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Maths

Introduction

This document is a statement of the aims, objectives, principles and strategies for teaching and learning Maths at Lumcloon N.S.

Our school is a mixed primary school of 62 pupils, a teaching principal, two further class teachers, one Learning Support Teacher (shared with Daingean N.S.) and one Resource teacher (shared with Oxmantown N.S.), both based in our school.

Rationale

The plan was drafted collaboratively by the teaching staff of the school in response to our commitment to providing a whole-school approach to Maths using evidence-based practices, the need to review our use of the LS/RT allocation to best meet the needs of pupils in our school, to conform to principles of learning outlined in the Primary School Curriculum and the requirements of the National Literacy and Numeracy Strategy/Circular 56/2011.

Vision Statement

We endeavour to make Lumcloon National School a place of learning and development, where each child is cherished and encouraged to reach his/her full potential and to provide a well ordered, caring, happy and secure atmosphere where the intellectual, spiritual, physical, moral and cultural needs of the pupils are identified and addressed. We see the development of their Maths skills as being central to this process. We believe that this will contribute greatly to the development of their self-esteem and their personal growth.

Relationship to the Characteristic Spirit of the School

We are committed to the holistic development of all pupils in order to assist them to contribute and play a fulfilling role in their own community. We see the development of their Maths skills as being central to this process.

Aims and Objectives

We endorse the aims and objectives of the primary mathematics curriculum as outlined on page 12.

- to develop a positive attitude towards mathematics and an appreciation of both its practical and its aesthetic aspects

- to develop problem-solving abilities and a facility for the application of mathematics to everyday life

- to enable the child to use mathematical language effectively and accurately

- to enable the child to acquire an understanding of mathematical concepts and processes to his/her appropriate level of development and ability

- to enable the child to acquire proficiency in fundamental mathematical skills and in recalling basic number facts.

Broad objectives

When due account is taken of intrinsic abilities and varying circumstances, the mathematics curriculum should enable the child to

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Skills development

- apply mathematical concepts and processes, and plan and implement solutions to problems, in a variety of contexts

- communicate and express mathematical ideas, processes and results in oral and written form

- make mathematical connections within mathematics itself, throughout other subjects, and in applications of mathematics in practical everyday contexts

- reason, investigate and hypothesise with patterns and relationships in mathematics

- implement suitable standard and non-standard procedures with a variety of tools and manipulatives

- recall and understand mathematical terminology, facts, definitions, and formulae

Skills development

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Number

Broad Objectives

The aim of this plan is to provide a structured sequential programme for teachers to enable children to:

- understand, develop and apply place value in the denary system (including decimals)

- understand and use the properties of number

- understand the nature of the four number operations and apply them appropriately

- approximate, estimate, calculate mentally and recall basic number facts

- understand the links between fractions, percentages and decimals and state equivalent forms

- use acquired concepts, skills and processes in problem-solving

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Early Mathematical Activities: Content for Junior Infants

Classifying	Matching	Comparing	Ordering
• Classify objects on the basis of one attribute, such as colour, shape, texture or size • Identify the complement of a set (i.e. elements not in a set)	• Match equivalent and non-equivalent sets using one-to-one correspondence	• Compare objects according to length, width, height, weight, quantity, thickness or size • Compare sets without counting	• Order objects according to length or height • Order sets without counting.

Early Mathematical Activities: Methodologies for Junior Infants

- sort collections of objects
- add similar objects to a clearly defined set
- identify the complement of a set (i.e. elements not in a set)
- categorise objects such as things I like/don't like, red things/things that are not red.
- match pairs of identical objects in one-to-one correspondence:
- lollipop sticks, Unifix cubes
- match pairs of related objects in one-to-one correspondence:
- putting out knives and forks, buttoning coats, putting lids on pans
- match equivalent and non-equivalent sets to establish the concept of more than, less than, enough, as many as.
-
- compare pairs of identical objects that differ in length, noting the need for a baseline or common starting point
- compare pairs of pencils
- how does each differ from the next?
- long/short, longer/shorter
- more than and less than.
- compare pairs of identical objects that differ in length, noting the need for a baseline or common starting point
- compare pairs of pencils
- how does each differ from the next?
- long/short, longer/shorter
- compare sets without counting
- more than and less than.
- examine three objects and describe how each object differs from the preceding one
- order objects by length or height, starting with a different object each time
- order new objects to make a set like a given one

Number: Content for Junior Infants

Counting	Comparing and Ordering	Analysis of Number
• Count the number of objects in a set, 1 - 10	• Compare equivalent and non-equivalent sets 1 - 5 by matching without using symbols • Order sets of objects by number, 1 – 5 • Use the language of ordinal number: first, last •	**Combining** • Explore the components of number, 1 – 5 • Combine sets of objects, totals to 5 **Partitioning** • Partition sets of objects, 1 – 5 **Numeration** • Develop an understanding of the conservation of number, 1 – 5 • Read, write and order numerals, 1 – 5 • Identify the empty set and the numeral zero • Subitise (tell at a glance) the number of objects in a set, 1 – 5 • Solve simple oral problems, 0 - 5

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Number: Methodologies for Junior Infants

Note: Many teaching methodologies appropriate to the development of Number are inherent in the content detailed on the previous page.

- count objects, pushing them aside while counting
- count regular arrays or rows before random groups
- use number rhymes and stories.
- use one-to-one matching to determine equality and inequality (more than/less than/same as)
- record by drawing
- arrange sets of objects in ascending order
- order rods and number strips by length
- order number cards; match them with sets and number patterns
- who is first/last in the line?
- the first colour is red, the last colour is blue.
- identify the ways in which the numbers can be modelled using concrete objects:
- 4 and 1, 2 and 2, 1 and 2 and 1
- identify pairs of related facts: 1 and 2 is the same as 2 and 1
- add one more to a given set
- combine two sets, state total
- record pictorially
- partition sets of objects with a pencil or straw to show component parts
-

- record pictorially.
- count rearranged number arrays and observe that the number does not change
- present sets to match a numeral and vice versa
- use counters or objects to form number patterns
- trace numerals cut out of sandpaper or carpet
- draw numerals in sand or with thick crayon
- show an empty basket; how many apples in it?
- remove pencils from a jar until none is left
- show the numeral
- count down to zero
- counting back number rhymes
- tell at a glance how many objects are in a set
- estimate using a known set
- without counting, classify the other sets as less than/about the same as/more than the given set
- you have 3 sandwiches for lunch, you eat 2,how many are left? Zero can be used when there are none left.
- Joan has 2 crayons, Seán has 3 crayons, how many altogether?
- teacher presents a problem orally, pupils use counters to solve it.

Number: Content for Senior Infants

Counting	Comparing and Ordering	Analysis of Number
• Count the number of objects in a set, 1 - 20	• Compare equivalent and non-equivalent sets 1 - 10 by matching • Order sets of objects by number, 1 – 10 • Use the language of ordinal number: first, second, third, last	**Combining** • Explore the components of number, 1 – 10 • Combine sets of objects, totals to 10 **Partitioning** • Partition sets of objects, 0 – 10 • Use the symbols + and = to construct word sentences involving addition **Numeration** • Develop an understanding of the conservation of number, 1 – 10 • Read, write and order numerals, 1 – 10 • Identify the empty set and the numeral zero • Estimate the number of objects in a set, 2 – 10 • Solve simple oral and pictorial problems, 0 - 10

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Number: Methodologies for Senior Infants

Note: Many teaching methodologies appropriate to the development of Number are inherent in the content detailed on the previous page.

- count the same set several times, starting with a different object each time
- present different patterns and arrays of the same number.
- name the inequality: I have 2 more than you;
- 3 is less than 5
- use ordinal numbers to describe position in a line
- use this language when ordering numbers.
- use appropriate strategies: counting all, counting on
- counting on on the number strip
- start at 5, count on 3, where am I?
- oral counting without the number strip
- combine two or more sets, state total
- record
- 8 people are on my team. 6 are girls, how many are boys?
- record pictorially
- formal introduction of the symbols should occur only
- after sufficient oral and exploratory work has been
- completed
- the meaning of the symbols will have to be discussed
- frequently
- the equals sign does not signal "the answer comes next"
- equals means "the same" or equivalent; explore using a number balance.
- check estimate by counting
- problems can include story problems and open-ended exploratory questions
- how many different ways can you make a pattern with 6 counters?

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Number: Content for 1st Class

Counting and Numeration	Comparing and Ordering	Place Value	Operations	Fractions
• Count the number of objects in a set • Read, write and order numerals, 0 – 99 • Estimate the number of objects in a set 0 – 20 •	• Compare equivalent and non-equivalent sets 0 – 20 • Order sets of objects by number • Use the language of ordinal number, first to tenth	• Explore, identify and record place value 0 – 99	**Addition** • Develop an understanding of addition by combining • or partitioning sets, use concrete materials 0 - 20 • explore, develop and apply the commutative, associative and zero properties of addition • develop and/or recall mental strategies for addition facts within 20 • construct number sentences and number stories; solve problems involving addition within 20 • add numbers without and with renaming within 99 • explore and discuss repeated addition and group counting **Subtraction** • Develop an understanding of subtraction as deducting, as complementing and as difference 0 – 20 • Develop and/or recall mental strategies for subtraction 0 – 20 • Construct number sentences and number stories; solve problems involving subtraction 0 – 20 • Estimate differences within 99 • Subtract numbers without renaming within 99 • Use the symbols +, - , =	• Establish and identify half of sets to 20

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Counting and Numeration	Comparing and Ordering	Place Value	Operations	Fractions
			• Solve one-step problems involving addition or subtraction.	

Number: Methodologies for 1st Class

Note: Many teaching methodologies appropriate to the development of Number are inherent in the content detailed on the previous page.

- count the same set several times, starting with a different object each time (regular and random arrays)
- re-count rearranged sets and arrays to determine that number does not change
- match a numeral to a set and vice versa
- write numerals to correspond to sets
- count on and back from a given number, using concrete materials, number line and hundred square
- state the number that follows or precedes a number
- compare a known set with other sets, check by counting
- describe different sets of cubes as less than, more than or about the same as the known set.
- name the inequality
    - o I have 5 more than you; 7 is less than 10 ; 6 is less than 9 by how many?
- when ordering sets and numbers, describing patterns, taking turns.
- group and count in tens and units using cubes, counters, lollipop sticks and coins (1 cent and
- 10 cents), base ten materials and notation boards
- express groups of counters as units or as tens and units
- record pictorially and on the abacus.
- find all the addition combinations to make up a given number: 11 + 1 = 12, 2 + 6 + 4 = 12
- record addition: orally, pictorially, in number sentences, in jumps on the number line
- commutative property: 6 + 2 = 8, 2 + 6 = 8
- associative property: (2 + 3) + 5 =10, 2 + (3 + 5) =10
- zero property: 7 + 0 = 7
- use concrete materials to count on using commutative property, zero property, counting in twos,
- doubles and near doubles,

- orally memorise addition facts using strategies
- construct and tell a number story, record pictorially, as a number sentence or as a written story
- solve written problems; pupils can also devise problems for each other
- estimate sum by adding the tens,
- check estimates using manipulatives
- add numbers using concrete materials, notation boards, number lines and hundred squares
- use mental calculations
- record using number lines, number sentences and algorithm
- counting in twos, fives, tens, count children in the line, 2, 4, 6, 8 ....
- deducting:
    - o I had 10 sweets, I ate 3. How many have I left?
- complementing:
    - o There are 10 stickers in a set. I have 4. How many more do I need to make a full set?
- difference:
    - o I have 12 crayons. Mary has 6 crayons. How many more have I? How many fewer has Mary?
- focus on subtraction as the inverse of addition
- record subtraction: concretely, orally, pictorially, in number sentences, in jumps on the number line, and on notation boards
- counting back/on, using doubles/near doubles, using zero, using knowledge of 10 facts, add to check results
- construct and tell a number story; record pictorially, as a number sentence, or as a written story
- solve written problems; pupils can also devise problems for each other
- subtracting the tens
- check estimates using manipulatives, estimate difference
- use concrete materials, number lines and hundred squares
- use mental calculations

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• pairs of numbers that total 10 (6 + 4 = 10); • complement numbers to 10 (3 + □ =10); • equals means "the same" or equivalent • explore using a number balance • share sets of objects equally between two people, record pictorially.	• record using number lines, number sentences and algorithms • formal introduction of the symbols should occur only after sufficient oral and exploratory work has been completed • the meaning of the symbols will have to be discussed frequently • the equals sign does not signal "the answer comes next":

Number: Content for 2nd Class

Counting and Numeration	Comparing and Ordering	Place Value	Operations	Fractions
• Count the number of objects in a set • Read, write and order numerals, 0 – 199 • Estimate the number of objects in a set 0 – 20 •	• Compare equivalent and non-equivalent sets • Use the language of ordinal number	• Explore, identify and record place value 0 – 199	**Addition** • Develop an understanding of addition by combining or partitioning sets • Explore, develop and apply the commutative, associative and zero properties of addition • Develop and recall mental strategies for addition facts within 20 • Construct number sentences and number stories; solve problems involving addition within 99 • Add numbers without and with renaming within 99 • Explore and discuss repeated addition and group counting **Subtraction** • Develop an understanding of subtraction as deducting, as complementing and as difference • Develop and recall mental strategies for subtraction 0 – 20 • Construct number sentences involving subtraction of whole numbers; solve problems involving subtraction • Estimate differences within 99	• Establish and identify halves and quarters of sets to 20

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Counting and Numeration	Comparing and Ordering	Place Value	Operations	Fractions
			• Subtract numbers without and with renaming within 99 • Use the symbols +, -, =, <, > • Solve one-step and two-step problems involving addition and subtraction.	

Number: Methodologies for 2nd Class

Note: Many teaching methodologies appropriate to the development of Number are inherent in the content detailed on the previous page.

- estimate first and check by counting. e.g. the number of marbles in a jar
- state the number that comes before and after a random number
- fill in missing numbers on the hundred square
- record using < > and =
- using the calendar.
- extend grouping and renaming activities to include the hundred, in tens
- rename numbers as one hundred, tens and units
- represent numbers using place value material: coins, number cards, word cards, number line.
- discuss different strategies for combining numbers:

  - 9 + 8 = 10 + 8 - 1 or 8 + 8 + 1 or 9 + 9 - 1

- memorise and record addition facts using strategies
- estimate simple sums within 99
- use mental calculations
- record using notation boards, number lines, number sentences and algorithm
- emphasise addition of 10 to multiples of 10, to other numbers (36 + 10)
- add multiples of 10 to numbers (45 + 20)
- in practical situations, e.g. buying a number of identical articles

  - 10 sweets in a packet; how many in 5 packets?

  - 10 + 10 + 10 + 10 + 10 = 50 sweets

- discuss different strategies for subtracting numbers
- use rounding strategies
- estimate difference using tens
- written calculations after plenty of practical and mental calculations

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- check answers using hundred square, number line or addition
- discuss relationship between a half and a quarter.

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Number: Content for 3rd Class

Place Value	Operations	Fractions	Decimals
• Explore and identify place value in whole numbers, 0 – 999 • Read, write and order three-digit numbers • Round whole numbers to the nearest ten or hundred • Explore and identify place value in decimal numbers to one place of decimals.	**Addition and Subtraction** • Add and subtract, without and with renaming, within 999 • Know and recall addition and subtraction facts • Solve word problems involving addition and subtraction **Multiplication** • Develop an understanding of multiplication as repeated addition and vice versa • Explore, understand and apply the zero, commutative and distributive properties of multiplication • Develop and/or recall multiplication facts within 100 • Multiply a one-digit or two-digit number by 0 – 10 • Solve and complete practical tasks and problems involving multiplication of whole numbers **Division** • Develop an understanding of division as sharing and as repeated subtraction, without and with remainders • Develop and/or recall division facts within 100 • Divide a one-digit or two-digit number by a one-digit number without and with remainders • solve and complete practical tasks and problems involving division of whole numbers	• Identify fractions and equivalent forms of fractions with denominators 2, 4, 8 and 10 • Compare and order fractions with appropriate denominators and position on the number line • Calculate a fraction of a set using concrete materials • Develop an understanding of the relationship between fractions and division • Calculate a unit fraction of a number and calculate a number, given a unit fraction of the number • Solve and complete practical tasks and problems involving fractions	• Identify tenths and express in decimal form • Order decimals on the number line • Solve problems involving decimals.

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Number: Methodologies for 3rd Class

Note: Many teaching methodologies appropriate to the development of Number are inherent in the content detailed on the previous page.

- grouping and swapping activities involving units, tens, hundreds using concrete materials, e.g. lollipop sticks, abacus, notation boards, base ten materials, money
- significance of zero: 208, 420
- identify and record numbers represented by money and abacus
- identify and express numbers in expanded form
    - o 246 = 2 hundreds + 4 tens + 6 units
- order numbers on the number line or hundred square
- 247: what is the value of 4 in this number?
    - o which digit has the greatest value?
- what is the next number after 499?
- which number is nearer to 40: 29 or 79?
- which number is nearer to 500: 432 or 567?
- estimate sums and differences (rounding where necessary)
- check estimates
- record using horizontal and vertical presentation
- count sets of objects in twos, threes, fours etc. to tens
- count in steps on the number line or hundred square
- construct number sentences with concrete materials and
- record diagrammatically

    ❀ ❀   ❀ ❀   ❀ ❀ = ❀ ❀ ❀ ❀ ❀ ❀
      2 + 2 + 2 = 6
           3 x 2 = 6

- record number sentences as 6 + 6 + 6 = 3 x 6 = 18.
- use concrete materials, charts and illustrations to
- establish and record:
- zero property, e.g. 5 x 0 = 0 and 0 x 7 = 0
- commutative property, e.g. 3 x 4 = 4 x 3
- distributive property, e.g. 5 x 4 = (3 x 4) + (2 x 4)
- counting in 2, 3, 5 and 10

- use rounding to estimate products
- rounding up/down, e.g. 6 x 28 is near to 6 x 30
- represent in horizontal and vertical form
    - o 23 x 7 and 23
        - x 7
- establish effect of multiplication by 1 and by 10
    - o 1 x 17 = 17, 10 x 53 = 530
- how many days in 9 full weeks?
- share a quantity in equal groups of 2, 3 …
- record using number sentences or vertically
    - o 20 - 4 - 4 - 4 - 4 - 4 - 4 = 0
- use inverse of multiplication facts
- use halves
    - o 9 is half of 18 (2 x 9 = 18)
- represent division as repeated subtraction
- represent division as number sentences
    - o 20 ÷ 4 = 5
- record using the division algorithm
    -    5   7 r 2
    - 4)20   5)37
- use different strategies to estimate quotients and check answers rounding up or down, e.g. 44 ÷ 12 is about 40 ÷ 10
- problems based on the environment
    - o how many cars are needed to take 27 children to a game if only 4 children are allowed in each car?
- estimate, discuss and record.
- construct and cut out simple fractions of regular shapes
- record using diagrams or fraction charts
- ¼ of 32 = 8, $^{32}/_4$ = 8
- what is ¼ of 12?
- $^1/_8$ of a number = 6, find the number
- what fraction of a chart is coloured yellow/is not green?
- express $^1/_{10}$ as 0.1
- cut out tenths and/or 0.1 of regular shapes

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• doubles, trebles
   o 2 x 9 = 18, 4 x 9 = 36, 8 x 9 = 72
   o 3 x 4 = 12, 9 x 4 = 36
	• record using diagrams or charts
	• draw a circle around the number with the greatest value: 0.5, 0.1, 0.7, 0.2

Number: Content for 4th Class

Place Value	Operations	Fractions	Decimals
• Explore and identify place value in whole numbers, 0 – 9999 • Read, write and order four-digit numbers and solve simple problems • Round whole numbers to the nearest thousand • Explore and identify place value in decimal numbers to two places of decimals.	**Addition and Subtraction** • Add and subtract, without and with renaming, within 9999 • Know and recall addition and subtraction facts • Solve word problems involving addition and subtraction **Multiplication** • Develop an understanding of multiplication as repeated addition and vice versa • Explore, understand and apply the zero, commutative, distributive and associative properties of multiplication • Develop and/or recall multiplication facts within 100 • Multiply a two-digit or three-digit number by a one or two-digit number • Use a calculator to check estimates • Solve and complete practical tasks and problems involving multiplication of whole numbers **Division** • Develop an understanding of division as sharing and as repeated subtraction, without/with remainders • Develop and/or recall division facts within 100 • Divide a three-digit number by a one-digit number without and with remainders • Use calculator to check estimates • Solve and complete practical tasks and problems	• Identify fractions and equivalent forms of fractions with denominators 2, 4, 8, 10 and 12 • Compare and order fractions with appropriate denominators and position on the number line • Calculate a fraction of a set using concrete materials • Calculate a number, given a multiple fraction of the number • Express one number as a fraction of another number • Solve and complete practical tasks and problems involving fractions	• Express tenths and hundredths as fractions and decimals • Identify place value of whole numbers and decimals to two places and write in expanded form • Order decimals on the number line • Add and subtract whole numbers and decimals up to two places • Multiply and divide a decimal number up to two places by a single-digit whole number • Solve problems involving decimals.

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Place Value	Operations	Fractions	Decimals
	involving division of whole numbers		

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Number: Methodologies for 4th Class

Note: Many teaching methodologies appropriate to the development of Number are inherent in the content detailed on the previous page.

- grouping and swapping activities involving units, tens, hundreds and thousands using concrete materials and notation boards
- significance of zero: 1078, 2005, 3620
- write 5683 in expanded form

  o   5000 + 600 + 80 + 3

- what is the value of the underlined 7 in 77<u>7</u>7?
- make as many numbers as you can from 3, 7, 0, 6
- place in order, starting with the largest
- which number is nearer to 5000: 4328 or 5675?
- estimate sums and differences
- check estimates without and with a calculator
- use a calculator to develop problem-solving strategies and verify estimations
- use concrete materials and charts to establish associative property, e.g. (3 x 4) x 5 = 3 x (4 x 5)
- estimate products
- represent multiplication in expanded form
- 26 ✘ 37 = (20 ✘ 37) + (6 ✘ 37)
- record and calculate using long multiplication algorithm

$$
\begin{array}{r}
37 \\
26 \times \\
\hline
222 \quad (37 \times 6) \\
740 \quad (37 \times 20) \\
\hline
962
\end{array}
$$

- 34 children buy one packet of sweets per child each day how many packets altogether do they buy in a month?
- using regrouping

  o   372 ÷ 6 may be seen as 37 tens + 2 units ÷ 6

  o   (37 tens ÷ 6) and (2 units ÷ 6)

  o   6 tens and (12 ÷ 6) = 62

- using algorithm

$$
\begin{array}{ll}
62 & 54\ r\ 2 \\
6)\overline{372} & 6)\overline{206}
\end{array}
$$

- explore, understand and apply the distributive property of division

  o   84 ÷ 7 = (70 ÷ 7) + (14 ÷ 7)

- using compatible numbers (i.e. numbers easily worked with an extension of basic facts)

  o   338 ÷ 7 is compatible with 350 ÷ 7

- how many small boxes of eggs (6 per box) can be filled from a crate containing 350 eggs?
- estimate, discuss and record.
- $^3/_{10}$ of a number = 45, find the number
- 3 = ½ of 6
- find $^3/_4$ of a 1 metre piece of string
- find $^1/_5$ of 2500 metres.
- 3.45 = 3 + 0.4 + 0.05
- identify the number with the greatest value: 0.57, 0.01, 0.72, 0.25
- what is the value of the 6 in the following? 4.<u>6</u>5, 2.7<u>6</u>, <u>6</u>.05

Number: Content for 5th Class

Place Value	Operations	Fractions	Decimals and Percentages	Number Theory
• Read, write and order whole numbers and decimals • Identify place value in whole numbers and decimals • Round whole numbers and round decimals •	• Estimate sums, differences, products and quotients of whole numbers • Add and subtract whole numbers and decimals (to three decimal places) without and with a calculator • Multiply a decimal (up to three places) by a whole number, without and with a calculator • Divide a three-digit number by a two-digit number, without and with a calculator • Divide a decimal number by a whole number, without and with a calculator	• Compare and order fractions and identify equivalent forms of fractions with denominators 2 - 12 • Express improper fractions as mixed numbers and vice versa and position them on the number line • Add and subtract simple fractions and simple mixed numbers • Multiply a fraction by a whole number • Express tenths, hundredths and thousandths in both fractional and decimal •	• Develop an understanding of simple percentages and relate them to fractions and decimals • Compare and order fractions and decimals • Solve problems involving operations with whole numbers, fractions, decimals and simple percentages	• Identify simple prime and composite numbers • Identify square and rectangular numbers • Identify factors and multiples

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Number: Methodologies for 5th Class

Note: Many teaching methodologies appropriate to the development of Number are inherent in the content detailed on the previous page.

- extend previous conceptual and practical work to include larger numbers and decimals
- extend previous conceptual and practical work to include larger numbers and decimals
- round whole numbers to nearest ten, hundred, thousand
- round decimals to nearest whole number.
- use strategies for estimation, e.g. front-end estimation, rounding, clustering, special numbers
- estimate calculations and compute answers with a calculator
- e.g. 450 x 9 4500 (estimation based on 450 x 10)
- estimate first, then use calculator to get actual result
- develop and extend the use of existing algorithms
- develop and extend the use of existing algorithms: 8.125 x 9
- explore the concept of division with concrete materials
- develop the long division algorithm from repeated subtraction and multiples of repeated subtraction
- explore the concept of division of decimals with concrete materials, money and measurement
- extend the algorithm in conjunction with place value: 75.6 ÷ 4.
- explore, compare and record simple equivalence using concrete materials, paper folding, and fraction charts
- establish equivalence by using concrete materials
- explore, compare and record simple improper fractions and mixed numbers diagrammatically, numerically and on the number line
- use equivalent fractions to simplify calculations
- develop concepts with concrete materials, paper folding and fraction charts
- four $^3/_4$ of a pizza is how many pizzas?
- explore and compare using concrete materials
- express as fractions and as decimals.
- express percentages as fractions and as decimals, and vice versa

- calculate simple percentages, e.g. 50%, 25% 10%
- explore, compare and record using concrete materials and money
- order diagrammatically or on the number line
- use diagrams; estimate and compute answers with a calculator
- include simple discount and increase examples: 10% off all jeans, 20% extra free.
- define a prime number, i.e. a number greater than 1 with exactly two divisors, itself and 1
- identify simple prime numbers by trial and error, e.g. 2, 5, 7, 11
- identify and record primes with Sieve of Eratosthenes
- define a composite number, i.e. a number that has more than two divisors, e.g. 4, 6, 9
- identify and record composite numbers using number facts and/or a calculator
- investigate relationship with odd and even numbers
- construct diagrams on geoboards, pegboards and squared paper to illustrate simple square and rectangular numbers
- explore, compare and record these numbers

identify factors and multiples from basic multiplication facts.

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Number: Content for 6ᵗʰ Class

Place Value	Operations	Fractions	Decimals and Percentages	Number Theory
• Read, write and order whole numbers and decimals • Identify place value in whole numbers and decimals • Round decimals	• Estimate sums, differences, products and quotients of decimals • Add and subtract whole numbers and decimals (to three decimal places) without and with a calculator • Multiply a decimal by a decimal, without and with a calculator • Divide a four-digit number by a two-digit number, without and with a calculator • Divide a decimal number by a decimal, without and with a calculator •	• Compare and order fractions and identify equivalent forms of fractions • Express improper fractions as mixed numbers and vice versa and position them on the number line • Add and subtract simple fractions and simple mixed numbers • Multiply a fraction by a fraction • Express tenths, hundredths and thousandths in both fractional and decimal form • Divide a whole number by a unit fraction • Understand and use simple ratios	• Use percentages and relate them to fractions and decimals • Compare and order percentages of numbers • Solve problems relating to profit and loss, discount, VAT, interest, increases and decreases.	• Identify simple prime and composite numbers • Identify and explore square numbers • Explore and identify simple square roots • Identify common factors and multiples • Write whole numbers in exponential form

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Number: Methodologies for 6th Class

Note: Many teaching methodologies appropriate to the development of Number are inherent in the content detailed on the previous page.

- round decimals to one, two or three decimal places.
- use strategies for estimation
- estimate calculations and compute answers with a calculator
- develop and extend the use of existing algorithms: 7.25 x 1.5; 13.2 x 0.75
- understand that multiplication does not always make larger
- develop and extend the use of existing algorithms: 7852 ÷ 26
- explore the concept of division by decimals with concrete materials, money and measurement: 36.92 ÷ 2.6; 27.6 ÷ 0.2
- understand that division does not always make smaller.
- order equivalent fractions on the number line and on fraction charts
- common denominator should be found by listing multiples
- explore and develop concept by using concrete materials and the number line and by drawing diagrams to illustrate examples, leading to the development of an algorithm
- how many quarters in 2? 2 ÷ 1/4;   15 ÷ 1/5
- explore and record the relationship between the natural numbers and their multiples.
- express quantities as percentages
- square numbers: $16 = 4 \times 4 = 4^2$
- construct diagrams
- record and relate to square numbers
- explore and record factors and multiples to identify common factors and multiples
- exponentials: $1000 = 10 \times 10 \times 10 = 10^3$, $8 = 2 \times 2 \times 2 = 2^3$

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Algebra

Broad Objectives

The aim of this plan is to provide a structured and sequential programme for teachers to enable children to:

- explore, perceive, use and appreciate patterns and relationships in numbers

- identify positive and negative integers on the number line

- understand the concept of a variable, and substitute values for variables in simple formulae, expressions, and equations

- translate verbal problems into algebraic expressions

- acquire an understanding of properties and rules concerning algebraic expressions

- solve simple linear equations

- use acquired concepts, skills and processes in problem-solving

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Algebra: Content for Junior Infants

Extending Patterns
• Identify, copy and extend patterns in colour, shape and size

Algebra: Methodologies for Junior Infants

• using a range of objects, e.g. cubes or threading beads • continue the pattern, what comes next? • pupils make their own patterns using gummed paper shapes; two colours, two shapes, two sizes • computer software can be used where appropriate • discuss results.

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Algebra: Content for Senior Infants

Extending Patterns
• Identify, copy and extend patterns in colour, shape, size and number (3Ð4 elements) • Discover different arrays of the same number • Recognise patterns and predict subsequent numbers

Algebra: Methodologies for Senior Infants

Note: Many teaching methodologies appropriate to the development of Number are inherent in the content detailed on the previous page.

- copy and extend patterns using beads and blocks, by drawing and colouring e.g. 2 blue, 3 red; 3 circles, 1 square; 2 big beads, 1 small bead; red, blue, yellow
- discuss
- teacher makes a pattern (array) using a number of counters; child creates a different array using the same number of counters
- how many different patterns of 10 can you make?
- how many numbers can you arrange in pairs?
- find the missing numbers: 2, 3, 4, □, 6, 7; 10, 9, □, □, 6, 5, 4, 3, □ , □ .

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Algebra: Content for 1st Class

Exploring and Using Patterns
• Recognise pattern, including odd and even numbers • Explore and use patterns in addition facts • Understand the use of a frame to show the presence of an unknown number

Algebra: Methodologies for 1st Class

Note: Many teaching methodologies appropriate to the development of Algebra are inherent in the content detailed on the previous page.

- count in twos on the hundred square; colour each number you stop at
- construct sets that increment in twos, starting with 0 (0, 2, 4, 6 ...), starting with 1 (1, 3, 5, 7 ...)
- discuss and record pictorially
- use two colours to identify odd and even numbers on the hundred square; discuss results
- extend activities to group counting with fives and tens
- notice patterns that make up tens: (9 + 1 = 10, 2 + 8 = 10, 18 + 2 = 20) and the effect of adding 10 to a given number: 3 + 10 = 13, 13 + 10 = 23
- missing number/frames; 3 + 5 =□; 2 + □ = 6.

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Algebra: Content for 2nd Class

Exploring and Using Patterns
• Recognise patterns and predict subsequent numbers • Explore and use patterns in addition facts • Understand the use of a frame to show the presence of an unknown number

Algebra: Methodologies for 2nd Class

Note: Many teaching methodologies appropriate to the development of Algebra are inherent in the content detailed on the previous page.

- counting on the hundred square:

    o   start on 2, count on 5   2 + 5 = 7

    o   start on 12, count on 5   12 + 5 = 17

- explore other number patterns, including odd and even number patterns, on the hundred square
- group count in threes, fours and sixes
- discuss the results
- missing number/frames 24 + 6 = □ 14 + □ = 20,   2 + 4 + □ = 12.

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Algebra: Content for 3rd Class

Number Patterns and Sequences	Number Sentences
• Explore, recognise and record patterns in number, 0 - 999 • Explore, extend and describe (explain rule for) sequences • Use patterns as an aid in the memorisation of number facts	• Translate an addition or subtraction number sentence with a frame into a word problem (frame not in initial position) • Solve one-step number sentences

Algebra: Methodologies for 3rd Class

Note: Many teaching methodologies appropriate to the development of Algebra are inherent in the content detailed on the previous page.

- group and count in twos, threes, fours ... tens on number line and hundred square
- recognise number bonds through grouping: 17 + 3, 27 + 3, 37 + 3
- recognise links within and between multiplication tables (e.g. links between 4 and 8 times tables)
- patterns of odd and even numbers
- patterns or sequences of objects or shapes
- whole-number sequences (e.g. 54, 44, 34, or 1, 3, 9, 27)
- make patterns on the hundred square.
- Mary has three sweets, she gets seven more, how many has she now? 3 + 7 = ☐
- number frames: 400 - ☐ = 350: 810 + 23 = ☐ .

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Algebra: Content for 4th Class

Number Patterns and Sequences	Number Sentences
• Explore, recognise and record patterns in number, 0 - 9999 • Explore, extend and describe sequences • Use patterns as an aid in the memorisation of number facts	• Translate an addition, subtraction, multiplication or division number sentence with a frame into a word problem (frame not in initial position) • Translate a one-step word problem into a number sentence • Solve one-step number sentences

Algebra: Methodologies for 4th Class

Note: Many teaching methodologies appropriate to the development of Algebra are inherent in the content detailed on the previous page.

• make patterns on the hundred square.
• Rita has 18 toy cars. She wants to arrange them in 3 rows: $18 = 3 \times \square$
• discuss and record solutions for open number sentences: $3 + \square < 7$ or $5 + \square > 8$.

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Algebra: Content for 5th Class

Directed Numbers	Rules and Properties	Variables	Equations
• Identify positive and negative numbers in context	• Explore and discuss simple properties and rules about brackets and priority of operation • Identify relationships and record verbal and simple symbolic rules for number patterns	•	• Translate number sentences with a frame into word problems and vice versa • Solve one-step number sentences and equations

Algebra: Methodologies for 5th Class

Note: Many teaching methodologies appropriate to the development of Algebra are inherent in the content detailed on the previous page.

- examine and discuss money affairs, video counters and calculator displays, sports reports, golf scores, temperature, sea level and lifts, leading to the need to distinguish between amounts above and below zero
- refer to positive and negative numbers as 'positive seven' and 'negative three'
- record positive and negative numbers with + or - signs raised e.g. +7 -3
- rewind a video tape
- pupils draw and label a thermometer, mark in temperatures, consult weather forecasts in newspapers.
- identify, discuss and compute expressions with brackets in a variety of positions

  o 10 + (4 + 7) = ☐   (10 + 4) + 7 = ☐

  o (8 - 1) + 4 = ☐   8 - (1 + 4) = ☐

  o (3 x 4) + 5 = ☐   3 x (4 + 5) = ☐

  o 8 ÷ (2 + 2) = ☐   (8 ÷ 2) + 2 = ☐

- what is the significance of the positions of the brackets?
- identify, discuss and compute expressions with brackets excluded

  o 4 + 3 3 5 = ☐   12 x 6 + 3 = ☐

- problem; a man has twenty-eight windows to clean; it takes him an hour to clean four; how long will it take him altogether?
- Number frames; 75 - 43 = ☐   3.5 x ☐ = 14   25% of ☐ = 15.
- what is the significance of starting operations at different points? e.g. 4 + 3 before 3 x 5 or vice versa in 4 + 3 x 5
- establish the value of brackets, leading to the priority of multiplication and division over addition and subtraction
- explore these properties and rules without and with a calculator
- identify and discuss rules for simple number sequences; 2.0, 3.5, 5.0, 6.5 ... i.e. sequence increases by adding 1.5
- 81, 27, 9 ... decreases by dividing by 3; 1, 4, 9, 16, 25, 36 ...
- create number stories to describe a given number sentence; how many teams of four can the teacher make for relays from a class of twenty-eight children? 28 ÷ 4 = ☐

construct number sentences to describe mathematically a given word

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o   2.45 ÷ 5 - 0.75 = ☐   96 ÷ 8 - 12 = ☐

Algebra: Content for 6th Class

Directed Numbers	Rules and Properties	Variables	Equations
• Identify positive and negative numbers on the number line • Add simple positive and negative numbers on the number line	• Know simple properties and rules about brackets and priority of operation • Identify relationships and record symbolic rules for number patterns	• Explore the concept of a variable in the context of simple patterns, tables and simple formulae and substitute values for variables	• Translate word problems with a variable into number sentences • Solve one-step number sentences and equations

Algebra: Methodologies for 6th Class

Note: Many teaching methodologies appropriate to the development of Algebra are inherent in the content detailed on the previous page.

• walk the number line to experience positive and negative numbers that arise in discussion and/or in context
• identify and mark positive and negative numbers on personal and class number lines
• add simple positive and negative numbers by walking the number line and by counting on the class and personal number line

   o $^+5 + ^-7 = ☐$ $^-9 + ^-3 = ☐$ $^-8 + ^+2 = ☐$

• add positive and negative numbers that arise contextually, e.g. a golfer's score over four rounds was 6 under par, 2 over par, 3 under par, and 1 under par; what was her final score relative to par?
• use the calculator in exercises to find missing numerals and missing operator: e.g. 37 ? 21 ? 23 = 800; 27 ? (36 ? 11) = 675
• deduce and record rules for given number patterns: 2, 6, 12, 20, 30 ..., 4:1, 8:2, 16:4 ...
• identify and discuss simple formulae from other strands: e.g. d = 2 x r;   a = l x w
• substitute values into formulae and into symbolic rules developed from number patterns.
• Peter cut a length of ribbon into five equal parts; each part was 30 cm long. How long was the ribbon before it was cut? x ÷ 5 = 30
• number frames: -3 + $^+6$ = ☐ $^-4$ + ☐ = $^+1$ 10 x ☐ = 8 x 5

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Shape and Space

Broad Objectives

The aim of this plan is to provide a structured and sequential programme for teachers to enable children to:

- develop a sense of spatial awareness

- investigate, recognise, classify and describe the properties of lines, angles, and two-dimensional and three-dimensional shapes

- deduce informally relationships and rules about shape

- combine, tessellate and partition two-dimensional shapes and combine and partition three-dimensional shapes

- draw, construct and manipulate two-dimensional and three-dimensional shapes

- identify symmetry in shapes and identify shape and symmetry in the environment

- describe direction and location using body-centred (left/right, forward/back) and simple co-ordinate geometry

- use acquired concepts, skills and processes in problem-solving

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Shape and Space: Content for Junior Infants

Spatial Awareness	3-D Shapes	2-D Shapes
• Explore, discuss, develop and use the vocabulary of spatial relations	• Sort 3-D shapes, regular and irregular • Solve tasks and problems involving shape.	• Sort and name 2-D shapes: square, circle, triangle, rectangle • Use suitable structured materials to create pictures • Solve problems involving shape

Shape and Space: Methodologies for Junior Infants

- position: over, under, up, down, on, beside, in
- directions: moving in straight/curved lines, in a circle, finding own space.
- things that do/do not roll, do/do not fit together
- make constructions with 3-D shapes and discuss them
- directed sorting of 2-D shapes with different criteria, e.g. round/not round, thick/thin
- which two shapes go together to cover a square?

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Shape and Space: Content for Senior Infants

Spatial Awareness	3-D Shapes	2-D Shapes
• Explore, discuss, develop and use the vocabulary of spatial relations	• Sort, describe and name 3-D shapes: cube, cuboid, sphere and cylinder • Combine 3-D shapes to make other shapes • Solve tasks and problems involving shape.	• Sort, describe and name 2-D shapes: square, circle, triangle, rectangle • Combine and divide 2-D shapes to make larger or smaller shapes • Solve problems involving shape and space • Give simple moving and turning directions. •

Shape and Space: Methodologies for Senior Infants

Note: Many teaching methodologies appropriate to the development of Shape and Space are inherent in the content detailed on the previous page.

• position: above, below, near, far, right, left
• stop and state your position
• direction: through the hoop, behind the mat
• stop and describe your action.
• edge, corner, face, straight, curved, round and flat
• sort shapes according to rules, e.g. objects with four sides, objects that roll
• collect and sort different shapes; e.g. straight, curved, flat, side, corner
• make shapes with art straws, on geoboard
• draw shapes found in the environment
• cut paper shapes into 2 or 4 pieces and discuss the results
• make a shape with 7 blocks; how many different shapes can you make with 5 blocks?

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Shape and Space: Content for 1st Class

Spatial Awareness	2-D shapes	3-D shapes	Symmetry	Angles
• Explore, discuss, develop and use the vocabulary of spatial relations • Give and follow simple directions within classroom and school settings	• Sort, describe, compare and name 2-D shapes: square, rectangle, triangle, circle, semicircle • Construct and draw 2-D shapes • Combine and partition 2-D shapes • Identify halves of 2-D shapes • Identify and discuss the use of 2-D shapes in the environment	• Describe, compare and name 3-D shapes, including cube, cuboid, cylinder and sphere • Discuss the use of 3-D shapes in the environment • Solve and complete practical tasks and problems involving 2-D and 3-D shapes • Explore the relationship between 2-D and 3-D shapes.	•	•

Algebra: Methodologies for 1st Class

Note: Many teaching methodologies appropriate to the development of Shape and Space are inherent in the content detailed on the previous page.

- between, underneath, on top of, around, through, left, right
- explore closed shapes (e.g. circle), so that one walks from one point back to the same point without having to turn around
- explore open shapes (e.g. V-shape), where one has to turn around to get back to the starting point
- make body shapes
- directions
  - from desk to window
  - from classroom to school hall
  - from classroom to school yard
- explore and solve practical problems.
- describe shapes, referring to size, corners, number and length of sides
- sort shapes: 4-sided/not 4-sided, curved/not curved

- combine shapes to make new shapes and patterns
- make pictures and mosaic patterns by combining shapes
- fit many examples of identical shapes together to cover surface
- fold paper shapes in half and cut to make new shapes
- shapes in furniture, classroom objects, own possessions.
- collect, sort and describe shapes, referring to number and shapes of faces, edges, vertices (corners on 3-D shape)
- identify shapes that stack, roll or slide
- shapes in the environment; boxes, packets, containers, fish-tank
- use boxes, cardboard packs or containers in construction activities

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• use templates, stencils, geostrips, geoboards •	

Shape and Space: Content for 2nd Class

Spatial Awareness	2-D shapes	3-D shapes	Symmetry	Angles
• Explore, discuss, develop and use the vocabulary of spatial relations • Give and follow simple directions within classroom and school settings, including turning directions using half and quarter turns	• Sort, describe, compare and name 2-D shapes: square, rectangle, triangle, circle, semicircle, oval • Construct and draw 2-D shapes • Combine and partition 2-D shapes • Identify half and quarter of shapes • Identify and discuss the use of 2-D shapes in the environment	• Describe, compare and name 3-D shapes, including cube, cuboid, cylinder, sphere and cone • Discuss the use of 3-D shapes in the environment • Solve and complete practical tasks and problems involving 2-D and 3-D shapes • Explore the relationship between 2-D and 3-D shapes.	• Identify line symmetry in shapes and in the environment	• Explore and recognise angles in the environment

Shape and Space: Methodologies for 2nd Class

Note: Many teaching methodologies appropriate to the development of Shape and Space are inherent in the content detailed on the previous page. • turning on the spot to face in different directions • take 2 steps forward, do a half turn, take 3 steps forward • pupils give instructions to other pupils • use mazes, grids, board games, computer • explore and solve practical problems. • note similarities and differences between shapes • discuss the relationship between halves and quarters • look for examples of tiling in the environment. • make prints with the surfaces of 3-D shapes and discuss results • dismantle boxes and examine constituent shapes •	• fold shapes in half, blob and fold paintings • complete shapes or pictures symmetrically • collect and sort objects on the basis of symmetry. • investigate things that turn: door handles, wheels • make full, half and quarter turns in yard or hall • investigate angles as corners; use a right angle made from card to 'measure' corners on 2-D shapes; discuss relate square corner to quarter turn.

Shape and Space: Content for 3rd Class

2-D shapes	3-D shapes	Symmetry	Lines and Angles
• Identify, describe and classify 2-D shapes: square, rectangle, triangle, hexagon, circle, semicircle, oval and irregular shapes • Explore, describe and compare the properties (sides, angles, parallel and non-parallel lines) of 2-D shapes • Construct and draw 2-D shapes • Combine, tessellate and make patterns with 2-D shapes • Identify the use of 2-D shapes in the environment • Solve and complete practical tasks and problems involving 2-D shapes.	• Identify, describe and classify 3-D shapes, including cube, cuboid, cylinder, cone, sphere, triangular prism, pyramid • Explore, describe and compare the properties of 3-D shapes • Explore and describe the relationship of 3-D shapes with constituent 2-D shapes • Construct 3-D shapes • Solve and complete practical tasks and problems involving 2-D and 3-D shapes.	• Identify line symmetry in the environment • Identify and draw lines of symmetry in two-dimensional shapes	• Identify, describe and classify 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 • Solve problems involving lines and angles.

Shape and Space: Methodologies for 3rd Class

Note: Many teaching methodologies appropriate to the development of Shape and Space are inherent in the content detailed on the previous page.

• use templates, stencils, geostrips, geoboards
• cover surfaces with 2-D shapes that tessellate or do not tessellate
• identify properties that facilitate or hinder tessellation
• combine shapes to make patterns
• the environment; buildings, road signs, printing, household objects
• number and shape of faces, number of edges and corners, ability to roll, slide or stack
• identify constituent 2-D shapes by observation and deconstruction and compile a table of results
• trace around nets and cut out; use straws or pipe cleaners

• fold paper shapes or use a mirror to identify lines of symmetry
• use fold lines to draw and record lines of symmetry
• classify 2-D shapes according to their number of lines of symmetry.
• discuss and describe lines in the environment
• draw and label lines
• use geostrips to construct vertical and horizontal lines
• form angles by opening books and doors, by rotating clock hands and geostrip arms, by physically turning (clockwise/anti-clockwise), or on computer
• construct and use a right-angle measure to identify right angles in the environment and in 2-D and 3-D shapes
• classify and record angles as >, < or = to a right angle

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Shape and Space: Content for 4th Class

2-D shapes	3-D shapes	Symmetry	Lines and Angles
• Identify, describe and classify 2-D shapes: equilateral, isosceles and scalene triangle, parallelogram, rhombus, pentagon, octagon • Explore, describe and compare the properties (sides, angles, parallel and non-parallel lines) of 2-D shapes • Construct and draw 2-D shapes • Combine, tessellate and make patterns with 2-D shapes • Identify the use of 2-D shapes in the environment • Solve and complete practical tasks and problems involving 2-D shapes.	• Identify, describe and classify 3-D shapes, including cube, cuboid, cylinder, cone, sphere, triangular prism, pyramid • Establish and appreciate that when prisms are sliced through (in the same direction) each face is equal in shape and size • Explore and describe the relationship of 3-D shapes with constituent 2-D shapes • Construct 3-D shapes • Solve and complete practical tasks and problems involving 2-D and 3-D shapes	• Identify line symmetry in the environment • Identify lines of symmetry as horizontal, vertical or diagonal • Use understanding of line symmetry to complete missing half of a shape, picture or pattern	• Identify, describe and classify oblique and perpendicular lines • Draw, discuss and describe intersecting lines and their angles • Classify angles as greater than, less than or equal to a right angle • Solve problems involving lines and angles.

Shape and Space: Methodologies for 4th Class

Note: Many teaching methodologies appropriate to the development of Shape and Space are inherent in the content detailed on the previous page.

• use ruler and set square
• combine shapes to make patterns and to make other shapes
• create a tessellating pattern on squared paper
• the environment; hoardings, shop fronts, paving-stones
• keep work exploratory and simple; e.g. use Plasticine, triangular prisms or suitable foods
• construct 3-D shapes from 2-D shapes
• identify the use of 3-D shapes in the environment.
• using examples from the environment, e.g. an open book, windows, gates
• identify lines of symmetry in drawings, on geoboard or pegboard where the fold is vertical, horizontal or diagonal.

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- use straws to construct oblique and perpendicular lines and diagonals in a square
- identify perpendicular and oblique lines
- identify acute, obtuse and right angles

Shape and Space: Content for 5ᵗʰ Class

2-D shapes	3-D shapes	Symmetry	Lines and Angles
• Make informal deductions about 2-D shapes and their properties • 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 their lines of symmetry • Use 2-D shapes and properties to solve problems	• Identify and examine 3-D shapes and explore relationships, including tetrahedron (faces, edges and vertices) • Draw the nets of simple 3-D shapes and construct the shapes	• Identify line symmetry in the environment • Identify lines of symmetry as horizontal, vertical or diagonal • Use understanding of line symmetry to complete missing half of a shape, picture or pattern	• Recognise, classify and describe angles and relate angles to shape and the environment • Recognise angles in terms of a rotation • Estimate, measure and construct angles in degrees • Explore the sum of the angles in a triangle

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Shape and Space: Methodologies for 5th Class

Note: Many teaching methodologies appropriate to the development of Shape and Space are inherent in the content detailed on the previous page.

- name, explore and compare a wide variety of three and four-sided figures in terms of size and number of angles, type and number of sides e.g. trapezium, scalene triangle, regular hexagon
- explore and compare circles of various unit diameters
- measure and identify the relationship of diameter to radius
- examine area by counting square units
- draw using a compass
- explore, compare and record lines of symmetry in 2-D shapes
- make a specified shape with Tangram shapes.
- explore, compare and record the number of faces of 3-D shapes
- identify number of edges and vertices of 3-D shapes
- name the shape of the faces
- deconstruct 3-D shapes into nets; examine and discuss
- discuss and draw simple net including flaps where necessary
- construct 3-D shapes from nets.
- explore and compare a wide variety of angles and shapes
- measure and record angles as acute, obtuse, reflex or right angles, and determine the number of such angles in relation to common regular shapes
- examine, measure and record the angles (including the reflex angle) formed by the hands of a clock at a variety of different times
- extend by using manipulatives, e.g. straws, lollipop sticks, Meccano, string, 360¡ protractor, LOGO computer language if available
- measure and record a wide variety of angles using a protractor
- construct angles of various sizes using a protractor
- estimate angle sizes and check by measuring with a protractor
- cut off the three corners of a paper triangle and put them together to make 180°
- measure the angles in a variety of triangles using a protractor; calculate and record their sum, examine and discuss results.

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Shape and Space: Content for 6th Class

2-D shapes	3-D shapes	Symmetry	Lines and Angles
• Make informal deductions about 2-D shapes and their properties • Use angle and line properties to classify and describe triangles and quadrilaterals • Construct triangles from given sides or angles • 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 their lines of symmetry • Plot simple co-ordinates and apply where appropriate • Use 2-D shapes and properties to solve problems.	• Identify and examine 3-D shapes and explore relationships, including octahedron (faces, edges and vertices) • Draw the nets of simple 3-D shapes and construct the shapes.	• Identify line symmetry in the environment • Identify lines of symmetry as horizontal, vertical or diagonal • Use understanding of line symmetry to complete missing half of a shape, picture or pattern	• Recognise, classify and describe angles and relate angles to shape • Recognise angles in terms of a rotation • Estimate, measure and construct angles in degrees • Explore the sum of the angles in a quadrilateral

Shape and Space: Methodologies for 6th Class

Note: Many teaching methodologies appropriate to the development of Shape and Space are inherent in the content detailed on the previous page.

• complete the construction of triangles, given two sides and the angle between them or given two angles and the line between them
• relate the diameter of a circle to its circumference by measurement
• measure the circumference of a circle or object such as a rolling-pin or wheel e.g. use a piece of string
• use geoboards and squared paper
• identify types of angles in the environment
• cut off the four corners of a paper quadrilateral and put them together to make 360°
• measure the angles in a variety of quadrilaterals and calculate their sums.

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Measures

Broad Objectives

The aim of this plan is to provide a structured and sequential programme for teachers to enable children to:

- know, select and use appropriate instruments of measurement

- estimate, measure and calculate length, area, weight, capacity and average speed using non-standard and appropriate metric units of measurement

- estimate, measure and calculate angles, time, money and scale using non-standard and appropriate units of measurement

- recognise and appreciate measures in everyday use

- use acquired concepts, skills and processes in problem-solving

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Measures: Content for Junior Infants

Length	Weight	Capacity	Time	Money
• Develop an understanding of the concept of length through exploration, discussion, and use of appropriate vocabulary • Compare and order objects according to length or height.	• Develop an understanding of the concept of weight through exploration, handling of objects, and use of appropriate vocabulary; heavy/light, heavier/lighter, balance, weigh • Compare objects according to weight	• Develop an understanding of the concept of capacity through exploration and the use of appropriate vocabulary; full/nearly full/empty/holds more/holds less/holds as much as • Compare containers according to capacity	• Develop an understanding of the concept of time through the use of appropriate vocabulary; morning/evening, night/day, lunchtime, bedtime, early/late, days of the week, school days, weekends • Sequence daily events or stages in a story	• Recognise and use coins (up to 5 cent) • Solve practical tasks and problems using money.

Measures: Methodologies for Junior Infants

- discuss objects in the environment: long/short, tall/short, wide/narrow, longer, shorter, wider than
- sort objects according to length
- sort objects into heavy or light sets
- handle and describe objects using the vocabulary of weight
- present simple problems, e.g. pupils estimate (guess) by handling; which object is heavier or lighter?
- check using balance; discuss
- compare pairs of objects that look alike but are different in weight, e.g. golf ball and plastic squash ball.
- fill and empty containers of various sizes, discuss
- use smaller containers to fill larger containers
- use a variety of containers; discuss
- emphasise that full means full to the top

- present simple problems:
  - do you think the jar holds more sand than the cup?
  - will all the water from the jug go into the glass?
- use the language of time to discuss events
- record weather for each day on a chart
- pupils state the order of familiar events
- order pictures in correct time sequence
- sequence events in familiar stories and rhymes.
- sort and name coins up to 5 cent
- select appropriate coins in simple shopping activities,
- use correct vocabulary: buy, sell, spend, coins, cent, how much?

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Measures: Content for Senior Infants

Length	Weight	Capacity	Time	Money
• Develop an understanding of the concept of length through exploration, discussion, and use of appropriate vocabulary • Compare and order objects according to length or height • Estimate and measure length in non-standard units • Select and use appropriate non-standard units to measure length, width or height. Discuss reasons for choice.	• Develop an understanding of the concept of weight through exploration, handling of objects and use of appropriate vocabulary • Compare and order objects according to weight • Estimate and weigh in non-standard units • Select and use appropriate non-standard units to weigh objects	• Develop an understanding of the concept of capacity through exploration and the use of appropriate vocabulary • Compare and order containers according to capacity • Estimate and measure capacity in non-standard units • Select and use appropriate non-standard units to measure capacity	• Develop an understanding of the concept of time through the use of appropriate vocabulary; yesterday/today/tomorrow / seasons / soon / not yet / birthday • Sequence daily and weekly events or stages in a story • Read time in one-hour intervals.	• Recognise coins up to 20 cent and use coins up to 10 cent • Solve practical tasks and problems using money

Measures: Methodologies for Senior Infants

Note: Many teaching methodologies appropriate to the development of Measures are inherent in the content detailed on the previous page.

- identify: as long as/as wide as/longest/shortest
- estimate, and check by measuring; how many lollipop sticks do you think will fit along the length of the table? Guess, check and discuss
- present simple problems: How can we find out which is wider, the door or the table? Which unit will we use (stick or pencil)?
- compare objects that differ in size, shape and weight by handling
- check using balance; discuss
- compare an object with a collection of objects
- compare a collection of objects with another collection of objects
- order three objects according to weight by handling;
- check using balance; discuss
- present simple problems: how many apples do you think will balance your lunchbox?
- present simple problems: How can we find the weight of a stone? Which unit will we use (matchsticks or conkers)? discuss reasons for choice.
- fill one container and pour contents into another
- compare the capacity of two very different containers, noting that both can hold the same amount
- compare three containers; arrange in order of capacity;
- label, e.g. holds more/holds most
- present simple problems: estimate (guess) how many spoons or egg-cups of sand or dried peas will fill the cup; how many jugs of water will fill the bucket?
- use the same unit to fill two different containers; check by measuring
- record results using one counter for each cup or jug poured; children work in pairs
- present simple problems; How can we find the capacity of the bucket? Which unit will we use (teaspoons or cups)? discuss reasons for choice.
- significant events, festivals, holidays
- discuss significant times in the day
- record orally and pictorially the time sequence of four events in the school day
- make scrapbooks of 'My Day'
- sequence pictures representing stages of development
- pupils identify errors in a sequence; discuss
- exchange a number of coins for a single coin of equal value and vice versa
- use coins in shopping activities, tender appropriate coins, calculate change
- use correct vocabulary: cost, price, cheap/expensive, change, too much/too little
- which items can be bought with a given coin?
- spend the same amount of money in two different ways.

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Measures: Content for 1st Class

Length	Area	Weight	Capacity	Time	Money
• Estimate, compare, measure and record length using non-standard units • Select and use appropriate non-standard measuring units and instruments • Estimate, measure and record length using standard unit (the metre) • Solve and complete practical tasks and problems involving length		• Estimate, compare, measure and record weight using non-standard units • Select and use appropriate non-standard measuring units and instruments • Estimate, measure and record weight using standard unit (the kilogram) and solve simple problems	• Estimate, compare, measure and record capacity using non-standard units • Select and use appropriate non-standard measuring units and instruments • Estimate, measure and record capacity using standard unit (the litre) and solve simple problems	• Use the vocabulary of time to sequence events • Read and record time using simple devices • Read time in hours and half-hours on 12-hour analogue clock • Read day, date and month using calendar	• Recognise, exchange and use coins up to the value of 50 cent • Calculate how many items may be bought with a given sum.

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Measures: Methodologies for 1st Class

Note: Many teaching methodologies appropriate to the development of Measures are inherent in the content detailed on the previous page.

- use non-standard units; lollipop sticks, pencils, spans, strides
- choose a measuring unit from a selection available in the classroom (e.g. selecting either a cube, lollipop stick or a stride to measure the room)
- discuss which units are best for measuring long objects and which are best for measuring short objects
- use language of measurement; length, width, height, measure, metre, nearly a metre, a bit more than/a bit less than a metre
- discuss the need for standard units
- collect sets of objects longer than, shorter than or the same length as a metre
- suggest ways of measuring around a tree-trunk or other irregular object
- suggest ways of comparing objects at home; who has the widest gate?
- measure with string and bring the string to school for comparison and discussion.
- language of weight; heavy, heavier, heaviest; light, lighter, lightest; balance
- sort objects into heavy or light by hand
- find objects that are lighter or heavier than given object
- estimate comparative weight of two objects by sight
- compare weights by hand weighing
- check using balance
- choose a measuring unit from a selection available in the classroom, e.g. selecting either stones, cubes or beads to weigh school bag
- discuss which units are best for weighing various objects
- discuss the need for standard units
- collect sets of objects lighter than, heavier than or the same weight as a kilogram
- find the largest packet and the smallest packet that weighs a kilogram
- make two objects (two balls of Plasticine) that weigh the same.
- language of capacity; pour, fill, full, empty, holds more, less or the same amount as
- find the capacity of a larger container by using teaspoons, egg-cups, cups
- find containers that hold more or less than a given container; estimate, and check by measuring

- choose a measuring unit from a selection; which container is best for filling the bucket? why?
- discuss the need for standard units
- collect sets of containers that hold more than, less than or about the same as a litre
- collect litre containers of different shapes and sizes; label; check capacity by pouring from one to the other
- how many children could have a full cup of water from a litre bottle?
- sequence events associated with different times of the day, days of the week, months of the year
- discuss characteristics of seasons, of months of the year, day before, day after
- find how many times sand will pass through an egg-timer while a story is read
- use candle clock or water clock to measure amount of time that passes by the end of a class activity, by roll call, by break time, by home time
- become familiar with clock face, movement of hands
- record positions at hours and half-hours
- record activities at these times
- examine television schedules to find programmes that begin on hour and half-hour
- state what time it will be one hour later, half an hour later
- read today's day, date and month
- discuss birthdays and other significant dates
- identify from the calendar the day of the week on which a given date occurs.
- practise tendering and receiving amounts of money
- calculate and give change
- exchange a coin or coins for others of equal value

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Measures: Content for 2nd Class

Length	Area	Weight	Capacity	Time	Money
• Estimate, compare, measure and record length using non-standard units • Select and use appropriate non-standard measuring units/instruments • Estimate, measure and record length using metre and centimetre • Solve and complete practical tasks and problems involving length	• Estimate and measure area using non-standard units	• Estimate, compare, measure and record weight using non-standard units • Select and use appropriate non-standard measuring units and instruments • Estimate, measure and record weight using kilogram, half kilogram and quarter kilogram and solve simple problems • Explore and discuss instances when objects or substances that weigh 1 kg vary greatly in size	• Estimate, compare, measure and record the capacity of a wide variety of containers using non-standard units • Select and use appropriate non-standard measuring units and instruments • Estimate, measure and record capacity using litre, half-litre and quarter-litre bottles and solve simple problems	• Use the vocabulary of time to sequence events • Read and record time using simple devices • Read time in hours, half-hours and quarter-hours on 12-hour analogue clock • Read time in hours and half-hours on digital clock • Read day, date and month using calendar and identify the season	• Recognise, exchange and use coins up to the value of €2 • Write the value of a group of coins; record money amounts as cent and later as euro

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Measures: Methodologies for 2ⁿᵈ Class

Note: Many teaching methodologies appropriate to the development of Measures are inherent in the content detailed on the previous page.

- select and use units/instruments for measuring tasks
- discuss which instrument is best for short objects and which is best for long objects
- explore relationship between metre and centimetre through counting and recording
- measure using 10 cm rods, half-metre stick, metre stick, and trundle wheel
- find the height of each child in a group; who is the shortest/tallest? graph results.
- how many playing-cards, postcards or workbooks cover the table?
- which shape is the most suitable?
- measure the area of the same surface several times with different units
- which surface has more wood, the table-top or the window-sill? children suggest ways of finding out
- estimate, discuss, measure and record.
- measuring with pan balance, kitchen scales, bathroom scales
- fill bags or containers with 1 kg of sand, flour, polystyrene strips, beads.
- estimate comparative capacity of two containers by sight; check by measuring and discuss results
- fill several containers using the same unit and arrange in order of capacity; discuss
- make a collection of different-shaped containers that hold the same amount
- make collections of bottles of differing shapes but similar capacity
- compare capacity of litre, $\frac{1}{2}$ litre and $\frac{1}{4}$ litre containers
- ask the children to suggest reasons why some liquids are sold in a variety of different-sized or different-shaped cartons.
- discuss the passing of time: 24 hours in a day, 7 days in a week, numbers of days in the month.
- 135 cent may be written as €1.35

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Measures: Content for 3rd Class

Length	Area	Weight	Capacity	Time	Money
• Estimate, compare, measure and record lengths of a wide variety of objects using appropriate metric units (m, cm) • Rename units of length in m and cm • Solve and complete practical tasks and problems involving the addition and subtraction of units of length (m, cm) •	• Estimate, compare and measure the area of regular and irregular shapes	• Estimate, compare, measure and record the weight of a wide variety of objects using appropriate metric units (kg, g) • Solve and complete practical tasks and problems involving the addition and subtraction of units of weight (kg and g)	• Estimate, compare, measure and record the capacity of a wide variety of objects using appropriate metric units (l, ml) • Solve and complete practical tasks and problems involving the addition and subtraction of units of capacity (l, ml)	• Consolidate and develop further a sense of time passing • Read time in five-minute intervals on analogue and digital clock (12-hour) • Record time in analogue and digital forms • Read and interpret simple timetables • Rename minutes as hours and hours as minutes • Read dates from calendars and express weeks as days and vice versa • Solve and complete practical tasks and problems involving times and dates	• Rename amounts of euro or cents and record using symbols and decimal point • Solve and complete one-step problems and tasks involving the addition and subtraction of money.

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Measures: Methodologies for 3rd Class

Note: Many teaching methodologies appropriate to the development of Measures are inherent in the content detailed on the previous page.

- measure everyday objects, furniture, heights of children
- estimate length and height without and with unit of measurement present measure to check estimates
- renaming; 125 cm = 1 m 25 cm
- confine to totals that can be readily checked by measuring.
- counting non-standard square units.
- use everyday objects, books, piles of copybooks lighter and heavier than 1 kg
- objects showing that there is no constant relationship between weight and size
- handle and compare objects as an aid to estimation
- confine to totals which can be readily checked by weighing.
- use cartons, spoons, cups, jugs, plastic bottles and other common containers
- use litre, 250 ml and 500 ml measuring containers
- use tall, low, wide and narrow containers
- place daily, weekly, monthly and annual events in sequence
- discuss movement of hands of clock or sand in hourglass as indicating passing of time
- refine and develop vocabulary of time; before/after, a long time ago, last year, last month, yesterday, immediately, soon, tomorrow, in a week's time, for a short/long time
- count in fives up and down number line, hundred square and clock face
- construct simple clock face and relate intervals; $\frac{1}{4}$ hour = 15 min = 3 x 5 min
- discuss and record times of a variety of common events, school and home activities, television programmes
- timetables; school, bus, train, television schedules.
- rename minutes; 70 min = 1 hour 10 min, $1\frac{1}{2}$ hour = 1 hour 30 min = 90 min (confine work to five-minute intervals)
- collect and record significant personal dates and dates in life of school and family
- practical problems that can be readily checked by measurement.

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Measures: Content for 4th Class

Length	Area	Weight	Capacity	Time	Money
• Estimate, compare, measure and record lengths of a wide variety of objects, using appropriate metric units, and selecting suitable instruments of measurement • Rename units of length using decimal or fraction form • Understand, estimate and measure the perimeter of regular 2-D shapes • Solve and complete practical tasks and problems involving the addition, subtraction, multiplication and simple division of units of length (m, cm, km).	• Estimate, compare and measure the area of regular and irregular shapes	• Estimate, compare, measure and record the weight of a wide variety of objects using appropriate metric units (kg, g) and selecting suitable instruments of measurement • Rename units of weight in kg and g • Rename units of weight using decimal or fraction form • Solve and complete practical tasks and problems involving the addition, subtraction, multiplication and simple division of units of weight (kg and g).	• Estimate, compare, measure and record capacity using appropriate metric units (l, ml) and selecting suitable instruments of measurement • Rename units of capacity in l and ml • Rename units of capacity using decimal and fraction form • Solve and complete practical tasks and problems involving the addition, subtraction, multiplication and simple division of units of capacity (l, ml).	• Consolidate and develop further a sense of time passing • Read time in one-minute intervals on analogue and digital clock (12-hour) • Express digital time as analogue time and vice versa • Read and interpret simple timetables.	• Rename amounts of money as euro or cent and record using e symbol and decimal point; 125 cent = €1.25, €3.56 = 356 cent • Solve and complete practical one-step and two-step problems and tasks involving the addition, subtraction, multiplication and simple division of money.

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Measures: Methodologies for 4th Class

Note: Many teaching methodologies appropriate to the development of Measures are inherent in the content detailed on the previous page.

- measure lengths and heights of doors, corridors, school yard, paths, drives, playing-fields
- instruments: rulers, tape measures, trundle wheel
- renaming; 25 cm = 0.25 m = ¼ m; 2 km 150 m = 2150 m = 2.15 km
- use standard square units: sq. cm, sq. m (cm^2, m^2).
- use and select from bathroom scales, kitchen scales, spring balance
- become familiar with major and minor markings on scales (e.g. 100 g markings, 1/2 kg, 1/4 kg)
- renaming; 2 kg 250 g = 2250 g; 250 g = 0.25 kg = ¼ kg (confine to examples requiring only two places of decimals)
- become familiar with major and minor markings on measuring containers (e.g. 100 ml markings, ½ l, ¼ l)
- rename; 1500 ml = 1 l 500 ml; 250 ml = 0.25 = ¼ l; 2 l 150 ml = 2150 ml = 2.15 l (confine to examples requiring only two places of decimals)
- practical problems that can be readily checked by measurement
- add hours and minutes separately

| | 4 hours | 45 minutes |
| | 3 hours | 25 minutes |

– 7 hours 70 min

| | 8 hours | 10 minutes |

rename minutes before subtraction

| | 5 hours | 50 minutes | – 2 hours 90 min |
| – | 1 hour | 40 minutes | |

| | 1 hour | 50 minutes |

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Measures: Content for 5th Class

Length	Area	Weight	Capacity	Time	Money
• Select and use appropriate instruments of measurement • Estimate and measure length using appropriate metric units • Estimate and measure the perimeter of regular and irregular shapes.	• Discover that the area of a rectangle is length by breadth • Estimate and measure the area of regular and irregular 2-D shapes • Calculate area using square centimetres and square metres • Compare visually square metres and square centimetres.	• Select and use appropriate instruments of measurement • Estimate and measure weight using appropriate metric units	• Select and use appropriate instruments of measurement • Estimate and measure capacity using appropriate metric units	• Read and interpret timetables and the 24-hour clock (digital and analogue) • Interpret and convert between times in 12-hour and 24-hour format	• Compare 'value for money' using unitary method

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Measures: Methodologies for 5th Class

Note: Many teaching methodologies appropriate to the development of Measures are inherent in the content detailed on the previous page.

- use ruler for shorter objects, metre stick for longer objects or distances, trundle wheel for distances
- estimate and measure a large variety of objects and places, both outdoors and indoors: books, desks, corridors, driveways, playing-pitch sidelines
- how far can you throw a ball? jump? run in 20 seconds?
- use appropriate measuring units
  - o mm (shorter objects)
  - o cm (longer objects)
  - o m (short distances)
  - o km (long distances)
- determine by repeated experiments using rectangles with sides measured in whole centimetres and square units of one square centimetre
- measure a wide variety of regular and irregular shapes using square units of one square centimetre and one square metre
- choose appropriate measuring units:
  - o square centimetres (smaller objects)
  - o square metres (large objects or rooms)
- choose measurement instruments appropriate to given tasks, e.g. balance, kitchen scales, bathroom scales and spring balance
- estimate and measure a large variety of objects
- use appropriate measuring units
  - o grams (pencils and copybooks)
  - o kilograms (school bags and people).
- choose measurement instruments appropriate to given tasks graduated jugs, litre containers or fractional litre containers
- estimate and measure a large variety of objects
- use appropriate measuring units
  - o millilitres (cups)
  - o litres (watering-can).
- timetables; bus, train, air, ship, films, theatre, school, class
- change formats: 10:30 p.m. = 22:30 hours; 07:50 hours = 7:50 a.m.
- compare the cost of 6 apples costing 75 cents and 4 apples costing 50 cents
- calculate pay, based on hourly or daily rate
- calculate totals of shop bills.

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Measures: Content for 6th Class

Length	Area	Weight	Capacity	Time	Money
• Select and use appropriate instruments of measurement • Rename measures of length • Estimate and measure the perimeter of regular and irregular shapes • Use and interpret scales on maps and plans	• Recognise that the length of the perimeter of a rectangular shape does not determine the area of the shape • Calculate the area of regular and irregular 2-D shapes • Measure the surface area of specified 3-D shapes • Calculate area using acres and hectares • Identify the relationship between square metres and square centimetres • Find the area of a room from a scale plan	• Select and use appropriate instruments of measurement • Rename measures of weight	• Select and use appropriate instruments of measurement • Rename measures of capacity • Find the volume of a cuboid experimentally	• Explore international time zones • Explore the relationship between time, distance and average speed	• Explore value for money • Convert other currencies to euro and vice versa

Measures: Methodologies for 6th Class

Note: Many teaching methodologies appropriate to the development of Measures are inherent in the content detailed on the previous page.

- rename measurements of appropriate metric units;
- express results as fractions and decimal fractions of appropriate metric units
    - 233 m = $^{233}/_{1000}$ km = 0.233 km
    - 1 m 11 cm = 1 $^{11}/_{100}$ m = 1.11 m
- identify given scale on a map or plan and draw items to a larger or smaller scale.
- construct rectangles of constant perimeter with varying areas
- estimate and calculate area of shapes, and check by measuring with square centimetre units
- circles: calculate by counting squares only
- measure 3-D surfaces by measuring individual 2-D faces or by extending into nets
- area in hectares; fields, large playgrounds, car parks
- explore and compare areas of one, four, twenty-five and one hundred square centimetres to establish relationships
- measure and calculate area of rectangular shapes by partitioning into rectangles and combining individual areas
- extend to finding area of room plans (rectangular)
- extend to using scale to find area of rooms from plans.
- rename measurements of appropriate metric units
- express results as fractions or decimals of appropriate metric units
    - 750 g = $^{3}/_{4}$ kg = 0.75 kg
    - 4 kg 45 g = 4 $^{45}/_{1000}$ kg = 4.045 kg.
- rename measurements of appropriate metric units
- express results as fractions or decimals of appropriate metric unit
    - 625 ml = $^{5}/_{8}$ l = 0.625 l
    - 8 l 253 ml = 8 $^{253}/_{1000}$ l = 8.250 l
- fill a cuboid container with water and measure capacity in litres
- fill a cuboid container with unit cubes and count.
- identify and discuss the need for time zones
- calculate time differences between Ireland and other countries
- measure, using a stop-watch, the time taken for short journeys to be completed or short distances to be covered and compile database to examine averages.
- calculate sale prices, e.g. 10% discount, 20% VAT added
- identify and discuss exchange rates from newspaper
- calculate major currency equivalents for basic sums of euro
- convert sums of money in other currencies to euro equivalents.

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Data

Broad Objectives

The aim of this plan is to provide a structured and sequential programme for teachers to enable children to:

- collect, classify, organise and represent data using concrete materials and diagrammatic, graphical and pictorial representation

- read, interpret and analyse tables, diagrams, bar charts, pictograms, line graphs and pie charts

- appreciate, recognise and express the outcomes of simple random processes

- estimate and calculate using examples of chance

- use acquired concepts, skills and processes in problem-solving.

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Data: Content for Junior Infants

Recognising and Interpreting Data
• Sort and classify sets of objects by one criterion • Match sets, equal and unequal; enough/more/as many as/less • Represent and interpret a set of simple mathematical data using real objects, models and pictures

Data: Methodologies for Junior Infants

• sort collections on the basis of colour, shape, size, texture and function • children represent the chosen set concretely and pictorially • children identify the numerical correspondence between the pictures and the objects, e.g. the set of children who had an apple for lunch.

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Data: Content for Senior Infants

Recognising and Interpreting Data
• Sort and classify sets of objects by one and two criteria • Represent and interpret data in two rows or columns using real objects, models and pictures

Data: Methodologies for Senior Infants

Note: Many teaching methodologies appropriate to the development of Data are inherent in the content detailed on the previous page.

- sort into two groups by one criterion: with/without wheels, red/not red shapes
- sort by two criteria: red toys with wheels
- pupils choose between two types of pet
- pupil is given picture or model of a pet
- pictures or models are arranged in columns or rows in
- one-to-one correspondence
- discuss and compare results
- discuss the need for a common baseline.

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Data: Content for 1st Class

Recognising and Interpreting Data
• 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

Data: Methodologies for 1st Class

Note: Many teaching methodologies appropriate to the development of Data are inherent in the content detailed on the previous page.

- sort blocks according to colour, shape, size and thickness
- identify a block in the collection from a description of its attributes
- represent concretely and pictorially the sets of children who had an apple, an orange or a banana for lunch; identify the correspondence between the number of symbols (fruit pictures) and the people in the set
- progress to representing data using more abstract 3-D forms, e.g. coloured blocks to represent people
- construct simple pictograms.

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Data: Content for 2nd Class

Recognising and Interpreting Data
• Sort and classify objects by two and three criteria • Represent, read and interpret simple tables and charts (pictograms) • Represent, read and interpret simple block graphs

Data: Methodologies for 2nd Class

Note: Many teaching methodologies appropriate to the development of Data are inherent in the content detailed on the previous page. • chart of cars passing school during a particular time, weather chart records • construct by fixing coloured squares to large sheet of paper • progress to drawing on squared paper.

Data: Content for 3rd Class

Representing and Interpreting Data	Chance
• Collect, organise and represent data using pictograms, block graphs and bar charts • Read and interpret tables, pictograms, block graphs and bar charts • Use data sets to solve and complete practical tasks and problems	• Use vocabulary of uncertainty and chance: possible, impossible, might, certain, not sure • Order events in terms of likelihood of occurrence • Identify and record outcomes of simple random processes

Data: Methodologies for 3rd Class

Note: Many teaching methodologies appropriate to the development of Data are inherent in the content detailed on the previous page.

- collect data from the environment and record in tabular form
- represent data in appropriate format
- discuss strengths and limitations of the format used
- use simple scale in block graphs and bar charts
- use computer applications if available to organise and represent data
- solve simple problems using data collected from own environment.
- examine and discuss the likelihood of occurrence of simple events and order from least likely to most likely

    o   Our school will be closed next Monday

    o   The sun will shine for two hours tomorrow

    o   The teacher will fall asleep at 11 o'clock today

- toss a coin ten or twenty times and record results
- draw a cube from a bag containing, for example, 4 blue cubes and 8 red cubes a number of times, replacing the drawn cube each time; discuss results.

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Data: Content for 4th Class

Representing and Interpreting Data	Chance
• 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 • Read and interpret bar-line graphs and simple pie charts involving use of ½, $^1/_5$, ¼ • Use data sets to solve and complete practical tasks and problems.	• Use vocabulary of uncertainty and chance: chance, likely, unlikely, never, definitely • Order events in terms of likelihood of occurrence • Identify and record outcomes of simple random processes

Data: Methodologies for 4th Class

Note: Many teaching methodologies appropriate to the development of Data are inherent in the content detailed on the previous page.

• use scales appropriate to the range of numbers for this level
• toss a coin, roll a die ten or twenty times and record results
• draw a cube from a bag of two red, one blue and one yellow cube a number of times, replacing drawn cube each time; discuss results and record outcomes.

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Data: Content for 5th Class

Representing and Interpreting Data	Chance
• Collect, organise and represent data using pictograms, single and multiple bar charts and simple pie charts • Read and interpret pictograms, single and multiple bar charts, and pie charts • Compile and use simple data sets • Explore and calculate averages of simple data sets • Use data sets to solve problems	• Identify and list all possible outcomes of simple random processes • Estimate the likelihood of occurrence of events • Construct and use frequency charts and tables

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Data: Methodologies for 5th Class

Note: Many teaching methodologies appropriate to the development of Data are inherent in the content detailed on the previous page.

- collect data from the environment in tabular form and represent in appropriate format
- discuss and explore modes of representation
- examine and discuss class-based examples and interpret charts from newspapers, magazines and computergenerated charts
- compile lists of statistics from childrenÕs experiences, e.g. personal data (height, age, hair colour) sports results (wins, losses, scores)
- use data as source for representation, interpretation and setting problems
- identify the most frequently occurring item in a data set
- calculate average by adding all the values and dividing by the number of items (use a calculator)
- solve problems based on data sets and representations used in class
  - what were the most popular buns at a cake sale?
- discuss and list all possible outcomes of:
- rolling a die (1, 2, 3, 4, 5, 6)
- tossing two coins (2 heads, 2 tails, head and tail)
- drawing a cube from a bag containing blue, red and green cubes (blue cube, red cube, green cube)
- if we toss a coin, say, 100 times, how many heads would we expect to get? a head has 50 chances in 100, or 1 chance in 2, of appearing; heads and tails are equally likely to occur if we roll a die: how often would we expect to get a 2? (1 chance in 6); each of the 6 outcomes is equally likely; this activity can be done in groups with each child or group throwing the die (or coin) 20 times and pooling the results; discuss the fairness of board games

- perform the experiment (toss a coin, roll a die, draw a cube from a bag containing 3 blue and 6 green cubes ...) a large number of times (50 - 100 times) this activity can be done in groups with each child or group throwing the die (or coin) 20 times and pooling the results
- record the outcomes and use to construct a frequency table; for example, if drawing a cube from a bag as above, the table might be as follows:

colour	number of times drawn
blue	36
green	64

- we estimate the likelihood of a blue cube to be 36 in 100 and that of a green cube to be 64 in 100
- discuss: is that what we expected?
- data sets compiled from children's experiences (personal data, weather, sports) might be used; for example, a survey of favourite cereals might have produced the following table:

cereal	number of pupils who prefer it
corn flakes	19
porridge	4
crispies	9
muesli	3

- the likelihood that a pupil picked at random prefers corn flakes is estimated to be 19 in 35.

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Data: Content for 6th Class

Representing and Interpreting Data	Chance
• Collect, organise and represent data using pie charts and trend graphs • Read and interpret trend graphs and pie charts; e.g. height or weight in relation to age • Compile and use simple data sets • Explore and calculate averages of simple data sets • Use data sets to solve problems. •	• Identify and list all possible outcomes of simple random processes • Estimate the likelihood of occurrence of events; order on a scale from 0 to 100%, 0 to 1 • Construct and use frequency charts and tables

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Data: Methodologies for 6th Class

Note: Many teaching methodologies appropriate to the development of Data are inherent in the content detailed on the previous page.

- sales or rainfall per month
- compile lists of statistics from children's experiences; e.g. personal data (height, age, hair colour) sports; results (wins, losses, scores)
- use data as source for representation, interpretation and setting problems
- identify the most frequently occurring item in a data set
- compare calculated averages with the most frequently occurring items
- discuss and list all possible outcomes of: rolling two dice and calculating the total (2, 3, 4 ... 12); selecting two numbers at random from the numbers 1, 2, 3, 4, 5 (ten possibilities)
- when tossing a coin, a head has 1 chance in 2 of occurring; thus the likelihood of a head is 1 in 2, or 1/2 or 50%, similarly for a tail
- when rolling a die, each outcome has a 1 in 6 chance of occurring - therefore the likelihood is 1/6
- when drawing a cube from a bag containing 3 red and 6 blue cubes, a blue cube has 6 chances in 9 of occurring and thus has a probability of 6/9 or 2/3; the probability of drawing a red cube is 3/9 or 1/3
- what if the bag contains 5 red, 5 blue and 5 green cubes? or 3 red, 6 blue and 6 green?
- perform the experiment (toss two coins, draw a cube from a bag containing a number of different-coloured cubes) a large number of times; larger numbers of throws can be achieved by using group work

  record the outcomes and use to construct a frequency table; for example, when tossing two coins, the table might look as follows:

outcome	frequency
2 heads	20
2 tails	28
1 head, 1 tail	52

- we estimate the chance of 2 heads to be 20/100, that of 2 tails to be 28/100, that of one head and one tail to be 52/100:
- discuss, is this what we expected?
- using two coins of different colours may help examine a table of school attendance for the class what is the chance of full attendance on any one day?
- what is the chance of more than 20% of the class being absent on any one day?
- pupils are given a bag and told it contains 10 cubes in 3 different colours; by drawing a cube repeatedly, say 50 times, and constructing a frequency table, they must estimate how many cubes of each colour there are in the bag.

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Organisational Aspects of Our Maths Plan

1. **Resources**

   In our school, we have the following resources to facilitate the implementation of our plan:

   - Planet Maths Scheme

   - Ancillary materials from Maths scheme which include resource books, posters, shapes, concrete objects, number lines, worksheets, flashcards, CDs, DVDs, websites;

   - Prim-Ed Copymasters etc.;

   - Selection of toys, phones etc.;

   - DVDs, Interactive White Boards;

   - Digital Cameras; iPads, Fizzbook

   - Notebook computers and printers in each classroom;

   They are audited annually at the beginning of June and added to as required.

2. **Parental Involvement**

   We encourage and welcome the involvement of parents in their children's education. Such partnership is exemplified in:

   - Annual Parent / Teacher meetings which allow for a discussion of individual children's progress.

   - Informal Parent / Teacher meetings convened at the request of the parent or teacher.

   - Written communications via the child's Homework Journal, school website/blog, Twitter, Text-a-Parent

   - Other written communications e.g. Termly School Newsletter.

3. **Learning Support and Special Needs**

   Early intervention and a Staged Approach is central to our Learning Support Programme. See our Special Education Policy.

4. **Linkage and Integration**

   While our Maths Plan is presented under the strand headings, the practice in this school is that all strand units are often interlinked. The subject also provides significant opportunities for integration with all other curricular areas.

5. **Gender Equality**

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We are committed to the provision of equal opportunities to all our pupils in the implementation of our English programme. See our Equality Policy.

6. Assessment & Record Keeping

See Assessment Policy.

7. Continuous Professional Development

CPD needs are identified through review and discussion at termly staff meetings or as the need arises. CPD opportunities may include the organisation of a staff development day / session, engagement of external expertise, attendance by a representative of the staff at specific in-service and / or the provision of required resource materials. Notices of upcoming courses are circulated to each staff member. Staff members who have attended courses are given opportunities to report back to other staff members during time allocated at staff meetings or a staff development day. Portion of CPD hours are arranged as outlined in the 2011 Croke Park Agreement.

8. Information and Communication Technology

In our school we have a wide selection of software to support the teaching and learning of Maths. Each classroom has been fitted with notebook computers, a printer and Interactive White Board and a notebook computer and printer in the learning support and resource room. Pupils engage in Digital Learning using tools such as maths websites, databases, online research for projects, voice recording/Podcasts, recording of data, posting content on the school blog/website and Twitter account, e-portfolios, iPads, and creative writing programmes.

9. Timetabling

A weekly minimum of three hours and twenty five minutes is allocated for Maths in the Infant Classes and four hours and thirty five minutes from 1st to 6th Classes as per Department of Education and Skill Circular 0056/2011.

Success Criteria

The school-wide implementation of this plan will result in enhancement of pupil learning in the following ways:

The plan will impact on the learning and teaching of mathematics in this school based on the following criteria; Teacher planning will be based on the whole school plan and will also refer to the whole school plan.

As far as possible, procedures outlined in this plan will be followed consistently

Assessment, both formal and informal, will indicate when objects are being realized

Short term planning, which will be carried out in a co-operative manner, and such planning will refer to criteria and objectives set out in the whole school plan.

The achievement of these success criteria will be assessed through tracking/analysis of Sigma-T tests, teacher-designed tests, checklists, self-assessment tools and feedback from teachers, pupils and parents.

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Roles and Responsibilities

The implementation of our plan will be supported as follows:

Roles	Person(s) Responsible
Development of schemes of work	Class Teacher
Assessment (Standardised / Diagnostic) Teacher	Class Teacher & Learning/Resource Support
Co-ordination of School / Class Inventory	Class teachers
Purchasing of Resources	Principal / BOM / Parents' Association

Co-ordination of monitoring and evaluation of plan Principal & Teaching Staff

Timeframe for Implementation & Review

This revised policy will be implemented in September 2014 and will be reviewed in 2017. It will be consequently reviewed;

- at the end of every third school year thereafter

- if the introduction/implementation of new national strategies require changes to the policy

- if the staff feels that aspects of the policy need to be revisited before the completion of the three year cycle.

Ratification and Communication

A draft copy of this policy was submitted to the Parents' Association for comment/contribution. Parents were also informed that a draft version of the policy was available to download on the school website - moodle.lumcloon.net or alternatively available in hard copy from the school office. A three week period was set aside for parental comment.

The ratified policy is available from the school and also to download on the school website.

The Board of Management ratified this policy on the 10 of March, 2011. It will be necessary to review this plan on a regular basis to ensure optimum implementation of the Maths curriculum.