Mathematics

Syllabus

2015

Standard Based

Papua New Guinea
Department of Education

Elementary

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Content

Secretary's Message

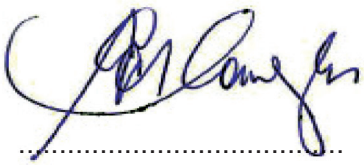
The Mathematics Syllabus is part of the new Standard Based Curriculum for Elementary schools in Papua New Guinea. This means that the study of Mathematics in Standard Based Curriculum is written to raise the standards of numeracy level in Papua New Guinea in comparison to the Pacific and elsewhere globally. Thus enhances the 21st Century changes and technological needs for individual's full participation and performance in society.

The standards stated in the Mathematics Syllabus describe what students should know, be able to do and achieve before they begin primary school. They are based on everyday Mathematics used in the community. Teachers are encouraged to use resources in the community to help in their teaching.

The teachers should plan their daily lessons well and use assessment methods and strategies for students to achieve the content standards.Teachers are required to use their understanding of concepts and make teaching and learning fun and enjoyable for their students.

English will be the medium of instruction to teach Mathematics and other subjects in all Elementary schools.

I commend and approve this Mathematics Syllabus to be used in all Elementary schools throughout Papua New Guinea.



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DR. UKE W KOMBRA, PhD
Acting Secretary for Education

Introduction

Standard based means that mathematics concepts within the content standards are processed through mathematical thinking and problem solving approaches and that the outputs are same in all mathematical understandings and applications for all students in Papua New Guinea.

The study of mathematics at elementary level enables the students to reason and communicate their decisions and are able to solve their everyday dealings. Students should learn to enjoy and value mathematics as they develop physically, they also grow to be confident and think analytically and use their understandings and appreciate the role of mathematics in their lives.

This standard based Mathematic syllabus describes the mathematics knowledge, skills and concepts that must be taught to all elementary students. They are organised under the four strands:

Strand 1: Number and Operation.

Strand 2: Quantities and Measurement.

Strand 3: Geometrical Figures and.

Strand 4: Data and Mathematical Relations.

The strands are expanded into topics consistent to progressive development and link from topic to topic for each level of mathematical thinking, understanding and application. A number of content standards are written for each topic and then expanded into performance standards and assessment tasks.

Teachers will use the content with the teacher guide and text books to plan and program their lessons to teach each grade.

By the end of Elementary 2, the results of tests and reports of assessable tasks must be recorded and compiled for each student achievement of the benchmarks set for each strand in elementary.

The minimum time for teaching mathematics will be 240 minutes per week for all three years of elementary schooling. The timetable can be flexible to allow for spontaneous learning experiences.

Rationale

All citizens have the right to participate in the future development of Papua New Guinea. For this reason students need to develop sound mathematical knowledge and skills and be able to confidently apply and use these to solve problems in their daily lives.

The Standard Based Elementary Mathematics Syllabus provides the foundation for future learning and focuses on logical reasoning, analytical thinking and problem solving skills. These proficiencies enable students to respond to familiar and unfamiliar situations by employing mathematical strategies to make informal decisions and solve problems effectively.

Students should enjoy learning and using mathematics in their everyday lives. Understanding mathematics will give them confidence to do things by themselves and for themselves. They will learn through play and exploring mathematics in their home environment.

The Task Force Report (2013) recommended a move to Standard Based Curriculum. The Report also recommended the use of text books and scripted lessons to raise standards of numeracy in teaching and learning of mathematics starting at elementary level.

Aims

The overall goal of the National Mathematics Curriculum is to ensure that all students will achieve a level of mastery of mathematics that will help them well in their lives, and for those who have the interest and ability to pursue mathematics at the highest levels.

The aims of this syllabus are for students to develop;

- sound foundation for further mathematical learning,
- confidence and creativity in applying mathematical skills of, communicating their ideas, investigation, using representations and interpret situations,
- understanding of mathematical concepts and fluency with processes and are able to reason and solve problems in all key learning areas of mathematics at elementary,
- mathematical thinking and problem solving abilities as a facility for the application of mathematics in everyday life,
- mathematical language to effectively and accurately understand mathematical processes and concepts to his/her appropriate level of development and ability,
- an appreciation and value mathematics as a very important role in their daily lives.

National benchmarks

Benchmarks are the national standards that all students must reach at the end of each level of their schooling.

The benchmarks are derived from the standards set at the end of the year for each level. These are at the end of Elementary 2, Grade 5, Grade 8, Grade 10 and Grade 12.

Schools must record and report students' achievements in all areas of learning. The Standards Officer must inspect the students' progress towards the achievement of the benchmarks and ensure all their reports are filed for future references.

National Benchmarks for Elementary Mathematics

At the end of Elementary 2 the students should achieve the national benchmarks for mathematics as set out below for each strand. They should at this level be well prepared for Junior Primary mathematics learning.

Strand 1: Number and Operation

The students should understand the meaning and representation of;

- 1-digit up to 4-digit numbers,
- simple fractions,
- add 1-digit up to 3-digit numbers,
- multiplication tables up to 9 x 9
- multiplication between 2-digit and 1-digit numbers in simple cases.

Strand 2: Quantities and Measurement

Students should develop experiences as the basis for learning Quantities and Measurement such as;

- compare length and area,
- use objects around them as units of measurement,
- compare sizes by considering how many such units they are,
- read clocks in the context of their daily life and about the meaning of standard units that are shared and measured by everyone,
- understand the units of length, centimeter *(cm),* and meter *(m),* units of volume, millilitre *(mL),* deciliter *(dL),* and liter *(L),* with units of time, day, hour, minute, and the relationship among them.

Strand 3: Geometrical Figures

The students should develop with enriched experiences that will form the basis;

- for understanding geometrical figures of recognizing shapes and grasp the characteristics of shapes,
- to focus on components of geometrical figures and understand geometrical figures such as triangles and quadrilaterals.

Strand 4: Data and Mathematical Relations

The student should;

- do addition and subtraction operations of algebraic expression and make their interpretations,
- represent numbers of objects by using pictures and diagrams and be able to interpret,
- represent and explain the mutual relationship between addition and subtraction, and algebraic expressions of multiplication and their interpretation,
- organize numbers and quantities from their everyday lives and represent them by using simple tables and graphs to interpret such representations.

Curriculum Principles

Our Way of Life

Cultural Relevance

The syllabus provides for the growth of our cultural identity through vernacular language skills and activities. It is through language that important aspects of our country's many cultures are transferred from one generation to the next and between people who live and work together but who originate from different cultures. Our cultures, and communities are at the very heart of the English Elementary curriculum as the language of instruction and as a subject.

Ethics, morals and values

Papua New Guinea National Curriculum Statement emphasises the process of socialization and interaction. Students will communicate their knowledge, skills, attitudes, spiritual and moral values in their communities. They will learn how to communicate for different audiences, purposes and situations. In Elementary, students will learn to use mathematics confidently in other subject areas.

Multiculturalism

As a multicultural society, we must promote and respect our cultures and languages. The diversity of our cultures is the source of our knowledge, skill, attitudes and Melanesian values. These values will be promoted and knowledge in language and literacy will enable students to share understanding of these with the rest of the world. In the same way, students will learn to exchange understanding from stories and knowledge from the past relating to their own communities and environment. In this way, multiculturism will be maintained and enjoyed while learning experiences will be enriched.

Integral human development

Papua New Guinea is a rapidly changing society and faces many challenges. To face these effectively, an individual must strive to reach their full potential socially, intellectually, emotionally, mentally and physically and work with other agents of education such as the Home, School and Community.

The Philosophy of Education for Papua New Guinea, known as the Matane Report, acknowledges the National Goals and Directive Principles in the National Constitution and is based on Integral Human Development.

- **Integral** in the sense that all aspects of a person are important.
- **Human** in the sense that social relationships are basic.
- **Development** in the sense that every individual has the potential to grow in knowledge, wisdom, understanding, skill and goodness.

Citizenship

Through working individually, in pairs or in small groups, the students will be guided on how to relate responsibly to others and to respect each other's opinions, talents, traditions and beliefs. Students will know that each citizen of Papua New Guinea has a role in the growth of their country and that Papua New Guinea herself belongs to a much larger global community.

Catering for diversity – gender

Gender is what it means to be a women or man. Gender refers to behaviours and attitudes that are accepted culturally as ways of being a woman, femineity and of being a man, masculinity. Gender is culturally determined. In Papua New Guinea there is a need for the local cultural practices and values with respect to traditional roles of females and males.

Catering for diversity – students with special needs

All students have the right to good teaching. Both boys and girls must be treated the same during lessons. Teachers must help all students to reach the standards in the syllabus. All students must be given the opportunity to achieve success.

Guiding Principles

Teaching

Effective mathematics teaching requires understanding what students know and need to learn and then challenging and supporting them to learn it well.
An effective mathematics teaching and learning program is based on careful thought and design of content. Teachers must prepare clear, specific and focused student centered lessons.
The sequence of topics and performances should be based on what is known about how students' mathematical knowledge, skills, and understanding is developed over time. This requires teachers who have a deep knowledge of mathematics and are able to draw on that knowledge with flexibility in their teaching task. Teachers must be supported with ample opportunities and resources to enhance and refresh their knowledge

Learning

Students must learn mathematics with understanding, activity building new knowledge from experience and previous knowledge. Mathematical ideas should be explored in ways that stimulate curiosity, create enjoyment of mathematics, and develop depth of understanding. Students learn best when we,

- Build new concepts on what is already known.
- Recognize an immediate use or need for what is to be learned.
- Use ideas and skills in a coordinated way to solve real problems.

Research has solidly established the important role of conceptual understanding in the learning of mathematics. By aligning factual knowledge and procedural proficiency with conceptual knowledge, students can become effective learners. They have to recognize the importance of reflecting on their thinking and learning from their mistakes. Students become competent and confident in their ability to tackle difficult problems and willing to preserver when task are challenge.

Students should be actively engaged in doing meaningful mathematics, discussing mathematical ideas, and applying mathematics in interesting, thought-provoking situations such asking close and open questions and set real life problems

Equity

Excellences in mathematics education require equity – high expectations and strong support for all students.

All students come to school with expectations to learn mathematics that meets their individual interest and need. All students must have the opportunity to learn and meet the same high – quality mathematical instruction.

The standards provide for a wide range of students, from those requiring special remedial support to those with talents in mathematics. Every student regardless of race, colour, gender and ability should have the benefit of quality instructional materials, good libraries, and adequate technology.

Flexibility and relevance

In Elementary the school hours will end at 2.30pm each day.

The curriculum and learning materials in standard based are also based on activities, stories, culture, beliefs and environment of the community.

Teachers need to be flexible in allowing time for spontaneous or unplanned learning experiences to take place any time during the school day.

Teachers should encourage students to take part in local activities to make the curriculum more interesting and relevant.

Content Overview

The content overview of mathematics is the description of what students will learn for each grade when they study the syllabus content. The statements of each strand summarises what students will study overall and should achieve in mathematics in Elementary grades.

Strand 1: Number and Operation

This strand consists of the content that describes the meaning, representation and skills of numbers such as integers, decimal numbers and fractions and methods of calculations. In this strand, the objectives are to understand the meaning and representation of 1-digit up to 4-digit numbers, introduction of unit as 10,000 and simple fractions.
In Operation, students add 1-digit up to 3-digit numbers and do multiplication up to 9 x 9, multiply between 2-digit and 1-digit numbers in simple case.
Acquiring operation skills include the activity to think about how to calculate. This is more than calculation itself. On this objective, students are able to use number and operation in their simple life.

Strand 2: Quantities and Measurement

In this strand, the main objective is to provide students with rich experiences that will become the basis for learning quantities and measurements such as comparing length, area, volume and use objects around them as units of measurement and compare sizes by considering how many such units there are. They should be able to, read clocks in context to their daily life and know the meaning of standard units that are shared by everyone and measurements using the standard units. They should learn how to produce units and understand units of length, centimetre (*cm*) and meter *(m)* and the units of volume, millilitter (*mL*), decilitre (*dL*) and litre (*L*). They should also know the units of time, day, hour, minute and their relationships. The activities to produce units and use the devices for their life become the base for further learning in primary level.

Strand 3: Geometrical Figures

This strand is about the meaning and properties of plane figures and solid figures and the structures of geometrical figures. This strand is very important as it links teaching by closely connecting, understanding of the meaning of numbers, quantities, and geometrical figures with activities such as calculations, measurement and composition. The main objective is to provide students with enriched experiences that will form the basis for understanding geometrical figures, recognise shapes, and grasp the characteristics of shapes, make students to focus on components of geometrical figures such as triangles and quadrilaterals. On this objective, they are able to use the figures and shapes in their life.

Strand 4: Data and Mathematical Relations

This strand involves ways of thinking and methods that can be commonly used in handling quantities and geometrical figures. In this strand, the main contents include ideas of functions such as change and correspondences, representation by algebraic expressions of multiplication and their interpretation, organising of numbers and quantities from their everyday lives, represent them by using simple tables and graphs and interpret such representations. Through their learning they are able to use these devices in their life and get necessary basic Numerary skills for their life and further learning.

Table of Strands and Topics

The table below outlines the strands and topics of the content and concepts. The topics are the headings of content knowledge using mathematical expressions to help teachers understand how to deal with them when they are expanded into content standards, performance standards and Assessment Tasks.

The topics for each strand are laid out in consistent to the progressive development and linkages from topic to topic from Elementary Prep to Elementary 2 and should show the same in primary and up each grade level.

This table will be used to review student's progress in mathematics learning and achievements and also used for teachers to do planning and programming.

Strand	Topics		
	Elementary Prep	**Elementary one**	**Elementary Two**
1. Number and Operation	Numbers up to 120 Base 10 place value Addition and subtraction of 1 and 2 digit numbers	Numbers up to 1000 Simple Fractions Addition and Subtraction of 2 and 3 digit numbers	Numbers up to 10000 Multiplication up to 2 digit numbers Addition, subtraction and multiplication problems
2. Quantities and Measurement	Arbitrary Units for Comparison Telling time	Units of Length Reading time	Units of Volume Time and Duration
3: Geometrical Figures	Making Shapes	Triangles and Quadrilaterals Shape of box	Exploring circle and sphere
4. Data and Mathematical Relations	Finding patterns Representing quantities	Rules of addition and subtraction Collecting and representing data	Exploring multiplication table

Content Standards

Content standards describe what all students should know and be able to do in Mathematics at Elementary level. The content standards show important mathematical knowledge, skills and attitudes that students should achieve in each strand at the end of each grade and prepares them for the next grade and level of learning.

The topics under each strand are covered within the content standards.

The table below shows the content standards of each strand across the Elementary grades; Elementary Prep, Elementary 1 and Elementary 2. Each content standard is coded as follows; *for example;* **P.1.2.**

- first number or letter shows the grade (P),
- second number shows the strand (1) and,
- the third number shows the content standard (2).

Strand 1: Number and Operation

Elementary Prep	Elementary One	Elementary Two
P.1.1 Find an easier representation for counting and comparing the numbers of concrete objects up to 120	**1.1.1** Understand the meaning and representations of numbers using place value by making 10 and 100 up to 1000	**2.1.1** Appreciate and use their understanding of representing, recognising, reading and writing of numbers up to 10,000 using base 10 place value
P.1.2 Depending on the context, distinguish the number of objects and their position in order of objects with numbers, and explain the condition carefully to the others	**1.1.2** Understand the use of relative size of numbers in various situations	**2.1.2** Understand the meaning of multiplication as repeated addition and represent it in various situations
P.1.3 Compare larger or smaller numbers on the number sequence and number line, and arrange in order	**1.1.3** Show and represent the meaning of half and quarter as equally divided part of a whole using pictorial or concrete objects	**2.1.3** Extend their understanding of addition, subtraction and multiplication to solve simple problems
P.1.4 Use their understanding of numbers to count objects by 10 as a unit for place value	**1.1.4** Extend their understanding of addition and subtraction to calculate 2 digit numbers	
P.1.5 Understand the meaning of addition and calculate 1 digit numbers and 2 simple digit numbers		
P.1.6 Understand the meaning of Subtraction and calculate 1 digit numbers and 2 simple digit numbers		

Strand 2: Quantities and Measurement

Elementary Prep	Elementary One	Elementary Two
P.2.1 Understand and compare quantities and produce arbitrary units of measurement **P.2.2** Read o'clock time in relation to long and short hand on the clock face	**1.2.1** Understand and compare length of objects using the units of measurement such as centimetre (*cm*) and metre *(m*) **1.2.2** Extend the understanding of standard units of measurement in length to add and subtract quantities of measurement using scale **1.2.3** Understand and set the units of time and duration in hours and days	**2.2.1** Understand and compare volume of liquids using the standard units of measurement for volume such as millilitre (*mL*), decilitre (*dL*) and Liter (*L*) **2.2.2** Use the scale on clock face to represent their daily activities and how long it takes

Strand 3: Geometrical Figures

Elementary Prep	Elementary One	Elementary Two
P.3.1 Understand the characteristics of geometrical figures through observation and composing using familiar shapes of objects	**1.3.1** Understand and investigate components of triangles and quadrilaterals as geometrical figures **1.3.2** Knowing boxes by the component of the faces and make a box	**2.3.1** Understand and investigate the common properties of sphere and circles as geometrical figures

Strand 4: Data and Mathematical Relations

Elementary Prep	Elementary One	Elementary Two
P.4.1 Find patterns and recognise their structure in addition and subtraction. **P.4.2** Explore and represent number of objects in form of picture and figures and interpret their patterns	**1.4.1** Apply using rules for inverse operation to calculate addition and subtraction **1.4.2** Understand and use simple tables and graphs to represent and compare various types of situations in everyday life	**2.4.1** Understand the structure of multiplication tables and use it for up to 9 x 9 multiplication table

Content Expansion

Content standards are expanded into performance standards and assessment tasks for each strand.

The plan of teaching the content expansion is organised into sections for each grade as follows;

- level/grade standard for each grade describes and sets the standard for what students should achieve from each strand by the end of the year,
- strand; gives key learning area for each specific mathematic content,
- topics; given headings for the contend standards.The topics for each strand may have one or more contend standards
- content standards contain knowledge, skills and attitudes and thinking concept that the teacher will use to plan lessons,
- performance standards are set of activities indicated with letters that students must know and are expected to demonstrate the proficiency at a specific level on the content standards. They will be used to create teaching and learning activities according to the text book or other resources in context,
- the Assessment Tasks must be used for **Assessment For, As and Of learning** when planning lessons for teaching and learning.

There are assessment tasks given for teachers to plan and assess to achieve the content standards with reference to activities taught from the performance standards.The above organisation helps to select the grade content that they should be teaching.

For example,

- Elementary Prep teacher will teach Elementary Prep content.
- Elementary 1 teacher will teach Elementary 1 content.
- Elementary 2 teacher will teach Elementary 2 content.

Elementary Prep

Grade Standard

By the end of Elementary Prep, students should obtain basic knowledge and skills taught in the four strands.

In **Number and Operation** students should understand the meaning and representation of numbers up to 2 - digit numbers. In calculation, addition and subtraction between two 1 - digit numbers. Acquire the skills of adding and subtracting accurately and reliably. Simple cases of sums and differences involving 2 - digit numbers.

In **Quantities and Measurements,** students acquire skills of how to directly compare length, area, and volume using arbitrary units to develop the foundation for learning units and measurements and how to tell time in their daily lives.

In **Geometrical Figures,** students should understand the shapes of objects in daily life, and both plane and solid figures to develop the foundation for learning geometrical figures.

In **Data and Mathematical Relations,** students acquire the skills of how to represent cases where addition and subtraction can be applied by using algebraic expressions, and understand how to represent the number of objects in diagrams or in pictures.

Strand 1. Number and Operation

Topic: Numbers up to 120

Content Standard	**P.1.1.** Find an easier representation for counting and comparing the numbers of concrete objects up to 120
Performance Standard	**a.** Make one-to-one correspondence between objects for comparison with clear ordering and lining of objects and confirm the result. **b.** Match and connect concrete object to represent the numbers up to 10. **c.** Group objects by composite and de-composite numbers up to 10. **d.** Use the place value to represent numbers with objects by 10. **e.** Counting by groups of 2, 5, and 10 up to 120.
Assessment Task(s)	**1.** In pairs use concrete objects to match number symbols and pictures. **2.** Fill in missing numbers on cards for given groups of concrete objects. **3.** Use concrete objects to make groups by 2, 5 and 10 and enjoy counting them. **4.** Use concrete objects and number cards to make and break numbers from 10 to 20 or more

Content Standard	**P.1.2** Depending on the context, distinguish the number of objects and their position in order of objects with numbers, and explain the condition carefully to the others.
Performance Standard	**a.** Say the amount of objects with quantity by the appropriate denomination such as 7 cups, 7 pencil and 7 eggs, not only just say 7. **b.** Say the appropriate position in relation to the first object of counting and counting direction/order such as from 1st to 7th.
Assessment Task(s)	**1.** Given picture cards count number of like items and say how many are there all together. **2.** Say the position of its number order from first to last.

Content Standard	**P.1.3** Compare larger or smaller numbers on the number sequence and number line, and arrange in order
Performance Standard	**a.** Line concrete objects from the view point of order of numbers. **b.** Line number cards from the view point of order of numbers. **c.** Compare the size of the numbers on number line.
Assessment Task(s)	**1.** Draw pictures to represent order of numbers. **2.** Line up the cards that have the same answer, *e.g.* 1 and 5, 3 and 3, 4 and 2 for same answer 6. **3.** Explain the number line using the starting point and unit of span. **4.** Compare the size by the fixed unit.

Topic: Base 10 place value

Content Standard	**P.1.4** Use their understanding of numbers to count objects by 10 as a unit for place value
Performance Standard	**a.** Skip count object by 2,5, 10 using objects. **b.** Use composite and de-composite such as 10 for making or breaking 10. **c.** Mark and count objects in sets of 10 up to 100. **d.** Represent values of numbers using various representations.
Assessment Task(s)	**1.** Memorize the two numbers to make 10. **2.** Solve the task for ones place and tens place. **3.** Count objects by 10 or 5 and say which ways of counting is good.

Topic: Addition and Subtraction of 1 and 2 digit numbers

Content Standard	**P.1.5** Understand the meaning of addition and calculate 1 digit numbers and 2 simple digit numbers
Performance Standard	**a.** Represent the meaning of addition as how many altogether or increase using various situations. **b.** Explore various ways to add 1 digit numbers without or with regrouping. **c.** Explore various ways to add 2 digit numbers without or with regrouping. **d.** Recognise and understand mathematical sentences, expressions and signs of additions.
Assessment Task(s)	**1.** Use various ways to add 1 and 2 digit numbers. **2.** Make addition maths story using given number sentence *e.g.* (6 +3=9) **3.** Solve addition problems.
Content Standard	**P.1.6** Understand the meaning of Subtraction and calculate 1 digit numbers and 2 simple digit numbers
Performance Standard	**a.** Represent the meaning of addition as take away or how many left using various situations. **b.** Explore various ways to subtract 1 digit numbers without or with regrouping. **c.** Explore various ways to subtract 2 digit numbers without regrouping. **d.** Recognise and understand mathematical sentences, expressions and signs of subtractions.
Assessment Task(s)	**1.** Use various ways to subtract 1 and 2 digit numbers. **2.** Make subtraction maths story using given number sentence *e.g.* (6 - 3 = 3) **3.** Solve subtraction problems.

Strand 2: Quantities and Measurement

Topic: Arbitrary Units for Comparison

Content Standard	**P.2.1** Understand and compare quantities and produce arbitrary units of measurement
Performance Standard	**a.** Describe measurable attributes such as length, volume and area and their uses in their lives. **b.** Use appropriate terms such as larger, smaller, longer and shorter in comparing objects. **c.** Use arbitrary units to compare and measure objects *e.g.* Hand span, pencil, and etc.
Assessment Task(s)	**1.** Given a problem on "how many objects are there altogether ? student should answer and say such as, "There are 7 dishes altogether" **2.** Use arbitrary units to measure length of objects, *e.g.* use pencil to measure the length of blackboard. **3.** Use arbitrary units to compare and measure volume of objects. **4.** Use arbitrary units to compare which unit is larger or smaller to measure width.

Topic: Telling time

Content Standard	**P.2.2** Read o'clock time in relation to long and short hand on the clock face**.**
Performance Standard	**a.** Tell time on the clock face using long hand and short hand.
Assessment Task	**1.** Tell o'clock time and indicate on the clock face.

Strand 3: Geometrical Figures

Topic: Making shapes

Content Standard	**P.3.1** Understand the characteristics of geometrical figures through observation and composing using familiar shapes of objects
Performance Standard	**a.** Compare, create, trace and compose shapes using common words. **b.** Understand and recognise geometrical figures in various representations of their characteristics as front and rear, right and left, above and below, move, slide, rotate and flip.
Assessment Task (s)	**1.** Use shapes to create other figures with enjoyment. **2.** Arrange colour pieces and create different shapes.

Strand 4: Data and Mathematical Relations

Topic: Finding patterns

Content Standard	**P.4.1** Find patterns and recognise their structure in addition and subtraction
Performance Standard	**a.** Order concrete objects with number sequence. **b.** Order cards with same answer in addition and subtraction and explain their representation using blocks to represent patterns. **c.** Use mathematical sentences to represent patterns.
Assessment Task(s)	**1.** Arrange addition and subtraction card and find beautiful patterns. **2.** Explain the number increase or decrease by one, say the answer on this card.

Topic: Representing quantities

Content Standard	**P.4.2** Explore and represent number of objects in form of pictures and figures and interpret their patterns
Performance Standard	**a.** Arrange blocks in number patterns and represent in drawing and show with arrow the increase and decrease. **b.** Collect and arrange picture cards such as their favourable food items and compare the quantity in numbers.
Assessment Task(s)	**1.** Arrange number cards from 1 to 10 and show which numbers are larger and use blocks to show increase by 1. **2.** Show order and position of numbers in given situation such as when students are standing in line. **3.** Sort picture cards of items and compare their quantity in numbers.

Elementary One

Grade standards

By the end of Elementary 1 the students should obtain basic knowledge and skills taught in the four strands.

At this grade the students have learnt knowledge and skills to progress and help them to learn the content that will be taught.

In **Number and Operation** students should understand the meaning and representation of larger numbers up to 1000 or more and be able to calculate accurately and reliably using 2-digit and 3-digit numbers in addition and subtraction. Recognise simple factions and their representations to become the foundation for learning fractions and be able to understand and obtain operation skills to use in their simple life.

In **Quantities and Measurements,** students should understand the units of length (*e.g*. meters) and their measurement and how to read time on a clock.

In **Geometrical Figures,** students should understand about triangles, quadrilaterals, squares, rectangles, and right triangles as plane figures, and the box as a solid figure.

In **Data and Mathematical Relations,** students should understand how to represent the relationship between addition and subtraction, and obtain basic knowledge and skills to represent data by using simple tables and graphs.

Strand1. Number and Operation

Topic: Numbers up to 1,000

Content Standard	**1.1.1** Understand the meaning and representations of numbers using place value by making 10 and 100 up to 1000
Performance Standard	**a.** Count and compare by grouping objects in sets of 2, 5, and 10 with enjoyment. **b.** Recognise and show position of numbers correctly using different strategies such as number line and number cards **c.** Know and use symbols, more than (>) and less than (<) to compare numbers. **d.** Count up to 1000, using base 10 system to understand the representations, value and order of numbers.
Assessment Task(s)	**1.** Use concrete objects to count large numbers in groups of 10. **2.** Write figures for the given number sentence such as 250 for two hundred and fifty. **3**. Show their understanding of number sequence by filling in missing numbers in sequence on a number line. **4.** Use < or > signs correctly by comparing given numbers on a number line such as 2< 3, or 3 >2.

Content Standard	**1.1.2** Understand the use of relative size of numbers in various situations.
Performance Standard	**a.** Count in units of 10, 100 and 1000. **b.** Use the units as base to count numbers in various ways *e.g.* 50 tens, 5 0ne hundreds. **c.** Use place value to increase and decrease numbers in various representation.
Assessment Task (s)	**1.** Count numbers in sets of tens and hundreds for given sets of objects such as 7 sets of 10 and 7 sets of 100. **2.** Calculate addition of vertical form for given situations *e.g.* 100+10, 120+10 and so on using place value. **3.** Calculate subtraction of vertical form for given situations *e.g.* 100-90, 120-25 and so on, using place value.

Topic: Simple Fractions

Content Standard	**1.1.3** Show and represent the meaning of half and quarter as equally divided part of a whole using pictorial or concrete objects
Performance Standard	**a.** Demonstrate by dividing a whole equally into halves.` **b.** Demonstrate by dividing a whole equally into quarters. **c.** Recognise numbers symbols for halves and quarters. *e.g* 1/2, 1/4
Assessment Task	**1.** Fold paper into halves and quarters.

Topic: Addition and Subtraction of 2 and 3 digit numbers

Content Standard	**1.1.4** Extend their understanding of addition and subtraction to calculate 2 digit numbers
Performance Standard	**a.** Explore the various ways of addition and subtraction of two-digit numbers, based on the learned representation and calculations. **b.** Use vertical form to add and subtract 2 and 3 digit numbers. **c.** Use tape diagram to explain addition and subtraction with 2 digit numbers.
Assessment Task(s)	**1.** Add and subtract using various ways to calculate. **2.** Add and subtract problems in vertical form. **3.** Add and subtract problems with 3 digit numbers.

Strand 2: Quantities and Measurement

Topic: Units of Length

Content Standard	**1.2.1** Understand and compare length of objects using the units of measurement such as centimetre *(cm)* and metre *(m)*
Performance Standard	**a.** Know and compare arbitrary units to standard units of measurement for length in centimetre and metre. **b.** Understand and recognise the scale on the ruler in centimetre and metre. **c.** Know how to measure with ruler, length of objects using centimetre and metre.
Assessment Task(s)	**1.** Explain the difficulty when we use different arbitrary units for comparing. **2.** Explain the necessity of smaller units or larger units. **3.** Use zero as starting point of measure and set destination point for measuring direction and read the measurement on the scale *e.g.* when measuring with ruler. **4.** Enjoy the activity of measuring using ruler.

Content Standard	**1.2.2** Extend the understanding of standard units of measurement in length to add and subtract quantities of measurement using scale
Performance Standard	**a.** Compare scale in centimetre and metre *e.g.* 2cm - 0cm = 2cm , 3 cm -1 cm = 2 cm, 4 cm - 2 cm = 2 cm, 5 cm - 3 cm = 2cm, 6cm - 4cm = 2 cm . **b.** Do addition and subtraction of quantity of measuring scales using the units of measurement for length in centimetre (*cm)* and metres (*m*). **c.** Change different units to same units for simple addition and subtraction and compare.
Assessment Task(s)	**1.** Knowing the difference on the scale using a metre. **2.** Add and subtract when the units are same. **3.** Change different units to same units, *e.g.* cm to m before adding and subtracting the quantities.

Topic: Reading time

Content Standard	**1.2.3** Understand and set the units of time and duration in hours and days
Performance Standard	**a.** Understand the clock face by 12 and 60 unit scale. **b.** Represent their daily activities and duration of activities using the clock face. **c.** Read time and duration as after and before using clock face.
Assessment Task(s)	**1.** Tell how long does it take to do activities in minutes and hours. **2.** Show on the clock face how long it took to do an activity.

Strand 3: Geometrical Figures

Topic: Triangles and Quadrilaterals

Content Standard	**1.3.1** Understand and investigate components of triangles and quadrilaterals as geometrical figures
Performance Standard	**a.** Recognise and compare squares and rectangles as quadrilaterals and right triangles as triangles. **b.** Explore and develop right angles using various representations.
Assessment Task(s)	**1.** Fold the paper to produce right angle and use it to find right angle. **2.** Using dotted paper, draw the quadrilateral or triangles to make beautiful patterns. **3.** Create different figures from using various representations such as paper, strings, sticks etc.

Topic: Shape of box

Content Standard	**1.3.2** Knowing boxes by the component of the faces and make a box
Performance Standard	**a.** Know the parts of a box such as faces, sides, edge and corner. **b.** Identify and describe the features of a box.
Assessment Task(s)	**1.** Follow steps of making a box correctly and make a box. **2.** Use different material to make a box *e.g.* strings, sticks, clay.

Strand 4: Data and Mathematical Relations

Topic: Rules of addition and subtraction

Content Standard	**1.4.1** Apply using rules for inverse operation to calculate addition and subtraction
Performance Standard	**a.** Understand the rule of addition for the same sum. **b.** Know the use of sum or difference in subtraction.
Assessment Task(s)	**1.** Add using a rule to find the same sum. **2.** Subtract using the rule to find the difference.

Topic: Collecting and representing data

Content Standard	**1.4.2** Understand and use simple tables and graphs to represent and compare various types of situations in everyday life.
Performance Standard	**a.** Collect data and represent on pictorial form. **b.** Read and understand table and pictorials and appreciate how useful they are in life. **c.** Use the rules in addition and subtraction.
Assessment Task	**1.** Given a situation such as favourite colours collect data to represent on table and picture graph.

Elementary Two

Grade standards

By the end of Elementary 2, the students should understand and obtain basic knowledge and skills taught in the four strands.

At this grade the students have learnt knowledge and skills to progress and help them to learn the content that will be taught.

In **Number and Operation,** students should understand the meaning and representation of larger numbers up to 10,000 or more and be able to calculate accurately and reliably.

Mastery of Multiplication table from 2 x table up to 9 x table. Calculate basic multiplication up to 2- digit numbers and simple cases of addition, and subtraction of 3-digit numbers and multiplication between 2- digit and 1- digit numbers.

In **Quantities and Measurements,** students should understand unit of volume (*e.g. litres*) and their measurement and be able to read time and duration.

In **Geometrical Figures**, students should understand circle and sphere and its characteristics.

In **Data and Mathematical Relations,** students should understand and obtain basic skills in cases where multiplication is applied by using algebraic expressions.

Strand 1. Number and Operation

Topic: Numbers up to 10,000

Content Standard	**2.1.1** Appreciate and use their understanding of representing, recognising, reading and writing of numbers up to 10,000 using base 10 place value
Performance Standard	**a.** Use base 10 system to represent, compare and order numbers up to 10,000. **b.** Recognise and write numbers in figures and words up to 10,000. **c.** Recognise and show position, order and value of numbers up to 10,000.
Assessment Task(s)	**1.** Show position and value of numbers using these sign < or > on number line. **2.** Write numbers in figures and words for selected numbers in dictation. **3.** Use the number card with 0,1,2,3 to see how many different numbers they can make and represent these on the number line.

Topic: Multiplication up to 2 digit numbers.

Content Standard	**2.1.2** Understand the meaning of multiplication as repeated addition and represent it in various situation
Performance Standard	**a.** Know situation where multiplication is used and its various ways of representation. **b.** Explain and demonstrate how to simplify the expression of adding the same number over and over (repeated addition). **c.** Explore how same numbers of objects are placed in each group to represent as total number.
Assessment Task(s)	**1.** Write multiplication table using sets of objects or pictures. **2.** Rewrite multiplication table by using flash cards. **3.** Use multiplication table to calculate multiplication and addition problems.

Topic: Addition, Subtraction and multiplication problems.

Content Standard	**2.1.3** Extend their understanding of addition, subtraction and multiplication to solve simple problems
Performance Standard	**a.** Use tape diagram to represent part –part and whole-part relationship in addition and subtraction representations. **b.** Divide objects into two and four parts equally using tape diagram and blocks in multiplication. **c.** Show different ideas of dividing equally.
Assessment Task(s)	**1.** Use tape diagram to explain addition and subtraction problem. **2.** Use tape diagram to explain multiplication as repeated addition. **3.** Solve multiplication problems.

Strand 2: Quantities and Measurement

Topic: Units of Volume

Content Standard	**2.2.1** Understand and compare volume of liquids using the standard units of measurement for volume such as millilitre (*mL*), decilitre (*dL*) and Liter (*L*)
Performance Standard	**a.** Compare the relationship between the arbitrary units to standard units of volume and the necessity of changing to standard unit. **b.** Use measuring cups to produce 1dL cup and 1L bucket of water with enjoyment. **c.** Show how to measure with different measuring cups using the standard units of volume (*mL, dL, L*). **d.** Compare measuring units of volume to measure units of length to understand their difference. **e.** Use addition and subtraction operation to calculate volumes of liquids in millitres, decilitres and litres problems.
Assessment Task(s)	**1.** Use 10 x 1dL cups to fill 1L bucket with water. **2.** Discuss the relationship between 1L, dL and mL **3**. Use Litre *(L)* and decilitre *(dL)* to calculate simple problem.

Topic: Time and Duration

Content Standard	**2.2.2** Use the scale on clock face to represent their daily activities and how long it takes.
Performance Standard	**a.** Read and write units of time and duration in hours and day. **b.** Read the time duration after or before the clock time.
Assessment Task(s)	**1.** Tell the time and duration for special events. **2.** Calculate the travel situation in PNG and find the difference of time on the clock face.

Strand 3: Geometrical Figures

Topic: Exploring circle and sphere

Content Standard	**2.3.1** Understand and investigate the common properties of sphere and circles as geometrical figures
Performance Standard	**a.** Identify the common properties of circles and sphere. **b.** Explore different ways of drawing circles. **c.** Using circles make different patterns and appreciate its beautifulness.
Assessment Task(s)	**1.** Use various instruments and draw circles to make patterns. **2.** Discuss and explain centre, radius and diameter on the circle drawn.

Strand 4: Data and Mathematical Relations

Topic: Exploring multiplication table

Content Standard	**2.4.1** Understand the structure of multiplication tables and use it for up to 9 x multiplication table
Performance Standard	**a.** Explore and find various patterns to produce the multiplication table. **b.** Use rules of multiplication in multiplication table to create patterns such as playing multiplication games.
Assessment Task(s)	**1.** Compare answers in rows and columns on the multiplication table. **2.** Play multiplication games. **3.** Fill in the blanks on the multiplication game number chart.

Assessment and Reporting

Assessment and Reporting Practices described for Standard Based Curriculum can be referenced to the National Assessment and Reporting Policy and other support materials produced by National Department of Education.

Assessment

Standards Based Assessment is a learning focused system and is an ongoing process of collecting and interpreting information about students achievements. It assumes that all students are capable of reaching a certain expectation and measure of learning. It also focuses on what students **know** and **are able to do**, at the same time assessment practices must identify areas where students need to improve.

Assessment is a collection of information for a purpose in relation to improve students learning and achievement. Those dealing with assessment should know the following:

- How do teachers collect information about the students?
- How do we collect information about the impact of the resources?
- We give test to collect written evidence but one evidence does not tell you everything.

Teachers must also use multiple assessment methods and strategies to provide sufficient evidence about students' progress and achievement in learning.

National benchmarking or end of term tests are examples of assessment of learning.

There are three focus areas of assessment in Standard Based Curriculum for Elementary include:

- Assessment ***as/in*** learning.
- Assessment ***for*** learning.
- Assessment ***of*** learning.

Assessment as/in learning

Assessment as/in learning means that students are involved in assessing their own progress and the work of other students in the class.

It is designed to inform students what they do well and what they need to improve on daily/weekly as integral part of everyday teaching and learning such as exercises, activities or experiments students do or practice each lesson. This method help teachers to identify those students who need extra help and those who need to be further challenged in their learning.

Teachers need to identify those students who need extra help and those who need to be further challenged in their learning.

Teachers identify learning problems as they arise so students can be given help straight away to improve their work. Normally referred to as formative assessment.

Assessment for learning

Assessment for learning is on-going assessment. It is the assessment that teachers do every day during their teaching and at the end of the lesson.

A common form of assessment for learning is “diagnostic assessment”.

- Diagnostic assessment measures a student’s current knowledge and skill for the purpose of identifying a suitable program of learning.
- Is generally carried out throughout a course or project. Also referred to as Formative assessment and is used to aid learning.
- In an educational setting, formative assessment might be a teacher (or peers group or the learner, providing feedback on a student’s work and would not necessarily be used for grading purposes.
- Can take the form diagnostic or standardized tests.

Assessment of learning

Assessment of learning is also called summative assessment.

It is designed to provide a summary of students learning over a set period of time and is generally carried out at the end of a course or project. It is typically used to assign students a course grade. It summaries student learning for a particular purpose such as;

- end of term or end of year reports,
- grade 2,8,10 or 12 certificates,
- for selection.

Recording

It is important for teachers to keep a record of student progress and problems they are having. They should use the progress chart to record student learning at the end of each year for reporting purposes.

Reporting

It is compulsory for teachers to;

- report student progress to parents at the end of each term,
- pass students records to the next teacher before next school year, begins,
- pass the student records to primary when they graduate from Elementary school.

Evaluation

Evaluation is when teacher reflects on their own teaching to improve the student learning, for example being able to find answers to the questions such as:

- Was the lesson effective?
- Did the student reach the expected standard?
- What did they write in their books?
- How can I improve my teaching?

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