Chance
Skills Required	Discussing the likelihood of events; predicting probability of results
Materials Needed	Tub of dice; website: www.mathpickle.com
Anticipated Process (allowing for children to be involved in planning)	<ol style="list-style-type: none"> 1. Explain the rules of Peruda. Show the video of how to play the game (www.mathpickle.com) 2. Children practise playing Peruda in their maths groups (3 children per group). Each child played against the other members of their maths group independently. 3. Whole class discussion and children thought about strategies to play Peruda. 4. For homework, the children had two options: 1) Write the rules and how to play the game 2) Write out the optimal way to play Peruda 5. The children discuss with the members of their maths team the strategies they came up with to play the game 6. The children play against the other maths teams, using the strategies they came up with 7. Discussion as a whole class group
Possibilities for differentiating the task	High Threshold/Low Ceiling Task Some learners focused on how to play the game and learned about simple probability concepts. Higher achievers tried to write out a strategy/proof for the unsolved maths question above. The children work in mixed ability maths groups.

Title of the Investigation	Money Measurement
Central Question	Which prize (of a selection of coin accumulations) would be best value?
Class Level	6th Class
Strand Unit and Key Objectives	Measure – weight, length, area, money Number – estimation, place value, operations Shape and space – circle, thickness of coins, diameter of coins
Skills Required	Estimation, problem-solving, selecting appropriate materials, communicating, expressing, integrating and connecting
Materials Needed	<i>Teaching with Tasks for Effective Maths Learning</i> , pg 190 (Money Measurement)
Anticipated Process (allowing for children to be involved in planning)	<ol style="list-style-type: none"> 1. Children work in groups to decide how to measure each category of coins. 2. Children discuss best approaches and practical options 3. Estimation using rulers and multiple coins 4. Individual work re what information was required to make a choice 5. Practical measuring not done due to difficulty acquiring coins (to value of approximately €500). It is recommended this be done around Spring Fair time, when lots of coinage is available. 6. Calculation using accurate coin measurements found on internet
Possibilities for differentiating the task	There were four different tasks within this investigation. The more complex one was the area based calculation which can be given to a more capable group. The other linear measurements/calculations suited most of class.

Title of the Investigation	Stop or Dare
Central Question	When is the best time to bank points while playing this game?
Class Level	6th Class
Strand Unit and Key Objectives	Data – chance: construct and use frequency charts and tables; estimate the likelihood of occurrence of events; order on a scale from 0 to 100%, 0 to 1; identify and list all possible outcomes of simple random processes
Skills Required	Reasoning, applying and problem-solving Communicating and expressing Implementing.
Materials Needed	Decks of cards, Maths copies
Anticipated Process (allowing for children to be involved in planning)	<ol style="list-style-type: none"> 1. Children work in groups to play game. Game rules are available here. 2. Children discuss best approaches and practical options 3. Estimation and experimentation using copies and cards. 4. Individual work re what information was required to make a choice. 5. Replay the game and compare pre- and post-analysis scores.
Possibilities for differentiating the task	Multiple decks of cards shuffled together. Pen and paper records rather than mental calculations.