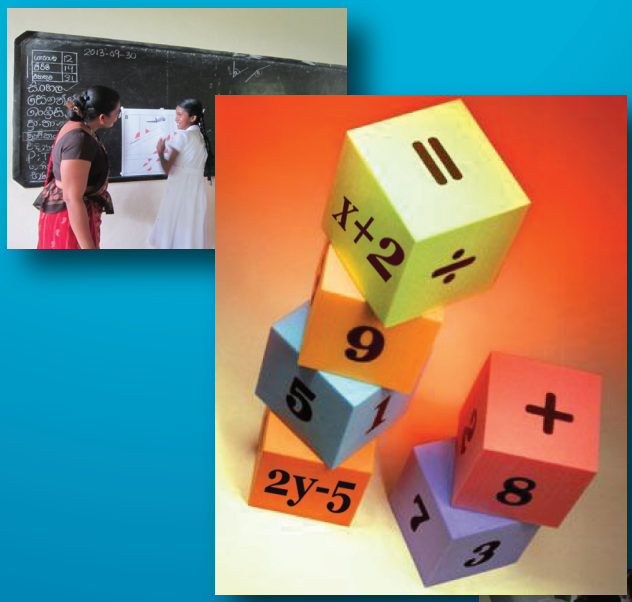
Grade

6 Mathematics

Teachers' Guide

(Implemented from year 2015)



Department of Mathematics
Faculty of Science & Technology
National Institute of Education
Maharagama,
Sri Lanka.

Web: www.nie.lk
Email: info@nie.lk

Mathematics

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Message of the Director General

The first phase of the new competency based curriculum, with 8 years curriculum cycle was introduced to secondary education in Sri Lanka in 2007 replacing the existed content based education system with basic objective of developing the national level competencies recommended by the National Education Commission.

The second phase of the curriculum cycle to be introduced to grades 6 and 10 starts from 2015. For this purpose, National Institute of Education has introduced a rationalization process and developed rationalized syllabi for these grades using research based outcomes and various suggestions made by different stakeholders.

In the rationalization process, vertical integration has been used to systematically develop the competency levels in all subjects from fundamentals to advanced levels using the bottom up approach. Horizontal integration is used to minimize the overlapping in the subject content and to reduce the content over loading in the subjects to produce more students friendly and implementable curricular.

A new format has been introduced to the teachers' guide with the aim of providing the teachers with the required guidance in the areas of lesson planning, teaching, carrying out activities and measurement and evaluation. These guidelines will help the teachers to be more productive and effective in the classroom.

The new teachers' guides provide freedom to the teachers in selecting quality inputs and additional activities to develop the competencies of the students. The new teachers' guides are not loaded with subject content that is covered in the recommended textbooks. Therefore, it is essential for the teacher to use the new teachers' guides simultaneously with the relevant textbooks prepared by Education Publication Department as reference guides to be more aware of the syllabi.

The basic objectives of the rationalized syllabi and the new format of teachers' guide and newly developed textbooks are to bring a shift from the teacher centered education system into a student centered and more activity based education system in order to develop the competencies and skills of the school leavers and to enable the system to produce suitable human resource to the world of work.

I would like to take this opportunity to thank the members of Academic Affairs Board and Council of National Institute of Education and all the resource persons who have immensely contributed in developing these new teacher guides.

Director General
National Institute of Education

Message of the Deputy Director General

Education from the past has been constantly changing and forging forward. In recent years, these changes have become quite rapid. Past two decades have witnessed a high surge in teaching methodologies as well as in the use of technological tools and in the field of knowledge creation.

Accordingly, the National Institute of Education is in the process or taking appropriate and timely steps with regard to the education reforms of 2015.

It is with immense pleasure that this Teachers' Guide where the new curriculum has been planned based on a thorough study of the changes that have taken place in the global context adopted in terms of local needs based on a student-centered learning-teaching approach, is presented to you teachers who serve as the pilots of the schools system.

An instructional manual of this nature is provided to you with the confidence that, you will be able to make a greater contribution using this.

There is no doubt whatsoever that this Teachers' Guide will provide substantial support in the classroom teaching-learning process at the same time. Furthermore the teacher will have a better control of the classroom with a constructive approach in selecting modern resource materials and following guide lines given in this book.

I trust that through the careful study of this Teachers Guide provided to you, you will act with commitment in the generation of a greatly creative set of students capable of helping Sri Lanka move socially as well as economically forward.

This Teachers' Guide is the outcome of the expertise and unflagging commitment of a team of subject teachers and academics in the field Education.

While expressing my sincere appreciation of this task performed for the development of the education system, my heartfelt thanks go to all of you who contributed your knowledge and skills in making this document such a landmark in the field.

M.F.S.P. Jayawardhana
Deputy Director General
Faculty of Science and Technology

Advice and Approval: Academic Affairs Board,
National Institute of Education

Supervision: Mr. K.Ranjith Pathmasiri, Director,
Department of Mathematics,
National Institute of Education

Coordination: Mr. G.P.H. Jagath Kumara
Project Leader of Grades 6-11 Mathematics

Curriculum Committee:

External:

Dr. U. Mampitiya	Senior Lecturer, department of Mathematics, University of Kelaniya
Dr. D.R. Jayewardena	Senior Lecturer, department of Mathematics, University of Colombo
Mr. M.S. Ponnambalam	Retired Senior Lecturer, Siyane National College of Education
Mrs. W.M.B Janaki Wijesekara	Retired Director, Department of Mathematics, National Institute of Education
Mr. W. Rathnayake	Retired Project Officer, Department of Mathematics, National Institute of Education
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Mr. B.D.C. Biyanwila	Director, Mathematics Branch, Ministry of Education, Isurupaya,Battaramulla

Internal

Mr. K. Ranjith Pathmasiri	Director, Department of Mathematics, National Institute of Education
Mr. G.P.H. Jagath Kumara	Senior Lecturer, Department of Mathematics, National Institute of Education

Mr. G.L. Karunarathna	Senior Educationist, Department of Mathematics, National Institute of Education
Mrs. M.N.P. peiris	Lecturer, Department of Mathematics, National Institute of Education
Mrs. W. Iresha Gayani Rathnayake	Lecturer, Department of Mathematics, National Institute of Education
Mr. S. Rajendram	Lecturer, Department of Mathematics, National Institute of Education
Mrs. H.K.D.U. Gunawardena	Lecturer, Department of Mathematics, National Institute of Education
Mrs. U.G.P. Abeyrathna	Lecturer, Department of Mathematics, National Institute of Education

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Mrs. M.A.S. Rabel	Teacher Service (Retired)
Language Editing:	Mr. H.P. Susil Sirisena, Lecturer, Hapitigama National College of Education

Computer Type Setting:

Cover Page:

Plan:	Mr. E.L.A. Liyanage, Press, National Institute of Education
Pictures:	Try outing the lesson plans in schools of Western and North-western Provinces

Instructions on the use of the Teacher's Guide

The Department of Mathematics of the National Institute of Education has been preparing for the new education reforms to be implemented in 2015 for the first time since 2007, in accordance with the education reforms policy which is implemented once every eight years. The Grade 6 Mathematics Teacher's Guide which has been prepared accordingly has many special features.

The **Grade 6 syllabus** is included in the first chapter. The syllabus has been organized under the titles Competencies, Competency Levels, Content, Learning Outcomes and Number of Periods. The proposed **lesson sequence** is given in the second chapter. The **Learning-Teaching-Evaluation methodology** has been introduced in the third chapter. A special feature of this is that the best method to develop each of the subject concepts in students has been identified from various methods such as the discovery method, the guided discovery method, the lecture-discussion method etc and the lesson plan has been developed based on it.

Following the proposed lesson sequence, the relevant competency and competency levels as well as the number of periods required for each lesson have been included at the beginning under each topic. Specimen lesson plans have been prepared with the aim of achieving one or two of the learning outcomes related to a selected competency level under each competency. These lesson plans have been carefully prepared to be implemented during a period or a maximum of two periods.

To create awareness amongst the students regarding the practical applications of the subject content that is learnt, a section titled '**Practical Use'** which contains various such applications has been introduced in some of the lessons.

You have been provided with the opportunity to prepare suitable lesson plans and appropriate assessment criteria for the competency levels and related learning outcomes for which specimen lesson plans have not been included in this manual. Guidance on this is provided under the title '**For your attention** ….'.

Another special feature of this Teacher's Guide is that under each lesson, websites which can be used by the teacher or the students, in the classroom or outside which contain resources that include videos and games to enhance students' knowledge is given under the title '**For further use'** and the symbol  **.** Although it is not essential to make use of these, the learning-teaching-evaluation process can be made more successful and students' subject knowledge can be enhanced by their use, if the facilities are available.

Further, in selected lessons, under the title "**For the teacher only**" and the symbol  , facts which are especially for the teacher are included. This information is only to enhance the teacher's knowledge and is not given to be discussed with the students directly. The teacher has the freedom to make necessary amendments to the specimen lesson plan given in the new teacher's manual which includes many new features, depending on the classroom and the abilities of the students.We would be grateful if you would send any amendments you make or any new lessons you prepare to the Director, Department of Mathematics, National Institute of Education. The mathematics department is prepared to incorporate any new suggestions that would advance mathematics educations in the secondary school system.

Project Leader

Contents

Syllabus

5.0 Syllabus

Competency	Competency Level	Content	Learning Outcomes	Periods
Competency – 1 Manipulates the mathematical operations in the set of real numbers to fulfill the needs of day to day life.	**1.1** Investigates the quantitative value of numbers.	• Numbers • Place Value • Reading and writing numbers up to the billion zone (Standard form)	• Identifies the place value of each digit in a number. • Reads numbers up to the billion zone. • Writes numbers up to the billion zone in words and numerically. • Solves problems related to reading and writing numbers up to the billion zone.	**06**
	1.2 Uses the number line to introduce negative numbers.	• Number line • Representing whole numbers • Introducing negative numbers • Introducing integers • Representing integers	• Represents whole numbers on the number line. • Identifies negative numbers. • Analyses the instances where integers are represented in the created environment. • Recognizes positive whole numbers, negative whole numbers and zero as integers. • Represents integers on the number line.	**06**
	1.3 Uses symbols to easily communicate the magnitude of numbers.	• Comparing integers and organizing them • Using the symbols >, < and = and	• Compares a pair of integers using the symbols >, < or =. • Compares integers using the symbols >, < and = and orders them.	**05**

		their names • Finding an integer between two non-consecutive integers	• Writes an integer between two non-consecutive integers.	
	1.4 Manipulates whole numbers under addition and subtraction.	• Whole Numbers • Addition • Subtraction	• Adds whole numbers. • Subtracts whole numbers when the answer is a whole number. • Solves problems related to the addition and subtraction of whole numbers.	**05**
	1.5 Manipulates whole numbers under the operations of multiplication and division.	• Multiplication and division • By 10, 100, 1000 • By two digit numbers	• Multiplies whole numbers by 10, 100 and 1000. • Divides whole numbers by 10, 100 and 1000. • Multiplies whole numbers by two digit numbers. • Divides whole numbers by two digit numbers. • Solves problems related to the multiplication and division of whole numbers.	**05**
	1.6 Investigates the factors and multiples of whole numbers.	• Factors and multiples (Up to 100) • Using the 10 × 10 multiplication table	• Finds the factors and multiples of numbers using the 10 × 10 multiplication table. • By using multiplication and	**05**

		• By other methods	division, finds the factors and multiples of numbers that are not included in the 10 × 10 multiplication table. • Solves problems related to factors and multiples.	
	1.7 Investigates the methods of easily observing whether a number is divisible by another number.	• Rules of Divisibility • By 2, by 5, by 10	• Identifies methods of observing whether a number is divisible by 2, 5, 10. • Examines whether a number is divisible by 2, 5, 10 by using the identified methods. • Solves problems by using the identified methods.	**04**
	1.8 Estimates the number of elements in a set that can be counted.	• Estimation • The number of elements in a set that can be counted	• Describes how the number of elements in a set that can be counted is estimated. • Estimates the number of elements in a set that can be counted.	**04**
	1.9 Facilitates communication and computation by obtaining an approximate value for a number.	• Rounding off • Numbers less than 100 to the nearest 10	• Identifies the rules that are used when rounding off a number less than 100 to the nearest multiple of 10. • Rounds off numbers less than 100 to the nearest multiple of 10.	**04**

Competency – 2 Makes decisions for future requirements by investigating the various relationships between numbers.	**2.1** Classifies numbers based on their properties.	• Types of numbers • Odd and even • Relationship between odd and even numbers • Addition, Subtraction andMultiplication • Prime and Composite • Perfect square numbers and Triangular numbers	• Classifies whole numbers as odd numbers and even numbers. • Identifies the properties of the sums, differences and products of odd numbers and even numbers. • Identifies prime numbers and composite numbers. • Classifies whole numbers as prime numbers and composite numbers. • Identifies Perfect square numbers and triangular numbers. • Selects and groups the given group of whole numbers as Perfect square numbers and triangular numbers.	**05**
	2.2 Determines the pattern in a number sequence.	• Number patterns • Simple number patterns (Including odd and even) • Square numbers • Triangular numbers	• Identifies simple number patterns including the square number pattern and the triangular number pattern. • Solves problems related to number patterns.	**05**
Competency – 3 Manipulates units and parts of units under the	**3.1** Identifies unit fractions and proper	• Introducing fractions	• Recognizes a **fraction** as a part or parts of a unit/group.	**03**

mathematical operations to easily fulfill the requirements of day to day life.	fractions.	• As a portion of a unit and as a portion of a group • Unit fractions • Proper fractions	• Identifies unit fractions and proper fractions.	
	3.2 Identifies equivalent fractions.	• Introducing equivalent fractions	• Describes how fractions equivalent to a given fraction are found. • Finds fractions equivalent to a given fraction.	**01**
	3.3 Solves problems by comparing fractions.	• Comparison of fractions • Equal denominators • Unit fractions • Equal numerators • Related denominators	• Compares unit fractions. • Compares fractions with equal denominators. • Compares fractions with equal numerators. • Compares fractions with related denominators. • Solves problems related to comparing unit fractions, fractions with equal denominators, fractions with equal numerators and fractions with related denominators.	**04**
	3.4 Manipulates parts of a unit under the operations of addition and subtraction.	• Addition and subtraction of fractions • Equal denominators	• Adds and simplifies fractions with equal denominators when the answer is a proper fraction. • Subtracts and simplifies	**04**

		• Related denominators	fractions with equal denominators when the answer is a proper fraction. • Adds and simplifies fractions with related denominators when the answer is a proper fraction. • Subtracts and simplifies fractions with related denominators when the answer is a proper fraction. • Solves problems related to the addition and subtraction of fractions with equal denominators and with related denominators.	
	3.5 Identifies and compares decimal numbers.	• Decimals • Introduction • Comparison	• Identifies decimal numbers. • Compares decimal numbers up to the second decimal place and orders them. • Solves problems related to comparing decimal numbers.	**03**
	3.6 Manipulates decimal numbers under the operations of addition and subtraction.	• Decimals • Addition • Subtraction	• Adds decimal numbers up to the second decimal place. • Subtracts decimal numbers up to the second decimal place. • Solves problems related to the addition and subtraction of decimal numbers.	**03**

Competency – 4 Uses ratios to facilitate day to day activities.	**4.1** Makes connections between quantities.	• Ratios • Concept • Equivalent ratios • Simplest form (Between two quantities) • Applications of rate	• Describes the concept of a ratio of two quantities. • Finds ratios equivalent to a given ratio. • Writes a ratio in its simplest form. • Uses "rate" in simple transactions and other practical situations.	**06**
Competency – 6 Uses logarithms and calculators to easily solve problems in day to day life.	**6.1** Makes connections between numbers and powers to facilitate representation.	• Indices • Notation • Number (Less than 100) ⇔ Power • Expanding powers	• Identifies the index notation and uses it. • Writes as a power, a number which can be written as a power of a whole number. • Expands a power and writes its value.	**04**
Competency – 7 Investigates the various methods of finding the perimeter to carry out daily tasks effectively.	**7.1** By using suitable units, investigates situations where measurements of length occur.	• Length • Concept (Height, distance, depth, breadth and thickness as a length) • Units (mm, cm, m, km) • Measurement of length • Conversion	• Identifies height, distance, breadth, depth and thickness as "**length**". • Selects a suitable unit from mm, cm, m and km to measure a given length. • Measures lengths by selecting and using a suitable measuring instrument. • Expresses the relationships between the different units of	**05**

		(mm ⇔ cm ⇔ m⇔ km) • Estimation	length. • Converts cm ⇔ mm, cm ⇔ m, m ⇔ km. • Estimates distance, height, depth, breadth and thickness.	
	7.2 Relates measurements of length to find the perimeter of rectilinear plane figures.	• Finding the perimeter	• Identifies the length around a given rectilinear plane figure as its **perimeter**. • Finds the perimeter of a rectilinear plane figure with known measurements.	**03**
Competency – 8 Makes use of a limited space in an optimal manner by investigating the area.	**8.1** Investigates the area of rectilinear plane figures.	• Area • Concept • Units (cm^2) • Areas of squares • Areas of rectangles (Using a grid with $1cm^2$ squares)	• Identifies the extent of a bounded region as its **area**. • Measures the area using arbitrary units. • Recognizes cm^2 as a unit of measurement of area. • Finds the areas of squares and rectangles using a 1cm ×1cm grid. • Creates meaningful plane figures of given area using $1cm^2$ square laminas.	**05**
Competency – 9 Works with an awareness of mass to fulfill daily requirements.	**9.1** Uses measurements related to mass for daily requirements.	• Mass • Concept	• Identifies the amount of matter in an object as its	**05**

		• Units (g, kg)
		• Conversion (g ⇔kg)
		• Measurements (g, kg)
		  • Addition
		  • Subtraction
			mass.
			• Selects the suitable unit from g and kg to measure a given mass.
			• Expresses the relationship between g and kg.
			• Does conversions of units; g ⇔ kg.
			• Adds masses involving g and kg.
			• Subtracts masses involving g and kg.
			• Uses appropriate units to measure mass in daily activities.	

Competency – 11
Works critically with the knowledge of liquid measures to fulfill daily needs.
	11.1
	Uses liquid measurements in day to day activities.
		• Liquid Measurements
		• Units (ml, l)
		• Conversion (ml ⇔ l)
		• Estimation of liquid amounts
		• Measurements (ml, l)
		  • Addition
		  • Subtraction
			• Recognizes that ml and l are used to measure liquid amounts.
			• Selects the appropriate unit from ml and l to measure a given amount of liquid.
			• Expresses the relationship between ml and l.
			• Does conversions of units; ml ⇔ l.
			• Estimates given liquid amounts in ml and l.
			• Adds liquid volumes involving ml and l.
			• Subtracts liquid volumes
				04

			involving ml and l. • Uses appropriate units to measure liquid volumes in daily activities.	
Competency – 12 Manages time to fulfill the needs of the world of work.	**12.1** Plans daily activities by being conscious of the time.	• Time • Units (seconds, minutes, hours, days) • Find the **time spent** • Addition and subtraction	• Identifies seconds, minutes, hours and days as units of time. • Identifies the relationship between seconds and minutes, between minutes and hours and between hours and days. • Finds the **timespent** by using difference between finished time of a task and started time of the task. • Performs additions in relation to time that is given in terms of seconds and minutes. • Performs additions in relation to time that is given in terms of minutes and hours. • Performs additions in relation to time that is given in terms of hours and days. • Performs subtractions in relation to time that is given in terms of seconds and minutes. • Performs subtractions in	**03**

			relation to time that is given in terms of minutes and hours. • Plans daily activities according to a time table.	
	12.2 Writes the time and date in the standard form.	• 24 hour clock ⇔ 12 hour clock (Standard form) • Writing the date (Standard form)	• Expresses the time according to a 24 hour clock (In the international standard form). • Expresses the time given according to a 24 hour clock (in the international standard form) in terms of a 12 hour clock. • Expresses the time given according to a 12 hour clock in terms of a 24 hour clock (In the international standard form). • Writes the date in the international standard form as yyyy.mm.dd.	**03**
Competency – 13 Uses scale diagrams in practical situations by exploring various methods.	**13.1** Makes connections with the environment to fulfill daily needs by having an awareness of directions.	• Eight directions • The horizontal and the vertical (with respect to the ground)	• Identifies the eight directions. • Describes the direction of a location by using the eight directions. • Expresses the direction of a location with respect to another location in terms of the eight directions. • Identifies the horizontal and	**05**

			the vertical with respect to the ground. • Plans daily activities with an awareness of direction.	
Competency – 14 Simplifies algebraic expressions by systematically exploring various methods.	**14.1** Represents variables by algebraic symbols according to the requirement.	• Representing unknown constant terms by algebraic symbols • Representing a variable by an algebraic symbol according to the requirement	• Describes the information that is represented by standard symbols. • Identifies constant values that are not known as **unknown constants**. • Identifies a quantity which can take any value within a certain range as a **variable.** • Represents an unknown constant by an algebraic symbol according to the requirement. • Represents a variable by an algebraic symbol according to the requirement.	**04**
	14.2 Meaningfully constructs simple algebraic expressions using addition or subtraction and finds the value by substitution.	• Constructing algebraic expressions using addition or subtraction • With one unknown of coefficient 1 • Substituting into	• Constructs algebraic expressions in one unknown of coefficient 1 using the mathematical operation addition. • Constructs algebraic expressions in one unknown of coefficient 1 using the mathematical operation subtraction.	**04**

		an algebraic expression (Whole numbers) • With one unknown of coefficient 1	• Finds the value of an algebraic expression in one unknown of coefficient 1 by substituting whole numbers.	
Competency – 21 Makes decisions by investigating the relationships between various angles.	**21.1** Classifies angles with respect to the right angle.	• Types of angles with respect to the right angle • Right angle • Acute angles • Obtuse angles • Straight angles • Reflex angles	• Identifies angles by means of simple examples. • Identifies an angle with respect to the right angle as either a right angle, an acute angle, an obtuse angle, a straight angle or a reflex angle. • Classifies angles with respect to the right angle. • Identifies right angles, acute angles, obtuse angles, straight angles and reflex angles in the environment.	**04**
Competency – 22 Creates new models by exploring various solids.	**22.1** Investigates the properties of solids.	• Creation of models • Cube • Cuboid • Regular tetrahedron • Vertices, edges, faces • Cube, cuboid, regular tetrahedron	• Constructs models of a cube, a cuboid and a regular tetrahedron using nets that are given. • Expresses the number of vertices, edges and faces in a cube, a cuboid and a regular tetrahedron. • Identifies the geometrical shapes of the faces of these solids and names them**.**	**08**

			• Creates various nets for the cube, cuboid and regular tetrahedron. • Constructs compound solids with cubes, cuboids and regular tetrahedrons.	
Competency – 23 Makes decisions regarding day to day activities based on geometrical concepts related to rectilinear plane figures.	**23.1** Investigates the shapes of rectilinear plane figures.	• Properties of rectilinear plane figures and drawing them on a grid • Rectangle • Square • Triangle • Parallelogram • Trapezium	• Identifies the special features of rectilinear plane figures such as rectangles, squares, triangles, parallelograms and trapeziums. • Draws rectilinear plane figures such as rectangles, squares, triangles, parallelograms and trapeziums on a grid. • Describes objects in the created environment that have the shape of squares, rectangles, triangles, parallelograms or trapeziums.	**04**
Competency – 24 Thinks logically to make decisions based on	**24.1** Creates various designs using circular shapes.	• Circular shaped objects	• Identifies the circular shapes among a collection of items.	**03**

geometrical concepts related to circles.		• Circular designs (Using coins, bangles etc)	• Creates circular designs using items such as coins and bangles. (The use of a pair of compasses is not expected)	
Competency – 28 Facilitates daily work by investigating the various methods of representing data.	**28.1** Finds convenient methods of collecting and representing data.	• Data • Collection using tally marks (Not more than five groups and less than 100 data points) • Representation • By tables • By picture graphs	• Uses tally marks as a method of collecting data. • Collects data of no more than five groups and less than 100 data points, using tally marks. • Represents data using tables. • Represents data using picture graphs. (Including when $\frac{1}{2}$, $\frac{1}{4}$ of a picture is used)	**06**
Competency – 29 Makes predictions after analyzing data by various methods to facilitate daily activities.	**29.1** Interprets data represented using various methods.	• Interpretation of data • Using tables • Using picture graphs	• Interprets the data represented in tables. • Interprets the data represented using picture graphs.	**05**

Competency – 30 Manipulates the principles related to sets to facilitate daily activities.	**30.1** Groups a collection of items based on common properties.	• Sorting • Names for groups	• Separates a collection of items into different groups based on common properties. • Indicates the basis on which the collection of items was separated into the different groups. • Names the groups according to the common property.	**04**
			Total	**157**

2.0 Lesson Sequence

Content	Number of periods	Competency Levels
Term 1		
1. Circles	03	24.1
2. Place Value	06	1.1
3. Mathematical Operations on whole numbers	10	1.4,1.5
4. Time	06	12.1,12.2
5. Number Line	11	1.2,1.3
6. Estimation and Rounding off	08	1.8,1.9
7. Angles	04	21.1
8. Directions	05	13.1
	53	
Term 2		
9. Fractions	12	3.1,3.2,3.3,3.4
10. Selecting	04	30.1
11. Factors and Multiples	09	1.6,1.7
12. Rectilinear plane Figures	04	23.1
13. Decimals	06	3.5,3.6
14. Types of Numbers and Number Patterns	10	2.1,2.2
15. Length	08	7.1,7.2
16. Liquid Measurements	04	11.1
17. Solids	08	22.1
	65	
Term 3		
18. Algebraic Symbols	04	14.1
19. Constructing Algebraic Expressions and Substitution	04	14.2
20. Mass	05	9.1
21. Ratio	06	4.1
22. Data Collection and Representation	06	28.1
23. Data Interpretation	05	29.1
24. Indices	04	6.1
25. Area	05	8.1
	39	
TOTAL	157	

Instructions for the Learning-Teaching Evaluation Process

03. Instructions for the Learning-Teaching Evaluation Process

1. Circles

Competency 24 : Thinks logically to make decisions based on geometrical concepts related to circles.

Competency Level 24.1: Creates various designs using circular shapes.

Number of Periods : 03

Introduction:
It is expected that the student who has identified circles in the primary grades will identify circular shapes by considering various items and create different designs using circular items such as coins and bangles.

Learning outcomes relevant to competency level 24.1:

1. Identifies circular shapes from among various shaped items.
2. Creates circular designs using circular items such as coins and bangles. (The use of a pair of compasses is not expected)

Glossary of Terms

Circle	-	වෘත්තය	-	வட்டம்
Circular shape	-	වෘත්තාකාර හැඩ	-	வட்ட வடிவங்கள்
Designs	-	මෝස්තර	-	அலங்காரங்கள்

Instructions to plan the lesson:

It is expected that the students will be guided towards achieving the learning outcomes 1 and 2 of competency level 24.1. A specimen lesson plan to guide the students towards these learning outcomes is given below.

Time: 40 minutes

Quality Inputs :

- Demy Paper, Coloured A_4 paper, gum, pairs of scissors
- Circular items of various sizes (coins, bangles, saucers, bottle tops, circular lids)
- Pencil colours/ pastels
- A drawing containing various geometrical shapes, a majority of which are circular shapes
- A design or pattern created using circular shapes
- Copies of the activity sheet for students

Instructions for the teacher:

Approach:

- Display the drawing containing the geometrical shapes and lead a discussion on the various shapes that can be observed.
- Approach the lesson by focusing on the circular shapes that can be observed.

Developing the lesson:

- Display various circular items and explain that they are circular in shape.
- Show the students the design created using circular shapes and explain that circular shapes can be used to create such designs.
- Divide the class in a suitable manner into groups and give each group a copy of the activity sheet.
- Provide each group with a demy paper, several coloured A_4 sheets, gum, pairs of scissors, several circular items and pencil colours/pastels.
- At the commencement of the activity mention what a 'lamina' is.
- Stress the fact that attention should be paid to creativity, colour combinations and the finish of their creation.
- Allow the students to exhibit their work and assess the work.
- After the students have presented their work, lead a discussion and highlight the fact that certain items used in the home are circular in shape. Also discuss how circular shapes are used to make decorations more attractive in day to day life situations.

Activity sheet for the students:

- Create a design on the demy paper provided to you, by drawing circles using the circular shaped items that have been given.
- Make your design attractive by colouring it.
- On the coloured A4 sheets that have been given to you, draw circles of different sizes using the circular shaped items and cut out these laminas.
- Prepare a decoration using the coloured laminas.
- Display your work in the classroom.

Assessment and Evaluation:

- Assessment Criteria
  - Identifies circular shapes from given various shaped items.
  - Accepts that circular shapes can be used to enhance the beauty of the environment.
  - Creates various designs using circular shapes.
  - Works with discipline within the group.
  - Cleans the work table and puts away the resources that were used in the appropriate places.

- Direct the students to do the relevant exercises in the first lesson of the textbook.

For further study:

- http://www.shutterstock.com/s/%22circular+patterns%22/search.html

2. Place Value

Competency 1 : Manipulates the mathematical operations in the set of real numbers to fulfill the needs of day to day life.

Competency Level 1.1: Investigates the quantitative value of numbers.

Number of Periods : 06

Introduction:
The need to communicate as well as to use numbers arises in day to day activities. Therefore we need to be able to read and write numbers. We need to identify the relevant zones when we write or read numbers. By competency level 1.1, the ability to read and write numbers in the units zone, thousands zone, millions zone and billions zone is expected.

Learning outcomes relevant to competency level 1.1:

1. Identifies the place value of each digit in a number.
2. Reads numbers up to the billions zone.
3. **Writes numbers up to the billions zone in words and numerically.**
4. Solves problems related to reading and writing numbers up to the billions zone.

Glossary of Terms

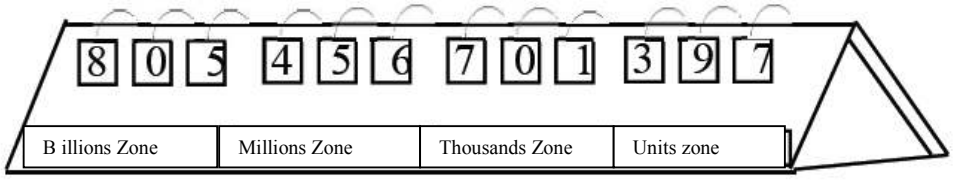
Thousand	-	දහස	-	ஆயிரம்
Million	-	මිලියනය	-	மில்லியன்
Billion	-	බිලියනය	-	பில்லியன்
Units zone	-	ඒකක කලාපය	-	அலகு வலயம்
Thousands zone	-	දහස් කලාපය	-	ஆயிரம் வலயம்
Millions zone	-	මිලියන කලාපය	-	மில்லியன் வலயம்
Billions zone	-	බිලියන කලාපය	-	பில்லியன் வலயம்

Instructions to plan the lesson:

This lesson is limited to guiding students in whom the learning outcomes 1 and 2 of competency level 1.1 have been established towards learning outcome 3. In developing the concepts under learning outcome 3 of competency level 1.1, a device to represent numbers is used to approach the lesson, to develop it, as well as to assess the students. The above steps are carried out using a lecture-discussion method and the content is expected to be established in students through a group activity in the form of a game.

Time: 40 minutes

Quality Inputs :



The device to represent numbers, made from cardboard

- Sets of 12 cards, on each of which one of the numbers from 0 to 9 is written
- Copies of the activity sheet for students

Instructions for the teacher:

Approach:

- Using the device to represent numbers, recall how numbers consisting of one digit, two digits, three digits etc, up to numbers with five digits are read.
- Inquire about the standard method of writing a number and lead a discussion on it.

Developing the lesson:

- With the aid of the device to represent numbers, by inquiring how a number with more than three digits is read, discuss how it is written.
- Explain that to facilitate reading a number, the digits in the number are divided from right to left into zones which are groups of three digits each.
- Using the device, show how the digits from right to left are divided into the units zone, the thousands zone, the millions zone and the billions zone.
- Explain that a gap should be kept between the groups of digits in the different zones when writing a number.
- Explain that the standard method should be used when reading and writing numbers.

- Discuss about the convenience of using the standard method to write numbers.
- Divide the class in a suitable manner into groups and give each group an activity sheet.
- Give each group a set of cards and engage the students in the activity.
- Pay attention to the weaker students while the groups are engaged in the activity.
- Let the students do this activity as a game during a given time period.
- Consider the group which has written the greatest amount of numbers in the given zone according to the activity sheet as the winner.
- After the activity, let the students present the facts that need to be considered when writing a number in the standard form.
- Lead a discussion based on the students' discoveries and reiterate the facts that need to be considered when writing a number in standard form.

Activity sheet for the students:

- Form a number by selecting three cards from the cards that you have been given, and write down the number in words.
- Now select either 4, 5 or 6 cards and form a number and write it down in words.
- Again select either 7, 8 or 9 cards and form a number and write it down in words.
- Now select 10, 11 or 12 cards and form a number and write it down in words.
- Collect facts that need to be considered when writing a number in standard form.
- Remember that the winner is selected based on the amount of numbers that have been written correctly during the given time period.
- Present to the class, the numbers you have written down as well as the facts that should be considered when writing a number in standard form.

Assessment and Evaluation:

- Assessment Criteria

  - Accurately writes a number up to the billions zone.
  - Accurately reads a number up to the billions zone.
  - Accepts that communication is facilitated by separating a large number into zones and writing it.
  - Collects facts that need to be considered when writing a number in standard form.
  - Helps the weaker students and works as a team to achieve victory.

- Represent more numbers using the device and ask the students to state the numbers.
- Direct the students to do the relevant exercise in lesson 2 of the textbook.

Practical Use:

- Discuss instances when numbers up to the billions zone are used by considering the following.
  - The distance from the sun to each of the planets.
  - The population in different countries.
  - Bank assets

For your attention…

Development of the lesson:

- Emphasize that when numbers are separated into zones and written, a comma (,) is not placed between the zones.
- Mention that although in advertisements in the newspapers, commas are used to separate the zones in numbers this is not the standard method.
- Explain that the Lotteries Board still writes and reads numbers in the manner done earlier but that this is not the standard method.
- When preparing problems on reading and writing numbers up to the billions zone, use the above practical situations and guide the students to solve the problems.

Assessment and Evaluation:

- Direct the students to the relevant exercise in lesson 2 of the textbook.

For further study:

- http://www.youtube.com/watch?v=t2L3JFOqTEk
- http://www.youtube.com/watch?v=b22tMEc6Kko
- http://www.youtube.com/watch?v=ZaqOUE3H1mE
- http://www.youtube.com/watch?v=fWan_T0enj4
- http://www.youtube.com/watch?v=gmlc_vkuNR4
- http://www.youtube.com/watch?v=V9_J-u9oYI0

3. Mathematical Operations on Whole Numbers

Competency 1 **:** Manipulates the mathematical operations in the set of real numbers to fulfill the needs of day to day life.

Competency Level 1.4: Manipulates whole numbers under addition and subtraction.
Competency Level 1.5: Manipulates whole numbers under the operations of multiplication and division.

Number of Periods : 10

Introduction:

- The basic addition number bonds are formed by taking the sum of any two digits from 0 to 9.
  Example: 5 + 3 = 8, 4 + 4 = 8
- Numbers are added by using the basic addition number bonds.
  Example: To find 54 + 98, the number bonds are 4 + 8 = 12,
  1 + 5 = 6, 6 + 9 = 15
- When a number from 0 to 9 is subtracted from the sum of a basic addition bond, such that the solution is a whole number, a subtraction number bond is obtained.
  Example: 17 – 5 = 12, 12 – 9 = 3
- When adding two numbers, the numbers belonging to the different places (units place, tens place etc) should be added together from right to left.
- When a number is multiplied by 10, 100 or 1000, then 1, 2 or 3 zeros are respectively added to the end of the number.
- When a multiple of 10, 100, 1000 or any other power of 10 is divided by 10, 100 or 1000 respectively, 1, 2 or 3 zeros are respectively removed from the end of the number.
- When a number is multiplied by a number consisting of two digits, the two digit number is considered as a multiple of 10 + a number from 0 to 9 and multiplied.
  Example: 348 × 57 = 348 × (50 + 7)
- When a number is divided by another number, division should be carried out from left to right.
- In this section, the addition and subtraction of whole numbers considered under competency level 1.4 and the multiplication and division of whole numbers considered under competency level 1.5 will be discussed.

Learning outcomes relevant to competency level 1.4:

1. Adds whole numbers.
2. Subtracts whole numbers when the answer is a whole number.
3. Solves problems related to the addition and subtraction of whole numbers.

Glossary of Terms

Addition number bonds	-	ආකලන බන්ධන	-	கூட்டல் பிணைப்புகள்
Subtraction number bonds	-	ව්‍යාකලන බන්ධන	-	கழித்தல் பிணைப்புகள்
Addition	-	එකතු කිරීම	-	கூட்டல்
Subtraction	-	අඩු කිරීම	-	கழித்தல்
Multiplication	-	ගුණ කිරීම	-	பெருக்கல்
Division	-	බෙදීම	-	வகுத்தல்
Place value	-	ස්ථානීය අගය	-	இடப்பெறுமானம்
Digits	-	ඉලක්කම්	-	எண்கள்
Whole number	-	පූර්ණ සංඛ්‍යාව	-	முழு எண்கள்

Instructions to plan the lesson:

The following is a exemplar lesson plan related to the first learning outcome under competency level 1.4. Since identifying the basic number bonds plays an important role in adding numbers, this specimen has been prepared with the aim of helping students to understand the concept of number bonds as well as to develop the skills of adding whole numbers. The group activity provided here will pave the way for students to discover these subject concepts.

Time: 80 minutes

Quality Inputs:

- A copy of the 10 × 10 grid given in the figure for each group. (The numbers in the first column and first row should be different for each group)
- Copies of the student activity sheet

+	7	9	2	5	1	4	8	0	6	1
4						I				
2						I				
0						I				
7						I				
5	–	–	–	–	–	9				
3										
8										
1										
6										
9										

Instructions for the teacher:

Approach:

- Display the following two problems on the board and give the students the opportunity to fill in the blanks with the suitable digits.

(i)

$$\begin{array}{r} 3\ 1 \\ +\ 6\ 4 \\ \hline \square \end{array}$$

(ii)

$$\begin{array}{r} \boxed{\ldots}9 \\ +\ 5\boxed{\ldots} \\ \hline 9\ 1 \end{array}$$

- Lead a discussion and display on the board the pairs of digits from 0 to 9, namely 1 + 4 = 5 and 3 + 6 = 9 in (i) and 9 + 2 = 11, 1 + 3 = 4 and 4 + 5 = 9 in (ii) which are used to add the given numbers.
- Show that the sum of two digits does not change even if the order is reversed.
- Highlight the fact that the sum of two digits from 0 to 9 can be obtained as the sum of two different digits too.
- Emphasize the fact that when adding numbers with and without carry overs, the digits should be added from the units place in the right, to the left, with an awareness of place value, and engage the students in the activity.

Developing the lesson:

- Group the students in a suitable manner and provide the groups with a copy each of the activity sheet and grid.
- Ensure that the digits in the first column and first row of the grids provided to the groups are different from each other.
- Direct the students to answer the questions regarding the additions which are given in the activity sheet, once they have completed the grid.
- Once the activity has been completed, give the students an opportunity to share facts related to the grid. Lead a discussion and highlight the following facts.
  - There are 100 additions within the grid
  - The sum of two digits remains the same even when the order of addition is reversed
  - The sum can be the same for different pairs of digits
  - The basic addition number bonds are formed by the addition of any pair of digits from 0 to 9.
  - These basic addition bonds are used when numbers are added together.

Activity sheet for the students:

- By considering the example provided in the grid, (5 + 4 = 9), complete the grid.
- Find the greatest value and the least value that is obtained as a sum.
- Write the pair of digits that gave the greatest sum in the form …….. + ……
- Write the pair of digits that gave the least sum in the form …….. + ……
- Examine all the pairs of digits that add up to 10 and write each pair of digits as a sum in the above manner.
- Examine all the pairs of digits that add up to 15 and write each pair of digits as a sum in the above manner.
- Separately write down the additions in the grid which are used to obtain the value of 245 + 42.
- By using the additions in the grid, find the sums of the following numbers along the rows and downwards and compare them with the given answer.

$$514 + 413 = ...$$

$$275 + 527 = ...$$

$$\underline{\quad + \quad} = \underline{1729}$$

- Within the group, discuss about the additions in the grid which were used in the additions performed above.
- Present to the class, your findings regarding the additions of the digits from 0 to 9 that come into play in the addition of two numbers as well as the additions in the grid.

Assessment and Evaluation:

- Assessment Criteria
  - Writes down all the addition number bonds that can be written down with the digits from 0 to 9.
  - Provides facts to show that several basic addition number bonds are involved in the addition of two numbers.
  - Accepts that basic addition number bonds are used when numbers are added together.
  - Adds several numbers together by using the basic addition number bonds.
  - Approaches the targets by working in cooperation within the group.

- Direct the students to write the basic addition number bonds from 0 to 18 in the following manner.

  0 = 0 + 0 …….. 1 addition number bond
  1 = 0 + 1 …….. 1 addition number bond
  2 = 0 + 2, 1 + 1 ……..... 2 addition number bonds
  3 = 0 + 3, 1 + 2 …… 2 addition number bonds
  4 = 0 + 4, 1 + 3, 2 + 2 ……. 3 addition number bonds

- Give the students the opportunity to complete magic squares.
  Example:

4		
	5	
8		

The sum along the columns, rows and the diagonals is 15.

- Direct the students towards the relevant exercises in lesson 3 of the textbook.

For your attention…
Development of the lesson:

- Prepare an activity for the students to discover that the subtraction number bonds are formed by subtracting the numbers from 0 to 9 from the sums (maximum of 18) that are obtained through addition number bonds, and engage the students in the activity.
- Prepare an activity involving additions for students to get a clear understanding that addition is done from right to left and to grasp the concepts of addition without carry overs as well as with carry overs, and engage the students in the activity.
- Prepare a lesson plan for competency level 1.5 and implement it.

Assessment and Evaluation:

- Direct the students to complete magic squares and charts consisting of numbers and involving additions and subtractions, which contain blank spaces.
- Direct the students to solve word problems which involve the addition and subtraction of numbers.

For further study:

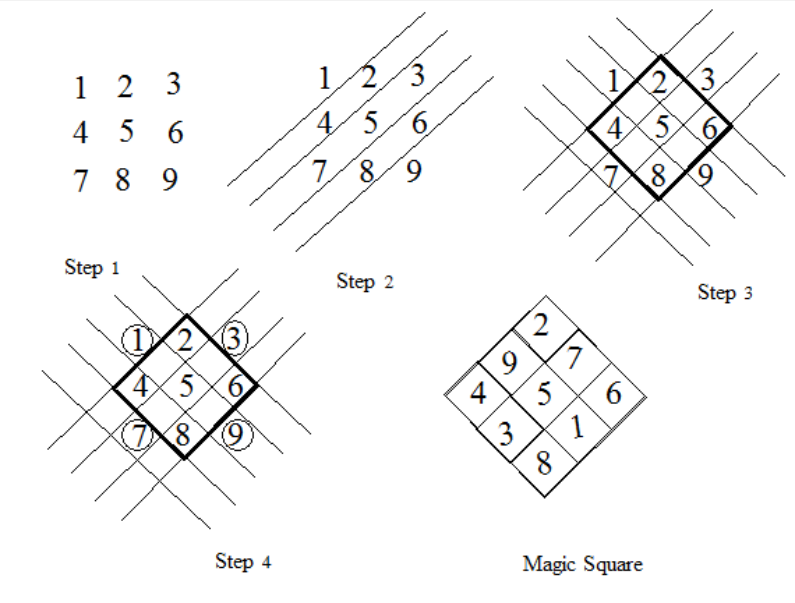
- http://www.youtube.com/watch?v=omUfrXtHtN0
- http://www.youtube.com/watch?v=GBtcGO44e-A
- http://www.youtube.com/watch?v=QY8vv7eVVJE
- http://www.youtube.com/watch?v=jb8mFpA1YI8

For the teacher only:

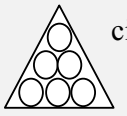
- There are 55 basic addition number bonds.
- There are 100 basic subtraction number bonds.
- Pay attention to the following table of subtraction number bonds.

-	0	1	2	3	4	5	6	7	8	9
0	0-0									
1	1-0	1-1								
2	2-0	2-1	2-2							
3	3-0	3-1	3-2	3-3						
4	4-0	4-1	4-2	4-3	4-4					
5	5-0	5-1	5-2	5-3	5-4	5-5				
6	6-0	6-1	6-2	6-3	6-4	6-5	6-6			
7	7-0	7-1	7-2	7-3	7-4	7-5	7-6	7-7		
8	8-0	8-1	8-2	8-3	8-4	8-5	8-6	8-7	8-8	
9	9-0	9-1	9-2	9-3	9-4	9-5	9-6	9-7	9-8	9-9
10		10-1	10-2	10-3	10-4	10-5	10-6	10-7	10-8	10-9
11			11-2	11-3	11-4	11-5	11-6	11-7	11-8	11-9
12				12-3	12-4	12-5	12-6	12-7	12-8	12-9
13					13-4	13-5	13-6	13-7	13-8	13-9
14						14-5	14-6	14-7	14-8	14-9
15							15-6	15-7	15-8	15-9
16								16-7	16-8	16-9
17									17-8	17-9
18										18-9

- Apply the following steps to construct magic squares



- When the numbers that are used are from 1 to 9, the sum in the magic square is $\frac{\frac{9}{2}(1+9)}{3} = 15$.
- When the numbers that are used are 12, 13, 14, 15, 16, 17, 18, 19 and 20, the sum in the magic square is $\frac{\frac{9}{2}(12+20)}{3} = 48$.



- The circles need to be filled with the numbers 1, 2, 3, 4, 5 and 6 such that the sum of the numbers in each row containing three circles is a constant. Giving the students the opportunity to fill in the circles with the numbers such that the sum is 9, 10, 11 or 12 will not only be an enjoyable experience for them but will also strengthen their knowledge.

For special attention:

It is recommended that the 100 grid is used daily to improve students' speed of adding numbers. After their speed of adding numbers is improved, they should be given to subtract, multiply and divide numbers.

4. Time

12.2

Competency 12 : Manages time to fulfill the needs of the world of work.

Competency Level 12.1: Plans daily activities by being conscious of time.

Competency Level 12.2: Writes the time and date in the standard form.

Number of Periods : 06

Introduction:
It is extremely important to develop the concept of time in Grade 6 students. Seconds, minutes, hours and days should be introduced as units of time. The relationships between seconds and minutes, between minutes and hours and between hours and days should be identified as follows.

60 seconds = 1 minute
60 minutes = 1 hour
24 hours = 1day

Time spent on a task can be found by taking the difference between the time the task ended and the time the task commenced.

Time spent = Time the task ended – Time the task commenced

Time given in seconds and minutes, in minutes and hours and in hours and days can be added and subtracted.

It is necessary to discuss about the importance of planning daily activities according to a time table and to direct students to prepare a time table for their daily activities.

Students need to be guided to express the time according to the 24 hour clock as well as in the standard international form. They also need to be guided to express time given in the standard international form, according to the 12 hour clock.

When time is expressed according to the standard international form, use the symbol : in between hours, minutes and seconds as hh:mm:ss. As well as hours, minutes and seconds are expressed using two digits each.
e.g. – 2.30 p.m. is expressed as 14:30:00 according to the standard international form.

When writing the date in the standard form, the year should be represented using 4 digits, the month with 2 digits and the date with 2 digits in the form *yyyy.mm.dd*.

Learning outcomes relevant to competency level 12.1:

1. **Identifies seconds, minutes, hours and days as units of time.**
2. **Identifies the relationship between seconds and minutes, between minutes and hours and between hours and days.**
3. **Finds the time spent on a task by taking the difference between the time the task ended and the time the task commenced.**
4. Performs additions in relation to time that is given in terms of seconds and minutes.
5. Performs additions in relation to time that is given in terms of minutes and hours.
6. Performs additions in relation to time that is given in terms of hours and days.
7. Performs subtractions in relation to time that is given in terms of seconds and minutes.
8. Performs subtractions in relation to time that is given in terms of minutes and hours.
9. Plans daily activities according to a time table.

Glossary of Terms

Time	-	කාලය	-	நேரம்
International standard form	-	අන්තර් ජාතික සම්මත ක්‍රමය	-	சர்வதேச நியம நேரம்
Time spent	-	ගත වූ කාලය	-	எடுத்த நேரம்

Instructions to plan the lesson:

Development of the subject concepts relevant to the learning outcomes 1, 2 and 3 of competency level 12.1 is expected. The following is a exemplar lesson plan based on the method of "lecture and discussion" together with a student activity, to help students develop the skills of identifying units of time and the relationships between these units as well as finding the time spent on a task.

Time: 40 minutes

Quality Inputs **:**

- Digital watch
- Stop watch
- "Madati" seeds
- Jam bottle
- A poem written on a demy paper
- A page of the English textbook

Instructions for the teacher:

Approach:

- Lead a discussion on the need to measure time.
- Ask the students about the units that are used to measure time and introduce seconds, minutes, hours and days as units of time.

Developing the lesson:

- Discuss the following relationships with the students.
  60 seconds = 1 minute, 60 minutes = 1hour, 24 hours = 1 day
- Display the demy paper with the poem written on it in front of the class and call one student to read the poem.
- Direct the students to note down the time the student starts reading the poem and the time he/she ends the poem.
- Lead a discussion and emphasize the fact that the time spent on reading the poem is found by subtracting the time the student started the poem from the time he ended it. Mention that accordingly, 'time spent' is equal to the difference between two times.
- Engage the students in the following activity to further establish this concept by practically measuring the time spent on a task.
- Prepare the items given under the quality inputs which are required to measure the time spent.
- Divide the class into two or more groups in a suitable manner.
- Give each group a student activity sheet.
- Give each group a digital watch, stop watch, jam bottle, sufficient 'madati' seeds to fill the jam bottle completely and a copy of a page of the English text book.
- While the students are engaged in the activity, assist them when required and assess them.
- At the end of the activity, lead a discussion and highlight the following.
  - The units seconds, minutes, hours and days are used to measure time.
  - The relationships that exists between these units.
  - Time spent on a task is found by taking the difference between the time the task ended and the time the task commenced.
  - The stop watch can be used to examine the accuracy of the value calculated in the above manner for the time spent.

Activity sheet for the students:

- Prepare the items which are required to fill the jam bottle with 'madati' seeds.
- Note down the time on the digital watch the instant you start filling the jam bottle with the 'madati' seeds.
- Start the stopwatch at the same instant.
- As soon as the bottle is filled, note down the time on the digital watch and stop the stopwatch.
- In the same manner, note down the above information from the digital watch and stopwatch for the task of reading a page of the English textbook.
- Give a student in the group the task of reciting a poem and again collect information as above.
- Include the information you noted down in the following table.

Activity	Commencement Time	Completion Time	Completion Time – Commencement Time = Time Spent	Stopwatch Time
1. Filling the jam bottle with madati 2. Reading a page of the textbook 3. Reciting a poem				

- For each activity, compare the calculated value of the 'time spent' with the time you got using the stopwatch.

Assessment and Evaluation:

- Assessment Criteria

  - Measures the commencement time and completion time accurately.
  - Accepts that the time spent is the difference between the completion time and the commencement time.
  - Calculates the time spent on an activity.
  - Correctly uses the stopwatch to examine the accuracy of the above calculated value.
  - Engages in the activity with commitment to achieve qualitatively better results.

- Direct the students to do the relevant exercises in lesson 4 of the textbook.

Practical Use:

- Discuss the following practical applications of time spent.
  - The time during the day when the school was in session is the difference between the time it commenced and the time it ended.
  - The time spent on a journey by a bus is the difference between the time the bus started the journey and the time it approached its destination.
  - The victory of a runner is determined by the time taken by the runner to complete the race.

For your attention…

Development of the lesson:

- Prepare a suitable activity to develop the skill of adding and subtracting times which involve seconds and minutes, minutes and hours, hours and days and implement it.
- Plan a suitable activity to encourage students to prepare a time table for their daily activities.
- Prepare a suitable lesson plan for competency level 12.2 and implement it.

Assessment and Evaluation:

- Guide the students to express time using the 24 hour clock (in the international standard form) and to represent time given by the 24 hour clock in terms of the 12 hour clock.
- Direct the students to the relevant exercise in lesson 4 of the textbook.

For further study:

- http://www.youtube.com/watch?v=NjJFJ7ge_qk
- http://www.youtube.com/watch?v=ftndEjAg6qs

5. Number Line

Competency 1 **:** Manipulates the mathematical operations in the set of real numbers to fulfill the needs of day to day life.

Competency Level 1.2: Uses the number line to introduce negative numbers.
Competency Level 1.3: Uses symbols to easily communicate the magnitude of numbers.

Number of Periods **:** 11

Introduction:
In instances when the greatest in quantity, the tallest, the lightest, the shortest, the coldest etc are considered, a comparison of similar quantities can be made. When their numerical values are obtained, the comparison can be done numerically. By using the symbols >, < and = to denote 'greater than', 'less than' and 'equal' respectively, communication of the comparison is facilitated.

Learning outcomes relevant to competency level 1.3:

1. **Compares a pair of integers using one of the symbols >, < or =.**
2. Compares integers using the symbols >, < and = and orders them.
3. Writes down an integer between two non-consecutive integers.

Glossary of Terms

Whole numbers	-	පූර්ණ සංඛ්‍යා	-	முழு எண்கள்
Negative numbers	-	ඍණ සංඛ්‍යා	-	மறை எண்கள்
Integers	-	නිඛිල	-	நிறைவெண்கள்
Greater	-	විශාල	-	பெரிது
Less	-	අඩු	-	சிறிது
Equal	-	සමාන	-	சமன்
Number line	-	සංඛ්‍යා රේඛාව	-	எண்கோடு

Instructions to plan the lesson:

It is expected that the first learning outcome under the competency level 1.3 will be achieved by implementing the following activity which is prepared according to the guided discovery method, after a suitable activity is implemented to introduce negative numbers and to represent integers on a number line which are the subject content under the competency level 1.2.

Time: 80 minutes

Quality Inputs :
- A box with slips of paper with the numbers from 0 to 10 written on them, and another box with slips of paper with the numbers from -1 to -10 written on them. (For one group)
- A Bristol board with an enlarged number line marked from -10 to +10 drawn on it.
- An A_4 paper with a number line marked from -10 to +10. (One for each group).

Instructions for the teacher:

Approach:
- Recall that positive whole numbers, negative whole numbers and zero are called integers.
- Engage the students in the following activity by recalling how integers are represented on a number line.

Developing the lesson:
- First, group the students in a suitable manner and give each group a copy of the number line marked from -10 to +10 and a box containing the slips with the numbers from 0 to 10 written on them.
- Ask two students from each group to pick a number each from the box. Direct the students in the group to select the larger number.
- Introduce the symbol " > " for larger, greater etc. Explain that the side with the open mouth is used to indicate the greater side.
- Give the students the opportunity to represent the two numbers that were selected earlier by two students, using the symbol >.
- Introduce the symbol < for **lesser** by means of the symbol > used to indicate **greater**.
- Guide the students to recognize that the same symbol represents both cases and help them to understand using the representation of the numbers by the groups that, the **open side of the symbol indicates the greater sid**e and that the **closed side of the symbol represents the lesser side**.
- Give the other students in the groups too the opportunity to draw slips and direct them to compare the numbers in pairs and write down the comparison using the symbol.

- Direct the students to mark the number they each got on the number line given to the group and inquire from them about the numbers which are greater/larger than a selected number. (Example: That the numbers 5, 6, 7 etc are greater than 4). Use the enlarged copy of the number line to explain this.
- In the same manner, inquire about the numbers which are less than a selected number. Use the negative numbers too for this.
- Using this method get the students themselves to discover that the values increase gradually as you move from the left side (negative side) towards the right side.
- Give the groups the box with the numbers from -1 to -10 written on the slips and direct them to compare numbers by selecting slips from both boxes.

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- Ask the students how they would compare and write down the relationship if two students obtain the same number. Elicit from the students themselves that the two numbers are equal and that the symbol = is used to represent this fact.
- Summarize what was learnt by stating that for two numbers A and B, A is greater than B, A is less than B and A is equal to B are respectively denoted symbolically by A > B, A < B and A = B.
- Familiarize students with the use of the symbols > , < and = by providing further examples involving the number line as well as without it.

Assessment and Evaluation:

- Assessment Criteria

  - Selects the greater or lesser number from two given numbers.
  - Compares two given integers using the symbols <, > and =.
  - Writes down values which are greater than and which are less than a given integer.
  - Accepts that using symbols facilitates the comparison of integers (more than using words)
  - Works in cooperation within the group.

- Direct the students to do the relevant exercise in lesson 5 of the textbook.

For your attention…

Development of the lesson:

- Prepare and implement a suitable activity to develop the skill of comparing several integers using the symbols >, <, = and writing them in ascending or descending order.

- Use a suitable method to develop the skill of finding an integer between two non-consecutive integers.

Assessment and Evaluation:

- Direct the students to do the relevant exercise in lesson 5 of the textbook.

For further study:

- http://www.youtube.com/watch?v=VW6UrPKPInA
- http://www.youtube.com/watch?v=uC09taczvOo
- http://www.ezschool.com/games/compare.html
- http://www.softschool.com/matg.jsp

6. Estimation and Rounding Off

Competency 1 : Manipulates the mathematical operations in the set of real numbers to fulfill the needs of day to day life.

Competency Level 1.8: Estimates the number of elements in a set that can be counted.
Competency Level 1.9: Facilitates communication and computation by obtaining an approximate value for a number.

Number of Periods : 08

Introduction:
The aim of estimation is to give a numerical value for the amount of a certain material relative to a numerical value of a known amount of the same material. How good the estimation is depends on how close the estimated value is to the real value. Since the estimated values can differ from person to person, estimation is subjective. Day to day work can be carried out efficiently using estimation.
Rounding off is also done to obtain an approximate value of a number. In this lesson it is expected to round off numbers less than 100 to the nearest multiple of 10.

Learning outcomes relevant to competency level 1.8:

1. **Describes how the number of elements in a collection that can be counted is estimated.**
2. **Estimates the number of elements in a collection that can be counted.**

Glossary of Terms

Estimation	-	නිමානය	-	மதிப்பிடல்
Countable	-	ගිනිය හැකි	-	எண்ண முடியுமான
Elements	-	අවයව	-	உறுப்புகள்
Rounding off	-	වටැයීම	-	மட்டத்தட்டல்

Instructions to plan the lesson:

The following is a exemplar lesson plan which uses the discovery method to develop the subject concepts related to the learning outcomes 1 and 2 under the competency level 1.8 in students.

Time: 40 minutes

Quality Inputs :
- A handful of Nellie/Veralu
- A large bundle and a small bundle containing sticks of the same size
- A large stack and a small stack of Deines cubes of the same size
- A large pile and a small pile of chick peas of the same size
- A large pile of cowpeas and a small pile of cowpeas of the same size
- Copies of the activity sheet for students

Instructions for the teacher:

Approach:
- Show a handful of small fruits such as nelli/veralu to the students and ask them how many fruits there are. Write down their answers on the blackboard.
- Using the various answers provided by the students, explain to them that it is difficult to give the correct answer in situations like this, without counting the exact amount, and that only an approximate value is obtained in this manner.

Developing the lesson:
- Group the students in a suitable manner and give each group a copy of the activity sheet for students.
- Engage the students in the relevant activity.
- Give them the opportunity to present their findings.
- Encourage the students by giving small prizes to the groups whose estimates are the closest to the actual values.
- Using the findings of the students lead a discussion and highlight the following important facts of the lesson.

- When giving a numerical estimate of an amount of material it should be done relative to a known amount of the same material.
- At a later date, estimation can be done based on one's experience.
- A good estimate should be close to the actual amount.

Activity sheet for the students:

- Count the number of sticks in the small bundle of sticks given to you.
- Taking this number into consideration, estimate the number of sticks there are in the large bundle of sticks.
- Count the number of Deines cubes in the small stack given to you.
- Taking this number into consideration, estimate the number of Deines cubes in the larger stack.
- Count the number of chickpeas in the small pile given to you.
- Taking this number into consideration, estimate the number of chickpeas in the larger pile.
- Similarly estimate the number of cowpeas in the larger pile.
- Write down the estimated values in the relevant column in the following table.

Item	Estimated Value	Actual Value
Sticks Deines cubes Chickpeas Cowpeas		

- Obtain the actual numbers of sticks, Deines cubes, chickpeas and cowpeas there are in the larger groups of the items.
- Include these values in the table under the column 'Actual Value'.
- Examine how close your estimated values are to the actual values.
- Present your discoveries to the class.

Assessment and Evaluation:

- Assessment Criteria

  - Describes how the number of items in a collection that can be counted is estimated.
  - Accepts the importance of the estimated value being close to the actual value.
  - Uses estimated values appropriately in various situations.
  - Performs day to day activities efficiently using estimates.
  - Values the opinions of others within the group.

- Direct the students to do the relevant exercise in lesson 6 of the textbook.

Practical use:

- Discuss the practical applications of estimation by considering the following situations.

- Estimates the amount of dry rations required for a meal at home based on the number of household members.
- Estimates the amount of food and drinks that is required for a sports event.
- When planning an educational tour it is important to pay attention to the time required for the tour, which is usually estimated.
- When planning a prize giving the cost is estimated and planning is done so as to minimize waste.

For your attention…
Development of the lesson:

- Prepare and implement a suitable lesson plan to develop in students the skill of rounding off numbers which are less than 100 to the nearest multiple of 10, which is expected under the competency level 1.9.

Assessment and Evaluation:

- Direct the students to do the relevant exercise in lesson 6 of the textbook.

For further study:

- http://www.youtube.com/watch?v=tx2Niw7aJJ8
- http://www.youtube.com/watch?v=CMdck80SHnw

7. Angles

Competency 21 : Makes decisions by investigating the relationships between various angles.

Competency Level 21.1: Classifies angles with respect to the right angle.

Number of Periods : 04

Introduction:
The student who identified the right angle in grade 5 recognized that there are angles which are greater than a right angle as well as angles which are less than a right angle. The aim of competency level 21.1 is to classify angles as acute angles, obtuse angles, straight angles and reflex angles.

Learning outcomes relevant to competency level 21.1:

1. **Identifies angles by means of simple examples.**
2. **Identifies an angle with respect to the right angle as either a right angle, an acute angle, an obtuse angle, a straight angle or a reflex angle.**
3. **Classifies angles with respect to the right angle.**
4. **Identifies right angles, acute angles, obtuse angles, straight angles and reflex angles in the environment.**

Glossary of Terms

Angle	-	කෝණය	-	கோணம்
Acute angle	-	සුළු කෝණය	-	கூர்ங்கோணம்
Right angle	-	සෘජුකෝණය	-	செங்கோணம்
Obtuse angle	-	මහා කෝණය	-	விரிகோணம்
Straight angle	-	සරල කෝණය	-	நேர்கோணம்
Reflex angle	-	පරාවර්ත කෝණය	-	பின்வளைகோணம்

Instructions to plan the lesson:

A exemplar lesson plan to introduce different types of angles to students using the lecture – discussion method to guide students towards learning outcomes 1, 2 and 3 of competency level 21.1 is given below.

Time: 40 minutes

Quality Inputs :
- A map/drawing of the roads of a city indicating how the roads branch off in various directions forming the shapes of all five types of angles.
- For each student, a piece of paper of any shape, the size of a page of the exercise book.

Instructions for the teacher:

Approach:

- Ask a few students to give examples of places in the class room where right angles which were studied in grade 5 can be observed.
- Using these examples remind the students that in grade 5 they also identified angles which are greater than a right angle as well as angles which are less than a right angle.

Developing the lesson:

- Give each student a piece of paper the size of a page of an exercise book and direct them to form a right angle by folding the piece of paper as was done in Grade 5. (Guide the students who require help).
- In the classroom, display the map/drawing of the roads of a city which branch off.
- Ask a few students to come forward and compare the angles you indicate in the map/drawing with the right angle they created.
- Get the students to place their right angle accurately on the angles in the map/drawing and to state whether the relevant angle in the map is greater, less or equal to a right angle.
- Accordingly introduce the words 'acute angle' and 'obtuse angle'.
- Similarly, with the participation of the students show using the map/drawing that a straight angle is equal to two right angles.
- Using the map/drawing, show them reflex angles and inform them that such angles which are greater than a straight angle, that is, greater than two right angles are called reflex angles.
- Develop the lesson by drawing several angles of each type on the board and naming them.
- Engage the students in an exercise of classifying a given set of angles as right angles, acute angles, obtuse angles, straight angles and reflex angles with the aid of the right angle they formed.

Assessment and Evaluation:

- Assessment Criteria

  - Determines whether a given angle is an acute angle, right angle, obtuse angle, straight angle or a reflex angle using the right angle and mentions it.
  - From a given set of angles, selects the acute angles, right angles, obtuse angles, straight angles and reflex angles and names them accurately.
  - Correctly uses the right angle which was formed to identify different types of angles.

- Follows the given instructions.

- Direct the students to do the relevant exercise in lesson 7 of the textbook.

Practical use:

- Discuss the following examples in the environment where the different types of angles can be observed.
  Example: The ways in which the branches of a tree spread out. The angle between the hour hand and minute hand of a clock.

For your attention…
Development of the lesson:

- Prepare an activity for the students to go out of the class room in groups and find examples of acute angles, right angles, obtuse angles straight angles and reflex angles in the environment, and implement it.

Assessment and Evaluation:

- Direct the students to do the relevant exercise in lesson 7 of the textbook.

For further study:

- http/www.mathisfun.com/angles,html
- http//www.youtube.com/watch?v=MWYakuD8

8. Directions

Competency 13 : Uses scale diagrams in practical situations by exploring various methods.

Competency Level 13.1 : Makes connections with the environment to fulfill daily needs by having an awareness of directions.

Number of Periods : 05

Introduction:
It is essential to have an understanding of directions when conducting one's day to day activities. The fact that the sun rises from the east and sets in the west is known to us from our childhood. The child who moves to grade six from grade 5 with an understanding of the four main directions, studies more facts about directions in grade 6.
The aims of this section are to develop the following skills in students.

- To identify the eight directions which are the four main directions and the four sub-directions.
- To describe the locations in a diagram or a map in terms of the eight directions
- To describe various locations with respect to a certain location, in terms of the eight directions, by first identifying the eight directions in relation to the original location.
- To identify the horizontal and the vertical with respect to the earth.
- To plan daily activities with an awareness of directions.

Learning outcomes relevant to competency level 13.1:

1. **Identifies the eight directions.**
2. **Describes the direction of a location by using the eight directions.**
3. Expresses the direction of a location with respect to another location in terms of the eight directions
4. Identifies the horizontal and the vertical with respect to the ground.
5. Plans daily activities with an awareness of directions.

Glossary of Terms

Direction	-	දිශාව	-	திசை
Main directions	-	ප්‍රධාන දිශා	-	பிரதான திசைகள்
Sub directions	-	අනු දිශා	-	உப திசைகள்
Eight directions	-	අට දිශා	-	எட்டுத் திசைகள
Vertical	-	සිරස	-	நிலைக்குத்து

Horizontal - තිරස - கிடை

Instructions to plan the lesson:

A exemplar lesson plan based on the lecture – discussion method to help develop in students the skills relevant to the subject concepts of learning outcomes 1 and 2 of competency level 13.1 is given below.

Time: 40 minutes

Quality Inputs :

- An enlarged map of the school with the main directions marked on it (The directions marked relative to the centre of the school)
- Copies of the map of Sri Lanka similar to that found in Annex 1 printed on A_4 paper, with cities in the four main directions and 4 sub-directions marked on it. (A map for each group.)
- Copies of the activity sheet

Instructions for the teacher:

Approach:

- Place the map of the school with the four main directions marked on it **horizontally** on the teacher's table. Remind the students about the four main directions by getting them to come forward in groups and observe the map.
- Once the students have observed the map, display it in front of the class.
- Name the four main directions with the aid of the map and inquire from the students regarding the directions in which they lie. (Consider a direction only if a place is located in that direction in the map of the school),
- Indicate a place located along one of the main directions and ask the students which direction it is in.
- Taking into consideration the answers provided by the students lead a discussion on the locations that lie in the four main directions.
- Approach the lesson by mentioning that apart from the four main directions, there are four other directions that have been named and that these directions are called sub-directions.

Developing the lesson:

- Explain that between every pair of main directions, another direction has been named, and that since these four directions lie between the four main directions, they are called **sub-directions.**
- Explain that the direction that lies between the North and the East is called the **North-East**.

- Mark the **North-East** direction by an arrow on the map of the school that was displayed and inquire from the students regarding the places that lie in that direction.
- Explain that in the same manner, the South-East direction lies between the East and the South, the South-West direction lies between the South and the West and the North-West direction lies between the North and the West.
- Mark the South-East, South-West and North-West directions also on the map with arrows.
- Select students randomly and ask them about the places on the map lying along these directions.
- Ask the students about the directions along which selected places lie.
- Suggest a place (For example a swimming pool), and inquire from the students in which direction it should be located. Direct the students to mark this location on the displayed map of the school.
- Group the students in a suitable manner and give each group an activity sheet and a map of Sri Lanka.
- Engage the students in the group activity.
- Provide the groups with the opportunity to present their findings.
- Lead a discussion by taking into consideration the findings of the students and highlight the following facts

- Apart from the four main directions named North, South, East and West there are four other directions named North East, North West, South West and South East.
- These four directions are considered as **sub-directions**.
- It is important to be able to express the directions in which places on a diagram or a map which has the directions marked on it are located.
- It is important to be able to mark a place in a given direction on a diagram or a map.

Activity sheet for the students:

- Carefully observe the map of Sri Lanka which has been given to you.
- By considering the main directions which are marked on the map, indicate the sub-directions using arrows.
- List out the cities and places that are located in the main directions and the sub-directions
- There are well grown coconut trees along the beach in the South-West. Mark this on the map.
- An inactive large ship is located in the sea in the North-West. Draw a sketch of this on the map.
- List out instances when the knowledge of directions is used at home.
- Present your findings to the class.

Assessment and Evaluation:

- Assessment Criteria

  - In a figure, represents the eight directions with respect to the North.
  - Describes the places in a diagram which are located in the eight directions.
  - Accepts that in day to day activities it is important to have knowledge of the eight directions.
  - Marks places in a diagram in the given directions.
  - Describes instances when the knowledge of directions is used at home.
  - Works within the group respecting the views of others.

- Direct the students to do the relevant exercise in lesson 8 of the textbook.

Practical use:

- By considering the following examples lead a discussion on the practical applications of the knowledge of directions.
- When making a plan of a site, directions are used to describe locations.
- The Meteorological Department takes the directions into consideration when issuing statements regarding the weather.
- Directions are considered when performing the rituals of the Sinhala/Tamil New Year.
- Directions are considered when planning the location of the kitchen, bedroom, bathroom etc of a house.

- Directions are considered when drawing a map.

For your attention…

Development of the lesson:

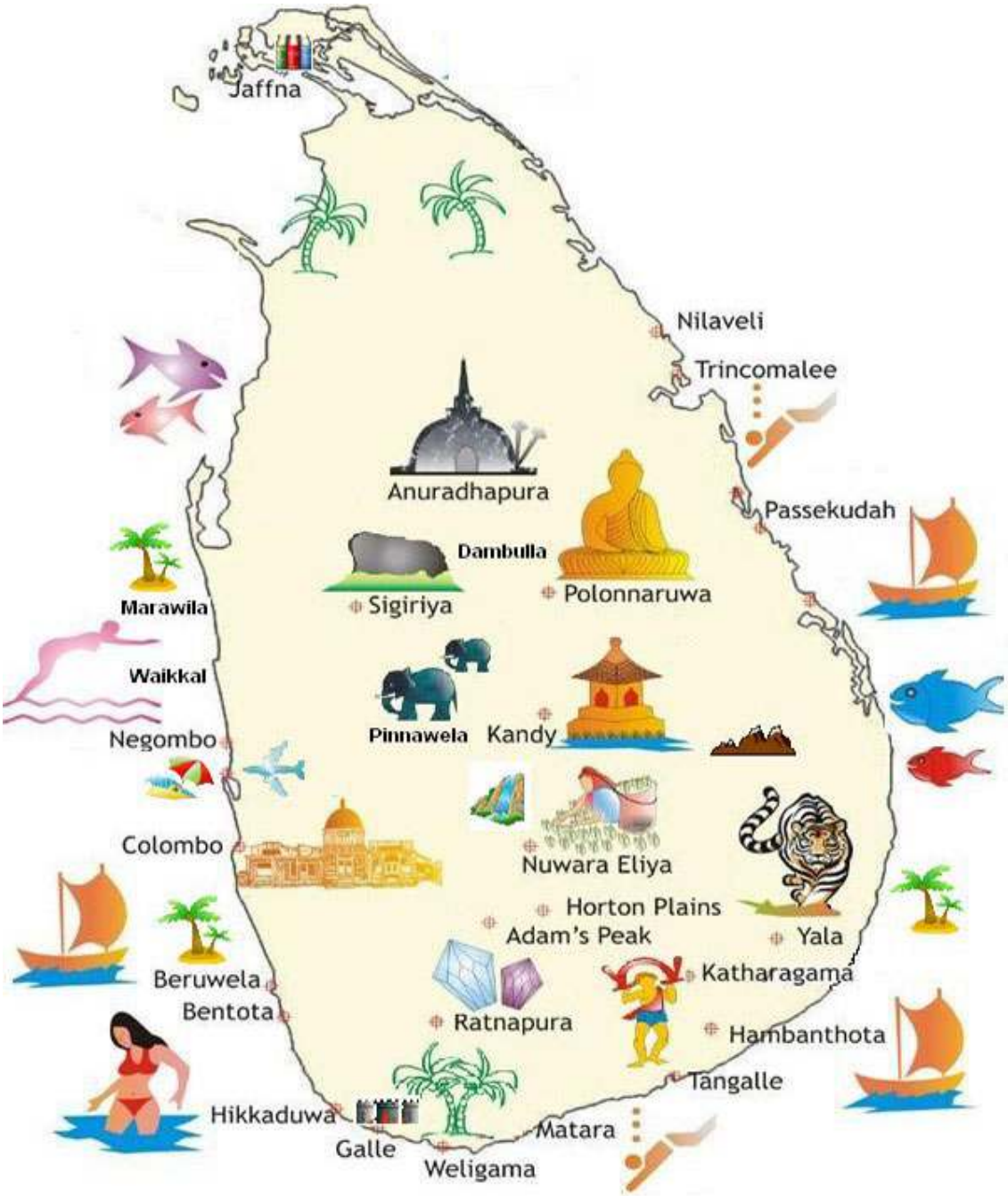
- An activity such as the following can be planned to develop the skill in students of determining in terms of the eight directions, the direction in which a certain place lies with respect to another location.
- First, describe what a compass is and explain how the north is located using it.
- Group the students and assign different places in the school garden to the different groups. Direct the students to determine the places that lie in the eight directions with respect to their places and to make a sketch of these places. (Give each group a compass)
- Direct the students to display their sketches and to describe the locations of the places they selected.
- Use a suitable method to help students identify the horizontal and the vertical with respect to the earth and to have an awareness of directions as they attend to their daily work.

Assessment and Evaluation:

- Direct the students to do the relevant exercise in lesson 8 of the textbook.

For further study:

Annex 1


Jaffna
Nilaveli
Trincomalee
Anuradhapura
Passekudah
Dambulla
Polonnaruwa
Marawila
Sigiriya
Waikkal
Pinnawela
Kandy
Negombo
Colombo
Nuwara Eliya
Horton Plains
Adam's Peak
Yala
Beruwela
Bentota
Katharagama
Ratnapura
Hambanthota
Tangalle
Hikkaduwa
Galle
Matara
Weligama

9. Fractions

Competency 3 : Manipulates units and parts of units under the mathematical operations to easily fulfill the requirements of day to day life.

Competency Level 3.1: Identifies unit fractions and proper fractions.
Competency Level 3.2: Identifies equivalent fractions.
Competency Level 3.3: Solves problems by comparing fractions.
Competency Level 3.4: Manipulates parts of a unit under the operations of addition and subtraction.

Number of Periods : 12

Introduction:
The aims of this section are to introduce unit fractions, proper fractions and equivalent fractions, and to develop in students the ability to compare fractions as well as to add and subtract fractions. After the subject content relevant to competency 3.1 is established, students should be directed to the following lesson plan related to competency level 3.2

Learning outcomes relevant to competency level 3.2:

1. Describes how fractions equivalent to a given fraction are found.
2. Finds fractions equivalent to a given fraction.

Glossary of Terms

Fraction	- භාගය	- பின்னம்
Half	- බාගය	- அரை
Unit fraction	- ඒකක භාගය	- அலகுப் பின்னம்
Proper fraction	- නියම භාගය	- முறைமைப் பின்னம்
Equivalent fraction	- තුල්‍ය භාගය	- சமவலுப் பின்னம்
Numerator	- ලවය	- தொகுதி எண்
Denominator	- හරය	- பகுதி எண்

Instructions to plan the lesson:

A exemplar lesson plan that can be used to develop the subject concepts related to the learning outcomes 1 and 2 under competency level 3.2 using a 'group activity' method is given below.

Time: 40 minutes

Quality Inputs:

- Copies of the student activity sheet
- Pairs of scissors and gum
- Four pieces of paper half the size of an A_4 sheet each (For each group)
- Pencil colours, pastels

Instructions for the teacher:

Approach:

- Commence the lesson by recalling that the relevant unit has to be divided into equal parts when a fraction is considered.

Developing the lesson:

- Organize the items given under the quality inputs.
- Group the students in a suitable manner.
- Provide each group with the pieces of paper and pencil colours/pastels.
- Guide the students to fold the pieces of paper to obtain 4, 8 and 16 equal parts.
- Direct the students to discover and then present the relationship $\frac{1}{2} = \frac{2}{4} = \frac{4}{8} = \frac{8}{16}$.
- After the students' presentations, using the relationship $\frac{1}{2} = \frac{2}{4} = \frac{4}{8} = \frac{8}{16}$, explain that these fractions are called equivalent fractions.
- Explain further that equivalent fractions can be obtained by multiplying both the numerator and the denominator of a fraction by the same number. Write down a fraction such as $\frac{8}{10}$ and explain that equivalent fractions can also be obtained by dividing both the numerator and the denominator by the same number.

Activity sheet for the students:

- Take one of the rectangular shaped pieces of paper that was given to you and fold it once such that the two pieces overlap each other and then unfold it again.
- In the same manner fold the other three pieces of paper and then unfold them too.
- In each of the four pieces of paper, colour one of the two parts that you obtained by folding the paper.
- Except for one of the pieces of papers, fold the other three papers repeatedly until you get 4 equal parts on one paper, 8 equal parts on another paper and 16 equal parts on the third paper.
- On all four pieces of paper clearly outline the fold marks with a pen.
- Write the fraction of the paper that is coloured on each of the papers themselves.
- By paying special attention to the piece of paper which was folded into just two parts, discuss among the group about the fractions represented by the coloured part of all four pieces of paper.
- Prepare to present your observations to the rest of the class.

Assessment and Evaluation:

- Assessment Criteria

  - Colours a portion of a paper according to the given instructions.
  - Folds a piece of paper according to the given instructions, clearly indicating the fold marks.
  - Writes the portion that was coloured accurately as a fraction.
  - By considering the fractions that have been written down, observes the relationship that exists between the denominators and numerators.
  - Works cooperatively within the group and prepares for the presentation.

- Direct the students to do the relevant exercises in lesson 9 of the textbook.

For your attention…

Development of the lesson:

- When introducing equivalent fractions it is essential to consider the same unit.
- Before introducing equivalent fractions ensure that the concept of fractions is firmly established in students by engaging them in suitable activities. Emphasize that fractions of a unit can be written by considering

either a part or several parts of the unit only when the unit has been divided into equal parts.

- Explain to the students that even when a unit is divided into unequal portions, a portion will be a fraction of the unit, but that it cannot be considered as a unit fraction of the number of parts the unit has been divided into. Explain the difference between 'half' and 'fraction'.
- Show the students that to compare fractions either the numerators or the denominators have to be equal. Explain the use of equivalent fractions when it is required to write fractions with equal denominators.
- Explain how equivalent fractions are used when adding or subtracting fractions.

Assessment and Evaluation:

- Direct the students to do the relevant exercise in lesson 9 of the textbook.

For further study:

- http://www.youtube.com/watch?v=Q_CljEweGOE
- http://www.youtube.com/watch?v=NRJFZaSw1Y0
- http://www.youtube.com/watch?v=fVsxYtXOIXg
- http://www.youtube.com/watch?v=u2hLYcmI5y4
- http://www.youtube.com/watch?v=dCQbfaQZtaY
- http://www.youtube.com/watch?v=5r2FYszC_sU

10. Selection

Competency 30 : Manipulates the principles related to sets to facilitate daily activities.

Competency Level 30.1: Groups a collection of items based on common properties.

Number of Periods : 04

Introduction:
Children have made selections based on properties such as colour, texture, shape and size since they were little. In this section groups of items will be selected based on common properties and suitable names for these groups will be proposed.

Learning outcomes relevant to competency level 30.1:

1. Separates a collection of items into different groups based on a common property.
2. Indicates the basis on which the collection of items was separated into the different groups.
3. Names the groups according to the common property.

Glossary of Terms

Group	-	කාණ්ඩය	-	கூட்டம்
Grouping	-	කාණ්ඩ කිරීම	-	கூட்டமாக்கல்
Common Characteristics	-	පොදු ලක්ෂණ	-	பொதுப்பண்புகள்
Selection	-	තේරීම	-	தெரிதல்

Instructions to plan the lesson:

A exemplar lesson plan based on the discovery method to instill in students the subject concepts related to the learning outcomes 1, 2 and 3 under the competency level 30.1 is given below.

Time: 40 minutes

Quality Inputs:

- Cards equal in number to the students in the class, prepared by the teacher consisting of fruits, vegetables, animals and vehicles, similar to the example given below

- Pins
- Copies of the activity sheet for students

Instructions for the teacher:

Approach:

- Commence the lesson by discussing with the students regarding how the clothes in a clothing shop are arranged, how the books in a book store are placed on the shelves, how the items in a grocery store are organized on the racks and how the different types of drugs are placed on the shelves of a pharmacy.
- Mention that items have to be grouped as above in day to day life too. As an example, give students the opportunity to recall how each of their mothers separates out the different vegetables that she brings home from the market and then inquire about it from them.

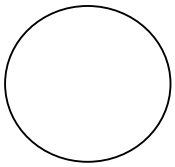
Developing the lesson:

- Take the quality inputs and go to the grounds with the students.
- Instruct the students to bring their notebooks and pens.
- Get the students to form a large circle and place the cards that you brought in the centre of the circle.
- Distribute the pins among the students.
- Ask the students to pick a card each and pin it on their uniforms.
- Instruct them to form groups based on the figures they have pinned on their uniforms.
- Give each group a copy of the activity sheet given below and ask them to complete it.
- At the end of the activity, give the groups the opportunity to present their work to the class and lead a discussion and highlight the following facts

- When grouping items, special attention should be paid to their common properties.
- When naming groups a name that reflects their common properties should be given.

Activity sheet for the students:

- Write the names of the figures worn by the members of the group in the circle given below.
- Suggest a suitable name for the group of figures and write it on the dotted line.



……..

- Write down in your note book why the members of your group joined together to form the group.
- Also write down in your notebook why you didn't join any of the other groups.

Assessment and Evaluation:

- Assessment Criteria

  - Separates out a group of items based on common properties and lists the items.
  - Methodically writes down the items in separate groups.
  - Explains with reasons the common properties that were considered when grouping the items.
  - Suggests a name for the group based on the common properties that were considered.
  - Works in cooperation with others as well as with commitment to achieve high quality results.

- Direct the students to do the relevant exercises in lesson 10 of the textbook.

Practical use:

- Considering the following situations lead a discussion on when selection and grouping are applied practically.
  - Placing similar books together in a library or bookstore
  - Placing clothing items of the same size and type together in a clothing store.
    Example: Shirts of collar size 15"
    Blouses of the same collar size
    Skirts of the same waist size.

For further study:

11. Factors and Multiples

Competency 1 : Manipulates the mathematical operations in the set of real numbers to fulfill the needs of day to day life.
Competency Level 1.6: Investigates the factors and multiples of natural numbers.
Competency Level 1.7: Investigates the methods of easily observing whether a number is divisible by another number.

Number of Periods : 09

Introduction

Any counting number can be divided without remainder by 1 and itself. Some counting numbers can be divided without remainder, not only by itself and 1, but also by other numbers. The numbers by which a number can be divided without remainder are called the factors of the number.

A multiple of any counting number can be obtained by multiplying the number by an integer.

Any counting number can be expressed as a product of two factors. Any counting number which can be divided by 2 without remainder has one of the digits 0, 2, 4, 6, or 8 in the units place, any counting number which can be divided by 5 without remainder has 0 or 5 in its units place and any counting number which can be divided by 10 without remainder has 0 in its units place.

Learning outcomes relevant to competency level 1.6:

1. **Finds the factors of numbers by using the 10 × 10 multiplication table.**
2. **Finds the multiples of numbers by using the 10 × 10 multiplication table.**
3. By respectively dividing and multiplying, finds the factors and multiples of numbers which are not included in the 10 × 10 multiplication table.
4. Solves problems related to factors and multiples.

Glossary of Terms

Factors	-	සාධක	-	காரணிகள்
Multiples	-	ගුණාකාර	-	மடங்குகள்
Remainder	-	ඉතිරිය	-	மீதி
Product	-	ගුණිතය	-	பெருக்கம்
Units place	-	ඒකස්ථානය	-	ஒன்றிலிடத்திலக்கம்

Instructions to plan the lesson:

A exemplar lesson plan to develop the skill of finding the factors of numbers using the 10 × 10 grid, related to learning outcome 1 under competency level 1.6 is given below. The subject concepts are instilled using the lecture-discussion method and guidance is given through an activity to establish these concepts further.

Time: 40 minutes

Quality Inputs:

- An enlarged copy of the multiplication table provided in annex 1
- A copy of the multiplication table for each student
- Pencils colours

Instructions for the teacher:

Approach:

- Discuss with the students how a number can be represented in the shape of a rectangle using dots.
- Ask them to represent 12 using a pattern of dots in the shape of a rectangle.
- Carry out a discussion and highlight the fact that 12 is obtained as the product of the number of rows and the number of columns in the pattern.
- Discuss the fact that any counting number can be written as a product of two numbers.

Developing the lesson:

- Display the enlarged multiplication table.
- Discuss all the possible methods of representing 24 as a product of two numbers using the 10 × 10 multiplication table.
- Show the students using the table that 3, 4, 6 and 8 are factors of 24 and mention that it is not necessary to repeat a factor.
- Discuss other ways of writing 24 as a product of two factors which cannot be observed in the 10 × 10 multiplication table.
- Thereby explain that 1, 24, 2 and 12 are also factors of 24.
- Ask the students to divide 24 by each of its factors.
- Discuss the conditions that should be satisfied for a number to be a factor of another number.
- Assist the students to understand how to write down all the factors of 24, as 1, 2, 3, 4, 6, 8, 12 and 24.
- To develop these concepts further, provide each student with a copy of the multiplication table, mention a number and ask them to colour all the squares in the table which contain the given number using the same colour.
- Ask them to write all the possible ways of representing the number as a product.
- Ask them to divide the given number by all the numbers which were used to write the given number as a product.
- Thereby ask them to write down all the factors of the given number.
- Establish the fact that 1 and the number itself are factors.

- Mention several other numbers in the multiplication table and ask the students to write down their factors in the above manner.
- This activity can also be carried out as a game.

Assessment and Evaluation:

- Assessment Criteria

  - Writes a given counting number as a product of two factors.
  - Mentions all the factors of a given counting number.
  - Accepts that 1 and the number itself are factors of the given number.
  - Presents convenient ways of writing down factors.
  - Solves problems in day to day life using the knowledge of factors.

- Direct the students to do the relevant exercises in lesson 11 of the textbook.

For your attention…

Developing the lesson:

- Prepare a lesson using a suitable method to instill the subject concepts related to learning outcomes 2, 3 and 4 and implement it.

Assessment and Evaluation:

- Direct the students to the relevant exercise in lesson 11 of the textbook.

For further study:

- http://www.youtube.com/watch?v=A3vD_-fX-us
- http://www.youtube.com/watch?v=i16N01ldlhk

Annex 1

×	1	2	3	4	5	6	7	8	9	10
1	1	2	3	4	5	6	7	8	9	10
2	2	4	6	8	10	12	14	16	18	20
→ 3	3	6	9	12	15	18	21	24	27	30
→ 4	4	8	12	16	20	24	28	32	36	40
5	5	10	15	20	25	30	35	40	45	50
→ 6	6	12	18	24	30	36	42	48	54	60
7	7	14	21	28	35	42	49	56	63	70
→ 8	8	16	24	32	40	48	56	64	72	80
9	9	18	27	36	45	54	63	72	81	90
10	10	20	30	40	50	60	70	80	90	100

12. Rectilinear Plane Figures

Competency 23 : Makes decisions regarding day to day activities based on geometrical concepts related to rectilinear plane figures.

Competency Level 23.1: Investigates the shapes of rectilinear plane figures.

Number of Periods : 04

Introduction:
The student who has identified the rectangle, square and triangle in previous grades will in this grade identify the properties of these shapes as well as identify parallelograms and trapeziums and their properties.

Learning outcomes relevant to competency level 23.1:

1. **Identifies the special features of rectilinear plane figures such as rectangles, squares, triangles, parallelograms and trapeziums.**
2. Draws rectilinear plane figures such as rectangles, squares, triangles, parallelograms and trapeziums on a grid.
3. Describes objects in the created environment that have the shape of a square, a rectangle, a triangle, a parallelogram or a trapezium.

Glossary of Terms

Straight line	-	සරල රේඛාව	-	நேர்கோடு
Straing line segment	-	සරල රේඛා කණ්ඩය	-	நேர்கோட்டுத் துண்டம்
Plane figure	-	තල රූපය	-	தளஉரு
Rectangle	-	සෘජුකෝණාස්‍රය	-	செவ்வகம்
Square	-	සමචතුරස්‍රය	-	சதுரம்
Triangle	-	ත්‍රිකෝණය	-	முக்கோணி
Parallelogram	-	සමාන්තරාස්‍රය	-	இணைகரம்
Trapezium	-	ත්‍රාපීසියම	-	சரிவகம்
Lamina	-	ආස්තරය	-	அடர்

Instructions to plan the lesson:

A exemplar lesson plan that can be used to develop the subject concepts related to the learning outcome 1 under competency level 23.1 is given below. Here, subject concepts are developed by means of a group activity.

Time: 40 minutes

Quality Inputs:

- Copies of the student activity sheet
- One grid per group
- Several laminas in the shape of a triangle, a square, a rectangle, a parallelogram and a trapezium which overlap with the grid (These should be drawn and cut out from a transparent sheet of paper. If the laminas are cut out from cardboard, the grid should be on a transparent sheet.)
- Geometric Board
- Pieces of paper from which a right angled corner can be formed.

Instructions for the teacher:

Approach:

- Display a triangle, a rectangle and a square and ask the students to name them.
- Ask them how the figures differ from each other.
- Explain to the students that a closed plane figure bounded by three straight line segments is a triangle and that a closed plane figure bounded by four straight line segments is a quadrilateral.
- Explain that based on their properties, certain quadrilaterals are named as squares, rectangles, parallelograms or trapeziums. (Use the following figures for this)

Rectangle Square Parallelogram Trapezium

Developing the lesson:

- Separate the class in a suitable manner into groups based on the number of students in the class.
- Give each group a copy of the activity sheet, laminas, grid and a piece of paper and engage them in the activity.
- Give them the opportunity to present their findings.
- After the activity lead a discussion and highlight the following properties of the shapes.

- The triangle has 3 interior angles while the other shapes have four interior angles each.
- The interior angles of a rectangle and a square are right angles while for a general parallelogram, this is not so.
- All four sides of a square are equal in length while pairs of opposite sides are equal in length in a rectangle and a parallelogram.
- When pairs of opposite sides of a parallelogram are considered separately, the distances between them are equal while for a trapezium the distance between just one pair of opposite sides is equal.

- To further establish the subject concepts that were learnt, give the students the opportunity to construct various shapes on the geometric board and identify their properties.

Activity sheet for the students:

- Place each of the shapes you were provided with on the grid and find out their properties.
- Pay special attention to the lengths of the sides, the shapes of the angles and the distance between the sides.
- By counting the squares, determine whether the sides are equal to each other or not.
- Form a right angled corner using the piece of paper that was given to you and examine the shapes of the angles in the figures.
- Use the right angled corner to determine whether the distance between a pair of opposite sides of the figure is constant or not.
- Note down your observations in the following table.

Shape	Lengths of the sides	Shapes of the angles	Distance between opposite sides
Triangle Rectangle Square Parallelogram Trapezium			

- Present this information to the class.

Assessment and Evaluation:

- Assessment Criteria

  - Expresses the common properties of the shapes rectangle, square, triangle, parallelogram and trapezium.
  - Expresses the special properties of each of the shapes rectangle, square, triangle, parallelogram and trapezium.
  - Distinguishes any two shapes from rectangles, squares, triangles, parallelograms and trapeziums based on their common and special properties.
  - Works with team spirit.
  - Completes the work within the allocated time period.

- Direct the students to do the relevant exercises in lesson 12 of the textbook.

Practical Use:

- Discuss the fact that Vesak lanterns are attractive solids created using these shapes.

For your attention…

Development of the lesson:

- Engage the students in the following activity related to learning outcomes 2 and 3.
- Direct the students to draw the above shapes on a square ruled piece of paper.
- Give the lengths of the sides to the students and direct them to draw the relevant shape according to the given lengths.
- Provide them with the opportunity to list the places where the above shapes can be observed in the environment and the classroom.

Assessment and Evaluation:

- Direct the students to do the relevant exercise in lesson 12 of the textbook.

For further study:

13. Decimals

Competency 3 : Manipulates units and parts of units under the mathematical operations to easily fulfill the requirements of day to day life.

Competency Level 3.5: Identifies and compares decimal numbers.
Competency Level 3.6: Manipulates decimal numbers under the operations of addition and subtraction.

Number of Periods : 06

Introduction:
The origins of the decimal number system can be traced back to the Babylonian number system which was a place valued system. Hindu writings of circa 6 AD mention the use of fractions with denominator equal to a power of 10. However the present day method of representing decimals was introduced in the 17th century AD by the mathematician H. Briggs. It later became popular worldwide.
The field of mathematics expanded due to the decimal number system. This enabled weights and measurements as well as classifications to become more meaningful and accurate. This is also the basis for subject areas such as indices and logarithms.
The aim of this section is to introduce decimal numbers and to develop the skills of adding and subtracting decimal numbers by first comparing them. It is expected that the following lesson plan related to competency level 3.6 will be implemented after the subject content related to competency level 3.5 has been established in students.

Learning outcomes relevant to competency level 3.6:

1. **Adds decimal numbers up to the second decimal place.**
2. Subtracts decimal numbers up to the second decimal place.
3. Solves problems related to the addition and subtraction of decimal numbers.

Glossary of Terms

Decimals	-	දශම	-	தசமம்
Place value	-	ස්ථානීය අගය	-	இடப்பெறுமானம்
Decimal point	-	දශම තිත	-	தசமபுள்ளி
Tenths	-	දහයෙන් පංගු	-	பத்தின் கூறுகள்
Hundredths	-	සියයෙන් පංගු	-	நூறின் கூறுகள்

Instructions to plan the lesson:

A exemplar lesson plan which is based on a group activity is given below to develop the subject concepts related to the addition of decimal numbers which come under the competency level 3.6.

Time: 40 minutes

Quality Inputs:

- A copy of the student worksheet found in Annex 1 for each group.
- Copies of the activity sheet for the students.

Instructions for the teacher:

Approach:

- Display the table given here on the black board.
- Recall how numbers are included in such a table and lead a discussion on it.
- Ask a student to mention a number with two decimal places, and ask another student to enter it in the table. (Repeat this several times over)
- After a short discussion focusing on the decimal point and decimal places, engage the students in the following activity.

Number	Place Value				
	100	10	1	$\frac{1}{10}$	$\frac{1}{100}$

Developing the lesson:

- Group the students in a suitable manner, and give each group a copy each of the student worksheet and activity sheet for students.
- After the students have obtained the final answer by proceeding step by step, give them the opportunity to present their findings regarding the addition of decimal numbers.
- Lead a discussion and highlight the following facts.
  - When adding decimal numbers, as for whole numbers, addition should be done from right to left.
  - The digits corresponding to each place value should be added together.
  - 0 can be added if necessary to the end of a decimal number, on the right side of the decimal point.
  - The sum of decimal numbers will contain the same number or less decimal places than the decimal number with the most number of decimal places of those that were added.

Activity sheet for the students:

- Enter the two decimal numbers contained on the left hand side under (1) of your worksheet in the relevant columns of the table.
- Add the two numbers given under (1) downwards along the columns of the table and write the answer in the box that has been highlighted (outlined in dark)
- In the same manner, note down the pairs of numbers under (2), (3), (4) and (5) in the table in the appropriate places, add them, and write down the answers in the highlighted boxes.
- Under (6), get three members to write down three numbers of their choice and find the sum.
- Under (7), write down three other numbers of one or 2 decimal places and add them without the aid of the table, and note down the answer.
- Prepare to present to the class, the important facts you discovered regarding the addition of decimal numbers.

Assessment and Evaluation:

- Assessment Criteria
  - Writes down two decimal numbers one below the other, according to the place values of their digits.
  - Adds decimal numbers accurately.
  - Accepts that the number of decimal places in the sum of decimal numbers is the same or less than the number of decimal places in the number which has the most number of decimal places of those that were added.
  - Uses various methods to approach the target.
  - Moves forward with the experience gained.
- Direct the students to perform additions of two or three decimal numbers.
- Direct the students to do the relevant exercises in lesson 13 of the textbook.

Practical use:

- Discuss the following situations where the addition of decimal numbers is used practically.
  - Taking the sum of weights and measures.
    Example: The total length of several pieces of wire, where the lengths of the wires have been obtained by taking measurements.
  - In transactions involving cash in rupees and cents, the decimal system is involved. Cents are taken as numbers with two decimal places and adding the amounts involves adding numbers with two decimal places.

For your attention…

Development of the lesson:

- Prepare and implement an activity which is suitable to be used to develop the skills of subtracting decimal numbers of up to two decimal places by identifying the place values of the digits.
- Direct the students to add and subtract decimal numbers which arise from situations in day to day life.
- After the students have had sufficient practice adding numbers written one below the other, the more capable students can be given decimal numbers to be added along a row.

Assessment and Evaluation:

- Direct the students to do the relevant exercise in lesson 13 of the textbook.

For further reading:

- http://www.youtube.com/watch?v=AuD2TX-90Cc
- http://www.youtube.com/watch?v=HCC96awA-FM

Work Sheet
Adding decimal numbers

	Number	Place value				
		100	10	1	$\frac{1}{10}$	$\frac{1}{100}$
(1)	12.3		1	2	3	
	+ 5.4					
(2)	15.8					
	+ 3.7					
(3)	12.74					
	+ 3.8					
(4)	8.75					
	+ 3.12					
5)	5.32					
	12.1					
	+97.85					
(6)						
(7)						

14. Types of Numbers and Number Patterns

Competency 2 : Makes decisions for future requirements by investigating the various relationships between numbers.

Competency Level 2.1: Classifies numbers based on their properties.
Competency Level 2.2: Determines the pattern in a number sequence.

Number of Periods : 10

Introduction:
If a number can be divided by two without remainder, then that number is an even number, and if there is a remainder of one when a number is divided by two, then that number is an odd number. If a number has exactly two distinct factors, then that number is a prime number and if a number has more than two distinct factors, then that number is a composite number.
Numbers such as 1, 3, 6, 10, …. which can be represented in a pattern of triangles are called triangular numbers and numbers such as 1, 4, 9, 16, … which can be represented in a pattern of squares are called square numbers. It is also expected to examine whether the sums, differences, products of odd numbers/even numbers are odd/even.

Learning outcomes relevant to competency level 2.1:

1. **Classifies whole numbers as odd numbers and even numbers.**
2. Identifies the properties of the sum, difference and product of odd numbers and even numbers.
3. Identifies prime numbers and composite numbers
4. Classifies whole numbers as prime numbers and composite numbers.
5. Identifies square numbers and triangular numbers.
6. Selects triangular numbers and square numbers from a given set of whole numbers and groups them.

Glossary of Terms

Odd numbers	-	ඔත්තේ සංඛ්‍යා	-	ஒற்றை எண்கள்
Even numbers	-	ඉරට්ට සංඛ්‍යා	-	இரட்டை எண்கள்
Whole numbers	-	පූර්ණ සංඛ්‍යා	-	முழு எண்கள்
Prime numbers	-	ප්‍රථමික සංඛ්‍යා	-	முதன்மை எண்கள்
Composite numbers	-	සංයුත සංඛ්‍යා	-	சேர்த்தி எண்கள்
Triangular numbers	-	ත්‍රිකෝණ සංඛ්‍යා	-	முக்கோணி எண்கள்
Square numbers	-	සමචතුරස්‍ර සංඛ්‍යා	-	சதுர எண்கள்

Sequence	-	අනුක්‍රමය	-	தொடரி
Pattern	-	රටාව	-	கோலம்
Sum	-	ඓකයය	-	கூட்டுத்தொகை
Properties	-	ගුණ	-	இயல்புகள்
Product	-	ගුණිතය	-	பெருக்கம்
Difference	-	අන්තරය	-	வித்தியாசம்

Instructions to plan the lesson:

It is expected that the subject concepts related to the learning outcome 1 of competency level 2.1 will be developed in students. A exemplar lesson plan to develop the skill of classifying odd and even numbers using the discovery method is given below.

Time: 40 minutes

Quality Inputs:

- A small box **coloured blue**, named '**Odd numbers**' and a small box **coloured red**, named '**Even numbers**' (For each group)
- A pack containing blue cards with the odd numbers from 1 to 20 written on them, and red cards with the even numbers from 1 to 20 written on them. (For each group)
- Copies of the activity sheet for students

Instructions for the teacher:

Approach:

- Recall the whole numbers from 1 to 30.
- Give the students several numbers such as 12 and 18 which are divisible by two and several numbers such as 13 and 25 which are not divisible by two and direct them to divide the given numbers by two.
- Discuss with the students regarding the remainder that was obtained in each case.
- Mention that whole numbers can be separated into different groups based on their properties, and then engage the students in the following activity.

Developing the lesson:

- Group the students in a suitable manner and give each group a copy of the activity sheet for the students.
- Give each group a blue box, a red box, a blue set of cards and a red set of cards.

- After the students have completed the activity, give them the opportunity to present the properties by which odd and even numbers can be recognized.
- Lead a discussion and highlight the following facts.

- If a number has a remainder of 0 when it is divided by two, or if it is a multiple of two or if the digit in the units place is one of 0, 2, 4, 6 or 8, then it is an **even number**.
- If a number has a remainder of 1 when it is divided by 2 or if it is of the form of a multiple of 2 plus 1, or if the digit in the units place is 1, 3, 5, 7 or 9, then it is an **odd number**.

Activity sheet for the students:

- Place the blue and red cards respectively in the box which is of the same colour.
- Take the cards in the red box out and divide each of the numbers on the cards by two.
- Write down the remainder you obtain in each case.
- What can you say about the remainder you obtained in all the cases?
- Based on the remainder you obtained, write down a common property of the even numbers that were in the red box.
- Discuss among the group and determine whether the even numbers have any other common properties.
- In the same manner, discuss among the group about the remainder that is obtained when the numbers on the cards in the blue box are divided by 2, and write down the common properties of the odd numbers in the blue box.
- Present your findings on the properties of **odd** and **even** numbers to the class.

Assessment and Evaluation:

- Assessment Criteria
  - Describes the properties of odd numbers and of even numbers.
  - Accepts that whole numbers can be separated in groups based on their various properties.
  - Selects the odd and even numbers from a given set of whole numbers and groups them.
  - Engages in the classification of quantities based on common properties.
  - Engages in the activity with commitment to achieve high quality results.
- Direct the students to do the relevant exercises in lesson 14 of the textbook.

For your attention…

Development of the lesson:

- Prepare a suitable lesson plan for the rest of the learning outcomes under competency level 2.1 as well as for competency level 2.2 and implement it.

Assessment and Evaluation:

- Direct the students to do the relevant exercise in lesson 14 of the textbook.

For further study:

- http://www.youtube.com/watch?v=mISt85X4U8M
- http://www.youtube.com/watch?v=3h4UK62Qrbo
- http://www.youtube.com/watch?v=Ei19HMn1BxM
- http://www.youtube.com/watch?v=hMSd7wGuTT4
- http://www.youtube.com/watch?v=TgQn8snKGtw
- http://www.youtube.com/watch?v=UxFQgyUZOE8

For the teacher only….

An odd number and an even number can be defined formally as follows

Formal definition of an even number

n is an even number if there is an integer k such that $n = 2k$. Accordingly, the set of even numbers can be written as follows:{…., -4, -2, 0 , 2, 4, … }

Formal definition of an odd number

n is an odd number if there is an integer k such that $n = 2k + 1$. Accordingly, the set of odd numbers can be written as follows:

{…., -5, -3, -1 , 1, 2, 5, … }

15. Length

Competency 7 **:** Investigates the various methods of finding the perimeter to carry out daily tasks effectively.

Competency Level 7.1: By using suitable units, investigates situations where measurements of length occur.

Competency Level 7.2: Uses measurements of length to find the perimeter of rectilinear plane figures.

Number of Periods **:** 11

Introduction:
It is expected that through this lesson, width, height, depth and thickness will also be identified as length and will be measured using a suitable instrument. It is necessary to direct students to discover the relationships between measurements of length and to remember them. The aim of this lesson is to develop the skills of taking measurements of length, estimation, and converting units.
It should be emphasized that depending on the required measurement, the unit as well as the measuring instrument will vary.

Learning outcomes relevant to competency level 7.1:

1. **Identifies height, breadth, depth and thickness as "length".**
2. **Selects a suitable unit from mm, cm, m and km to measure a given length.**
3. **Measures lengths using suitable instruments.**
4. Expresses the relationships between the different units of length.
5. Converts cm ⇔ mm, cm ⇔ m, m ⇔ km.
6. Estimates height, depth, breadth and thickness.

Glossary of Terms

Length	-	දිග	-	நீளம்
Width	-	පළල	-	அகலம்
Height	-	උස	-	உயரம்
Depth	-	ගැඹුර	-	ஆழம்
Thickness	-	ඝනකම	-	தடிப்பு
Estimation	-	නිමානය	-	மதிப்பிடல்
Trundle wheel	-	නාද රෝදය	-	இசைச் சில்லு

Instructions to plan the lesson:

A exemplar lesson plan with a practical activity which is to be implemented using the discovery method and the lecture-discussion method to help students develop the learning outcomes 1, 2 and 3 under competency level 7.1 is given here.

Time: 40 minutes

Quality Inputs:

- Instruments to measure length (Metre ruler, centimetre ruler, tape, trundle wheel)
- 2 coins per group
- 1 cup/tumbler per group

Instructions for the teacher:

Approach:

- Display the instruments used to measure length that were learnt about in grade 5 and describe them to the students.
- Discuss with the students about the metric units used to measure length.
- Ask the students whether the same unit and the same instrument would be suitable for all measurements of length and direct them to find the answer to this question through the following activity.

Developing the lesson:

- Divide the class into small groups of 4 - 6 students.
- Give each group the instruments required to obtain the measurements.
- Direct the students to obtain the measurements of the following items. (Explain what measurement should be taken if required)
  Measurements which are required:
  - Length, width and height of a desk
  - Length, width and height of a chair
  - Thickness of the given coins
  - Depth of a cup or tumbler
  - Length and width of the classroom
  - Depth of the table drawer
  - Thickness of the table top (or some other piece of wood)
- Ask the students to copy the table given below and to complete it using the measurements obtained by the group.
- Give the groups the opportunity to present their findings to the class.
- Develop the lesson by emphasizing the following facts, taking into consideration the findings of the students.

- Discuss about the instrument and the units used for each measurement and the reason for using different instruments and units.
- Explain that length, width, height, depth, thickness are all measurements of length.

Table to be completed by the students

Item to be measured	Appropriate Unit	Appropriate Instrument	Measurement
1. Length of a desk 2. Width of a desk 3. Height of a desk 4. Thickness of a Rs… coin 5. Thickness of a Rs. … coin 6. Depth of the cup 7. Depth of the drawer 8. Length of the classroom 9. Width of the classroom			

Assessment and Evaluation:

- Assessment Criteria
  - Accepts that suitable instruments and units should be used when taking measurements.
  - Selects suitable instruments and units to obtain measurements.
  - Obtains accurate measurements.
  - Correctly completes the table.
  - Shares the work and works in cooperation within the group.
- Direct the students to do the relevant exercises in the textbook.

Practical use:

- Establish the fact that measurements of length are used very frequently in day to day life by discussing the following situations.
  Example: Amount of material required for a suit
  Preparing the plan to build a house
  Length of wooden beams required to build a house

For your attention…

Development of the lesson:

- Prepare and implement suitable lesson plans to achieve the remaining learning outcomes under competency level 7.1 and the learning outcomes under competency level 7.2.

Assessment and Evaluation:

- Direct the students to do the relevant exercises in lesson 15 of the textbook.

For further study:

16. Liquid Measurements

Competency 11 : Works critically with the knowledge of liquid measurements to fulfill daily needs.

Competency Level 11.1: Uses liquid measurements in day to day activities.

Number of Periods : 04

Introduction:
Various measurement units are used in day to day life to measure liquid amounts. Among these, teaspoon, tablespoon, bottle, cup, *ml* and litre are very popular. Apart from these, gallon, ounce etc were used previously. Even today these units are used when food items are prepared and medicines are prescribed.
Example: Bottle of coconut oil
One teaspoon/2 tablespoons of medicine
$2\frac{1}{2}$ cups of flour
Today, the litre (*l*) which is accepted as the standard international unit of liquid measurements and the millilitre (*ml*) are used.

1000 *ml* = 1*l*

It is very important to select the most suitable liquid measurement unit based on the amount of liquid that is being measured. Due to developing this ability, time can be saved and the task can be completed easily. It is also important to know the relationship between *l* and *ml*. Estimation of a volume of liquid is giving an approximate value for an amount of liquid that can be poured into a vessel or that is in a vessel, by observing the amount, and based on your experience with liquid measurements. Having this ability facilitates daily work.

Learning outcomes relevant to competency level 11.1:

1. **Recognizes that *ml* and *l* are used to measure liquid amounts.**
2. **Selects the appropriate unit from *ml* and *l* to measure a given amount of liquid.**
3. **Expresses the relationship between *ml* and *l*.**
4. **Estimates given liquid amounts in *ml* and *l*.**
5. Does conversions of units; *ml* $\Leftrightarrow$ *l*.
6. Adds liquid volumes involving *ml* and *l*.
7. Subtracts liquid volumes involving *ml* and *l*.
8. Uses appropriate units to measure liquid volumes in daily activities.

Glossary of Terms

Liquid measurements	-	දුව මිනුම්	-	திரவ அளவீடுகள்
Litre	-	ලීටර	-	லீற்றர்
Millilitre	-	මිලිලීටර	-	மில்லிலீற்றர்
Volume	-	පරිමාව	-	கனவளவு
Conversion	-	පරිවර්තනය	-	மாற்றல்
Estimation	-	නිමානය	-	மதிப்பீடு
Capacity	-	ධාරිතාව	-	கொள்ளளவு

Instructions to plan the lesson:

A exemplar lesson plan with the expectation of guiding the student towards achieving the learning outcomes 1, 2, 3 and 4 under competency level 11.1 using a group discovery method has been prepared.

Time: 40 minutes

Quality Inputs:

- 1 *l*, 500 *ml* and 100 *ml* measuring jars or vessels calibrated to these amounts (A set for each group)
- A 1*l* vessel with only 1*l* marked on it (For one group)
- A vessel of water (About 5*l*) (For one group)
- Small vials
- An empty basin or bucket (Which holds about 3 – 4 *l*)
- A small vessel which has not been calibrated (Of a little more than 1 *l*) (This is only for the teacher)
- Copies of the instruction sheet (1 per group)

Instructions for the teacher:

Approach:

- Ask about the units used at home to measure liquid amounts and get the answers teaspoon, tablespoon, cup, bottle etc (*ml* and *l* may be mentioned here).
- Explain that *ml* and *l* are used as standard units to measure liquid amounts.
- Inform the students that they will be doing an activity on liquid measurements.

Developing the lesson:

- First, place the items that are required by the groups in a suitable place outdoors (vessel of water, measuring jars, vessel that has not been calibrated, calibrated vessel etc).
- Group the students in a suitable manner and guide the groups towards the locations where the items have been placed. Instruct them to bring the items that are required to keep notes.

- Give each group a copy of the activity sheet for students.
- Inform them of the importance of paying careful attention when taking the readings of the liquid amounts in the measuring jars and calibrated vessels and show them that by keeping the eye level straight with the water level in the vessel, the reading can be taken accurately.
- Direct the students to note down the information when required according to the instructions in the activity sheet.
- After the activity has been completed, get the students to prepare to present their findings.
- After all the presentations, show the small vessel that has not been calibrated and ask them how many litres of liquid the vessel will hold. Give each student the opportunity to answer the question.
- Measure the amount of liquid that the small vessel holds and acknowledge those who have given the best estimates.
- In the same manner, pour in an amount of liquid (less than 1 *l*) into the small vessel and ask the students how many mililitres of liquid is in the vessel.
- Ask the students to consider how much liquid there is in the vessel relative to the amount that was in it earlier and get each student to provide an estimate.
- Measure the amount that was in the vessel using a measuring jar and acknowledge those who gave the best estimates.
- Explain the following facts.
    - The most suitable measuring unit should be selected based on the amount of liquid there is to be measured.
    - Doing this will save time and facilitate the task.
    - 1 litre is equal to 1000 mililitres
    - It is essential to know this relationship when performing calculations related to liquid measurements.
    - Using ones experience about the amount of liquid that a particular vessel can hold, an approximate value can be given for the amount of liquid in another vessel. This is called estimation.

Activity sheet for the students:

- Carefully examine the measuring jars or calibrated vessels given to your group.
- Find out the maximum amount of liquid that can be measured using each of the measuring jars or vessels.
- Using the 100 *ml* measuring jar, fill the vessel which has 1*l* marked on it with water up to the relevant level. How many times should water be poured from the 100 *ml* measuring jar to fill the 1*l* vessel?
  ……. times 100 *ml*
- Now empty the 1*l* vessel and fill it again with water up to the relevant level using the 500 *ml* measuring jar. How many times should water be poured from the 500 *ml* measuring jar to fill the 1*l* vessel?
  …… times 500 *ml*
- Based on the above two instances find how much ml there is in 1*l*.
- Carefully read the calibration on the 1*l* measuring jar and confirm your previous result of the amount of *ml* in 1*l*.
  1*l* = …. *ml*
- Fill the empty basin or bucket your group received with water using a suitable measuring jar and note down the amount of liquid the vessel holds.
- Which measuring jar did you use to fill the basin/bucket? Write down your reasons for using it.
- Fill the vials you received with water using a suitable measuring jar and note down the amount of liquid they hold.
- Which measuring jar did you use to fill the vials? Write down your reasons for using it.
- Prepare to present to the rest of the class, how you carried out this activity and the facts you discovered and noted down.

Assessment and Evaluation:

- Assessment Criteria
  - Selects the appropriate measuring unit from *ml* and *l* to measure liquid amounts.
  - Expresses the relationship between *l* and *ml* as 1*l* = 1000ml.
  - Estimates the volume of water in a vessel by stating a value which is close to the actual value.
  - Divides the task among the group and works in cooperation with each other.
  - Appreciates the importance of cleaning up once the activity is completed.

- Direct the students to do the relevant exercises in lesson 16 of the textbook.

For your attention…

Development of the lesson:

- Use a suitable activity for the conversion of *ml* to *l* and vice versa. [Hint: Plan an activity or a game of organizing cards with 100 *ml*, 200 *ml*, ….., 900 *ml* and 10 *ml*, 20 *ml,* .... etc written on them to match a given amount of litres]
- After the conversion *l* ⇔ *ml* is further established, direct the students to do the relevant exercises in the textbook.
- Use appropriate activities and exercises to develop the skills of adding and subtracting liquid volumes given in *l* and *ml.*

Assessment and Evaluation:

- Direct the students to the relevant exercises in lesson 16 of the textbook.

For further study:

- www.math-aids.com/Measurement/Graduated-Cylinden.html
- www.Sheppardsof/ware.com/mothgames/measurement/MeasurementLiters.html

For the teacher only:

Various units are used to measure liquid volumes. Below are the relationships between several of these units.

1 tablespoon = 3 teaspoons
1 teaspoon = 5 *ml*
1 gallon = 6 bottles

17. Solids

Competency 22 **:** Creates new models by exploring various solids.

Competency Level 22.1: Investigates the properties of solids.

Number of Periods **:** 08

Introduction:
The students have identified the cube, the cuboid and the tetrahedron in grade 5. The aim of competency level 22.1 is to identify the geometrical shapes of the faces of these solids using their given nets, to state the number of vertices, edges and faces of these solids, to create various nets and using these solids to construct other compound solids creatively.

Learning outcomes relevant to competency level 22.1:

1. **Constructs models of a cube, a cuboid and a regular tetrahedron using nets that are given.**
2. **Expresses the number of vertices, edges and faces in a cube, a cuboid and a regular tetrahedron.**
3. **Identifies the geometrical shapes of the faces of these solids and names them.**
4. Creates various nets for the cube, cuboid and regular tetrahedron.
5. Constructs compound solids with cubes, cuboids and regular tetrahedrons.

Glossary of Terms

Solids	-	ඝනවස්තු	-	திண்மம்
Cube	-	ඝනකය	-	சதுரமுகி
Cuboid	-	ඝනකාභය	-	கனவுரு
Regular tetrahedron	-	සවිධි චතුස්තලය	-	ஒழுங்கான நான்முகி
Vertex	-	ශීර්ෂය	-	உச்சி
Edge	-	දාරය	-	விளிம்பு
Face	-	මුහුණත	-	முகம்
Compound solids	-	සංයුක්ත ඝනවස්තු	-	கூட்டுத்திண்மம்
Triangle	-	ත්‍රිකෝණය	-	முக்கோணி
Square	-	සමචතුරස්‍රය	-	சதுரம்
Rectangle	-	සෘජුකෝණාස්‍රය	-	செவ்வகம்

Instructions to plan the lesson:

A exemplar lesson plan to guide the student towards achieving the learning outcomes 1, 2 and 3 of competency level 22.1 using a suitable discovery method is given below.

Time: 80 minutes

Quality Inputs:

- Cube, cuboid and tetrahedral shaped packages or models.
- Sufficient nets of cubes, cuboids and regular tetrahedrons prepared using the nets given in the textbook (Each group should be provided with all these nets).
- Bristol board, gum, pairs of scissors

Instructions for the teacher:

Approach:

- Show the models of the cube, cuboid and tetrahedron to the class and by inquiring about the models, provide the students with the opportunity to identify them.
- Explain to the students about the vertices, edges and faces of these models.
- Open out each of the models and display their nets so that the students can gain a proper understanding of nets. (Pay attention to the pasting allowance)

Developing the lesson:

- Divide the class into groups.
- Give each group the nets of all three solids, Bristol boards, pairs of scissors and gum.
- Engage the students in the activity.
- Give the groups the opportunity to present their findings.
- Develop the lesson based on their finding, paying attention to the facts given below.
- Using a table of the following form, discuss about the number of edges, vertices and faces of the solids.

Solid	Number of vertices	Number of edges	Number of faces
Cube Cuboid Tetrahedron			

- A cube is a regular solid with faces which are squares of equal size.
- All the faces of a regular tetrahedron are equilateral triangles of the same size.
- Discuss about the similarities and differences between cubes and cuboids.

Activity sheet for the students:

- Copy the given nets on the Bristol board. In doing so take care not to waste paper.
- Mark the allowances for pasting.
- Cut out each net with allowances with the pair of scissors.
- Make models of the three solids by pasting along the allowances.
- For each solid, write down the number of vertices, edges and faces.
- Write down the shapes of the faces for each model.
- Make sketches of the faces.
- For each solid, write down the properties you observe.
- Write down the similarities and the differences you observe between the cube and the cuboid.

Assessment and Evaluation:

- Assessment Criteria
  - Draws the nets without wasting paper.
  - Creates models of high quality by pasting along the allowances.
  - Writes down the correct numbers of vertices, edges and faces of each solid.
  - Compares the cube and cuboid and writes down their similarities and differences.
  - Works in cooperation with each other within the group.
- Direct the students to do the relevant exercises in lesson 17 of the textbook.

For your attention…

Development of the lesson:

- Provide the students with the faces (equilateral triangles, squares, rectangles) required to create each of the solids, drawn on thick paper, and allow them to prepare various nets to make the solids, and thereby guide them towards achieving learning outcome 4.
- When creating compound solid objects, encourage the students to create either Vesak lanterns or similar decorations relevant to daily life.

Assessment and Evaluation:

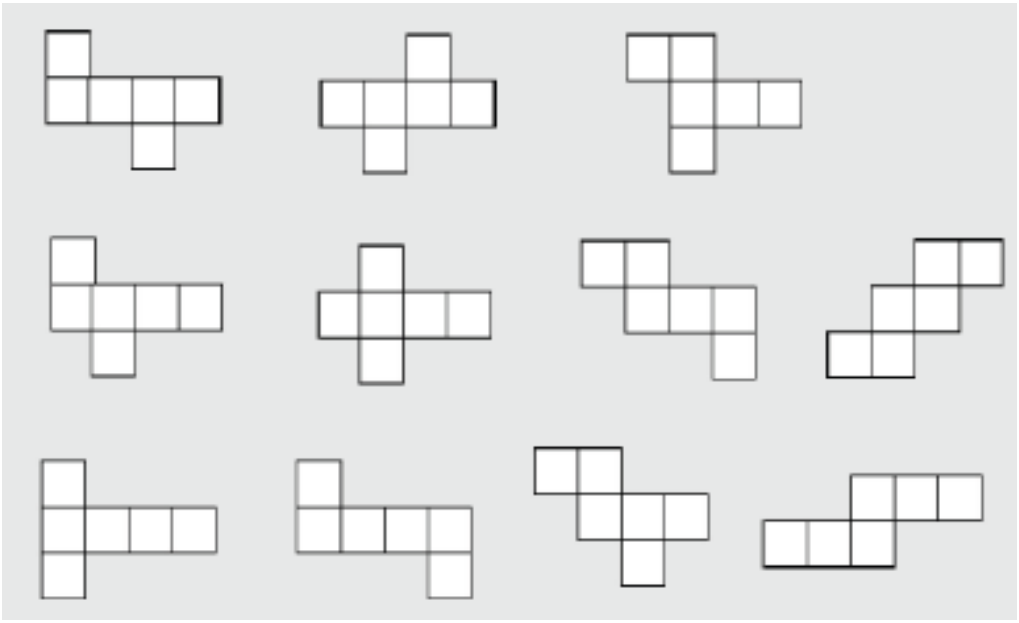
- Direct the students to the relevant exercises in lesson 17 of the textbook.

For further reading:

- http://www.youtube.com/watch?v=iWc4WEjiIdI

For the teacher only:

Several nets that can be used to create a cube are given below.



There are only eleven different nets to create a cube.

18. Algebraic Symbols

Competency 14 : Simplifies algebraic expressions by systematically exploring various methods.

Competency Level 14.1: Represents variables by algebraic symbols according to the requirement.

Number of Periods : 04

Introduction:
Symbols have been used to express ideas since the ancient days. Constant terms of which the value is not known are called **unknown constants**.
Example: - i. The amount of money Siripala has
Examples such as this where the value is a constant which is not known can be considered
A variable is a quantity which can take any value within a certain range.
Example: - i. The height of a student in grade 6
ii. The price of a kilogramme of rice in the market
Algebraic symbols are used to represent the numerical value of an unknown constant or a variable.
Example: - *n* can be used for the number of students in grade 6
P can be used for the amount of money Siripala has
h can be used for the height of a student in grade 6
Rs *x* can be used for the price of a kilogramme of rice in the market.
Symbols are also used to represent an expression given in words in a concise way to facilitate communication.
Example: + denotes 'add'

Learning outcomes relevant to competency level 14.1:

1. **Describes the information that is represented by standard symbols.**
2. Identifies constant values that are not known as unknown constants.
3. Identifies a quantity which can take any value within a certain range as a variable.
4. Represents an unknown constant by an algebraic symbol according to the requirement.
5. Represents a variable by an algebraic symbol according to the requirement.

Glossary of Terms

Algebraic	-	වීජීය	-	அட்சரகணித
Symbols	-	සංකේත	-	குறியீடுகள்
Variables	-	විචලය	-	மாறிகள்
Unknown term	-	අඥාත පදය	-	தெரியாத
Constant	-	නියත පදය	-	ஒருமை

Instructions to plan the lesson:

A exemplar lesson plan based on the 'activity' method to develop in students the subject concepts related to learning outcome 1 under competency level 14.1 is given below.

Time: 40 minutes

Quality Inputs:

- A poster with several symbols as given in Annex 1
- A set of 5 cards named A consisting of symbols according to the poster
- A set of 5 cards named B with the meanings of the symbols on the cards in set A written in words
- A set of 5 cards named C consisting of symbols not included in set A
- A set of 5 cards named D with the meanings of 5 symbols not included in A or C written on the cards
- Copies of the activity sheet for students
- Demy paper

Instructions for the teacher:

Approach:

- Display the poster in front of the class.
- Ask the students what is meant by each of the symbols.
- Through a discussion bring out the fact that using symbols facilitates communication.
- Discuss the fact that the letters of an alphabet are also symbols.

Developing the lesson:

- Group the students in a suitable manner and give each group a copy of the activity sheet for students.
- Give each group the sets of cards A and B and engage the students in the relevant activity.
- Give each group a set of cards C and engage the students in the relevant activity.
- Give each group a set of cards D and engage the students in the relevant activity. (If the students draw various symbols for the statements, introduce the symbols that are usually used)
- Give the students the opportunity to present their work and lead a discussion and explain that symbols are used in day to day life to communicate information and that specific information is communicated through standard symbols which are used in day to day life.

Activity sheet for the students:

- First examine the two sets of cards your group received.
- Match the cards consisting of symbols in set A with their meanings on the cards in set B and paste them on the demy paper.
- Examine the set of cards C.
- Write down the meaning of each symbol in set C on the demy paper and paste the symbol next to it.
- Examine the set of cards D.
- On the demy paper, paste each card from the set D with the statement written on it, and draw a suitable symbol next to it.
- Draw as many symbols as you can observe in the environment and write down the meaning of each symbol in words.

Assessment and Evaluation:

- Assessment Criteria
  - Lists out **standard symbols** that are used in day to day life.
  - Correctly identifies the symbols and their meanings and matches them together.
  - Accepts that using a symbol to express an idea facilitates communication.
  - Writes down statements which correctly express the ideas denoted by the given symbols.
  - Works in cooperation within the group.
- Direct the students to do the relevant exercises in lesson 18 of the textbook.

For your attention…

Development of the lesson:

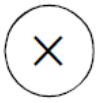
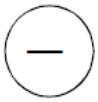
- Introduce unknown constants to the students.
- Discuss what a variable is with the students.
- Discuss with the students the fact that algebraic symbols can be used to represent unknown constants and variables according to the need.

Assessment and Evaluation:

- Direct the students to the relevant exercises in lesson 18 of the textbook.

For further study:

Annex 1

Symbol	Explanation	Symbol	Explanation
	- Add		- Multiply
	- Subtract		- Divide
	- Five		- Centimetres
	- Bridge ahead		- Roundabout ahead
	- Switch off mobile phones		- Traffic lights ahead
	- No parking		- No smoking

19. Constructing Algebraic Expressions and Substitution

Competency 14 : Simplifies algebraic expressions by systematically exploring various methods.

Competency Level 14.2: Meaningfully constructs simple algebraic expressions using addition or subtraction and finds the value by substitution.

Number of Periods : 04

Introduction:
Algebraic expressions have an important place in mathematics. Let us compare the two expressions '2 + 5' and 'x + 5'. '2 + 5' has a definite value 7. But 'x + 5' does not have a definite value. The reason for this is because the value of x is not known. Therefore 'x' is called an unknown. Also, when 'x' is assigned a known value, that is, when a value is substituted for 'x', then 'x + 5' will a definite value. The aim of competency level 14.2 is the construction of algebraic expressions in one unknown of coefficient 1 using the mathematical operation addition.

Learning outcomes relevant to competency level 14.2:

1. **Constructs algebraic expressions in one unknown of coefficient 1 using the mathematical operation addition.**
2. Constructs algebraic expressions in one unknown of coefficient 1 using the mathematical operation subtraction.
3. Finds the value of an algebraic expression in one unknown of coefficient 1 by substituting whole numbers.

Glossary of Terms

Algebraic expression	-	වීජීය ප්‍රකාශන	-	
Algebraic term	-	වීජීය පදය	-	அட்சரக்கணித
Coefficient	-	සංඛ්‍යාංකය	-	
Unknown	-	අඥාතයක්	-	தெரியாக்கணிய
				ம்

Instructions to plan the lesson:

A exemplar lesson plan based on the lecture-discussion method, to develop the subject concepts related to learning outcome 1 under competency level 14.2, together with an activity to strengthen the subject concepts that were learnt is given below.

Time: 40 minutes

Quality Inputs:

- Leaflets with expressions written in words which can be converted into algebraic expressions (sufficient for all the groups)
- Leaflets containing algebraic expressions of the expressions written in words and other algebraic expressions and numbers
- Copies of the activity sheet for students
  (All the above expressions should contain only the mathematical operation addition and should involve only one unknown of coefficient 1)

Instructions for the teacher:

Approach:

- Recall what an unknown constant and a variable are and how symbols are used to denote them.

Developing the lesson:

- Explain what an algebraic expression is.
- Using examples, describe algebraic expressions involving only addition and containing just one unknown of coefficient 1.
  Example: Ruchira's age is x years. His brother is 3 years older to him. Ruchira's brother's age can be denoted by the algebraic expression $x + 3$.
- Get the students to provide examples similar to the one given above and through discussion construct relevant algebraic expressions.
- Divide the class in a suitable manner into groups and let them engage in the following activity to further strengthen their knowledge of the subject concepts.

Activity:

- Divide the class in a suitable manner into groups and give the leaflets with the expression written in words which can be written as algebraic expressions to the groups so that each student gets a leaflet.
- Roll the leaflets with the algebraic expressions and numbers, place them in a box and keep the box at the centre of the groups.
- Ask the students one at a time, to pick a leaflet from the box and to see whether it matches the expression on the leaflet they were given.
- Instruct the students who found an algebraic expression which matches the expression on their leaflet to come forward and display the leaflets.
- The teacher can decide how long the students should be engaged in this activity based on the number of students and the time.
- This can also be conducted as a game by dividing each group into two.

Assessment and Evaluation:

- Assessment Criteria
  - Selects from given algebraic expressions the algebraic expression which corresponds to a given written expression.
  - Constructs an algebraic expression corresponding to a given written expression.
  - Accepts that an algebraic expression must always contain an algebraic symbol.
  - Responds accurately and clearly.
  - Works cooperatively within the group.
- Direct the students to do the relevant exercises in lesson 19 of the textbook.

For your attention…

Development of the lesson:

- Plan and implement a suitable activity to construct algebraic expressions involving subtraction and containing just one unknown of coefficient 1.
- Plan and implement a suitable activity to find the value of an algebraic expression containing one unknown of coefficient 1, by substituting whole numbers.

Assessment and Evaluation:

- Direct the students to the relevant exercises in lesson 19 of the textbook.

For further study:

- http://www.youtube.com/watch?v=arY-EUZDNfk
- http://www.amsi.org.au/teacher-modules

20. Mass

Competency 9 **:** Works with an awareness of mass to fulfill daily requirements.

Competency Level 9.1: Uses measurements related to mass for daily requirements.

Number of Periods **:** 05

Introduction:
In grade 5, the students learnt about measuring weights and that kg and g are used as units of weight. Since the word mass is being introduced in grade 6, it is necessary to establish this concept well. Introducing the kilogramme as the international standard unit of mass and g as a sub-unit of kg is done here. In this lesson it is expected to introduce the relationship between kg and g, to convert one unit to the other and to perform additions and subtractions with carry overs as well, involving kg and g. Only kg and g are discussed in this section as international units. The teacher is responsible for developing the skill of selecting the appropriate unit from kg and g, according to the magnitude of the item to be measured and to direct students to use this skill in practical situations.

Learning outcomes relevant to competency level 9.1:

1. **Identifies the amount of matter in an object as its mass.**
2. **Selects the suitable unit from g and kg to measure a given mass.**
3. Expresses the relationship between g and kg.
4. Does conversions of units; g ⇔ kg.
5. Adds masses involving g and kg.
6. Subtracts masses involving g and kg.
7. Uses appropriate units to measure mass in daily activities.

Glossary of Terms

Mass	-	ස්කන්ධය	-	திணிவு
Matter	-	පදාර්ථය	-	சடத்துவம்
Units	-	ඒකක	-	அலகு

Instructions to plan the lesson:

A exemplar lesson plan based on the lecture-discussion method and games to develop and establish the subject concepts related to learning outcomes 1 and 2 is given below.

Time: 40 minutes

Quality Inputs:

- Several 1 kg, 2 kg, 1g, 5g, 10g, 100g and 500g weights
- A box labeled kg
- A box labeled g
- The video with a vision of an astronaut
- Sets of different coloured cards with the following written on them (Each group should be given cards of the same colour)
- Mass of a bag of rice
- Mass of a child
- Mass of a toy car
- Mass of a bar of soap
- Mass of a pen
- Mass of a vehicle
- Mass of a packet of biscuits
- Mass of a block of wood
- Copies of the activity sheet for students
- Cards with stars to distribute to the students

Instructions for the teacher:

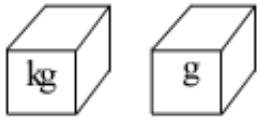
Approach:

- Start the lesson by recalling the phrase 'the weight of an elephant'.
- Discuss with the students about 'weight' which was studied in grade 5 and about instances when items are weighed for daily needs. Highlight the fact that the items that are brought from the market are of varying amounts and that these amounts are weighed before they are brought home.
- Give the students the opportunity to observe that there are children of different weights in the class. Explain the need to measure the amounts of various items and the fact that there are different units to measure these amounts.

Developing the lesson:

- Discuss with the students the fact that solids, liquids and gases all consist of matter, that the amount of matter in different substances is different and that the quantity 'mass' is used as the measure of the amount of matter in a substance.
- Discuss about the items of less mass and the items of greater mass. Explain to students that solids, liquids and gases all have masses.
- Instruct the students to prepare lists containing items of large mass and items of small mass.
- Ask the students whether 500g of iron and 500g of cotton weigh the same amount and carry out a discussion about it.
- Show a video of an astronaut walking on the moon and explain that the mass of the man on the earth and on the moon is the same.
- Show the 2kg, 1kg, 500g, 100g, 50g, 10g, 5g and 1g weights to the students and discuss about their masses.

- Divide the class into groups of 5 – 6 students.
- Engage the students in this group activity in the form of a game to discover and strengthen their knowledge of the fact that the unit of mass that needs to be used will depend on the magnitude of the item that is being measured.
- Place the empty box labeled kg and the empty box labeled g on the teacher's table.



- Give each group a set of cards of the same colour.
- Give each group a copy of the activity sheet for students.
- After all the groups complete the activity, collect the cards and check their accuracy and discuss the reasons for them.
- Give 1 mark for each correct response and select the best group.
- Encourage the students by giving three stars to each student in the best group, two stars each to the students in the next best group and a star each to the students in the third best group.
- After the students complete the game, lead a discussion and highlight the following facts
  - The mass of an object is a measure of the amount of matter the object consists of.
  - Either kg or g should be selected as the unit of mass depending on the amount that is being measured.

Activity sheet for the students:

- Decide which unit is suitable to measure the mass of the items on the cards you received.
- Drop each of the cards into the suitable box from the two boxes, the kg box and the g box placed on the teacher's desk.
- Complete the task correctly and as quickly as possible by working as a team.
  (Marks will be given for the right answers and the three best groups will be selected based on the marks)

Assessment and Evaluation:

- Assessment Criteria
  - Accepts that the unit should be selected depending on the mass that is being measured.
  - Identifies the masses that have to be measured using g and those that have to be measured using kg.
  - Selects the correct unit.
  - Explains the reasons for selecting a particular unit.
  - Works in cooperation and completes the task actively and efficiently.
- Direct the students to do the relevant exercises in lesson 20 of the textbook.

For your attention…

Development of the lesson:

- Plan suitable methods to achieve the learning outcomes 3, 4, 5, 6 and 7 and implement them.

Assessment and Evaluation:

- Direct the students to the relevant exercises in lesson 20 of the textbook.

Practical Use:

- Using the following examples explain that measurements of mass are often used in day to day life.
  - Bringing home items from the market
  - Mass of a child at birth
  - Mass lifted at a weight lifting competition
  - The mass that can be carried by a vehicle.

For further study:

21. Ratios

Competency 4 **:** Uses ratios to facilitate day to day activities.

Competency Level 4.1: Makes connections between quantities.

Number of Periods **:** 06

Introduction:
A ratio can be considered as a comparison of the relative amounts of two quantities. Here the two quantities under consideration have to be in the same units.
The ratio of *a* to *b* is usually denoted by *a* : *b*. This means that, when the amount of the first quantity is *a*, then the amount of the second quantity is *b*. This is usually expressed in words as the ratio of *a* to *b*.
In this section the concept of ratios will be introduced and how a ratio which is equivalent to another ratio is found as well as how a ratio is written in its simplest form will be learnt. The application of rates in simple transactions as well as other practical situations will also be discussed.

Learning outcomes relevant to competency level 4.1:

1. **Describes the concept of a ratio of two quantities.**
2. Finds ratios which are equivalent to a given ratio.
3. Writes a ratio in its simplest form.
4. Uses rates in simple transactions and other practical situations.

Glossary of Terms

Quantities	-	රාශි	-	கணியங்கள்
Ratio	-	අනුපාතය	-	விகிதம்
Simplest form	-	සරල ම ආකාරය	-	எளிய வடிவம்
Rates	-	අනුපාතික	-	வீதங்கள்

Instructions to plan the lesson:

The aim of this lesson is to guide students towards achieving learning outcome 1 by approaching the lesson through a discussion and then developing the subject concepts via a game.

Time: 40 minutes

Quality Inputs:

- Bristol boards
- Pieces of cardboard on which the following sentences have been written

Sentences:

- When making a cement mixture it is necessary to mix 1 pan of cement with 6 pans of sand.
- It is necessary to mix 3 tablespoons of sugar with 9 tablespoons of milk powder when making a jug of milk.
- One litre of water is required to dilute 3 litres of a certain type of paint.
- The price of two loaves of bread is Rs. 140.
- To prepare one litre of drink, 400 ml of fruit juice and 600 ml of water was required.
- Ajith took 2 hours to finish reading a book which Amith took 3 hours to complete.
- 4 men can dig a well in two days.
- 4 eggs are required to make a cake with 500g of flour.
- Rs. 2.50 has been charged per minute for mobile phone call.

(About 25 to 30 such sentences should be prepared. Include some sentences which do not involve ratios)

Instructions for the teacher:

Approach:

- Approach the lesson by mentioning examples from day to day life which involve ratios.
- Give the students also an opportunity to provide examples of ratios and carry out a discussion about them.

Developing the lesson:

- Introduce a ratio as a relationship between two quantities and explain the related subject concepts by providing examples and discussing them.
- Engage the students in the following game to further enhance their understanding of the subject concepts.
- Select a cardboard piece with a sentence containing a ratio as described in the quality inputs and explain how the information in the sentence can be expressed as a ratio.
- Stand the students in a row, one behind the other, either in the classroom or outdoors.
- One by one, display the cardboard pieces with the sentences written on them which were prepared beforehand.
- Explain how the information in the sentence can be expressed as a ratio, if such information is contained in the sentence, and also how the game is played.
- Instruct the students to take a step to the left if the information in the sentence on the displayed piece of cardboard **can be** expressed as a ratio, and **if not**, to take a step to the right.

- Put out from the game the students to give the wrong answer.
- Introduce the students who remain till the end as the winners.
- Group the students and distribute the cardboard pieces with the sentences which can be expressed as ratios among them so that each group gets 4 to 5 cardboard pieces.
- Direct the students to write the ratios represented on the cardboard pieces using the notation for ratios.
- Discuss the accuracy of the answers provided by the groups.

Assessment and Evaluation:

- Assessment Criteria
  - Correctly selects the sentences that can be expressed as ratios.
  - Using the notation for ratios, writes the relationship between the quantities which has been expressed in a sentence.
  - Gives reasons why a given sentence can or cannot be written as a ratio.
  - Works cooperatively within the group.
  - Presents the work clearly.
- Direct the students to do the relevant exercises in lesson 21 of the textbook.

For your attention…

Development of the lesson:

- Discuss with the students how ratios which are equivalent to a given ratio are found.
- Use a suitable method to discuss how a ratio is represented in its simplest form.
- Prepare a suitable lesson plan for the learning outcome '**Uses rates in simple transactions and other practical situations**' and implement it.

Assessment and Evaluation:

- Direct the students to the relevant exercises in lesson 21 of the textbook.

For further study:

- http://www.youtube.com/watch?v=b-6pqRnm2b8
- http://www.youtube.com/watch?v=Vx5uoZAkxng
- http://www.youtube.com/watch?v=tOd2T72eJME
- http://www.youtube.com/watch?v=MaMk6-f3T9k

For the teacher

It is believed that the concept of 'ratios', like many other mathematical concepts comes from the ancient Greek civilization. The word ratio means 'reason' or 'rational' in Latin. Rational numbers are represented in the form $\frac{p}{q}$. Accordingly, it is clear that a ratio too can be expressed as a rational number (fraction). Later, Pythagoras developed the concepts of ratio and proportion and used them with numbers.

22. Data Collection and Representation

Competency 28 : Facilitates daily work by investigating the various methods of representing data.

Competency Level 28.1: Finds convenient methods of collecting and representing data.

Number of Periods :

Introduction:
In day to day life we use various types of data to obtain information. The aim of introducing this section is to give students an understanding of how to collect such data and note it down.

Learning outcomes relevant to competency level 28.1:

1. **Uses tally marks as a method of collecting data.**
2. **Collects data of no more than five groups and less than 100 data points, using tally marks.**
3. Represents data using tables.
4. Represents data using picture graphs. (Including when $\frac{1}{2}$, $\frac{1}{4}$ of a picture is used)

Glossary of Terms

Data collection	-	දත්ත රැස් කිරීම	-	தரவுகளைச் சேகரித்தல்
Tally mark	-	ප්‍රගණන ලකුණ	-	வரவுக்குறி
Data representation	-	දත්ත නිරූපණය	-	தரவுகளை வகைகுறித்தல்

Instructions to plan the lesson:

A exemplar lesson plan based on the lecture-discussion method to develop the subject concepts relevant to the learning outcomes 1 and 2 under competency level 28.1 and an individual activity to develop the skills of collecting data consisting of no more than 5 types and less than 100 values using tally marks is given below.

Time: 40 minutes

Quality Inputs:
- Cards with pictures of various types of vehicles (about 30 cards of at least 5 types)

Instructions for the teacher:

Approach:

- Recall what was learnt in grade 5 regarding representing data in tables and column graphs.
- Recall how in grade 5, "/ " was used to represent one data point when collecting data. Explain that this is called a tally mark.

Developing the lesson:

- Get the students to copy the table given below and explain to them that they have to obtain the number of vehicles of each type that is shown.

Type of vehicle	Tally Marks	Number of vehicles

- Display the vehicles on the cards from time to time. (The number of times the cards are displayed can be decided based on the number of available cards. The same card can be displayed more than once)
- Observe how the students are noting down the information while you are displaying the cards.
- On an occasion when one type has been displayed more than 5 times, observe how the students have noted this down and explain that since it is difficult to count the number when several tally marks "/" are written in a row, to overcome this, the tally marks are separated into groups of 5 and written as 𝍸
- Explain that the reason why the scores are separated into groups of 5 and written as 𝍸 is because the scores 4, 3, 2 and 1 which are less than 5 can easily be counted. Explain that if the scores were separated into groups of 10 as 𝍸𝍸, counting the scores such as 9, 8 and 7 which are less than 10 would be difficult. Thereby explain the importance of separating the scores into groups of 5 and denoting each group by 𝍸 .
- Again display the cards and allow the students to continue collecting information.
- After displaying the cards let them write down the number of vehicles of each type that were shown by considering the tally marks.
- After the students have completed the table develop the lesson by explaining on which occasions tally marks should be used to collect data.

  Important:
- Instead of types of vehicles, types of fruits or vegetables etc also may be used.
- This activity would be more successful if the students could be taken close to a road way and allowed to count the actual numbers of different types of vehicles that pass.

Assessment and Evaluation:

- Assessment Criteria
  - Gathers data using tally marks.
  - Values the importance of representing tally marks in groups of five.
  - Explains the necessity of using tally marks.
  - Completes the table by writing the number that is represented by tally marks using digits.
  - Engages in the activity with enthusiasm.
- Direct the students to do the relevant exercises in lesson 22 of the textbook.

For your attention…

Development of the lesson:

- Plan and implement a suitable activity to develop the skill of representing the information obtained using tally marks in a table.
- Plan and implement a suitable activity to develop the skill of representing the information that has been represented in a table by picture graphs. Here, direct the students to do the following.
  - Select a suitable picture to represent the data
  - Ensure that all the pictures are of the same size
  - Direct the students to select examples where $\frac{1}{2}$ a picture and $\frac{1}{4}$ of a picture need to be used.

Assessment and Evaluation:

- Direct the students to the relevant exercises in lesson 22 of the textbook.

For further study:

23. Data Interpretation

Competency 29 **:** Makes predictions after analyzing data by various methods to facilitate daily activities.

Competency Level 29.1: Interprets data represented using various methods.

Number of Periods **:** 05

Introduction:
The aim of competency level 29.1 is to develop in students the skill of interpreting data that is represented in a table or a picture graph. The aim of this lesson is to help students achieve the first learning outcome which is **'Interprets the data represented in tables**'.
When reading the data in a table or a picture graph, it is important to first identify how the data has been represented. For example, for a picture graph it is importance to identify the key. Once this is done, the data can easily be interpreted.

Learning outcomes relevant to competency level 28.1:

1. Interprets data represented in tables.
2. Interprets data represented using picture graphs

Glossary of Terms

Data	-	දත්ත	-	தரவு
Interpretation	-	අර්ථකථනය	-	விளக்கமளித்தல்
Picture graphs	-	චිත්‍ර ප්‍රස්තාර	-	படவரைபு
Collection	-	රැස් කිරීම	-	சேர்த்தல்
Representation	-	නිරූපණය	-	வகைகுறித்தல்
Tables	-	වගු	-	அட்டவணை

Instructions to plan the lesson:

The aim of this lesson is to develop in students the skill of interpreting data which has been represented in tables which is the first learning outcome under competency level 29.1. A specimen lesson plan to develop the above subject concepts using the lecture-discussion method and to further establish these concepts through a group activity is given below.

Time: 40 minutes

Quality Inputs:

- Several tables obtained from newspapers, notices and magazines
- Copies of the activity sheet for students (one for each group)
- An enlarged table of the following form which includes a column for the days of the week and another column to mark the attendance

Day	Attendance		
	Males	Females	Total
Monday Tuesday Wednesday Thursday Friday			

- Marker pens

Instructions for the teacher:

Approach:

- Display the tables obtained from the newspapers, notices and magazines in front of the class.
- With the aid of the above tables, conduct a discussion with the students regarding using tables to represent information.

Developing the lesson:

- Display the enlarged table to mark the attendance of students during the days of a week.
- In this table, include the information regarding the attendance of the students during the previous week.
- Ask the students the following questions regarding the table and lead a discussion
  - How many students were present on each of the days?
  - On which day was the attendance the highest?
  - On which day was the attendance the lowest?
  - On which day was the attendance of the boys the highest?
  - On which day was the attendance of the girls the highest?
  - What is the difference between the number present on the day with the highest attendance and the number present on the day with the lowest attendance?
- Instruct the students to do the following activity.
- Divide the class in a suitable manner into groups and give each group a copy of the activity sheet for students.
- Instruct the groups to carefully observe the table in the activity sheet and then to answer the given questions.

- Give the groups the opportunity to present their findings to the class.
- Based on their findings review what was learnt and highlight the following facts
  - The communication of information is facilitated by using tables.
  - Since certain information is given in tables in newspapers, notices and magazines, readers an easily interpret the given information.

Activity sheet for the students:

Study the given table carefully and answer the questions that have been asked.

Method of travelling to school	Number of students
Bus	20
School van	15
Walking	06
Personal vehicle	05

1. How many students travel to school by bus?
2. How many students walk to school?
3. What is the mode of transport used by the most number of students?
4. What is the mode of transport used by the least number of students?
5. What is the difference between the number of students who travel by bus and the number that walk to school?
6. How many students in total are represented in the table?

Assessment and Evaluation:

- Assessment Criteria
  - Identifies and describes the information in a table.
  - Is inclined to compare information.
  - Accepts that tables facilitate the communication of information.
  - Interprets data given in a table.
  - Engages in the activity in cooperation while exchanging ideas with each other.
- Direct the students to do the relevant exercises in lesson 23 of the textbook.

Practical use:

- Discuss the following situations where the data in a table which has been interpreted is used practically.
  1. Information of a large population can be presented easily in a table.
  2. Information on the results of a sporting event or a quiz can be obtained easily and quickly when it is presented in a table.

For your attention…

Development of the lesson:

- Prepare a suitable lesson plan to achieve the learning outcome 2 under competency level 29.1.

Assessment and Evaluation:

- Direct the students to the relevant exercises in lesson 23 of the textbook.

For further study:

- http://www.youtube.com/watch?v=4QX-tMRR0TE
- http://www.youtube.com/watch?v=XxmS_7I6c7Y

24. Indices

Competency 6 : Uses logarithms and calculators to easily solve problems in day to day life.

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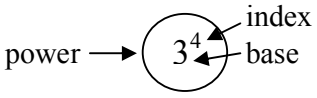
Competency Level 6.1: Makes connections between numbers and powers to facilitate representation.

Number of Periods : 04

Introduction:
The aim of this section is to introduce the index notation and to show how a whole number is written as a power as well as how the value of a power is found by expansion.
Accordingly, 81 can be expanded and written as $3 \times 3 \times 3 \times 3$ as well as condensed and written as 3^4.
This is expressed as **three to the power four**. The index, base and power are indicated as follows



Similarly, 5^2 expanded and written is 5×5 and 5×5 or 25 condensed is 5^2.

Learning outcomes relevant to competency level 6.1:

1. **Identifies the index notation and uses it.**
2. **Writes as a power, a number which can be written as a power of a whole number.**
3. **Expands a power and writes its value.**

Glossary of Terms

Index (Exponent)	-	දර්ශකය	- சுட்டி
Power	-	බලය	- வலு
Base	-	පාදය	- அடி
Factor	-	සාධකය	- காரணி
Index notation	-	දර්ශක අංකනය	- சுட்டிக் குறிப்பீடு
Expansion	-	ප්‍රසාරණය	- விரிவு
Condense	-	හකුළුවා ලිවීම	- சுருக்கம்

Instructions to plan the lesson:

The aim of this section is to develop the subject concepts related to the learning outcomes 1, 2 and 3 under competency level 6.1. A exemplar lesson plan which uses the lecture-discussion method to introduce the index notation and to develop the skills of writing a whole number as a power as well as of finding the value of a power by expanding it, and an activity to establish these subject concepts in students is given here.

Time: 80 minutes

Quality Inputs:

- Copies of the activity sheet for students
- Demy papers
- Sets of 20 cards each (mentioned under 'Instructions for the teacher')

Instructions for the teacher:

Approach:

- Place a chart similar to the one given below on the blackboard or display a poster of it and enter into a discussion with the students. Through the discussion highlight the importance of condensing and writing products similar to those given below, considering the difficulty of writing the terms repeatedly.

  2
  2×2
  $2 \times 2 \times 2$
  $2 \times 2 \times 2 \times 2$

Developing the lesson:

- Ask the students how 16 can be written as a product of its factors and list them in the following manner on the blackboard/whiteboard.

  2×8
  4×4
  $2 \times 2 \times 4$
  $2 \times 2 \times 2 \times 2$

- Discuss the fact that the above products of factors can be condensed and written and note them down as follows.

  $4 \times 4 = 4^2$
  $2 \times 2 \times 2 \times 2 = 2^4$
  $2 \times 2 \times 4 = 2^2 \times 4$
  $2 \times 8 = 2^1 \times 8^1$

- Mention that 4^2, 2^4, 2^2, 4^1, 2^1 and 8^1 are defined as **powers.**
  Note down on the board how the above powers are read out.
  4^2 – four to the power two
  2^4 – two to the power four
  2^1 – two to the power one
  2^2 – two to the power two
- Discuss how the numbers which are condensed and written, for example as 2^4 or 3^2, are expanded and written, as well as how their values are found, and then write the following expansions on the board.
  $2^4 = 2 \times 2 \times 2 \times 2 = 16$
  $3^2 = 3 \times 3 = 9$
- Engage the students in the following activity to further establish the subject concepts.

8	$2 \times 2 \times 2$	2^3	two to the power three
25	5×5	5^2	five to the power two
32	$2 \times 2 \times 2 \times 2 \times 2$	2^5	two to the power five
27	$3 \times 3 \times 3$	3^3	three to the power three
16	4×4	4^2	four to the power two

- Get copies of the above table sufficient for the groups and cut each table into 20 parts, and give each group the 20 pieces cut out from one table.
- Give each group a copy of the activity sheet for the students.
- At the end of the activity, recall what was learnt about the index notation, how to write a whole number as a power and how to find the value by expanding a power.

Activity sheet for the students:

- From the cards you received, organize the cards that contain whole numbers on the table, one below the other.
- Place each of the cards which contains the expansion of the whole number to the right of it.
- In the same manner, select the card with the number written as a power as well as the card with the power written in words and place them also to the right of the card.
- On the demy paper, copy the cards in the same order that you placed them on the table and note down the base and the index of each power.
- Present your work to the class

Assessment and Evaluation:

- Assessment Criteria
  - Condenses and writes as a power, a number which has been written as a repeated product of a number
  - Accepts that it is easier to write a number as a power than as a repeated product.
  - Identifies the index and the base of a power.
  - Calculates the value of a number which is represented as a power.
  - Works in cooperation within the group.
- Direct the students to do the relevant exercises in lesson 24 of the textbook.

For further reading:

- http://www.youtube.com/watch?v=XZRQhkii0h0
- http://www.teachmathematics.net/page/3067//visualising-indices

25. Area

Competency 8 **:** Makes use of a limited space in an optimal manner by investigating the area.

Competency Level 8.1: Investigates the area of rectilinear plane figures.

Number of Periods **:** 05

Introduction:
The amount of surface enclosed within a given boundary is considered as the area of the bounded region. Although the surface area of various shapes can be discussed, in this grade only the area bounded by squares and rectangles will be considered. Although there are no instruments to measure the area, it can be calculated by defining a unit of area. The surface area of a shape is calculated by taking the area of a 1cm × 1cm square to be 1 cm^2. It is very important to establish the concept of area to achieve the competency of making use of a limited space in an optimal manner in day to day activities as well as when engaged in creating things.

Learning outcomes relevant to competency level 8.1:

1. **Identifies the extent of a bounded region as its area.**
2. **Measures the area using arbitrary units.**
3. **Recognizes cm^2 as a unit of measurement of area.**
4. Finds the areas of squares and rectangles using a 1cm × 1cm square grid.
5. Creates meaningful plane figures of given area using $1cm^2$ square laminas.

Glossary of Terms

Area	-	වර්ගඵලය	-	பரப்பளவு
Square Grid	-	සෙංචු ජාලය	-	சதுரச் சட்டகம்
Boundary	-	මායිම	-	எல்லை
Closed figures	-	සංවෘත රූප	-	மூடிய உருக்கள்
Plane figures	-	තල රූප	-	தள உருக்கள்
Space	-	ඉඩ ප්‍රමාණය	-	இடத்தின் அளவு

Instructions to plan the lesson:

A exemplar lesson plan to establish the subject concept of area related to learning outcomes 1, 2 and 3 and to develop the skill of measuring the area using arbitrary units is given here.

Time: 40 minutes

Quality Inputs:

- Four post cards of the same size
- Two square ruled pages from the exercise book, two papers with large square ruled used in primary classes, two 1cm × 1cm square grids drawn on a half sheet
- Copies of the activity sheet for students
- An enlarged copy of the chart of figures given in Annex 1

Instructions for the teacher:

Approach:

- Display the enlarged copy of the chart in Annex 1 in the classroom and ask the students to answer the question in it.
- Discuss their responses and conclusions and inform them of the properties of open figures, identical figures, rectilinear plane figures and curvilinear plane figures.
- Discuss the fact that closed plane figures can take different shapes and that their surfaces can be equal or unequal in size.

Developing the lesson:

- Supply quality inputs sufficient for all the groups.
- Give each group a copy of the activity sheet and the items mentioned in the following table.

Group	1	2	3	4
Item	•Post card •Square ruled paper •Paper with 1cm × 1cm square grid	•Post card •Square ruled paper •Paper with large square ruled used in primary classes	•Post card •Square ruled paper •Paper with large square ruled used in primary classes	•Post card •Square ruled paper •Paper with 1cm × 1cm square grid

- Engage the students in the activity.
- Get the students to present their findings, and then lead a discussion and highlight the following.
  - The amount of surface enclosed within the boundary of a closed plane figure is its area.
  - A plane surface cannot have different areas.
  - It is important to select a standard unit to measure areas.
  - The amount of surface bound by a 1cm × 1cm square is considered to be 1 cm^2

Activity sheet for the students:

- Copy the shape of the postcard onto the square ruled paper given to your group by placing it on the sheet of paper and tracing its outline.
- By counting them, find how many squares the surface bounded by the closed plane figure that you obtained by copying the shape of the postcard is.
- Copy the shape of the postcard onto the other square ruled sheet given to you and find out how many squares are enclosed within its boundary.
- Examine for which sheet of paper you obtained a greater number of squares.
- Discuss within the group why you obtained two different answers on the two occasions for the same postcard size.
- Prepare to present your findings.

Assessment and Evaluation:

- Assessment Criteria
  - Expresses the relationship between a figure being closed and the area.
  - Represents the surface that is bounded by a closed plane figure in terms of a certain number of squares.
  - Gives reasons why the answers obtained for the area of a figure differed when two distinct arbitrary units were used.
  - Accepts that a standard unit is necessary to measure the area of closed plane figures.
  - Works cordially and efficiently within the group.
- Direct the students to do the relevant exercises in lesson 25 of the textbook.

Practical Use:

- Discuss the concept of area and the measurement of area in practical situations by considering the following.
  - Placing items in the house according to the area there is.
  - Deciding on the number of tiles required to tile a floor.

For your attention…

Development of the lesson:

- For learning outcomes 4 and 5 give each group 1cm × 1cm square grids (printed on transparent sheets) and plane figures in the shapes of squares and rectangles (length and breadth measured in cm taking integral values) and get them to find the areas of the figures by counting the number of

squares that is bounded by the shapes. Direct the students to discover a method of finding the areas without counting squares.

- Direct the students to cut out 1cm × 1cm square laminas and use them to design a meaningful picture. Direct them to also draw different figures having the same area as well as to create figures using the Chinese tangram.

Assessment and Evaluation:

- Direct the students to the relevant exercise in lesson 25 of the textbook.

For further study:

Annex 1