MATHEMATICS

a revised Syllabus for Primary Schools

primary Mathematics support team

June 2014

PREFACE

The Primary Mathematics syllabus has been revised and will be put into effect as from the coming Scholastic Year (2014 – 2015). The revised syllabus is aligned with the rationale and aims of the National Curriculum Framework and is also addressing feedback received on the current syllabus. Below are some changes that are prominent in the revised version:

- the syllabus incorporates the rationale, the learning outcomes, a list of keywords (per topic per year) and various opportunities that the children should be given. A note about pre-numeracy skills is included.
- each topic is developed in detail from Year 1* to Year 6 on the same document. This decision has been taken to facilitate differentiation and progression.
- the list of opportunities per topic per year is long but not exhaustive. It has been included to encourage application and reasoning: two important cognitive domains. The opportunities outlined are not mandatory but are to be treated as recommendations that enhance learning. Ultimately, it is the teacher to decide which opportunities best meet the needs of the students in the class.
- the learning outcomes have been kept to a minimum and are distributed almost equally across the years.
- the coding has also been revised to simplify its use.
- the revised syllabus is emphasising that procedures (knowledge of rules and procedures used in carrying out routine mathematical tasks and the symbols used to represent mathematics) should never be learned in the absence of a concept (logical relationships, representations, using manipulatives, an understanding and ability to talk, write and give examples of these relationships) .
- the syllabus should guide the teaching and learning. The textbook is just one tool for the implementation of the syllabus. Consequently, it is suggested that any guidelines by colleges/schools on the topics to be covered till the Half Year Exams (for Year 4 and Year 5 students) is to be informed by learning outcomes rather than by textbook pages.

Feedback about the revised syllabus is encouraged. The latter and/or any queries should be addressed to Melanie Casha Sammut, Education Officer for Primary Mathematics: melanie.casha.sammut@ilearn.edu.mt .

*Topic focusing on Multiplication and Division starts from Year 3.

RATIONALE

"The ability to develop and apply mathematical thinking in order to solve a range of problems in everyday situations is important for all learners. Through Mathematics, learners acquire a sound knowledge of numbers, measures and structures, basic operations and basic mathematical presentations, an understanding of mathematical terms and concepts, and an awareness of the questions to which mathematics can offer answers.

With increased fluency in Mathematics, young people are provided with opportunities to deepen their mathematical knowledge and reasoning, to come more formally into contact with abstract and logical reasoning, and to better appreciate and apply the communication possibilities that the mathematics medium offers. This Learning Area will include financial literacy aspects such as mathematical and financial understandings in order to ensure that a culture of financial planning and preparation is instilled and nurtured during the Junior and Secondary Cycles of education."

(National Curriculum Framework, 2012, p. 35)

"The learning that takes place within the area of Mathematics allows children to develop:

- Essential numeracy skills which support them in daily life.
- Key numeric competences that include the understanding of concepts, principles, and applications.
- Creative approaches in the four strands, namely, use of number, measurement, space and shapes and data handling.
- Logical thought and engagement with investigative processes that lead to solutions.
- Application of mathematical concepts on matters relating to financial decisions and planning.

All children need to experience mathematics as a rewarding and enjoyable experience. This can best be achieved by using a combination of different teaching styles and through differentiated teaching taking into consideration different learning styles."

(National Curriculum Framework, 2012, p. 53)

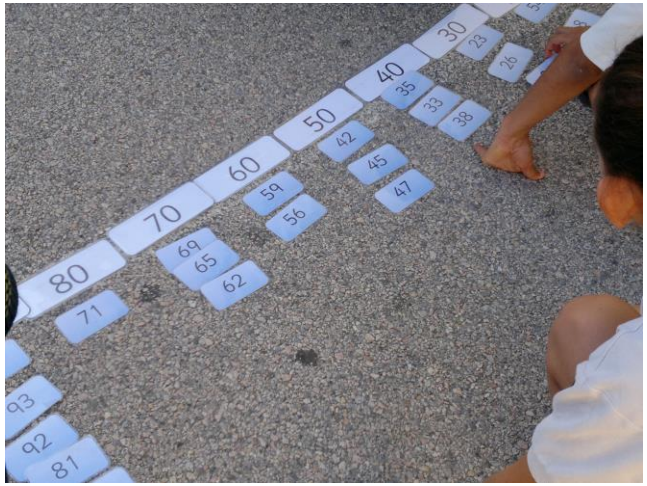
During the mathematics lesson children should be given the possibility to experience various situations and opportunities as portrayed in Figure 1 below.

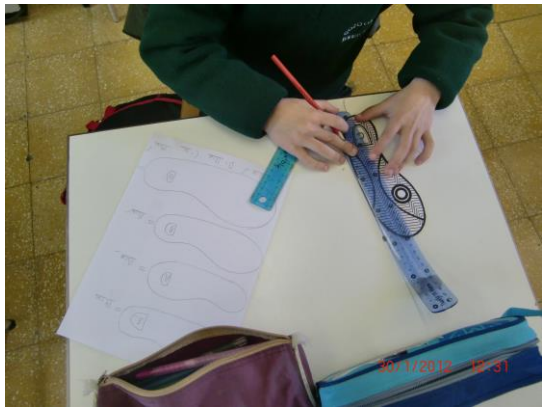
Figure 1: Opportunities through the Mathematics Lessons.

Word cloud has been created using the online application *Wordle*.

Achievement Aims of the Mathematics Curriculum across the FOUR strands.

Number and Algebra





The mathematics curriculum provides opportunities for children to:

- develop an understanding of numbers, the ways they are represented and the quantities for which they stand.
- develop accuracy, efficiency and confidence in calculating – mentally, and on paper.
- develop an ability to estimate and to make approximations, and check the reasonableness of results and measurements.
- recognise patterns and relationships in mathematics and the real world.
- develop the ability to use symbols, notation, graphs and diagrams to represent and communicate mathematical relationships and concepts.

Measurement

The mathematics curriculum provides opportunities for children to:

- develop knowledge and understanding of systems of measurement and their use and interpretation.
- develop confidence and competence in using instruments and measuring devices.

Space and Shapes

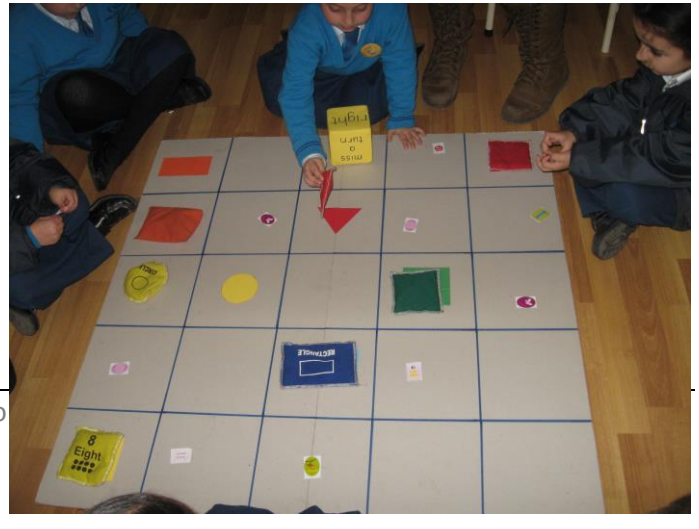
The mathematics curriculum provides opportunities for children to:

- gain knowledge of geometrical relations in two and three dimensions and recognise and appreciate shapes in the environment.
- develop spatial awareness and the ability to recognise and make use of the geometrical properties and objects.
- develop the ability to use geometrical models as aids to solving practical problems in time and space.

Data Handling

The mathematics curriculum provides opportunities for children to:

- recognise appropriate statistical data for collection and develop the skills of collecting, organising and analysing data.
- interpret data presented in tables, charts and graphs of various kinds.



Approaches to Teaching and Learning in Mathematics

Problem Solving Approach

A balanced mathematical programme incorporates concept learning and the development, maintenance and application of skills. These should be taught in such a way that children develop their ability to think mathematically.

Children learn mathematical thinking most effectively through the application of concepts and skills in interesting and realistic contexts that are personally meaningful to them. This implies that mathematics is best taught by helping children to solve problems drawn from their own experiences.

Real-life problems are not always closed, nor do they necessarily have only one solution. Determining the best approach for solving a problem when several approaches are possible is a skill frequently required in everyday life including on the workplace. Consequently children need to be given various opportunities to work on open-ended problems. The solution to problems, which are worth solving, rarely involve one item of mathematical understanding or just one skill. Rather than remembering a single correct method, problem solving requires children to search for clues and make connections to the various pieces of mathematics and other knowledge and skills which they have learned. Such problems encourage thinking rather than mere recall.

Closed problems, which follow a well-known pattern of solution, develop only a limited range of skills. They encourage memorisation of routine methods rather than experimentation and investigation. Without diminishing the importance of being fluent with basic techniques, routine methods only become useful tools when children can successfully apply them

to non-routine and realistic problems. The latter may not always be presented to children towards the end of a topic. The problem solving approach as described in Figure 2 is recommended.

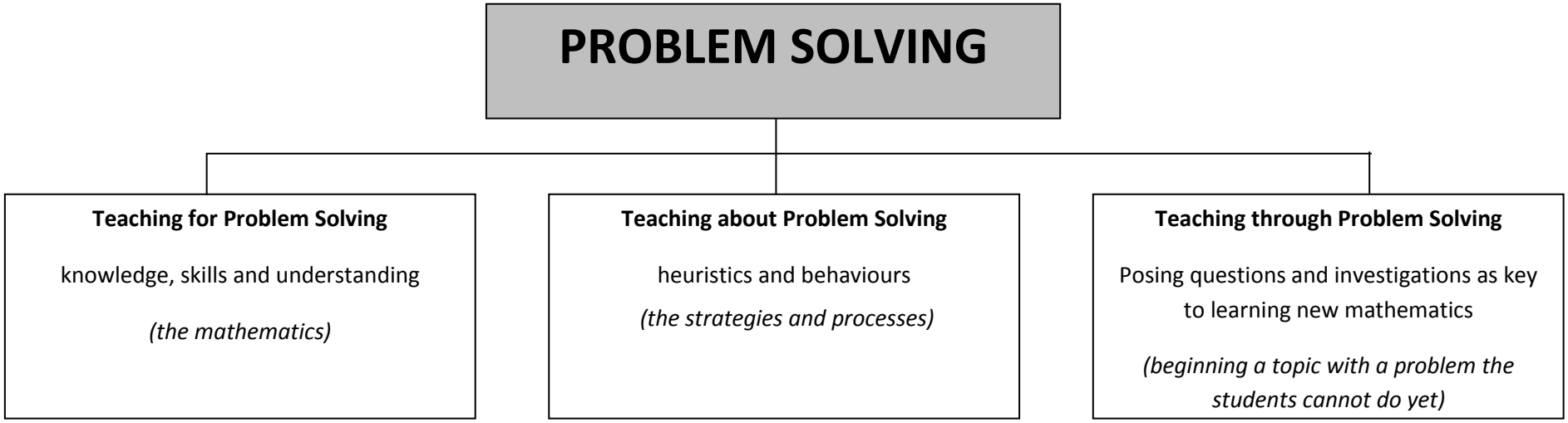


Figure 2: Teaching for – about – through Problem Solving.

Good problem solving techniques are characterised by the systematic collection of data or evidence, experiment (including trial and error followed by improvement), creativity, reflection on and critical evaluation of the process that has been followed. These characteristics may be developed by providing children with opportunities that encourage them to practise and learn simple strategies such as guessing, checking, drawing a diagram, making lists, looking for patterns, classifying, substituting, re-arranging, putting observations into words, making predictions and developing simple proofs. Learning to communicate about mathematics and through mathematics is part of learning to become a mathematical problem-solver and learning to think mathematically. Critical reflection may be developed by encouraging children to

share ideas, to use their own words to explain their ideas and to record their thinking in a variety of ways, such as words, symbols, diagrams and models.

The Language of Communication

The class teacher, in accordance with the school strategy, is to decide what language must be used to facilitate the development and acquisition of mathematical concepts. Once this objective is achieved, however, it is essential that children are exposed to the mathematical ideas in English and listen to adults using the words correctly. Care must be taken to ensure that the English language used is simple and accessible; hence it should be presented in very short sentences in situations involving the appropriate mathematical language. The use of flash cards, displaying the specific mathematical language, is recommended. In the younger classes, pictures and real-life objects should be used to facilitate the children's understanding of the language, as do consistency and repetition. As they grow children should be encouraged to express and articulate their explanations, thinking and reasoning in English to strengthen their mathematical communication skills. However, on no account should the use of either language (Maltese or English) impede upon the children's learning of mathematics.

Developing the Understanding of Mathematical Vocabulary

Children's failure to understand mathematical vocabulary manifests itself when they fail to answer questions during lessons, when they fail to carry out a set task and when they do poorly in tests and examinations.

Possible reasons for this failure could be that:

- **they do not understand the spoken or written instructions**

  (e.g. draw a line . . .; put a ring around one of these numbers . . .).

- **they are not familiar with the mathematical vocabulary**

  (e.g. difference, product, multiple, factor, estimate . . .).

- **they may be confused about mathematical terms which have different meanings in English**

  (e.g. table, left, odd, take away . . .).

- **they may be confused about other words**

  (e.g. sides and size; width and with; height and the Maltese ħajt; straight, vertical and horizontal . . .).

It is for these reasons that children need to acquire the appropriate mathematical vocabulary so that they can fully participate in set tasks and tests. An even more important reason is that mathematical language is crucial to the children's development of thinking. Unless they have the vocabulary to talk about *division*, *perimeter*, *capacity*, etc, they cannot make progress in understanding the various areas of mathematical knowledge.

Since children cannot learn the meaning of words in isolation, the use of questions is crucial in coming to grips with the mathematical ideas and mathematical terms correctly. It is important to ask questions in different ways so that the children have more opportunities to assimilate the question, understand the meaning and provide a valid response. One should not use only questions that require recall and application of facts but also questions, which require a higher level of thinking and promote good dialogue and interaction. Eventually children will begin to give more complex answers in which they explain their thinking.

All children need regular, planned opportunities to develop their mathematical vocabulary. They need to experience a cycle of **oral work**, **reading** and **writing**. They need **oral work based on practical work** so that they may have visual images and tactile experience of what mathematical words mean in a variety of contexts.

Various forms of oral work include:

- listening to adults and children using words correctly.
- acquiring confidence and fluency in speaking, using complete sentences that include the new words and phrases, sometimes in chorus and sometimes individually.
- describing, defining and comparing mathematical properties, positions, methods, patterns, relationships, and rules.
- discussing ways of tackling a problem, collecting data and organising their work.
- hypothesising or making predictions about possible results.
- presenting, explaining and justifying their methods, results, solutions or reasoning, to the whole class or to a group or

partner.

- generalising or describing examples that match a general statement.

They need to read aloud and silently, sometimes as a whole class and sometimes individually. For example, they should read:

- numbers, signs and symbols, expressions and equations.
- instructions and explanations in textbooks, workbooks, handouts, . . .
- labels on diagrams, charts, graphs and tables.

They need to write and record in a variety of ways, progressing from words, phrases and short sentences to paragraphs and longer pieces of writing. Different forms of writing include:

- writing prose in order to describe, compare, predict, interpret, explain, justify;
- writing formulae, first using words, then symbols;
- sketching and labelling diagrams to clarify their meaning;
- drawing and labelling graphs, charts or tables, and interpreting and making predictions from the data in them, in mathematics and other subjects.

Catering for Individual Needs (Differentiation)

In accordance with "the principles of diversity and inclusion which underpin the NCF … at all stages learners of all aptitudes and competences should experience success, challenge, and the necessary support to sustain their effort. They need flexible learning programmes providing diverse learning experiences that cater for a wide spectrum of learners and allow for different rates of progression as children and young people work through their school years" (National Curriculum Framework, 2012, p. 40).

Children of lower ability need to have the opportunity to experience a range of mathematics, which is appropriate to their level of development, interests and capabilities. Equally children with exceptional ability in mathematics must be extended and not simply be expected to carry out different repetitions of work they have already mastered.

New experiences allow children to refine their existing knowledge and ideas and to construct new knowledge. The extent to which teachers are able to facilitate this process significantly affects how well children learn. It is important that they are given the opportunity to relate their new learning to knowledge and skills which they have developed in the past.

Some children fail to reach their potential because they do not see the applicability of mathematics to their daily lives and because they are not encouraged to connect new mathematical concepts and skills to experiences, knowledge and skills they already have. As a result these children develop a negative attitude towards mathematics. The development of more positive attitudes to mathematics and a greater appreciation of its usefulness are the key to improving child participation.

Use of Resources

Manipulatives

The importance of the use of apparatus to help children form mathematical concepts is well known. Using apparatus provides a foundation of practical experience on which children can build abstract ideas. It encourages them to be inventive, helps to develop their confidence and encourages independence.

Teachers need to make use of an appropriate range of apparatus to focus the children's thinking on the concept to be developed, modifying the apparatus as the learner's understanding grows. The use of manipulatives also facilitates the children's thinking during the problem solving process.

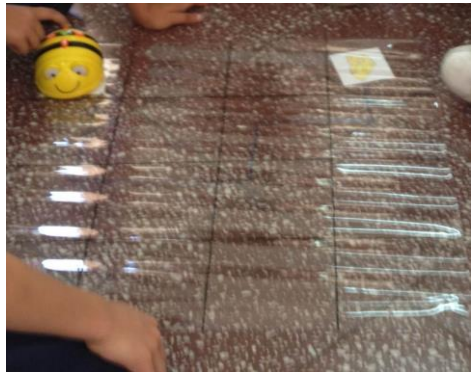
Textbooks

Textbooks contain material that provides children with practice and enrichment. They also contain ideas for problem solving situations which develop mathematical skills and understanding. However, teachers must realise that a textbook is just one tool to help with the implementation of the syllabus.

eLearning

Computers are learning tools which children can use to discover and reinforce new ideas.

The use of electronic media and ICT can provide children with opportunities to:



- learn from feedback.
- observe patterns.
- see connections.
- work with dynamic images.
- explore data.
- "teach" the computer or any other electronic device by giving it simple instructions.

The i-learn toolbox is an interactive whiteboard resource that consists of a workspace and tools that the teacher can combine and use to create learning experiences customised for each and every child. An overview of its tools and features can be downloaded from http://primarymaths.skola.edu.mt/wp-content/uploads/2012/07/iLearn-Maths-Toolbox.pdf .

Mathematics Across the Curriculum

Teachers need to help children appreciate the importance of mathematics in their lives. They may achieve this by adopting "a more cross-curricular, thematic, interdisciplinary and collaborative approach" (National Curriculum Framework, 2012, p. 31).

Assessment in Mathematics

Evaluation of children's achievement is an essential part of mathematics education. This is necessary for various purposes:

- to give teachers feedback on the success of their methods and approaches and to assist planning for new learning (formative).
- to assess the children's readiness for new learning and to find out what they have learnt (summative).

Diagnostic assessment procedures enable teachers to discover difficulties that individual children may be having. Appropriate diagnostic assessment may reveal that the reason for a particular student's lack of progress is a lack of understanding achieved at an earlier time and the difficulty may be relatively easily addressed. Diagnosis may also reveal that the child is very talented and is simply bored by the lack of stimulation. Diagnostic assessments enable teachers to plan further learning activities specifically designed to meet learning needs of individual children. Worthwhile diagnosis may be carried out by employing closed and open-type questions.

Assessment should focus both on what children know and can do, and on how they think about mathematics. **It should involve a broad range of tasks and problems and require the application of a number of mathematical ideas.** Skills assessed should include the ability to communicate findings, to present an argument and to exploit an intuitive approach to a problem.

Assessment should be an integral part of the normal teaching and learning programme. It should involve multi techniques, including written, oral and demonstration formats. Group and team activities should also be assessed.

Teachers should avoid carrying out only tests which focus on a narrow range of skills such as the correct application of standard algorithms (procedures). While such skills are important, a consequence of a narrow assessment procedure, which isolates skills or knowledge, is that children tend to learn in that way. Mathematics becomes for them a set of separate skills and concepts with little obvious connection to other aspects of learning or to their world.

Assessment should also be undertaken to provide children and their parents with an indication of the child's progress. When marking children's work and giving feedback (oral or written) teachers should indicate what the children have done well and what they need to do to improve and to act on feedback given to them. In summarising the results of evaluations of children's achievement, teachers should report what the children have achieved and how well they achieved it. A grade or mark alone is insufficient.

Annual Examinations: At the end of Year 4 and Year 5 children in state schools sit for an Mathematics Annual Examination which consists of a Written Paper (carries 80% of the global mark) and a Mental Paper (carries 20% of the global mark). However, it is recommended that:

- children in Year 5 following an alternative programme and/or functioning at, or below Year 2 Primary standard;
- children in Year 4 following an alternative programme and/or functioning at, or below Year 1 Primary standard;
- children in Year 4 and Year 5 following an alternative programme;
- children with Statement of Needs (upon positive recommendation of INCO), shall be exempted from the Annual Mainstream Mathematics Paper .

The final decision on who sits for the centrally-provided Alternative Written Paper is based on evidence from the Diagnostic Test (to be carried out by the Maths Support Teacher) and/or evidence from Checklists' Assessment Tasks (also carried out by the Maths Support Teacher). The latter need only be carried out if the performance on the Diagnostic Test is inconclusive. This evidence needs to be endorsed by the Head of School, in collaboration with the INCO and/or Complementary Teacher and the Maths Support Teacher.

End of Primary Benchmark: At the end of Year 6, children sit for the Mathematics End of Primary Benchmark. This consists of a Mental paper which carries 20% of the global mark and a Written paper which carries 80% of the global mark.

Further details regarding the Mathematics Annual Examination and the Mathematics End of Primary Benchmark can be accessed on http://curriculum.gov.mt/en.

Specimen Papers of the Annual Primary Mathematics Alternative Papers (Level 1 and Level 2) can be accessed through the eLearning Platform from EO's Room (Mathematics Primary).

Strands

The Mathematics curriculum is divided into four strands: **Number and Algebra**; **Measures**; **Space and Shapes** and **Data Handling**. This division is a convenient way of categorising the outcomes for mathematics education in schools. It emphasises that there are a number of aspects, which are all equally important. This division does not mean that children are expected to learn Mathematics in individual "packages". Connection between the four strands is encouraged through **problem solving**.

Each of the four strands is further developed below, in this order:

Lesson Structure

The following structure is recommended for the daily Mathematics lesson:

Year Group: Years 1 to 6
Duration: 45 to 60 minutes
(*Timings are approximate and depend on the nature of the teaching input and activities for pupils that teacher has planned.)*

1. **Oral work and mental calculation**
2. **The main teaching activity**
3. **A plenary**

(*Structure may vary depending on the Learning Intention.)*

Oral work and mental calculation *(about 5 to 10 min)*
whole class work to rehearse, sharpen, and develop mental and oral skills

The main teaching activity *(about 30 to 40 min)*
teaching input and pupil activities
work as a whole class, in groups, in pairs or as individuals

A plenary
(to round off the lesson)
(about 10 to 15 min)
to sort out misconceptions and identify progress
to summarise ideas and what to remember
to set work to do at home
to make links to other work and discuss the next steps

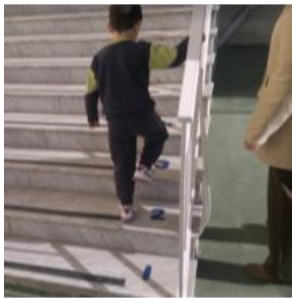
It is also recommended that teachers share the specific Learning Intention/s with the children at the appropriate time during the introductory part of the lesson.

An additional purpose of the plenary should be to identify progress made vis- à-vis the Learning Intention. Giving due importance to the Learning Intention will enhance the children's development of self-assessment skills.
Feedback, in oral and/or written form, should also be related to the Learning Intention.

The Early Years

Throughout the Early Years the children will begin to:

- know and understand early mathematical language of measurement, shapes, space, position, numbers and patterns.
- classify, order and sort.
- learn number rhymes and songs.
- be aware of conservation
- know the sequence of numbers
- begin to understand positional words: e.g. in, on, outside.
- show an awareness of time.
- be aware of shapes in the environment.
- be aware of one-to-one correspondence.
- acquire new vocabulary.



Note: The National Curriculum Framework (2012, p. 46) requires a "move away from emphasising specific subject content teaching in favour of pedagogies which enhance curricular links and thus facilitate learning processes."

A: NUMBERS, NUMBER PATTERNS AND PLACE VALUE

Place value is significant due to the fact that it helps you understand the meaning of a number. Thus, we can say that understanding of place value is central to developing number sense. It is also the basis for the four fundamental operations on numbers. Consequently, place value connects to many other important concepts.

YEAR 1

LEARNING OUTCOMES Children will be able to:		KEY VOCABULARY	OPPORTUNITIES Children should be given a range of opportunities such as:
A.1.1	count reliably forward and backwards up to 10 everyday objects.	one…..twenty before after next count count on/forward count back/backward How many? correct less than more than few/fewer/fewest more/most small/smaller/smallest	• saying and using the number names in order in familiar contexts such as number rhymes, songs, stories, counting games and activities (first to five, then ten, then twenty and beyond). • counting on and back on the number line. • counting reliably in different contexts such as clapping sounds or hopping movements. • counting on from any number. • counting up to 10 objects, knowing that the next number in the count is the total. • using a number line to help them identify largest/smallest of three numbers. • estimating a number of objects up to 10.
A.1.2	understand the value of each number.		
A.1.3	recognise and write numerals 1 to 9, then 0 and 10, then beyond 10.		
A.1.4	compare and order numbers including ordinal numbers.		

A.1.5	talk about, recognise and recreate simple patterns e.g. counting in 2's and 10's.	large/larger/largest along guess close/closer/closest order between ten, twenty…….hundred tens twos	• recognising small amounts without counting (first to 5, then 10, then beyond), then check by counting. • recognising 'none' and 'zero' in stories, rhymes and when counting. • saying a number which lies between two given numbers. • recording numbers, initially by making marks, then progressing to simple tallying to writing numerals. • recognising that when a dice is thrown, we can identify patterns. • using developing mathematical ideas and methods to solve practical problems involving counting and comparing in a real or role play context.

YEAR 2

LEARNING OUTCOMES **Children will be able to:**		**KEY VOCABULARY**	**OPPORTUNITIES** **Children should be given a range of opportunities such as:**
A.2.1	count reliably at least 30 objects.	zero, one, two….thirty ones. twos, threes, fives, tens ten, twenty…….hundred is equal to (=) answer total number name large/larger/largest small/smaller/smallest between count on/back guess/estimate How many.... do you think? close/closer/closest more/more than less/less than left over	• knowing the number names and recite them in order to 30 (then extend), from and back to zero. • counting up to 30 objects and understand that if they re-arrange the objects the numbers stay the same. • using a number line and a number grid. • estimating a number of objects up to 30. • comparing two 2-digit numbers, recognising the larger and smaller and giving a number which lies between them. • reading and recognising number names and matching them to the numerals. • counting by grouping objects. • knowing that in a two digit number e.g. 14, is *one ten* and *four ones* (units). • rehearsing counting in 10's by *spider counting*. • understanding that even numbers make two equal towers and odd numbers do not. • recognising the unit digit in an odd or even number.
A.2.2	count on and back in steps of 1s, 10s, 2s, 5s and 3s.		
A.2.3	recognise odd and even numbers up to 30.		
A.2.4	read and write numerals from 0 to at least 30.		
A.2.5	know what each digit in a two-digit number represents.		
A.2.6	partition a 'teens' number and also partition larger two-digit numbers into a multiple of ten and ones (TU).		
A.2.7	compare and order numbers to at least 30, and position them on a number track.		

A.2.8	use the = sign to represent equality.	grid column row ones (units) odd even first, second, third … tenth position order/in order next beside	• recognising and predicting a number pattern and their relationships. • knowing that the between numbers are those found in the middle of two numbers. • investigating a general statement about familiar numbers by finding examples that satisfy it.

YEAR 3

LEARNING OUTCOMES Children will be able to:		KEY VOCABULARY	OPPORTUNITIES Children should be given a range of opportunities such as:
A.3.1	recognise, read and write whole numbers to at least 100 in figures and words.	one…….one hundred tens units/ones twos threes fours fives hundreds odd/even groups small/smallest/smaller large/largest/larger between half way next equally total more/less left/right upwards/downwards	• saying the number names in order to at least 100, from and back to zero. • counting reliably up to 100 objects by grouping them. e.g. in tens, then in fives or twos. • using interlocking cubes, base ten material and coins. • ordering whole numbers to at least 100, and position them on a number line and 100 square. • comparing two given two-digit numbers, saying which is more or less, and giving a number which lies between them. • saying a number that is 1 or 10 more or less than any given two-digit number. • recognising that the 3 and 4 in the number 34 are called digits. 34 is a two-digit number: 3 tens and 4 units. • knowing that the smallest two digit number is 10 and the largest is 99. • counting in twos, threes, fours, fives and tens using the grid. • describing a simple sequence and extending it. • recognising the smaller of two digit numbers, by first checking the tens digit. If two numbers have the same tens digit, the smaller number has the smaller units digits. • understanding that 15 is not between 15 and 20 but when counting
A.3.2	count on/back in 1s, 2s or 10s starting from any number.		
A.3.3	count on in steps of 3s, 4s and 5s to at least 50.		
A.3.4	count in 100s from and back to 0.		
A.3.5	recognise odd and even numbers to at least 50.		
A.3.6	know what each digit in a two-digit number represents, including 0 as a place holder and partition two-digit numbers into a multiple of ten and ones (TU).		
A.3.7	compare and order numbers, including ordinal numbers to 100.		
A.3.8	round numbers less than 100 to the nearest 10.		

		estimate range near/nearer/nearest	from 15 to 20, you include both numbers. • discovering that when we count in tens the unit stays the same using place-value cards. • finding one more/less than a number and explore the pattern (moving one place right/left on the grid). • finding 10 more/less than a number and explore the pattern (moving one place down/up on the grid). • knowing that a number lies between two tens and locating the nearest ten to a number. • knowing that if a number lies exactly half way between two tens, then they always round up. • solving mathematical problems or puzzles, recognising simple number patterns and relationships, generalising and predicting and suggesting extensions.

YEAR 4

LEARNING OUTCOMES Children will be able to:		KEY VOCABULARY	OPPORTUNITIES Children should be given a range of opportunities such as:
A.4.1	read, write and order whole numbers to at least 10,000 in figures and words and know what each digit represents.	ones, twos, threes, fours, fives… fifties… twenty-fives zero one hundred and one… thousand/(Th) hundreds /(H) tens /(T) units/ (U) value estimate sequence roughly closest correct row/column larger/smaller	• counting larger collections by grouping them e.g. in tens, then other numbers. • using a number line and number grid. • using interlocking cubes, base ten material and coins. • adding/subtracting 1, 10, 100 or 1000 to/from any integer (whole number) • counting on or back in tens, hundreds or thousands from any whole number up to 10,000. • giving one or more numbers lying between two given numbers and order a set of whole numbers less than 10,000. • recognising and reading three-digit numbers in a context including measurements. • recognising and extending number sequences formed by counting from any number in steps of constant size. • recognising and reading four-digit numbers. • saying the number that is 1, 10 or 100 more or less than any given
A.4.2	partition numbers into thousands (TH), hundreds (H), tens (T) and units (U) .		
A.4.3	read, say and write ordinal numbers to at least 100.		
A.4.4	identify odd and even numbers to at least 100.		
A.4.5	count: • on/back in 1s, 2s, 10s or 100s, starting from any two- or three-digit number. • on/back in steps of 3, 4 or 5		

	from any small number to at least 50. • on in steps of 25 and 50 to 500.	between halfway odd/even digits nearest 10/100 round/ing round up/down every other before/after less than (<) greater than (>) is equal to (=)	two- or three-digit number. • ordering whole numbers to at least 1000, and positioning them on a number line. • recognising that the smallest 3-digit number is 100 and the largest is 999. • recognising that the smallest 4-digit number is 1,000 and the largest is 9,999. • recognising that even numbers can be halved but odd numbers cannot. • recognising odd and even numbers by looking at the units digit. • illustrating on a number line the location of a number to recognise the nearest 10/100. • knowing that if a number lies exactly half way between two hundreds/two tens, then always round up. • knowing that the units digits of the multiples have repeating patterns. • solving mathematical problems or puzzles, recognising simple patterns and relationships, generalising and making predictions. • investigating a general statement about familiar numbers and suggesting extensions.
A.4.6	round any two-digit number to the nearest 10.		
A.4.7	round any three-digit number to the nearest 100.		
A.4.8	use symbols correctly, including less than (<), greater than (>), equals (=).		

YEAR 5

LEARNING OUTCOMES Children will be able to:		KEY VOCABULARY	OPPORTUNITIES Children should be given a range of opportunities such as:
A.5.1	read and write whole numbers in figures and words, and know what each digit represents.	one…..ten thousand thousand (Th) hundred (H) tens (T) units (U) (place) value number line/grid nearest ten nearest hundred rounding round up/round down	• using place value to multiply/divide by 10/100/1000. • using a number line to help find the nearest ten, hundred or thousand to a number. • using interlocking cubes base ten material and coins. • reading and recognising five digit numbers. • working out what is one more/less than a number such as 9,999 or 4,000. • saying the number which is exactly halfway between: two tens, two hundreds or two thousands. • identify the pattern for the units digit in odd numbers (1, 3, 5, 7 or 9)
A.5.2	recognise odd and even numbers up to 1000 and identify some of their properties including the outcome of sums or differences of pairs of odd/even numbers.		
A.5.3	explore and understand square numbers.		

A.5.4	recognise and extend number sequences formed by counting from any number in steps of constant size (including square numbers).	greater/less than approximate odd/even digit total sequence multiplication square row/column square number less than (<) greater than (>) is equal to (=)	and the pattern for the units digit in even numbers (0, 2, 4, 6 or 8). • investigating the total of two numbers when both are even, both are odd and when one is even and one is odd. • working with sequences to better understand that a sequence is a string of numbers made by counting in steps for equal size/pattern. • sequencing square numbers: 1, 4, 9, 16, 25, …… • exploring number patterns including multiples and trying to describe them. • solving mathematical problems or puzzles, recognising and explaining patterns and relationships, generalising, predicting and suggesting extensions. • making and investigating a general statement about familiar numbers by finding examples that satisfy it. • explaining a generalised relationship (formula) in words. • making and justifying estimates up to about 250, and estimating a proportion.
A.5.5	round any integer up to 10,000 to the nearest 10, 100 or 1000.		
A.5.6	compare and order numbers. Include symbols such as <, >, =.		
A.5.7	give one or more numbers lying between two given numbers		
A.5.8	estimate and approximate.		

YEAR 6

LEARNING OUTCOMES Children will be able to:		KEY VOCABULARY	OPPORTUNITIES Children should be given a range of opportunities such as:
A.6.1	round number to the nearest tenth, whole, 10, 100, 1000.	one…..million thousand (Th) Hundreds (H) Tens (T) Units (U) rounding rounding up/down Nearest ten/hundred/thousand nearest whole number nearest tenth digit digit total decimal point decimal number	• using place value to multiply/divide by 10/100/1000. • using a number line to identify the nearest ten, hundred or thousand to a number, or the nearest tenth or whole number to a decimal number. • using interlocking cubes, base ten material and coins. • recognising the need for zeros to demonstrate the absence of tenths and hundredths. Help by using a place value grid and sliding number cards. • investigating the total of two numbers when both are even, both are odd and when one is even and one is odd. • working with sequences to better understand that a sequence is a string of numbers made by counting in steps for equal size/pattern. • sequencing square numbers: 1, 4, 9, 16, 25, …… • sequencing triangular numbers to better understand that the
A.6.2	count on in steps of 0·1, 0·2, 0·25, 0·5… and then back.		
A.6.3	explore and understand triangular numbers.		
A.6.4	recognise and extend number sequences, such as the sequence of square number and the sequence of triangular numbers and predict the next few terms.		
A.6.5	compare and order numbers less than 1 million. Include symbols		

	such as <, >, =.	number line square numbers triangular numbers sequence estimate odd/even	sequence of triangular numbers is made by adding a number 1 more than the last time. • making and investigating general statements about familiar numbers. • playing Sudoku and other number puzzles. • creating number games. • solving mathematical problems or puzzles, recognising and explaining patterns and relationships, generalising, predicting and suggesting extensions. • making and investigating a general statement about familiar numbers by finding examples that satisfy it.
A.6.6	give one or more numbers lying between two given numbers.		
A.6.7	make and justify estimates of large numbers including proportion.		
A.6.8	rehearse properties of sums/differences of odd and even numbers and recognise the properties of the products.		

B: ADDITION AND SUBTRACTION

Addition and subtraction are basic operations in mathematics and are inversely related. These are powerful foundational concepts in mathematics with applications to many problem situations and connections to many other topics. Undoubtedly, their importance extends to real-life situations.

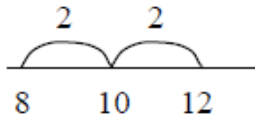
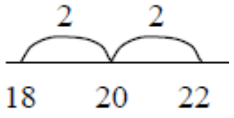
YEAR 1

LEARNING OUTCOMES Children will be able to:		KEY VOCABULARY	OPPORTUNITIES Children should be given a range of opportunities such as:

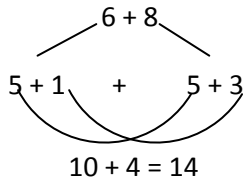
B.1.1	use (begin to) the vocabulary involved in adding and subtracting.	one more
		one less
		counting on / forward
		counting back / backward
		total
		take away
		How many …. are left?
		How many more …?
			• using the number line.
			• using concrete objects, pictures and practical activities.
			• separating (partition) a given number of objects into two groups.
			• using strategies such as:
			  • starting with the larger and counting on, when adding two quantities.
			  • making 5
			  • making 10
			• working out a total by counting on when one group of concrete objects is hidden/removed.
			• working out how many have been removed from a larger group of objects by counting up from a number e.g. If I start with 7 and 5 are left over, I count up from 5 to 7 to find out that 2 have been removed. (Practical Activity).
			• working out how many more are needed to make a larger number
			• listening to stories, poems or songs that will give them the opportunity to reinforce understanding, allow for application and may also provide the opportunity for creation e.g. role play.

B.1.2	say and show 'one more' and 'one less' than a number from 1 to 9.		
B.1.3	understand addition as the combination of two sets (extend to three sets).		
B.1.4	relate addition, including that of doubles, to counting on.		
B.1.5	select two groups of objects to make a given total.		
B.1.6	subtract from a number of objects (up to 10) by taking away		
B.1.7	understand subtraction as counting back.		

YEAR 2			
LEARNING OUTCOMES **Children will be able to:**		**KEY VOCABULARY**	**OPPORTUNITIES** **Children should be given a range of opportunities such as:**

B.2.1	understand the operation of addition, and of subtraction (as 'take away', 'difference', and 'how many more to make'), and use the related vocabulary.	add
		subtract
		take away
		difference
		count on/forward
		count back/backward
		more/less
		larger/smaller
		total
		make
		equal to
		leaves/left
		answer
		pairs
		double/doubling
		near doubles
		nothing/zero
		How many more….?
			• solving addition and /or subtraction calculation using number line and/or number grid as needed.
			• using concrete objects, pictures, and practical activities in real life context.
			• using and exploring different strategies such as:
			  • starting with the larger and counting on, when adding two quantities.
			  • making 5.
			  • making 10.
			  • adding and subtracting 10 using number grid.
			  • use facts to 10.
			  • bridging to 10 (Example 3).
			  • bridging to 20 (Example 4).
			  • writing the bigger number first (Example 5).
			  • use portioning into '5 and a bit' when adding 6,7,8 or 9, then recombine (Example 6).
			(Children should be given the opportunity to discover and experiment with other strategies related to addition and subtraction using place value and number patterns.)
			example 3
			Bridging to 10
			8 + 4 seen as
			 
			
			example 4
			Bridging to 20
			18 + 4 seen as
			 

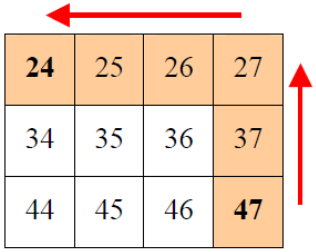
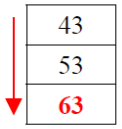
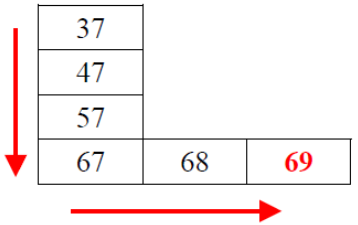
B.2.2	recognise that addition can be done in any order.		
B.2.3	use the +, – and = signs to write a number sentence and recognise the use of symbols such as □ or △ to stand for an unknown number.		
B.2.4	recognise and demonstrate that more than two numbers can be added together.		
B.2.5	identify the number that is 1 or 10 more or less than any given number within the range 0 to 30.		
B.2.6	**know by heart** all pairs of numbers with a total of 10; e.g. 3 + 7 and their corresponding subtraction facts.		
B.2.7	**know by heart** addition doubles of all numbers to at least 5 (up to a total of 10).		

B.2.8	**use the following Mental Strategies:**		
i	use knowledge that addition can be done in any order to do mental calculations more efficiently.		***example 5*** $5 + 9 = 9 + 5$ **(and using facts to 10)** $= (9 + 1) + 4$ $= 10 + 4$ $= 14$
ii	identify near doubles, using doubles already known.		
iii	add 9 to single-digit numbers by adding 10 then subtracting 1.		
iv	use patterns of similar calculations. e.g. 10 – 0 = 10, 10 – 1 = 9, 10 – 2 = 8		***example 6*** 
v	use known number facts and place-value to add or subtract a pair of numbers mentally within the range 0 to at least 10, then 0 to at least 20.		
Vi	bridge to 10, when adding a single digit number.		

YEAR 3			
LEARNING OUTCOMES **Children will be able to:**		**KEY VOCABULARY**	**OPPORTUNITIES** **Children should be given a range of opportunities such as:**

B.3.1	use the +, – and = signs to record mental addition and subtraction in a number sentence and use of symbols such as □ or △ to stand for an unknown number.	add
		subtract
		take away
		difference
		count on/forward
		count back/backward
		more/less
		larger/smaller
		total
		make
		equal to
		leaves/left
		answer
		pairs
		double/doubling
		near doubles
		nothing/zero
		How many more….?
			• comparing total of different addition and subtraction sums to better understand that:
			  • addition can be done in any order but not subtraction.
			  • subtraction is the inverse of addition.
			  example 7: 10 + 5 = 15
			  15 – 5 = 10
			  15 – 10 = 5
			• using the number grid to add/subtract 10 and multiples of 10.
			• using the number grid to add/subtract 2-digit numbers.
			• using apparatus such as the number line, counters and interlocking cubes and any other tangible objects for adding 3 two-digit numbers
			• using base-ten equipment.
			• using mental addition and subtraction to solve simple word problems involving numbers in 'real life', money or measures.
			• explaining how the problems were solved.
			• using and exploring different strategies such as:
			  • putting the larger number first and counting on in tens or ones.
			  • adding three small numbers by putting the largest number first.
			  • finding a pair totalling 10 or 100.
			  • partitioning addition into tens and units, then recombine.
			  • counting up e.g. 42 – 39: counting up from 39 … 40, 41, 42 (3)
			  • identifying patterns in addition/subtraction such as: 2 + 4 = 6, 20 + 40 = 60
			  • 26 + 8 seen as 26 + 4 (30) and 4 (34).
			  • subtracting 10 and multiples of 10 from a 2-digit number. (Example 8).
			  • adding 10 or multiple of 10 to a 1- or 2- digit number (Example 9).
			  • adding two digit numbers looking for multiples of 10 (Example 10).
			  • using place value and number patterns.

B.3.2	**Know by heart:** • all addition and subtraction facts for each number to at least 10. • all pairs of numbers up to 20. • all pairs of multiples of 10 with a total of 100. • all pairs of multiples of 5 with a total of 100.		
B.3.3	find a small difference by counting up from the smaller to the larger number.		
B.3.4	• add/subtract 9 or 11 by adding/subtracting 10 and then adjusting by 1. • add/subtract 19 or 21 by adding/subtracting 20 and then adjusting by 1.		
B.3.5	understand that subtraction is the inverse of addition and state the subtraction corresponding to a given addition, and vice versa.		

B.3.6	add a 1-digit number to a 2-digit number with totals up to 100.		(Children should be given the opportunity to discover and experiment with other strategies related to addition and subtraction). ***Example 8*** Use the number grid 47 – 23 = (47 – 20) – 3 = 27 – 3 = 24  ***Example 9*** The spider moves down one or more rows to add 10 or a multiple of 10 to a 2-digit number. 43 + 20 =  ∴ 43 + 20 = 63 ***Example 10*** 37 + 32 =  ∴ 37 + 32 = 69
B.3.7	add a 2-digit number to a 2-digit number and three 2-digit numbers with the help of apparatus with totals up to 100.		
B.3.8 **i** **ii** **iii** **iv**	**use the following Mental Strategies:** add 3 single digit numbers mentally. identify near doubles using doubles already known with totals up to 100. add numbers such as 9 or 11 and 19 or 21. bridge to 10 and later 20, then adjust.		

<table>
<tr><th colspan="3">YEAR 4</th></tr>
<tr><th colspan="2">LEARNING OUTCOMES
Children will be able to:</th><th>KEY VOCABULARY</th><th>OPPORTUNITIES
Children should be given a range of opportunities such as:</th></tr>
<tr><td>B.4.1</td><td>know by heart/derive quickly:
all pairs of 100 in multiples of 10 and 5.
all number pairs that total 100.
all pairs of multiples of 100 with a total of 1000.
all pairs of multiples of 50 with a total of 1000.</td><td rowspan="4">add/ing
addition sentence
subtract
take away
count on
smaller/larger
before/after
more than
difference
double
less/less than
more/than
leaves/left
addition pairs
pair/pairing
amount
estimate
hundreds
tens
units
thousand
fifties
multiple of 10/5/100
nearly
calculation
next ten
digit
total</td><td rowspan="4">those aimed towards understanding of relationship between + and –.
showing and illustrating parts of the number grid to explain addition/subtraction.
interpreting and applying addition and subtraction using number cards and place value grid.
estimating before calculating using rounding.
using the understanding that subtraction is the inverse of addition to regularly check their work.
playing card games involving addition and subtraction
use and explore different strategies such as:
adding near multiples of 10 (Example 11).
adding a 2-digit number to a 3-digit number (Example 12).
subtracting by counting on to the next ten or hundred or thousand [starting from smaller number].
subtracting a near multiple of 10 (Example 13).
(Children should be given the opportunity to discover and experiment with other strategies related to addition and subtraction).
solving word problems involving numbers in ‘real life’ by applying addition and subtraction in different context such as length, capacity, weight and money, such as:
finding totals and differences
giving change
making 100 and 1000 involving km, m, cm, l, ml, kg and g
and then communicating the process adopted and/or their result/s.
investigating mathematical statements and then communicating the process adopted and/or their result/s.
creating word problems and/or games related to addition and subtraction.</td></tr>
<tr><td>B.4.2</td><td>understand the principles (not the names) of the commutative and associative laws as they apply to addition and subtraction.
e.g. 9 + 8 = 8 + 9
(communtative law)

(3 + 6) + 8 = 3 + (6 + 8)
(associative law)</td></tr>
<tr><td>B.4.3</td><td>add 1, 10, 100 or 1000 to/from any integer (whole number), and count on in tens, hundreds or thousands from any whole number up to 10 000.</td></tr>
<tr><td>B.4.4</td><td>extend understanding that more than two numbers can be added: three or four two-digit numbers with the help of apparatus or pencil and paper.</td></tr>
</table>

B.4.5	extend understanding that subtraction is the inverse of addition.		
B.4.6	use informal pencil and paper methods to support, record or explain HTU ± TU, HTU ± HTU.		
B.4.7	use column addition and subtraction for HTU ± TU, HTU ± HTU where the calculation cannot easily be done mentally.		
B.4.8	**use the following Mental Strategies:**		
i	using knowledge that addition can be done in any order.		
ii	adding 3 or 4 small numbers by putting the larger number first and /or by finding pairs totalling 9, 10 or 11.		
iii	partitioning into tens and units then recombine.		
iv	counting on or back in repeated steps of 1, 10 or 100.		
v	finding a small difference by counting up. e.g. 102 – 97, 5003 – 4996.		
vi	adding three two-digit multiples of 10. e.g. 10 + 70 +50.		

Example 11

e.g. 1

$47 + 29$ (nearly 30)

$(47 + 30) - 1 = 77 - 1$ (because we have added 1 too many)

$= 76$

e.g. 2

$29 + 72 = (30 + 70) - 1 + 2$

$= 100 - 1 + 2$

$= 101$

Example 12

$21 + 176$ (focus on 2-digit numbers part of the addition)

$21 + 76$

$= 21 + 70 + 6$

$= 91 + 6$

$= 97$

$\therefore 21 + 176 = 197$

Example 13

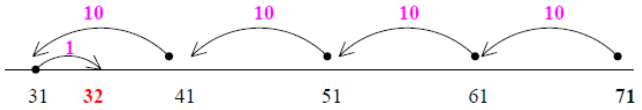
e.g. 1

$71 - 39$ (39 is nearly 40)

$= (71 - 40) + 1$ (because we have subtracted 1 too many)

$= 31 + 1$

$= 32$



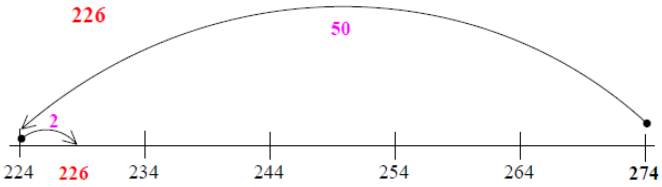
e.g. 2

$274 - 48$ (48 is nearly 50)

$= (274 - 50) + 2$ (because we have subtracted 2 too many)

$= 224 + 2$

$= 226$

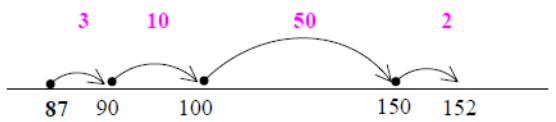


vi	adding and subtracting a 'near multiple of 10' to or from a two-digit number by adding/ subtracting 10, 20, 30… and adjusting		
vii	identifying near doubles using doubles already known.		
viii	using patterns of similar calculations.		

YEAR 5

LEARNING OUTCOMES Children will be able to:		KEY VOCABULARY	OPPORTUNITIES Children should be given a range of opportunities such as:
B.5.1	derive quickly: • decimals that total 1 or 10; • all 2-digit pairs that total 100; • all pairs of multiples of 50 with a total of 1000.	digit doubles thousands hundreds tens units subtract/subtraction take away add/addition total difference multiple nearest multiple count on next ten next hundred estimate vertically	• choosing and using appropriate number operations and appropriate ways of calculating (mental, mental with jottings, pencil and paper) to solve problems. • explaining methods and reasoning about addition and subtraction, orally and in writing. • solving mathematical problems or puzzles, recognising and explaining patterns and relationships in addition and subtraction, then generalising and predicting. • use and explore different strategies such as: • adding two 3-digit numbers using informal method (Example 14). • adding three 3-digit numbers using vertical written column methods (Example 15). • subtracting TU from HTU and HTU from HTU using informal written methods (Example 16). • subtracting TU from HTU and HTU from HTU using standard written methods (Example 17). (Children should be given the opportunity to discover and experiment
B.5.2	consolidate understanding of relationship between + and –. Understand the principles (not the names) of the commutative and associative laws, as they apply or not, to addition and subtraction.		
B.5.3	partition into H, T and U, adding or subtracting the most significant digits first.		

B.5.4	use column addition and subtraction for HTU ± TU and HTU ± TU where the calculation cannot easily be done mentally and extend to 10,000.	round up smaller larger nearest ten nearest hundred decimal number decimal point tenths hundredths number facts column	with other strategies related to addition and subtraction). • solving word problems involving 'real life', money or measures, numbers and quantities, using one or more steps. • investigating addition and subtraction through games including card games, number cards, number grid and board games. ***Example 14*** 436 + 160 436 = 400 + 30 + 6 160 = 100 + 60 500 + 90 + 6 or 4 3 6 + 1 6 0 5 0 0 9 0 6 5 9 6 4 3 6 + 1 6 0 6 9 0 5 0 0 5 9 6 ∴ 436 + 160 = 596
B.5.5	identify near doubles such as 1·5 + 1·6 or 31 + 32.		
B.5.6	extend written methods to addition or subtraction of a pair of decimal fractions, both with one or both with two decimal places.		
B.5.7	add or subtract the nearest multiple of 10 or 100, then adjust.		
B.5.8 **i** **ii** **iii**	**use the following Mental Strategies:** finding differences mentally by counting up through the next multiple of 10, 100, or 1000. adding or subtracting the nearest multiple of 10 or 100, then adjust. adding several numbers , e.g. four or five single digits or multiples of 10 such as 40 + 50 + 80.		***Example 15*** 364 + 123 + 255 H T U 3 6 4 1 2 3 + 2 5 5 7 4 2 1 1 We put the 1 *below* in the tens column because 12 is 1 ten and 2 units; ∴ we write the 1 close to the 2 to signify 12. 1. **Add units in units column** 4 + 3 + 5 = 12 Write units part (2) in units column and tens part (1) below in tens column. 2. **Now add the tens in the tens column.** 6 tens + 2 tens + 5 tens and 1 more ten is 14 tens i.e. one hundred and forty. We write the tens digit (4) in the tens column and the hundreds digit (1) below in the hundreds column. 3. **Now add the hundreds in the hundreds column.** 3 hundreds + 1 hundred + 2 hundred and 1 more hundred i.e. 7 hundreds. ∴ 364 + 123 + 255 = 742

iv	using known number facts and place-value for mental addition and subtraction.		***Example 16*** 152 – 87 = (Record the *hops* vertically and then add all the *hops* together)  152 – 87 3 → 90 10 → 100 50 → 150 + 2 → 152 65 ∴ 152 – 87 = 3 + 10 + 50 + 2 = 65 ***Example 17*** 382 – 167 = 215 200 H T U 7 1 3 8 2 – 1 6 7 2 1 5 **Steps involved** 1. Give an estimate 2. Subtract the units, '*changing*' a ten for 10 units (12 units – 7 units) 3. Subtract the tens (7 tens – 6 tens) 4. Subtract the hundreds (3 hundreds – 1 hundred) 5. Check with estimate **DO NOT USE THE WORD '*BORROWING*'** The term 'borrowing' implies 'giving back'. Use instead the terms '*changing*' or '*swapping*'

YEAR 6			
LEARNING OUTCOMES **Children will be able to:**		**KEY VOCABULARY**	**OPPORTUNITIES** **Children should be given a range of opportunities such as:**

B.6.1	recognise what must be added to a decimal number to make the next whole number		• applying several mental addition and subtraction strategies.
			• reasoning and selecting an appropriate operation and strategy when solving a problem.
			• verifying the result of a calculation by using an equivalent calculation, an inverse operation or an inverse order.
			• doing investigative work involving solutions to non-routine problems. These activities are essential to enable children to develop problem solving skills and to link together all the strands in the syllabus.
			• solve real-life problems and checking solutions.
			• using different strategies when solving problems such as:
			  • looking for important words in a question.
			  • looking for a pattern.
			  • trial and error.
			  • using tables or charts.
			  • drawing.
			  • working backwards.
			  • trying an easier problem.
			  • making models by using paper, blocks, …
			  • thinking logically for example getting rid of the answer/s that does/do not make sense.
			• exploring mathematical patterns, particularly using addition and subtraction.

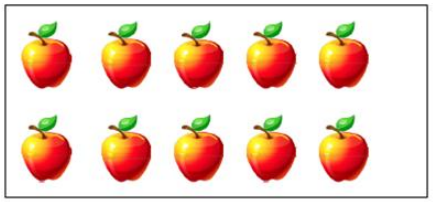
B.6.2	select and use an appropriate operation and strategy when solving a problem		
B.6.3	rehearse adding/ subtracting ThHTU ± ThHTU using informal and standard written methods		
B.6.4	check the result of a calculation and/or real life problem by using an equivalent calculation, an inverse operation or an inverse order		
B.6.5	extend written methods to column addition and subtraction of numbers involving decimals.		
B.6.6	explore mathematical patterns, particularly using addition and subtraction.		
B.6.7	relate mathematical patterns to arithmetical facts and operations.		

B.6.8	**use Mental strategies from previous years, including:**		
i	working out a difference by counting up.		
ii	adding or subtracting the nearest multiple of 10, 100 or 1000, then adjusting.		
iii	using the relationship between addition and subtraction.		
iv	adding several numbers.		
v	using known number facts and place-value to consolidate mental addition/subtraction.		

C: MULTIPLICATON AND DIVISION

Multiplication and division are also basic operations in mathematics and are inversely related. These are powerful foundational concepts in mathematics with applications to many problem situations and connections to many other topics. Undoubtedly, their importance extends to real-life situations.

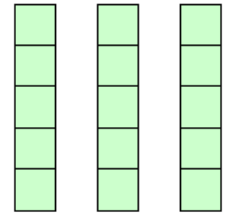
YEAR 3

LEARNING OUTCOMES Children will be able to:		KEY VOCABULARY	OPPORTUNITIES Children should be given a range of opportunities such as:
C.3.1	understand the operation of multiplication as repeated addition that can be done in any order and division as repeated subtraction.	times (×) times table x2,x5,x10 table twos fives tens share between equally left over double/doubling half/halving lots of row column multiplication multiply (×) multiply by	• using and arranging tangible objects to record multiplication and division facts, such as interlocking cubes, beads, marbles, coins (2c, 5c and 10c), other suitable objects and the students themselves. • using the multiplication grid. • identifying patterns in multiplication and division. • explaining an array card using a multiplication and/or division sentence.  e.g. 2 x 5 = 2 lots of 5 = 10 5 x 2 = 5 lots of 2 = 10 10 ÷ 2 = 5 (How many twos make 10?) 10 ÷ 5 = 2 (How many fives make 10?) • counting on and back in 2s, 5s and 10s from any number. • saying multiplication facts as one two is two, two twos are four, three twos are six….. • exploring relationship among doubling, adding and multiplying, e.g. double 20 can be seen as 20 + 20 and 20 x 2, double 35 can be seen as 30 + 30 (60) and/or 30 x 2 and 5 + 5 (10)
C.3.2	recognise multiplication and division as an array.		
C.3.3	use the x, ÷ and = signs to record mental calculations in a number sentence.		
C.3.4	recognise the use of a symbol such as □ or △ to stand for an unknown number.		
C.3.5	**know by heart** multiplication facts for the 2, 5 and 10 times-tables.		
C.3.6	**derive quickly:** • division facts corresponding		

	to the 2, 5 and 10 times-tables. • doubles of all whole numbers to at least 20 and all the corresponding halves. • doubles of multiples of 5 to 50 and all their corresponding halves. • halves of multiples of 10 to 100 and all their corresponding halves.	division (÷) divide divide by	and/or 5 x 2. • expressing half of 70 as half of 60 (30) and half of 10 (5) that make 35.
C.3.7 i ii	**use the following Mental Strategies:** using known number facts to carry out simple multiplication and division. using known number facts and/or place-value to double and halve mentally.		

YEAR 4

LEARNING OUTCOMES Children will be able to:		KEY VOCABULARY	OPPORTUNITIES Children should be given a range of opportunities such as:

C.4.1	extend understanding of the operations of multiplication (×) and division (÷) and further understand that:
	▪ multiplication is repeated addition.
	▪ multiplication can be done in any order (commutative).
	▪ division is repeated subtraction.
	▪ division is grouping and/ or sharing.
		times
		multiply
		multiplication (×)
		lots of
		product
		multiplication sentence
		divide by
		division (÷)
		addition
		subtraction
		pair
		twos
		threes
		fours
		fives
		tens
		eights
		hundreds
		double/doubling
		half/halving
		equal
		digit
		place-value
		remainder (r)
			• counting on and back in 2s, 3s, 4s, 5s and 10s from any number.
			• saying multiplication facts as one two is two, two twos are four, three twos are six…..
			• using and arranging tangible objects to record multiplication and division facts, such as interlocking cubes, beads, marbles, money (coins and notes), other suitable objects and the students themselves.
			• exploring arrays to understand better how each array leads to two multiplications and two divisions.
			$5 \times 3 = 15$
			$3 \times 5 = 15$
			$15 \div 3 = 5$
			$15 \div 5 = 3$
			 
			• using the multiplication grid to observe and identify patterns, such as:
			  • the 4 times-table is double 2 times-table.
			  • the 8 times-table facts by doubling the 4 times-table.
			• identify patterns, such as:
			  • to multiply by 4, double, then double again.
			  • to multiply by 5, multiply by 10 then halve.
			  • to multiply by 20, multiply by 10 then double.
			• checking calculations using the inverse operation.

C.4.2	recognise that division is the inverse of multiplication, and that halving is the inverse of doubling.		
C.4.3	identify remainders after simple division and round up or down after division, depending on the context.		
C.4.4	**know by heart** the multiplication facts of 2, 3, 4, 5, 8 and 10 times-tables .		

<table>
<tr>
<td>C.4.5</td>
<td>multiply by 10/100 (shift the digits one/two places to the left) and to divide multiples of 10/100 by 10/100 (shift the digits one/two places to the right. [integer answers only]).</td>
<td rowspan="3">row
column
array
number line
multiple</td>
<td rowspan="3">

multiplying by 10/ 100 using a place value grid and shifting numbers to the left.

$4 \times 10 = 40$
$4 \times 100 = 400$
<table>
<tr><th>H</th><th>T</th><th>U</th><th></th></tr>
<tr><td></td><td></td><td>4</td><td>4 × 1</td></tr>
<tr><td></td><td>4</td><td>0</td><td>4 × 10</td></tr>
<tr><td>4</td><td>0</td><td>0</td><td>4 × 100</td></tr>
</table>

experiencing mathematical investigations (routine and non-routine) that enable children to develop problem solving skills and further explore links with other strands in the syllabus such as changing from cm to m and working with money.

</td>
</tr>
<tr>
<td>C.4.6</td>
<td>derive quickly:

division facts corresponding to the 2, 3, 4, 5, 8 and 10 times-tables.
doubles of all whole numbers to at least 50 and all the corresponding halves.
doubles of multiples of 5 to 100 and all the corresponding halves.
doubles of multiples of 50 to 500 and all the corresponding halves.

</td>
</tr>
<tr>
<td>C.4.7

i

ii

iii</td>
<td>use the following Mental Strategies:

using doubling or halving, starting from known facts.

knowing how to use the relationship between multiplication and division.

using known number facts and place value to carry out simple multiplications and divisions mentally.</td>
</tr>
</table>

YEAR 5

LEARNING OUTCOMES Children will be able to:		KEY VOCABULARY	OPPORTUNITIES Children should be given a range of opportunities such as:

C.5.1	understand the effect of and the relationship between the four operations, and the principles (not the names) of the arithmetic laws as they apply to multiplication and to use brackets.
	e.g. 4 × 46
	= 4 × 40 and 4 × 6
	= (4 × 40) +(4 × 6)
		multiplication
		multiply
		multiple
		division
		divide by
		addition
		subtraction
		times table
		double/doubling
		half/halving
		digit/tens digit/units digit
		multiplication square
		grid
		row
		column
		thousands
		hundreds
		tenths
		estimate
		remainder (r)
		round up/down
		fraction
		decimal numbers
		decimal point
		number facts
		bracket
		change
			• using the multiplication grid to observe and identify patterns for new multiplication tables such as 6 times-table is double 3 times-table and/or develop the ×6 table from the ×4 and ×2 tables.
			• using multiplication grid to identify factors.
			• rehearsing multiplying by zero: know that a number of zeros altogether is zero.
			• using place value cards and mats to multiply and divide by 10/100.
			• deriving strategies from known x 10/100 facts:
			  • to multiply by 25, multiply by 100 then divide by 4.
			  • to multiply by 9 or 11, multiply by 10 and adjust.
			  • to multiply by 19 and 21, multiply by 20 and adjust.
			• rounding up or down after division, depending on the context.
			• checking results of calculations with inverse operation, approximation (round to nearest 10 or 100) and/or equivalent calculation.
			• exploring any/all of the calculation strategies below:
			Example 18
			$36 \times 4 = 4 \times 36$
			$= 4 \times (30 + 6)$
			$= (4 \times 30) + (4 \times 6)$
			$= 120 + 24$
			$= 144$
			36
			30 6
			160 4 120 24
			Example 19 54 × 26
			50 4
			estimate 1500 20 1000 80
			6 300 24 = 1404
			∴ 54 × 26 = 1404

C.5.2	develop and refine estimation and written methods for: • TU × U • HTU × U • TU × TU • U·t × U • HU·t × U • TU ÷ U • HTU ÷ U • multiplying and dividing by 10/100, shifting the digits one/two places to the right/left.		

C.5.3	identify all pairs of factors of any number up to 100.	horizontal vertical	***Example 20*** 54 × 26 1 5 0 0 — Estimate (50 × 30) 5 4 × 2 6 2 4 — 6 × 4 — Multiply the units (6) by units (4) 3 0 0 — 6 × 50 — Multiply the units (6) by tens (5) 8 0 — 20 × 4 — Multiply the tens (2) by units (4) 1 0 0 0 — 20 × 50 — Multiply the tens (2) by tens (5) 1 4 0 4 — Add the four results 1 **2 tens × 5 tens = 2 tens × 50 = 100 tens = 1000** ∴ 54 × 26 = 1404 ***Example 21*** 9 × 4·7 45 9 × 4·7 = 9 × 4·0 = 36·0 — Split 4·7 into units and tenths 9 × 0·7 = 6·3 — Multiply the units by 9 (9 lots of 4 units). 42·3 — Multiply the tenths by 9 (9 lots of 7 tenths). Add the results **63 tenths = 6 units and 3 tenths = 6·3** ∴ 9 × 4·7 = 42·3
C.5.4	identify remainders after division and express a quotient as a fraction, or as a decimal up to two decimal places.		
C.5.5	**know by heart all**: • multiplication/division facts up to 10 × 10.		
C.5.6	**derive quickly:** • doubles of all whole numbers 1 to 100 and their corresponding halves. • doubles of multiples of 10 to 500 and their corresponding halves. • doubles of multiples of 10 to 1000 and their corresponding halves. • doubles of multiples of 100 to 5000 and their corresponding halves. • doubles of multiples of 100 to 10 000 and their corresponding halves.		

C.5.7	**use the following Mental Strategies:**		***Example 22*** $84 \div 6$
i	using doubling or halving, starting from known facts.		
ii	finding quarters by halving halves.		
iii	using known number facts and place-value to multiply and divide mentally.		
iv	using closely related facts such as: • to multiply by 9 or 11, multiply by 10 and adjust. • to multiply by 19 or 21, multiply by 20 and adjust.		
v	partitioning and using the distributive law: e.g. $23 \times 4 = (20 \times 4) + (3 \times 4)$		

$$
\begin{array}{r|l}
 & \boxed{12} \\
 & \mathbf{1\ 4} \\
\hline
6\ \big)\ 8\ 4 & \\
-\ 6\ 0 & 10 \times 6 \quad \text{Are there ten sixes in 84? Yes} \\
\hline
\quad 2\ 4 & \\
-\ 2\ 4 & 4 \times 6 \quad \text{How many sixes in 24?} \\
\hline
\quad\ \ 0 & \mathbf{14} \times 6 \\
\hline
\end{array}
$$

$\therefore\ 84 \div 6 = \mathbf{14}$

YEAR 6

LEARNING OUTCOMES Children will be able to:		KEY VOCABULARY	OPPORTUNITIES Children should be given a range of opportunities such as:
C.6.1	consolidate the understanding and the usage of the four operations and the principles (not the names) of the arithmetic laws including the use of brackets.	multiplication fact division fact multiplication multiply division divide by double/doubling half/halving multiple calculation estimate rounding round up/down fraction multiplication square remainder brackets rectangle units/tens tenths/hundredths decimal point decimal numbers product quotient	• using multiplication grid for factors. • using place value cards and mats to multiply and divide by 10/100. • multiplying by zero knowing and exploring pattern : multiplying any number by zero make zero. • rounding up or down after division, depending on the context. • checking results of calculations with inverse operation, and/or equivalent calculation. • recognising that multiplying/dividing by 100 is equivalent to multiplying/dividing by 10 then 10 again. • using doubling and halving to help multiply. • estimating, before multiplying. • exploring any/all of the calculation strategies below: ***Example 20*** 680 ÷ 3 200 2 2 6 r 2 3) 6 8 0 −6 0 0 — 200 × 3 — Do we have a hundred threes in 680? Yes. Do we have two hundred threes in 680? Yes. 8 0 − 6 0 — 20 × 3 — Do we have ten threes in 80? Yes. Are there twenty threes? Yes. 2 0 − 1 8 — 6 × 3 — How many threes in 20? 2 — 226 × 3 ∴ 680 ÷ 3 = 226 r 2
C.6.2	use written methods for: • ThHTU × U • HTU × TU • U.t × U • HU·t × U • U·th × U • TU ÷ U • HTU ÷ U • HTU ÷ TU • U.t ÷ U • U·th ÷ U • multiplication and division by 10/100 including decimals (shifting the digits one/two places to the right/left)		

C.6.3	multiply by near multiples of 10 and 100 e.g. to multiply by 49 or 51, multiplying by 50 and adjusting.		***Example 21*** 956 ÷ 32 30 2 9 r 28 32) 9 5 6 – 6 4 0 (20 × 32) Are there ten thirty-twos in 956? Yes. Are there twenty thirty-twos in 956? Yes. 3 1 6 – 2 8 8 (9 × 32) How many thirty-twos in 316? 2 8 ∴ 956 ÷ 32 = 29 r28 ***Example 22*** 123·41 ÷ 7 2 0 1 7 · 6 3 7) 1 2 3 · 4 1 – 7 0 · 0 0 (10 0 × 7) Start by subtracting tens of seven. 5 3 · 4 1 – 4 9 · 0 0 (7 0 × 7) Then subtracting units of seven. 4 · 4 1 – 4 · 2 0 (0 6 × 7) Next subtracting tenths of seven. 0 · 2 1 – 0 · 2 1 (0 03 × 7) Finally subtracting hundredths of seven. 0 · 0 0 (17 63 × 7)
C.6.4	identify remainders after division and express a quotient as a fraction, or as a decimal up to two decimal places.		
C.6.5	identify common multiples of 2 or 3 numbers and the smallest common multiples of 2 or 3 numbers.		
C.6.6	**derive quickly**: • multiplication/division facts up to 10 × 10 and the corresponding halves. • squares of multiples of 10 to 100 and the corresponding halves. • doubles of decimal numbers and the corresponding halves. • doubles of multiples of 10 to 10,000 and the corresponding halves.		

C.6.7	**use the following Mental Strategies:**		
i	using the relationship between multiplication and division.		
ii	relating multiplication/division facts and doubling or halving to: • double or halve the most significant digit first. • multiply by 25, multiply by 100 then divide by 4. • double one number and halve the other.		
iii	using factors and/or partitioning. e.g. • 35 × 18 = 35 × 6 × 3 • 87 × 6 = (80 × 6) + (7 × 6) • 3·4 × 3 = (3 × 3) + (0·4 × 3)		
iv	using closely related facts such as multiplying by 49 or 51 by multiplying by 50 and adjusting.		

D: FRACTIONS, DECIMALS, PERCENTAGES AND PROPORTION

Fractions, percentages, decimals and proportion are closely related. A fraction is any part of a group, number or whole. A decimal is a number containing both an integer part and digits separated by the decimal point, while a percentage is a quantity out of 100. Proportion is a comprehensive concept and it is imbedded in fractions, percentages and decimals.

In everyday situations, we continuously move from one form to another and then back again. Despite their strong relationship we must also know when we need to use one form among the others.

A good grasp of fractions, decimals, percentages and proportion will help you: evaluate offers, calculate fuel consumption, read a recipe, build a scale model of a car or of an aeroplane and understand a news item or the results from a survey for example.

The above is only a basic representation of the importance of fractions, decimals, percentages and proportion. Helping our children understand and appreciate this may be fruitful.

YEAR 3

LEARNING OUTCOMES Children will be able to:		KEY VOCABULARY	OPPORTUNITIES Children should be given a range of opportunities such as:
D.3.1	use fraction notation.	half/halves quarter equal parts fraction whole numerator denominator semi-circle	• using shapes to fold and cut in halves and quarters and identifying that each half and quarter is exactly the same size and shape. (identical) • recognising that a quarter is a half of a half. • using tangible objects such as counters, marbles and interlocking cubes. • writing and understanding fractions with unit numerators, e.g. $\frac{1}{2}$. • understanding that the bottom number in the fractions shows how many equal parts into which the whole is divided.
D.3.2	recognise and find halves and quarters of shapes.		
D.3.3	recognise and find halves and quarters of small number of objects.		
D.3.4	recognise that two halves and four quarters make one whole.		
D.3.5	recognise that two quarters are equivalent to one half.		

YEAR 4

LEARNING OUTCOMES Children will be able to:		KEY VOCABULARY	OPPORTUNITIES Children should be given a range of opportunities such as:
D.4.1	recognise unit fractions and use them to find fractions of shapes and numbers such as: $\frac{1}{2}, \frac{1}{3}, \frac{1}{4}, \frac{1}{5}, \frac{1}{10}$.	fraction numerator denominator quarter	• understand that when a shape is divided into three equal parts it is called a third. • writing and understanding fractions with non-unit numerators, e.g. $\frac{3}{4}$.
D.4.2	recognise simple fractions that are several parts of a whole such as: $\frac{3}{4}, \frac{2}{3}, \frac{3}{10}$.	half/halves third eighth equal parts matching fractions whole mixed number	• understanding that the bottom number in the fractions shows how many equal parts into which the whole is divided and that the top part shows how many of these equal parts are considered. • showing fractions of shapes using paper shapes and colouring. • showing fractions of quantities using tangible objects. • using number lines and/or number grids. • recognising that one whole is the same as $\frac{2}{2}, \frac{3}{3}$...
D.4.3	recognise mixed numbers such as $5\frac{3}{4}$.		
D.4.4	recognise simple equivalent fractions such as five tenths and one half, five fifths and one whole.		
D.4.5	compare fractions.		

YEAR 5

LEARNING OUTCOMES Children will be able to:		KEY VOCABULARY	OPPORTUNITIES Children should be given a range of opportunities such as:
D.5.1	understand and use simple fractions and mixed numbers.	half quarter third eighth	• identifing two simple fractions with a total of 1. • exploring equivalent fractions including hundredths to tenths. • using a number line to show the position of a fraction and to compare fractions.
D.5.2	change an improper fraction to a mixed number and vice versa.		

D.5.3	relate fractions to division and find simple fractions of numbers and quantities.	tenth three quarters hundredth fraction matching fractions equivalent number line numerator denominator division/divide by equal decimal number decimal point whole number round up/down nearest estimate proportion	• deciding whether fractions are greater, less or equal to one half. • ordering a set of simple fractions and/or mixed numbers and position them on a number line. • using < and > and = to compare fractions. • understanding that if they know $\frac{1}{6}$ of a quantity than it is easier to find $\frac{2}{6}, \frac{3}{6}$, ….. of a quantity. • realising that the decimal point separates whole numbers and tenths and hundredths. • knowing that 3.0 is the same as 3. • recalling decimal addition pairs to 1 and 10. • recognising what must be added to a decimal number to make the next whole number. • knowing that when something is divided into ten equal parts, each part is one tenth or zero point one. • understanding that whole numbers and tenths can be written in two different ways such as $3\frac{2}{10}$ = 3·2 (three point two) and 3 $\frac{45}{100}$ = 3·45 (three point four five) . • ordering decimal numbers to better understand that they first need to look at the number of units (whole), then the tenths, then the hundredths. • using a number line to help order decimals. • using < and > and = to compare decimal numbers. • recognising that between two adjacent tenths, there are another ten equal divisions called hundredths. • recognising that: $\frac{1}{2}$, $\frac{5}{10}, \frac{5}{100}$ and 0.5; $\frac{1}{4}, \frac{25}{100}$ and 0.25; $\frac{3}{4}$, $\frac{75}{100}$ and 0.75 are equivalent. • rounding a decimal number to its nearest whole number to better understand that they have to: • decide between which whole numbers it lies, then which is the
D.5.4	use decimal notation for tenths and hundredths (i.e. up to two decimal places) and know what each digit represents.		
D.5.5	round a number with one or two decimal places to the nearest integer (whole number).		
D.5.6	compare and order: • a set of simple fractions. • a set of mixed numbers. • a set of decimal numbers (including measurements).		
D.5.7	recognise the equivalence between the decimal and the fraction forms for halves, quarters and tenths.		
D.5.8	use simple proportion to solve simple problems.		

			nearer. • round down if the number of tenths is less than 5, and round up if it is 5 or more. • understanding that a proportion is a part of a whole and can be expressed in different ways, e.g. 4 parts out of a whole 5 parts can be expressed as 4 in 5, 4 out of 5, $\frac{4}{5}$. • understanding that proportion can be simplified in the same way as a fraction, e.g. a proportion of 6 out of 8 can be simplified as 3 out of 4.

YEAR 6

LEARNING OUTCOMES Children will be able to:		KEY VOCABULARY	OPPORTUNITIES Children should be given a range of opportunities such as:
D.6.1	reduce a fraction to its simplest form by cancelling common factors in the numerator and denominator.	fraction common factor half third quarter fifth sixth eighth tenth equivalent fraction simplest form reduce numerator denominator improper fraction mixed number hundredths thousandths order largest smallest	• using a fraction as an 'operator' to find fractions, including tenths and hundredths, of numbers or quantities. • understanding that the simplest fraction is the one that cannot be reduced (divided) any further. • reducing a fraction to its simplest form by dividing the top and bottom by the largest possible common factor. • ordering fractions with the same denominator. • knowing that a mixed number is part whole number and part fraction. • understanding that an improper fraction is one whose numerator is greater than the denominator. • converting an improper fraction into a mixed number. • converting a mixed number into an improper fraction. • understanding what each digit in a number (with up to three decimal places) represents. • converting a fraction into a decimal. • understanding that 3·42 lies between 3·4 and 3·5 (by extending this idea they realise that there is an infinite number of decimal fractions between 3·4 and 3·5). • ordering a mixed set of numbers or measurements with up to three decimal places.
D.6.2	order fractions by converting them to fractions with a common denominator, and position them on a number line.		
D.6.3	rehearse converting a mixed fraction into an improper fraction and vice versa.		
D.6.4	use decimal notation for tenths and hundredths in calculations, and tenths, hundredths and thousandths when recording measurements.		
D.6.5	to solve simple problems involving proportion.		
D.6.6	understand percentage as the		

	number of parts in every 100.	percentage proportion lowest term	• rounding a number with two decimal places to the nearest tenth or to the nearest whole number. • recognising the equivalence between the decimal and fraction forms of one half, one quarter, three quarters, one eighth … and tenths, hundredths and thousandths. • recalling simple fractions as percentages such as: $\frac{1}{2}$ = 50%, $\frac{1}{4}$ = 25%, $\frac{3}{4}$ = 75%. • knowing that a proportion is a part of a whole and can be expressed in different ways, e.g. 4 parts out of a whole 5 parts can be expressed as 4 in 5, 4 out of 5, $\frac{4}{5}$. • understanding that a proportion can be simplified in the same way as a fraction, e.g. a proportion of 6 out of 8 can be simplified as 3 out of 4.
D.6.7	express simple fractions such as one half, one quarter, three quarters and tenths and hundredths as percentages.		
D.6.8	find simple percentages of small whole-number quantities.		
D.6.9	understand the relationship between fractions, decimals and percentages.		

D: MASS (WEIGHT)

Weight is a quantity. Measuring and understanding weight is of utmost importance. Undoubtedly, you have experienced the measurement of weight many times, such as at the time of physical health check-ups. Or perhaps you may have asked yourself: Is that object too heavy to pick up by myself or do I need something to lift it?

When you go to the greengrocer to buy vegetables and fruit, for example, there will be tags attached that tell you the price per kilogram so you can compare the cost of one brand/item over another. Without a standard measure of weight, in this case a kilogram, you wouldn't know exactly what you are paying for.

Unlike other quantities, it is very difficult to measure weight in a visible way like length and size. Weight is difficult to judge visually. While you can always make an estimate of the weight of an object, you will need to use a measuring tool such as a measuring tape, a ruler or a trundle wheel to have an accurate measure in grams and/or kilograms. In order to do this, you need to be able to read a scale.

The above are only a few life situations where being able to read, measure and understand weight is important. Helping our children understand and appreciate this may be fruitful.

Note: The terms mass and weight are different, yet are used interchangeably throughout the Primary years.

YEAR 1

LEARNING OUTCOMES Children will be able to:		KEY VOCABULARY	OPPORTUNITIES Children should be given a range of opportunities such as:
E.1.1	use language such as heavier or lighter to compare two quantities, then more than two, by making direct comparisons of masses.	heavy light heavier than lighter than weigh/s larger/smaller balance scales	▪ feeling the weight of various familiar objects to compare them by using words such as 'heavier' or 'lighter'. ▪ estimating the weight of familiar objects by comparing two objects and guessing which one is 'heavier' or 'lighter'. ▪ identifying objects around them which they consider to be lighter or heavier than their weight. ▪ recognising that a larger object can be lighter and a smaller object can be heavier. ▪ using simple measuring scales such as the balance scales (rocker
E.1.2	compare the weights of two objects directly, using balance scales.		

			balance or pan scales) to understand that the heavier object is pulled down. This can also be compared to the idea of a see-saw.

YEAR 2

LEARNING OUTCOMES Children will be able to:		KEY VOCABULARY	OPPORTUNITIES Children should be given a range of opportunities such as:
E.2.1	understand and use the vocabulary related to mass to compare two masses by direct comparison; extend to more than two.	Heavy light heavier than lighter than balance scales weigh/s weight order	• suggesting suitable uniform non-standard units and measuring equipment to estimate, then measure, a mass • recording estimates and measurements e.g. 'about as heavy as 20 cubes'. • practising comparing the mass (weight) of two objects using the balance scales (rocker balance or pan scales) and choosing which object is heavier or lighter (understanding that the heavier side goes down and the lighter side goes up). • understanding that smaller objects are not necessarily lighter than bigger objects, i.e. recognising that mass (weight) and size are not necessarily related. This could be carried out using toys or vegetables and fruits. • being exposed to the standard units in their environment (to become aware), i.e. kilograms and grams.
E.2.2	measure using uniform non-standard units.		

YEAR 3

LEARNING OUTCOMES Children will be able to:		KEY VOCABULARY	OPPORTUNITIES Children should be given a range of opportunities such as:
E.3.1	use and read the vocabulary related to mass.	heavy heavier than light lighter than weigh /s weight kilogram (Kg) gram (g) scales balance	• suggesting suitable units and equipment for estimating and measuring the mass (weight) of various objects, including kitchen analogue and digital scales. • feeling the mass (weight) of different objects which weigh one kilogram and recognising that mass (weight) and size are not necessarily related. • Identifying objects around them which weigh less or more than one kilogram. • reading the labels on products which show their mass (weight) and comparing the mass (weight) of various objects by putting them in order.
E.3.2	estimate, measure and compare masses using standard units and read a simple scale to the nearest labelled division.		

			• identifying different products which together weigh a total of one kilogram. • estimate how many fruits or vegetables of the same type are needed to make one kilogram and then find the actual number. • practising estimating and then measuring different amounts of ingredients or sweets during activities such as cooking, maths fun activities, etc.

YEAR 4

LEARNING OUTCOMES Children will be able to:		KEY VOCABULARY	OPPORTUNITIES Children should be given a range of opportunities such as:
E.4.1	read and write the vocabulary related to mass.	weight gram (g) kilogram (kg) balance heavy / heavier light / lighter	• suggesting suitable units and measuring equipment to estimate or measure mass, including using an analogue and digital kitchen scales. • using and reading scales to the nearest division (labelled or unlabelled). • recording estimates and measurements to the nearest whole or half unit or in mixed units e.g. about 3.5kg. • identifying the labels on products which show their mass (weight) and comparing the mass (weight) of various objects by putting them in order. • identifing different products which together weigh a particular mass (weight) e.g. 1 kilogram, 2 kilograms, etc. • estimating how many fruits or vegetables of the same type are needed to make one kilogram, two kilograms, etc.. and then find the actual number. • practising estimating and then measuring different amounts of ingredients or sweets during activities such as cooking, maths fun activities, etc. • making one kilogram using various smaller masses (weights), eg. ten 100g weights, or two 500g weights, etc, and knowing that one kilogram is the same as 1000 grams. • solving (one-step) real-life problems related to the topic mass (weight) involving recipes, travelling by plane, at the supermarket, …
E.4.2	measure and compare using standard units and know the relationships between kilograms and grams.		

YEAR 5			
LEARNING OUTCOMES **Children will be able to:**		**KEY VOCABULARY**	**OPPORTUNITIES** **Children should be given a range of opportunities such as:**
E.5.1	use, read and write standard metric units of mass, including their abbreviations, and know and use the relationships between them.	weight gram (g) kilogram (kg) balance heavy / heavier light / lighter scales convert difference compare	• choosing an appropriate unit of measurement and measuring equipment to make a reasonable estimate and measure mass (weight). • recording estimates and readings from scales to a suitable degree of accuracy. • practising weighing and estimating the mass (weight) of familiar objects and developing their own benchmark for comparisons, for example, having a 1 kg weight or an object that weighs a certain amount as a reference. • feeling real supermarket products with their mass (weight) hidden, estimating their mass (weight) and putting them in order from lightest to heaviest, then checking their actual mass (weight) using a balance. • converting a collection of mass (weight) labels shown on real products or in recipes from kilograms to grams and from grams to kilograms, and from fraction or decimal number to kilograms and grams and vice versa. • using the bathroom scales to measure their own mass (weight) and comparing their mass (weight) to other objects or persons. • solving (up to two-step) real-life problems related to the topic mass (weight) involving recipes, travelling by plane, at the supermarket, … and communicating the process adopted and/or their result/s. • investigating mathematical problems and communicating the process adopted and/or their result/s. • creating word problems related to mass (weight).
E.5.2	know the equivalent of one half, one quarter, three quarters and one tenth of 1 kg, and convert weights in kilograms and grams to grams and vice versa.		

YEAR 6			
LEARNING OUTCOMES **Children will be able to:**		**KEY VOCABULARY**	**OPPORTUNITIES** **Children should be given a range of opportunities such as:**
E.6.1	use, read and write standard metric units, including their abbreviations, and relationships between them.	weight gram (g) kilogram (kg) balance heavy / heavier light / lighter scales convert difference compare	• choosing an appropriate unit of measurement and measuring equipment to make a reasonable estimate and measure mass (weight). • recording estimates and readings from scales to a suitable degree of accuracy. • practising weighing and estimating the mass (weight) of familiar objects and developing their own benchmark for comparisons, for example, having a 1 kg weight or an object that weighs a certain amount as a reference. • feeling real supermarket products with their weights hidden, estimating their weights and putting them in order from lightest to heaviest, then checking their actual weight using a balance. • converting a collection of mass (weight) labels shown on real products or in recipes from kilograms to grams and from grams to kilograms, and from fraction or decimal number to kilograms and grams and vice versa. • using the bathroom scales to measure their own mass (weight) and comparing their mass (weight) to other objects or persons. • solve real-life problems (inc. multi-step) related to the topic mass (weight) such as involving recipes, travelling by plane, at the supermarket, … and then communicating the process adopted and/or their result/s. • investigating mathematical problems and then communicating the process adopted and/or their result/s. • creating word problems related to mass (weight).
E.6.2	convert larger to smaller units and vice versa.		

F: CAPACITY

Understanding capacity is especially important in the field of medicine or chemistry when one is dealing constantly with liquid measurement. Nonetheless, understanding capacity is also important in our everyday life.

When you are sick and your doctor prescribes medicine you need to take your medicine in the proper amounts. Your health will not benefit if you take too little or too much. Cooking also involves a lot of measurement such as: add 120 mℓ of water or 50 mℓ of olive oil. In fact, the kitchen is a good place, though not the only, to measure different capacities. Using a measuring jug you can check the capacity of different items such as cups, glasses, bottles and perhaps the capacity of a kettle. What is the capacity of the milk carton in your fridge? And do you have anything in your kitchen, in the cupboards or in the fridge, which has a capacity of 1 litre? Estimate and then check by reading the label on the container/s.

The above are only a few life situations where being able to read, measure and understand capacity is important. Helping our children understand and appreciate this may be fruitful.

YEAR 1

LEARNING OUTCOMES Children will be able to:		KEY VOCABULARY	OPPORTUNITIES Children should be given a range of opportunities such as:
F.1.1	understand and use the vocabulary related to capacity.	fill pour full empty half full half empty nearly full nearly empty holds more / most less / least	• filling a collection of containers with dry filling material (e.g. peas, rice, lentils, sand, etc) to show different capacities, such as full, nearly full, half full, nearly empty and empty. • sorting different transparent containers according to capacity and describing how full or empty they are. • filling a transparent container with coloured water and then pouring the same water from one container to the next and discussing what they see. • estimating the capacity of different containers by responding to questions such as: 'Which containers do you think holds the most or the least?'
F.1.2.	use language such as more or less to compare two quantities, then more than two, by making direct comparisons and filling and emptying containers.		

<table>
<tr><th colspan="4">YEAR 2</th></tr>
<tr><th colspan="2">LEARNING OUTCOMES
Children will be able to:</th><th>KEY VOCABULARY</th><th>OPPORTUNITIES
Children should be given a range of opportunities such as:</th></tr>
<tr><td>F.2.1</td><td>understand and use the vocabulary related to capacity.</td><td rowspan="2">fill
pour
empty /nearly / half empty
full / half / nearly full
capacity
holds
more / the most
less / the least
largest
smallest</td><td rowspan="2">• measuring using uniform non-standard units (e.g. yoghurt pots, jam jar, beaker, eggcup) or standard units (e.g . litre jugs).
• suggesting suitable standard or uniform non-standard units and measuring equipment to estimate, then measuring a capacity, recording estimates and measurements as ‘about 3 beakers full’ or ‘ almost 5 tea cups full’, etc.
• filling containers to given capacities, e.g show half full, then nearly full, then full, etc.
• estimating the order of capacity of a set of containers and later measuring each container using non-standard units to find the actual capacity in terms of yoghurt pots, cups, eggcups, etc.</td></tr>
<tr><td>F.2.2</td><td>compare two capacities by direct comparison; extend to more than two.</td></tr>
<tr><th colspan="4">YEAR 3</th></tr>
<tr><th colspan="2">LEARNING OUTCOMES
Children will be able to:</th><th>KEY VOCABULARY</th><th>OPPORTUNITIES
Children should be given a range of opportunities such as:</th></tr>
<tr><td>F.3.1</td><td>use and read the vocabulary related to capacity.</td><td rowspan="2">estimate
measure
capacity
litres
potfuls
cupfuls
smaller
larger
equal to
more / the most
less / the least
fill
holds
full / half / nearly full
empty / nearly / half empty</td><td rowspan="2">• suggesting suitable units and equipment for measuring the capacity of different containers.
• reading a simple scale to the nearest labelled division, including using a ruler to draw and measure lines to the nearest litre, recording estimates and measurements.
• estimating and measuring the capacity of different containers by using non-standard units, e.g. yoghurt pots, tea cups, etc
• adding the capacities of various containers to the nearest litre and showing the total capacity on a given scale.
• looking at various capacities of different products or objects from real life, in litres; e.g. bottles, detergents, buckets.</td></tr>
<tr><td>F.3.2</td><td>estimate, measure and compare capacities using standard units.</td></tr>
</table>

<table>
<tr><th colspan="3">YEAR 4</th></tr>
<tr><th colspan="2">LEARNING OUTCOMES
Children will be able to:</th><th>KEY VOCABULARY</th><th>OPPORTUNITIES
Children should be given a range of opportunities such as:</th></tr>
<tr><td>F.4.1</td><td>read and write the vocabulary related to capacity.</td><td rowspan="2">estimate
measure
litre
millilitre
capacity
division
scale
smaller
larger
more / the most
less / the least
equal to
convert</td><td rowspan="2">• suggesting suitable units and measuring equipment to estimate or measure capacity (ml or l)
• reading scales to the nearest division (labelled or unlabelled).
• exploring and comparing differently-shaped containers which have the same capacity and discuss their observations.
• finding containers and products from real life which are less, more or equal to 1 litre.
• estimating the capacity of various products from real life, and then putting them in order from smallest to largest by referring to the printed capacity shown.
• converting the capacity of products from litres to millilitres and vice versa.
• investigating and solving (up to one-step) word problems related to capacity by referring to situations from real life, e.g. ‘How many 200 mℓ cups are needed to fill a 2 ℓ bottle?’, ‘how many teaspoons are needed to fill a tea cup?’ and communicating the process adopted and/or their result/s.</td></tr>
<tr><td>F.4.2</td><td>measure and compare different capacities using standard units and know the relationship between litres and millilitres.</td></tr>
<tr><th colspan="3">YEAR 5</th></tr>
<tr><th colspan="2">LEARNING OUTCOMES
Children will be able to:</th><th>KEY VOCABULARY</th><th>OPPORTUNITIES
Children should be given a range of opportunities such as:</th></tr>
<tr><td>F.5.1</td><td>use (measure and estimate), read and write standard metric units, including their abbreviations in order to refer to capacity.</td><td rowspan="2">estimate
measure
litres
millilitres
capacity
scale
divisions
smaller
larger</td><td rowspan="2">• suggesting suitable units and measuring equipment to estimate or measure capacity of various containers and / or products.
• recording estimates and readings from scales to a suitable degree of accuracy.
• converting litres and millilitres into millilitres and vice versa.
• practising comparing different containers which have the same capacity and observing how their shape can make it appear larger or smaller (refer to products we buy at the supermarket, etc)
• estimating different capacities of containers or products by referring to</td></tr>
<tr><td>F.5.2</td><td>know the equivalent of one half, one quarter, three quarters and one tenth of 1 litre in mℓ.</td></tr>
</table>

		more / the most less / the least equal to convert one half one quarter three quarters one tenth	a known 1 litre container as a benchmark (e.g. a large carton of milk is equal to 1 litre). • working on finding or reading the capacity on various measuring jugs having different divisions, e.g. 50 *mℓ* divisions, 100 *mℓ* divisions, and discuss how they should be read. • estimating how many smaller containers are needed to make 1 litre. Trying out the same activity using other small containers with different capacities. • observing and comparing products having different capacities when shopping, such as at the supermarket, etc. Identifying the labels showing the capacity and comparing the prices to see how much money can be saved (if any) when buying products with larger capacities, rather than buying two smaller products. • solving various simple (up to two-step) real-life problems involving capacity and communicating the process adopted and/or their result/s. • investigating mathematical problems and communicating the process adopted and/or their result/s. • creating word problems related to capacity.

YEAR 6

LEARNING OUTCOMES Children will be able to:		KEY VOCABULARY	OPPORTUNITIES Children should be given a range of opportunities such as:
F.5.1	use (measure and estimate), read and write standard metric units, including their abbreviations, (*mℓ* and *ℓ*), and relationships between them (by converting from larger to smaller units and vice versa) in order to refer to capacity.	estimate measure litres millilitres scale capacity divisions smaller larger equal to more / the most less / the least convert	• suggesting suitable units and measuring equipment to estimate or measure capacity. • recording estimates and readings from scales to a suitable degree of accuracy. • estimating the capacity of a number of products from real-life, then checking their capacity label or measuring their capacity using a measuring jug. Children can put the products in order from smallest to largest. • estimating how many smaller containers are needed to fill a larger container and vice versa. • observing and comparing products having different capacities when shopping, such as at the supermarket, etc. Identifying the labels
F.5.2	measure and draw lines on scales to the nearest millimetre.		

			showing the capacity and comparing the prices to see how much money can be saved (if any) when buying products with larger capacities rather than two smaller products. • solving various real-life problems (inc. multi-step) related to capacity through reasoning and practical work and communicating the process adopted and/or their result/s. • investigating mathematical problems and communicating the process adopted and/or their result/s. • creating word problems related to capacity.

G: LENGTH, PERIMETER AND AREA

Learning how to measure length is an important life skill. Measurements in millimetres, centimetres, metres and kilometres are also very much present in sports and not only. Sometimes, measurements need to be accurate, however many times we simply need to make estimates.

Measuring length is also essential for calculating perimeter and area: two important and fundamental mathematical topics. They help you to measure physical space. Perimeter is a measurement of the distance around a shape and the area gives us an idea of how much surface the shape covers. Knowledge of perimeter and area is applied practically by people on a daily basis, such as architects, engineers, and graphic designers… it is mathematics that is very much needed by people in general. Understanding how much space you have and learning how to fit shapes together exactly will help you when you paint a room, buy a home, remodel a kitchen or build a deck.

The above are only a few life situations where being able to read, measure, calculate and understand length, perimeter and area is important. Helping our children understand and appreciate this may be fruitful.

YEAR 1

LEARNING OUTCOMES Children will be able to:		KEY VOCABULARY	OPPORTUNITIES Children should be given a range of opportunities such as:
G.1.1	use language such as long/short and longer/ shorter… to compare two quantities.	length long/longer short/shorter measure height tall/taller How long/tall… do you think…?	• recognising that different units can be used to measure length e.g. crayons, straws, and that they must be placed end to end with no gaps. • recognising that length is not usually an **exact** number of units, it is often **nearly** a number of units • using long objects of different lengths such as, metre stick, pole, shelf, drinking straws etc. • using tall objects of different heights such as, chair, pole, bin, and drinking straws. • recognising that different units of different lengths can be used to measure heights. • understanding that to measure the height of an object you can often measure its length when it is lying flat.
G.1.2	understand the vocabulary associated with length and height.		
G.1.3	estimate (begin to) and measure length using non-standard units.		
G.1.4	estimate (begin to) and measure height using non-standard units.		

G.1.5	record estimates and measurements using non-standard units.		

YEAR 2

LEARNING OUTCOMES Children will be able to:		KEY VOCABULARY	OPPORTUNITIES Children should be given a range of opportunities such as:
G.2.1	understand and use the vocabulary related to length.	long/longer short/shorter tall/taller high/higher length height compare measure correct / correctly closest furthest	• comparing two lengths and recognising that one is longer, the other is shorter. • comparing two heights and recognising that when one is taller and the other is shorter. • choosing two objects and predicting which one is longer / taller / shorter using appropriate vocabulary and then putting them side by side and checking. • recognising that different units can be used to measure length or height. (e.g. towers of ten interlocking cubes, drinking straws, strips of squared paper, paper clips etc.) • recognising that the units must be placed end to end and should be the same length. • recognising that the first unit must be lined up with the end of the object to be measured. • recognising that the length is not usually an exact number of units.
G.2.2	compare two lengths/heights by direct comparison; extend to more than two.		
G.2.3	suggest suitable standard or uniform non-standard units and measuring units to estimate.		
G.2.4	measure the length or height of an object using non-standard units.		

YEAR 3

LEARNING OUTCOMES Children will be able to:		KEY VOCABULARY	OPPORTUNITIES Children should be given a range of opportunities such as:
G.3.1	use and read the vocabulary related to length.	length long centimetre / metre (cm/m) measure estimate	• knowing that different units of the same length can be used to measure length or height. • knowing that we can measure lengths using centimetre strips. • realising that cm is short for centimetre and m is short for metre. • knowing that length can be measured in metres too • recognising the relationship between metres and centimetres.
G.3.2	estimate, measure and compare lengths using standard units (m/cm)		
G.3.3	suggest suitable units and		

	equipment for such measurement (e.g. would you measure the length of a pencil in m or cm?)		• knowing that there are 100 cm in 1 m etc. • understanding that measuring stick or strip must be lined up with the object to be measured.
G.3.4	read a simple scale to the nearest labelled division, inc. using a ruler to draw and measure lines to the nearest cm.		
G.3.5	record estimates and measurements e.g. '3 and a bit metres long' or 'about 8 cm long'.		

YEAR 4

LEARNING OUTCOMES **Children will be able to:**		**KEY VOCABULARY**	**OPPORTUNITIES** **Children should be given a range of opportunities such as:**

G.4.1	read and write the vocabulary related to length.	centimetre (cm)
		metre (m)
		kilometre (km)
		more/less
		estimate
		about/roughly
		units (of measure)
		long/longer
		short/shorter
		difference
		estimate
			• understanding that:
			  • there are one hundred centimetres in a metre.
			  • a 9 year old child is a metre and a bit tall.
			  • there are one thousand metres in a kilometre.
			  • kilometres measure long distances.
			  • there are 100 cm in a metre
			• working out the total of two lengths.
			• working out the difference between two lengths by counting on from the smaller to the larger.
			• understanding that 'one metre and twenty five centimetres' can be written as '1·25'.
			• investigating and solving (up to one-step) word problems related to length by referring to situations from real life and communicating the process adopted and/or their result/s.

G.4.2	measure and compare using standard units , including using a ruler to draw and measure lines to the nearest centimetre/metres		
G.4.3	know the relationship between metres and centimetres, metres and kilometres.		

G.4.4	suggest: • suitable units to estimate. • measuring equipment to estimate or measure length.		
G.4.5	record estimates and measurements to the nearest whole or half unit or in missed units. e.g. 3 m and 20 cm.		
G.4.6	use the decimal notation for metres and centimetres.		

YEAR 5

LEARNING OUTCOMES Children will be able to:		KEY VOCABULARY	OPPORTUNITIES Children should be given a range of opportunities such as:
G.5.1	use, read and write standard metric units including their abbreviations.	length distance height centimetres (cm) millimetres (mm) metres (m) kilometres (km) area square centimetre/ cm^2 length/ breadth perimeter	• recognising that we use different units depending on what we are measuring. • understanding that 10 mm = 1 cm, 100 cm = 1 m, 1000 m = 1 km and explore other relationships. • converting from one unit of measurement to another, e.g. converting up to 1000 cm in metres and vice versa. • recognising and read cm^2 as square centimetres. • understanding that area is not a measurement of length but the amount of ground covered. • working out the area of a 2-D (flat) object by covering it with flat objects and counting how many are needed; the units must all be the same size. • understanding how to use length × breadth to calculate the area of a rectangle. • understanding that perimeter is a measurement of length and is the distance all the way around an object.
G.5.2	know the equivalent of one half, one quarter, three quarters and one tenth of 1 m in cm.		
G.5.3	suggest: • suitable units to estimate. • measuring equipment to estimate or measure length.		

G.5.4	understand, measure and calculate the perimeter and area of rectangles and other simple shapes using non-standard units, counting methods and standard units (cm, cm^2)		• recording estimates and readings from scales to a suitable degree of accuracy. • measuring and drawing lines to the nearest millimetre. • solving up to two-step word problems and communicating the process adopted and/or their result/s. • investigating mathematical problems and communicating the process adopted and/or their result/s. • creating word problems related to length, perimeter and/or area.
G.5.5	understand and use the formula in words,' length times breadth' for the area of a rectangle.		

YEAR 6

LEARNING OUTCOMES Children will be able to:		KEY VOCABULARY	OPPORTUNITIES Children should be given a range of opportunities such as:
G.6.1	use, read and write standard metric units, including their abbreviations, and explore the relationships between them.	millimetre (mm) centimetre (cm) metre (m) kilometre (km) approximately equal to area square centimetre (cm^2) length times breadth (l × b) perimeter rectangle/square	• understanding metric units. • converting larger to smaller units e.g km to m, m to cm or mm. • converting smaller to larger units e.g. m to km, cm or mm to m. • measuring and drawing lines to the nearest millimetre. • recording estimates and readings from scales to a suitable degree of accuracy. • understanding area measured in square centimetres. • solving word problems (inc. multi-step) and communicating the process adopted and/or their result/s. • investigating mathematical problems and communicating the process adopted and/or their result/s. • creating word problems related to length, perimeter and/or area.
G.6.2	suggest suitable units and measuring equipment to estimate or measure length.		
G.6.3	understand and use the formula in words length x breadth for the area of a rectangle.		
G.6.4	calculate the area of compound shapes that can be split into rectangles.		

G.6.5	understand, measure and calculate perimeters of rectangles and regular polygons.		
G.6.6	work out the area of a right angled triangle by considering it as half a rectangle.		

H: TIME

Being able to tell time is a functional mathematical skill. Being punctual is important: whether at school or whether you are meeting your friends. When you grow up you would want to be punctual at work too. Moreover, being able to tell time will help you catch a bus or a flight on time. Usually it is suggested to be at the airport two hours before the departure of our flight. On the other hand if you park your car in a 150 minute parking space, you will need to be careful not to get a ticket.

Being able to tell time will further help you not to miss your favourite television programme. And what if you are baking a cake and on the recipe it says that bake time is 45 minutes, you would want to know how to keep the time on your analogue watch or on the digital time display on your oven. Likewise, if your favourite football team is winning 2 – 1, you would want to be able to know how many minutes are left to end of the match. And in order to remember to prepare a birthday card for your best friend you need to be able to read a calendar.

The above are only a few life situations when being able to tell time is important. Helping our children understand and appreciate this may be fruitful.

YEAR 1

LEARNING OUTCOMES Children will be able to:		KEY VOCABULARY	OPPORTUNITIES Children should be given a range of opportunities such as:
H.1.1	understand and use the vocabulary of time.	minute before after night day days of the week week the day before the day after minute hand hour hand hands clock face	• experiencing the duration of 1 minute, e.g. by clapping rhythmically and counting up to 60, or by using a minute egg/sand timer. • recording the number of times something occurs in one minute. • talking about activities using vocabulary such as yesterday, today and tomorrow. • sequencing events according to time and explaining the appropriateness of events at different times of the day, e.g. lunch at 3 o'clock in the afternoon. • constructing a clock face. • drawing the hands to show the hour. • practicing telling the time from both analogue and 12-hour digital clocks and connect time to the events of a day using 'o'clock' . • creating and using an analogue/digital timeline.
H.1.2	sequence familiar events.		
H.1.3	recognise that there are seven days in a week and put them in order.		
H.1.4	read the time to the hour.		
H.1.5	show the time to the hour on an analogue clock.		

		o'clock	• listening to stories, poems or songs that will give them the opportunity to reinforce understanding, allow for application and may also provide the opportunity for creation e.g. role play.

YEAR 2

LEARNING OUTCOMES Children will be able to:		KEY VOCABULARY	OPPORTUNITIES Children should be given a range of opportunities such as:
H.2.1	understand and use the vocabulary related to time.	minutes night day days of the week weeks the day before the day after minute hand hour hand hands clock face o'clock half past seasons of the year	• experiencing the duration of 1 minute, e.g. by clapping rhythmically and counting up to 60, or by using a minute egg/sand timer. • counting the number of times something occurs in one minute. • identifying and talk about events that last 1 hour/half hour e.g. the Maths lessons lasts half an hour. • talking about activities using vocabulary such as yesterday, today and tomorrow. • sequencing events according to time and explain the appropriateness of events at different times of the day, e.g. lunch at 3 o'clock in the afternoon. • constructing a clock face. • drawing the hands to show the hour and half hour. • practicing telling the time from both analogue and 12-hour digital clocks and connecting time to the events of a day. • creating and using an analogue/digital timeline. • listening to stories, poems or songs that will give them the opportunity to reinforce understanding, allow for application and may also provide the opportunity for creation e.g. role play. • creating their own journal.
H.2.2	order familiar events in time.		
H.2.3	know the days of the week in order and the seasons of the year.		
H.2.4	read the time to the hour or half hour.		
H.2.5	show the time to the hour or half hour on an analogue clock on analogue clocks (o'clock).		

YEAR 3

LEARNING OUTCOMES Children will be able to:		KEY VOCABULARY	OPPORTUNITIES Children should be given a range of opportunities such as:
H.3.1	use and read vocabulary related to time.	seconds minutes	• talking about activities using vocabulary such as yesterday, today and tomorrow.

H.3.2	use units of time and know the relationships between them.	days weeks year months of the year minute hand hour hand o'clock half past quarter past quarter to noon midnight	• sequencing events according to time and explaining the appropriateness of events at different times of the day, e.g. lunch at 3 o'clock in the afternoon. • using a calendar and talk about familiar events such as birthdays, school outing. • drawing the hands to show the time to the hour, half hour or quarter hour (using a ruler). • practicing telling the time from both analogue and 12-hour digital clocks and connect time to the events of a day. • creating and using a digital timeline to work out duration. • identifing the relationship between second, minute, hour, day and week (emphasis not on calculation but on relationship). • listening to stories, poems or songs that will give them the opportunity to reinforce understanding, allow for application and may also provide the opportunity for creation e.g. role play . • creating their own journal.
H.3.3	choose suitable units to estimate or measure time.		
H.3.4	order the months of the year.		
H.3.5	read and show the time to the hour, half hour or quarter hour on an analogue clock and a 12-hour digital clock, and understand the notation 7:30.		

YEAR 4

LEARNING OUTCOMES Children will be able to:		KEY VOCABULARY	OPPORTUNITIES Children should be given a range of opportunities such as:

H.4.1	read and write the vocabulary related to time.	seconds
		minutes
		hours
		days
		weeks
		months
		year
		calendar
		leap year
		past
		to
		half past
		quarter past
		quarter to
			• using an analogue and a 12-hour digital clock .
			• connecting time to real life events.
			• counting aloud in steps of 5 as minute hand moves from one number to the next and make connections to the multiplication table of 5.
			• drawing hands on the clock face to show time (using a ruler).
			• measuring time in hours and minutes.
			• using a calendar.
			• converting from:
			  • hours to minutes, and vice versa.
			  • hours to days, and vice versa.
			  • days to weeks, and vice versa.
			  • months to days, and vice versa.
			• using a timetable (include: the use of real timetables).

H.4.2	use units of time and know the relationships between them.		
H.4.3	choose suitable units to estimate or measure time.		
H.4.4	read and show time to 5 minute, including quarter past/to, half past/to on an analogue clock and on a 12-hour digital clock.		
H.4.5	use a calendar.		

		o'clock
		morning
		afternoon
		night
		later
		earlier
		how long…?
			• creating and using a timeline to:
			  • calculate and compare durations of events.
			  • calculate the starting time and/or the finishing time.
			  • calculate the time a number of hours and /minutes earlier/later than a given time.
			• solving up to one-step word problems and communicating the process adopted and/or their result/s.
			• investigating mathematical problems and communicating the process adopted and/or their result/s.

YEAR 5

LEARNING OUTCOMES Children will be able to:		KEY VOCABULARY	OPPORTUNITIES Children should be given a range of opportunities such as:

H.5.1	use, read and write the vocabulary related to time.	Seconds
		minutes
		hours
		use of abbreviations **h** and **min**
		days
		weeks
		months
		year
		leap year
		calendar
		past
		to
		half past
		quarter past
		quarter to
		o'clock
		a.m.
		p.m.
		later
		earlier
		How long…?
			• using an analogue and a 12-hour digital clock.
			• connecting time to real life events.
			• drawing hands on the clock face to show time (using a ruler).
			• measuring time in hours and minutes.
			• using a calendar (exclude: the leap year).
			• converting from:
			  • hours to minutes, and vice versa.
			  • hours and minutes to minutes, and vice versa (exclude use of fractions to represent to minutes e.g. 2 ½ hour).
			  • hours to days, and vice versa.
			  • days to weeks, and vice versa.
			  • months to days, and vice versa.
			• using a timetable (include: the use of real timetables).
			• creating and using a timeline to:
			  • calculate and compare durations of events.
			  • calculate the starting time and/or the finishing time.
			  • calculate the time a number of hours and /minutes earlier/later than a given time.
			• solving up to two-step word problems and communicating the process adopted and/or their result/s.
			• investigating mathematical problems and communicating the process

H.5.2	estimate and calculate times using seconds, minutes, hours.		
H.5.3	read and show the time: • from an analogue clock to the nearest minute. • to the nearest minute, from a 12-hour digital clock.		
H.5.4	use a.m. and p.m. and the notation 9:53 .		
H.5.5	use a calendar.		

			adopted and/or their result/s. • creating word problems related to time.

YEAR 6

LEARNING OUTCOMES Children will be able to:		KEY VOCABULARY	OPPORTUNITIES Children should be given a range of opportunities such as:

H.6.1	use and compare units of time.	seconds
		minutes
		hours
		use of abbreviations **h** and **min**
		days
		weeks
		months
		year
		leap year
		calendar
		past
		to
		half past
		quarter past
		quarter to
		o'clock
		a.m.
		p.m.
		How long….?
		Duration
			• using an analogue and a digital clock.
			• connecting time to real life events.
			• drawing hands on the clock face to show time (using a ruler).
			• measuring time in hours, minutes and seconds.
			• converting from:
			  • hours to minutes, and vice versa.
			  • hours and minutes to minutes, and vice versa (include use of fractions to represent to minutes e.g. 2 ½ hour).
			  • minutes to seconds, and vice versa.
			  • days to weeks, and vice versa.
			  • months to days, and vice versa.
			• using a timetable (include: the use of real timetables).
			• using a timeline.
			• calculating and comparing durations of events.
			• calculating the starting time and/or the finishing time.
			• calculating the time a number of hours and /minutes earlier/later than a given time.
			• solving word problems (inc. multi-step) and communicating the process adopted and/or their result/s.
			• investigating mathematical problems and communicating the process adopted and/or their result/s.
			• creating word problems related to time.

H.6.2	read the time on a 24-hour digital clock and use 24-hour clock notation such as 19:53.		
H.6.3	convert time between analogue and digital 12- and 24-hour clocks.		
H.6.4	work out the duration of a time interval.		
H.6.5	use a calendar.		

I: MONEY

Being able to compare offers, read and understand receipts and pay bills at the supermarket, at a restaurant or at our favourite toy shop is very important. Then, you would want to make sure that you have received the correct change if you pay by cash and you do not have the exact amount. However, when you grow older you can also pay by cheque or card.

Equally important is being able to make plans related to money. This is what we refer to as budgeting. If you are saving to buy something special, you would want to be able to calculate how much more you need to save and also to know how long it will take you to save up for it.

If you or someone within your family have saved up to go on a family holiday, make sure to check the currency used in the country you are travelling to. The euro is the currency used in 18 of the 28 member states of the European Union.

The above are only a few life situations when being financially literate is important. Helping our children understand and appreciate this may be fruitful.

Note: use the words **euro** and **cent** as both singular and plural

YEAR 1

LEARNING OUTCOMES Children will be able to:		KEY VOCABULARY	OPPORTUNITIES Children should be given a range of opportunities such as:
I.1.1	understand (begin to) and use the vocabulary related to money.	coin/s cent euro how much? worth most worth least same cost/s change	• handling coins. • sorting coins by colour and size. • familiarising themselves with coins through activities such as coin rubbing, printing in play dough and feely bag. • handling and using coins to better understand that having one coin can be more valuable than having many of a different type. e.g. A 10c coin is more valuable that five 1c coins. • using coins to pay in role play and shopping activities in the classroom, by visiting shops or finding priced items at home e.g. What items can you really buy with 10c or 20c? • understanding that change is giving back the extra amount paid.
I.1.2.	sort and recognise euro coins including the one euro coin.		
I.1.3	order coins starting from 1 cent going up to the highest value.		
I.1.4	use coins to pay.		

<table>
<tr><th colspan="4">YEAR 2</th></tr>
<tr><th colspan="2">LEARNING OUTCOMES
Children will be able to:</th><th>KEY VOCABULARY</th><th>OPPORTUNITIES
Children should be given a range of opportunities such as:</th></tr>
<tr><td>I.2.1</td><td>recognise coins of different values up till two euro.</td><td rowspan="4">coins
cent
euro
more
how much?
makes
amount
worth
cost/s
change</td><td rowspan="4">• using coins in role play and shopping activities in the classroom.
• exploring different ways of making up a total.
• handling coins to reinforce understanding that having one coin can be more valuable than having many of a different type. e.g A 10c coin is more valuable that five 1c coins.
• discovering the real value of amounts of money in life by visiting shops or finding priced items at home e.g. What items can you really buy with 10c or 20c? – financial literacy.</td></tr>
<tr><td>I.2.2</td><td>work out totals up to 20 cent.</td></tr>
<tr><td>I.2.3</td><td>work out change from twenty cent.</td></tr>
<tr><td>I.2.4</td><td>understand notation € for euro and c for cent.</td></tr>
<tr><th colspan="4">YEAR 3</th></tr>
<tr><th colspan="2">LEARNING OUTCOMES
Children will be able to:</th><th>KEY VOCABULARY</th><th>OPPORTUNITIES
Children should be given a range of opportunities such as:</th></tr>
<tr><td>I.3.1</td><td>use the €.c notation e.g. knowing that €4.65 (four euro sixty five cent) indicates €4 (four euro) and 65c (sixty five cent).</td><td rowspan="4">coin/s
cent
euro
how much?
cost/s
price
total
change</td><td rowspan="4">• visiting a local supermarket to shop for a few items (or pretend to through role play), pay with money, check change and receipt.
• carrying out a scavenger hunt in a supermarket to find items with particular prices and so discover the value of money amounts in relation to objects we buy everyday – financial literacy.
• handling small amounts of money in classroom situations e.g. keeping track of money collected from small change for charity money collections.
• planning a small party or any other activity with a given budget.
• using receipts, simple menus, entrance tickets to work out totals and change.
• playing board games involving the handling of money.</td></tr>
<tr><td>I.3.2</td><td>work out totals beyond 20c (twenty cent).</td></tr>
<tr><td>I.3.3</td><td>work out change beyond 20c (twenty cent).</td></tr>
<tr><td>I.3.4</td><td>work out which coins are needed to pay.</td></tr>
</table>

<table>
<tr><th colspan="4">YEAR 4</th></tr>
<tr><th colspan="2">LEARNING OUTCOMES
Children will be able to:</th><th>KEY VOCABULARY</th><th>OPPORTUNITIES
Children should be given a range of opportunities such as:</th></tr>
<tr><td>I.4.1</td><td>recognise all euro coins and notes.</td><td rowspan="4">coin/s
notes
cent (c)
euro (€)
how much?
cost/s
price
total
change</td><td rowspan="4">• handling money in real life contexts such as helping with outing money collections and school fund raising activities.
• talking about prices marked as €0 .99 to better understand that this is a marketing strategy to make prices more attractive. Price need to be rounded to the next euro to show the true price of the product.
• playing board games involving the handling of money.
• planning an activity such as a party, a meal or an outing with a given budget.
• solving one-step word problems involving money and communicating their result/s and/or the process adopted.
• using junk mail, menus, price lists, receipts and shop loyalty cards to investigate and solve situations involving money.</td></tr>
<tr><td>I.4.2</td><td>work out totals up to €100 (hundred euro) and give change.</td></tr>
<tr><td>I.4.3</td><td>understand and practice that amounts such as €3.06 (three euro six cent) is €3 (three euro) and 6c (six cent).</td></tr>
<tr><td>I.4.4</td><td>work out which coins are needed to pay.</td></tr>
<tr><th colspan="4">YEAR 5</th></tr>
<tr><th colspan="2">LEARNING OUTCOMES
Children will be able to:</th><th>KEY VOCABULARY</th><th>OPPORTUNITIES
Children should be given a range of opportunities such as:</th></tr>
<tr><td>I.5.1</td><td>work out totals up to €10,000 (ten thousand euro).</td><td rowspan="4">coin/s
notes
cent (c)
euro (€)
how much?
cost/s
total
change</td><td rowspan="4">• handling money in real life contexts such as helping with outing money collections and school fund raising activities
• integrating this topic with weight and capacity as they calculate the cost of certain ingredients of a recipe.
• playing board games involving the handling of money.
• planning an activity such as a party, a meal or an outing with a given budget.
• using junk mail, menus, price list, receipts and shop loyalty cards to investigate and solve situations involving money.
• using tickets, travel brochures and any of the above to plan and budget for family or school trips.
• solving up to two-step word problems involving money and communicating their result/s and/or the process adopted.
• solving and investigating up to two-step word problems involving</td></tr>
<tr><td>I.5.2</td><td>give change.</td></tr>
<tr><td>I.5.3</td><td>work out which notes and coins are needed to pay.</td></tr>
<tr><td>I.5.4</td><td>convert euro to cent and vice versa.</td></tr>
</table>

			money and communicating their result/s and/or the process adopted. • creating word problems related to money.

YEAR 6

LEARNING OUTCOMES Children will be able to:		KEY VOCABULARY	OPPORTUNITIES Children should be given a range of opportunities such as:
I.6.1	work out totals up to €10,000 (ten thousand euro) and more.	coin/s notes cent (c) euro (€) how much? cost/s price total change	• handling money in real life contexts such as helping with outing money collections and school fund raising activities. • planning an activity such as a party, a meal or an outing with a given budget. • planning a shopping list with a given budget using estimation and rounding. • integrating this topic with weight and capacity as they calculate the cost of certain ingredients of a recipe. • reading information from a conversion graph (between different currencies). • calculating and discussing whether certain special offers are really worthwhile opting for. • playing board games involving the handling of money. • using junk mail, menus, price list, receipts and shop loyalty cards to investigate and solve situations involving money. • using tickets, travel brochures and any of the above to plan and budget for family or school trips. • solving word problems (inc. multi-step) involving money and communicate their result/s and/or the process adopted. • investigating word problems relating to money and communicating the process adopted and/or their result/s. • creating word problems related to money.
I.6.2	give change.		
I.6.3	work out which notes and coins are needed to pay.		
I.6.4	convert euro to cent and vice versa.		

J: SHAPES AND SYMMETRY

There is evidence of geometry everywhere. Buildings, planes, cars and maps all use geometry. For example, the home you live in is made of basic geometry shapes and some skyscrapers have windows made of rectangles and squares. Very often these structures are also symmetrical.

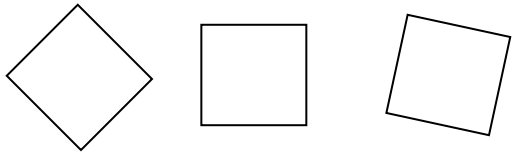
Symmetry can be seen almost everywhere in daily life. The human body is an example of symmetry: the kidney, the lungs the brain and to some extent even the face is.

Being able to understand the basic properties of 2-D and 3-D shapes, to draw shapes and to create your own patterns, whether symmetrical or not, will help you appreciate better the world we live in and will probably help you in your future career should you wish to become an engineer, a doctor, a scientist, a designer or a mechanic. However there are many other occupations that entail competence in geometry.

The above are only a few life situations where understanding of shapes and symmetry is important. Helping our children understand and appreciate this may be fruitful.

YEAR 1

LEARNING OUTCOMES Children will be able to:		KEY VOCABULARY	OPPORTUNITIES Children should be given a range of opportunities such as:
J.1.1	name (begin to) 3-D (solid) shapes and 2-D (flat) shapes.	Shape square circle triangle rectangle side corner straight cube cuboid cylinder cone pyramid face	• handling common 2D and 3D shapes and find corresponding shapes in the surrounding environments through fun activities such as shape hunts. • explaining the differences and similarities between two given shapes in response to questions such as, "Why is this a square?" using vocabulary related to properties of shapes. • predicting if 3D shapes will roll or slide on an elevated surface, justifying the reason/s why, then confirming through practical activities. • using a variety of shapes to make models, pictures and patterns, and describe them. • recognising shapes in different orientations as in *Figure 1* and sizes. e.g. while being partly revealed from an envelope or using the hide and reveal technique on the interactive whiteboard.
J.1.2.	put sets of objects and shapes in order of size.		
J.1.3	talk about, recognise and recreate patterns.		
J.1.4	identify symmetrical objects in the environment.		

		flat solid curved roll bigger/est smaller/est larger/est	 Figure 1 • creating 2D shapes e.g. by using geoboards, lolly sticks, straws. • identifying patterns in the environment such as on tiles, clothing, jewellery and patterns found in nature. • recognising and recreating patterns through practical activities and crafts using resources such as shapes, cubes, counters, paint, food items, coins, sequins and stickers, threading beads and pasta shapes. • identifing symmetrical objects around us such as buildings, animals and insects, traffic signs, clothing items (check by folding). • extending their learning experience through exposure to existing media broadcasts e.g. Umizoomi – Nickelodean productions or short online video clips or songs. • predicting and recognising hidden or partially hidden shapes (in feely bag or covered with a piece of cloth) by using the sense of touch.

YEAR 2

LEARNING OUTCOMES Children will be able to:		KEY VOCABULARY	OPPORTUNITIES Children should be given a range of opportunities such as:
J.2.1	name and talk about 2-D (flat) shapes and their properties such as the number and type of sides and the number of corners.	Shape square circle triangle rectangle side corner straight cube cuboid cylinder cone	• handling common 2D and 3D shapes and find corresponding shapes in the surrounding environments through fun activities such as shape hunts. • explaining the differences and similarities between two given shapes in response to questions such as, “Why is this a square?” using vocabulary related to properties of shapes. • comparing and contrasting 2D and 3D shapes by stating their properties. • making models using various 3D shapes from real-life and describe them. • making patterns and pictures with 2D shapes using construction kits,
J.2.2	name and talk about 3-D (solid) shapes and their properties such as the number and shape of faces, edges and corners.		
J.2.3	recognise and draw the line of symmetry of familiar objects and shapes around them.		

J.2.4	recognise line symmetry.	pyramid face flat solid curved half line of symmetry	geoboards, playdough and other materials and describe them. • relating solid shapes to pictures of them. • exploring the line of symmetry of different pictures or shapes using folding and mirrors. • completing the missing half of a symmetrical shape, picture or pattern using mirrors, shape construction kits, drawing. • exploring symmetrical patterns through interactive whiteboard activities

YEAR 3

LEARNING OUTCOMES Children will be able to:		KEY VOCABULARY	OPPORTUNITIES Children should be given a range of opportunities such as:
J.3.1	use the mathematical names for common 3-D (solid) and 2-D (flat) shapes.	pyramid cylinder pentagon hexagon octagon faces edges corners line of symmetry symmetrical shape symmetrical pattern	• handling common 2-D (flat) and 3-D (solid) shapes and finding corresponding shapes in the surrounding environments through fun activities such as shape hunts. • taking photographs of (or draw) various objects around them showing various 2-D (flat) and 3-D (solid) shapes. • explaining the differences and similarities between two given shapes in response to questions such as, "How is a hexagon different from a pentagon?", using vocabulary related to properties of shapes. • comparing and contrasting 2-D (flat) and 3-D (solid) shapes by stating their properties. • using solid shapes, templates, geoboards and elastic bands, squared paper and interactive onscreen activities to make pictures and models. Extend this activity by presenting the data of shapes needed for each model using graphs and / or tables. • relating 3-D (solid) shapes to pictures of them. • exploring the line/s of symmetry of different pictures or shapes by folding and by using mirrors (include flags, traffic signs, alphabet letters and numbers). • completing the missing half of a symmetrical shape, picture or pattern using mirrors, shape construction kits or drawing. • creating symmetrical patterns through cooking, crafts and science related activities (observe leaves and carry out leaf rubbing, decorate
J.3.2	sort shapes according to their properties and describe some of their features, such as the number of sides and corners, symmetry (2-D [flat] shapes), or the shapes of faces and number of faces, edges and corners (3-D [solid] shapes).		
J.3.3	make and describe shapes, pictures and patterns.		
J.3.4	recognise line symmetry and continue the other half of a simple symmetrical shape or picture..		

			gingerbread men, figolli, carnival masks and butterflies). • exploring symmetrical patterns through interactive whiteboard activities.

YEAR 4

LEARNING OUTCOMES Children will be able to:		KEY VOCABULARY	OPPORTUNITIES Children should be given a range of opportunities such as:
J.4.1	classify and describe 2-D (flat) and 3-D (solid) shapes, referring to properties, such as reflective symmetry, the number or shapes of faces, the number of sides/edges and vertices, whether sides/edges are the same length, whether or not angles are right angles.	two-dimensional (2-D) three-dimensional (3-D) semi-circle side vertex / vertices faces edges angles base right-angle symmetrical reflective symmetry	• handling 2-D (flat) and 3-D (solid) shapes and creating other shapes with them (e.g. exploring the different shapes that can be made from four cubes). • explaining the differences and similarities of 2-D (flat) and 3-D (solid) shapes, in response to questions such as "Which 3-D (solid) shapes have the same number of faces?", using vocabulary related to properties of shapes. • comparing and contrasting 2-D (flat) and 3-D (solid) shapes by stating their properties. • identifying right-angles in 2-D (flat) and 3-D (solid) shapes. • finding corresponding 2-D (flat) and 3-D (solid) shapes in the surrounding environment. • looking for symmetrical shapes or patterns in the environment (e.g. tiles, curtains, furniture and clothes). • identifying pictures or objects which have more than one line of symmetry. • continuing the reflective symmetry of a given diagram or object from real life. • participating in investigational maths activities that require problem-solving and allowing for further exploration of 2-D (flat) and 3-D (solid) shapes. e.g. Investigate the number of faces you can see when you arrange three cubes in different ways. • creating print patterns with faces of 3-D shapes and talk about them.
J.4.2	make and describe shapes and patterns.		
J.4.3	identify and sketch lines of symmetry in simple shapes, and recognise shapes with no lines of symmetry.		
J.4.4	sketch the reflection of a simple shape in a mirror line along one edge.		

YEAR 5

LEARNING OUTCOMES Children will be able to:		KEY VOCABULARY	OPPORTUNITIES Children should be given a range of opportunities such as:
J.5.1	classify polygons using criteria.	Polygons regular irregular two-dimensional three-dimensional pentagon hexagon octagon straight side vertex / vertices edges faces base nets equilateral isosceles horizontal vertical diagonal fold line	• describing and visualising 2-D (flat) and 3-D (solid) shapes. • using geoboards and square paper to create and draw polygons. • recognising that polygons can be both regular and irregular, e.g. a pentagon can be any shape having 5 straight sides. • constructing 3-D (solid) shapes by using their corresponding nets or templates. • describing what a polygon is and identifying polygons from a given number of diagrams. • using paper folding and cutting to create equilateral and isosceles triangles. • working in groups and use technological equipment such as probots to create various polygons by giving a series of instructions. • comparing and contrasting the properties of equilateral and isosceles triangles. • creating diagrams and patterns using equilateral and isosceles triangles. • identifying horizontal and vertical lines in real life, e.g. on flags, furniture, doors and tiles. • using vertical and horizontal terms during art and craft activities, such as paper weaving craft.
J.5.2	visualise 3-D (solid) shapes from 2-D drawings and identify simple nets of solid shapes.		
J.5.3	recognise equilateral and isosceles triangles.		
J.5.4	recognise simple examples of horizontal and vertical lines.		

YEAR 6

LEARNING OUTCOMES Children will be able to:		KEY VOCABULARY	OPPORTUNITIES Children should be given a range of opportunities such as:
J.6.1	classify triangles using criteria.	reflective symmetry line of symmetry polygons regular irregular	• stating the properties of different triangles, namely the equilateral, isosceles, and scalene triangles, by referring to the length of sides, their angles and lines of symmetry. • identifying the lines of symmetry of a given polygon using shape templates and folding.
J.6.2	visualise 3-D shapes from 2-D drawings and identify different nets for a closed cube and an open cube.		

J.6.3	recognise reflective symmetry in regular polygons, and recognise where a shape will be after reflection in a mirror line parallel to one side.	two-dimensional three-dimensional pentagon, hexagon, octagon straight side vertex / vertices edges faces base nets equilateral, isosceles, scalene right-angled triangle horizontal, vertical diagonal fold line	• working in groups and use technological equipment such as probots to create various polygons by giving a series of instructions. • exploring that regular polygons have the same number of lines of symmetry as the number of sides and the number of vertices. • extend the understanding of regular polygons by observing polygons in real life and finding their lines of symmetry. • using squared paper to complete the reflection of a polygon on the other side of a mirror line. • exploring polygons and symmetrical patterns using polygons during interactive onscreen activities. • describing polygons by referring to the sides, e.g. horizontal or vertical. • participating in investigational maths activities that require problem-solving and allow for further exploration of 2-D (flat) and 3-D (solid) shapes.
J.6.4	complete symmetrical patterns with two lines of symmetry at right angles.		

K: Position, Direction and Angles

Being able to read a map to follow and/or give directions are functional skills. Distinguishing between left and right, between clockwise and anticlockwise turns and among the eight compass points will equip you with these skills. A pilot, a sailor, a fisherman, a policeman… and any driver need to have a good grasp of these skills. Furthermore engineers, architects, product designers use knowledge of angles daily.

The above are only some instances where position, direction and angles are important. Helping our children understand and appreciate these through their own experiences may be fruitful.

YEAR 1

LEARNING OUTCOMES Children will be able to:		KEY VOCABULARY	OPPORTUNITIES Children should be given a range of opportunities such as:
K.1.1	follow instructions about positions, directions and movement.	above below beside next to before after up down left right between	• following instructions about positions, directions and movements in PE and other activities (e.g. clearing up and scavenger hunts). • following instructions and/or describe positions, direction and movements on grids (e.g. bee-bot). • giving instructions to each other during games and other activities.
K.1.2	recognise and use the language of movement.		
K.1.3	recognise and use the language of position.		
K.1.4	recognise and use the language of direction.		

YEAR 2

LEARNING OUTCOMES Children will be able to:		KEY VOCABULARY	OPPORTUNITIES Children should be given a range of opportunities such as:
K.2.1	follow instructions related to positions, direction and movement.	before after in front of	• following a sequence of instructions, use and experience positional vocabulary in different contexts (e.g. PE, games, online activities,

K.2.2	use everyday language to describe position, direction and movement.	between up down left right forward backwards sideways opposites whole half turn	maths trails). • programming instructions using a roamer (e.g. bee-bot). • combining two movements into one (e.g. forward 3 and forward 4 is forward 7, forward 5 and backwards 2 is forward 3). • using task cards to create models and/or drawing using positional vocabulary. • recognising opposites in everyday language related to position, direction and movement. • talking about things that turn (e.g. clock hands, roamers, cars, themselves) • identifying the difference between left and right through practical situations (may also include games like *Twister*). • comparing whole and half turns with the movement of the clock hands and other similar activities. (e.g. physical movements, drawings).
K.2.3	recognise right and left.		
K.2.4	recognise whole and half turns.		

YEAR 3

LEARNING OUTCOMES Children will be able to:		KEY VOCABULARY	OPPORTUNITIES Children should be given a range of opportunities such as:
K.3.1	use mathematical vocabulary to describe position, direction and movement.	clockwise anticlockwise turn forwards backwards towards straight line half corner angle right angle	• describing, placing, ticking, drawing or visualising objects in given positions. • giving instructions for moving along a route in straight lines and round right-angled corners (e.g. to pass through a simple maze). • drawing and following a path on a grid to show a route followed. • practising clockwise and anticlockwise for half turns and quarter turns on paper, by rotating themselves and/or by using roamer. • understanding the term angle as the meeting point of two edges or sides and /or part of a turn. • identifying right angles as quarter turns. • recognising right angles in squares and rectangles. • identifying right angles in different environments using a template (e.g. angle eater) • making a right angle measure. • using mazes, whether it is walking through mazes, or pen and paper
K.3.2	consolidate whole and half turns and recognise quarter turns.		
K.3.3	recognise clockwise and anticlockwise turns		
K.3.4	recognise angles and identify a right angle.		

			mazes in puzzle books.

YEAR 4

LEARNING OUTCOMES Children will be able to:		KEY VOCABULARY	OPPORTUNITIES Children should be given a range of opportunities such as:
K.4.1	read and write the vocabulary related to position, direction and movement	north (N) south (S) east (E) west (W) map turn clockwise anticlockwise right angle half turn quarter turn direction direction compass angle row column grid position	• describing and finding the position on a grid of squares with rows and columns labelled (e.g. Battleship, cinema seating, vending machines). • using a compass, recognising that a direction compass has a pointer which always points to the North. • using a map (e.g. describe points in relation to one another using the four-point compass). • comparing angles with a right angle in shapes and/or environment using a right-angle measure (template). • recognising that a straight line is equivalent to two right angles.
K.4.2	locate position on a grid with labelled rows and columns		
K.4.3	recognise and use the four-point compass directions.		
K.4.4	make and describe right-angled turns, including turns between the four compass points (clockwise / anticlockwise).		
K.4.5	identify right angles in 2-D (flat) shapes and the environment.		

YEAR 5

LEARNING OUTCOMES Children will be able to:		KEY VOCABULARY	OPPORTUNITIES Children should be given a range of opportunities such as:
K.5.1	recognise and use the eight compass directions.	direction/direction compass north/south/west/east north-east/north-west south-east/south-west halfway angle	• using a compass. • using a map (e.g. describe points in relation to one another using the four-point compass). • knowing that a degree is another measure of an angle and the shorthand for 'degree' is ^{o}. • investigating the relationship between right angles and degrees
K.5.2	know that angles are measured in degrees.		
K.5.3	make and measure clockwise and anticlockwise turns (in degrees		

	and right angles).	clockwise turn half turn quarter turn degree (45^0,90^0,180^0,270^0,360^0) clockwise grid/grid line	(e.g. 1 right angle = 90^0, half a right angle = 45^0, 3 right angles = 270^0…..) • investigating the size of the angle in degrees and right angles made by clock hands (e.g. 5 minute intervals). • using Pro-bot and/or Constructa-bot or other roamers to create angles. • planning and designing treasure/scavenger hunts using positional and/or directional vocabulary including angles.
K.5.4	order angles less than 180^o.		

YEAR 6

LEARNING OUTCOMES **Children will be able to:**		**KEY VOCABULARY or**	**OPPORTUNITIES** **Children should be given a range of opportunities such as:**
K.6.1	understand the eight compass-point directions.	angle/right angle degrees (°) direction/direction compass north/south/west/east north-east/north-west south-east/south-west halfway turn half turn quarter turn clockwise/anticlockwise grid/grid line protractor zero line centre scale acute/obtuse	• reinforcing the use of a compass. • constructing a wind vane, understanding the parts of a wind vane, understanding that wind vanes are used to measure wind direction and telling the wind direction from their own wind vane. • using the language of direction to guide a partner through a maze or to a place. • using a map (e.g. describe points in relation to one another using the four-point compass). • following and giving instructions involving distances by interpreting simple scales. • using Pro-bot and/or Constructa-bot or other roamers to programme commands/instructions to draw shapes/graphics to practice angles, directions and movement. • calculating one angle of a triangle, given the other two. • calculating a missing angle around a point, given the other/s. • using a protractor.
K.6.2	use angle measure in degrees		
K.6.3	identify, estimate and order acute and obtuse angles.		
K.6.4	estimate, measure and draw angles (acute and obtuse) in degrees to the nearest 5^0 using a protractor.		
K.6.5	understand that: • the sum of the angles of a triangle is 180°. • the angles on a straight line add up to 180°. • the angles around a point add up to 360°.		

L: Data Handling

Data handling is an essential activities in which we engage in our everyday life. We are frequently presented with data in various contexts which we need to analyse and interpret. Data can be presented in a variety of forms such as bar charts or pictograms. We often look for patterns and generalities within them and analysis is often confined to identifying the most popular or least popular item. However, we need to engage in more critical thinking. For example, drawing on real data in 2014 NSO has reported that from 2004 to 2013, both rainfall intensity and variability of total rainfall from the climatic norm were the lowest in the past four decades. And in the End of Primary Benchmark, in mathematics, the mean score was 69·20. We can attempt to look deeper into this data.

The above are only two instances of data analysis. Helping our children understand and appreciate data handling through their own experiences may be fruitful.

Note: At Primary level mean and average are used interchangeably.

YEAR 1

LEARNING OUTCOMES Children will be able to:		KEY VOCABULARY	OPPORTUNITIES Children should be given a range of opportunities such as:
L.1.1	solve a given problem by sorting, classifying and organising information in simple ways.	sort label	• sorting different shapes, colours, animals, vehicles etc. into two distinct categories (categories can be identified by teacher or by children themselves).
L.1.2	discuss and explain results.		

YEAR 2

LEARNING OUTCOMES Children will be able to:		KEY VOCABULARY	OPPORTUNITIES Children should be given a range of opportunities such as:
L.2.1	solve a given problem by sorting, classifying and organising information in simple ways.	Sort set label list table	• sorting objects or pictures in two distinct categories (categories can be identified by teacher or by children themselves). • looking closely at categories to understand that the same objects can be sorted in different ways. • sorting objects or pictures in a list or simple table.
L.2.2	discuss and explain results.		

YEAR 3

LEARNING OUTCOMES Children will be able to:		KEY VOCABULARY	OPPORTUNITIES Children should be given a range of opportunities such as:
L.3.1	solve a given problem by sorting, classifying and organising information in simple ways.	Sort label list table pictograph block graph title Carroll Diagram	• sorting objects or pictures in two categories. • sorting objects in a list or simple table. • completing or filling in a Carroll Diagram. • constructing a pictograph (symbol representing one unit). • constructing a block graph.
L.3.2	discuss and explain results.		

YEAR 4

LEARNING OUTCOMES Children will be able to:		KEY VOCABULARY	OPPORTUNITIES Children should be given a range of opportunities such as:
L.4.1	solve a given problem by organising and interpreting numerical data in simple lists, tables and graphs.	sort label list table pictograph bar chart frequency frequency table total pictograph title key Carroll Diagram	• collecting and organising data. • completing or filling in a Carroll Diagram. • constructing and interpreting a block graph. • constructing and interpreting a pictograph (symbol representing two units). • constructing and interpret a frequency table. • constructing bar charts- intervals labelled in ones then twos.
L.4.2	discuss and explain results.		

YEAR 5

LEARNING OUTCOMES Children will be able to:		KEY VOCABULARY	OPPORTUNITIES Children should be given a range of opportunities such as:
L.5.1	solve a given problem by collecting, representing and	Sort label	• constructing and interpreting frequency tables. • completing or filling in a Carroll Diagram.

	interpreting data in tables, charts, graphs and diagrams.	list table pictograph block graph frequency frequency table total pictograph title key most/least popular Carroll Diagram	• constructing and interpreting bar charts with intervals labelled in 2s, 5s, 10s, or 20s. • constructing and interpreting pictographs where the symbol represents 2, 5, 10 or 20.
L.5.2	discuss results.		

YEAR 6

LEARNING OUTCOMES Children will be able to:		KEY VOCABULARY	OPPORTUNITIES Children should be given a range of opportunities such as:
L.6.1	solve a problem by representing and interpreting data in tables, charts, graphs and diagrams.	sort label list table pictograph block graph frequency frequency table total pictograph title key most/least popular axis/axes horizontal/vertical average/mean Carroll Diagram	• constructing and interpreting bar-line graphs (vertical axis labelled in 2s, 5s, 10s, 20s or 100). • completing or filling in a Carroll Diagram. • constructing line graph. • interpreting line graphs e.g.: distance/time; a multiplication table, a conversion graph, a graph of pairs of numbers adding to 8.
L.6.2	solve a problem by representing, extracting and interpreting data in tables, graphs and charts, including those generated by a computer.		
L.6.3	work out the mean (commonly known as 'average') of a set of data.		